South West Stouffville Expansion Area
5061 Stouffville Road
Functional Servicing and Stormwater Management Report

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Submission History

Submission	Date	In Support Of	Distributed To
1st	May 2025	Re-Zoning	Town of Whitchurch-Stouffville, TRCA, Times Group Corporation
2nd	May 2026	Re-Zoning	Town of Whitchurch-Stouffville, TRCA, Times Group Corporation
3rd	October 2026	Re-Zoning	Town of Whitchurch-Stouffville, TRCA, Times Group Corporation

1.0 Introduction

SCS Consulting Group Ltd. has been retained by Times Group Corporation to prepare a Functional Servicing and Stormwater Management (SWM) Report for a proposed residential development located at the south west corner of the intersection of Stouffville Road and Highway 48 in the Town of Whitchurch-Stouffville.

1.1 Purpose of the Report

The Functional Servicing and SWM Report (FSSR) has been prepared in support of a zoning by-law amendment application for the proposed development. The Site Plan is provided in **Appendix A**.

The purpose of this report is to demonstrate that the proposed development can be accommodated by the external storm, sanitary and water infrastructure and to establish servicing and grading expectations for the future Site Plan application in accordance with the Town of Whitchurch-Stouffville, TRCA, and the Ministry of Environment, Conservation and Parks (MECP) design criteria.

1.2 Study Area

The study area is currently comprised of agricultural and open space areas located within the upper basin of the Little Rouge River in the Town of Whitchurch-Stouffville. As shown on **Figure 1.1**, the study area is bound by:

- Stouffville Road to the north;
- Agricultural land to the south and west; and
- Highway 48 to the east.

The proposed development will be divided into the Phase 1 (Residential Buildings A, B, C & Daycare Building F located on West) and the Phase 2 (Buildings D & E located on East). As shown on **Table 1.2**, the west phase buildings include 689 units as well as daycare assumed at 80 p/ha for 2.86 ha. The east phase buildings include 643 units.

Table 1.2: Population Phasing Plan

Phase	Residential Population	Daycare (Assumed at 80 p/ha)	Total Population
Phase 1 (West)	1516	229	1745
Phase 2 (East)	1415	-	1415
Total	2931	229	3160

The development also includes two proposed 18.0 m municipal rights-of-way (Streets 'A' and 'B') which run along the south and west sides of the development, respectively. Street 'A' will consist of an urbanized section east of Street 'B' and a rural section west of Street 'B'. Street 'B' will consist of an urbanized section.

The study area is approximately 7.21 ha in size and includes municipal roads, SWM facilities, and a site plan with total area of 2.86 ha and a developable area of a 2.67 ha consisting of five (5) residential towers located on three (3) podiums, a daycare center, and private roadways (refer to the Site Plan in **Appendix A**). Access to the development is proposed from Stouffville Road.

1.3 Background Servicing Information

In preparation of the servicing and SWM strategies, the following design guidelines and standards were used:

- Design Guidelines and Standard Drawings, Town of Whitchurch-Stouffville (January 2023);
- Rouge River Watershed Hydrology Study Update, Wood Environment & Infrastructure Solutions (September 2018);
- Stormwater Management Criteria – Version 1.0, Toronto and Region Conservation Authority (August 2012);
- Low Impact Development Stormwater Management Planning and Design Guide, Toronto and Region Conservation Authority and Credit Valley Conservation (2010);
- Ministry of Environment, Conservation and Parks (MECP) Stormwater Management Planning and Design Manual (March 2003); and
- Ministry of Transportation (MTO) Drainage Management Manual (1997).

The site servicing and SWM strategies in this report are based on the following reports:

- Water Balance Calculations, DS Consultants Ltd., October 9, 2026 (**Appendix B**);
- Water Distribution Modelling Update, MES, September 29, 2026 (**Appendix F**);
- Preliminary Irrigation Water Consumption Calculation, Schollen & Company Inc., April 8, 2025 (**Appendix B**);
- Geotechnical Investigation Proposed Highrise Building 4721 & 5061 Stouffville Road Whitchurch-Stouffville, Ontario, DS Consultants Ltd., December 13, 2024 (**Appendix B**);
- Hydrogeological Investigation 4721 & 5061 Stouffville Rd Hwy 48 & Stouffville Road Development, Whitchurch-Stouffville, Ontario, DS Consultants Ltd., April 4, 2025 (**Appendix B**);

- Preliminary Subsurface Utility Engineering Investigation, Stouffville Expansion Area, 4Sight Utility Engineers, October 16, 2024 (**Appendix B**); and
- Sanitary Capacity Analysis Stouffville Road and Main Street, Whitchurch-Stouffville, Ontario, GEI Consultants Inc., September 30, 2026 (**Appendix B**).

The site servicing and SWM strategies are also based on the following approved Engineering Drawings:

- Stouffville Road Plan and Profile – STA 17+740 TO STA 18+040, prepared by Town of Stouffville, December 2008; and
- Stouffville Road Plan and Profile – STA 18+040 TO STA 18+340, prepared by Town of Stouffville, December 2008.

The above listed drawings have been included in **Appendix B.**

2.0 Storm Servicing

2.1 Existing Storm Sewer System

As indicated on the subsurface utility engineering investigation completed by 4Sight Utility Engineers (**Appendix B**), the sizes and locations of the existing storm sewers surrounding the site are:

- A 300 mm diameter PVC storm sewer on Stouffville Road flowing west to east;
- A 650 mm diameter PVC storm sewer on Stouffville Road flowing west to east;
- A 500 mm diameter Concrete storm sewer on Stouffville Road flowing west to east;
- An 800 mm diameter corrugated steel storm culvert on Highway 48 flowing west to east; and
- A 1200 mm diameter corrugated steel storm culvert on Highway 48 flowing west to east.

2.2 Proposed Storm Sewer System

The storm sewer system (minor system) within the proposed development (**Figure 2.1**) has been designed for the 5 year return period storm per the Municipality standards. The proposed municipal right-of-way (ROW) (major system) has been designed for the 100 year return period storm. The storm sewer system was designed in accordance with the Town of Whitchurch-Stouffville, Ontario Building Code, and MECP guidelines, including the following:

- Minor System Conveyance: 5 Year
- Major System Conveyance: 100 Year
- Time of Concentration: 10 minutes
- Minimum Pipe Size: 300 mm diameter
- Minimum Velocity: 0.75 m/s
- Maximum Velocity: 4.5 m/s
- Minimum Pipe Cover: 1.20 m (frost cover)

The exact size and location of the proposed municipal storm sewer system for the proposed development will be determined in support of the Site Plan application. The rainfall intensity will be calculated using the A, B, and C values listed in **Table 2.1**.

Table 2.1: Rainfall Intensity Parameters

Return Period Storm	A	B	C
2 Year	651.63	3.75	0.80
5 Year	1045.41	4.90	0.83
10 Year	1331.42	5.26	0.84
25 Year	1817.88	6.22	0.87
50 Year	1918.97	6.00	0.86
100 Year	2167.43	6.03	0.86

Street 'B' will have a 300 mm diameter PVC storm sewer which will drain south. Street 'A' will have a concrete storm sewer ranging from 525 mm to 1050 mm in diameter which will drain east and ultimately to the proposed stormwater management pond located southeast of Street 'A'.

Separate storm sewer service connections are proposed for each phase of the site plan block. Control maintenance holes for both phases of the site plan block are proposed along Street 'A' and will ultimately discharge to the proposed stormwater management pond (SWM Facility 2), as shown on **Figure 2.1**. There are no storm sewers proposed for the rural section of Street 'A', where the road runoff is proposed to drain to roadside ditches and be conveyed to the proposed dry pond (SWM Facility 1) on the south side of the road.

3.0 Stormwater Management

3.1 Stormwater Runoff Control Criteria

The following stormwater runoff control criteria have been established based on the greatest requirements of each of the design guidelines and standards listed in **Section 1.3**. The stormwater runoff criteria are summarized below in **Table 3.1**.

Table 3.1: Stormwater Runoff Control Criteria

Criteria	Control Measure
Quantity Control	Proposed flows are to be controlled to the Little Rouge – Upper Basin Unitary Discharge rates for the 2 through 100 year storm events (Rouge River Watershed Hydrology Study Update). Stormwater management facilities are to provide volumes equal to or greater than the Little Rouge – Upper Basin Unitary Storage volumes for the 2 through 100 year storm events (Rouge River Watershed Hydrology Study Update). Required on-site capture/retention of 15 mm/impervious ha (Rouge River Watershed Hydrology Study Update).
Quality Control	MECP Enhanced Level Protection (80% TSS Removal) (TRCA).
Erosion Control	For sites with SWM ponds, extended detention of the 25 mm event for a period of 48 hours may be required, depending on the results of an erosion assessment (TRCA).
Water Budget	Maintain existing groundwater recharge rates and appropriate distribution, ensuring the protection of related hydrology ecologic functions. Best efforts to retain 15 mm of rainfall over the impervious areas of the proposed development as specified in the Rouge River Watershed Hydrology Study Update.

3.2 Existing Drainage

Runoff from the majority of the existing lands (Catchment 102, 6.02 ha) drains east via overland flow to the Highway 48 ditch. The flows are then conveyed east under Highway 48 to a tributary of the Little Rouge River via an existing 800 mm diameter corrugated steel culvert located approximately 90 m south of Stouffville Road and an existing 1200 mm diameter corrugated steel culvert located approximately 220 m south of Stouffville Road.

Runoff from the remainder of the existing lands (Catchment 101, 0.54 ha and Catchment 103, 0.67 ha) drain southwest to a separate tributary of the Little Rouge River via overland flow. The Catchment 101 area represents the equivalent catchment that will be developed and controlled through the proposed SWM measures discussed in **Section 3.7**. The Catchment 101 area was used to determine the target release rate for the proposed SWM measures discharging to the west. Catchment 103 represents an area that will remain undeveloped and does not require SWM measures. Therefore, target release rates are not calculated for this catchment.

Refer to **Figure 3.1** for the Existing Storm Drainage Plan.

3.3 Existing Flood Storage

During the Regulatory (Regional Storm) flood event, the water surface elevations produced by the Little Rouge River tributary east of Highway 48 exceed the invert elevations of the existing Highway 48 culverts. This results in the conveyance of flow from east to west through the Highway 48 culverts and the temporary storage of flood volume within the subject property. The location and elevations of the culverts were confirmed in the field by R. Avis Surveying Inc. (R. Avis) in September 2024 (refer to **Appendix C**). The invert elevations of the 800 mm diameter culvert are consistent with the ground elevations recorded in the site topographic survey completed by R. Avis in September 2019 (**Appendix C**). An additional topographic survey was completed by R. Avis Surveying Inc. in November 2025 (**Appendix C**) to assess the area immediately upstream of the 1200 mm diameter culvert, which was regraded during the culvert installation works.

As advised by TRCA, the existing Little Rouge River Regulatory (Regional Storm) flood elevation is 254.75 m at the 800 mm diameter culvert. The flood elevation at the 1200 mm diameter culvert was determined to be 253.92 m, based on interpolation between bounding cross sections. Approximately 1,535 m^3 of flood volume storage is provided within the study area. Refer to **Figure 3.2** for the Existing Floodplain Mapping and **Appendix D** for flood storage volume calculations.

3.4 Allowable Release Rate

The allowable release rates for the proposed development have been established based on the Little Rouge – Upper Basin Unitary Discharge rates for the 2 through 100 year storm events. The total allowable unit release rates to the east and west outlets based on the sum of the unitary discharge rates for impervious and pervious areas are summarized in **Table 3.2** below. Refer to **Appendix D** for unitary discharge rate calculations.

Table 3.2: Summary of Little Rouge – Upper Basin Unitary Discharge Rates

Return Period Storm	West Outlet - Catchment 101 (L/s)	East Outlet - Catchment 102 (L/s)
2 Year	6	61
5 Year	8	90
10 Year	11	126
25 Year	13	140
50 Year	15	163
100 Year	17	191

The existing peak runoff rates for the subject lands for storms were determined through Visual OTTHYMO Version 6.2 (VO6) hydrology modelling. The hydrology modelling used the 6 hour AES and 12 hour AES storm distributions. Refer to **Appendix D** for the hydrology model and supporting calculations. A summary of existing runoff rates to the east and west outlets are provided in **Table 3.3** below.

Table 3.3: Summary of Existing Peak Runoff Rates

Return Period Storm	West Outlet – Catchment 101 6hr AES (L/s)	West Outlet - Catchment 101 12hr AES (L/s)	East Outlet – Catchment 102 6hr AES (L/s)	East Outlet – Catchment 102 12hr AES (L/s)
2 Year	12	9	79	78
5 Year	23	15	152	134
10 Year	30	20	209	177
25 Year	41	25	289	235
50 Year	49	30	354	281
100 Year	58	35	422	328

3.5 Stormwater Best Management Practices Selection

In accordance with the Ministry of Environment Stormwater Management Planning and Design Manual (2003), a review of stormwater management best practices was completed using a treatment train approach, which evaluated lot level, conveyance system and end-of-pipe alternatives. The potential best management practices were evaluated based on the stormwater management objectives listed in **Table 3.1**.

The following study area characteristics were taken into consideration:

- The topography is generally flat with smooth transitions between elevations;
- Based on the Geotechnical Investigation, study area soils consist of generally cohesive soils like clay, silt and till with some sand;

- Hydraulic conductivity values were determined via single well response tests and result in estimated native soil percolation rates of up to approximately 14 mm/hr;
- Within the installed site wells, groundwater was observed at depths ranging between 4.0 m below existing grade to 0.8 m above existing grade;
- The proposed residential development is approximately 2.67 ha and consists of high intensity development; and
- The study area drains both east and west to tributaries of the Little Rouge River.

The following are examples of lot-level, conveyance and end-of-pipe controls that will be evaluated for use in the proposed development. While evaluating the following controls, cost, feasibility, groundwater and grading constraints will be taken into consideration.

Lot-Level Controls

Lot-level controls are at-source measures that reduce runoff prior to stormwater entering the conveyance system, such as:

- Increased topsoil depth;
- Amended topsoil;
- Roof leaders to grassed areas;
- At-source storage (i.e. rooftop or parking lot storage);
- Pervious pavements;
- Infiltration trenches/soak-away pits.

Conveyance Controls

Conveyance controls provide treatment of stormwater during the transport of runoff from individual lots to the receiving watercourse or end-of-pipe facility. Examples of conveyance controls include:

- Grassed Swales; and
- Pervious pipe system.

End-of-Pipe Controls

End-of-pipe stormwater management facilities receive stormwater flows from a conveyance system (i.e., storm sewers or ditches) and provide treatment of stormwater prior to discharging flows to the receiving watercourse. Typical end-of-pipe controls include:

- Wet ponds;
- Wetlands;

- Dry ponds;
- Infiltration basins; and
- Underground storage.

A comprehensive assessment of LID practices will be provided in support of the Site Plan Approval application. It is noted that the development consists of high-density blocks, an undeveloped block, and municipal roads. It is also noted the proposed development contains areas with high groundwater levels. Therefore, LIDs will be limited to areas where sufficient clearance to seasonal high groundwater elevations can be provided to support infiltration.

3.6 Proposed Flood Storage

In order to facilitate the proposed development, grading within the existing Regulatory (Regional Storm) flood backwater storage area is required. A flood storage compensation area is proposed to provide an equivalent flood storage volume to the existing conditions in the post-development scenario. The proposed flood compensation area provides a storage volume of 1,577 m^3 which is greater than the existing flood storage volume of 1,535 m^3. The proposed infiltration facility discussed in **Section 3.7.3** will be located outside the floodplain and will not contribute to the proposed flood compensation area. Refer to **Figure 3.4** for the Proposed Floodplain Mapping and **Appendix D** for flood storage volume calculations.

3.7 Proposed Storm Drainage

The proposed major and minor system flow patterns and drainage areas are shown on **Figure 3.3**.

Runoff from Catchment 201 will be conveyed to proposed SWM Facility 1 (dry pond) via overland flow through the proposed rural ROW ditches.

Catchment 202 is comprised of the proposed SWM Facility 1 area. Runoff from the catchment will be conveyed via overland flow directly to the proposed facility. SWM Facility 1 will discharge through a 75 mm diameter orifice plate controlling flow to acceptable release rates with outflows draining overland, ultimately to the tributary of the Little Rouge.

Catchment 203 will remain undeveloped and will continue to drain to south and west via overland flow and under the proposed rural road via a culvert discharging directly to the SWM Facility 1 outfall.

The remainder of the site, Catchments 301 to 307, will drain to the proposed SWM Facility 2 (wet pond) via a combination of overland flow and proposed storm sewers. Prior to discharging to proposed SWM Facility 2. A portion of the runoff from Catchments 304 and 305 will be captured and retained in storage tanks within the

proposed underground parking structure to be used for landscape irrigation. Catchment 306 represents an existing external area that will drain into the proposed SWM Facility 2 via overland flow based on the existing topography. Foundation drainage from the proposed site plan will also discharge to SWM Facility 2 via the proposed storm sewer system. The maximum short-term condition (temporary construction dewatering) foundation drainage rate (0.375 L/s) has been accounted for in the hydrology modelling as the dry weather flow from Catchment 305 (NHYD305). Refer to **Section 8.0** for detailed discussion of the groundwater discharge.

3.7.1 Quantity Control

In accordance with the Rouge River Hydrology Update, in addition to target release rates based on the existing drainage area, the detention volumes required for active storage in all storm events are provided through unitary storage values. Proposed release rates and required storage volumes were calculated using VO6. As noted in **Table 3.1**, where the Little Rouge River unitary discharge rates conflict with the minimum allowable outlet orifice size, proposed peak flows will be assessed against the existing peak runoff rates for the 2 through 100 year storm events. Relevant calculations are provided in **Appendix D**.

The proposed 100 year release rate from the site to the west outlet will be controlled via a 75 mm diameter orifice (minimum orifice size recommended by MECP) at an elevation of 256.72 m. To accommodate the controlled release rate, a dry pond (SWM Facility 1) is proposed at the south west corner of the site and is shown on **Figure 3.5**. The dry pond will provide the required 100 year storage volume of 158 m^3. A summary of proposed peak release rates from SWM Facility 1 is provided in **Table 3.4** and a summary of proposed storage volumes for SWM Facility 1 is provided in **Table 3.5**.

Table 3.4: Summary of SWM Facility 1 Peak Release Rates

Return Period Storm	Little Rouge Unitary Discharge Rate (L/s)	Existing 6hr AES Runoff Rate (L/s)	Existing 12hr AES Runoff Rate (L/s)	Proposed 6hr AES Release Rate (L/s)	Proposed 12hr AES Release Rate (L/s)
2 Year	6	12	9	6	6
5 Year	8	23	15	7	7
10 Year	11	30	20	7	7
25 Year	13	41	25	8	8
50 Year	15	49	30	8	8
100 Year	17	58	35	9	9

Table 3.5: Summary of SWM Facility 1 Storage Volumes

Return Period Storm	Little Rouge Total Required Storage (m^3)	Proposed 6hr AES Storage Volume (m^3)	Proposed 12hr AES Storage Volume (m^3)
2 Year	225	29	27
5 Year	240	56	51
10 Year	255	79	71
25 Year	270	109	98
50 Year	285	134	121
100 Year	300	158	145

The proposed SWM Facility 1 release rates are equal to or less than the target release rates set by the Little Rouge River Unitary Discharge Rates with the implementation of the minimum allowable orifice size. In addition, as shown in **Table 3.4**, the proposed release rates are less than the existing release rates for all return period storm events and storm distributions. As shown in **Table 3.5**, the proposed SWM Facility 1 does not meet the required unitary storage volumes required for each design storm, however, the facility has the capacity (574 m^3) to detain the required storage volume prior to uncontrolled flow occurring. Based on the hydrology modelling the actual required storage volumes are less than the prescribed unitary storage requirements. Refer to **Appendix D-3** for total SWM Facility 1 storage calculations.

The proposed 100 year release rate from the site to the east outlet will be controlled via an 80 mm diameter orifice at an elevation of 254.85 m and a 300 mm orifice at an elevation of 255.65 m. To accommodate the controlled release rate, a wet pond (SWM Facility 2) is proposed at the south east corner of the site and is shown on **Figure 3.6**. The wet pond will provide a total 100 year storage volume of 3,207 m^3. A summary of proposed peak release rates from SWM Facility 2 is provided in **Table 3.6**: Summary of SWM Facility 2 Peak Release Rates and a summary of proposed storage volumes for SWM Facility 2 is provided in **Table 3.7**.

Table 3.6: Summary of SWM Facility 2 Peak Release Rates

Return Period Storm	Little Rouge Unitary Discharge Rate (L/s)	Existing 6hr AES Runoff Rate (L/s)	Existing 12hr AES Runoff Rate (L/s)	Proposed 6hr AES Release Rate (L/s)	Proposed 12hr AES Release Rate (L/s)
2 Year	61	79	78	8	8
5 Year	90	152	134	9	10
10 Year	126	209	177	10	11
25 Year	140	289	235	11	12
50 Year	163	354	281	12	15
100 Year	191	422	328	18	26

Table 3.7: Summary of SWM Facility 2 Storage Volumes

Return Period Storm	Little Rouge Total Required Storage (m^3)	Proposed 6hr AES Storage Volume (m^3)	Proposed 12hr AES Storage Volume (m^3)
2 Year	2,124	1,078	1,237
5 Year	2,265	1,560	1,739
10 Year	2,407	1,903	2,096
25 Year	2,549	2,354	2,562
50 Year	2,690	2,703	2,908
100 Year	2,832	3,019	3,187

As shown in **Table 3.6**, the proposed release rates are less than the target Little Rouge River Unitary Discharge Rates and existing peak runoff rates for all return period storm events and storm distributions. As shown in **Table 3.7**, the proposed SWM Facility 2 does not meet the required unitary storage volumes required for every design storm, however, the facility has the capacity (5,054 m^3) to detain the required storage volume prior to uncontrolled flow occurring. Based on the hydrology modelling the actual required storage volumes are less than the prescribed unitary storage requirements. Refer to **Appendix D-3** for total SWM Facility 2 storage calculations.

Due to the relatively small drainage areas to the SWM facilities the unitary release rates produce stringent allowable release rates. If at detailed design release rates are unattainable with the standard orifice sizes defined by MECP alternative criteria (such as post to pre) will be evaluated in consultation with TRCA.

3.7.2 Quality Control

Runoff from Catchment 201 will receive quality control treatment via LIDs in the rural road ditches sized to provide MECP Enhanced Level Protection (80% TSS Removal) quality control. Catchments 202 and 203 will remain as pervious surfaces and therefore contribute only clean runoff to the west outlet.

Runoff from Catchments 301 to 307 will receive quantity control treatment via the proposed end-of-pipe wet SWM pond (SWM Facility 2) which will provide MECP Enhanced Level Protection (80% TSS Removal) quality control. The function of the permanent pool is to provide sediment removal from storm runoff conveyed to the facility. The required permanent pool is 787 m^3 based on the total developed area of 6.31 ha draining to the pond. The SWM pond is designed to provide a permanent pool volume of 1,397 m^3 (refer to calculations in **Appendix D**).

3.7.3 Erosion Control

Per the Rouge River Watershed Hydrology Study Update, on-site capture or retention of 15 mm/impervious ha is required for areas draining to a tributary of the Rouge River.

The required retention volume of 424.8 m^3 for the east portion of the site is proposed to be provided through a combination of greenroofs, infiltration/filtration trenches, underground storage tanks for on-site water reuse, and an end-of-pipe infiltration facility adjacent the proposed flood storage compensation area. The greenroof is expected to retain a volume of 15.6 m^3 and the water reuse tanks are sized to retain 56.5 m^3. The end-of-pipe bioretention facility is proposed to consist of a 0.30 m deep engineered soil layer and will provide a retention volume of 352.7 m^3. The total combined retention volume is 468.5 m^3 which satisfies the required retention volume. The required retention volume of 36.1 m^3 for the west portion of the site is proposed to be provided through the implementation of infiltration/filtration trenches within the ditches of the rural ROW. Refer to **Figure 3.7** for proposed retention measure locations.

The proposed wet pond (SWM Facility 2) is sized to provide extended detention of a 25 mm rainfall event for the contributing areas from Catchments 301 to 307. The extended detention volume is 758 m^3, with a release rate of 0.007 m^3/s. The extended detention drawdown time is approximately 51.3 hours.

The proposed dry pond (SWM Facility 1) is sized to provide extended detention of a 25 mm rainfall event for the contributing areas from Catchments 201 and 202. The extended detention volume is 81 m^3, greater than the required 41 m^3 for erosion control, with a release rate of 0.007 m^3/s. The extended detention drawdown time is approximately 4.0 hours using the minimum orifice size of 75 mm diameter as a best-effort approach.

Refer to **Appendix D** for erosion control and retention calculations.

3.7.4 Water Balance

A water balance assessment was completed by DS Consultants Ltd. to assess that changes in infiltration volume from the existing condition to the proposed condition. Under existing conditions, the total annual infiltration volume was determined to be approximately 13,843 m^3/yr. Without mitigation measures, the proposed condition results in a total annual infiltration volume of approximately 6,968 m^3/yr, which represents an annual infiltration deficit of 6,875 m^3/yr. With the inclusion of proposed LIDs, the mitigated post-development annual infiltration volume is 23,455 m^3/yr, which represents 169% of the existing condition annual infiltration volume. Refer to **Figure 3.7** for potential LID locations. Refer to **Appendix B** for water balance calculations and **Appendix D** for preliminary LID calculations.

4.0 Sanitary Servicing

4.1 Existing Sanitary Sewer System

As indicated in the preliminary site servicing figure (**Figure 4.1**), the sizes and locations of the existing sanitary sewers on and surrounding the site are:

- A 200 mm diameter PVC sanitary sewer on Stouffville Road flowing east.

The existing sanitary sewer system adjacent to the site was not originally sized to accommodate the proposed development.

4.2 Proposed Sanitary Sewer System

To accommodate the sanitary discharge from the proposed development, the existing 200 mm diameter PVC sanitary sewer along Stouffville Road will be upgraded to a 600 mm diameter sanitary sewer. The upgraded 600 mm diameter sanitary sewer will have sufficient capacity for the proposed development based on a sanitary capacity analysis completed by GEI Consultant, dated January 23, 2026 (see **Appendix B**). The detailed design of the sanitary sewer upgrades is being carried out through a separate planning application.

300 mm diameter municipal sanitary sewers are proposed under Street ‘A’ and ‘B’ to service the site plan block (phase 1 and phase 2). This 300 mm diameter sanitary sewer will connect to the upgraded 600 mm diameter sanitary sewer on Stouffville Road at the intersection with Street ‘B’. The proposed sanitary sewer will have 4.9 m of cover at the proposed connection on Stouffville Road, which is sufficient to service the proposed development.

Separate sanitary sewer service connections are proposed for each phase of the site plan block. Control maintenance holes for both phases of the site plan block are proposed along Street ‘A’.

The sanitary sewers within the site and proposed municipal right-of-way will have slopes ranging between 0.5% and 2% (typically) and will be provided at 3 m to 5 m deep. The sanitary sewer system will be designed in accordance with the Town of Stouffville and MECP criteria, including but not limited to:

- Residential Sanitary Generation Rate: 350 L/cap/day
- Residential Population Density:
  - 3.2 persons/unit (Single-family)
  - 2.9 persons/unit (Townhouse)
  - 2.2 persons/unit (Apartment)
- Peaking Factor: Harmon’s Equation (Max = 4.0, Min = 2.0)
- Infiltration Rate: 0.23 L/s/ha

- Minimum Pipe Size: 200 mm diameter
- Minimum Pipe Cover: 2.80 m (between road centerline and sewer obvert)
- Minimum Full Flowing Velocity: 0.60 m/s
- Maximum Velocity: 3.00 m/s

Based on the design criteria mentioned above, **Table 4.2** below shows the peak flow rate generated for each phase.

Table 4.2: Sanitary Peak Flow Rate

Phase	Residential Population	Institutional Population	Total Population	Peak Flow Rate (L/s)
Phase 1 (West)	1511	229	1740	26.6
Phase 2 (East)	1426	-	1426	21.6

Design sheet which shows calculation of sanitary peak flow rate for each phase has been provided on **Appendix E.**

The detailed design of the proposed municipal sanitary sewer system and associated sanitary service connections for the proposed site plan block will be determined through the future Site Plan Application.

5.0 Water Supply and Distribution

5.1 Existing Water Distribution

As indicated in the preliminary water distribution plan (**Figure 5.1**), the following existing watermain is located adjacent to the site:

- A municipal 400 mm diameter PVC watermain on the north side of Stouffville Road.

The development is located in the Stouffville Zone 2 pressure district, with water supplied from McCowan Road Reservoir. A hydrant flow test was completed on October 18, 2024 to determine existing flows and pressures for the Stouffville Road watermain (see MES Watermain Analysis in **Appendix F**).

5.2 Proposed Water System

Water supply for the proposed development will be provided from the existing 400 mm diameter watermain on Stouffville Road. Water supply for the site plan block will be from the proposed 300 mm diameter PVC watermain on Streets 'A' and 'B' and proposed 200 mm PVC watermain within the Street 'A' cul-de-sac. Phase 2 will require a secondary fire connection from the proposed 300 mm diameter PVC watermain on Street 'B', since the proposed buildings are over 84 metres tall. The secondary fire connection will be built during the development of the West phase which is to be constructed first.

The proposed municipal water distribution system will be designed in accordance with the City of Toronto and MECP criteria, including but not limited to the following:

- Domestic Water Consumption Rate: 350 L/cap/day
- Peaking Factors:
  - Maximum Day = 2.0
  - Maximum Hour (PM) = 3.0
  - Maximum Hour (AM) = 3.0
  - Minimum Hour = 0.7
- Residential Population Density:
  - 3.2 persons/unit (Single-family)
  - 2.9 persons/unit (Townhouse)
  - 2.2 persons/unit (Apartments)
- Minimum Pipe Size: 150 mm diameter
- Minimum Fire Flow: 7,000 L/min
- Minimum Pipe Cover: 1.80 m
- Maximum Hydrant Spacing:
  - 120 m (Single-family)
  - 90 m (townhouse and high-rise)

A Water Distribution Analysis was completed by Municipal Engineering Solutions (MES) (**Appendix F**). According to the analysis, the maximum daily and peak hourly demand for the proposed development is 25.54 L/s and 38.31 L/s respectively.

Per the Town of Whitchurch-Stouffville design guideline, the general fire flow requirement is 150 L/s for apartment and 175 L/s for institutional.

The municipal watermain on Stouffville Road is sufficient to service the proposed development when Zone 2 Elevated Tank operates at 50% capacity as Max Day + Fire Flows range from 178 to 237 L/s at 20 psi. However, when Zone 2 pumps are off in addition to Zone 2 Elevated Tank operating at 50% capacity as worst case scenario, Max Day + Fire Flows range from 164 to 218 L/s at 20 psi which is slightly less than the 175L/s generally required by the Town's design guideline for institutional. Further discussion with the Town will be required to determine if the current fire flow is satisfactory for the proposed development. It is recommended to conduct new hydrant flow test while no pump is running to accurately predict the available fire flow.

It is acknowledged that servicing allocation is provided by York Region to the Town of Whitchurch Stouffville, for provision to individual applications.

6.0 Grading

6.1 Existing Grading Conditions

The site generally drains from the west to the east towards the King's Highway 48. The existing topography has slopes in the range of 0.50% to 5%. The ground surface elevations through the study area range from approximately 259.50 m in the northwest corner to approximately 254.25 m in the southeast corner.

6.2 Proposed Grading Concept

In general, the proposed development has been graded in a manner which satisfies the following goals:

Satisfy the Town of Stouffville lot and road grading criteria, create required depth for sanitary sewer, as well as provision of an efficient earthworks program, including:

- Minimum Road Grade: 0.5%
- Maximum Road Grade: 6.0%
- Minimum Lot Grade: 2%
- Maximum Lot Grade: 5%
- Minimum Driveway Grade: 2%
- Maximum Driveway Grade: 8%
- Minimize the need for retaining walls
- Minimize the volume of earth to be moved and minimize cut/fill differentials
- Minimize the need for rear lot catchbasins
- Achieve the stormwater management objectives required for the proposed development.

A preliminary grading plan is provided on **Figure 6.1**. A retaining wall is proposed along the north and east limits of the site, with a maximum height of 3.81m at the northeast corner. Further details will be provided at the Draft Plan and Site Plan application stages.

At the detailed design stage, the preliminary grading shown on **Figure 6.1** will be subject to a more in-depth analysis in an attempt to balance the cut and fill volumes and minimize slopes and retaining walls.

7.0 Rights-of-Way and Sidewalks

The proposed 18.0 m ROW will be in accordance to the Town of Stouffville standards (see **Appendix G**).

An intersection is proposed with existing Stouffville Road from the proposed municipal ROW.

The proposed sidewalk location is provided on **Figure 7.1**. For the areas where sidewalk will be provided along one side of the street, sidewalks will be typically be located on north or east side of the boulevard or the boulevard side where the larger number of frontages can be serviced.

8.0 Groundwater Discharge

A Hydrogeological Assessment was prepared by DS Consultant Ltd. to address concerns relating to temporary and permanent groundwater discharge for the proposed development.

The report indicates that for the short-term condition (i.e: temporary construction dewatering), the maximum groundwater discharge rate is estimated to be 126,000 L/day (1.46 L/s). The dewatering rate is not expected to exceed 400,000 L/day, therefore, a Permit to Take Water (PTTW) is not required. The permanent dewatering requirement is 49,000 L/day (0.57 L/s) per the Hydrogeological Investigation (April 2025) by DS Consultants LTD.

The groundwater discharge from temporary construction dewatering is proposed to be discharged to the proposed municipal storm sewer on Street ‘A’. Based on stormwater calculations, the proposed SWM Facility 2 can accommodate the temporary dewatering rate.

Dewatering activities for both short-term and long-term groundwater discharge will be under the Town of Stouffville’s Sewer Use Bylaw as the groundwater will be discharged to the storm sewer on proposed municipal street. The long-term groundwater discharge rate has been taken into account in the stormwater management calculation.

The expected peak pump rate for construction dewatering will be calculated by the dewatering consultant at a later date prior to construction.

9.0 Erosion and Sediment Control During Construction

Erosion and sediment control measures will be designed and may include temporary sediment control fencing, a construction access driveway, check dams and temporary sediment control facilities where required. These measures will be designed and constructed as per the “Erosion and Sediment Control Guide for Urban Construction” document (TRCA, 2019). The detailed erosion and sediment control plan will be approved by the Municipality prior to any site alteration being undertaken. The plan will address phasing, inspection and monitoring aspects of erosion and sediment control. All reasonable measures will be taken to ensure sediment loading to the adjacent properties and storm sewers is minimized both during and following construction.

10.0 Summary

This Functional Servicing and Stormwater Management Report has outlined the means by which:

- The proposed development can be serviced with a combination of the proposed municipal services and proposed upgrades to the municipal services (i.e. sanitary and water within Stouffville Road and storm culverts under Highway 48);
- The stormwater management criteria can be achieved; and
- The proposed development can be graded in a manner which satisfies the Town of Whitchurch-Stouffville grading criteria and the stormwater management requirements for this development.

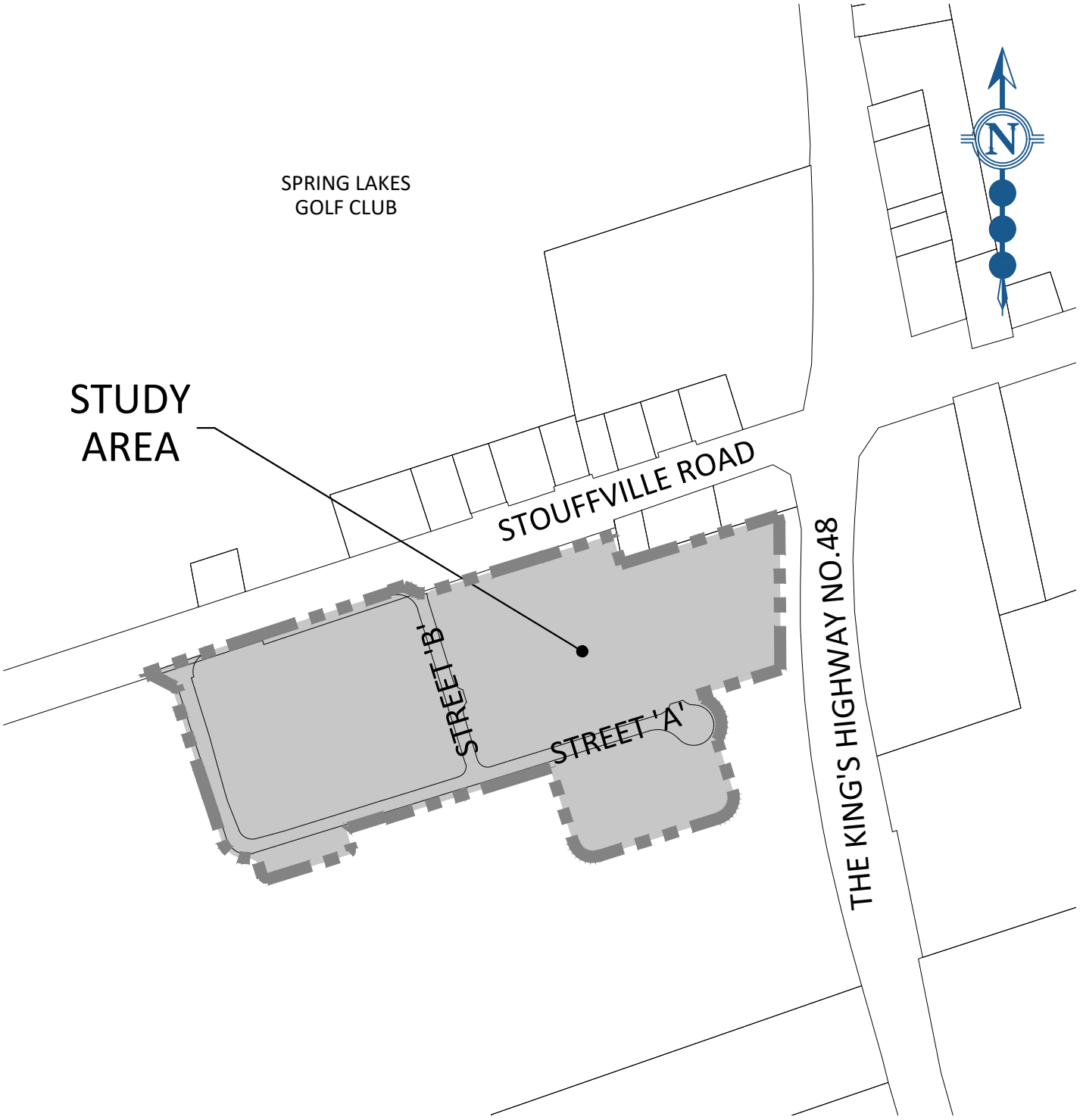
Respectfully Submitted

SCS Consulting Group Ltd.



Justin Salvucci, P.Eng.
jsalvucci@scsconsultinggroup.com

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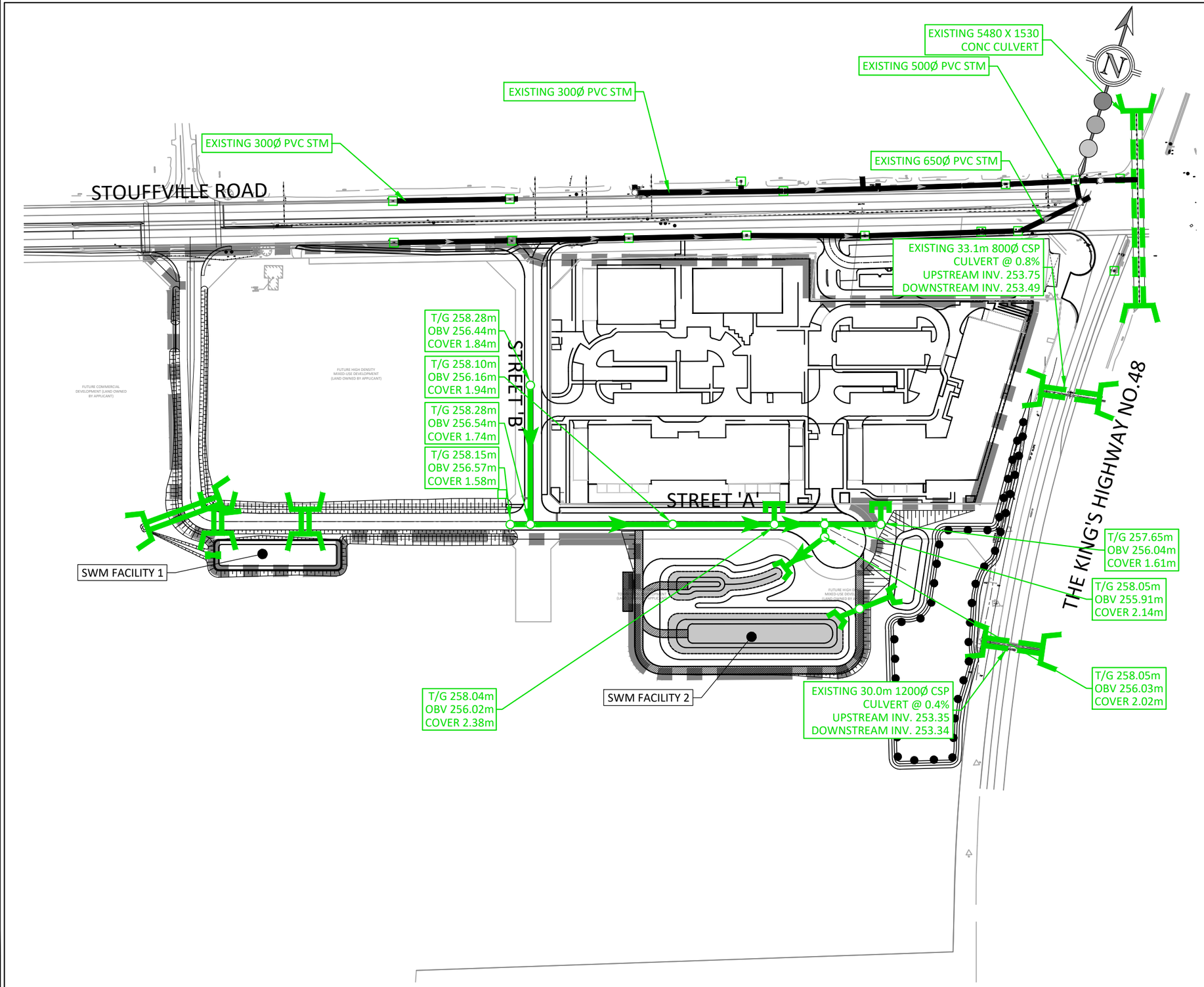
SCS consulting group ltd
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MARKHAM, ON L3R 8B8
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F (905) 475-8335

5061 STOUFFVILLE ROAD

SITE LOCATION PLAN

DESIGNED BY:	J.N.	CHECKED BY:	J.A.S.	PROJECT No:	FIGURE No:
SCALE:	N.T.S.	DATE:	SEPTEMBER 2026	2234	1.1

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LEGEND:

- LIMIT OF DEVELOPMENT
- STORM SEWER AND MAINTENANCE HOLE
- EXISTING STORM SEWER AND MAINTENANCE HOLE
- CULVERT
- EXISTING CULVERT
- CATCHBASIN
- STORM SEWER PLUG
- PROPOSED REGIONAL FLOODLINE

*NOTE: LAYOUT IS SCHEMATIC ONLY, DETAILS TO BE PROVIDED AT DETAILED DESIGN STAGE.

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5061 STOUFFVILLE ROAD

PROPOSED STORM SERVICING PLAN

DESIGNED BY:	J.A.S.	CHECKED BY:	E.T.C.K.
SCALE:	1:2000	DATE:	SEPTEMBER 2026
PROJECT No:	2234	FIGURE No:	2.1

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EXISTING 5480 X 1530
CONC CULVERT

EXISTING 500Ø PVC STM

EXISTING 650Ø PVC STM

EXISTING 300Ø PVC STM

EXISTING 300Ø PVC STM

STOUFFVILLE ROAD

EXISTING 33.1m 800Ø CSP
CULVERT @ 0.8%
UPSTREAM INV. 253.75
DOWNSTREAM INV. 253.49

0.67ha
103 | 0%

6.02ha
102 | 0%

0.54ha
101 | 0%

EXISTING 30.0m 1200Ø CSP
CULVERT @ 0.4%
UPSTREAM INV. 253.35
DOWNSTREAM INV. 253.34

THE KING'S HIGHWAY NO.48

LEGEND:

- LIMIT OF DEVELOPMENT
- EXISTING STORM DRAINAGE BOUNDARY
- OVERLAND FLOW ARROW
- 6.00ha / 102 | 0% — DRAINAGE AREA (HECTARES); PERCENT (%) IMPERVIOUS; CATCHMENT ID
- EXISTING CULVERT
- EXISTING STORM SEWER AND MAINTENANCE HOLE

*NOTE: LAYOUT IS SCHEMATIC ONLY, DETAILS TO BE PROVIDED AT DETAILED DESIGN STAGE.

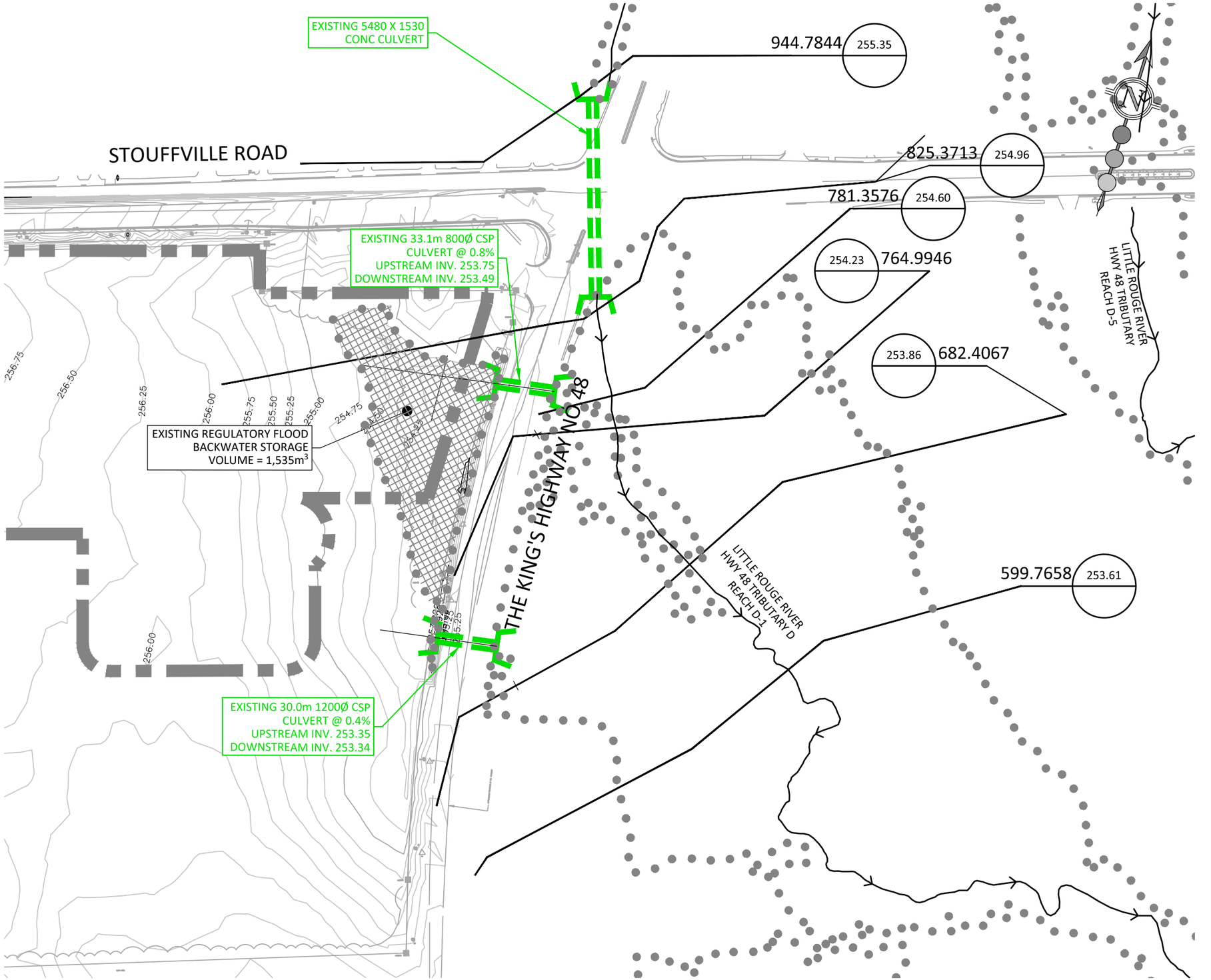
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5061 STOUFFVILLE ROAD

EXISTING STORM DRAINAGE PLAN

DESIGNED BY:	J.A.S.	CHECKED BY:	E.T.C.K.
SCALE:	1:2000	DATE:	SEPTEMBER 2026
PROJECT No:	2234	FIGURE No:	3.1

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LEGEND:

- LIMIT OF DEVELOPMENT
- 256.00 — EXISTING CONTOUR AND ELEVATION
- EXISTING REGULATORY FLOODLINE
- HEC CROSS-SECTION
- LITTLE ROUGE RIVER TRIBUTARY PROVIDED BY TRCA FLOODPLAIN MAPPING PROGRAM PREPARED BY WOOD ENGINEERING, 2020
- 262.39 / 2745 — EXISTING REGULATORY FLOOD ELEVATION / HYDRAULIC SECTION ID
- FLOODLINE ELEVATION LEADER
- REGULATORY FLOOD BACKWATER STORAGE AREA

*NOTE: LAYOUT IS SCHEMATIC ONLY, DETAILS TO BE PROVIDED AT DETAILED DESIGN STAGE.

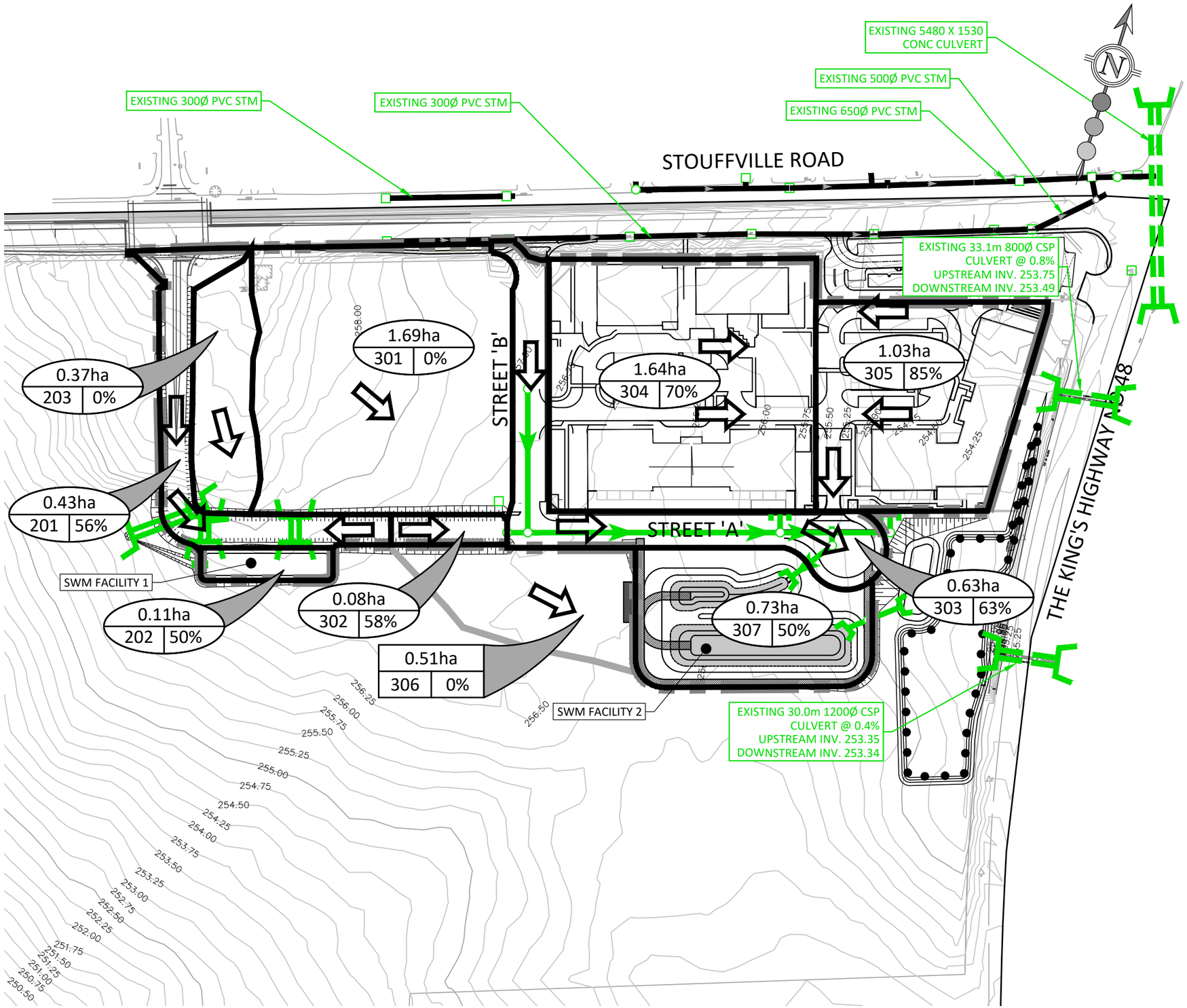
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5061 STOUFFVILLE ROAD

EXISTING FLOODPLAIN MAPPING

DESIGNED BY:	J.A.S.	CHECKED BY:	E.T.C.K.
SCALE:	1:2000	DATE:	SEPTEMBER 2026
PROJECT No:	2234	FIGURE No:	3.2

File: P:\2234 SW Stouffville Expansion Area–Times\Drawings\FSP\Fig\Report Figures\2234P–3.2–FLOD.dwg – Revised by <CNIRO> : Thu, May 14 2026 – 1:48pm



LEGEND:

- LIMIT OF DEVELOPMENT
- STORM DRAINAGE BOUNDARY
- EXTERNAL STORM DRAINAGE BOUNDARY
- OVERLAND FLOW ARROW
- 0.72ha / 303 | 61% — DRAINAGE AREA (HECTARES); PERCENT (%) IMPERVIOUS; CATCHMENT ID
- AREA / ID | % — EXTERNAL STORM DRAINAGE AREA (HECTARES); PERCENT (%) IMPERVIOUS; CATCHMENT ID
- STORM SEWER AND MAINTENANCE HOLE
- EXISTING STORM SEWER AND MAINTENANCE HOLE
- CULVERT
- EXISTING CULVERT
- CATCHBASIN/DICB
- STORM SEWER PLUG
- PROPOSED REGIONAL FLOODLINE

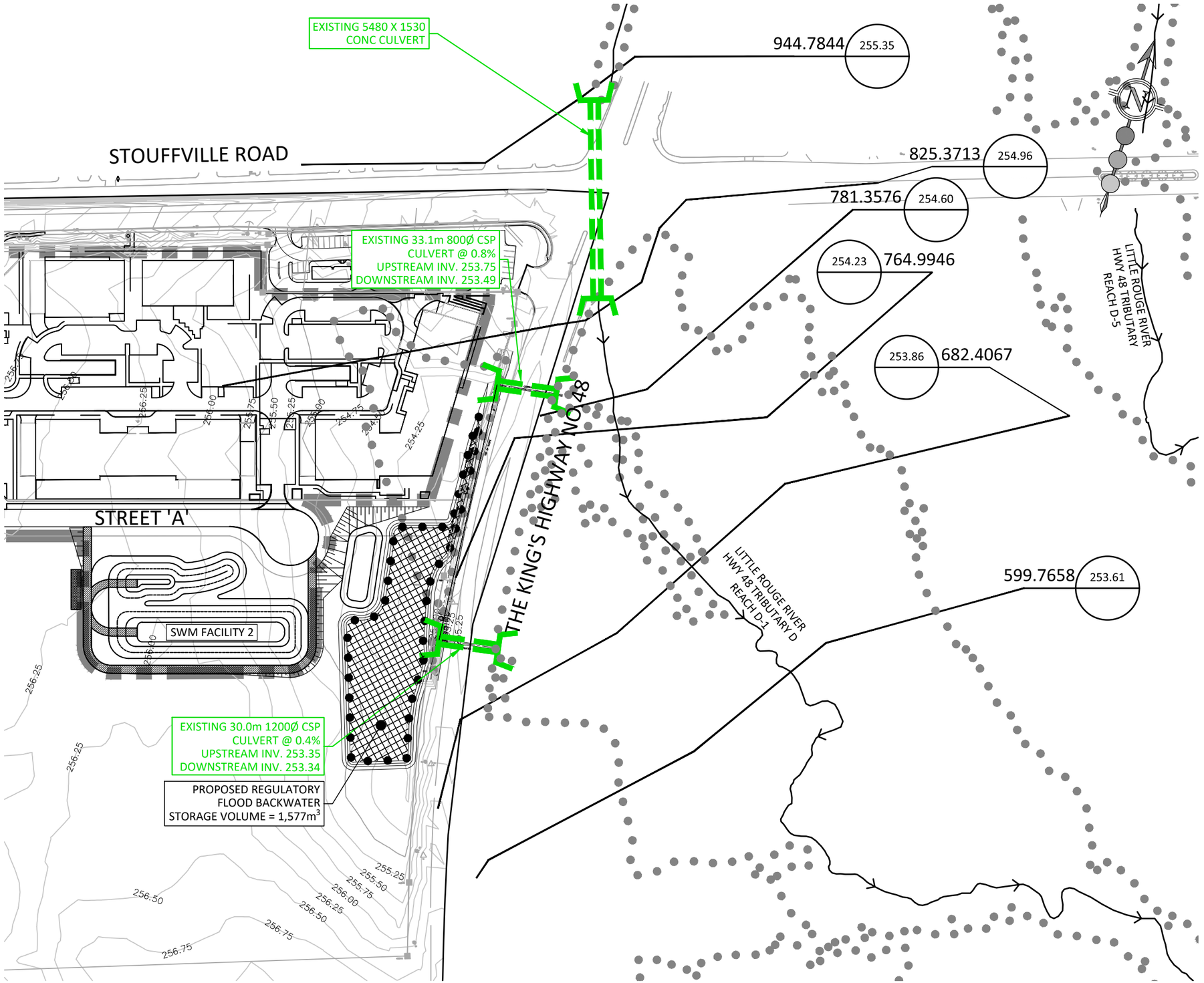
*NOTE: LAYOUT IS SCHEMATIC ONLY, DETAILS TO BE PROVIDED AT DETAILED DESIGN STAGE.

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5061 STOUFFVILLE ROAD

PROPOSED STORM DRAINAGE PLAN

DESIGNED BY:	J.A.S.	CHECKED BY:	E.T.C.K.
SCALE:	1:2000	DATE:	SEPTEMBER 2026
PROJECT No:	2234	FIGURE No:	3.3



LEGEND:

- LIMIT OF DEVELOPMENT
- 256.00 — EXISTING CONTOUR AND ELEVATION
- PROPOSED REGULATORY FLOODLINE
- EXISTING REGULATORY FLOODLINE
- HEC CROSS-SECTION
- LITTLE ROUGE RIVER TRIBUTARY PROVIDED BY TRCA FLOODPLAIN MAPPING PROGRAM PREPARED BY WOOD ENGINEERING, 2020
- 262.39 / 2745 — EXISTING REGULATORY FLOOD ELEVATION / HYDRAULIC SECTION ID
- FLOODLINE ELEVATION LEADER
- REGULATORY FLOOD BACKWATER STORAGE AREA

*NOTE: LAYOUT IS SCHEMATIC ONLY, DETAILS TO BE PROVIDED AT DETAILED DESIGN STAGE.

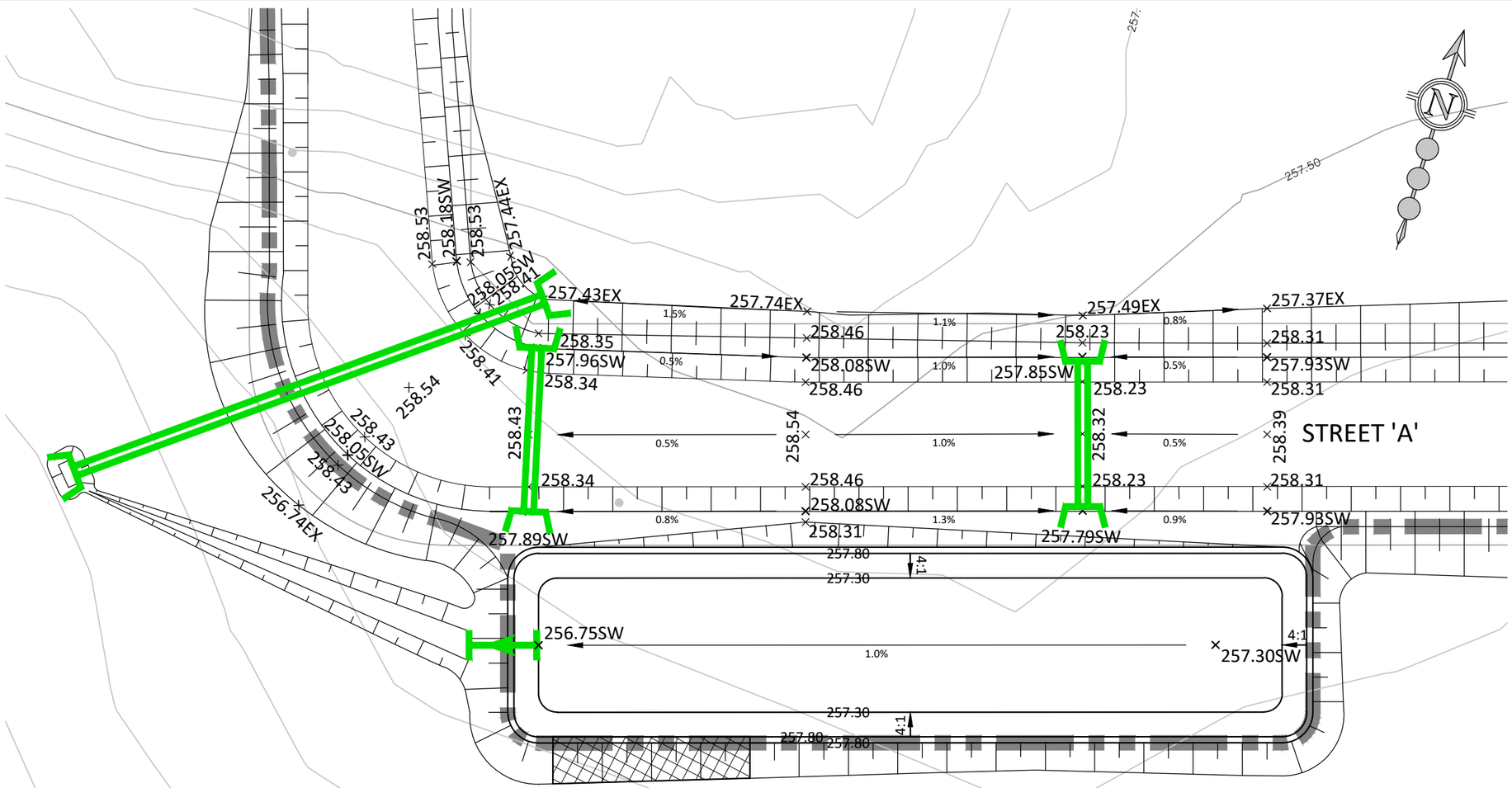
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5061 STOUFFVILLE ROAD

PROPOSED FLOODPLAIN MAPPING

DESIGNED BY:	J.A.S.	CHECKED BY:	E.T.C.K.
SCALE:	1:2000	DATE:	SEPTEMBER 2026
PROJECT No:	2234	FIGURE No:	3.4

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LEGEND:

- LIMIT OF DEVELOPMENT
- 256.00 EXISTING CONTOUR AND ELEVATION
- 204.00 PROPOSED POND CONTOUR AND ELEVATION
- PROPOSED STORM SEWER
- CULVERT
- 3:1 PROPOSED POND SLOPE
- EMERGENCY SPILLWAY

*NOTE: LAYOUT IS SCHEMATIC ONLY, DETAILS TO BE PROVIDED AT DETAILED DESIGN STAGE.

SWM FACILITY 1 (DRY POND) SUMMARY:
EXTENDED DETENTION REQUIRED = 81m³
EXTENDED DETENTION LEVEL = 257.12m
100 YEAR VOLUME REQUIRED = 158m³
100 YEAR WATER LEVEL = 257.27m
FREEBOARD = 0.53m

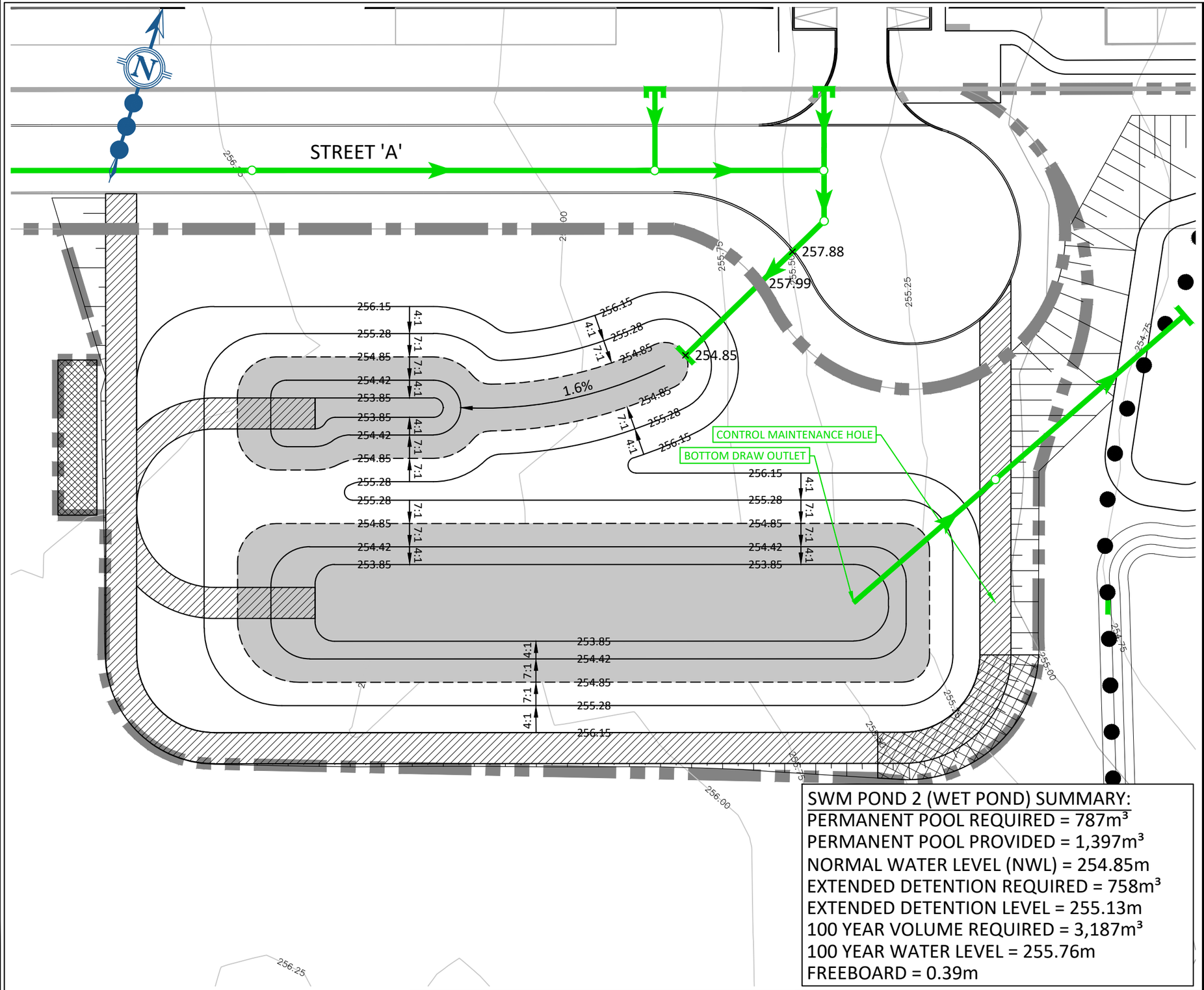
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PROPOSED SWM FACILITY 1

DESIGNED BY:	J.A.S.	CHECKED BY:	E.T.C.K.
SCALE:	1:400	DATE:	SEPTEMBER 2026
PROJECT No:	2234	FIGURE No:	3.5

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SWM POND 2 (WET POND) SUMMARY:
PERMANENT POOL REQUIRED = 787m³
PERMANENT POOL PROVIDED = 1,397m³
NORMAL WATER LEVEL (NWL) = 254.85m
EXTENDED DETENTION REQUIRED = 758m³
EXTENDED DETENTION LEVEL = 255.13m
100 YEAR VOLUME REQUIRED = 3,187m³
100 YEAR WATER LEVEL = 255.76m
FREEBOARD = 0.39m

LEGEND:

- LIMIT OF DEVELOPMENT
- LIMIT OF SWM POND
- 256.00 — EXISTING CONTOUR AND ELEVATION
- 204.00 — PROPOSED POND NWL CONTOUR AND ELEVATION
- 204.00 — PROPOSED POND CONTOUR AND ELEVATION
- PROPOSED STORM SEWER
- 3:1 — PROPOSED POND SLOPE
- EMERGENCY SPILLWAY
- SWM MANTENANCE ACCESS ROAD
- PERMANENT POOL
- SEDIMENT DRYING AREA
- PROPOSED REGIONAL FLOODLINE

*NOTE: LAYOUT IS SCHEMATIC ONLY, DETAILS TO BE PROVIDED AT DETAILED DESIGN STAGE.

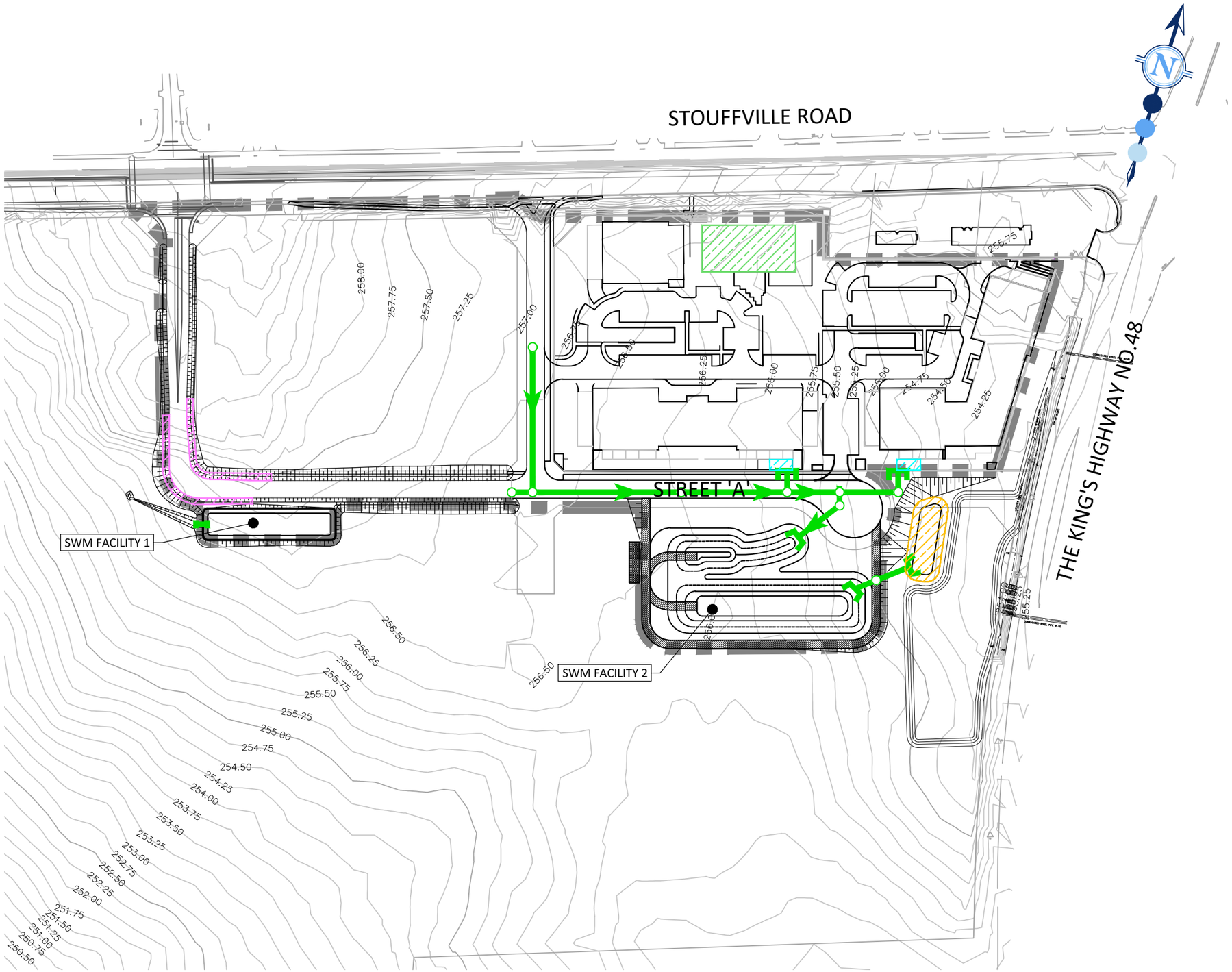
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5061 STOUFFVILLE ROAD

PROPOSED SWM FACILITY 2

DESIGNED BY:	J.A.S.	CHECKED BY:	E.T.C.K.
SCALE:	1:500	DATE:	SEPTEMBER 2026
PROJECT No:	2234	FIGURE No:	3.6

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LEGEND:

- LIMIT OF DEVELOPMENT
- 256.00 — EXISTING CONTOUR AND ELEVATION
- PROPOSED INFILTRATION/FILTRATION TRENCH (36.1m^3 RETENTION CAPACITY)
- PROPOSED GREENROOF (15.6m^3 RETENTION CAPACITY)
- PROPOSED WATER REUSE TANKS (56.5m^3 RETENTION CAPACITY)
- PROPOSED BIORETENTION FACILITY (352.7m^3 RETENTION CAPACITY)

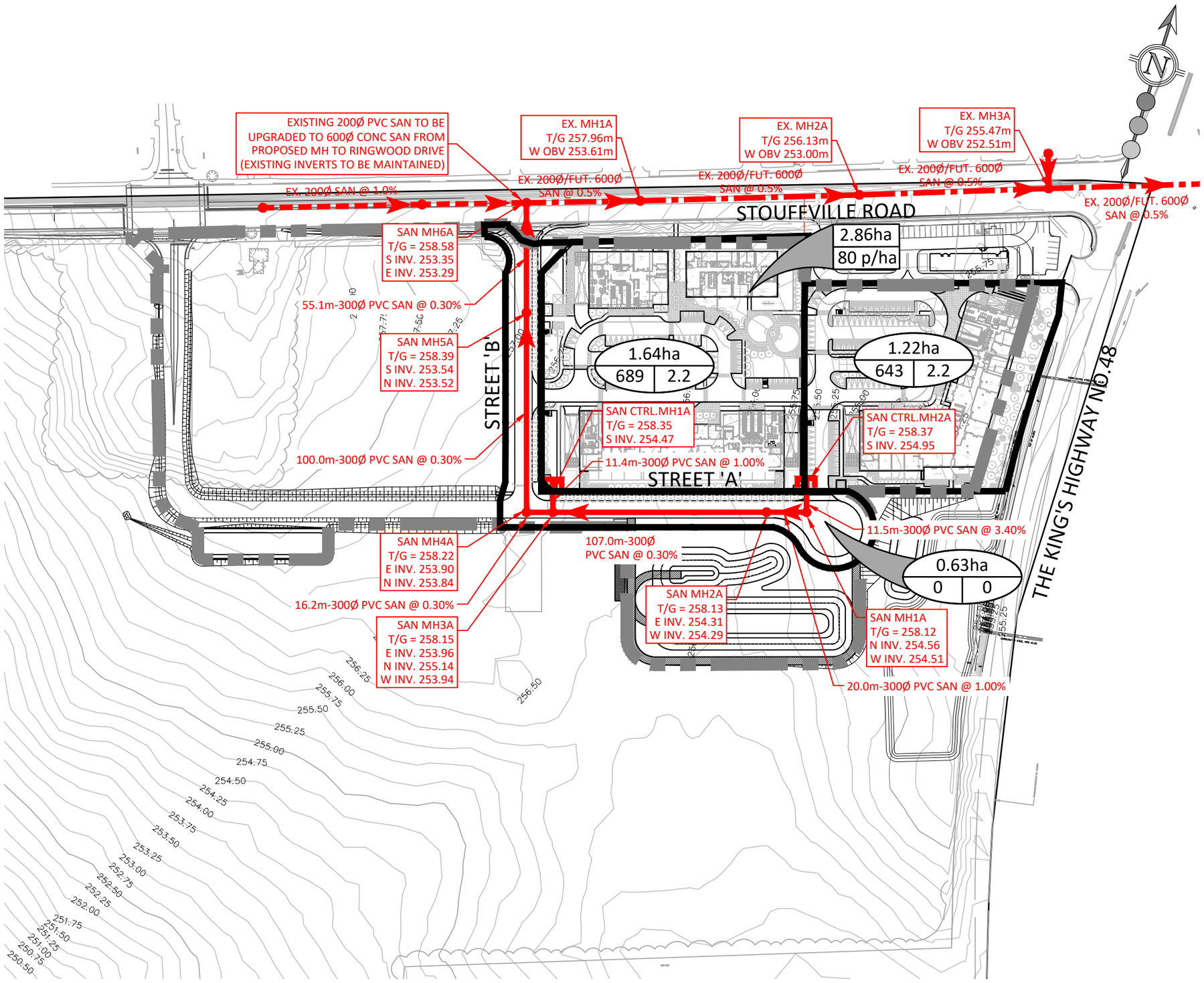
*NOTE: LAYOUT IS SCHEMATIC ONLY, DETAILS TO BE PROVIDED AT DETAILED DESIGN STAGE.

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5061 STOUFFVILLE ROAD

POTENTIAL L.I.D. LOCATIONS

DESIGNED BY:	J.A.S.	CHECKED BY:	E.T.C.K.
SCALE:	1:2000	DATE:	SEPTEMBER 2026
PROJECT No:	2234	FIGURE No:	3.7



LEGEND:

- LIMIT OF DEVELOPMENT
- 256.00 — EXISTING CONTOUR AND ELEVATION
- SANITARY DRAINAGE BOUNDARY
- 0.35ha / 99 / 3.8 — DRAINAGE AREA (HECTARES); PERSONS PER UNIT; NUMBER OF UNITS
- 2.86ha / 80 p/ha — DRAINAGE AREA (HECTARES) FOR PROPOSED DAYCARE *ASSUMES TOTAL SITE AREA FOR CONSERVATIVE ESTIMATE; POPULATION PER HECTARE FOR PROPOSED DAYCARE
- SANITARY SEWER AND MAINTENANCE HOLE
- EXISTING SANITARY SEWER AND MAINTENANCE HOLE
- FUTURE SANITARY SEWER AND MAINTENANCE HOLE
- SANITARY SEWER PLUG

*NOTE: LAYOUT IS SCHEMATIC ONLY, DETAILS TO BE PROVIDED AT DETAILED DESIGN STAGE.

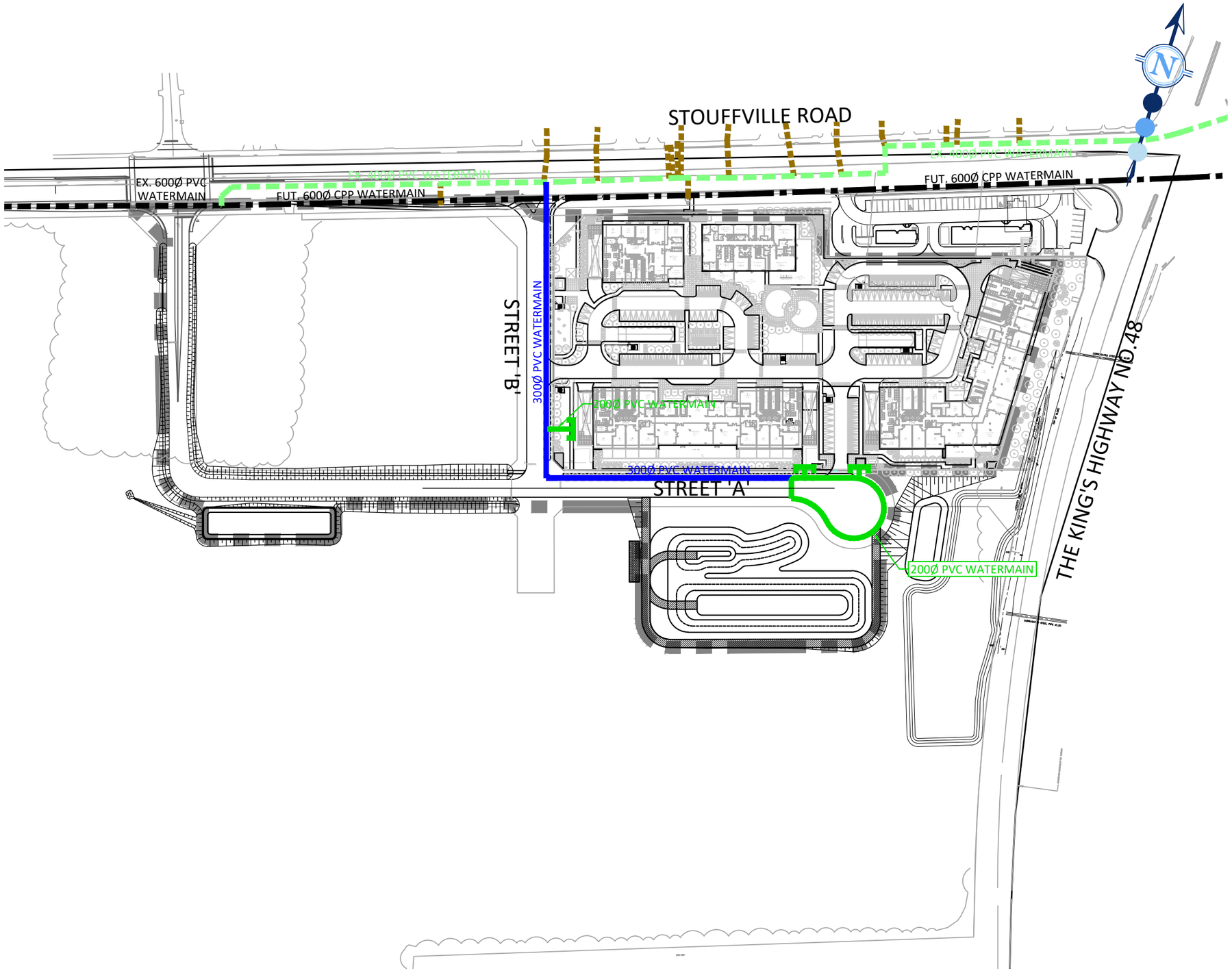
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MARKHAM, ONTARIO L3R 8B8
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5061 STOUFFVILLE ROAD

PRELIMINARY SANITARY SERVICING PLAN

DESIGNED BY:	J.A.S.	CHECKED BY:	E.T.C.K.
SCALE:	1:2000	DATE:	SEPTEMBER 2026
PROJECT No:	2234	FIGURE No:	4.1

File: P:\2234 SW Stouffville Expansion Area–Times\Drawings\FSP\Fig\Report Figures\2234P–4.1–SANI.dwg – Revised by <CNIRO> : Thu, May 14 2026 – 2:06pm



LEGEND:

- LIMIT OF DEVELOPMENT
- 300Ø PROPOSED WATERMAIN
- 200Ø PROPOSED WATERMAIN
- PROPOSED 200Ø WATERMAIN PLUG
- EXISTING WATER SERVICE CONNECTION (VARIOUS DIA.)
- 400Ø EXISTING WATERMAIN (MUNICIPAL)
- 600Ø EXISTING WATERMAIN (REGIONAL)
- 600Ø FUTURE WATERMAIN (MUNICIPAL)

*NOTE: LAYOUT IS SCHEMATIC ONLY, DETAILS TO BE PROVIDED AT DETAILED DESIGN STAGE.

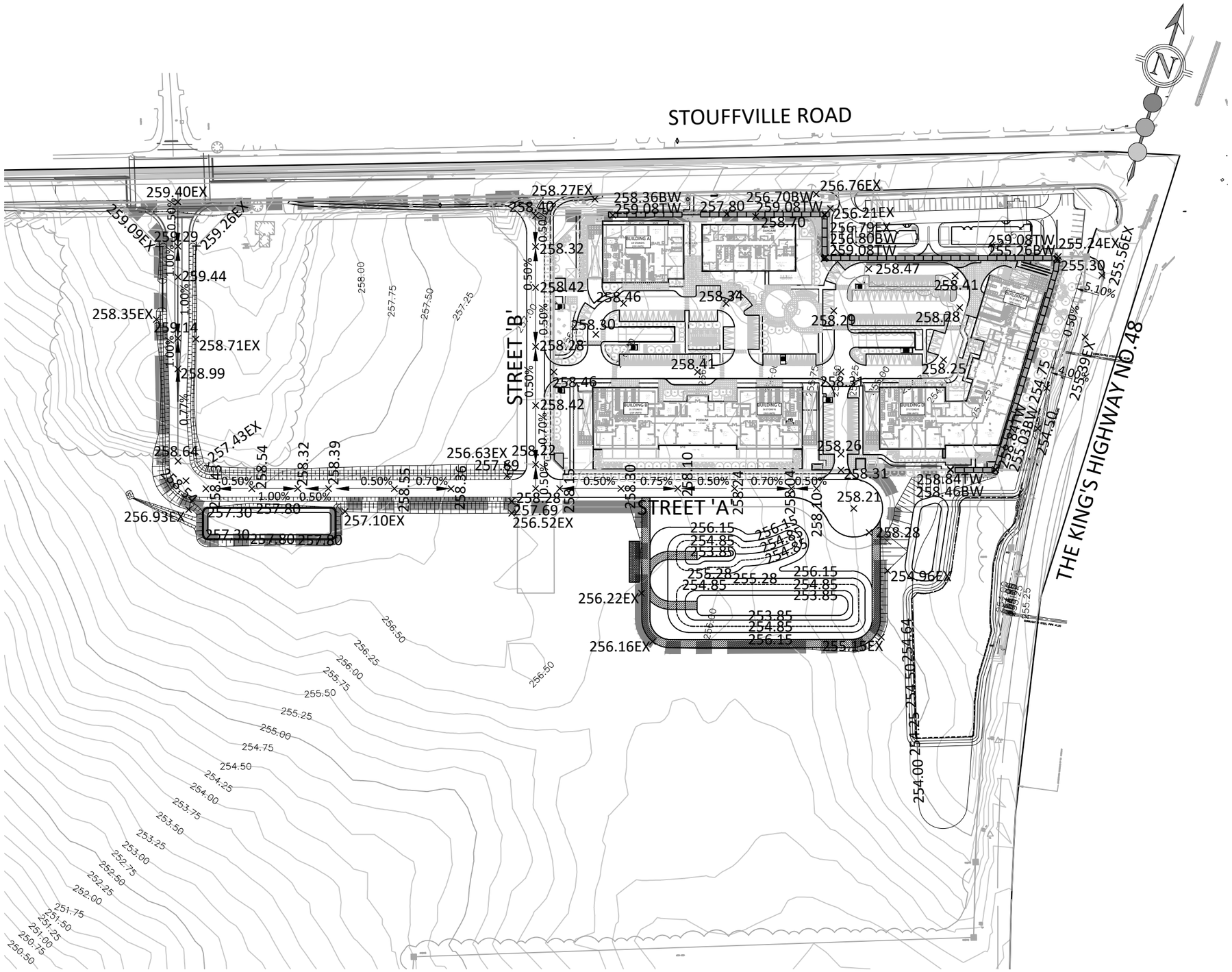
SCS consulting group ltd
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MARKHAM, ONTARIO L3R 8B8
TEL: (905) 475-1900
FAX: (905) 475-8335

5061 STOUFFVILLE ROAD

PRELIMINARY WATER DISTRIBUTION PLAN

DESIGNED BY:	J.A.S.	CHECKED BY:	E.T.C.K.
SCALE:	1:2000	DATE:	SEPTEMBER 2026
PROJECT No:	2234	FIGURE No:	5.1

File: P:\2234 SW Stouffville Expansion Area–Times\Drawings\FSP\Fig\Report Figures\2234P–5.1–WTRM.dwg – Revised by <CNIRO> : Thu, May 14 2026 – 2:10pm



LEGEND:

- LIMIT OF DEVELOPMENT
- 256.00 — EXISTING CONTOUR AND ELEVATION
- MAX 3:1 SLOPE
- 0.5% — ROAD SLOPE
- × 194.98 — PROPOSED ELEVATION
- × 194.98TW — PROPOSED TOP OF WALL ELEVATION
- × 194.98BW — PROPOSED BOTTOM OF WALL ELEVATION
- × 189.94EX — EXISTING ELEVATION
- 253.85 — PROPOSED CONTOUR AND ELEVATION
- PROPOSED RETAINING WALL

*NOTE: LAYOUT IS SCHEMATIC ONLY, DETAILS TO BE PROVIDED AT DETAILED DESIGN STAGE.

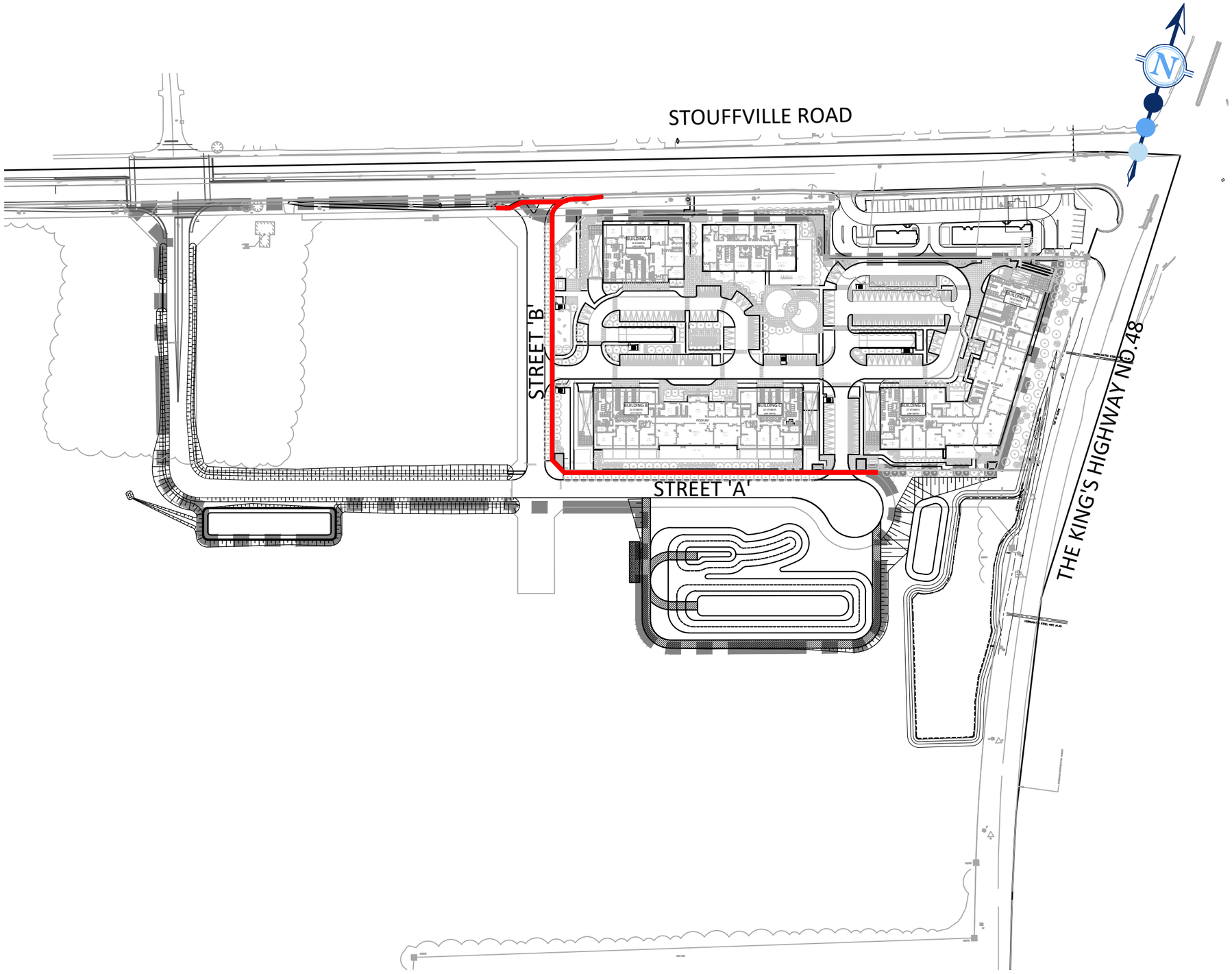
SCS consulting group ltd
30 CENTURIAN DRIVE, SUITE 100
MARKHAM, ONTARIO L3R 8B8
TEL: (905) 475-1900
FAX: (905) 475-8335

5061 STOUFFVILLE ROAD

PRELIMINARY GRADING PLAN

DESIGNED BY:	J.A.S.	CHECKED BY:	E.T.C.K.
SCALE:	1:2000	DATE:	SEPTEMBER 2026
PROJECT No:	2234	FIGURE No:	6.1

File: P:\2234 SW Stouffville Expansion Area–Times\Drawings\FSP\Fig\Report Figures\2234P–6.1–GRAD.dwg – Revised by <CNIRO> : Thu, May 14 2026 – 1:58pm



LEGEND:

LIMIT OF DEVELOPMENT

CONCRETE SIDEWALK

*NOTE: LAYOUT IS SCHEMATIC ONLY, DETAILS TO BE PROVIDED AT DETAILED DESIGN STAGE.

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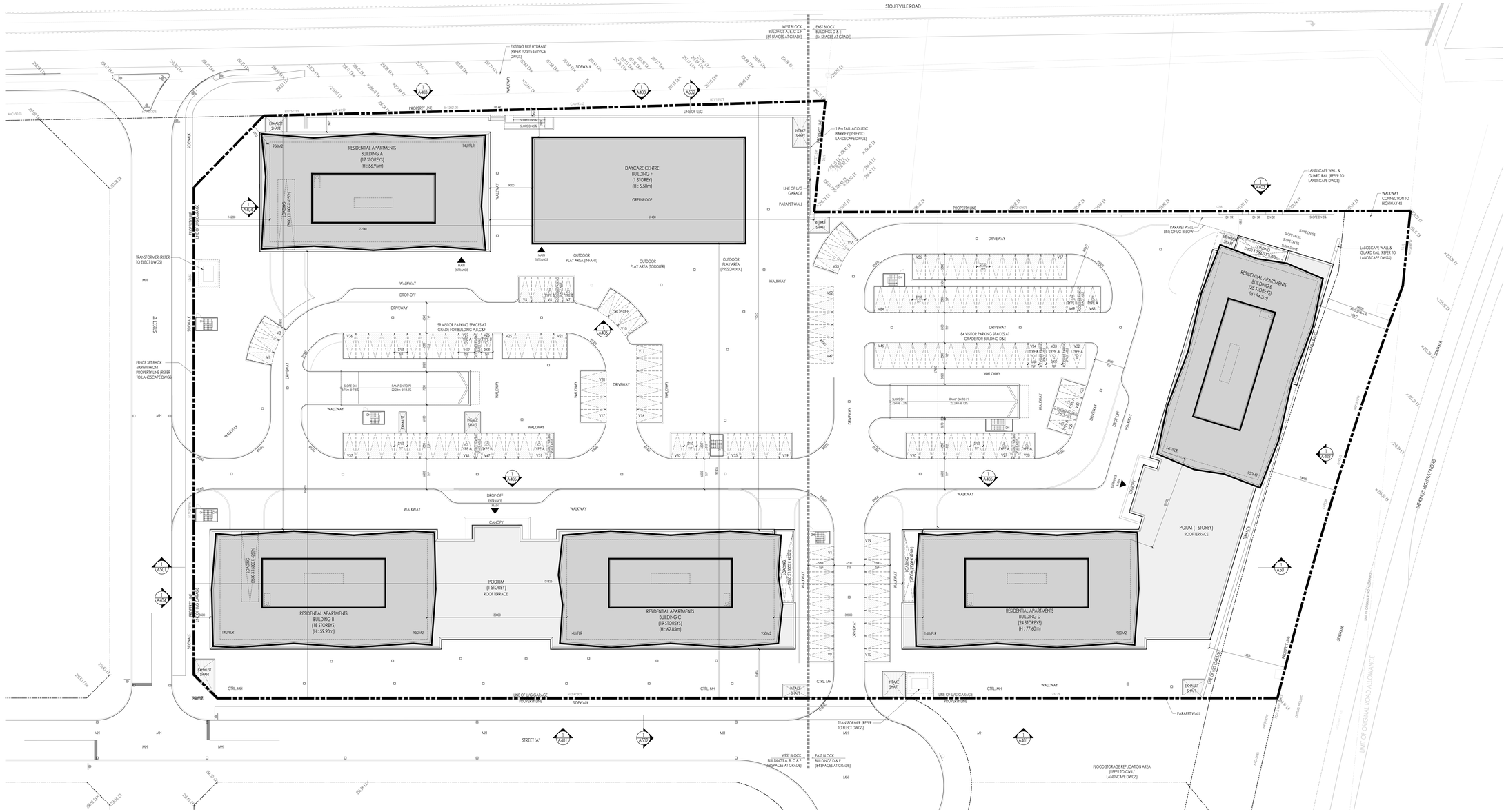
5061 STOUFFVILLE ROAD

PRELIMINARY SIDEWALK LAYOUT PLAN

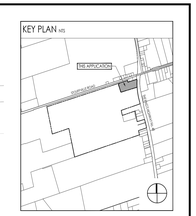
DESIGNED BY:	J.A.S.	CHECKED BY:	E.T.C.K.
SCALE:	1:2000	DATE:	SEPTEMBER 2026
PROJECT No:	2234	FIGURE No:	7.1

File: P:\2234 SW Stouffville Expansion Area–Times\Drawings\FSP\Fig\Report Figures\2234P–7.1–SDWK.dwg – Revised by <CNIRO> : Thu, May 14 2026 – 2:11pm

Appendix A Site Plan



KEY PLAN NTS



SURVEY INFORMATION

PLAN OF SURVEY	PART OF LOTS 34 AND 35 CONCESSION 7 TOWN OF WHITCHURCH - STOUFFVILLE (GEOGRAPHIC TOWNSHIP OF MARKHAM) REGIONAL MUNICIPALITY OF YORK
NOTES	BEARINGS SHOWN HEREON ARE GRID BEARINGS AND ARE DERIVED FROM HORIZONTAL CONTROL MONUMENTS No. 35881801097 AND No.35881974077, ZONE 17, CENTRAL MERIDIAN 81° 00' WEST LONGITUDE. 16° UNIVERSAL TRANSVERSE MERCATOR PROJECTION, NAD 83 (CSRS) (1997.0) MCM No.: 35881801097 MCM No.: 35881974077 N 4868964.770 N 4852466.153 E 637921.780 E 639990.960 DISTANCES SHOWN HEREON ARE GROUND DISTANCES AND CAN BE CONVERTED TO GRID DISTANCES BY MULTIPLYING BY A COMBINED SCALE FACTOR OF 0.999804.
ADDITIONAL NOTES	DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 3.3048.
SURVEY PLOT DATE	DECEMBER 13, 2024
SURVEYOR CONTACT INFORMATION	R. AVIS SURVEYING INC. 235 YORKLAND BOULEVARD, SUITE 203 NORTH YORK, ONTARIO TEL: (416) 491-8322 FAX: (416) 491-4206 www.avissurveying.com

GENERAL NOTES

1. LOADING SPACE AND STAGING PAD TO BE LEVEL (+ - 2%) AND CONSTRUCTED OF MINIMUM 200mm REINFORCED CONCRETE. MINIMUM 4.1m UNENCUMBERED VERTICAL CLEARANCE REQUIRED.
2. ACCESS DRIVEWAYS TO BE USED BY COLLECTION VEHICLES TO HAVE A MINIMUM VERTICAL CLEARANCE OF 4.4m THROUGHOUT.
3. ANY DRIVEWAY OF COLLECTION AREA REQUIRING A MINIMUM TURNING RADIUS AS DEMONSTRATED, SHALL BE SUPPORTED STRUCTURE TO BE RATED TO 25kN/m² SUPPORT THE REQUIRED LOADS

SITE PLAN LEGEND NTS

- MAIN ENTRANCE
- SECONDARY ENTRANCE
- EXISTING GRADE DATUM
- FINISH FLOOR ELEVATION
- ESTABLISHED GRADE
- PROPOSED GRADE DATUM
- EXISTING TREE (REFER TO SURVEY) CANOPY NOT TO SCALE
- PROPOSED TREE (REFER TO LANDSCAPE DWGS)
- EXISTING HYDRANT (REFER TO SURVEY)
- PROPOSED HYDRANT (REFER TO CIVIL DWGS)
- SIAMESE CONNECTION (REFER TO MECH/CIVIL DWGS)
- SANITARY MANHOLE (REFER TO CIVIL DWGS)
- STORM SEWER MANHOLE (REFER TO CIVIL DWGS)
- CATCHBASIN SEDIMENT TRAP (REFER TO CIVIL DWGS)
- CATCHBASIN (REFER TO CIVIL DWGS)
- EXISTING STREET LIGHT (REFER TO SURVEY/ELEC)
- PROPOSED STREET LIGHT (REFER TO ELEC DWGS)
- TRANSFORMER (REFER TO ELEC DWGS)
- GAS METER (REFER TO MECH DWGS)
- HYDRO METER (REFER TO ELEC DWGS)
- RECEPTACLE (REFER TO ELEC DWGS)
- AREA DRAIN
- HOSE BIB (REFER TO MECH/CIVIL DWGS)
- POST-MOUNTED SIGN (REFER TO TRAFFIC REPORT)
- WALL/CLOSE-MOUNTED SIGN (REFER TO TRAFFIC REPORT)
  - BF = BARRIER FREE PARKING STOP = STOP SIGN
  - LZ = LOADING ZONE TAV = TRUCK MANOEUVRING
  - NP = NO PARKING CM = CONVEX MIRROR
  - NS = NO STOPPING FR = FIRE ROUTE
- BL = BOLLARD LIGHTING (REFER TO LANDSCAPE DWGS)
- PL = POLE LIGHTING
- WALL/CEILING/FENCE-MOUNTED OR CEILING-MOUNTED CONVEX MIRROR SUBJECT TO ACTUAL CONDITION
- ELECTRIC VEHICLE CHARGER ROUGH-IN (SEE ELEC DWGS)

PARKING LEGEND NTS

NOTE: TYPICAL DRIVE AISLE - MIN 6500 CLEAR

- TYPICAL PARKING SPACE (2750 x 5500)
- TANDEM PARKING SPACE (2750 x 5500)
- TYPICAL VISITOR PARKING SPACE (2750 x 5500)
- TYPICAL PARALLEL PARKING SPACE (2750 x 6700)
- DBR PROPOSED HORIZONTAL BICYCLE PARKING (600X1800) - ALSO REFER TO LANDSCAPE DWGS
- TYPE 'A' BARRIER FREE PARKING SPACE (3400 x 5500 + 1500 AISLE*) *NOTE: 2 BF SPACE MAY SHARE AISLE
- TYPE 'B' BARRIER FREE PARKING SPACE (2400 x 5500 + 1500 AISLE*) *NOTE: 2 BF SPACE MAY SHARE AISLE
- TYP. LOADING SPACE (3600 x 13000)

NO.	DATE	ISSUE	BY
4	AUG 27, 2026	RE-ISSUED FOR OPA/REZONING	AB
3	MAY 14, 2026	RE-ISSUED FOR OPA/REZONING	AB
2	APRIL 8, 2026	RE-ISSUED FOR OPA/REZONING	AB
1	MAY 2, 2025	ISSUED FOR OPA/REZONING	AB

Issued

ICKE | BROCHU
ARCHITECTS INC.
517 Wellington St W., Suite 203, Toronto, Ontario, M5V 1G1
T 647 288 1800 IckeBrochu.net

5061 STOUFFVILLE ROAD RESIDENTIAL DEVELOPMENT

5061 STOUFFVILLE ROAD — STOUFFVILLE, ONTARIO

Drawing title: SITE PLAN

TOWN FILE NO.

Date	JANUARY, 2024
Drawn By	PL
Scale	1:250
Reviewed By	AB
Project No.	19.17
Drawing No.	A102
Plot Date	September 22, 2026

THE DRAWING, AS AN INSTRUMENT OF SERVICE IS PROVIDED BY AND IS THE PROPERTY OF THE ICKE BROCHU ARCHITECTS INC.
THE CONTRACTOR SHALL VERIFY AND ACCEPT RESPONSIBILITY FOR ALL DIMENSIONS AND CONDITIONS ON SITE AND SHALL NOTIFY ICKE BROCHU ARCHITECTS INC. OF ANY VARIATIONS FROM THE SUPPLIED INFORMATION.
THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE CONSTRUCTION OF ALL WORKS IN ACCORDANCE WITH THIS DRAWING AND ANY ASSOCIATED DRAWINGS AND SPECIFICATIONS PREPARED BY THE ARCHITECT AND ALL OTHER CONSULTANTS. REFER TO APPROPRIATE SUBMITTED STRUCTURAL, MECHANICAL, ELECTRICAL, LANDSCAPE, ETC. CONSULTANT DRAWINGS FOR ADDITIONAL INFORMATION.
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AMENDMENTS

URL, MECH., CIVIL ARRIVE	DATE

1. SITE AREA

	SQ. FEET (FT2)	SQ. METER (m2)	ACRES (ac)	HECTARES (ha)
TOTAL	307,622 ft2	28,580 m2	7.06 ac	2.86 ha

2. DENSITY (F.S.I)

GROSS FLOOR AREA (GFA) / LOT AREA	103,614 m2	/	28,580 m2	3.63

3. RESIDENTIAL DENSITY PER NET HECTARE *NET DENSITY IS THE AREA OF LAND INCLUDING THE LOT AND LOCAL AND COLLECTOR ROADS (STREET A AND B).

TOTAL APARTMENT DENSITY	1200 UNITS / 2.32 ha = 516 UNITS/ha

4. BUILDING HEIGHT OVERALL HEIGHT MEASURED FROM FT. GRADE OF 254.95m TO TOP OF MAIN ROOF (164m) (EXCLUDES MPH)

	BUILDING A	BUILDING B	BUILDING C	BUILDING D	BUILDING E	BUILDING F
PODIUM	1 STOREY	1 STOREY	1 STOREY	1 STOREY	1 STOREY	1 STOREY
TOWER	16 STOREY	17 STOREY	18 STOREY	23 STOREY	24 STOREY	
TOTAL	17 STOREY (56.95m)	18 STOREY (59.9m)	19 STOREY (62.85m)	24 STOREY (77.60m)	25 STOREY (84.3m)	1 STOREY (5.5m)

5. GARBAGE/RECYCLING ROOM

	BUILDING A	BUILDING B	BUILDING C	BUILDING D	BUILDING E	BUILDING F
GARBAGE ROOM	1	1	1	1	1	1
MINIMUM OF 30 m² FOR BULKY ITEMS STORAGE						

6. LOCKER STORAGE

	WEST BLOCK				EAST BLOCK			TOTAL
	BUILDING A	BUILDING B	BUILDING C	TOTAL	BUILDING D	BUILDING E	TOTAL	
GROUND	0	0	0	0	0	0	0	0
P1 UNDERGROUND	103	115	123	341	31	31	62	403
P2 UNDERGROUND	106	116	124	346	143	150	293	639
P3 UNDERGROUND					143	150	293	293
TOTAL PROVIDED	209	231	247	687	317	331	648	1,335 (1.0 SPJUNIT)

7. UNIT MIX

WEST BLOCK													EAST BLOCK														TOTAL UNITS
BUILDING A					BUILDING B					BUILDING C						BUILDING D					BUILDING E						
	STUDIO	1B/1B+D	2B/2B+D	3B/3B+D	TOTAL	STUDIO	1B/1B+D	2B/2B+D	3B/3B+D	TOTAL	STUDIO	1B/1B+D	2B/2B+D	3B/3B+D	TOTAL	TOTAL BUILDING A+B+C		STUDIO	1B/1B+D	2B/2B+D	3B/3B+D	TOTAL	STUDIO	1B/1B+D	2B/2B+D	3B/3B+D	TOTAL	TOTAL BUILDING D+E	
GROUND/1ST FLOOR	0	0	0	0	0	GROUND FLOOR	0	0	4	0	4	GROUND FLOOR	0	0	2	2	4	8	GROUND FLOOR	0	0	4	0	4	GROUND FLOOR	0	0	4	0	4	16
2ND FLOOR	0	6	1	0	7	2ND FLOOR	0	8	3	0	11	2ND FLOOR	0	9	4	0	13	31	2ND FLOOR	0	9	4	0	13	2ND FLOOR	0	9	4	0	13	26	57
3RD-15TH FLOOR (11FL)	0	110	44	0	154	3RD-16TH FLOOR (13FL)	0	120	48	0	168	3RD-15TH FLOOR (13FL)	0	130	52	0	182	504	3RD-20TH FLOOR (18FL)	0	180	72	0	252	3RD-21ST FLOOR (19FL)	0	190	76	0	266	518	1022
16TH-17TH FLOOR (4FL)	0	24	16	8	48	17TH-18TH FLOOR (4FL)	0	24	16	8	48	16TH-19TH FLOOR (4FL)	0	24	16	8	48	144	21ST-24TH FLOOR (4FL)	0	24	16	8	48	22ND-25TH FLOOR (4FL)	0	24	16	8	48	96	240
TOTAL - BUILDING A	0	140	61	8	209	TOTAL - BUILDING B	0	152	71	8	231	TOTAL - BUILDING C	0	163	74	10	247	687	TOTAL - BUILDING D	0	213	96	8	317	TOTAL - BUILDING E	0	223	100	8	331	648	1335

* OF WHICH 1BS IS BARRIER FREE

8. PARKING

PROPOSED PARKING	WEST BLOCK	EAST BLOCK	TOTAL
VISITOR (0.25 SPJUNIT)	163 (INCLUDES 2 ACCESSIBLE PARKING)	168	333
RESIDENTIAL (1.10 SPJUNIT)	744	723	1467
TOTAL (1.35 SPJUNIT)	907	869	1800

	WEST BLOCK								EAST BLOCK								TOTAL
	BUILDING A		BUILDING B		BUILDING C		(5+7+6+7+MEP)	BLOCK SUBTOTAL	BUILDING D		BUILDING E		BLOCK SUBTOTAL				
	VISITOR	RES	VISITOR	RES	VISITOR	RES	VISITOR	RES	VISITOR	RES	VISITOR	RES	VISITOR	RES	VISITOR	RES	TOTAL
SURFACE	23	0	22	0	14	0			59	0	46	0	38	0	84	0	143
GROUND/1ST FLOOR	0	0	0	0	0	0			0	0	0	0	0	0	0	0	0
P1 UNDERGROUND	28	101	33	103	45	120			106	324	38	83	66	88	84	169	590
P2 UNDERGROUND	0	117	0	147	0	178			0	442	0	125	0	140	0	265	707
P3 UNDERGROUND	0	0	0	0	0	0			0	0	0	126	0	141	0	267	267
TOTAL	51	218	55	250	59	298			165	766	84	334	104	369	168	701	1,467
GRAND TOTAL	269		305		357				931		418		473		869		1,800

* OF WHICH 10 ARE TYPE A AND 6 ARE TYPE B BF SPACES

** OF WHICH 4 ARE TYPE A AND 9 ARE TYPE B BF SPACES

*** OF WHICH 30 ARE SHARED WITH DAYCARE

9. BICYCLE PARKING

MIN. PARKING REQUIRED 0.25 SPJUNIT BICYCLES

	SHORT-TERM								LONG-TERM								TOTAL
	WEST BLOCK			EAST BLOCK					WEST BLOCK				EAST BLOCK				
	BUILDING A	BUILDING B	BUILDING C	BUILDING D	BUILDING E	BUILDING F	BUILDING G	BUILDING H	BUILDING A	BUILDING B	BUILDING C	BUILDING D	BUILDING E	BUILDING F	BUILDING G	BUILDING H	
SURFACE																	
GROUND FLOOR	14	14	14		14	14	28	0	30	30	30	188					
P1 UNDERGROUND							11	44	18	36	39	148					
P2 UNDERGROUND																	
P3 UNDERGROUND																	
BUILDING SUBTOTAL PROVIDED	14	14	14	0	14	14	39	44	48	66	69						
BLOCK SUBTOTAL PROVIDED	42			28			131			135							
TOTAL PROVIDED	70			266													336

10. GROSS FLOOR AREA (GFA)

| WEST BLOCK | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | EAST BLOCK | | | | | | | | | | | | | | | | | | |

Appendix B Record Drawings and Background Information

SCS consulting group ltd

Geotechnical Investigation
Proposed Highrise Building
4721 & 5061 Stouffville Road
Whitchurch-Stouffville, Ontario

PREPARED FOR:
Times Group Corporation

Project No: 19-043-103-R1
Date: December 13, 2024

DS CONSULTANTS LTD.
6221 Highway 7, Unit 16
Vaughan, Ontario, L4H 0K8
Telephone: (905) 264-9393
www.dsconsultants.ca

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1. INTRODUCTION

DS Consultants Ltd. (DS) was retained by Times Group Corporation to carry out a supplementary geotechnical investigation at 4721 & 5061 Stouffville Road for the proposed high-rise buildings.

It is understood that the proposed high-rise buildings ranges from 19 to 29 stories with 2 levels of underground parking (P2). The finished floor elevation of P2 is at Elev. 250.6 m.

In 2019 and 2021, DS conducted preliminary geotechnical and hydrogeological investigations on the site, drilling six (6) boreholes (BH21-1 to BH21-5 and BH19-5) to depths of 12.3 to 15.8 m below existing grade. The locations plan and logs of these boreholes are included in **Appendix A**.

The purpose of this supplementary geotechnical investigation was to obtain additional borehole information about the subsurface conditions and from the findings in the boreholes to provide recommendations for the proposed high-rise buildings.

Concurrently with the geotechnical investigation program, a hydrogeological study has been carried out by DS, and the results are addressed separately

This report is provided on the basis of the terms of reference presented above and, on the assumption, that the design will be in accordance with the applicable codes and standards. If there are any changes in the design features relevant to the geotechnical analyses, or if any questions arise concerning the geotechnical aspects of the codes and standards, this office should be contacted to review the design. It may then be necessary to carry out additional borings and reporting before the recommendations of this office can be relied upon.

The format and contents are guided by client specific needs and economics and do not conform to generalized standards for services. Laboratory testing for most part follows ASTM or CSA Standards or modifications of these standards that have become standard practice.

This report has been prepared for Times Group Corporation and its architect and designers. Third party use of this report without DS consent is prohibited.

2. FIELD AND LABORATORY WORK

A total of twelve (12) boreholes BH24-1 to BH24-12 were drilled between October and November 2024, to depths of 15.3 to 23.4 m below existing grade. The previous five (5) boreholes (BH21-1 to BH21-5) were drilled in 2020 to depths ranging from 12.3 to 15.8 m and one borehole BH19-5 was drilled in 2019 to a depth of 15.2 m below existing ground surface. The borehole locations are shown on **Drawing 1**.

Boreholes were drilled with hollow stem continuous flight augers and mud-rotary drill equipment by a drilling sub-contractor under the direction and supervision of DS personnel. Samples were

retrieved at regular intervals with a 50 mm O.D. split-barrel sampler driven with a hammer weighing 624 N and dropping 760 mm in accordance with the Standard Penetration Test (SPT) method. The samples were logged in the field and returned to the DS laboratory for detailed examination by the project engineer and for laboratory testing.

As well as visual examination in the laboratory, all soil samples from geotechnical boreholes were tested for moisture contents. Grain size analyses of twelve (12) selected soil samples were conducted and the results are presented in **Drawing 17** to **Drawing 19**. Atterberg Limits testing was conducted on selected five (5) soil samples and results are presented on the respective borehole logs and in **Drawing 20** and **Drawing 21**.

Water level observations were made during and upon completion of drilling. Five (5) boreholes (BH24-1, BH24-4, BH24-5, BH24-8 and BH24-9) were equipped with 50 mm dia. monitoring wells to measure stabilized groundwater levels and for hydrogeological study.

The geodetic ground surface elevations at the locations of the boreholes/monitoring wells were established by DS using differential GPS system. It should be noted that the elevations at the as-drilled borehole/well locations were not provided by a professional surveyor and should be considered to be approximate. Contractors performing any work referenced to the borehole/well elevations should confirm the borehole elevations for their work.

3. SITE AND SUBSURFACE CONDITIONS

The borehole location plan is shown on **Drawing 1**. General notes on sample description are provided on **Drawing 1A**. The subsurface conditions in the boreholes (BH24-1 to BH24-2) are presented in the individual borehole logs on **Drawings 2** to **13**. Generalized Subsurface Profiles at borehole Locations (BH24-1 to BH24-12, BH21-1 to BH21-5 and BH19-5) are shown on **Drawing 14** to **Drawing 16**. Logs of previous boreholes (BH21-1 to BH21-5 and BH19-5) are attached in Appendix A.

3.1 SOIL CONDITIONS (BH24-1 TO BH24-12)

Topsoil/Fill:

A surficial layer of topsoil of 125 to 3800 mm thick was found in all boreholes. It should be noted that the thickness of the topsoil explored at the borehole locations may not be representative for the site and should not be relied on to calculate the amount of topsoil at the site.

Fill and Weathered/Disturbed Materials:

Below the topsoil, fill materials and/or weathered/disturbed soils consisting of clayey silt to silty clay and sandy silt to silty sand were encountered in all boreholes, extending to depths varied from 0.8 to 2.4 m below ground surface. These soils were found traces of rootlets and topsoil

inclusions. The fill materials and weathered/disturbed soils were found in a firm to hard consistency/loose to dense state, with measured SPT 'N' values ranging from 4 to 30 blows per 300 mm penetration.

Clayey Silt to Silty Clay (Till):

Cohesive deposits of clayey silt to silty clay (till) were encountered in all boreholes, extending to depths ranging from 9.0 m to 23.4 m below existing ground surface. Boreholes BH24-3 to BH24-5, BH24-9 and BH24-12 were terminated in the clayey silt to silty clay (till). These cohesive deposits were found to have a firm to hard consistency with measured SPT 'N' values ranging from 8 to over 50 blows per 300mm of penetration. Occasional sand seams and cobble/boulder were present within the clayey silt to silty clay (till) deposits.

Grain size analyses of eleven (11) clayey silt to silty clay (till) samples (BH21-1/SS8, BH21-2/SS9, BH21-4/SS7, BH24-1/SS7, BH24-3/SS18, BH24-4/SS6, BH24-5/SS8, BH24-8/SS9, BH24-10/SS11, BH24-11/SS12 and BH24-12/SS15) were conducted and the results are presented in **Drawing 17** to **Drawing 19** and **in Appendix A**, with the following fractions:

Clay: 13% - 36%

Silt: 37% - 76%

Sand: 2% - 41%

Gravel: 0 - 3%

Sandy Silt to Silty Sand Till:

Sandy silt to silty sand till deposits were encountered in all boreholes, extending to depths of 12.0 to 23.4 m below existing grade. Sandy silt to silty sand till deposits were found to be in a compact to very dense state, with measured SPT 'N' values ranging from 10 to more than 50 blows per 300 mm of penetration. Occasional sand seams and cobble/boulder were present within the sandy silt to silty sand till deposits.

Grain size analyses of six (6) sandy silt to silty sand till samples (BH19-5/SS5, BH21-2/SS5, BH21-3/SS5, BH21-3/SS10, BH24-1/SS11 and BH24-8/SS16) were conducted and the results are presented in **Drawing 17** and **Drawing 18** and in **Appendix A**, with the following fractions:

Clay: 7% - 15%

Silt: 37% - 55%

Sand: 30% - 47%

Gravel: 4% - 19%

Cohesionless Sandy Soils (Silt, Sandy Silt to Silty Sand and Sand):

Cohesionless water bearing soils consisting of silt, sandy silt to silty sand and sand were encountered at various depths in all boreholes except for boreholes BH24-4 to BH24-6. The cohesionless soils were present in a compact to very dense state, with measured SPT 'N' values ranging from 19 to more than 50 blows per 300mm of penetration.

Grain size analyses of two (2) samples (BH24-7/SS15 and BH24-9/SS4) were conducted and the results are presented in **Drawing 18** and **Drawing 19**, with the following fractions:

Clay: 1% - 3%

Silt: 9% - 88%

Sand: 9% - 73%

Gravel: 0 - 15%

3.2 GROUNDWATER CONDITIONS

Based on the hydrogeological information, the site is within the physiographic region of the Oak Ridges Moraine (ORM), which contains granular water bearing strata within its core referred to as the Oak Ridges Moraine Aquifer Complex (ORMAC). During drilling, artesian conditions were encountered at site, with water flowing out of the boreholes. This finding is indicative of a confined aquifer possibly hydraulically connected with the ORMAC.

In the recent boreholes (BH24-1, 24-4, 24-5,24-8,24-9), artesian conditions were not encountered as the well screens were placed at higher elevations, at the levels of the proposed excavation depths.

Groundwater levels in the monitoring wells were found at 0.2 m above existing grade to 5.0 m below existing grade, corresponding to Elevations 250.8 to 256.5 m, as summarized on **Table 1.**

Table 1: Groundwater Levels Observed in Monitoring Wells

Well ID	Ground Elevation (masl)	Screened Interval (mbgs)	Date	Stick-up (m)	WL (top of pip) (m)	Depth to Water (mbgs)	Groundwater Elevation (masl)
BH21-1	254.5	12.2-15.2	25-Feb-21	0.8	1.1	0.3	254.2
			13-Apr-21		2.2	1.4	253.1
			18-May-21		2.1	1.3	253.2
			21-Jun-21		2.0	1.3	253.2
			16-Jul-21		2.3	1.5	253.0
			23-Aug-21		2.4	1.6	252.9
			14-Sep-21		2.5	1.7	252.8
			13-Oct-21		2.5	1.7	252.8

			15-Nov-21		2.5	1.7	252.8
			13-Dec-21		2.5	1.7	252.8
			11-Jan-22		2.3	1.5	253.0
			15-Feb-22		2.3	1.5	253.0
			14-Mar-22		2.2	1.4	253.1
			19-Apr-22		2.0	1.2	253.3
BH21-2	255.2	9.1-12.1	25-Feb-21	0.9		Frozen	
			13-Apr-21		2.0	1.1	254.1
			18-May-21		1.3	0.4	254.8
			21-Jun-21		2.4	1.5	253.7
			16-Jul-21		1.7	0.8	254.4
			23-Aug-21		2.0	1.1	254.1
			14-Sep-21		2.0	1.1	254.1
			13-Oct-21		1.7	0.8	254.5
			15-Nov-21		1.5	0.6	254.6
			13-Dec-21		1.3	0.4	254.9
			11-Jan-22		1.3	0.3	254.9
			15-Feb-22		1.5	0.6	254.6
			14-Mar-22		1.2	0.3	254.9
			19-Apr-22		1.2	0.3	254.9
BH21-3	256.6	4.5-6.0	25-Feb-21	1.0	4.4	3.4	253.2
			13-Apr-21		4.1	3.1	253.5
			18-May-21		4.1	3.1	253.5
			21-Jun-21		4.0	3.0	253.6
			16-Jul-21		4.7	3.7	252.9
			23-Aug-21		4.8	3.8	252.8
			14-Sep-21		4.9	3.9	252.7
			13-Oct-21		4.9	3.9	252.7
			15-Nov-21		4.8	3.8	252.8
			13-Dec-21		4.4	3.4	253.2
			11-Jan-22		4.2	3.2	253.4
			15-Feb-22		4.5	3.5	253.1
			14-Mar-22		4.3	3.3	253.3
			19-Apr-22		3.8	2.8	253.8
BH21-4	256.7	10.7-12.2	25-Feb-21	0.9	2.6	1.7	255.0
			13-Apr-21		1.2	0.3	256.4
			25-Feb-21			Frozen	
			18-May-21		1.1	0.2	256.5
			21-Jun-21		1.1	0.2	256.5
			16-Jul-21		1.3	0.4	256.3
			23-Aug-21		1.3	0.4	256.3
			14-Sep-21		1.4	0.5	256.2
			13-Oct-21		1.4	0.5	256.2

			15-Nov-21		1.4	0.5	256.2
			13-Dec-21		1.4	0.5	256.2
			11-Jan-22		1.4	0.5	256.2
			15-Feb-22		1.4	0.5	256.2
			14-Mar-22		1.4	0.5	256.2
			19-Apr-22		1.4	0.5	256.2
BH21-5	255.6	9.2-12.2	13-Apr-21	0.9	2.9	2.0	253.6
			18-May-21		1.0	0.1	255.5
			21-Jun-21		2.1	1.2	254.4
			23-Aug-21		1.8	0.9	254.7
			14-Sep-21		1.6	0.7	254.9
			13-Oct-21		1.2	0.4	255.3
			15-Nov-21		1.1	0.3	255.3
			13-Dec-21		0.8	0.0	255.6
			11-Jan-22		0.9	0.1	255.5
			15-Feb-22		1.1	0.3	255.3
			14-Mar-22		0.8	-0.1*	255.7
			19-Apr-22		0.7	-0.2*	255.8
BH19-5	254.3	12.2-15.2	13-Apr-21	0.8	0.8	0.0	254.3
			18-May-21		0.9	0.1	254.2
			21-Jun-21		1.0	0.2	254.1
			16-Jul-21		1.3	0.5	253.8
			23-Aug-21		-		
			14-Sep-21		1.5	0.7	253.6
			13-Oct-21		1.2	0.4	253.9
			15-Nov-21		1.0	0.3	254.0
			13-Dec-21		0.8	0.0	254.3
			11-Jan-22		0.7	-0.1*	254.4
			15-Feb-22		0.7	-0.1*	254.4
			14-Mar-22		0.7	-0.1*	254.4
			19-Apr-22		0.7	-0.1*	254.4
			7-Oct-24		1.2	0.4	253.9
			19-Nov-24		2.0	1.2	253.1
BH24-1	256.6	6.1-9.1	13-Nov-24	0.9	2.7	1.8	254.8
			19-Nov-24		2.8	1.9	254.7
BH24-4	255.4	4.6-7.6	13-Nov-24	0.9	2.2	1.3	254.1
			19-Nov-24		2.3	1.4	254.0
BH24-5	254.9	4.6-7.7	13-Nov-24	0.9	2.3	1.4	253.5
			19-Nov-24		2.4	1.5	253.4
BH24-8	254.5	4.1-7.1	13-Nov-24	0.9	2.3	1.4	253.1
			19-Nov-24		2.5	1.6	252.9
BH24-9	255.8	5.6-8.6	13-Nov-24	0.9	3.1	2.2	253.6
			19-Nov-24		5.9	5.0	250.8

*denotes groundwater level above existing grade

It should be noted that the groundwater levels can vary and are subject to seasonal fluctuations in response to major weather events.

Further groundwater monitoring must be carried out to confirm the groundwater conditions. Refer to DS's hydrogeological report for more information regarding long-term groundwater levels at the site to major weather events.

4. GEOTECHNICAL DISCUSSION AND RECOMMENDATIONS

4.1 ARTESIAN CONDITIONS & SAFE EXCAVATION DEPTHS (SED)

Based on the hydrogeology report prepared for the subject site, the northern part of the site is located within the physiographic region of the Oak Ridges Moraine (ORM), which contains granular water bearing strata within its core referred to as the Oak Ridges Moraine Aquifer Complex (ORMAC). During drilling, artesian conditions were encountered at site, with water flowing out of the boreholes. This finding is indicative of a confined aquifer possibly hydraulically connected with the ORMAC.

Groundwater levels in a number of boreholes as shown on **Table 1** were measured at up to 0.2m above the existing grade (artesian conditions). The upward hydraulic head in the cohesionless soil deposits of the Oak Ridges Aquifer Complex (ORAC) creates uplift pressure on overlying till deposits. If the uplift pressure in the aquifer exceeds the overlying weight of the soil, failure of the till unit can occur in excavations in the form of groundwater upwelling and fracturing within the till unit. Remediation of uplift failures can be very difficult and costly. The upward hydraulic pressures from the underlying aquifer create constraints to safe excavations for the basement construction.

Long-term monitoring of groundwater table is recommended to establish stabilized long-term groundwater levels. This office should be retained to review the artesian groundwater conditions for the proposed excavations for the basement foundations prior to the final design of the proposed development. **Table 2** provides the preliminary safe excavation depths at borehole locations, without positive dewatering or de-pressurization of the aquifer. A factor of Safety of 1.43 was used to calculate the safe excavation depths, in accordance with the Canadian Foundation Manual.

Table 2: Approximate Preliminary Safe Excavation Depths in Boreholes Without Positive Dewatering/Depressurization

Borehole No.	Ground Surface Elevation (m)	Depth/Elevation of Groundwater Level (m)	Safe Excavation Depth / Elevation without Positive Dewatering/ Depressurization**
BH19-5	254.3	-0.1/254.4*	3.6/250.7

BH21-1	254.5	0.3/254.2	3.9/250.6
BH21-2	255.2	0.3/254.9	3.9/251.3
BH21-3	256.6	2.8/253.3	5.2/251.4
BH21-5	255.6	-0.2/255.6*	3.1/252.5

* groundwater level above existing grade

**Safe Excavation Depths will vary with groundwater table elevations

Dewatering and depressurization of groundwater will be required prior to any excavation below the safe excavation depths and/or groundwater table.

4.2 FOUNDATIONS

It is understood that the proposed high-rise buildings rang from 19 to 29 stories with 2 levels of underground parking (P2). The finished floor elevation of P2 is at Elev. 250.6 m.

4.2.1 Available Bearing Capacity Value for Footings and Raft Foundation

Based on the borehole information, the bearing capacity values of 200 to 400 kPa at SLS (Serviceability Limit States) and 300 to 600 kPa at ULS (Ultimate Limit States) are available for conventional footings and raft foundations founded on the undisturbed native soils, as listed in **Table 3**.

Table 3: Bearing Values and Founding Levels of Conventional Footings/Raft Foundations on Native Soil

Proposed Buildings	BH No.	Ground Surface Elevation At Borehole (m)	Bearing Capacity at SLS (kPa)	Factored Geotechnical Resistance at ULS (kPa)	Minimum Depth below Existing Ground (m)	Founding Level at or below Elevation (m)
Building A (19 Storeys)	BH24-1	256.6	300 400	450 600	2.5 4.6	254.1 252.0
	BH24-2	256.3	300 400	450 600	3.1 6.1	253.2 250.2
Daycare Building F (1 Storey)	BH24-3	256.2	300	450	4.5	251.7
	BH24-4	255.4	300	450	2.3	253.1
Building E (29 Storeys)	BH24-5	254.9	300	450	3.1	251.8
	BH24-6	254.4	200	300	1.5	252.9
	BH21-5	255.6	300	450	2.6	253.0
Building D	BH24-7	254.8	300	450	2.5	252.3

(27 Storeys)	BH24-8	254.5	300	450	2.5	252.0
Building C (24 Storeys)	BH24-9	255.8	300 400	450 600	2.6 5.8	253.2 250.0
	BH24-10	256.0	300	450	3.3	252.7
	BH21-4	256.7	300 400	450 600	3.4 5.7	253.3 251.0
Building B (21 Storeys)	BH24-11	256.3	350	525	3.8	252.5
	BH24-12	256.6	350	525	4.5	252.1
Underground Parking Area	BH19-5	254.3	300	450	2.5	251.8
	BH21-1	254.5	300	450	3.2	251.3
	BH21-2	255.2	300	450	2.5	252.7
	BH21-3	256.6	350	525	3.2	253.4

Foundations designed to the specified bearing capacity of 200 to 400 kPa at the serviceability limit states (SLS) are expected to settle less than 30 mm total and 25 mm differential.

The recommended modulus of subgrade reaction values for the design of raft foundations are listed as follows:

K_t = 7 MPa/m for the design of raft foundations with 200 kPa at SLS.

K_t = 10 MPa/m for the design of raft foundations with 300 kPa at SLS

K_t = 12 MPa/m for the design of raft foundations with 350 kPa at SLS

K_t = 14 MPa/m for the design of raft foundations with 400 kPa at SLS

4.2.2 Combined Raft Foundation and CFA Piles

In the areas where the raft foundation pressure exceeds the recommend bearing capacity specified in **Table 3**, the raft foundation can be augmented with CFA (Continuous Flight Auger) piles to support the loads exceeding the recommended bearing capacity of 200 to 400 kPa at SLS in **Table 3**.

CFA pile of 600 mm diameter with pile toe elevations as specified in **Table 4** can be designed for a bearing capacity value of 2000 kN/pile at SLS and 2700 kN/pile at ULS, provided it is confirmed by the pile load testing.

Table 4: Bearing Capacity and Founding Elevations of CFA Piles

Proposed Buildings	Borehole No.	Bearing Capacity at SLS (kN/Pile)	Factored Geotechnical Resistance at ULS (kN/Pile)	Pile Tip at or below Elevation (m)	Minimum Depth of Pile Tip below P2 Floor (Elev. 250.6 m) (m)
Building A (19 Storeys)	BH24-1 BH24-2	2000	2700	235.0	15.6
Daycare Building F (1 Storey)	BH24-3 BH24-4	2000	2700	234.0	16.6
Building E (29 Storeys)	BH24-5 BH24-6	2000	2700	230.0	20.6
Building D (27 Storeys)	BH24-7 BH24-8	2000	2700	231.0	19.6
Building C (24 Storeys)	BH24-9 BH24-10	2000	2700	233.0	17.6
Building B (21 Storeys)	BH24-11 BH24-12	2000	2700	234.0	16.6

The test piles must be loaded to at least 1.67 times the ULS bearing resistance, i.e. to 4500 kN per pile. Depending on the load test results, deeper/longer piles may be required to achieve the design bearing resistances.

The bearing resistances of CFA piles will be highly dependent on the contractor's experience, the quality and procedure of the pile installation, and the skills of the installation operator(s). The CFA contractor must review the borehole information and evaluate bearing capacity of the piles based on their experience. The quality and the design bearing resistance of the piles must be ensured by the CFA contractor. A specialty contractor should be retained to design and install the CFA piles based on the performance specification and design bearing resistances.

Prior to the pile construction, the contractor should submit the details of the installation plan, load test program, installation procedure, automated monitoring system and control parameters, grout/concrete mix design, and reinforcement installation etc. for the review by the structural engineer and the geotechnical engineer. All pile installation must be inspected by this office.

In order to avoid group effect on the bearing capacity of the piles, the horizontal spacing of adjacent piles should be at least 3 times its diameter.

4.2.3 Other Comments on Foundations

Prior to the placement of concrete, all foundation bases must be inspected by this office to confirm the design bearing values. The subgrade of foundation base should be covered with 50 mm thick lean concrete slab immediately after inspection and cleaning.

All footings/piles exposed to seasonal freezing conditions must have at least 1.2 metres of soil cover for frost protection.

Where it is necessary to place footings/piles at different levels, the upper footing must be founded below an imaginary 10 horizontal to 7 vertical line drawn up from the base of the lower footing. The lower footing must be installed first to help minimize the risk of undermining the upper footing.

It should be noted that the recommended bearing capacities have been calculated by DS Consultants Ltd. from the borehole information for the design stage only. The investigation and comments are necessarily on-going as new information of the underground conditions becomes available. For example, more specific information is available with respect to conditions between boreholes when foundation construction is underway. The interpretation between boreholes and the recommendations of this report must therefore be checked through field inspections provided by DS Consultants Ltd. to validate the information for use during the construction stage.

4.3 FLOOR SLAB AND PERMANENT DRAINAGE

The floor slab can be supported on grade provided the fill, and surficially softened soils are removed and the base thoroughly proof rolled. The fill required to raise the grade can consist of inorganic soil, placed in shallow lifts and compacted to 98 percent of Standard Proctor Maximum Dry Density (SPMDD).

A moisture barrier consisting of at least 200mm of 19mm clear crushed stone should be installed under the floor slab.

A perimeter and underfloor drainage system will be required. Typical drainage and backfill recommendations are illustrated on **Drawing 22** and **Drawing 23** for the shored excavation system and on **Drawing 24** for open cut excavation. Feasibility of installing permanent perimeter and underfloor drainage in the basement must be carried out with hydrogeological investigations to estimate the seepage rates. If the City does not give permission to drain into the storm sewers, then the building foundations must be designed as watertight structures.

Where the exposed subgrade consists of cohesionless soil below the water table, all openings including the subgrade must be entirely covered or wrapped with geotextile filter fabric, typically a Class II non-woven textile with a filtration opening size (F.O.S.) of 50 to 100 μm.

4.4 EXCAVATION AND GROUNDWATER CONTROL

Excavations can be carried out with heavy hydraulic backhoe. Stabilized groundwater levels in the monitoring wells were found at 0.2 m above existing grade to 5.0 m below existing grade, corresponding to Elevations 250.8 to 256.5 m.

Dewatering and depressurization of groundwater will be required prior to any excavation below the safe excavation depths and/or groundwater table. Safe excavation depth (SED) values at the borehole locations are listed on Table 2 in Section 4.1 of this report.

More comments regarding the type and extent of groundwater control required at site during construction and permanent drainage are provided in our hydrogeology report. This office should be retained to review the artesian groundwater conditions for the proposed excavations prior to the final design of the proposed development.

It should be noted that the till is a non-sorted sediment and therefore may contain boulders. Possible large obstructions such as buried concrete pieces are also anticipated in the fill material. Provisions must be made in the excavation contract for the removal of possible boulders in the till or obstructions in the fill material.

All temporary excavations must be carried out in accordance with the most recent Occupational Health and Safety Act (OHSA). In accordance with OHSA, the fill material and cohesionless deposits (sand, sandy silt to silty sand and sand and gravel) can be classified as Type 3 Soil above groundwater table and Type 4 Soil below groundwater table. The very stiff to hard clayey soils can be classified as Type 2 soil above the groundwater table and Type 3 Soil below the groundwater table.

The select inorganic fill and native soils free from topsoil and organics can be used as general construction backfill where it can be compacted with sheep's foot type compactors. Loose lifts of soil, which are to be compacted, should not exceed 200 mm.

Imported Granular 'B' fill is recommended in areas where free draining material is required, i.e. backfill behind foundation walls and in footing trenches.

Imported granular fill, which can be compacted with hand-held equipment, should be used in confined areas.

Depending on the time of construction and weather, some excavated material may be too wet to compact and will require aeration prior to its use.

It should be noted that the excavated soils are subject to moisture content increase during wet weather which would make these materials too wet for adequate compaction. Stockpiles should therefore be compacted at the surface or be covered with tarpaulins to help minimize moisture uptake.

4.5 EARTH PRESSURES

The lateral earth pressures acting on walls may be calculated from the following expression:

$$p = K(\gamma\ h + q)$$

where p = Lateral earth pressure in kPa acting at depth h

K = Earth pressure coefficient equal to 0.4 for vertical walls and horizontal backfill.

γ = Unit weight of backfill, a value of 21 kN/m³ may be assumed

h = Depth to point of interest in metres

q = Equivalent value of surcharge on the ground surface in kPa

The above expression assumes that the perimeter drainage system prevents the build up of any hydrostatic pressure behind the wall.

4.6 EARTHQUAKE CONSIDERATIONS

Based on the borehole information and according to Table 4.1.8.4.A of OBC 2012, the subject site for the proposed building with two levels of basement can be classified as 'Class C' for seismic site response.

4.7 TEMPORARY SHORING

The proposed excavation may be supported by a temporary shoring system consisting of timber lagging and soldier piles. A caisson wall may be required to support adjacent structures (e.g. surrounding buildings and utilities). The requirement for caisson walls to support adjacent structures is given on **Drawing 25**.

The shoring system must be designed in accordance with the 4th Edition of the Canadian Foundation Engineering Manual. The surcharge loading from adjacent structures must be considered. The soil parameters estimated to be applicable for this design are as follows:

1) Earth Pressure Coefficient for shoring:

   (a) where movement must be minimal, K=0.45

   (b) where minor movement (.002H) can be tolerated K=0.30

   (c) passive earth pressure for soldier piles (unfactored) K_p=3.5 for dense to very dense soils and very stiff to hard soils

2) For stability check

$\phi = 30°$

$C = 0$

$\gamma = 21\ kN/m^3$

surcharge is to be determined by shoring contractor

3) For anchors

A bond stress of 100 kPa can be used for post-grouted anchors in dense to very dense soil and very stiff to hard soils, and 50 kPa in stiff/compact soils

The bond value is for preliminary design purpose. The actual bond values will depend on anchor installation methods and grouting procedures. Gravity poured concrete can result in low bond values while pressure grouted anchors will give higher values and produce a more satisfactory anchor. Casing will be required during the construction of the tiebacks to prevent caving of soils. The soldier piles should be installed in pre-augered holes taken below the deepest excavation. The holes should be filled with concrete below the excavation level and half bag mix above the base of the excavation. The concrete strength must be specified by the shoring designer. Temporary liners may be required to help prevent caving during the installation period. Positive measures may be required to prevent the loss of soil through the spaces between the lagging boards. This could probably be achieved by placing well-graded sand and gravel behind the lagging boards or by installing a geotextile filter cloth.

Soil anchors will be required to support the shoring. The anchors must be of a length that meets the Canadian Foundation Manual recommendations. It is important to note that the minimum length lies beyond the $45 - \phi/2 + .15H$ line drawn from the base of the soldier pile and the overall stability of the system must be checked at each anchor level, where H is the shoring height.

The top anchor must not be placed lower than 3.0 meters below the top of level ground surface. Anchors will require casing when penetrating through wet sandy/silty soils. The bond values of anchors are preliminary since the contractor's installation procedures will determine the actual soil to concrete bond value. Hence, the contractor must decide on a capacity and confirm its availability. All anchors must be tested as indicated in the Foundation Manual, 4th edition.

Adhesion on the buried caisson shaft or behind the shoring system must be neglected when designing this shoring system.

Movement of the shoring system is inevitable. Vertical movements will result from the vertical load on the soldier piles resulting from the inclined tiebacks and inward horizontal movement results from earth and water pressures. The magnitude of this movement can be controlled by

sound construction practices, and it is anticipated that the horizontal movement will be in the range of 0.1 to 0.25%H.

To ensure that movements of the shoring are within an acceptable range, monitoring must be carried out. Vertical and horizontal targets on the soldier piles must be located and surveyed before excavation begins. Weekly readings during excavation should show that the movements will be within those predicted; if not, the monitoring results will enable directions to be given to improve the shoring.

4.8 PAVEMENTS

The recommended pavement structures provided in **Table 5** are based upon an estimate of the subgrade soil properties determined from visual examination and textural classification of the soil samples. The values may need to be adjusted based on the city standards. Consequently, the recommended pavement structures should be considered for preliminary design purposes only. If required, a more refined pavement structure design can be performed based on specific traffic data and design life requirements and will involve specific laboratory tests to determine frost susceptibility and strength characteristics of the subgrade soils, as well as specific data input from the client.

Table 5: Recommended Pavement Structure Thickness

Pavement Layer	Compaction Requirements	Light Duty Parking (Cars)	Heavy Duty Parking/Driveway (Delivery Trucks)
Asphaltic Concrete	92.0 to 96.5% Maximum Relative Density (MRD)	40 mm HL 3 or SP 12.5 50 mm HL 8 or SP 19.0	40 mm HL 3 or SP 12.5 80 mm HL 8 or SP 19.0
OPSS Granular A Base (or 19mm Crusher Run Limestone)	100% SPMDD*	150 mm	150 mm
OPSS Granular B (or 50mm Crusher Run Limestone)	100% SPMDD	250 mm	350 mm

The subgrade must be compacted to 98% SPMDD for at least the upper 500 mm unless accepted by DS Consultants Ltd.

The long-term performance of the pavement structure is highly dependent upon the subgrade support conditions. Stringent construction control procedures should be maintained to ensure uniform subgrade moisture and density conditions are achieved. In addition, the need for adequate drainage cannot be over-emphasized. The finished pavement surface and underlying

subgrade should be free of depressions and should be sloped (preferably at a minimum grade of two percent) to provide effective surface drainage toward catch basins. Surface water should not be allowed to pond adjacent to the outside edges of pavement areas. Subdrains should be installed to intercept excess subsurface moisture and prevent subgrade softening. This is particularly important in heavy-duty pavement areas.

Additional comments on the construction of parking areas and access roadways are as follows:

1) As part of the subgrade preparation, proposed parking areas and access roadways should be stripped of topsoil and other obvious objectionable material. Fill required to raise the grades to design elevations should conform to backfill requirements outlined in previous sections of this report. The subgrade should be properly shaped, crowned then proof-rolled in the full-time presence of a representative of this office. Soft or spongy subgrade areas should be sub-excavated and properly replaced with suitable approved backfill compacted to 98% SPMDD.

2) The locations and extent of sub-drainage required within the paved areas should be reviewed by this office in conjunction with the proposed lot grading. Assuming that satisfactory crossfalls in the order of two percent have been provided, subdrains extending from and between catch basins may be satisfactory. In the event that shallower crossfalls are considered, a more extensive system of sub-drainage may be necessary and should be reviewed by DS Consultants Ltd.

3) The most severe loading conditions on light-duty pavement areas and the subgrade may occur during construction. Consequently, special provisions such as restricted access lanes, half-loads during paving, etc., may be required, especially if construction is carried out during unfavourable weather.

4) It is recommended that DS Consultants Ltd. be retained to review the final pavement structure designs and drainage plans prior to construction to ensure that they are consistent with the recommendations of this report.

5. GENERAL COMMENTS AND LIMITATIONS OF REPORT

DS Consultants Ltd. (DS) should be retained for a general review of the final design and specifications to verify that this report has been properly interpreted and implemented. If not accorded the privilege of making this review, DS will assume no responsibility for interpretation of the recommendations in the report.

This report is intended solely for the Client named. The material in it reflects our best judgment in light of the information available to DS at the time of preparation. Unless otherwise agreed in writing by DS, it shall not be used to express or imply warranty as to the fitness of the property for

a particular purpose. No portion of this report may be used as a separate entity, it is written to be read in its entirety.

The conclusions and recommendations given in this report are based on information determined at the test hole locations. The information contained herein in no way reflects on the environment aspects of the project, unless otherwise stated. Subsurface and groundwater conditions between and beyond the test holes may differ from those encountered at the test hole locations, and conditions may become apparent during construction, which could not be detected or anticipated at the time of the site investigation.

The benchmark and elevations used in this report are primarily to establish relative elevation differences between the test hole locations and should not be used for other purposes, such as grading, excavating, planning, development, etc.

The design recommendations given in this report are applicable only to the project described in the text and then only if constructed substantially in accordance with the details stated in this report.

The comments made in this report on potential construction problems and possible methods are intended only for the guidance of the designer. The number of test holes may not be sufficient to determine all the factors that may affect construction methods and costs. For example, the thickness of surficial topsoil or fill layers may vary markedly and unpredictably. The contractors bidding on this project or undertaking the construction should, therefore, make their own interpretation of the factual information presented and draw their own conclusions as to how the subsurface conditions may affect their work. This work has been undertaken in accordance with normally accepted geotechnical engineering practices.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. DS accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report. We accept no responsibility for any decisions made or actions taken as a result of this report unless we are specifically advised of and participate in such action, in which case our responsibility will be as agreed to at that time.

We trust that the information contained in this report is satisfactory. Should you have any questions, please do not hesitate to contact this office.

DS CONSULTANTS LTD.

DRAFT

Derek Wang, P.Eng.
Senior Geotechnical Engineer

DRAFT

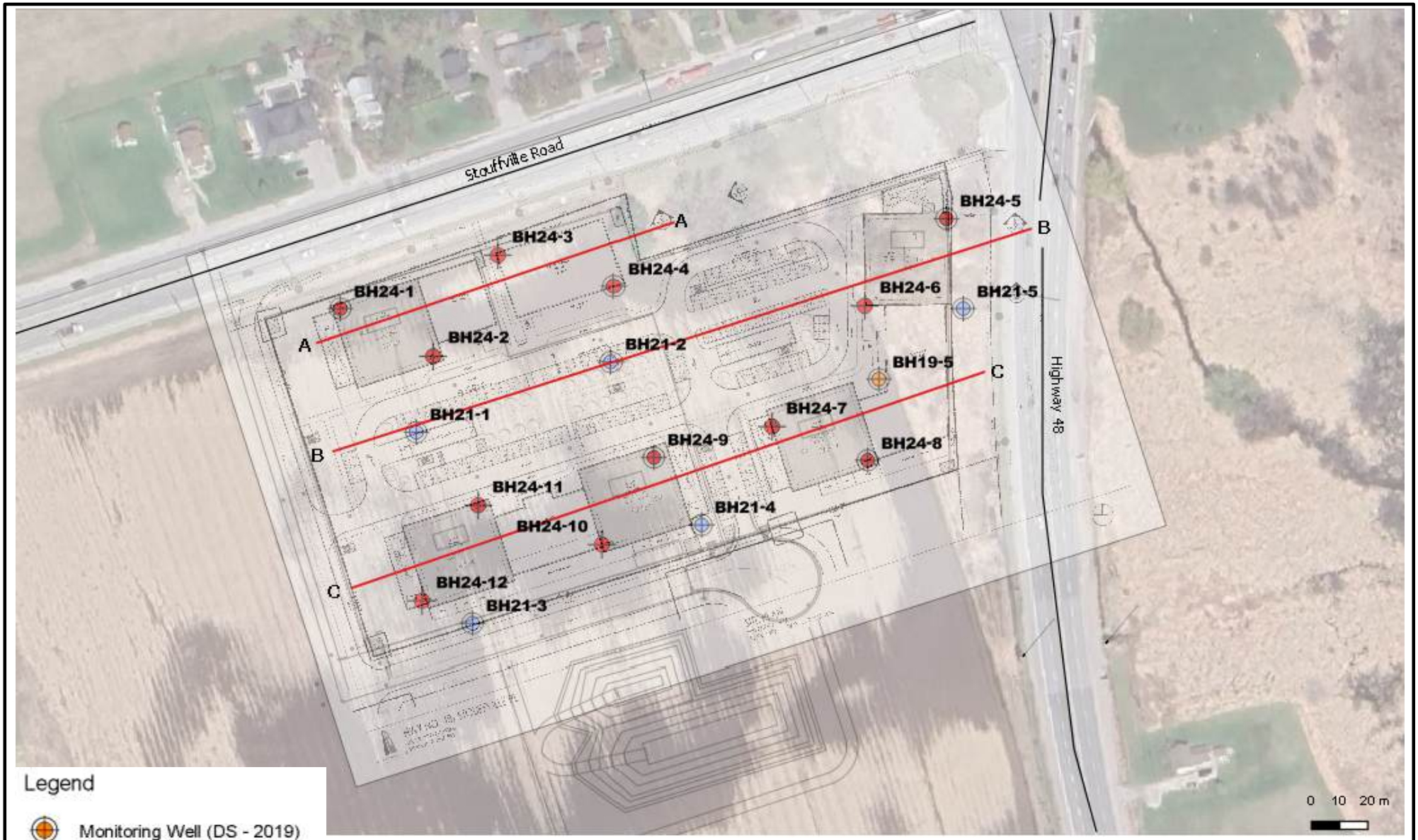
Fanyu Zhu, PhD., P.Eng.
Principal Geotechnical Engineer

DRAFT

Shabbir Bandukwala, M.Eng., P.Eng.
Principal Geotechnical Engineer

Drawings

J:\2019 Projects\19-043-103 Geo - Hydro - 2721 & 5061 Stouffville Road,Whitchurch-Stouffville, ON\Geotechnical\QGIS\1-QGIS\Drawing 1 Borehole Location Plan.qgs Nov-28



Legend

- Monitoring Well (DS - 2019)
- Borehole (DS - 2021)
- Monitoring Well (DS - 2021)
- Borehole (DS - 2024)
- Monitoring Well (DS - 2024)

DS CONSULTANTS LTD.
6221 Highway 7, UNIT 16
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Telephone: (905) 264-9393
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Project: GEOTECHNICAL INVESTIGATION
5061 Stouffville Road, Whitchurch - Stouffville, ON

Title: **BOREHOLE LOCATION PLAN**

N

Client: TIMES GROUP CORPORATION

Size:	Approved By:	Drawn By:	Date:
8.5 x 11	D.W	K.T	November 2024
Rev: 0	Scale: As Shown	Project No.: 19-043-103	Drawing No.: 1

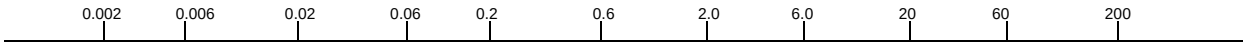
Image/Map Source: *Google Satellite Image*

Drawing 1A: Notes On Sample Descriptions

1. All sample descriptions included in this report generally follow the Unified Soil Classification. Laboratory grain size analyses provided by DS also follow the same system. Different classification systems may be used by others, such as the system by the International Society for Soil Mechanics and Foundation Engineering (ISSMFE). Please note that, with the exception of those samples where a grain size analysis and/or Atterberg Limits testing have been made, all samples are classified visually. Visual classification is not sufficiently accurate to provide exact grain sizing or precise differentiation between size classification systems.

ISSMFE SOIL CLASSIFICATION

CLAY	SILT			SAND			GRAVEL			COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE		



EQUIVALENT GRAIN DIAMETER IN MILLIMETRES

CLAY (PLASTIC) TO	FINE	MEDIUM	CRS.	FINE	COARSE
SILT (NONPLASTIC)	SAND			GRAVEL	

UNIFIED SOIL CLASSIFICATION

2. Fill: Where fill is designated on the borehole log it is defined as indicated by the sample recovered during the boring process. The reader is cautioned that fills are heterogeneous in nature and variable in density or degree of compaction. The borehole description may therefore not be applicable as a general description of site fill materials. All fills should be expected to contain obstruction such as wood, large concrete pieces or subsurface basements, floors, tanks, etc., none of these may have been encountered in the boreholes. Since boreholes cannot accurately define the contents of the fill, test pits are recommended to provide supplementary information. Despite the use of test pits, the heterogeneous nature of fill will leave some ambiguity as to the exact composition of the fill. Most fills contain pockets, seams, or layers of organically contaminated soil. This organic material can result in the generation of methane gas and/or significant ongoing and future settlements. Fill at this site may have been monitored for the presence of methane gas and, if so, the results are given on the borehole logs. The monitoring process does not indicate the volume of gas that can be potentially generated nor does it pinpoint the source of the gas. These readings are to advise of the presence of gas only, and a detailed study is recommended for sites where any explosive gas/methane is detected. Some fill material may be contaminated by toxic/hazardous waste that renders it unacceptable for deposition in any but designated land fill sites; unless specifically stated the fill on this site has not been tested for contaminants that may be considered toxic or hazardous. This testing and a potential hazard study can be undertaken if requested. In most residential/commercial areas undergoing reconstruction, buried oil tanks are common and are generally not detected in a conventional preliminary geotechnical site investigation.

3. Till: The term till on the borehole logs indicates that the material originates from a geological process associated with glaciation. Because of this geological process the till must be considered heterogeneous in composition and as such may contain pockets and/or seams of material such as sand, gravel, silt or clay. Till often contains cobbles (60 to 200 mm) or boulders (over 200 mm). Contractors may therefore encounter cobbles and boulders during excavation, even if they are not indicated by the borings. It should be appreciated that normal sampling equipment cannot differentiate the size or type of any obstruction. Because of the horizontal and vertical variability of till, the sample description may be applicable to a very limited zone; caution is therefore essential when dealing with sensitive excavations or dewatering programs in till materials.

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LOG OF BOREHOLE BH24-1

PROJECT: Geotechnical Investigation
CLIENT: Times Group Corporation
PROJECT LOCATION: 5061 Stouffville Road, Whitchurch-Stouffville, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4869173.7 E 637660.6

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200mm
Date: Oct-24-2024

REF. NO.: 19-043-103
ENCL NO.: 2

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION
256.6 / 0.0	**TOPSOIL:** 270mm						
256.3 / 0.3	**FILL:** sandy silt, trace rootlets, trace gravel, dark brown to brown, moist, compact		1	SS	11		256
255.8 / 0.8	**FILL:** clayey silt, sandy, trace organics, trace cobble, dark brown to brown, moist, stiff		2	SS	14		
255.0 / 1.6	**SANDY SILT TILL:** trace to some clay, trace gravel, occasional cobble, brown, moist, compact to dense		3	SS	21	▽	255
	clayey silt till layer at 2.6m		4	SS	34		254
253.6 / 3.0	**SILTY SAND:** trace clay, brown, wet, dense		5	SS	34		253
252.1 / 4.5	**SILTY CLAY TILL:** sandy, trace gravel, occasional cobble, grey, moist, hard		6	SS	75		252
			7	SS	54		251
249.1 / 7.5	**CLAYEY SILT:** trace sand, grey, moist, hard		8	SS	39		250
247.6 / 9.0	**SANDY SILT TO SILTY SAND TILL:** trace to some clay, trace gravel, occasional cobble, grey, moist to very moist, very dense		9	SS	50/ 130mm		249
			10	SS	50/ 130mm		248
			11	SS	50/ 130mm		247
			12	SS	50/ 130mm		246
			13	SS	50/ 130mm		245
			14	SS	50/		244
							243
							242
							241
							240

W. L. 254.7 m
Nov 19, 2024

DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)
SHEAR STRENGTH (kPa)
○ UNCONFINED + FIELD VANE & Sensitivity
● QUICK TRIAXIAL × LAB VANE
(20 40 60 80 100)

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%) (10 20 30)

POCKET PEN. (Cu) (kPa)
NATURAL UNIT WT (kN/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)	GR	SA	SI	CL
Switched to Mud Rotary				
	4	30	46	20
	6	36	46	12

Continued Next Page

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES
+3, ×3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

LOG OF BOREHOLE BH24-1

PROJECT: Geotechnical Investigation
CLIENT: Times Group Corporation
PROJECT LOCATION: 5061 Stouffville Road, Whitchurch-Stouffville, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4869173.7 E 637660.6

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200mm
Date: Oct-24-2024

REF. NO.: 19-043-103
ENCL NO.: 2

SOIL PROFILE (m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 10 20 30	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
18	**SANDY SILT TO SILTY SAND TILL:** trace to some clay, trace gravel, occasional cobble, grey, moist to very moist, very dense(Continued)				130mm		239				
19			15	SS	50/ 130mm		238		○		
20			16	SS	50/ 130mm		237		○		
21	cobbles/boulders at 21.3m		17	SS	50/ 25mm		236				
22							235				
233.6 23							234				
23.0	**END OF BOREHOLE:** Notes: 1) 50mm dia. monitoring well installed upon completion. 2) Water Level Readings: Date: Water Level(mbgl): Nov. 13, 2024 1.8 Nov. 19, 2024 1.9		18	SS	50/ 75mm				○		

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: +3, ×3: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

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LOG OF BOREHOLE BH24-2

PROJECT: Geotechnical Investigation
CLIENT: Times Group Corporation
PROJECT LOCATION: 5061 Stouffville Road, Whitchurch-Stouffville, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4869156.4 E 637693.6

DRILLING DATA
Method: Hollow Stem Auger
Diameter: 200mm
Date: Oct-28-2024

REF. NO.: 19-043-103
ENCL NO.: 3

(m) ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS 0.3 m "N"	ELEVATION
256.3					
256.0 0.0	**TOPSOIL:** 270mm				
0.3	**FILL:** clayey silt, trace rootlets, trace organics, trace gravel, dark brown to brown, moist, stiff	1	SS	9	256
255.3		2	SS	10	
1.0	**CLAYEY SILT TILL:** sandy, trace gravel, brown, moist, stiff to very stiff	3	SS	10	255
2	silt layer at 2.3m	4	SS	23	254
253.3					
3.0	**SILT:** trace to some clay, trace sand, brown, wet, dense	5	SS	36	253
4					
251.7					252
254.6	**SAND:** trace silt, trace clay, grey,				
5 4.8	wet, dense	6	SS	31	
	CLAYEY SILT TILL: sandy, trace gravel, occasional cobble, grey, moist, hard				251
6		7	SS	50/ 100mm	250
7	silt layer at 7.6m				249
8		8	SS	33	248
9		9	SS	50/ 130mm	247
10					
245.8					246
10.5	**SANDY SILT TO SILTY SAND TILL:** trace to some clay, trace gravel, grey, very moist, very dense	10	SS	50/ 130mm	
11	silt layer at 10.7m				245
12		11	SS	50/ 100mm	244
13					243
14		12	SS	50/ 130mm	
15					242
240.8		13	SS	50/ 100mm	241
15.5	**END OF BOREHOLE:**				

Notes:
1) Water encountered at 3.0m during drilling.

GROUND WATER CONDITIONS

DYNAMIC CONE PENETRATION RESISTANCE PLOT
20 40 60 80 100

SHEAR STRENGTH (kPa)
○ UNCONFINED + FIELD VANE & Sensitivity
● QUICK TRIAXIAL × LAB VANE
20 40 60 80 100

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30

POCKET PEN. (Cu) (kPa)

NATURAL UNIT WT (kN/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)
GR SA SI CL

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
+3, ×3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

DS SOIL LOG-2021-FINAL 19-043-103GEO.GPJ DS.GDT 24-12-13

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LOG OF BOREHOLE BH24-3

PROJECT: Geotechnical Investigation
CLIENT: Times Group Corporation
PROJECT LOCATION: 5061 Stouffville Road, Whitchurch-Stouffville, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4869192.4 E 637716.7

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200mm
Date: Oct-26-2024

REF. NO.: 19-043-103
ENCL NO.: 4

ELEV / DEPTH (m)	DESCRIPTION	NUMBER	TYPE	BLOWS 0.3 m "N"	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
256.2 / 0.0	**TOPSOIL:** 250mm	1	SS	8	
0.3 / 255.3	**FILL:** sandy silt, trace rootlets, trace gravel, dark brown to brown, moist, loose to compact	2	SS	15	
0.9	**CLAYEY SILT TILL:** sandy, trace gravel, occasional cobble, brown, moist, very stiff	3	SS	17	
253.8 / 2.4	**SILT:** trace to some clay, trace sand, brown, moist to wet, dense	4	SS	37	
253.2 / 3.0	**CLAYEY SILT TILL:** sandy, trace gravel, grey, moist, stiff to hard	5	SS	12	Switched to Mud Rotary
		6	SS	30	
		7	SS	26	
248.7 / 7.5	**CLAYEY SILT:** trace sand, grey, moist, very stiff	8	SS	26	
247.2 / 9.0	**SANDY SILT TO SILTY SAND TILL:** trace to some clay, trace gravel, occasional cobble, grey, moist to very moist, very dense	9	SS	50/ 100mm	
		10	SS	50/ 130mm	
		11	SS	50/ 100mm	
		12	SS	50/ 130mm	
		13	SS	50/ 130mm	
		14	SS	50/	

GROUND WATER CONDITIONS

ELEVATION: 256, 255, 254, 253, 252, 251, 250, 249, 248, 247, 246, 245, 244, 243, 242, 241, 240

DYNAMIC CONE PENETRATION RESISTANCE PLOT
20 40 60 80 100

SHEAR STRENGTH (kPa)
○ UNCONFINED + FIELD VANE & Sensitivity
● QUICK TRIAXIAL × LAB VANE
20 40 60 80 100

PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30

POCKET PEN. (Cu) (kPa)

NATURAL UNIT WT (kN/m³)

Continued Next Page

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
+3, ×3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

LOG OF BOREHOLE BH24-3

PROJECT: Geotechnical Investigation
CLIENT: Times Group Corporation
PROJECT LOCATION: 5061 Stouffville Road, Whitchurch-Stouffville, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4869192.4 E 637716.7

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200mm
Date: Oct-26-2024

REF. NO.: 19-043-103
ENCL NO.: 4

ELEV / DEPTH (m)	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS "N" 0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	SANDY SILT TO SILTY SAND TILL: trace to some clay, trace gravel, occasional cobble, grey, moist to very moist, very dense(Continued)				75mm		239					
18												
			15	SS	50/ 50mm		238					
19												
236.4							237					
20 19.8	**CLAYEY SILT TILL:** sandy, trace gravel, grey, moist, hard		16	SS	50/ 100mm				○			
21							236					
			17	SS	50/ 130mm		235		○			
22							234					
23												
232.8			18	SS	50/ 130mm		233		⊖			6 39 39 16
23.4	**END OF BOREHOLE:** Notes: 1) Water encountered at 2.4m during drilling.											

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES: $+^3$, $\times^3$: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

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LOG OF BOREHOLE BH24-4

PROJECT: Geotechnical Investigation
CLIENT: Times Group Corporation
PROJECT LOCATION: 5061 Stouffville Road, Whitchurch-Stouffville, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4869181.5 E 637757.2

DRILLING DATA
Method: Hollow Stem Auger
Diameter: 200mm
Date: Oct-28-2024

REF. NO.: 19-043-103
ENCL NO.: 5

SOIL PROFILE (m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100	SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 10 20 30	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
255.4													
255.2 0.0	**TOPSOIL:** 250mm												
0.3	**FILL:** clayey silt, trace rootlets, trace organics, trace gravel, dark brown to brown, moist, stiff to very stiff		1	SS	10		255						
254.4 1.0			2	SS	20	▽	254						
	CLAYEY SILT TO SILTY CLAY TILL: sandy, trace gravel, brown, moist, stiff to hard		3	SS	13		W. L. 254.0 m Nov 19, 2024						
2			4	SS	42		253						
3	grey below 3.0 m		5	SS	26		252						
4							251						
5			6	SS	32								1 22 51 26
6	silt layer at 6.1 m						250						
			7	SS	54		249						
7							248						
8			8	SS	19								
246.4 9.0							247						
	SANDY SILT TILL: trace to some clay, trace gravel, occasional cobble, grey, moist, very dense		9	SS	50/ 130mm		246						
10							245						
11			10	SS	81		244						
243.4 12.0													
	CLAYEY SILT TILL: sandy, trace gravel, occasional cobble, grey, moist, hard		11	SS	50/ 130mm		243						
13							242						
14			12	SS	50/ 130mm		241						
15													
239.9 15.5			13	SS	50/ 100mm		240						
	END OF BOREHOLE: Notes: 1) 50mm dia. monitoring well installed upon completion. 2) Water Level Readings:												

Continued Next Page

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES
+ 3, × 3: Numbers refer to Sensitivity
○ 8=3% Strain at Failure

LOG OF BOREHOLE BH24-4

PROJECT: Geotechnical Investigation
CLIENT: Times Group Corporation
PROJECT LOCATION: 5061 Stouffville Road, Whitchurch-Stouffville, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4869181.5 E 637757.2

DRILLING DATA
Method: Hollow Stem Auger
Diameter: 200mm
Date: Oct-28-2024

REF. NO.: 19-043-103
ENCL NO.: 5

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE 20 40 60 80 100	PLASTIC LIMIT / NATURAL MOISTURE CONTENT / LIQUID LIMIT w_P w w_L WATER CONTENT (%) 10 20 30	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)
(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m						GR SA SI CL
	Date: Water Level(mbgl): Nov. 13, 2024 1.3 Nov. 19, 2024 1.4										

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: +3, ×3: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

DS CONSULTANTS LTD.
Geotechnical ◆ Environmental ◆ Materials ◆ Hydrogeology

LOG OF BOREHOLE BH24-5

PROJECT: Geotechnical Investigation
CLIENT: Times Group Corporation
PROJECT LOCATION: 5061 Stouffville Road, Whitchurch-Stouffville, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4869205.3 E 637875.1

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200mm
Date: Nov-05-2024

REF. NO.: 19-043-103
ENCL NO.: 6

(m) ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS 0.3 m "N"	ELEVATION
254.9					
254.8 / 0.1	**TOPSOIL:** 150mm	1	SS	30	
254.4 / 0.5	**FILL:** sandy silt, trace rootlets, brown, moist, dense				
1	**FILL:** clayey silt, trace to some organics, trace rootlets, dark grey, moist, firm	2	SS	5	254
253.2 / 1.7	mixed with organics at 0.8m	3	SS	4	
2	**FILL:** silty sand, trace clay, trace gravel, brown, wet, loose to compact				
252.5 / 2.4	**CLAYEY SILT TILL:** trace to some sand, trace gravel, brown, moist, stiff to hard	4	SS	13	
3		5	SS	65	252
4		6	SS	50/150mm	251
	grey below 4.6m	7	SS	46	250
249.6 / 5.3	**CLAYEY SILT:** silt interbeds, trace to some sand, trace gravel, grey, moist, very stiff to hard	8	SS	58	
6		9	SS	31	249
7		10	SS	35	248
8		11	SS	23	247
246.5 / 8.4	**CLAYEY SILT TILL:** sandy, trace gravel, grey, moist, very stiff	12	SS	17	
9		13	SS	25	246
10					245
244.4 / 10.5	**SANDY SILT TO SILTY SAND TILL:** trace to some clay, trace gravel, occasional cobble, grey, very moist to wet, compact to very dense	14	SS	20	244
12	very dense below 12.0m	15	SS	50/150mm	243
13					242
14	wet below 13.7m	16	SS	50/130mm	241
15					240
16		17	SS	50/130mm	239
17		18	SS	50/	238

GROUND WATER CONDITIONS: W. L. 253.4 m, Nov 19, 2024

DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)

SHEAR STRENGTH (kPa) (20 40 60 80 100)
○ UNCONFINED + FIELD VANE & Sensitivity
● QUICK TRIAXIAL × LAB VANE

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%) (10 20 30)

POCKET PEN. (Cu) (kPa)

NATURAL UNIT WT (kN/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)

	GR	SA	SI	CL
Switched to Mud Rotary				
	2	10	71	17

Continued Next Page

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES
+3, ×3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

DS SOIL LOG-2021-FINAL 19-043-103GEO.GPJ DS.GDT 24-12-13

LOG OF BOREHOLE BH24-5

PROJECT: Geotechnical Investigation
CLIENT: Times Group Corporation
PROJECT LOCATION: 5061 Stouffville Road, Whitchurch-Stouffville, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4869205.3 E 637875.1

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200mm
Date: Nov-05-2024

REF. NO.: 19-043-103
ENCL NO.: 6

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS "N" 0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	SANDY SILT TO SILTY SAND TILL: trace to some clay, trace gravel, occasional cobble, grey, very moist to wet, compact to very dense(Continued)				130mm							
18	gravelly at 18.3m		19	SS	50/ 75mm		237					
19							236					
20			20	SS	50/ 100mm		235					
21							234					
233.6												
21.3	**CLAYEY SILT TILL:** sandy, trace gravel, grey, moist, hard		21	SS	50/ 130mm							
22							233					
231.9												
23.0	**END OF BOREHOLE:**		22	SS	50/ 100mm		232					

Notes:
1) 50mm dia. monitoring well installed beside original location.
2) Water Level Readings:

Date:	Water Level(mbgl):
Nov. 13, 2024	1.4
Nov. 19, 2024	1.5

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES
+ 3, × 3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

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LOG OF BOREHOLE BH24-6

PROJECT: Geotechnical Investigation
CLIENT: Times Group Corporation
PROJECT LOCATION: 5061 Stouffville Road, Whitchurch-Stouffville, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4869174.4 E 637846.4

DRILLING DATA
Method: Hollow Stem Auger
Diameter: 200mm
Date: Oct-31-2024

REF. NO.: 19-043-103
ENCL NO.: 7

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION
254.4							
254.2 0.0	**TOPSOIL:** 230mm		1	SS	7		254
0.2	**FILL:** clayey silt, trace rootlets, trace organics, trace gravel, dark brown to brown, moist, firm						
253.5 0.9	**CLAYEY SILT TILLL:** sandy, trace gravel, occasional cobble, brown, moist, very stiff to hard		2	SS	19		253
2			3	SS	21		
			4	SS	24		252
3	grey below 3.1m		5	SS	35		251
4			6	SS	18		
249.9 4.5	**CLAYEY SILT:** frequent silt layers, trace sand, grey, moist, stiff to very stiff		7	SS	17		250
5			8	SS	11		249
6	trace gravel below 6.1m		9	SS	12		248
7			10	SS	26		247
8			11	SS	21		
246.0 8.4	**CLAYEY SILT TILL:** sandy, trace gravel, grey, moist, very stiff		12	SS	19		246
9			13	SS	17		245
10							244
243.9 10.5	**SANDY SILT TO SILTY SAND TILL:** trace to some clay, trace gravel, grey, very moist to wet, compact to very dense		14	SS	20		
11							243
12			15	SS	63		242
13							241
14	wet at 13.7m		16	SS	17		
15							240
239.0			17	SS	50/ 75mm		239
15.4	**END OF BOREHOLE:** Notes: 1) Water encountered at 4.0m during drilling.						

DYNAMIC CONE PENETRATION RESISTANCE PLOT
20 40 60 80 100

SHEAR STRENGTH (kPa)
○ UNCONFINED + FIELD VANE & Sensitivity
● QUICK TRIAXIAL × LAB VANE
20 40 60 80 100

PLASTIC LIMIT / NATURAL MOISTURE CONTENT / LIQUID LIMIT
w_P w w_L
WATER CONTENT (%)
10 20 30

POCKET PEN. (Cu) (kPa)

NATURAL UNIT WT (kN/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)
GR SA SI CL

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
+3, ×3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

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LOG OF BOREHOLE BH24-7

PROJECT: Geotechnical Investigation
CLIENT: Times Group Corporation
PROJECT LOCATION: 5061 Stouffville Road, Whitchurch-Stouffville, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4869131.3 E 637813.6

DRILLING DATA
Method: Hollow Stem Auger
Diameter: 200mm
Date: Nov-01-2024

REF. NO.: 19-043-103
ENCL NO.: 8

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
254.8												
254.6	**TOPSOIL:** 250mm											
0.3	**FILL:** clayey silt, trace rootlets, trace organics, trace gravel, dark brown to brown, moist, stiff		1	SS	8							
253.9												
0.9	**CLAYEY SILT TILLL:** sandy, trace gravel, occasional cobble, brown, moist, stiff to hard		2	SS	13		254					
			3	SS	17		253					
			4	SS	52		252					
			5	SS	36		251					
251.0												
3.8	**SANDY SILT TILL:** trace to some clay, trace gravel, brown to grey, moist, very dense		6	SS	50/ 130mm		251					
250.3												
4.5	**CLAYEY SILT TILL:** sandy, frequent silt pockets, trace gravel, occasional cobble, grey, moist, very stiff to hard		7	SS	49		250					
			8	SS	27		249					
			9	SS	54		248					
			10	SS	26							
			11	SS	24		247					
			12	SS	22		246					
			13	SS	25		245					
			14	SS	disturbed		244					
242.8							243					
12.0	**SAND:** some gravel, trace silt, trace clay, grey, wet, very dense		15	SS	69		242					15 73 9 1
241.3												
13.5	**SANDY SILT TILL:** trace to some clay, trace gravel, grey, very moist, very dense		16	SS	63		241					
							240					
239.3			17	SS	50/ 75mm							
15.5	**END OF BOREHOLE:**											

Notes:
1) Water encountered at 3.8 m during drilling.

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: $+^3$, $\times^3$: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

DS SOIL LOG-2021-FINAL 19-043-103GEO.GPJ DS.GDT 24-12-13

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LOG OF BOREHOLE BH24-8

PROJECT: Geotechnical Investigation
CLIENT: Times Group Corporation
PROJECT LOCATION: 5061 Stouffville Road, Whitchurch-Stouffville, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4869119.5 E 637847.1

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200mm
Date: Oct-30-2024

REF. NO.: 19-043-103
ENCL NO.: 9

ELEV / DEPTH (m)	DESCRIPTION	NUMBER	TYPE	BLOWS "N" 0.3 m	ELEVATION
254.5 / 0.0	**TOPSOIL:** 250mm	1	SS	6	254
0.3 / 253.5	**FILL:** clayey silt, trace rootlets, trace organics, trace gravel, dark brown to brown, moist, firm	2	SS	8	
1.0	**CLAYEY SILT TILLL:** some sand, trace gravel, occasional cobble, brown, moist, stiff to hard	3	SS	14	253
		4	SS	22	252
		5	SS	38	251
	grey below 3.8m	6	SS	72	
		7	SS	50/100mm	250
		8	SS	36	249
248.5 / 6.0	**CLAYEY SILT:** silt seams/layers, trace sand, grey, moist, very stiff to hard	9	SS	39	248
		10	SS	23	247
		11	SS	21	
		12	SS	15	246
	trace gravel at 9.1m	13	SS	16	245
243.8 / 10.7	**SANDY SILT TO SILTY SAND TILL:** trace to some clay, trace gravel, grey, moist, very dense	14	SS	67	244
		15	SS	50/130mm	243
		16	SS	50/130mm	242
		17	SS	50/130mm	241
					240
					239
					238

GROUND WATER CONDITIONS: W. L. 252.9 m Nov 19, 2024

DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)
SHEAR STRENGTH (kPa) (20 40 60 80 100)
○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%) (10 20 30)

POCKET PEN. (Cu) (kPa)
NATURAL UNIT WT (kN/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)

	GR	SA	SI	CL
Switched to Mud Rotary at 3.1m				
	1	8	72	18
	7	44	42	7

Continued Next Page

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: +3, ×3: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

LOG OF BOREHOLE BH24-8

PROJECT: Geotechnical Investigation
CLIENT: Times Group Corporation
PROJECT LOCATION: 5061 Stouffville Road, Whitchurch-Stouffville, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4869119.5 E 637847.1

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200mm
Date: Oct-30-2024

REF. NO.: 19-043-103
ENCL NO.: 9

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 10 20 30	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
18	**SANDY SILT TO SILTY SAND TILL:** trace to some clay, trace gravel, grey, moist, very dense(Continued)		18	SS	50/ 130mm		237		○			
19			19	SS	50/ 100mm		236					
234.5							235					
20.0	**SILT:** trace to some clay, trace sand, trace gravel, grey, moist, very dense		20	SS	50/ 130mm				○ ○			
21 233.2							234					
21.3	**SILTY SAND TO SANDY SILT TILL:** trace clay, trace gravel, grey, moist, very dense		21	SS	50/ 75mm		233					
22							232					
23 231.1			22	SS	50/ 130mm				○			
23.4	**END OF BOREHOLE:** Notes: 1) 50mm dia. monitoring well installed upon completion. 2) Water Level Readings: Date: Water Level(mbgl): Nov. 13, 2024 1.4 Nov. 19, 2024 1.6											

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES: +3, ×3: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

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LOG OF BOREHOLE BH24-9

PROJECT: Geotechnical Investigation
CLIENT: Times Group Corporation
PROJECT LOCATION: 5061 Stouffville Road, Whitchurch-Stouffville, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4869120.9 E 637771.7

DRILLING DATA
Method: Hollow Stem Auger
Diameter: 200mm
Date: Oct-29-2024

REF. NO.: 19-043-103
ENCL NO.: 10

(m) ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS 0.3 m "N"	ELEVATION
255.8 / 0.0	**TOPSOIL:** 270mm				
0.3 / 254.8	**FILL:** clayey silt, trace rootlets, trace organics, trace gravel, dark brown to brown, moist, stiff	1	SS	8	255
1.0 / 253.2	**CLAYEY SILT TILL:** sandy, trace gravel, brown, moist, stiff to hard	2	SS	12	254
		3	SS	11	
		4	SS	32	253
2.6 / 251.3	**SILT:** trace clay, trace sand, brown to grey, wet, dense	5	SS	31	252
4.5 / 246.8	**CLAYEY SILT TILL:** sandy, trace gravel, grey, moist, very stiff to hard	6	SS	25	251
		7	SS	34	250
		8	SS	30	249
9.0 / 245.3	**CLAYEY SILT:** trace sand, silt layers, grey, moist, hard	9	SS	30	248
10.5	**SANDY SILT TO SILTY SAND TILL:** trace to some clay, trace gravel, occasional cobble, grey, moist to very moist, very dense	10	SS	50/ 30mm	247
		11	SS	50/ 30mm	246
		12	SS	50/ 30mm	245
		13	SS	50/ 100mm	244
		14	SS	50/	243
					242
					241
					240
					239

GROUND WATER CONDITIONS: W. L. 250.8 m, Nov 19, 2024

DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)

SHEAR STRENGTH (kPa) (20 40 60 80 100)
○ UNCONFINED + FIELD VANE & Sensitivity
● QUICK TRIAXIAL × LAB VANE

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%) (10 20 30)

POCKET PEN. (Cu) (kPa)

NATURAL UNIT WT (kN/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)

GR	SA	SI	CL
0	9	88	3

Continued Next Page

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
+3, ×3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

DS SOIL LOG-2021-FINAL 19-043-103GEO.GPJ DS.GDT 24-12-13

LOG OF BOREHOLE BH24-9

PROJECT: Geotechnical Investigation
CLIENT: Times Group Corporation
PROJECT LOCATION: 5061 Stouffville Road, Whitchurch-Stouffville, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4869120.9 E 637771.7

DRILLING DATA
Method: Hollow Stem Auger
Diameter: 200mm
Date: Oct-29-2024

REF. NO.: 19-043-103
ENCL NO.: 10

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
18 237.7	**SANDY SILT TO SILTY SAND TILL:** trace to some clay, trace gravel, occasional cobble, grey, moist to very moist, very dense(Continued)				130mm		238					
18.1	**CLAYEY SILT TILL:** sandy, trace gravel, grey, moist, hard sand and gravel layer at 18.4m		15	SS	50/ 130mm		237		○			
19												
20			16	SS	50/ 75mm		236		○			
21							235					
			17	SS	50/ 130mm		234		○			
22												
23 232.6			18	SS	50/ 30mm		233		○			
23.2	**END OF BOREHOLE:** Notes: 1) 50mm dia. monitoring well installed upon completion. 2) Water Level Readings: Date: Water Level(mbgl): Nov. 13, 2024 2.2 Nov. 19, 2024 5.0											

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: +3, ×3: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

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LOG OF BOREHOLE BH24-10

PROJECT: Geotechnical Investigation
CLIENT: Times Group Corporation
PROJECT LOCATION: 5061 Stouffville Road, Whitchurch-Stouffville, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4869089.4 E 637753

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200mm
Date: Nov-04-2024

REF. NO.: 19-043-103
ENCL NO.: 11

ELEV / DEPTH (m)	DESCRIPTION	NUMBER	TYPE	BLOWS "N" 0.3 m	ELEVATION	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
256.0						
255.8 / 0.2	**TOPSOIL:** 150mm					
255.2 / 0.8	**FILL:** silty sand, some clay, trace gravel, trace rootlets, dark brown to brown, moist, compact	1	SS	17	255	
	CLAYEY SILT TILL: sandy, trace gravel, brown, moist, stiff to very stiff	2	SS	24		
	sandy silt pockets at 1.5m	3	SS	14	254	
253.5 / 2.5	**SILT:** trace to some clay, trace sand, trace gravel, brown, wet, compact to dense	4	SS	19		
252.7 / 3.3	**SILTY SAND:** clayey silt pockets, brown, wet, dense	5	SS	36	253	Switched to Mud Rotary
		6	SS	42	252	
251.4 / 4.6	**CLAYEY SILT TILL:** sandy, trace gravel, grey, moist, very stiff to hard	7	SS	32		
		8	SS	31	251	
		9	SS	42	250	
	silt pockets below 6.9m	10	SS	29	249	
248.4 / 7.6	**CLAYEY SILT:** frequent silt layers, trace sand, grey, moist, very stiff	11	SS	17	248	1 2 76 21
	trace gravel at 8.4m	12	SS	27		
		13	SS	23	247	
245.5 / 10.5	**SANDY SILT TO SILTY SAND TILL:** trace clay, trace gravel, occasional cobble, grey, very moist to wet, very dense	14	SS	50/ 130mm	246	
	gravelly at 12.2m	15	SS	50/ 130mm	245	auger grinding
		16	SS	50/ 150mm	244	
240.7 / 15.3	**END OF BOREHOLE:** Notes: 1) Water encountered at 2.5m during drilling.	17	SS	50/ 75mm	243	
					242	
					241	

DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)
SHEAR STRENGTH (kPa) (20 40 60 80 100)
○ UNCONFINED + FIELD VANE & Sensitivity
● QUICK TRIAXIAL × LAB VANE
PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%) (10 20 30)
POCKET PEN. (Cu) (kPa)
NATURAL UNIT WT (kN/m³)
GROUND WATER CONDITIONS
STRATA PLOT

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
+3, ×3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

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LOG OF BOREHOLE BH24-11

PROJECT: Geotechnical Investigation
CLIENT: Times Group Corporation
PROJECT LOCATION: 5061 Stouffville Road, Whitchurch-Stouffville, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4869103.6 E 637709.7

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200mm
Date: Nov-04-2024

REF. NO.: 19-043-103
ENCL NO.: 12

(m) ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS 0.3 m "N"	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
256.3 / 0.0	**TOPSOIL:** 250mm				
255.5 / 0.8	**FILL:** silty clay, trace rootlets, trace gravel, trace organics, dark brown to brown, moist, stiff	1	SS	8	
	CLAYEY SILT TILL: sandy, trace gravel, brown, moist, stiff to hard	2	SS	11	
	sandy silt pockets at 1.5m	3	SS	13	
		4	SS	19	
252.9 / 3.4	**SILT:** trace sand, trace gravel,	5	SS	33	Switched to Mud Rotary
252.5 / 3.8	brown, very moist, dense				
	SILTY SAND: trace clay, brown, wet, dense	6	SS	40	
	silt pockets at 4.6m	7	SS	47	
251.0 / 5.3	**CLAYEY SILT TILL:** some sand to sandy, trace gravel, occasional cobble, grey, moist, very stiff to hard	8	SS	41	
		9	SS	50/ 150mm	
		10	SS	50/ 130mm	
		11	SS	74	
247.3 / 9.0	wet silt layer, very stiff at 8.4m	12	SS	22	7 14 61 18
	SILT: trace sand, trace clay, grey, moist, dense	13	SS	39	
245.6 / 10.7	**SANDY SILT TO SILTY SAND TILL:** trace to some clay, trace gravel, occasional cobble, grey, moist to wet, very dense	14	SS	50/ 150mm	
		15	SS	50/ 130mm	
		16	SS	50/ 130mm	
241.3 / 15.0	**CLAYEY SILT TILL:** sandy, trace gravel, occasional cobble, grey, moist, hard	17	SS	50/ 150mm	
241.0 / 15.3	**END OF BOREHOLE:**				

Notes:
1) Water encountered at 2.7m during drilling.

GROUND WATER CONDITIONS

ELEVATION: 256, 255, 254, 253, 252, 251, 250, 249, 248, 247, 246, 245, 244, 243, 242, 241

DYNAMIC CONE PENETRATION RESISTANCE PLOT
20 40 60 80 100

SHEAR STRENGTH (kPa)
○ UNCONFINED + FIELD VANE & Sensitivity
● QUICK TRIAXIAL × LAB VANE
20 40 60 80 100

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30

POCKET PEN. (Cu) (kPa)

NATURAL UNIT WT (kN/m³)

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
+3, ×3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

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LOG OF BOREHOLE BH24-12

PROJECT: Geotechnical Investigation
CLIENT: Times Group Corporation
PROJECT LOCATION: 5061 Stouffville Road, Whitchurch-Stouffville, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4869069.4 E 637689.9

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200mm
Date: Oct-23-2024

REF. NO.: 19-043-103
ENCL NO.: 13

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION
256.6							
256.4 0.0	**TOPSOIL:** 250mm		1	SS	11		256
0.3 255.6	**FILL:** silty clay, trace rootlets, trace gravel, trace organics, dark brown to brown, moist, stiff		2	SS	11		
1.0 255.1	**CLAYEY SILT:** trace sand, trace gravel, brown, moist, stiff		3	SS	44		255
1.5 254.3	**SILTY SAND:** trace clay, some gravel, brown, moist, dense		4	SS	16		254
2.3 252.1	**CLAYEY SILT TILL:** sandy, trace gravel, brown, moist, very stiff		5	SS	20		253
4.5 250.6	**SANDY SILT TO SAND:** trace clay, brown, wet, dense		6	SS	35		252
6.0 249.1	**CLAYEY SILT TILL:** sandy, trace gravel, grey, moist, very stiff		7	SS	28		251
7.5 246.1	**CLAYEY SILT:** trace sand, grey, moist, very stiff to hard silt layer at 9.1m		8	SS	49		249
			9	SS	23		247
10.5 244.6	**SANDY SILT TILL:** trace to some clay, trace gravel, occasional cobble, grey, moist, very dense		10	SS	50/ 130mm		246
12.0 243.1	**SANDY SILT:** trace clay, grey, wet, very dense		11	SS	50/ 30mm		244
13.5	**SANDY SILT TO SILTY SAND TILL:** trace clay, trace gravel, occasional cobble, grey, moist to very moist, very dense		12	SS	50/ 100mm		243
			13	SS	50/ 30mm		241

DYNAMIC CONE PENETRATION RESISTANCE PLOT
20 40 60 80 100

SHEAR STRENGTH (kPa)
○ UNCONFINED + FIELD VANE & Sensitivity
● QUICK TRIAXIAL × LAB VANE
20 40 60 80 100

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30

POCKET PEN. (Cu) (kPa)

NATURAL UNIT WT (kN/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)
GR SA SI CL

Switched to Mud Rotary

Continued Next Page

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
+3, ×3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

DS SOIL LOG-2021-FINAL 19-043-103GEO.GPJ DS.GDT 24-12-13

LOG OF BOREHOLE BH24-12

PROJECT: Geotechnical Investigation
CLIENT: Times Group Corporation
PROJECT LOCATION: 5061 Stouffville Road, Whitchurch-Stouffville, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4869069.4 E 637689.9

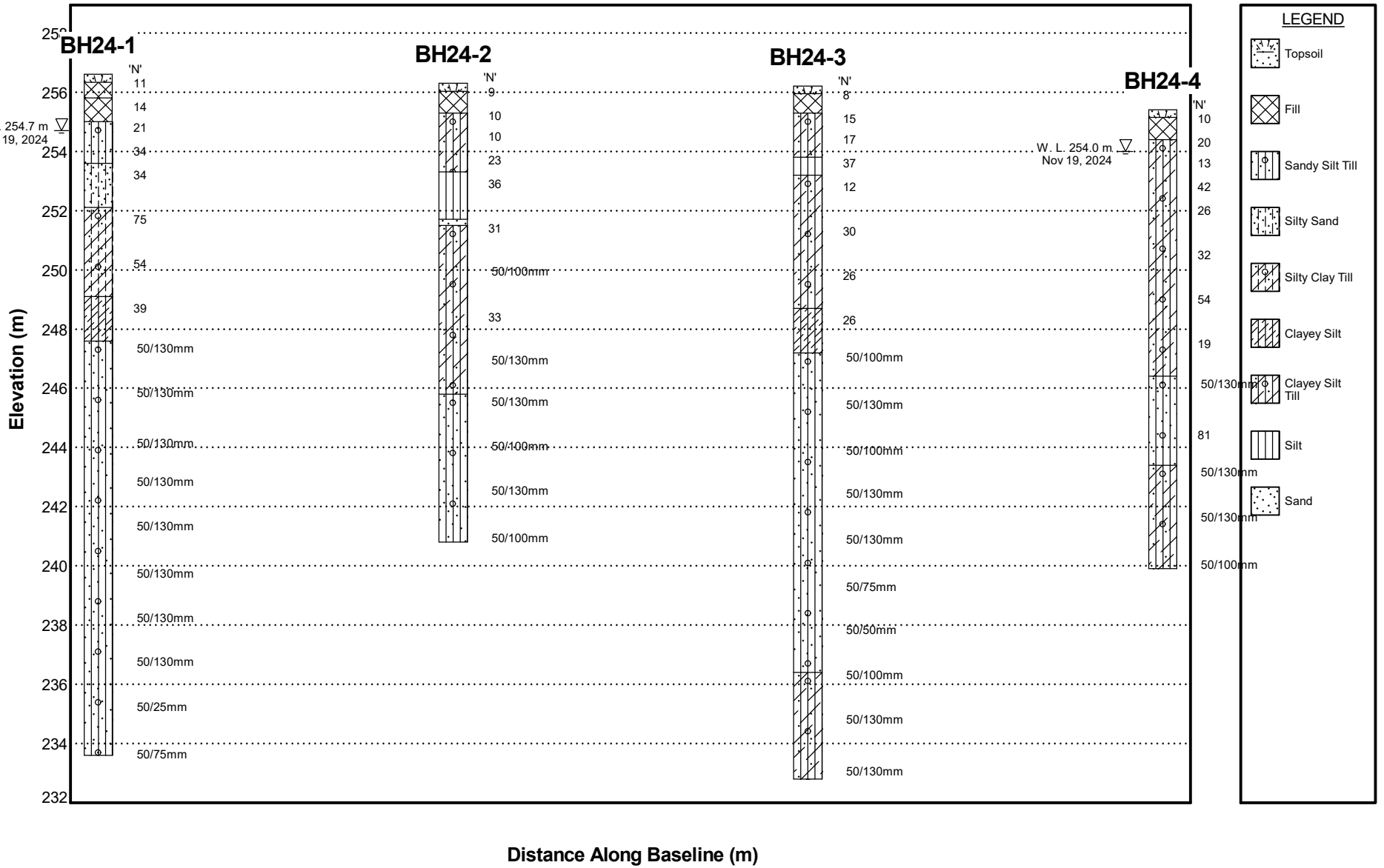
DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200mm
Date: Oct-23-2024

REF. NO.: 19-043-103
ENCL NO.: 13

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 10 20 30	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
18	**SANDY SILT TO SILTY SAND TILL:** trace clay, trace gravel, occasional cobble, grey, moist to very moist, very dense(Continued)		14	SS	50/ 130mm		239					
238.3												
18.3	**CLAYEY SILT TILL:** sandy, trace gravel, grey, moist, hard		15	SS	50/ 130mm		238					9 41 37 13
19												
20			16	SS	50/ 130mm		237					
21							236					
22			17	SS	50/ 130mm		235					
233.6							234					
23.0	**END OF BOREHOLE:** Notes: 1) Water encountered at 4.6m during drilling.		18	SS	50/ 100mm							

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
+3, ×3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure



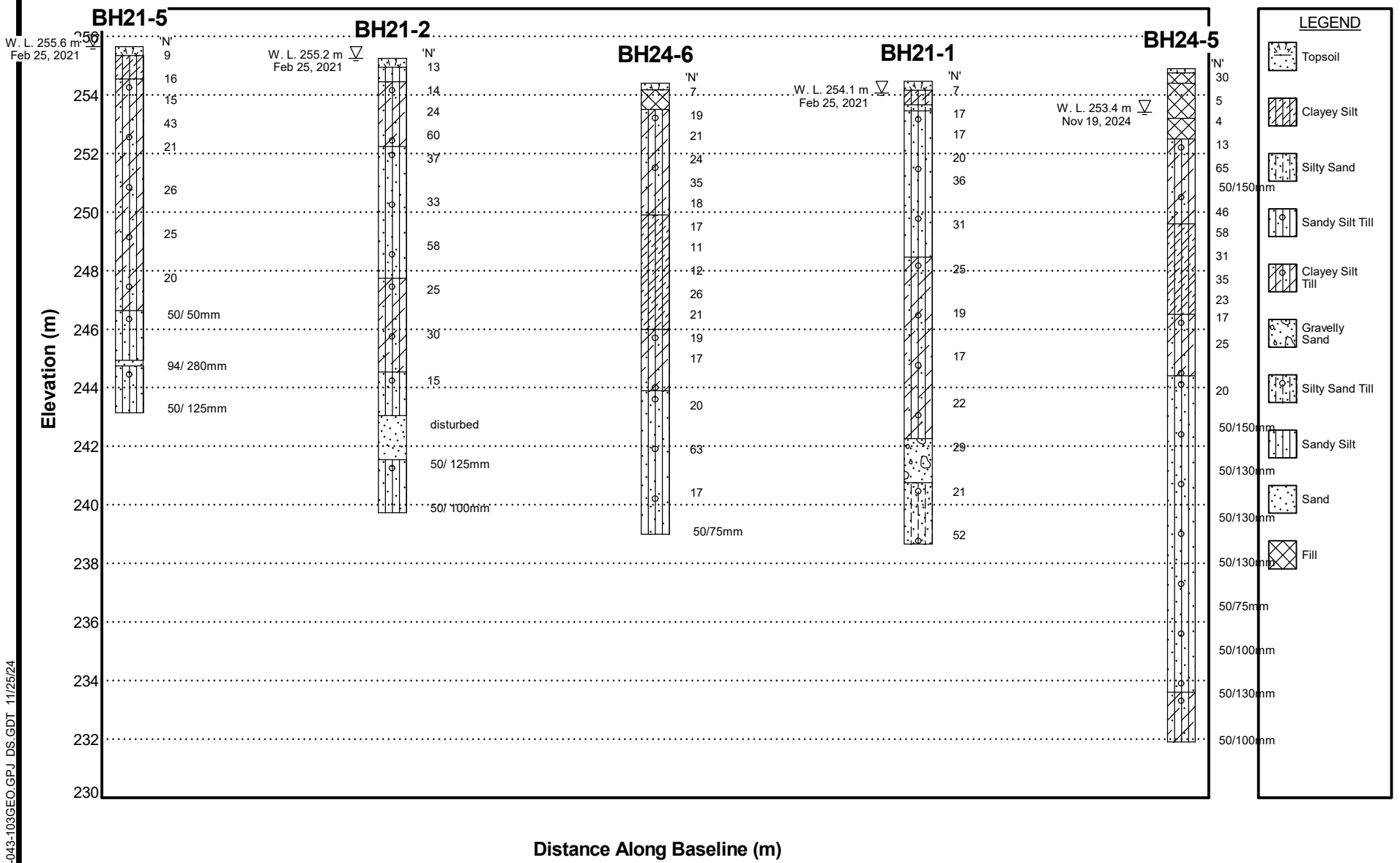
Distance Along Baseline (m)

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Generalized Sub-surface Profile A-A (NTS)

DRAWING NO.	14
JOB NO.	19-043-103
DATE	November, 2024

DS FENCE (M) 19-043-103GEO.GPJ DS.GDT 11/25/24



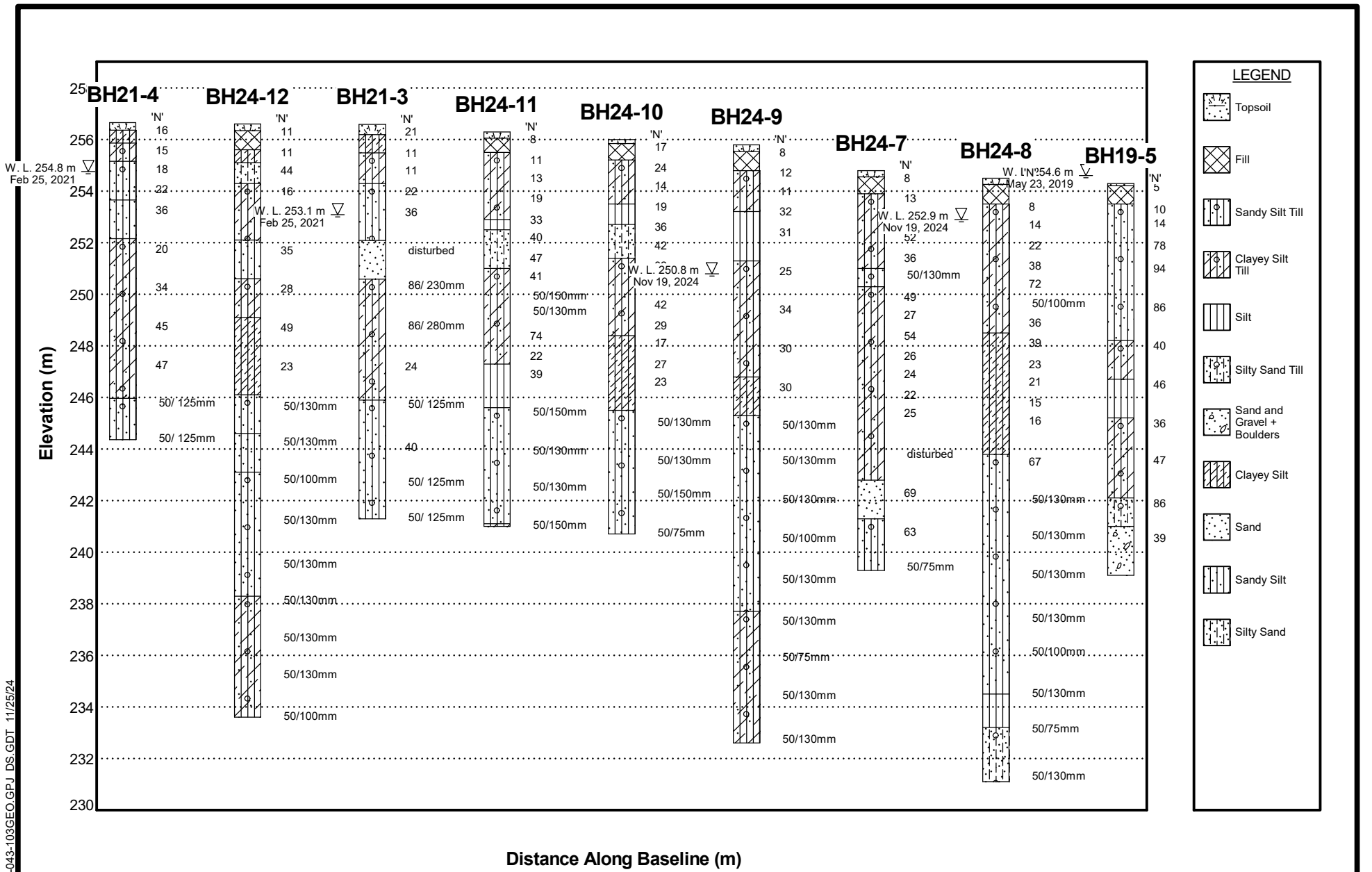
Distance Along Baseline (m)

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Generalized Sub-surface Profile B-B (NTS)

DRAWING NO.	15
JOB NO.	19-043-103
DATE	November, 2024

DS FENCE (M) 19-043-103GEO.GPJ DS.GDT 11/25/24



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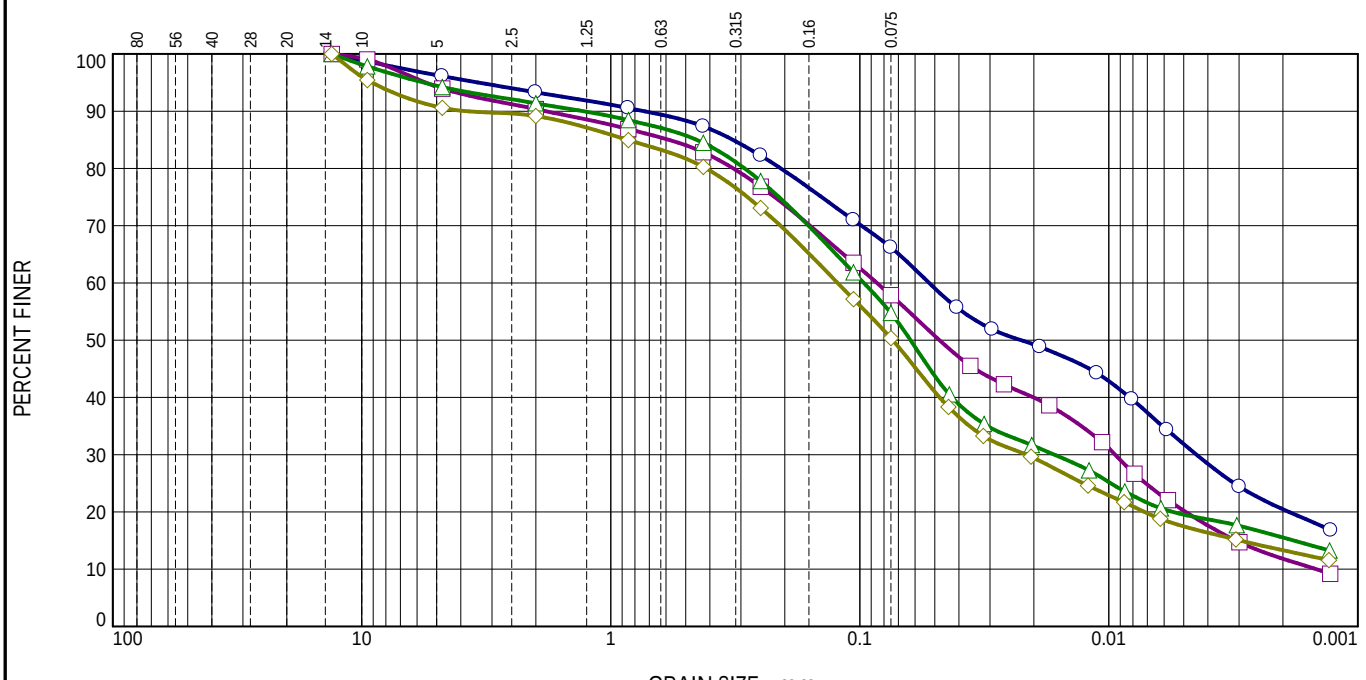
Generalized Sub-surface Profile C-C (NTS)

DRAWING NO.	16
JOB NO.	19-043-103
DATE	November, 2024

DS FENCE (M) 19-043-103GEO.GPJ DS.GDT 11/25/24

Particle Size Distribution Report

ASTM D422



	% +75mm	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	3.9	2.8	6.0	21.1	45.7	20.5
□	0.0	0.0	6.1	3.5	7.6	24.9	46.1	11.8
△	0.0	0.0	5.8	2.8	6.9	29.7	39.3	15.5
◇	0.0	0.0	9.4	1.4	8.9	29.9	37.1	13.3

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	19	9	0.3235	0.0527	0.0225	0.0044				
□			0.5838	0.0853	0.0479	0.0094	0.0031	0.0015	0.71	58.15
△	15	8	0.4516	0.0963	0.0626	0.0165	0.0018			
◇	15	9	0.8571	0.1227	0.0737	0.0214	0.0030			

Material Description	USCS	AASHTO
○ Silty clay till, sandy, trace gravel	CL	A-4(3)
□ Sandy silt till, some clay, trace gravel		
△ Clayey silt till, sandy, trace gravel	CL-ML	A-4(0)
◇ Clayey silt till, sandy, trace gravel	CL-ML	A-4(0)

Project No. 19-043-103 Client: Times Group Corporation

Project: Geotechnical Investigation, 5061 Stouffville Rd., Whitchurch-Stouffville, ON

○Location: BH24-1 SS7 Sample Number: VM-6132

□Location: BH24-1 SS11 Sample Number: VM-6132

△Location: BH24-3 SS18 Sample Number: VM-6132

◇Location: BH24-12 SS15 Sample Number: VM-6132

Remarks:

○F.M.=0.71

□F.M.=0.94

△F.M.=0.90

◇F.M.=1.15

DS CONSULTANTS LTD.

Geotechnical ◆ Environmental ◆ Materials ◆ Hydrogeology

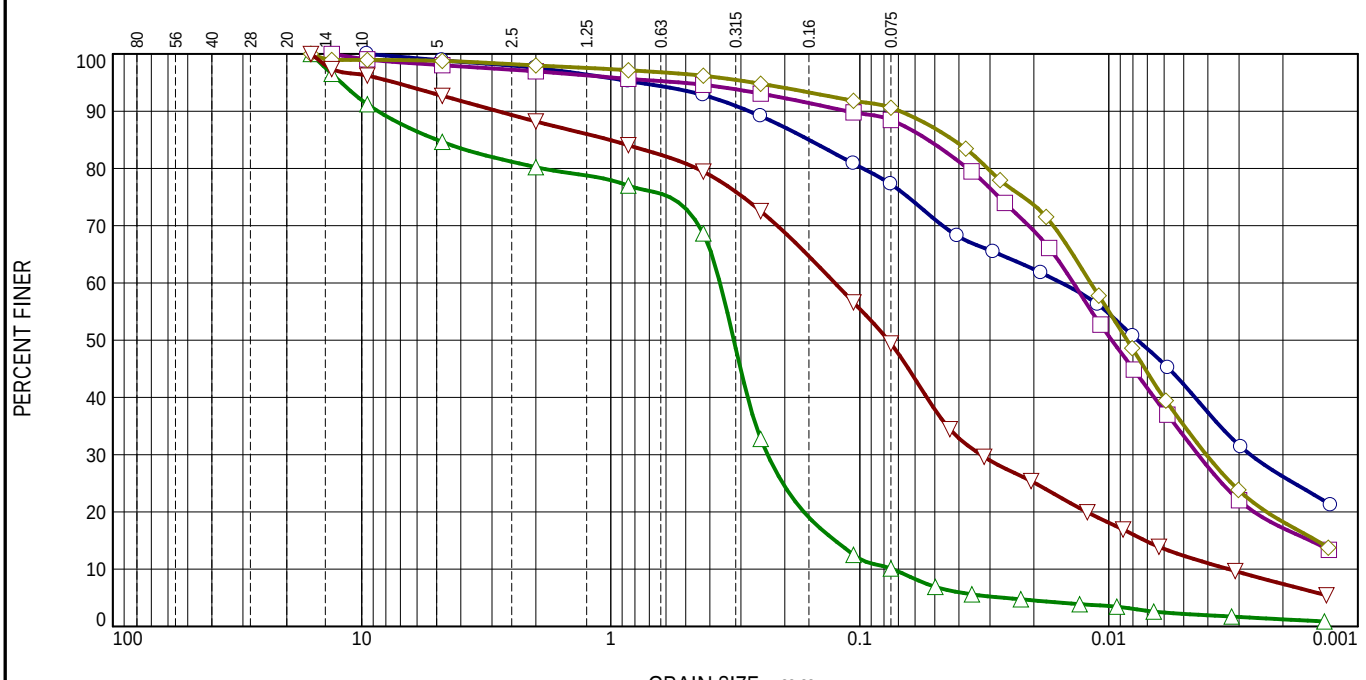
CCIL

Figure 17

Tested By: ○Helen/Nisha □Helen/Disha △Helen/Nisha ◇Helen/Nisha Checked By: Kirupa

Particle Size Distribution Report

ASTM D422



	% +75mm	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	1.1	1.3	4.8	15.5	51.1	26.2
□	0.0	0.0	2.0	1.0	2.4	6.1	71.3	17.2
△	0.0	0.0	15.4	4.4	11.5	58.6	8.9	1.2
◇	0.0	0.0	1.2	0.8	1.8	5.6	72.3	18.3
▽	0.0	0.0	7.3	4.5	8.8	30.0	42.0	7.4

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	20	12	0.1599	0.0155	0.0077	0.0027				
□	20	14	0.0532	0.0139	0.0097	0.0044	0.0016			
△			4.9861	0.3642	0.3205	0.2345	0.1256	0.0738	2.05	4.93
◇	21	15	0.0422	0.0118	0.0084	0.0041	0.0015			
▽			1.0131	0.1259	0.0768	0.0326	0.0072	0.0033	2.56	38.17

Material Description	USCS	AASHTO
○ Silty clay till, sandy, trace gravel	CL	A-4(3)
□ Clayey silt, trace sand, trace gravel	CL-ML	A-4(2)
△ Sand, trace silt, trace clay, some gravel		
◇ Clayey silt till, trace sand, trace gravel	CL-ML	A-4(3)
▽ Silty sand till, trace clay, trace gravel		

Project No. 19-043-103 Client: Times Group Corporation

Project: Geotechnical Investigation, 5061 Stouffville Rd., Whitchurch-Stouffville, ON

○Location: BH24-4 SS6 Sample Number: VM-6181

□Location: BH24-5 SS8 Sample Number: VM-6181

△Location: BH24-7 SS15 Sample Number: VM-6181

◇Location: BH24-8 SS9 Sample Number: VM-6181

▽Location: BH24-8 SS16 Sample Number: VM-6181

Remarks:

○F.M.=0.38

□F.M.=0.30

△F.M.=2.27

◇F.M.=0.21

▽F.M.=1.16

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Geotechnical ◆ Environmental ◆ Materials ◆ Hydrogeology

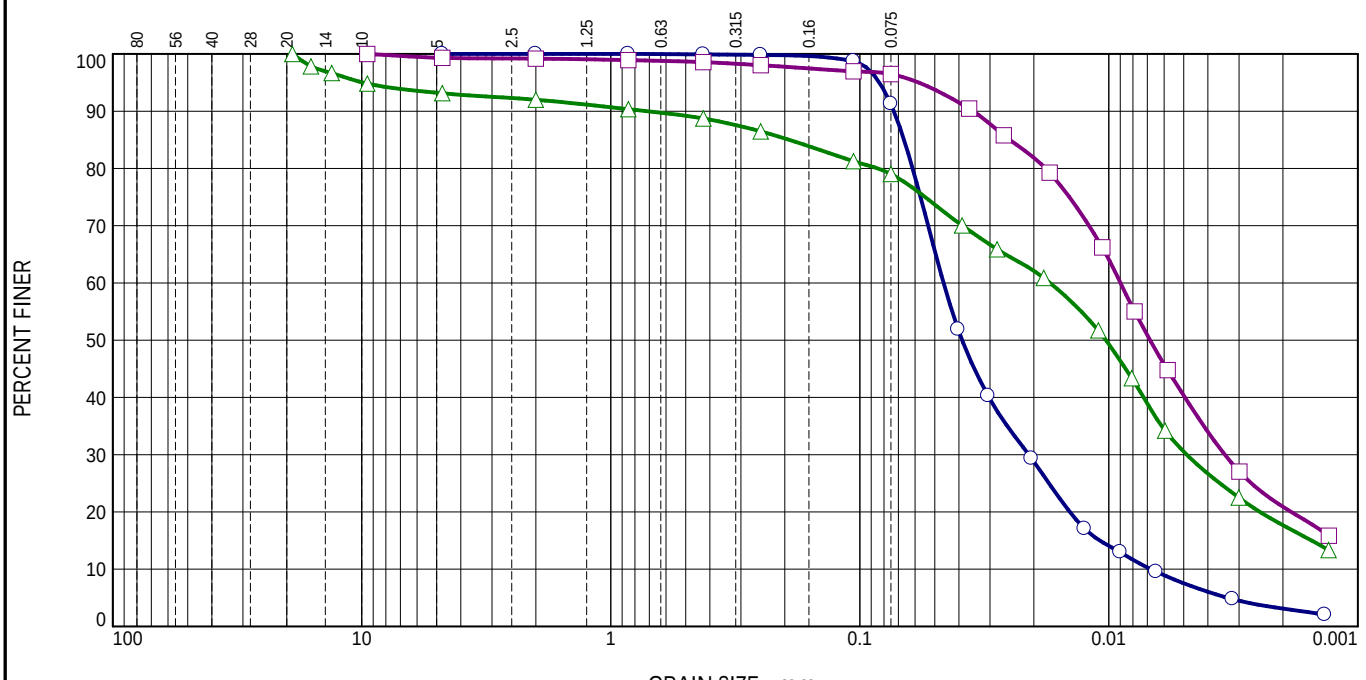
CCIL

Figure **18**

Tested By: Helen/Disha Checked By: Kirupa

Particle Size Distribution Report

ASTM D422



	% +75mm	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.0	0.0	0.1	8.6	88.2	3.1
□	0.0	0.0	0.7	0.1	0.6	2.1	75.6	20.9
△	0.0	0.0	6.9	1.1	3.3	9.7	61.3	17.7

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			0.0664	0.0461	0.0388	0.0210	0.0109	0.0068	1.41	6.79
□	22	16	0.0250	0.0090	0.0068	0.0034				
△	19	14	0.1923	0.0172	0.0103	0.0049	0.0015			

Material Description	USCS	AASHTO
○ Silt, trace clay, trace sand		
□ Clayey silt, trace sand, trace gravel	CL-ML	A-4(3)
△ Clayey silt till, some sand, trace gravel	CL-ML	A-4(1)

Project No. 19-043-103 Client: Times Group Corporation

Project: Geotechnical Investigation, 5061 Stouffville Rd., Whitchurch-Stouffville, ON

○Location: BH24-9 SS4B Sample Number: VM-6181

□Location: BH24-10 SS11 Sample Number: VM-6181

△Location: BH24-11 SS12 Sample Number: VM-6181

Remarks:

○F.M.=0.01

□F.M.=0.08

△F.M.=0.68

DS CONSULTANTS LTD.

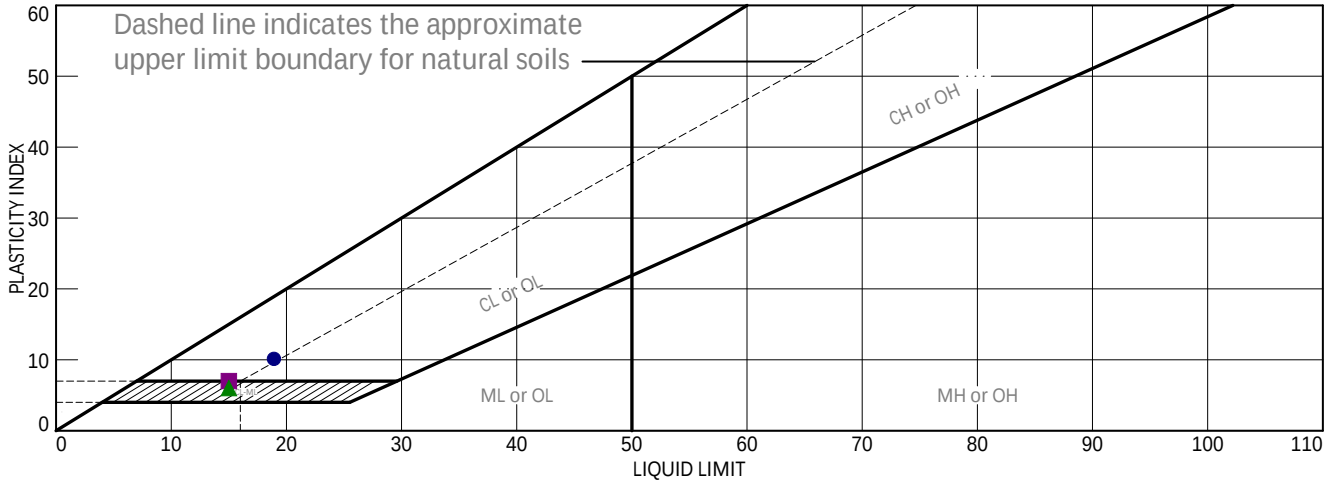
Geotechnical ◆ Environmental ◆ Materials ◆ Hydrogeology

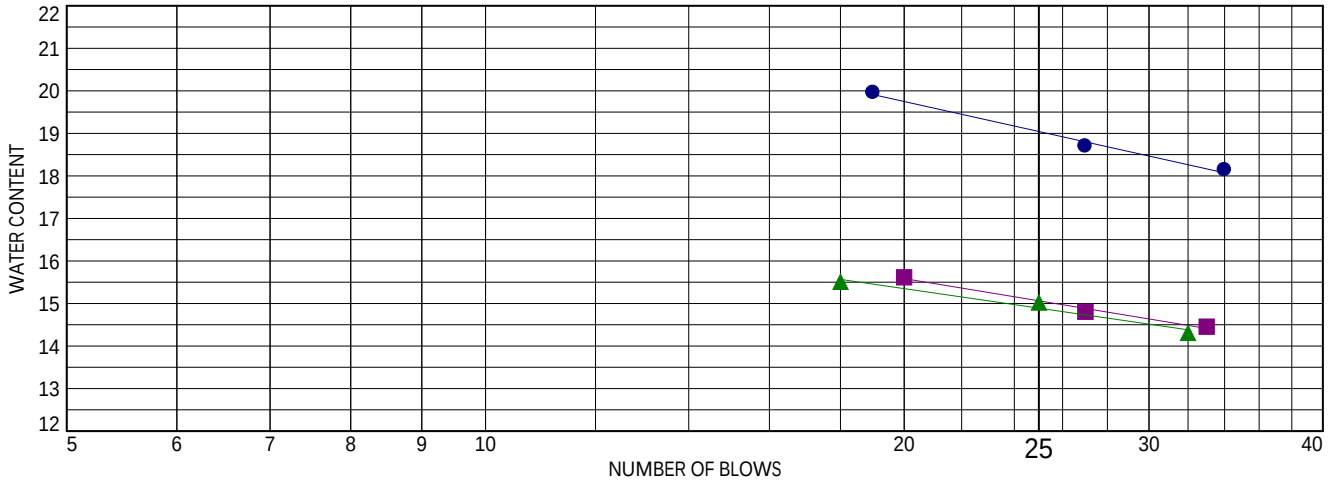
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Figure **19**

Tested By: Helen/Disha Checked By: Kirupa

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Silty clay till, sandy, trace gravel	19	9	10	87.3	66.2	CL
■	Clayey silt till, sandy, trace gravel	15	8	7	84.5	54.8	CL-ML
▲	Clayey silt till, sandy, trace gravel	15	9	6	80.3	50.4	CL-ML

Project No. 19-043-103 Client: Times Group Corporation

Project: Geotechnical Investigation, 5061 Stouffville Rd., Whitchurch-Stouffville, ON

●Location: BH24-1 SS7 Sample Number: VM-6132

■Location: BH24-3 SS18 Sample Number: VM-6132

▲Location: BH24-12 SS15 Sample Number: VM-6132

Remarks:

●Sampled on October 24, 2024

■Sampled on October 26, 2024

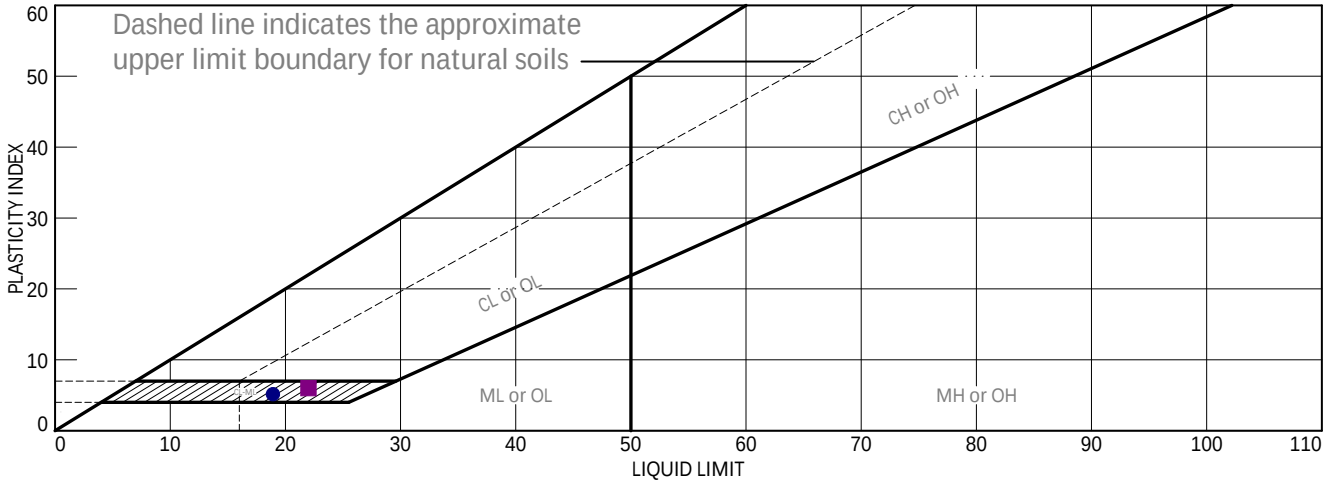
▲Sampled on October 23, 2024

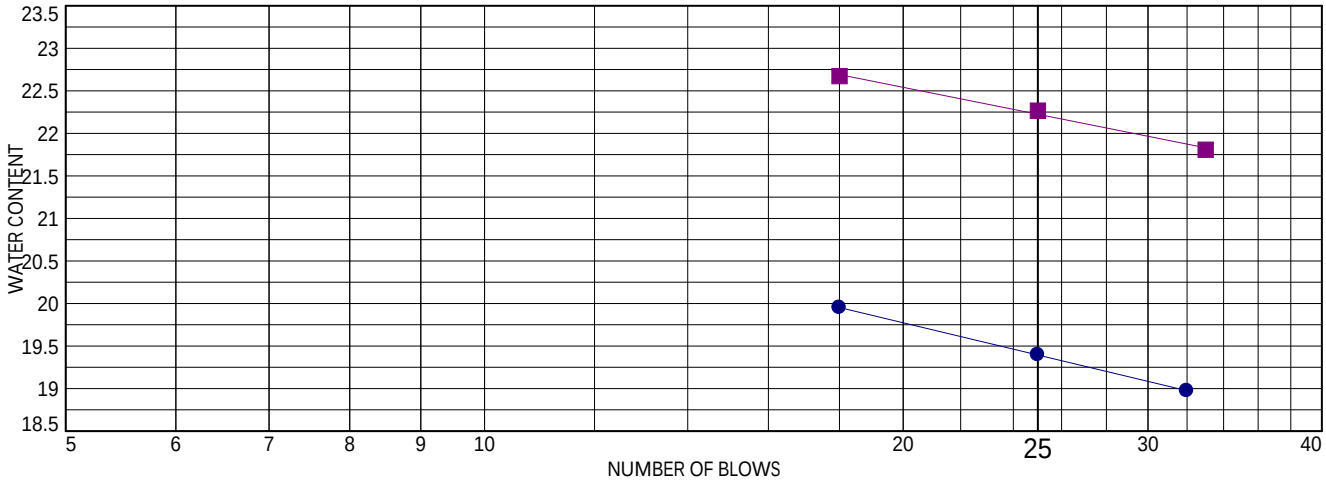
DS CONSULTANTS LTD.
Geotechnical ❖ Environmental ❖ Materials ❖ Hydrogeology

Figure 20

Tested By: Nisha Checked By: Kirupa

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Clayey silt till, some sand, trace gravel	19	14	5	88.7	79.0	CL-ML
■	Clayey silt, trace sand, trace gravel	22	16	6	98.6	96.5	CL-ML

Project No. 19-043-103 Client: Times Group Corporation

Project: Geotechnical Investigation, 5061 Stouffville Rd., Whitchurch-Stouffville, ON

●Location: BH24-11 SS12 Sample Number: VM-6181

■Location: BH24-10 SS11 Sample Number: VM-6181

Remarks:

●Sampled on November 04,2024

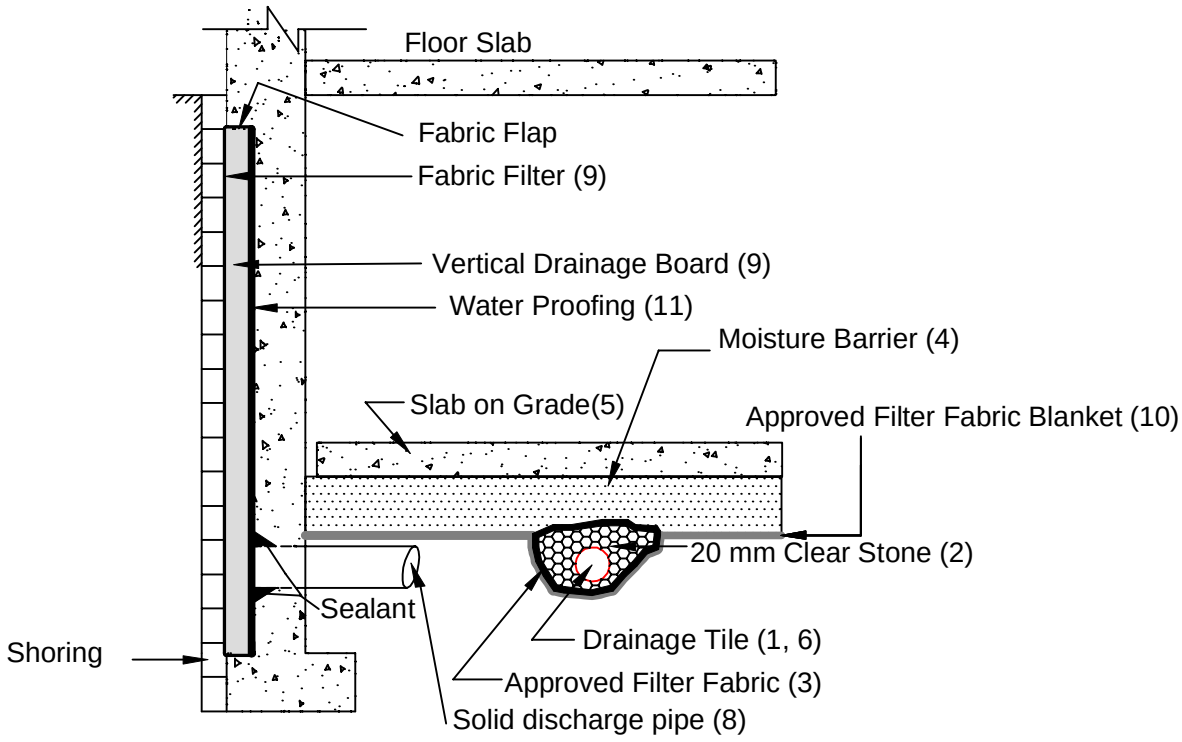
■Sampled on November 04,2024

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Geotechnical ❖ Environmental ❖ Materials ❖ Hydrogeology

Figure 21

Tested By: Disha Checked By: Kirupa

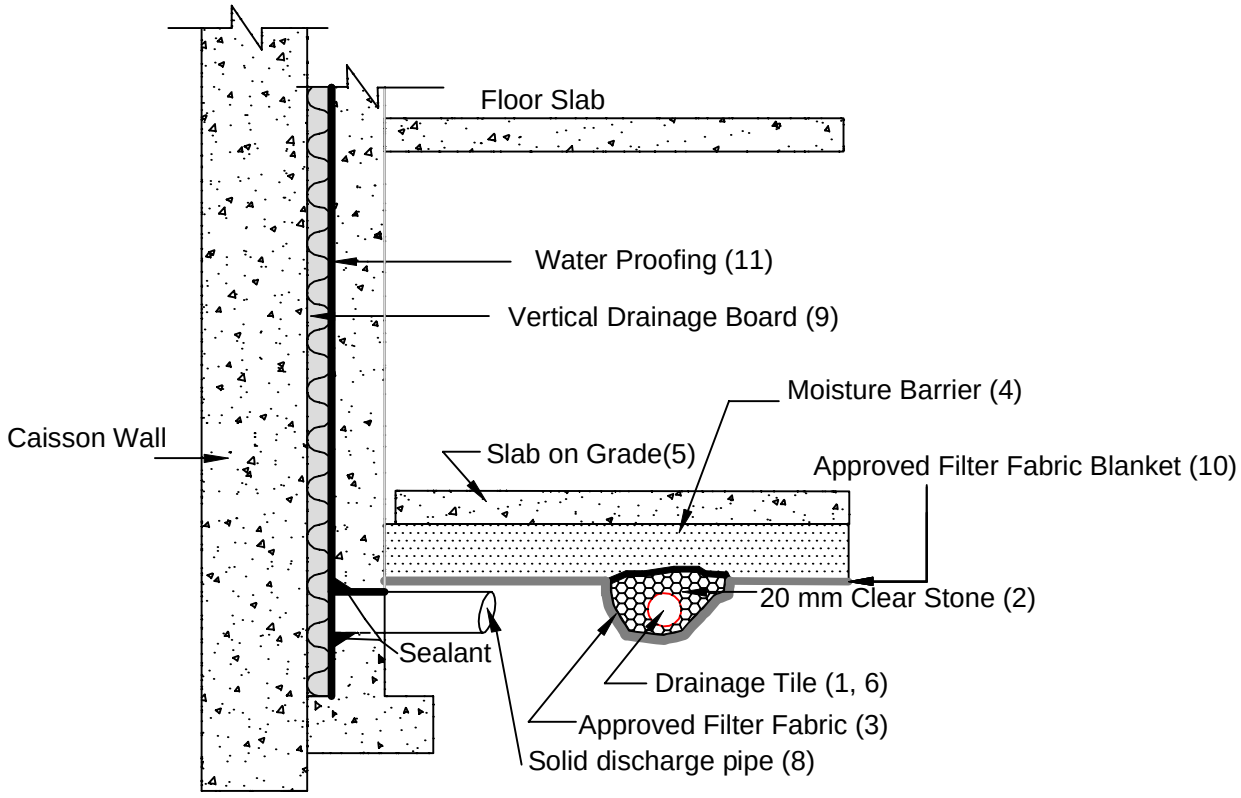


EXTERIOR FOOTING

Notes

1. Drainage tile to consist of 100 mm (4") diameter weeping tile or equivalent perforated pipe leading to a positive sump or outlet, spaced between columns.
2. 20 mm (3/4") clear stone - 150 mm (6") top and side of drain. If drain is not on footing, place100 mm (4 inches) of stone below drain .
3. Wrap the clear stone with an approved filter membrane (Terrafix 270R or equivalent).
4. Moisture barrier to be at least 200 mm (8") of compacted clear 20 mm (3/4") stone or equivalent free draining material. A vapour barrier may be required for specialty floors.
5. Slab on grade should not be structurally connected to the wall or footing.
6. Underfloor drain invert to be at least 300 mm (12") below underside of floor slab. Drainage tile placed in parallel rows 6 to 8 m (20 to 25') centers one way. Place drain on 100 mm (4") clear stone with 150 mm (6") of clear stone on top and sides. Enclose stone with filter fabric as noted in (3).
7. Do not connect the underfloor drains to perimeter drains.
8. Solid discharge pipe located at the middle of each bay between the solider piles, approximate spacing 2.5 m, outletting into a solid pipe leading to a sump.
9. Vertical drainage board with filter cloth should be kept a minium of 1.2 m below exterior finished grade.
10. The entire subgrade to be sealed with approved filter fabric (Terrafix 270R or equivalent) if non-cohesive (sandy) soils below ground water table encountered.
11. The basement walls should be water proofed using bentonite or equivalent water-proofing system.
12. Review the geotechnical report for specific details. Final detail must be approved before system is considered acceptable.

DRAINAGE RECOMMENDATIONS
Shored Basement wall with Underfloor Drainage System
(not to scale)



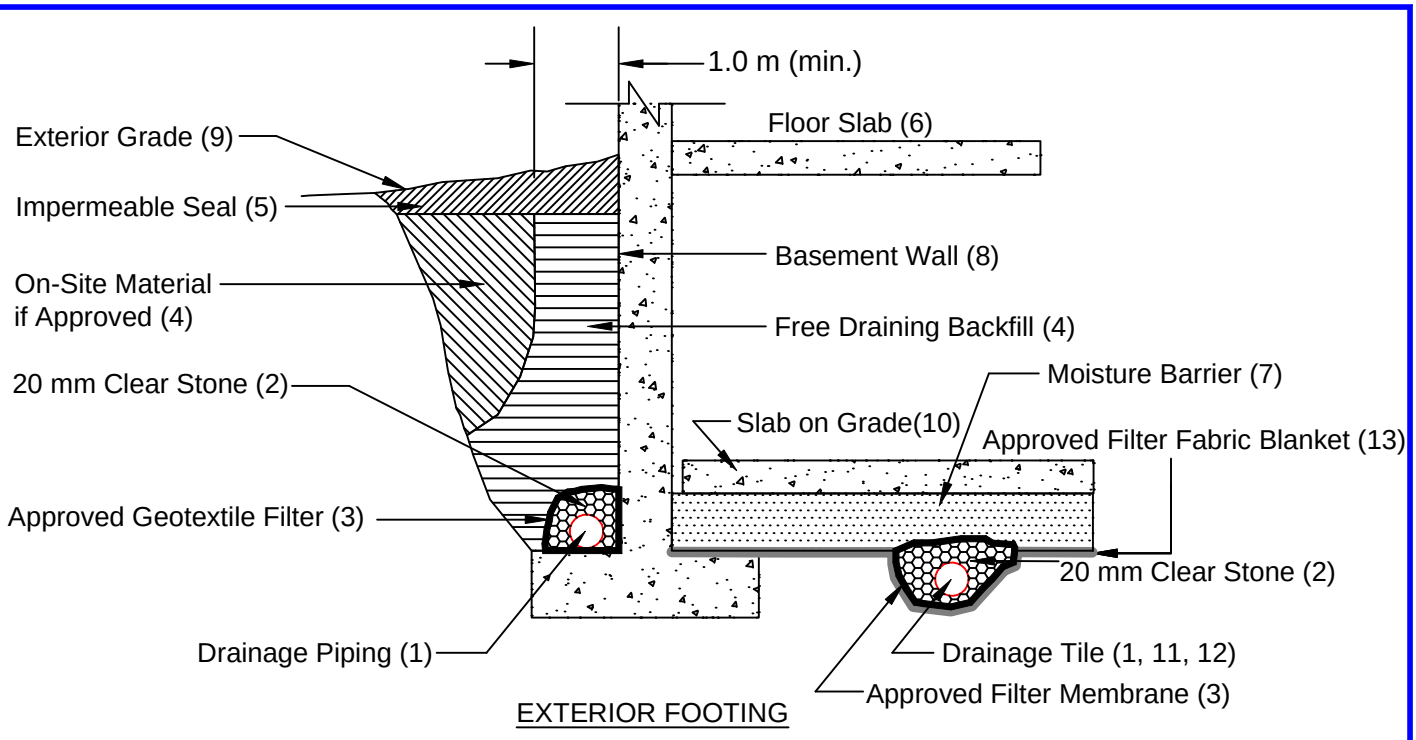
EXTERIOR FOOTING

Notes

1. Drainage tile to consist of 100 mm (4") diameter weeping tile or equivalent perforated pipe leading to a positive sump or outlet, spaced between columns.
2. 20 mm (3/4") clear stone - 150 mm (6") top and side of drain. If drain is not on footing, place100 mm (4 inches) of stone below drain .
3. Wrap the clear stone with an approved filter membrane (Terrafix 270R or equivalent).
4. Moisture barrier to be at least 200 mm (8") of compacted clear 20 mm (3/4") stone or equivalent free draining material. A vapour barrier may be required for specialty floors.
5. Slab on grade should not be structurally connected to the wall or footing.
6. Underfloor drain invert to be at least 300 mm (12") below underside of floor slab. Drainage tile placed in parallel rows 6 to 8 m (20 to 25') centers one way. Place drain on 100 mm (4") clear stone with 150 mm (6") of clear stone on top and sides. Enclose stone with filter fabric as noted in (3).
7. Do not connect the underfloor drains to perimeter drains.
8. Solid discharge pipe located at the middle of each bay between the solider piles, approximate spacing 2.5 m, outletting into a solid pipe leading to a sump.
9. Vertical drainage board mira-drain 6000 or eqivalent with filter cloth should be continous from bottom to 1.2 m below exterior finished grade.
10. The entire subgrade to be sealed with approved filter fabric (Terrafix 270R or equivalent) if non-cohesive (sandy) soils below ground water table encountered.
11. The basement walls must be water proofed using bentonite or equivalent water-proofing system.
12. Review the geotechnical report for specific details. Final detail must be approved before system is considered acceptable.

DRAINAGE RECOMMENDATIONS
Shored Basement wall with Underfloor Drainage System

(not to scale)



EXTERIOR FOOTING

Notes

1. Drainage piping to consist of 100 mm (4") diameter weeping tile or equivalent perforated pipe leading to a positive sump or outlet.
2. 20 mm (3/4") clear stone - 150 mm (6") top and side of drain. If drain is not on footing, place100 mm (4 inches) of stone below drain .
3. Wrap the clear stone with an approved geotextile filter fabrics (Terrafix 270R or equivalent).
4. Free Draining backfill - OPSS Granular B or equivalent compacted to the specified density. Do not use heavy compaction equipment within 450 mm (18") of the wall. Use hand controlled light compaction equipment within 1.8 m (6') of wall. The minimum width of the Granular 'B' backfill must be 1.0 m.
5. Impermeable backfill seal - compacted clay, clayey silt or equivalent. If original soil is free-draining, seal may be omitted. Maximum thickness of seal to be 0.5 m.
6. Do not backfill until wall is supported by basement floor slabs or adequate bracing.
7. Moisture barrier to be at least 200 mm (8") of compacted clear 20 mm (3/4") stone or equivalent free draining material. A vapour barrier may be required for specialty floors.
8. Basement wall to be damp proofed /water proofed as per OBC requirements.
9. Exterior grade to slope away from building min 2%.
10. Slab on grade should not be structurally connected to the wall or footing. Waterproof the slab and the slab-to-wall joint.
11. Underfloor drain invert to be at least 300 mm (12") below underside of floor slab.
12. Drainage piping placed in parallel rows 6 to 8 m (20 to 25') centers one way. Place drain on 100 mm (4") clear stone with 150 mm (6") of clear stone on top and sides. Enclose stone with filter fabric as noted in (3).
13. The entire subgrade to be covered with approved filter fabric (Terrafix 270R or equivalent) if non-cohesive (sandy) soils below ground water table encountered.
14. Do not connect the underfloor drains to perimeter drains.
15. Review the geotechnical report for specific details.

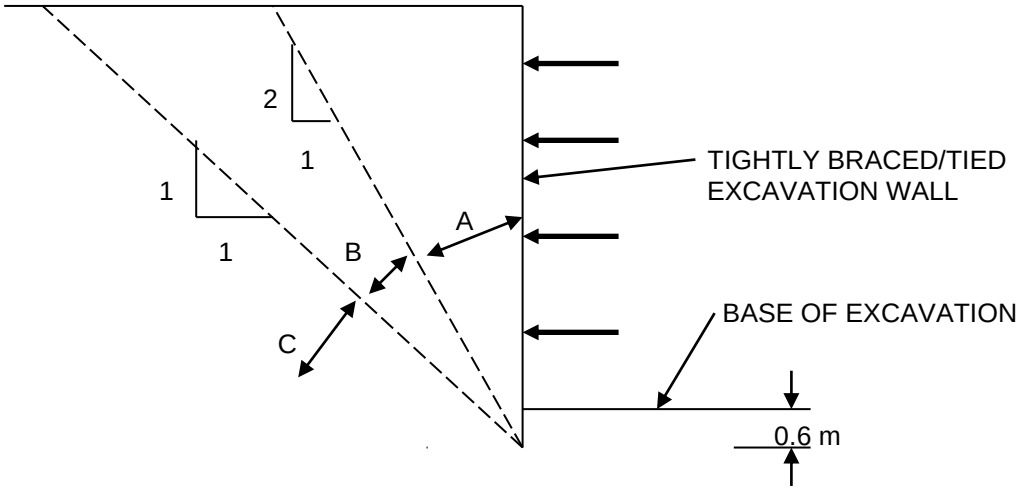
DRAINAGE AND BACKFILL RECOMMENDATIONS
Basement with Underfloor Drainage

(not to scale)

Project: 19-043-103 **Drawing 25**

Guidelines for Underpinning in Soil and Excavation Support

Existing foundations located within Zone A normally require underpinning, especially for heavy structures. For some foundations in Zone A, it may be possible to eliminate underpinning and control foundation movement by tightly braced excavation walls, such as caisson walls.



Zone A Foundations located within this zone normally require underpinning. Horizontal and vertical pressures on the excavation wall of non underpinned foundations must be considered

Zone B Foundations located within this zone normally do not require underpinning. Horizontal and vertical pressures on the excavation wall of non underpinned foundations must be considered

Zone C Underpinning to structures is normally founded in this zone. Lateral pressure from underpinning is not normally considered

(Reference: Figure 26.27 from Canadian Foundation Engineering Manual, 4th Edition)

APPENDIX A

LOCATION PLAN AND LOGS OF BOREHOLES (BH21-1 TO BH21-5 AND BH19-5)

J:\-GIS\19-043-100 4721 and 5061 Stouffville Road_Times Group\1-QGIS\HydroG-101\Figure 3 – Borehole and Monitoring Well Locations_MM_Jun2021.qgz



Legend

- Approx Site Boundary
- Borehole
- Monitoring Well

DS CONSULTANTS LTD.
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Vaughan, Ontario L4H 0K8
Telephone: (905) 264-9393
www.dsconsultants.ca

Client: TIMES GROUP

Project: HYDROGEOLOGICAL INVESTIGATION
5061-4721 Stouffville Road, Whitchurch-Stouffville, ON

Title: **Geotechnical Investigation High-Rise Building**

N

Size:	Approved By:	Drawn By:	Date:
8.5 x 11	D.G	S.Y	March 2021
Rev: 0	Scale: As Shown	Project No.: 19-043-101	Drawing No.: 1

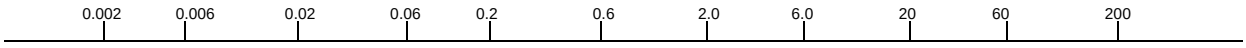
Image/Map Source: *Google Satellite Image*

Drawing 1A: Notes On Sample Descriptions

1. All sample descriptions included in this report generally follow the Unified Soil Classification. Laboratory grain size analyses provided by DS also follow the same system. Different classification systems may be used by others, such as the system by the International Society for Soil Mechanics and Foundation Engineering (ISSMFE). Please note that, with the exception of those samples where a grain size analysis and/or Atterberg Limits testing have been made, all samples are classified visually. Visual classification is not sufficiently accurate to provide exact grain sizing or precise differentiation between size classification systems.

ISSMFE SOIL CLASSIFICATION

CLAY	SILT			SAND			GRAVEL			COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE		



EQUIVALENT GRAIN DIAMETER IN MILLIMETRES

CLAY (PLASTIC) TO	FINE	MEDIUM	CRS.	FINE	COARSE
SILT (NONPLASTIC)	SAND			GRAVEL	

UNIFIED SOIL CLASSIFICATION

2. Fill: Where fill is designated on the borehole log it is defined as indicated by the sample recovered during the boring process. The reader is cautioned that fills are heterogeneous in nature and variable in density or degree of compaction. The borehole description may therefore not be applicable as a general description of site fill materials. All fills should be expected to contain obstruction such as wood, large concrete pieces or subsurface basements, floors, tanks, etc., none of these may have been encountered in the boreholes. Since boreholes cannot accurately define the contents of the fill, test pits are recommended to provide supplementary information. Despite the use of test pits, the heterogeneous nature of fill will leave some ambiguity as to the exact composition of the fill. Most fills contain pockets, seams, or layers of organically contaminated soil. This organic material can result in the generation of methane gas and/or significant ongoing and future settlements. Fill at this site may have been monitored for the presence of methane gas and, if so, the results are given on the borehole logs. The monitoring process does not indicate the volume of gas that can be potentially generated nor does it pinpoint the source of the gas. These readings are to advise of the presence of gas only, and a detailed study is recommended for sites where any explosive gas/methane is detected. Some fill material may be contaminated by toxic/hazardous waste that renders it unacceptable for deposition in any but designated land fill sites; unless specifically stated the fill on this site has not been tested for contaminants that may be considered toxic or hazardous. This testing and a potential hazard study can be undertaken if requested. In most residential/commercial areas undergoing reconstruction, buried oil tanks are common and are generally not detected in a conventional preliminary geotechnical site investigation.

3. Till: The term till on the borehole logs indicates that the material originates from a geological process associated with glaciation. Because of this geological process the till must be considered heterogeneous in composition and as such may contain pockets and/or seams of material such as sand, gravel, silt or clay. Till often contains cobbles (60 to 200 mm) or boulders (over 200 mm). Contractors may therefore encounter cobbles and boulders during excavation, even if they are not indicated by the borings. It should be appreciated that normal sampling equipment cannot differentiate the size or type of any obstruction. Because of the horizontal and vertical variability of till, the sample description may be applicable to a very limited zone; caution is therefore essential when dealing with sensitive excavations or dewatering programs in till materials.

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Geotechnical ◆ Environmental ◆ Materials ◆ Hydrogeology

LOG OF BOREHOLE BH19-5

PROJECT: Geotechnical Investigation
CLIENT: Times Group Corp
PROJECT LOCATION: 4721 to 5061 Stouffville Road, Whitchurch-Stouffvill, ON
DATUM: Geodetic
BOREHOLE LOCATION: See Drawing 1 N 4869147.9 E 637851

DRILLING DATA
Method: Solid Stem Auger
Diameter: 150mm
Date: May/01/2019

REF. NO.: 19-043-100
ENCL NO.: 2

(m) ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS
254.3					W. L. 254.6 m May 23, 2019 Apr 13, 2021
254.2 0.1	**TOPSOIL:** 125mm	1	SS	5	
253.5 0.8	**FILL:** silty clay, trace sand, brown, moist, firm	2	SS	10	
	SANDY SILT TILL: trace to some clay, some gravel, occasional cobble/boulder, brown, wet, compact to very dense	3	SS	14	
		4	SS	78	
	some clay, grey, moist below 3.1m	5	SS	94	
		6	SS	86	
248.2 6.1	**CLAYEY SILT TILL:** sandy, trace gravel, grey, moist, hard	7	SS	40	
246.7 7.6	**SILT TO SANDY SILT:** some clay, grey, moist, dense	8	SS	46	
245.2 9.1	**CLAYEY SILT TILL:** sandy, trace gravel/ cobble, grey, moist, hard	9	SS	36	
		10	SS	47	
242.1 12.2	**SILTY SAND TO SANDY SILT TILL:** trace to some clay, trace cobbles, grey, moist, very dense	11	SS	86	
241.0 13.3	**SAND AND GRAVEL:** trace silt, grey, wet, dense	12	SS	39	
239.1 15.2	**END OF BOREHOLE**				

Notes:
1) 50mm dia. monitoring well installed at 15.2 mbgl upon completion.
2) Water level readings:

Date:	W.L. Depth (m):
Apr 13, 2021	-0.01 (above ground surface)
May 23, 2019	-0.30 (above ground surface)

DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)
SHEAR STRENGTH (kPa)
○ UNCONFINED + FIELD VANE & Sensitivity
● QUICK TRIAXIAL × LAB VANE
(40 60 80 100)

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%) (10 20 30)

POCKET PEN. (Cu) (kPa)
NATURAL UNIT WT (kN/m³)

METHANE AND GRAIN SIZE DISTRIBUTION (%)

GR	SA	SI	CL
19	33	38	10

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: +3, ×3: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

DS SOIL LOG 19-043-100, 4271 STOUFFVILLE.GPJ DS.GDT 4/15/21

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LOG OF BOREHOLE BH21-1

PROJECT: Geotechnical Investigation - Additional Work
CLIENT: Times Group
PROJECT LOCATION: 4721 and 5061 Stouffville Rd, Whitchurch-Stouffvill, ON
DATUM: Geodetic
BOREHOLE LOCATION: See Drawing 1 N 4869159.459 E 637854.913

DRILLING DATA
Method: Hollow Stem Auger
Diameter: 200mm
Date: Feb-11-2021

REF. NO.: 19-043-101
ENCL NO.: 3

ELEV / DEPTH (m)	DESCRIPTION	NUMBER	TYPE	BLOWS 0.3 m "N"
254.5 / 0.0	**TOPSOIL:** 300mm	1	SS	7
253.7 / 0.8	**CLAYEY SILT:** some sand, trace gravel, brown, moist, firm (weathered)			
253.5 / 1.0	**SILTY SAND:** trace clay, trace gravel, brown, wet, compact	2	SS	17
	SANDY SILT TILL: trace clay, trace gravel, brown, moist, compact to dense	3	SS	17
		4	SS	20
		5	SS	36
	grey below 4.5m	6	SS	31
248.5 / 6.0	**CLAYEY SILT TILL:** some sand, trace gravel, grey, moist, very stiff	7	SS	25
		8	SS	19
		9	SS	17
		10	SS	22
242.3 / 12.2	**SAND AND GRAVEL:** silty, trace cobble, trace clay, grey, saturated, compact	11	SS	29
240.8 / 13.7	**SILTY SAND TILL:** trace clay, trace gravel, brown, wet, compact to very dense	12	SS	21
238.7 / 15.8	**END OF BOREHOLE**	13	SS	52

Notes:
1) 50mm dia. monitoring well installed upon completion.
2) Water level readings:

Date:	W.L. Depth (m):
April 13, 2021	1.37
Feb. 25, 2021	0.4

W. L. 254.1 m Feb 21, 2025
W. L. 253.1 m Apr 13, 2021

DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)
SHEAR STRENGTH (kPa) (20 40 60 80 100)
○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE
PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%) (10 20 30)

METHANE AND GRAIN SIZE DISTRIBUTION (%)

GR	SA	SI	CL
2	17	54	27

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: $+^3$, $\times^3$: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

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LOG OF BOREHOLE BH21-2

PROJECT: Geotechnical Investigation - Additional Work
CLIENT: Times Group
PROJECT LOCATION: 4721 and 5061 Stouffville Rd, Whitchurch-Stouffvill, ON
DATUM: Geodetic
BOREHOLE LOCATION: See Drawing 1 N 4869127.615 E 637803.503

DRILLING DATA
Method: Hollow Stem Auger
Diameter: 200mm
Date: Feb-11-2021

REF. NO.: 19-043-101
ENCL NO.: 4

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	METHANE AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
255.2												
254.9 0.0	**TOPSOIL:** 300mm											
0.3 254.4	**SANDY SILT:** trace clay, trace gravel, trace organics, brown, moist, compact (weathered)		1	SS	13		W. L. 255.2 m Feb 21, 2025					
1 0.8	**CLAYEY SILT TILL:** sandy, trace gravel/ cobble, grey, moist, stiff to hard		2	SS	14		W. L. 254.1 m Apr 13, 2021					
2			3	SS	24		253					
	No recovery at 2.3m		4	SS	60							
252.2 3.0	**SANDY SILT TILL:** clay seams, trace gravel/ cobble, grey, moist, dense to very dense		5	SS	37		252					9 30 46 15
4												
	some clay below 4.5m		6	SS	33		251					
5							250					
6			7	SS	58		249					
247.7 7.5	**CLAYEY SILT TILL:** some sand to sandy, trace gravel/ cobble, grey, moist, very stiff to hard		8	SS	25		248					
8							247					
9			9	SS	30		246					0 2 62 36
244.5 10.7	**SANDY SILT TILL:** some clay, trace gravel/ cobble, grey, wet, compact		10	SS	15		245					
11							244					
243.0 12.2	**SAND:** trace clay, trace gravel, grey, saturated		11	SS	disturbed		243					
13							242					
241.5 13.7	**SANDY SILT TILL:** trace clay, trace gravel/ cobble, grey, moist, very dense		12	SS	50/ 125mm		241					
15												
239.7 15.5	**END OF BOREHOLE**		13	SS	50/ 100mm		240					

Notes:
1) 50mm dia. monitoring well installed upon completion.
2) Water level readings:

Date:	W.L. Depth (m):
April 13, 2021	1.18
Feb. 25, 2021	- 0.02 (above ground)

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: +3, ×3: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

DS SOIL LOG 19-043-101 4721 AND 5061 STOUFFVILLE RD ADDITIONAL WORK_TIMES GROUP.GPJ DS.GDT 21-5-3

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LOG OF BOREHOLE BH21-3

PROJECT: Geotechnical Investigation - Additional Work
CLIENT: Times Group
PROJECT LOCATION: 4721 and 5061 Stouffville Rd, Whitchurch-Stouffvill, ON
DATUM: Geodetic
BOREHOLE LOCATION: See Drawing 1 N 4869091.791 E 637696.023

DRILLING DATA
Method: Hollow Stem Auger
Diameter: 200mm
Date: Feb-16-2021

REF. NO.: 19-043-101
ENCL NO.: 5

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	METHANE AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
256.6												
0.0 / 256.2	**TOPSOIL:** 380mm		1	SS	21		256					
0.4 / 255.5	**CLAYEY SILT:** trace clay, trace gravel, trace topsoil, dark brown, moist, stiff to very stiff (weathered)		2	SS	11							
1.1 / 254.3	**CLAYEY SILT TILL:** sandy, trace gravel, sand seams, brown, moist, stiff		3	SS	11		255					
2.3	**SANDY SILT TILL:** some clay, trace gravel/ cobbles, brown, moist, compact to dense		4	SS	22		254					
			5	SS	36	W. L. 253.3 m W. L. 253.1 m Feb 21, 2025						4 30 55 11
252.1							253					
4.5	**SAND:** some silt, trace clay, brown, saturated		6	SS	disturbed		252					
250.6												
6.0	**CLAYEY SILT TILL:** sandy, trace gravel, sand seams, grey, moist, very stiff to hard		7	SS	86/ 230mm		251					
			8	SS	86/ 280mm		250					
	trace sand below 9m		9	SS	24		249					
245.9							248					
10.7	**SANDY SILT TO SILTY SAND TILL:** trace clay, trace gravel, grey, wet, dense to very dense		10	SS	50/ 125mm		247					7 47 37 9
			11	SS	40		246					
	moist below 13.7m		12	SS	50/ 125mm		245					
241.3							244					
15.3	**END OF BOREHOLE**		13	SS	50/ 125mm		243					
	Notes: 1) 50mm dia. monitoring well installed upon completion. 2) Water level readings: Date: W.L. Depth (m): April 13, 2021 3.3 Feb. 25, 2021 3.5						242					

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES: +3, ×3: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

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LOG OF BOREHOLE BH21-4

PROJECT: Geotechnical Investigation - Additional Work
CLIENT: Times Group
PROJECT LOCATION: 4721 and 5061 Stouffville Rd, Whitchurch-Stouffvill, ON
DATUM: Geodetic
BOREHOLE LOCATION: See Drawing 1 N 4869153.844 E 637681.724

DRILLING DATA
Method: Hollow Stem Auger
Diameter: 200mm
Date: Feb-12-2021

REF. NO.: 19-043-101
ENCL NO.: 6

(m) ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS 0.3 m "N"
256.7				
256.4 0.0	**TOPSOILAND SILT:** 330mm	1	SS	16
0.3 255.9	**CLAYEY SILT:** trace gravel, trace topsoil, brown, moist, very stiff (weathered)			
1 0.8		2	SS	15
255.2	**CLAYEY SILT TILL:** sandy, trace gravel, brown, moist, very stiff			
1.5		3	SS	18
2	**SANDY SILT TILL:** trace clay, trace gravel/ cobble, brown, very moist, compact			
		4	SS	22
253.7				
3.0	**SANDY SILT:** trace clay, brown, wet, dense	5	SS	36
4				
252.2				
4.5	**CLAYEY SILT TILL:** some sand, trace gravel, grey, moist, very stiff to hard	6	SS	20
5				
6		7	SS	34
7				
		8	SS	45
8				
9		9	SS	47
10				
246.0				
10.7 11	**SANDY SILT TILL:** some clay, trace gravel/ cobble, grey, very moist, very dense	10	SS	50/ 125mm
12				
244.4				
12.3	**END OF BOREHOLE**	11	SS	50/ 125mm

Notes:
1) 50mm dia. monitoring well installed upon completion.
2) Water level readings:

Date:	W.L. Depth (m):
April 13, 2021	0.28
Feb. 25, 2021	1.9

GROUND WATER CONDITIONS: W. L. 256.4 m Apr 13, 2021; W. L. 254.8 m Feb 21, 2025

ELEVATION: 255, 254, 253, 252, 251, 250, 249, 248, 247, 246, 245

DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)

SHEAR STRENGTH (kPa) (20 40 60 80 100)
○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%) (10 20 30)

POCKET PEN. (Cu) (kPa)

NATURAL UNIT WT (kN/m³)

METHANE AND GRAIN SIZE DISTRIBUTION (%)

GR	SA	SI	CL
3	16	54	27

DS SOIL LOG 19-043-101 4721 AND 5061 STOUFFVILLE RD ADDITIONAL WORK_TIMES GROUP.GPJ DS.GDT 21-5-3

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: +3, ×3: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

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LOG OF BOREHOLE BH21-5

PROJECT: Geotechnical Investigation - Additional Work
CLIENT: Times Group
PROJECT LOCATION: 4721 and 5061 Stouffville Rd, Whitchurch-Stouffvill, ON
DATUM: Geodetic
BOREHOLE LOCATION: See Drawing 1 N 4869178.503 E 637758.266

DRILLING DATA
Method: Hollow Stem Auger
Diameter: 200mm
Date: Feb-12-2021

REF. NO.: 19-043-101
ENCL NO.: 7

ELEV / DEPTH (m)	DESCRIPTION	NUMBER	TYPE	BLOWS 0.3 m "N"	ELEVATION
255.6 / 0.0	**TOPSOIL:** 330mm				
0.3 / 254.5	**CLAYEY SILT:** trace sand, trace topsoil, brown, moist, stiff (weathered)	1	SS	9	
1.1	**CLAYEY SILT TILL:** sandy, trace gravel/ cobble, grey, moist, very stiff to hard	2	SS	16	254
		3	SS	15	
	grey below 2.7m	4	SS	43	253
		5	SS	21	252
	sand seams below 4.5m	6	SS	26	251
		7	SS	25	250
		8	SS	20	249
246.6					248
9.0 / 244.9	**SANDY SILT TILL:** some clay, trace gravel/ cobble, grey, moist, very dense	9	SS	50/ 50mm	247
244.7 / 10.9	**SAND:** some silt, trace clay, trace gravel, brown, wet, very dense	10	SS	94/ 280mm	246
	SANDY SILT TILL: trace clay, trace gravel, grey, moist, very dense				245
243.1		11	SS	50/ 25mm	244
12.5	**END OF BOREHOLE**				

Notes:
1) 50mm dia. monitoring well installed upon completion.
2) Water level readings:

Date:	W.L. Depth (m):
April 13, 2021	0.30
Feb. 25, 2021	- 0.02 (above ground)

W. L. 255.6 m
Feb 21, 2025
Apr 13, 2021

DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)
SHEAR STRENGTH (kPa) (20 40 60 80 100)
○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE
PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%) (10 20 30)
POCKET PEN. (Cu) (kPa)
NATURAL UNIT WT (kN/m³)
METHANE AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: +3, ×3: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

Hydrogeological Investigation
4721 & 5061 Stouffville Rd
Hwy 48 & Stouffville Road Development
Whitchurch-Stouffville, Ontario

Prepared For:

Times Group Corporation

Project #: 19-043-103
Date: April 4, 2025

DS CONSULTANTS LTD.
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Vaughan, Ontario, L4H 0K8
Telephone: (905) 264-9393
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19-043-103 **April 4, 2025**

Times Group Corporation
3985 Highway 7, Suite 202
Markham, ON
L3R 2A2

Via email: hamid@timesgroupcorp.com

RE: Hydrogeological Investigation – 4721 & 5061 Stouffville Road, Whitchurch-Stouffville, ON

DS Consultants Ltd. (DS) was retained by Times Group Corporation to conduct an additional Hydrogeological Investigation of the site located on the northeast corner of the properties located at 4721 & 5061 Stouffville Road, Whitchurch-Stouffville, ON (Site). The site is currently a part of a rural parcel used for agricultural purposes. It is understood that the proposed development will have a 19 to 29-storey high-rise buildings with three (3) levels of underground parking proposed to extend to 249.35 meters above sea level (masl) along the east side of the proposed building and two (2) levels of underground parking proposed to extend to 250.60 masl on the western side of the Building. In addition, the Site is proposed to have a permanent subfloor and perimeter foundation drainage system. It is further understood that the purpose of this Hydrogeological Investigation was to better understand the opportunities and constraints associated with the future development, and identify constraints associated with the Oak Ridges Aquifer Complex (ORAC) by drilling additional boreholes and installing monitoring wells at the target elevation of the proposed P2-P3 level permanent groundwater drainage elevation. The findings from this hydrogeological investigation were then used to estimate the construction dewatering volume and permanent drainage volume associated with the proposed P2-P3 level underground structure.

Based on the results of our investigation, the following conclusions are presented:

1. In May 2019, DS drilled one (1) borehole (BH19-5) equipped with a monitoring well within the boundary limits as part of the geotechnical, environmental, and hydrogeological investigations to a depth of 15.2 meters below ground surface (mbgs) (239.1 masl). In February 2021, DS drilled five (5) boreholes and equipped all boreholes with monitoring wells within the site boundary. The boreholes were advanced to depths ranging from 12.3 to 15.8 mbgs. Monitoring wells were screened to depths ranging from 6.0 to 15.8 mbgs.

2. In October 2024, DS drilled twelve (12) boreholes with five (5) boreholes equipped with monitoring wells within the site boundary as part of the geotechnical and hydrogeological investigations. The boreholes were advanced to depths ranging from 15.3 to 23.4 mbgs. Monitoring wells were screened to depths ranging from 7.1 to 9.1 mbgs. In February 2026, DS advanced a borehole (BH25-1) to 37.1 mbgs, to determine (if any) the extent of a deeper aquifer at the Site. A monitoring well was installed in BH25-1 to a depth of 21.3 mbgs.

3. The topography at the site ranges from approximately 254.3 to 256.7 masl generally sloping south. Willowgrove Creek is located approximately 1.5 km west of the site. Willowgrove Creek is a branch of Little Rouge Creek, which ultimately flows into Lake Ontario located approximately 25 km south of the Site. A creek is located east adjacent to the site intersecting Highway 48, and a provincially significant wetlands are located along the eastern limits of the site.

4. The overburden geology at the site generally consisted of clayey silt and silty clay overlying a sand and gravel confined aquifer.

5. As part of the hydrogeological investigation, DS completed a search of the Ministry of Environment Conservation and parks (MECP) water well records (WWRs) database. Based on the MECP WWR search, there are forty-five (45) water wells within 500 m of the site. Twenty-six (26) wells were noted as domestic (DO) wells, two (2) wells were noted for livestock (ST), one (1) well was noted for commercial (CO) use, and two (2) wells were noted as a public supply (PS) well. All other wells were noted as test holes, monitoring well, not in use or unknown. All other wells were noted as test holes, monitoring well, not in use or unknown.

6. Most communities of Stouffville continue to be served by municipal groundwater, where significant quantities of groundwater are extracted from the Oak Ridges Moraine (ORM) to service municipal water supply. A door-to-door water well survey is recommended within the study area to confirm the presence and use of identified wells.

7. Groundwater levels were measured in all available monitoring wells advanced in 2021 between January 25th and June 21st, 2021, by DS. Groundwater levels were measured in monitoring wells advanced in 2024 on November 14, 2024. The groundwater level in BH25-1 was measured on March 7th and March 24th, 2025. Groundwater levels ranged from 252.7 to 254.8 masl in monitoring wells screened in the till overburden. Sub-artesian conditions were encountered in monitoring wells screened in the underlying cohesionless deposits. Groundwater levels in monitoring wells screened in the underlying cohesionless deposits ranged from 252.8 to 256.5 masl.

8. Based on groundwater elevations, the flow direction is inferred to be southeast towards the drainage ditch, the wetland and the creek located east adjacent to the site intersecting Highway 48. DS is currently undertaking continuous groundwater level monitoring at the Site for one (1) year.

9. In total, four (4) Single Well Response Tests (slug tests) were completed by DS at the site between May 2019 and February 2021, and an additional five (5) slug tests were conducted in November 2024, and one (1) test was conducted at BH25-1 in February 2025 to estimate hydraulic conductivity (k) for the representative geological units in which the wells were screened. The k-values ranged between 3.1 X 10^{-7} to 4.9 x 10^{-6} m/s in the underlying cohesionless unit and 1.9 X 10^{-9} to 7.5 x 10^{-7} m/s in the overlying clayey silt material, indicative of medium to high permeability lithology in the lower unit and low to medium permeability in the upper unit.

10. One (1) unfiltered groundwater sample was collected from monitoring well BH19-5 and BH24-5 on October 7th, and November 15th, 2024, respectively. Samples were submitted to SGS Laboratories in Lakefield, Ontario. SGS is certified by the Canadian Association of Laboratory Accreditation Inc. (CALA)

and Canadian Standard Association (CSA). The analytical results were compared to the parameter limits listed under the York Region sanitary and storm sewer by-law 2021_102. The reported analytical results indicate manganese exceeded the York Region storm sewer criteria from BH24-5. No exceedances were reported against York Region sanitary sewer criteria and against both criteria from BH19-5.

11. The total estimated daily rate for short term construction is estimated to be approximately 54,000 L/day (54 m^3/day) for P2 (east side) and 72,000 L/day (72 m^3/day) for P3 (west side), with a total combined rate of 126,000 L/day (126 m^3/day). This value incorporates a 100% safety factor. The estimated zone of influence (ZOI) is approximately 83 m and 71 m for P2 and P3 sides, respectively. An EASR is recommended to be submitted to the MECP for construction dewatering prior to construction.

12. An additional 340,000 Liters discharged over a 48-hour period (340 m^3 over a 48-hour period) of storm water from a 25 mm precipitation even should be accounted for. Surface water and stormwater contributions during construction are no longer included in the construction groundwater taking EASR and PTTW limits as of July 1st, 2021. Stormwater contributions are to be addressed under other activity requirements.

13. Following the construction of the underground structure, long-term groundwater flow to the underfloor drainage system for the building will be a function of the upward flux and from drainage along the foundation wall. Based on the assumed design, the estimated permanent theoretical flow is approximately 22,800 L/day (22.8 m^3/day) and 26,400 L/day (26.4 m^3/day) for P2 and P3, respectively with a combined rate of 49,000 L/day (49 m^3/day) with a 20% safety factor. Since the estimated maximum permanent drainage rate is below 50,000 L/day, a PTTW will not be required for long-term discharge. These values can change based on actual soil and groundwater conditions at the site and are to be confirmed during construction.

14. Based on results of the pre-development and post-development site water balance completed, the proposed developments will in general produce a decrease in annual evapotranspiration (11,702 m^3/year), a reduction in annual infiltration (3,756 m^3/year) and a general increase in annual runoff (12,763 m^3/year). The effects are mainly the result of increased impervious area and decreased pervious areas of the Site. Low Impact Development (LID) measures are recommended to reduce the infiltration deficit and meet pre-development conditions.

15. The site is designated as countryside area under O.Reg 140/02: Oak Ridges Moraine Conservation Plan. Countryside Areas provide an agricultural and rural transition and buffer between the Natural Core Areas and Natural Linkage Areas and the urbanized Settlement Areas. Infrastructure uses are permitted in Countryside Areas.

16. The Site and study area are located within the Toronto Region Source Protection Area (SPA). The Site and study area are located within a Highly Vulnerable Aquifer (HVA) with a score of 6, indicating moderate risk to the aquifer from construction. However, since construction is anticipated within the

overlying till, construction is not anticipated to impact the underlying sand aquifer. The site is also located within a Significant Groundwater Recharge (SGRA). Given the low permeability of the overlying till material identified during the field investigation, the site does not readily support recharge.

17. The site and the study area are located within a municipal Wellhead Protection Area-Quantity (WHPA-Q). The site is categorized to be at moderate risk for both water taking without returning it to the same source (WHPA-Q1), and for reducing recharge to the area (WHPA-Q2). Any WHPA-Q areas where significant or moderate drinking water stress has been identified is an area where significant drinking water quantity threat activities can occur. In these areas, future activities must return water to the same source and must not reduce recharge.

18. The MECP Permit to take Water (PTTW) Open Data Catalogue was searched within a 1 km radius of the Site. The search indicated that there was (1) active PTTWs within 1 km of the site, where the source was surface water. Therefore, groundwater interferences from surrounding activities may occur.

19. The wetland falls within the zone of influence during construction dewatering. Mitigation measures should be enacted to minizine adverse effects to the creek and wetlands. A wetland water balance risk evaluation may be required for the site from the TRCA prior to development. DS recommended monitoring the water features across the site and obtaining surface water samples to establish base line water quality conditions at the site.

Should you have any questions regarding these findings, please contact the undersigned.

DS Consultants Ltd.

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1.0 INTRODUCTION

DS Consultants Ltd. (DS) was retained by Times Group Corporation to conduct a Hydrogeological Investigation of the site located on the northeast corner of the properties located at 4721 & 5061 Stouffville Road, Whitchurch-Stouffville, ON (Site). The site is in a rural area currently used for agricultural purposes. The site is part of a larger development located at 4721 and 5061 Stouffville road, part of a rural parcel of land. DS understands that the purpose of this Hydrogeological Investigation is to better understand the opportunities and constraints associated with the future development, and identify constraints associated with the Oak Ridges Aquifer Complex (ORAC) and estimate construction dewatering volumes and permanent drainage volume associated with the underground structure.

1.2 Scope of Work

The scope of work for this investigation included:

- Site visits;
- Desktop review of pertinent geological and hydrogeological resources;
- Review the MECP Water Well Records and water use in the surrounding area;
- Field work including monitoring the well drilling program consisting of a total of nineteen (19) boreholes and twelve (12) monitoring wells;
- Conducting single well response tests (slug tests) to determine hydraulic conductivity values across the site;
- Characterize the stratigraphy and measure the ground water levels across the site;
- Estimate construction dewatering volumes and permanent drainage volumes for three (3) levels of underground parking; and
- Assess potential constraints of the site associated with future proposed development

2.0 FIELD INVESTIGATION

2.1 Previous Field Investigation

In May 2019, DS drilled one (1) borehole (BH19-5) equipped with a monitoring well within the boundary limits as part of the geotechnical, environmental, and hydrogeological investigations to a depth of 15.2 mbgs (239.1 masl). Sub-artesian conditions have been encountered at BH19-5, as water levels were found to be above the ground surface in May 2019. One (1) single well response test was completed at BH19-5 in 2019 yield a hydraulic conductivity value of 3.1 x 10^{-6} m/s for the screened silty sand unit.

In February 2021, DS drilled five (5) boreholes and equipped all boreholes with monitoring wells within the site boundary as part of the preliminary geotechnical and hydrogeological investigations. The boreholes were advanced to depths ranging from 12.3 to 15.8 mbgs. Monitoring wells were screened to depths ranging from 6.0 to 15.8 mbgs. All wells were completed with 50 mm diameter PVC pipes with 1.5 or 3.05 m well screens and were installed using above ground mounted protective casings. Three (3) single well response tests (SWRTs) were completed by performing a rising head test (slug test) to estimate hydraulic conductivity values of screened soils at the site.

2.2 Current Field Investigation

In October 2024, DS drilled twelve (12) boreholes with five (5) boreholes equipped with monitoring wells within the site boundary as part of the geotechnical and hydrogeological investigations. The boreholes were advanced to depths ranging from 15.3 to 23.4 mbgs. Monitoring wells were screened to depths ranging from 7.1 to 9.1 mbgs. In February 2026, DS advanced a borehole (BH25-1) to 37.1 mbgs, to determine (if any) the extent of the aquifer at the Site. A monitoring well was installed in BH25-1 to a depth of 21.3 mbgs.

All wells were completed with 50 mm diameter PVC pipes with 1.5 or 3.05 m well screens and were installed using above ground mounted protective casings. All monitoring wells were developed before any use to allow for groundwater level monitoring, hydraulic conductivity testing, and to assess groundwater quality. Six (6) single well response tests (SWRTs) were completed by performing a rising head test (slug test) to estimate hydraulic conductivity values of screened soils at the site. The borehole (BH) and monitoring well (MW) location plan is shown in **Figure 3**.

3.0 SITE SETTING

3.1 Physiography and Drainage

The site is currently being used for agricultural purposes. The topography at the site ranges from approximately 254.3 to 256.7 masl generally sloping south. Willowgrove Creek is located approximately 1.5 km west of the site. Willowgrove Creek is a branch of Little Rouge Creek, which ultimately flows into Lake Ontario located approximately 25 km south of the Site. A creek is located east adjacent to the site intersecting Highway 48, and provincially significant wetlands are located along the eastern limits of the site. The natural heritage map is shown in **Appendix E.** Drainage is generally controlled by streams and the local topography of the site.

3.2 Geology

The following presents a brief description of regional and site geology based on the review of available information and site-specific soil investigations.

3.2.1 Quaternary Geology

According to the Ontario Geological Survey mapping across the region, the site lies within the South Slope physiographic region of southern Ontario and is characterized by drumlinized till plains. The site borders the Oak Ridges Moraine (ORM) physiographic region to the north. However, according to the Ministry of

Natural Resources and Forestry, the site lies within the ORM boundary. The ORM is characterized as a linear, regionally high elevation ridge having hummocky topography that runs east to west, which is situated north of the Greater Toronto Area, and stretches approximately 160 km from the Trent River in the east to the Niagara Escarpment to the west. The ORM contains an abundant thickness of granular water bearing strata within its core that is the source for several groundwater fed tributaries that originate along the north and south slopes of the moraine. Based on a search of the MECP water well records the aquifer extends to approximately 30 mbgs within the study area. There is a possibility that the aquifer may extend beyond the approximated depth. The surficial geology at the site is characterized as clay to silt-textured till derived from glaciolacustrine deposits or shale. The overburden geology at the site generally consists of clayey silt and silty clay till overlying a sand and gravel confined aquifer. The surficial geology map is shown in **Figure 2.**

3.2.2 Bedrock Geology

According to the Ontario Geological Survey mapping across the region the bedrock at the site is predominantly comprised of shale, limestone, dolostone, siltstone of the Georgian Bay Formation; Blue Mountain Formation; Billings Formation; Collingwood Member; and Eastview Member. Bedrock was not encountered during the current investigation. Due to the thickness of the overburden and deep nature of the expected contact, it is not expected that bedrock will influence the groundwater system in respect to the current hydrogeological investigation.

3.2.3 Site Geology

On-site subsurface soils were interpreted from the boreholes/monitoring wells (BHs/MWs) drilled by DS. The locations of the BHs/MWs are shown on **Figure 3** and detailed subsurface conditions are presented on the borehole Logs in **Appendix A**. The subsurface conditions in the boreholes are summarized in the following paragraphs, and the geologic cross sections (A-A') is presented in **Figure 5.**

Topsoil/Fill: A surficial layer of topsoil of 125 to 3800 mm thick was found in all boreholes. It should be noted that the thickness of the topsoil explored at the borehole locations may not be representative of the site and should not be relied on to calculate the amount of topsoil at the site. Below the topsoil, fill materials and/or weathered/disturbed soils consisting of clayey silt to silty clay and sandy silt to silty sand were encountered in all boreholes, extending to depths varied from 0.8 to 2.4 m below ground surface. These soils were found traces of rootlets and topsoil inclusions.

Clayey Silt TO Silty Clay (Till): Cohesive deposits of clayey silt to silty clay (till) were encountered in all boreholes, extending to depths ranging from 9.0 m to 37.1 m below existing ground surface. Boreholes BH24-3 to BH24-5, BH24-9, BH24-12 and BH25-1 were terminated in the clayey silt to silty clay (till). These soils were found to be weathered/disturbed due to ploughing activities in the past. Traces of rootlets and topsoil inclusions were also observed in the weathered deposits. Occasional sand seams and cobble/boulder were present within the clayey silt to silty clay (till) deposits. These deposits were found in a firm to hard consistency.

Sandy Silt to Silty Sand Till: Sandy silt to silty sand till deposits were encountered in all boreholes, extending to depths of 12.0 to 23.4 m below existing grade. Sandy silt to silty sand till deposits were found to be in a compact to very dense state. Occasional sand seams and cobble/boulder were present within the sandy silt to silty sand till deposits.

Cohesionless Sandy Soils (Silt, Sandy Silt to Silty Sand and Sand): Cohesionless water bearing soils consisting of silt, sandy silt to silty sand and sand were encountered at various depths in all boreholes except for boreholes BH24-4 to BH24-6. The cohesionless soils were present in a compact to very dense state.

4.0 HYDROGEOLOGY

The hydrogeology at the development Site was evaluated using the on-site monitoring wells installed by DS, MECP WWRs in the study area and the Oak Ridges Moraine Groundwater Program mapping.

4.1 Hydrostratigraphy

The review of sub-surface soils and based on regional mapping from the Oak Ridges Moraine Groundwater Program mapping. Five (5) hydrostratigraphic units were identified in the vicinity of the site from youngest to oldest:

- **Oak Ridges Aquifer Complex (ORAC):** The ORAC sediments overlie a regional unconformity with infill tunnel channels forming a prominent east-west ridge. The ORAC sediments generally consist of silt and fine sands, but also include gravel seams and some clay. The aquifer is generally unconfined except for areas where it underlies the Halton Till. The ORM sediments are considered high recharge areas.

- **Lower Newmarket Till:** The Newmarket till is a thick aquitard, characterized by low hydraulic conductivity and forms an extensive sheet with various heterogeneous soil characteristics.

- **Thorncliffe Formation:** formed of poorly exposed, interbedded lake sediments and till. It generally comprises of sand and silt, clay, and till. The aquifer is confined by the Newmarket fill aquitard. The unit is characterized by sandy formations with high hydraulic conductivity.

- **Sunnybrook Drift:** Aquitard material separating the Thorncliffe deposits form the Scarborough Formation generally described as clast poor mud consisting of silt and clay.

- **Scarborough Formation:** The Scarborough formation is an aquifer formed of organic rich sands over silt and clays from melt water from glaciation which occurred about 40,000 to 90,000 years ago.

4.2 Local Groundwater Use

As part of the hydrogeological investigation, DS completed a search of the MECP water well records (WWRs) database. Based on the MECP WWR search, there are forty-five (45) water wells within 500 m of the site (**Appendix C**). Twenty-six (26) wells were noted as domestic (DO) wells, two (2) wells were noted for livestock

(ST), one (1) well was noted for commercial (CO) use, and two (2) wells were noted as a public supply (PS) well. All other wells were noted as test holes, monitoring well, not in use or unknown. **Figure 1** shows the MECP water well location plan. Most communities of Whitchurch-Stouffville continue to be served by municipal groundwater, where significant quantities of groundwater are extracted from the ORM to service municipal water supply. A door-to-door water well survey is recommended within the study area to confirm the presence and use of identified wells.

4.3 Groundwater Levels

Groundwater levels were measured in all available monitoring wells advanced in 2021 between January 25th and June 21st, 2021, by DS. Groundwater levels were measured in monitoring wells advanced in 2024 on November 14, 2024. The previously installed wells in 2021 were all found damaged during this monitoring event. The groundwater level in BH25-1 was measured on March 7th and March 24th, 2025. **Table 4-1** presents the groundwater levels in all monitoring wells. Groundwater levels ranged from 252.7 to 254.8 masl in monitoring wells screened in the till overburden (well depths ranging from 6.0 to 9.1 mbgs). Sub-artesian conditions were encountered in monitoring wells screened in the underlying cohesionless deposits (well depths ranging from 12.1 to 21.3 mbgs). Groundwater levels in monitoring wells screened in the underlying cohesionless deposits ranged from 252.8 to 256.5 masl.

Near ground surface groundwater levels, indicate that an underlying confined layer is under substantial pressure. The interpreted shallow groundwater contour map for the water level measurements is shown in **Figure 4.** Based on groundwater elevations, the flow direction is inferred to be southeast towards the drainage ditch, the wetland and the creek located east adjacent to the site intersecting Highway 48. The groundwater levels are subject to seasonal fluctuations and may vary in response to changing climate conditions and may also affect the direction of the shallow groundwater flow direction at the Site.

Table 4-1: Groundwater Levels in Monitoring Wells

Well ID	Ground Elevation (masl)	Screened Interval (mbgs)	Date	Stick-up (m)	WL (top of pip) (m)	Depth to Water (mbgs)	Groundwater Elevation (masl)
BH21-1	254.5	12.2-15.2	25-Feb-21	0.8	1.1	0.3	254.2
			13-Apr-21		2.2	1.4	253.1
			18-May-21		2.1	1.3	253.2
			21-Jun-21		2	1.3	253.2
			16-Jul-21		2.3	1.5	253
			23-Aug-21		2.4	1.6	252.9
			14-Sep-21		2.5	1.7	252.8
			13-Oct-21		2.5	1.7	252.8
			15-Nov-21		2.5	1.7	252.8
			13-Dec-21		2.5	1.7	252.8

			11-Jan-22		2.3	1.5	253.0
			15-Feb-22		2.3	1.5	253.0
			14-Mar-22		2.2	1.4	253.1
			19-Apr-22		2	1.2	253.3
BH21-2	255.2	9.1-12.1	25-Feb-21	0.9		Frozen	
			13-Apr-21		2	1.1	254.1
			18-May-21		1.3	0.4	254.8
			21-Jun-21		2.4	1.5	253.7
			16-Jul-21		1.7	0.8	254.4
			23-Aug-21		2	1.1	254.1
			14-Sep-21		2	1.1	254.1
			13-Oct-21		1.7	0.8	254.5
			15-Nov-21		1.5	0.6	254.6
			13-Dec-21		1.3	0.4	254.9
			11-Jan-22		1.3	0.3	254.9
			15-Feb-22		1.5	0.6	254.6
			14-Mar-22		1.2	0.3	254.9
			19-Apr-22		1.2	0.3	254.9
BH21-3	256.6	4.5-6.0	25-Feb-21	1	4.4	3.4	253.2
			13-Apr-21		4.1	3.1	253.5
			18-May-21		4.1	3.1	253.5
			21-Jun-21		4	3	253.6
			16-Jul-21		4.7	3.7	252.9
			23-Aug-21		4.8	3.8	252.8
			14-Sep-21		4.9	3.9	252.7
			13-Oct-21		4.9	3.9	252.7
			15-Nov-21		4.8	3.8	252.8
			13-Dec-21		4.4	3.4	253.2
			11-Jan-22		4.2	3.2	253.4
			15-Feb-22		4.5	3.5	253.1
			14-Mar-22		4.3	3.3	253.3
			19-Apr-22		3.8	2.8	253.8
BH21-4	256.7	10.7-12.2	25-Feb-21	0.9	2.6	1.7	255
			13-Apr-21		1.2	0.3	256.4
			25-Feb-21			Frozen	
			18-May-21		1.1	0.2	256.5
			21-Jun-21		1.1	0.2	256.5
			16-Jul-21		1.3	0.4	256.3
			23-Aug-21		1.3	0.4	256.3
			14-Sep-21		1.4	0.5	256.2
			13-Oct-21		1.4	0.5	256.2
			15-Nov-21		1.4	0.5	256.2
			13-Dec-21		1.4	0.5	256.2

			11-Jan-22		1.4	0.5	256.2
			15-Feb-22		1.4	0.5	256.2
			14-Mar-22		1.4	0.5	256.2
			19-Apr-22		1.4	0.5	256.2
BH21-5	255.6	9.2-12.2	13-Apr-21	0.9	2.9	2	253.6
			18-May-21		1	0.1	255.5
			21-Jun-21		2.1	1.2	254.4
			23-Aug-21		1.8	0.9	254.7
			14-Sep-21		1.6	0.7	254.9
			13-Oct-21		1.2	0.4	255.3
			15-Nov-21		1.1	0.3	255.3
			13-Dec-21		0.8	0	255.6
			11-Jan-22		0.9	0.1	255.5
			15-Feb-22		1.1	0.3	255.3
			14-Mar-22		0.8	-0.1	255.7
			19-Apr-22		0.7	-0.2	255.8
BH19-5	254.3	12.2-15.2	13-Apr-21	0.8	0.8	0	254.3
			18-May-21		0.9	0.1	254.2
			21-Jun-21		1	0.2	254.1
			16-Jul-21		1.3	0.5	253.8
			23-Aug-21		-	Not accessible	Not accessible
			14-Sep-21		1.5	0.7	253.6
			13-Oct-21		1.2	0.4	253.9
			15-Nov-21		1	0.3	254.0
			13-Dec-21		0.8	0	254.3
			11-Jan-22		0.7	-0.1	254.4
			15-Feb-22		0.7	-0.1	254.4
			14-Mar-22		0.7	-0.1	254.4
			19-Apr-22		0.7	-0.1	254.4
			07-Oct-24		1.2	0.4	253.9
BH24-1	256.6	6.1-9.1	13-Nov-24	0.9	2.7	1.8	254.8
BH24-4	255.4	4.6-7.6	13-Nov-24	0.9	2.2	1.3	254.1
BH24-5	254.9	4.6-7.7	13-Nov-24	0.9	2.3	1.4	253.5
BH24-8	254.5	4.1-7.1	13-Nov-24	0.9	2.3	1.4	253.1
BH24-9	255.8	5.6-8.6	13-Nov-24	0.9	3.1	2.2	253.6
BH25-1	254.3	16.3-21.3	07-Mar-25	0.94	1.09	0.2	254.1
			24-Mar-25		0.78	-0.2	254.5

4.4 Single Well Response Test Analysis

In total, four (4) Single Well Response Tests (slug tests) were completed by DS at the site between May 2019 and February 2021. An additional five (5) slug tests were conducted in November 2024, and one (1) test was conducted at BH25-1 in February 2025 to estimate hydraulic conductivity (k) for the representative

geological units in which the wells were screened. The testing was completed using data loggers placed at the bottom of the monitoring wells to accurately measure the change in the hydraulic head versus time. Hydraulic conductivity (k) values were calculated using the Bouwer and Rice method using the AquiferTest® Software. The semi-log plots for normalized drawdown versus time are provided in **Appendix B.** The k-values ranged between 3.1 X 10^{-7} to 4.9 x 10^{-6} m/s in the underlying cohesionless unit and 1.9 X 10^{-9} to 7.5 x 10^{-7} m/s in the overlying clayey silt material, indicative of medium to high permeability lithology in the lower unit and low to medium permeability in the upper unit. **Table 4-2** presents the Hydraulic Conductivity (k) values for the representative geological units.

Table 4-2: Summary of Hydraulic Conductivity (k) Test Results

Well ID	Screened Interval (mbgs)	Screened Formation	K-value (m/s)
BH21-1	12.2-15.2	Sand and Gravel, Silty Sand Till	1.6 x 10^{-6}
BH21-3	4.5-6.0	Sand	4.9 x 10^{-6}
BH21-4	10.7-12.2	Sandy Silt Till	6.8 x 10^{-7}
BH19-5	12.2-15.2	Silty Sand to Sandy Silt, Sand and Gravel	3.1 x 10^{-7}
BH25-1	16.3-21.3	Silty Sand and Silty Sand to Sandy Silt Till	3.2 x 10^{-7}
		Geomean	8.8 x 10^{-7}
BH24-1	6.1-9.1	Silty Clay Till & Clayey Silt	1.1 x 10^{-8}
BH24-4	4.6-7.6	Clayey Silt to Silty Clay Till	7.5 x 10^{-7}
BH24-5	4.6-7.6	Clayey Silt	7.1 x 10^{-8}
BH24-8	4.1-7.1	Clayey Silt Till & Clayey Silt	7.5 x 10^{-8}
BH24-9	5.6-8.6	Clayey Silt	1.9 x 10^{-9}
		Geomean	3.8 x 10^{-8}

4.5 Groundwater Quality Analysis

To assess the suitability for discharge of groundwater to the York Region sewers, one (1) unfiltered groundwater sample was collected from monitoring wells BH19-5 and BH24-5 on October 7th and November 15th, 2024, respectively. The samples were placed in pre-cleaned laboratory supplied vials and/or bottles provided with analytical test group-specific preservatives, as required. Dedicated nitrile gloves were used during sample handling. The groundwater samples were submitted to SGS Laboratories in Lakefield, Ontario. SGS is certified by the Canadian Association of Laboratory Accreditation Inc. (CALA) and the Canadian Standard Association (CSA). The analytical results were compared to the parameter limits listed under the York Region Sewer Use Bylaw 2021_102. The reported analytical results indicate manganese exceeded the York Region storm sewer criteria from BH24-5. No exceedances were reported against York

Region sanitary sewer criteria from both samples. **Table 4-3** presents a summary of the exceeded parameters, and the certificate of analysis is provided in **Appendix C.**

Table 4-3: Parameters in Groundwater Exceeding the York Region Sewer Use Bylaw

Parameter	Unit	York Region Storm Sewer By-Law Criteria	York Region Sanitary Sewer By-Law Criteria	BH19-5	BH24-5
Manganese	mg/L	0.15	5	0.0131	**0.323**
Note: 0.00- Exceeded Storm Bylaw **<u>0.00</u>**- Exceeded Sanitary Bylaw					

5.0 CONSTRUCTION DEWATERING- UNSEALED EXCAVATION

Construction dewatering is anticipated within the site boundaries for the proposed development. Construction dewatering estimates were based on the site area indicated on site plan designs. The current proposed development is to consist of a 19 to 29-storey high-rise building with P3 extending to 249.35 masl along the east side of the proposed building P2 extending to 250.60 masl on the western side of the Building. Footings are estimated to extend 2.5m below the P2 floor slab (248.10 masl) and P3 floor slab (246.85 masl). The groundwater level should be lowered 1 m below the footings of P2 and P3 to 247.10 masl and 245.85 mas, respectively. Dewatering will be required for the excavation below the groundwater table, and depressurization of the aquifer will be required for any excavations below the estimated safe excavation depths (SEDs). SEDs are discussed in the geotechnical report under a separate cover. The following section calculates the estimated dewatering required during the construction of the proposed developments using the steady-state flow equation for an unsealed excavation.

5.1 Total Estimation of Flow Rate- (Short Term/Construction Dewatering)

This section calculates the estimated dewatering needed considering the open-cut excavation methods using the Dupuit expression for an unconfined aquifer in steady-state conditions.

$$Q = \frac{\pi K(H^2 - h^2)}{2.3 \log\left(\frac{R_0}{re}\right)}$$ Equation 4.1

$$R_0 = C(H - h)\sqrt{k}$$ Equation 4.2

$$r_e = \sqrt{\frac{ab}{\pi}}$$ Equation 4.3

Where,

	P2 (West)	P3 (East)
H- Initial Elevation of Water Table (m)	8.4	11
h-Final Elevation of Water Table (m)	1	1
K- Hydraulic Conductivity (m/s)	1.6×10^{-7} (geomean for area)	2.9×10^{-7} (geomean for area)
Ro- Radius of Influence (m)	83	71
Re- Equivalent Radius (m)	74	54.7
A- Area (m^2)	17,300	9,400
C- Dimensionless Constant	3	3
Q- Flow Rate (L/day)	**27,000**	**36,000**
Q- Maximum Flow Rate (m^3/day) 100% safety factor	**54,000**	**72,000**

The total estimated daily rate for short term construction is estimated to be approximately **54,000 L/day (54 m^3/day)** for P2 (east side) and **72,000 L/day (72 m^3/day)** for P3 (west side), with a total combined rate of **126,000 L/day (126 m^3/day).** This value incorporates a 100% safety factor. It is expected that the initial dewatering rate will be higher to remove groundwater from within the overburden formation. The dewatering rates are expected to decrease once the target water level is achieved in the excavation footprint as groundwater will have been removed locally from storage resulting in lower seepage rates into the excavation. The maximum flow calculation is intended to provide conservative value to account for unforeseeable conditions that may arise during construction.

Surface water runoff and precipitation may accumulate in the excavation resulting in additional water discharge. Water discharge will depend on the size of the excavation, precipitation intensity and excavation method. To represent a 'significant' precipitation event, an estimated 25 mm precipitation event in 24 hours was used to estimate potential storm water discharge. This would account for approximately **340,000 L discharged over a 48-hour period (340 m^3over a 48-hour period)** for the entire Site. Surface water and stormwater contributions during construction are no longer included in the construction groundwater taking EASR and PTTW limits as of July 1st, 2021. Stormwater contributions are to be addressed under other activity requirements.

5.2 Zone of Influence During Construction

The radius of influence (Ro) for the construction dewatering was calculated based on the Sichardt equation (Equation 4.2). Ro is the distance at which the drawdown resulting from pumping is negligible. The equation is empirical and was developed to provide representative flow rates using the steady-state flow dewatering equations as indicated above. Under steady-state conditions, Ro of pumping will extend until boundary flow conditions are reached and sufficient water inputs are equal to the discharge rate due to pumping. Therefore, the Sichardt equation is used to provide a representative flow rate but is not precise in determining the actual radius of influence by pumping. Based on Sichardt equation the zone of influence for the proposed development at the site is approximately 83 m and 71 m for P2 and P3 sides, respectively.

5.3 Permanent Drainage (Long-term Discharge)

A subfloor and perimeter drainage system (PDS) will be required to be implemented to manage groundwater long-term. Continuous groundwater collection and discharge to the Region's sewer will be required. Alternatively, the underground parking structures may be designed as water-tight structures, and groundwater discharge will not be required. Following the construction of the underground structure, long-term groundwater flow to the underfloor drainage system for the building will be a function of the upward flux and drainage along the foundation wall. To estimate the groundwater flow to the future sub-,drain the Dupuit equation was used to obtain a flow rate.

	P2 (West)	P3 (East)
H- Initial Elevation of Water Table (m)	6.4	7.0
h-Final Elevation of Water Table (m)	0.5	0.5
K- Hydraulic Conductivity (m/s)	1.6×10^{-7} (geomean for area)	2.9×10^{-7} (geomean for area)
Ro- Radius of Influence (m)	81	65
Re- Equivalent Radius (m)	74.2	54.7
A- Area (m^2)	17,300	9,400
C- Dimensionless Constant	3	3
Q- Flow Rate (m^3/day)	**19,000**	**22,000**
Q- Maximum Flow Rate (m^3/day) 20% safety factor	**22,800**	**26,400**

Based on the assumed design, the estimated permanent theoretical flow is approximately **22,800 L/day (22.8 m^3/day)** and **26,400 L/day (26.8 m^3/day)** for P2 and P3, respectively with a combined rate of **49,000 L/day (49 m^3/day)** with a 20% safety factor. The drainage control system around and beneath the buildings should be designed with enough capacity to handle the expected permanent volume. This value is recommended to be verified once the underground construction is completed, and access is provided to DS to assess actual flow rates at the sumps.

5.4 Permit Requirements

5.4.1 Environmental Activity and Sector Registry (EASR) /Permit to Take Water (PTTW) Application

An EASR is required to be submitted to the MECP if the taking of groundwater and stormwater for a temporary construction project is between 50,000 L/day and 400,000 L/ day. The EASR application is an online registry and should be submitted to the MECP before any construction dewatering. A PTTW is only required to be submitted to the MECP if the taking of groundwater and stormwater for a temporary construction project is more than 400,000 L/ day.

Since the expected design dewatering rates for the unsealed excavation is above 50,000 L/day, an EASR application is required for short-term dewatering during construction.

Since the estimated maximum permanent drainage rate is below 50,000 L/day, a PTTW will not be required for long-term discharge. These values can change based on actual soil and groundwater conditions at the site and will be confirmed during construction.

5.4.2 Discharge Permits

A discharge permit may be required from the York Region if private water is to be sent to the storm sewer system for construction dewatering and permanent drainage.

6.0 SITE WATER BALANCE

To understand and compare existing hydrologic conditions, a Thornthwaite site water balance was completed. The Thornthwaite water balance (Thornthwaite, 1948; Mather, 1978; 1979) is an accounting type method used to analyze the allocation of water among various components of the hydrologic cycle. Inputs to the model are monthly temperature, Site latitude, precipitation, and stormwater run-off. Outputs include monthly potential and actual evapotranspiration, evaporation, water surplus, total infiltration, and total runoff. For ease of calculation, a spreadsheet model was used for the computation.

When precipitation (P) occurs, it can either runoff (R) through the surface water system, infiltrate (I) to the water table, or evaporate/evapotranspiration (ET) from the earth's surface and vegetation. The sum of R and I is termed as the water surplus (S). When long-term averages of P, R, I and ET are used, there is no net change in groundwater storage (ST). Annually, however, there is a potential for small changes in ST. The annual water budget can be stated as **P = ET + R + I + ST** and the components are discussed below.

6.1 Pre-Development Water Balance

The Site has a total approximate area of 26,748 m^2 and is predominantly comprised of agricultural land. **Figure 6A** shows the pre-development conceptual model considered for establishing current hydrologic conditions. To predict outputs of the pre-development water balance, various inputs were entered into the Thornthwaite model including monthly precipitation and temperature, site latitude, water holding capacity values for native soils and factors of infiltration. Various inputs and outputs of the model are summarized below.

The average annual precipitation rate for the area is approximately 895 mm/year. In the pervious area of the Site, the PET is estimated to be 612 mm/year, which is approximately 68% of the total annual precipitation rate.

Precipitation (P)

Based on the 30-year average for the Richmond Hill Climate Station in Ontario, the average precipitation for the area is about 895 mm/year for the period between 1981 and 2010. Also, the average monthly temperature from this station has been used. The monthly distribution of precipitation is presented in **Table 1, Appendix F.**

Storage (St)

Groundwater storage (ST) of native soils for the existing Site was estimated using values of Water Holding Capacity (mm) of respective land use and soil types identified in Table 3.1 of the Storm Water Management (SWM) Planning & Design Manual (MOE, March 2003). The land uses, soil types and respective water

holding capacities chosen to represent existing conditions at the Site include the following with their respective water holding capacity applied to March for monthly calculations:

- Agricultural/Moderately Rooted Crops, Silt Soils– 200 mm

Using the procedures outlined in the SWM Planning & Design Manual for the above land use and soil type, the annual change in storage is zero (0).

Evapotranspiration (Et)

Monthly Potential Evapotranspiration (PET) is estimated using monthly temperature data and is defined as a water loss from a homogeneous vegetation-covered area that never lacks water (Thornthwaite,1948; Mather, 1978). In the Thornthwaite water balance model, PET is calculated using the Hamon equation (Hamon, 1061);

PET Hamon = 13.97 * d * D2 * Wt

Where:
d = the number of days in the month
D = the mean monthly hours of daylight in units of 12 hours
Wt = a saturated water vapour density term = 4.95 * e0.627/100
T = the monthly mean temperature in degrees Celsius

The calculated Actual Evapotranspiration (AET) is based on PET and changes in ST (Δ ST). Where there is not enough P to satisfy PET, a reduction in ST occurs. As a result, volumes of AET are less than PET. Also, it is assumed that evaporation will occur and will amount to approximately 15% of the total precipitation for an impervious cover.

Precipitation Surplus (S)

Precipitation surplus is calculated as P–ET. For pervious areas, ET is considered AET and for impervious areas, ET is evaporation.

Infiltration (I) and Runoff (R)

For pervious areas, precipitation surplus has two (2) components in the Thornthwaite model: a runoff component (overland flow that occurs when soil moisture capacity is exceeded) and an infiltration component. The accumulation of infiltration factors for topography, soil types and cover as prescribed in Table 3.1 of the SWM Planning & Design Manual give infiltration factors for existing conditions on the Site as shown below in **Table 6-1**. The runoff component calculated in the pre-development model is the remaining volume of precipitation surplus following AET, ET, and infiltration.

Based on the above, the resulting annual evapotranspiration, infiltration and runoff volumes for each area of the Site during the pre-development period is summarized in **Table 6-1 below.**

Table 6-1 - Existing Conditions – Infiltration Factor

Land uses / soil types	Topography	Soil	Cover	Total Infiltration Factor
Agricultural/Moderately Rooted Crop	0.3	0.2	0.1	0.6

Table 6-2 – Summary of Pre-Development Water Balance

Land Uses / Soil Types	ET Volume (m^3/year)	AET Volume (m^3/year)	Infiltration Volume (m^3/year)	Runoff Volume (m^3/year)
Agricultural/Moderately Rooted Crop	NIL	15,409	5,122	3,414

The detailed calculations are provided in **Table 2, Appendix E**

6.2 Post Development Water Balance

Post-development conditions include impervious areas and pervious areas of park area (urban lawn), with silt loam soils. To predict outputs of the post-development water balance, the same 30-year average climate data and site latitude inputs were used. Changes in land use including landscaped areas include a reduction in soil water holding capacity inputs and factors of infiltration. **Figure 6B** shows the post-development conceptual model considered for establishing current hydrologic conditions. Various inputs and outputs of the post-development model are presented in **Table 3, Appendix F.**

PRECIPITATION (P)

Based on the 30-year average for the Richmond Hill WWTP Climate Station, the average precipitation for the area is about 895 mm/year for the period between 1981 and 2010. Also, the average monthly temperature from this station has been used. The monthly distribution of precipitation is presented in **Table 1, Appendix F.**

Storage (St)

The land uses, soil types and respective water holding capacities chosen to represent existing conditions at the Site including the following with their respective water holding capacity applied to March for monthly calculations:

- Park (Urban Lawns)/Silt Loam – 125 mm

Like the pre-development conditions, using the procedures outlined in the SWM Planning & Design Manual for each land use, the annual change in storage is 0. The monthly distribution of ST for each of the land use/soil types is presented in **Table 3, Appendix F**.

Evapotranspiration (Et)

The proposed plans for development during the post-construction period will result in an increase in the total impervious hard surfaces across the Site. The total area of impervious surfaces following the proposed plans for construction is approximately 20,063 m^2. In the impervious areas, it is assumed that only evaporation will occur and will amount to approximately 15% of the total precipitation. Considering a total annual precipitation of 895 mm/year, evaporation is estimated at 122 mm/year. On this basis, the total annual volume of evaporation is estimated at 134 m^3/year. The detailed calculations for evaporation are included in **Table 3, Appendix F**.

For post-development pervious areas, monthly PET is estimated using the same inputs and calculations described in the pre-development model respective of land use and soil moisture holding capacity. In the post-development scenario, annual AET is 3,707 m^3/year for the pervious landscaped/developmental area of the Site. The monthly distribution of post-development AET and detailed calculations are presented in **Table 3, Appendix F**.

Precipitation Surplus (S)

For post-development pervious surfaces at the Site, precipitation surplus is calculated as the difference between precipitation and actual evapotranspiration (P–AET), which is estimated to be 358 mm/year for pervious landscaped areas.

For Impervious surfaces at the Site, surplus is P-ET where ET is estimated at 15% of P. The resulting precipitation surplus is about 134 mm/yr. The more detailed calculations are included in **Table 3, Appendix F**.

Infiltration (I) and Runoff (R)

The accumulation of infiltration factors for topography, soil types and cover are prescribed in Table 3.1 of the SWM Planning & Design Manual. The annual volume of post-development infiltration for the development is estimated at 1,366 m^3/year.

The runoff component calculated in the post-development model is the remaining volume of precipitation surplus following infiltration. Considering the precipitation surpluses and the total infiltration volume, the total runoff for the development is approximately 16,177 m^3/year. Detailed calculations and the monthly distribution of infiltration and runoff are presented in **Table 3, Appendix F.**

6.3 Site Water Balance Results

Based on results of the pre-development and post-development water balance completed, the proposed developments will in general produce a decrease in annual evapotranspiration over the Site, a reduction in annual infiltration and a general increase in annual runoff at the Site. The effects are mainly the result of increased impervious area and decreased pervious areas of the Site. The proposed development will produce an infiltration deficit of 3,756 m^3/year and an increase in annual runoff of 12,763 m^3/year.

Table 6-3 below summarizes the pre- and post-development conditions with and without mitigation measures. LID measures are recommended to reduce the infiltration deficit and meet pre-development conditions. In-situ infiltration tests will be conducted once LID inverts are provided to DS for review. A minimum 1 m clearance must be maintained between the bottom invert of LID measures and the groundwater table. A mitigated water balance will be provided once LID design is provided to DS for review.

Table 6-3- Summary of Water Balance Analysis – Pre-Development and Post-Development

Hydrologic Output	Pre-Development	Post-Development	Change (Pre- to Post Development)
Proposed Development Area (m^2)	26,748	26,748	0
Precipitation (m^3/year)	23,945	23,945	0
Total Evaporation (m^3/year)	0	2,694	2,694
Total AET (m^3/year)	15,409	3,707	-11,702
Total Infiltration (m^3/year)	5,122	1,366	-3,756
Total Runoff (m^3/year)	3,414	16,177	12,763

7.0 POTENTIAL IMPACTS

The potential impacts associated with a development occurring at the site are presented in the sections below.

7.1 Oak Ridges Moraine Conservation Plan

The Site falls under O.Reg 140/02: Oak Ridges Moraine Conservation Plan. The ORM Conservation Plan is an ecologically based plan that provides land use and resource management direction for land and water within the Moraine. The site is categorized is designated as countryside area.

Countryside Areas provide an agricultural and rural transition and buffer between the Natural Core Areas and Natural Linkage Areas and the urbanized Settlement Areas. Infrastructure uses are permitted in Countryside Areas. Residential developments, and small-scall commercial, industrial, and institutional uses are permitted in Countryside Areas. Additional permitted land uses are outlined in section 12(3) and section 13(3) of O.Reg 140/02. The Ontario Ministry of Natural Resources and Forestry Map is shown in **Appendix E.**

7.2 Local Groundwater Use

The MECP water well record search identified multiple water supply wells within the study area. Prior to any development, it is recommended that a door-to-door water well survey be conducted within the study area to confirm the presence and the use of the water supply wells identified in the MEC WWRs, and to assess potential short-term and long-term impacts to private water wells that may occur from dewatering activities at the site.

7.3 Current PTTW Search

The MECP Permit to take Water (PTTW) Open Data Catalogue was searched within a 1 km radius of the Site. The search indicated that there is one (1) active PTTWs within 1 km of the Site where the source was surface water. Therefore, groundwater interferences from surrounding activities may occur. The PTTW search is summarized in **Table 7-1** below.

Table 7-1: PTTW Search within 1 km of Site

Permit Number	Permit Holder Name	Purpose	Specific Purpose	Max Litres Per Day	Source Type	Distance from Site (km)
2307-ALLT4C	63 Golf Inc. operating as Spring Lakes Golf Club	Commercial	Golf Course Irrigation	3,410,000	Surface Water	0.99

7.4 Source Protection Area

The site is located within the Toronto Region Source Protection Area (SPA). The site was identified to be within an area of significant groundwater recharge with a designated score of 6. Significant groundwater recharge areas are characterized by porous soils such as sand and gravel, which allow water to seep easily to the ground. A recharge area is considered significant when it helps maintain water levels in an aquifer that supplies a community with drinking water. Groundwater impacts as a result of construction should be assessed and minimize potential impacts to drinking water.

7.5 Highly Vulnerable Aquifer & Significant Groundwater Recharge Area (SGRA)

The site is located within a Highly Vulnerable Aquifer (HVA) with a score of 6, indicating a moderate risk to the aquifer from construction activities. However, since construction is anticipated within the overlying till, construction is not anticipated to impact the underlying sand aquifer. HVAs are aquifers that are more susceptible to contamination generally consisting of granular material (i.e., sand & gravel, and fractured rock near the surface). The Site is also located within a Significant Groundwater Recharge Area (SGRA) where storm water can easily seep into the ground and replenish the aquifer. SGRAs help maintain the water level in the aquifers that supply drinking water in the area. Given the low permeability of the overlying till material identified during the field investigation, the site does not readily support recharge.

7.6 Wellhead Protection Area

The site and the study area are located within a municipal Wellhead Protection Area-Quantity (WHPA-Q). The site is categorized to be at moderate risk for both water taking without returning it to the same source (WHPA-Q1), and for reducing recharge to the area (WHPA-Q2). Any WHPA-Q areas where significant or moderate drinking water stress has been identified is an area where significant drinking water quantity

threat activities can occur. In these areas, future activities must return water to the same source and must not reduce recharge. Areas where a PTTW is required under a moderate risk WHPA-Q must demonstrate that the water taking can be maintained on a sustainable basis; will not affect the ability of the aquifer to meet the municipal water supply requirements for the current and planned service capacity; and will ensure the hydrological integrity of municipal wells will be maintained.

7.7 Intake Protection Zone

The site and the study area are not located within a water intake protection zone (IPZ). No IPZ impacts are anticipated due to the proposed temporary dewatering.

7.8 Surface Water

A creek intersects highway 48 located east of the site and provincially significant wetlands are located along the eastern limits of the site. The wetland falls within the zone of influence during construction dewatering. Mitigation measures should be enacted to minizine adverse effects to the creek and wetlands. A wetland water balance risk evaluation may be required for the site from the TRCA prior to development. DS recommended monitoring the water features across the site and obtaining surface water samples to establish base line water quality conditions at the site.

8.0 LIMITATIONS

This report was prepared for the sole use of Life Construction Inc. the addressee to provide an assessment of the hydrogeological conditions on the property. The information presented in this report is based on information collected during the completion of the hydrogeological investigation by DS Consultants Ltd. DS Consultants Ltd. was required to use and rely upon various information sources produced by other parties. The information provides in this report reflects DS' judgment in light of the information available at the time of report preparation. This report may not be relied upon by any other person or entity without the written authorization of DS Consultants Ltd. The scope of services performed in the execution of this investigation may not be appropriate to satisfy the needs of other users, and any use or reuse of this documents or findings, conclusions and recommendations represented herein, is at the sole risk of said users. The conclusions drawn from the Hydrogeological report were based on information at selected observation and sampling locations. Different conditions between and beyond these locations may become apparent during future investigations or on-site work, which could not be detected or anticipated at the time of this investigation. DS Consultants Ltd. cannot be held responsible for hydrogeological conditions at the site that was not apparent from the available information.

Should you have any questions regarding these findings, please do not hesitate to contact the undersigned.

DS Consultants Ltd.

Prepared By:



Dorothy Santos, M.Sc.
Project Manager

Reviewed By:



Don Hsu, P.Eng.
Senior Project Manager (Hydrogeology)

9.0 REFERENCES

Approved Source Protection Plan: CTS Source Protection Region. Prepared by CTC Source Protection Region, July 2015.

Chapman, L.J., and D.F. Putnam; The Physiography of Southern Ontario, Third Edition, Ontario Geological Survey Special Volume 2; 1984, & 2007.

Freeze, R.A. and J.A. Cherry. “Groundwater”. Prentice-Hall, Inc. Englewood Cliffs, NJ. 1979.

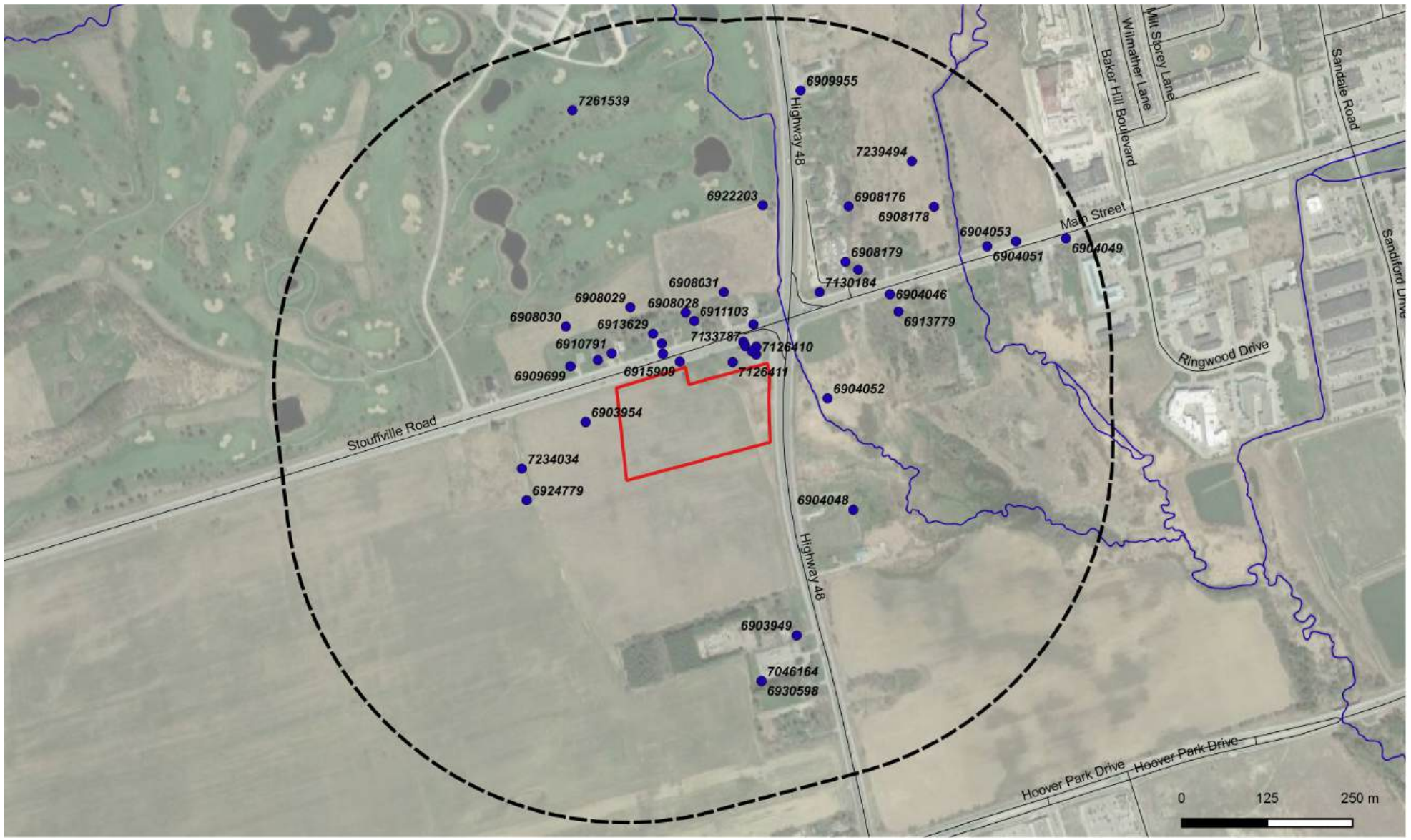
Ontario Regulation 140/02- Oak Ridges Moraine Conservation Act- 2001

Ontario Regulation 153/04 made under the Environmental Protection Act, July 1, 2011.

Ontario Regulation 245/11- Environmental Activity and Sector Registry.

Figures

C:\0Sharon\19-043-100 4721 and 5061 Stouffville Road_Times Group\1-QGIS\HydroG-101\NE Corner\Figure 1 – Site Location and MECP Well Records.qgs



Legend

- Approx Property Boundary
- 500m Buffer
- Registered Water Well (MECP WWR)

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Client: TIMES GROUP

Project: HYDROGEOLOGICAL INVESTIGATION
5061-4721 Stouffville Road, Whitchurch-Stouffville, ON

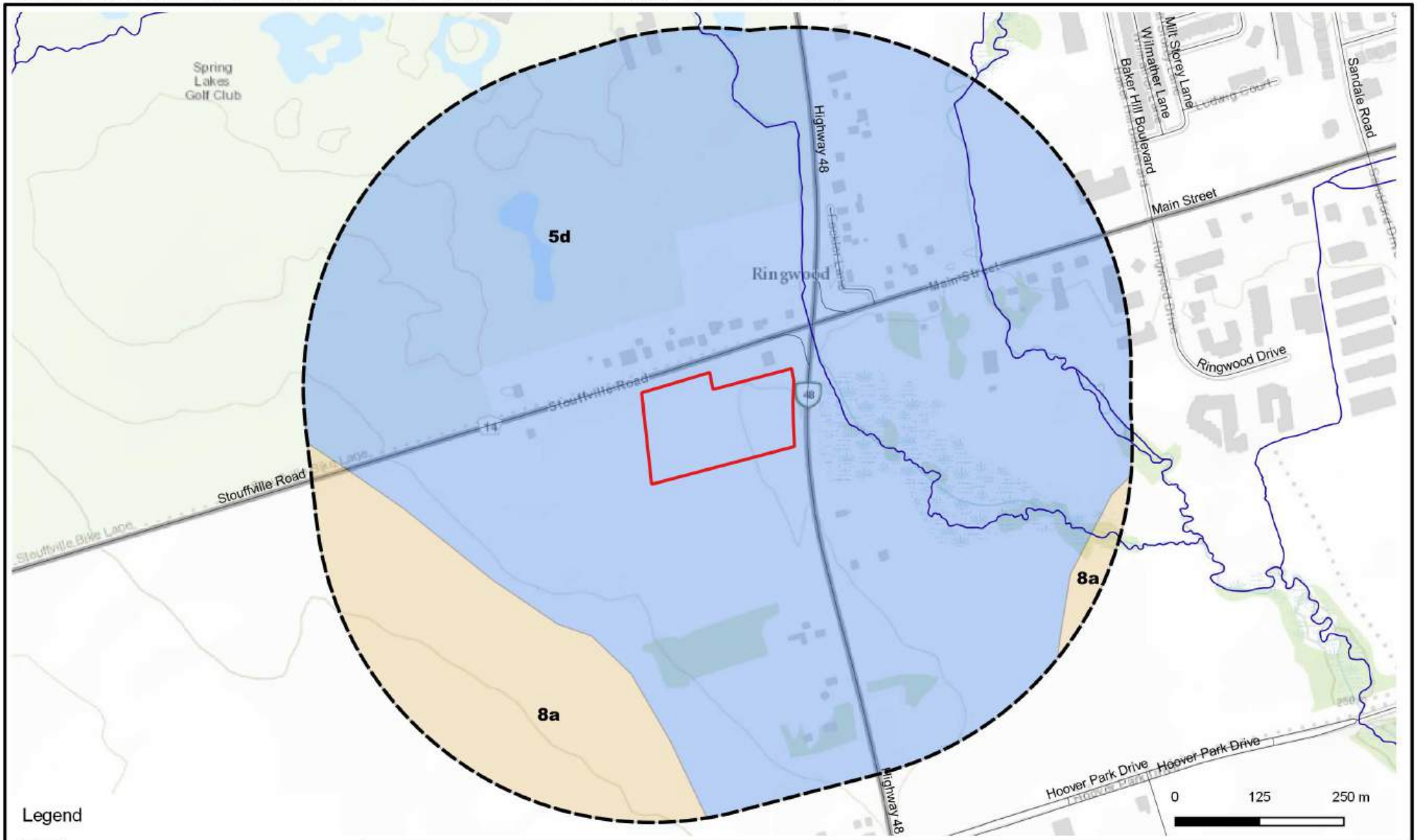
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Size:	Approved By:	Drawn By:	Date:
8.5 x 11	D.G	S.Y	June 2021
Rev:	Scale:	Project No.:	Figure No.:
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Image/Map Source: *Google Satellite Image*

C:\0Sharon\19-043-100 4721 and 5061 Stouffville Road_Times Group\1-QGIS\HydroG-101\NE Corner\Figure 2 – Surficial Geology Map.qgs



Legend

- 500m Buffer
- Approx Property Boundary
- 5d - Till
- 8a- Fine-textured Glacial Lake Deposits

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Title: **SURFICIAL GEOLOGY MAP**

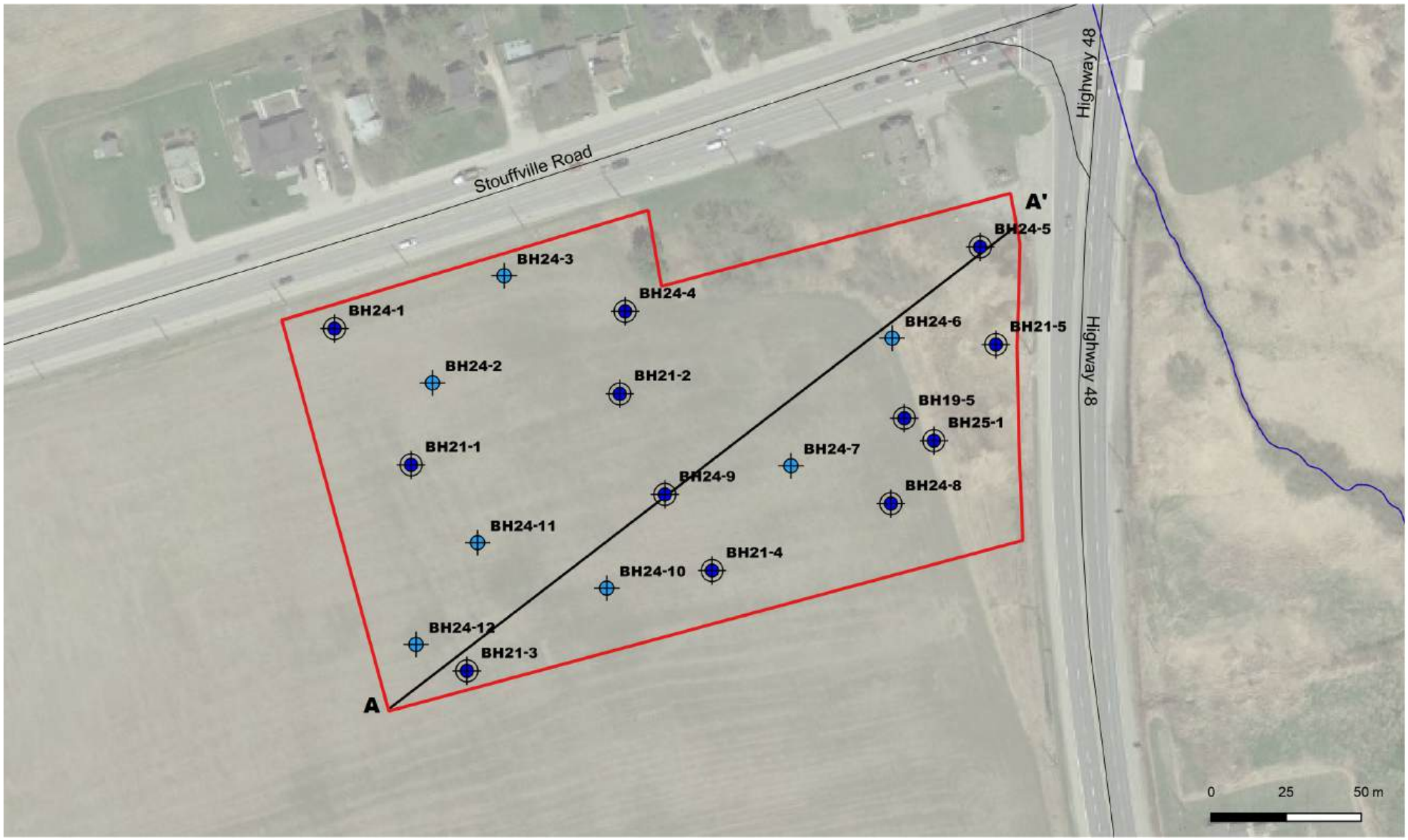
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Client: TIMES GROUP

Size:	Approved By:	Drawn By:	Date:
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Rev: 0	Scale: As Shown	Project No.: 19-043-101	Figure No.: 2

Image/Map Source: *Esri Topo Map & https://www.mndm.gov.on.ca/*

J:\-GIS\2019 PROJECTS\19-043-100 4721 and 5061 Stouffville Road_Times Group\1-QGIS\HydroG-101\NE Corner\Figure 3 – Borehole and Monitoring Well Locations.qgs



Legend

- Approx Property Boundary
- Cross Section
- Borehole
- Monitoring Well

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Title: **BOREHOLE AND MONITORING WELL LOCATIONS**

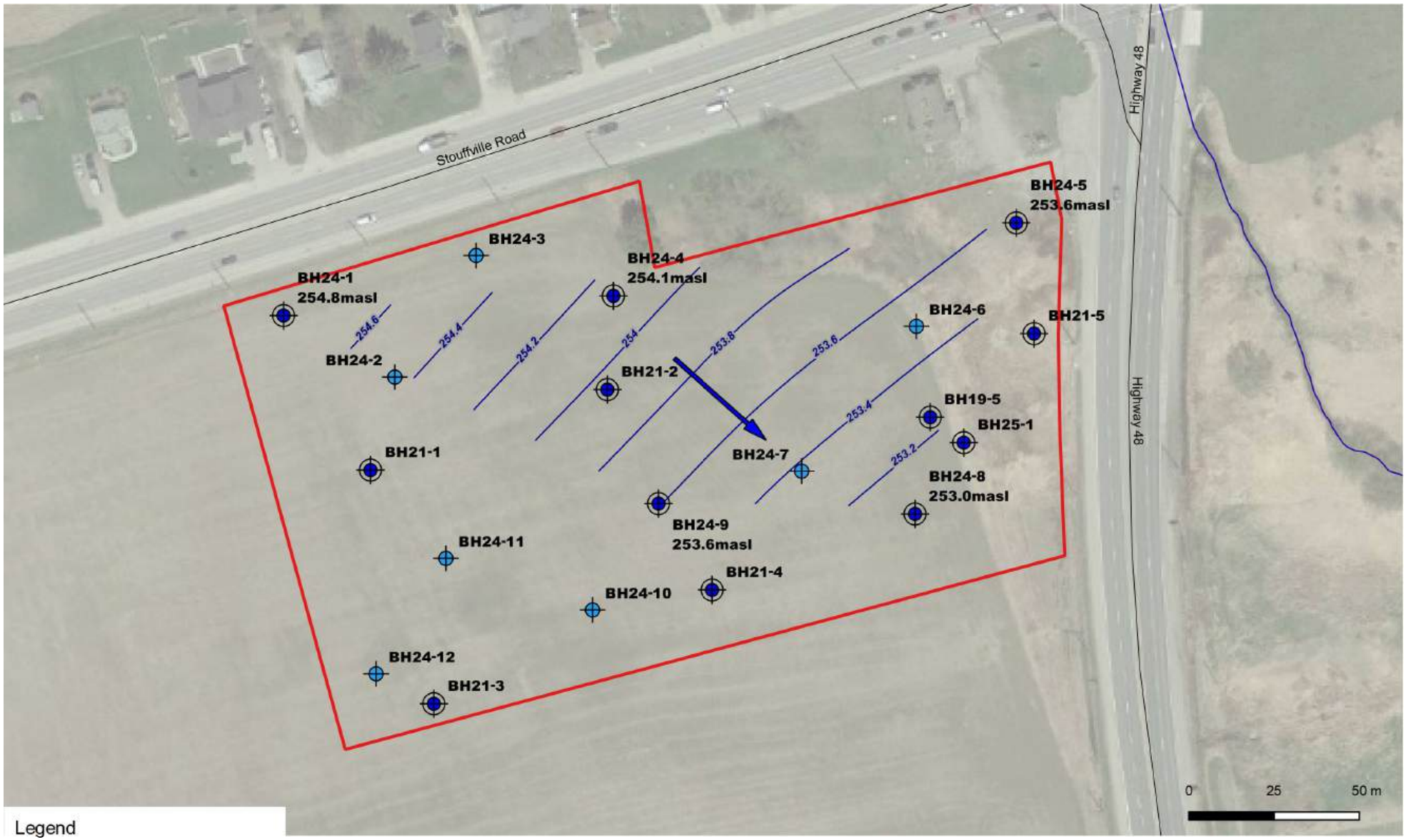
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Client: TIMES GROUP

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8.5 x 11	D.S	S.Y	April 2025
Rev: 0	Scale: As Shown	Project No.: 19-043-101	Figure No.: 3

Image/Map Source: *Google Satellite Image*

J:\-GIS\2019 PROJECTS\19-043-100 4721 and 5061 Stouffville Road_Times Group\1-QGIS\HydroG-101\NE Corner\Figure 4 - GW Elevation Contours and Flow



Legend

- Approx Property Boundary
- Borehole
- Monitoring Well
- Groundwater Flow Direction
- Groundwater Elevation Contour (Nov 13, 2024)

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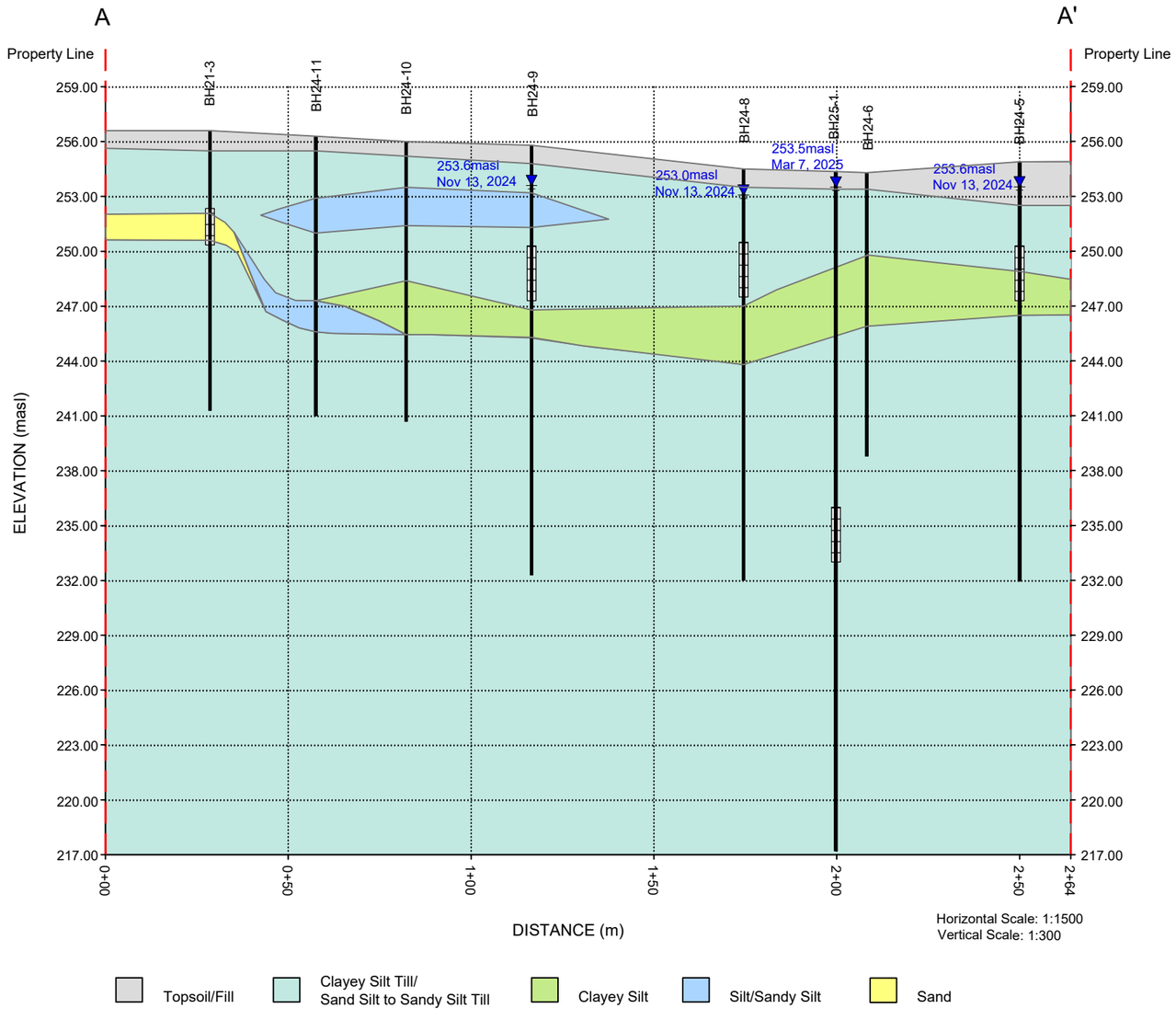
Title: **INFERRED GROUNDWATER CONTOURS AND FLOW DIRECTION MAP**

N

Client: TIMES GROUP

Size:	Approved By:	Drawn By:	Date:
8.5 x 11	D.S	S.Y	April 2025
Rev: 0	Scale: As Shown	Project No.: 19-043-101	Figure No.: 4

Image/Map Source: *Google Satellite Image*



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Title: **GEOLOGICAL CROSS SECTION A-A'**

Client: TIMES GROUP

Size:	Approved By:	Drawn By:	Date:
11 X 17	D.S	S.Y	April 2025
Rev.	Scale: As Shown	Project No: 19-043-101	Figure No. **5**

J:\-GIS\2019 PROJECTS\19-043-100 4721 and 5061 Stouffville Road_Times Group\1-QGIS\HydroG-101\NE Corner\Waterbalance\Figure 1 - Pre Development Landuse.qgs



Legend

- Approx Property Boundary
- Agricultural and Open Space

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5061-4721 Stouffville Road, Whitchurch-Stouffville, ON

Title: **PRE DEVELOPMENT LANDUSE**

N

Client: TIMES GROUP

Size:	Approved By:	Drawn By:	Date:
8.5 x 11	D.G	S.Y	December 2024
Rev: 0	Scale: As Shown	Project No.: 19-043-100	Figure No.: **6A**

Image/Map Source: *Google Satellite Image*

J:\-GIS\2019 PROJECTS\19-043-100 4721 and 5061 Stouffville Road_Times Group\1-QGIS\HydroG-101\NE Corner\Waterbalance\Figure 2 - Post Development Landuse.qgs



Legend

- Approx Property Boundary
- Building
- Open Space
- Road/Driveway/Parking

DS CONSULTANTS LTD.
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Vaughan, Ontario L4H 0K8
Telephone: (905) 264-9393
www.dsconsultants.ca

Project: HYDROGEOLOGICAL INVESTIGATION
5061-4721 Stouffville Road, Whitchurch-Stouffville, ON

Title: **POST DEVELOPMENT LANDUSE**

N

Client: TIMES GROUP

Size:	Approved By:	Drawn By:	Date:
8.5 x 11	D.G	S.Y	December 2024
Rev: 0	Scale: As Shown	Project No.: 19-043-100	Figure No.: **6B**

Image/Map Source: *Google Satellite Image*

Appendix A

DS CONSULTANTS LTD.
Geotechnical ◆ Environmental ◆ Materials ◆ Hydrogeology

LOG OF BOREHOLE BH19-5

PROJECT: Preliminary Geotechnical Investigation
CLIENT: Times Group Corp
PROJECT LOCATION: 4721 to 5061 Stouffville Road, Whitchurch-Stouffvill, ON
DATUM: Geodetic
BOREHOLE LOCATION: See Drawing 1 N 4869147.9 E 637851

DRILLING DATA
Method: Solid Stem Auger
Diameter: 150mm
Date: May/01/2019

REF. NO.: 19-043-100
ENCL NO.: 6

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION
254.3						W. L. 254.6 m May 23, 2019	254
254.2 0.1	**TOPSOIL:** 125mm		1	SS	5		
253.5 0.8	**FILL:** silty clay, trace sand, brown, moist, firm						
1	**SANDY SILT TILL:** trace to some clay, some gravel, occasional cobble/boulder, brown, wet, compact to very dense		2	SS	10		253
			3	SS	14		
2			4	SS	78		252
3	some clay, grey, moist below 3.1m		5	SS	94		251
4							250
5			6	SS	86		
248.2 6.1							249
	CLAYEY SILT TILL: sandy, trace gravel, grey, moist, hard		7	SS	40		248
7 246.7 7.6							247
	SILT TO SANDY SILT: some clay, grey, moist, dense		8	SS	46		
8 245.2 9.1							246
	CLAYEY SILT TILL: sandy, trace gravel/ cobble, grey, moist, hard		9	SS	36		245
10							244
11			10	SS	47		
12 242.1 12.2							243
	SILTY SAND TO SANDY SILT TILL: trace to some clay, trace cobbles, grey, moist, very dense		11	SS	86		242
13 241.0 13.3							241
	SAND AND GRAVEL: trace silt, grey, wet, dense		12	SS	39		
14 15 239.1 15.2	**END OF BOREHOLE**						240

Notes:
1) 50mm dia. monitoring well installed at 15.2 mbgl upon completion.
2) Water level readings:

Date:	W.L. Depth (m):
May 23, 2019	-0.30 (above ground surface)

DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)
SHEAR STRENGTH (kPa)
○ UNCONFINED + FIELD VANE & Sensitivity
● QUICK TRIAXIAL × LAB VANE
(20 40 60 80 100)

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%) (10 20 30)

POCKET PEN. (Cu) (kPa)
NATURAL UNIT WT (kN/m³)

METHANE AND GRAIN SIZE DISTRIBUTION (%)

GR	SA	SI	CL
19	33	38	10

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: +3, ×3: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

DS SOIL LOG 19-043-100; 4271 STOUFFVILLE.GPJ DS.GDT 7/16/19

DS CONSULTANTS LTD.
Geotechnical ◆ Environmental ◆ Materials ◆ Hydrogeology

LOG OF BOREHOLE BH21-1

PROJECT: Geotechnical Investigation - Additional Work
CLIENT: Times Group
PROJECT LOCATION: 4721 and 5061 Stouffville Rd, Whitchurch-Stouffvill, ON
DATUM: Geodetic
BOREHOLE LOCATION: See Drawing 1 N 4869159.459 E 637854.913

DRILLING DATA
Method: Hollow Stem Auger
Diameter: 200mm
Date: Feb-11-2021

REF. NO.: 19-043-101
ENCL NO.: 8

ELEV / DEPTH (m)	DESCRIPTION	NUMBER	TYPE	BLOWS 0.3 m "N"
254.5 / 0.0	**TOPSOIL:** 300mm	1	SS	7
254.2 / 0.3	**CLAYEY SILT:** some sand, trace gravel, brown, moist, firm (weathered)			
253.7 / 0.8	**SILTY SAND:** trace clay, trace gravel, brown, wet, compact	2	SS	17
253.5 / 1.0	**SANDY SILT TILL:** trace clay, trace gravel, brown, moist, compact to dense	3	SS	17
		4	SS	20
		5	SS	36
	grey below 4.5m	6	SS	31
248.5 / 6.0	**CLAYEY SILT TILL:** some sand, trace gravel, grey, moist, very stiff	7	SS	25
		8	SS	19
		9	SS	17
		10	SS	22
242.3 / 12.2	**SAND AND GRAVEL:** silty, trace cobble, trace clay, grey, saturated, compact	11	SS	29
240.8 / 13.7	**SILTY SAND TILL:** trace clay, trace gravel, brown, wet, compact to very dense	12	SS	21
		13	SS	52
238.7 / 15.8	**END OF BOREHOLE**			

Notes:
1) 50mm dia. monitoring well installed upon completion.
2) Water level readings:

Date:	W.L. Depth (m):
April 13, 2021	1.37
Feb. 25, 2021	0.4

W. L. 254.1 m Feb 21, 2025
W. L. 253.1 m Apr 13, 2021

DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)
SHEAR STRENGTH (kPa) (20 40 60 80 100)
○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE
PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%) (10 20 30)

METHANE AND GRAIN SIZE DISTRIBUTION (%)

GR	SA	SI	CL
2	17	54	27

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: $+^3$, $\times^3$: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

DS CONSULTANTS LTD.
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LOG OF BOREHOLE BH21-2

PROJECT: Geotechnical Investigation - Additional Work
CLIENT: Times Group
PROJECT LOCATION: 4721 and 5061 Stouffville Rd, Whitchurch-Stouffvill, ON
DATUM: Geodetic
BOREHOLE LOCATION: See Drawing 1 N 4869127.615 E 637803.503

DRILLING DATA
Method: Hollow Stem Auger
Diameter: 200mm
Date: Feb-11-2021

REF. NO.: 19-043-101
ENCL NO.: 9

ELEV / DEPTH (m)	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION
255.2							
255.0 0.0	**TOPSOIL:** 300mm						
0.3 254.4	**SANDY SILT:** trace clay, trace gravel, trace organics, brown, moist, compact (weathered)		1	SS	13		
1 0.8	**CLAYEY SILT TILL:** sandy, trace gravel/ cobble, grey, moist, stiff to hard		2	SS	14		
2			3	SS	24		
	No recovery at 2.3m		4	SS	60		
252.2 3.0	**SANDY SILT TILL:** clay seams, trace gravel/ cobble, grey, moist, dense to very dense		5	SS	37		
4	some clay below 4.5m		6	SS	33		
5			7	SS	58		
6							
7 247.7							
7.5 8	**CLAYEY SILT TILL:** some sand to sandy, trace gravel/ cobble, grey, moist, very stiff to hard		8	SS	25		
9			9	SS	30		
10 244.5							
10.7 11	**SANDY SILT TILL:** some clay, trace gravel/ cobble, grey, wet, compact		10	SS	15		
12 243.0							
12.2	**SAND:** trace clay, trace gravel, grey, saturated		11	SS	disturbed		
13 241.5							
13.7 14	**SANDY SILT TILL:** trace clay, trace gravel/ cobble, grey, moist, very dense		12	SS	50/ 125mm		
15 239.7			13	SS	50/ 100mm		
15.5	**END OF BOREHOLE**						

Notes:
1) 50mm dia. monitoring well installed upon completion.
2) Water level readings:

Date:	W.L. Depth (m):
April 13, 2021	1.18
Feb. 25, 2021	- 0.02 (above ground)

W. L. 255.2 m Feb 21, 2025
W. L. 254.1 m Apr 13, 2021

DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)
SHEAR STRENGTH (kPa) (20 40 60 80 100)
○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%) (10 20 30)

POCKET PEN. (Cu) (kPa)
NATURAL UNIT WT (kN/m³)

METHANE AND GRAIN SIZE DISTRIBUTION (%)

	GR	SA	SI	CL
5	9	30	46	15
10	0	2	62	36

DS SOIL LOG 19-043-101 4721 AND 5061 STOUFFVILLE RD ADDITIONAL WORK_TIMES GROUP.GPJ DS.GDT 21-5-3

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
+3, ×3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

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LOG OF BOREHOLE BH21-3

PROJECT: Geotechnical Investigation - Additional Work
CLIENT: Times Group
PROJECT LOCATION: 4721 and 5061 Stouffville Rd, Whitchurch-Stouffvill, ON
DATUM: Geodetic
BOREHOLE LOCATION: See Drawing 1 N 4869091.791 E 637696.023

DRILLING DATA
Method: Hollow Stem Auger
Diameter: 200mm
Date: Feb-16-2021

REF. NO.: 19-043-101
ENCL NO.: 10

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS "N" 0.3 m	GROUND WATER CONDITIONS	ELEVATION	METHANE AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
256.6								
0.0 / 256.2	**TOPSOIL:** 380mm		1	SS	21		256	
0.4 / 255.5	**CLAYEY SILT:** trace clay, trace gravel, trace topsoil, dark brown, moist, stiff to very stiff (weathered)		2	SS	11			
1.1 / 254.3	**CLAYEY SILT TILL:** sandy, trace gravel, sand seams, brown, moist, stiff		3	SS	11		255	
2.3 / 252.1	**SANDY SILT TILL:** some clay, trace gravel/ cobbles, brown, moist, compact to dense		4	SS	22		254	
			5	SS	36	W. L. 253.3 m W. L. 253.1 m Feb 21, 2025	253	4 30 55 11
4.5 / 250.6	**SAND:** some silt, trace clay, brown, saturated		6	SS	disturbed		252	
6.0	**CLAYEY SILT TILL:** sandy, trace gravel, sand seams, grey, moist, very stiff to hard		7	SS	86/ 230mm		251	
			8	SS	86/ 280mm		250	
	trace sand below 9m		9	SS	24		249	
245.9							248	
10.7	**SANDY SILT TO SILTY SAND TILL:** trace clay, trace gravel, grey, wet, dense to very dense		10	SS	50/ 125mm		247	7 47 37 9
			11	SS	40		246	
	moist below 13.7m		12	SS	50/ 125mm		245	
241.3							244	
15.3	**END OF BOREHOLE**		13	SS	50/ 125mm		243	
	Notes: 1) 50mm dia. monitoring well installed upon completion. 2) Water level readings: Date: W.L. Depth (m): April 13, 2021 3.3 Feb. 25, 2021 3.5						242	

DYNAMIC CONE PENETRATION RESISTANCE PLOT
20 40 60 80 100

SHEAR STRENGTH (kPa)
○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE
20 40 60 80 100

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30

POCKET PEN. (Cu) (kPa)

NATURAL UNIT WT (kN/m³)

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES
+3, ×3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

DS SOIL LOG 19-043-101 4721 AND 5061 STOUFFVILLE RD ADDITIONAL WORK_TIMES GROUP.GPJ DS.GDT 21-5-3

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LOG OF BOREHOLE BH21-4

PROJECT: Geotechnical Investigation - Additional Work
CLIENT: Times Group
PROJECT LOCATION: 4721 and 5061 Stouffville Rd, Whitchurch-Stouffvill, ON
DATUM: Geodetic
BOREHOLE LOCATION: See Drawing 1 N 4869153.844 E 637681.724

DRILLING DATA
Method: Hollow Stem Auger
Diameter: 200mm
Date: Feb-12-2021

REF. NO.: 19-043-101
ENCL NO.: 11

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS / 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION
256.7							
256.4 0.0	**TOPSOILAND SILT:** 330mm		1	SS	16		
0.3	**CLAYEY SILT:** trace gravel, trace topsoil, brown, moist, very stiff (weathered)					W. L. 256.4 m Apr 13, 2021	
255.9 1 0.8	**CLAYEY SILT TILL:** sandy, trace gravel, brown, moist, very stiff		2	SS	15		
255.2 1.5 2	**SANDY SILT TILL:** trace clay, trace gravel/ cobble, brown, very moist, compact		3	SS	18	W. L. 254.8 m Feb 21, 2025	255
			4	SS	22		254
253.7 3.0 3 4	**SANDY SILT:** trace clay, brown, wet, dense		5	SS	36		253
252.2 4.5 5	**CLAYEY SILT TILL:** some sand, trace gravel, grey, moist, very stiff to hard		6	SS	20		252
6			7	SS	34		251
7							250
8			8	SS	45		249
9							248
10			9	SS	47		247
246.0 10.7 11	**SANDY SILT TILL:** some clay, trace gravel/ cobble, grey, very moist, very dense		10	SS	50/ 125mm		246
12 244.4 12.3	**END OF BOREHOLE**		11	SS	50/ 125mm		245

Notes:
1) 50mm dia. monitoring well installed upon completion.
2) Water level readings:

Date:	W.L. Depth (m):
April 13, 2021	0.28
Feb. 25, 2021	1.9

DYNAMIC CONE PENETRATION RESISTANCE PLOT
20 40 60 80 100

SHEAR STRENGTH (kPa)
○ UNCONFINED + FIELD VANE & Sensitivity
● QUICK TRIAXIAL × LAB VANE
20 40 60 80 100

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30

POCKET PEN. (Cu) (kPa)

NATURAL UNIT WT (kN/m³)

METHANE AND GRAIN SIZE DISTRIBUTION (%)

GR	SA	SI	CL
3	16	54	27

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
+3, ×3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

DS SOIL LOG 19-043-101 4721 AND 5061 STOUFFVILLE RD ADDITIONAL WORK_TIMES GROUP.GPJ DS.GDT 21-5-3

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LOG OF BOREHOLE BH21-5

PROJECT: Geotechnical Investigation - Additional Work
CLIENT: Times Group
PROJECT LOCATION: 4721 and 5061 Stouffville Rd, Whitchurch-Stouffvill, ON
DATUM: Geodetic
BOREHOLE LOCATION: See Drawing 1 N 4869178.503 E 637758.266

DRILLING DATA
Method: Hollow Stem Auger
Diameter: 200mm
Date: Feb-12-2021

REF. NO.: 19-043-101
ENCL NO.: 12

SOIL PROFILE (m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION
255.6 / 0.0	**TOPSOIL:** 330mm						
255.3 / 0.3	**CLAYEY SILT:** trace sand, trace topsoil, brown, moist, stiff (weathered)		1	SS	9		
254.5 / 1.1	**CLAYEY SILT TILL:** sandy, trace gravel/ cobble, grey, moist, very stiff to hard		2	SS	16		
			3	SS	15		
	grey below 2.7m		4	SS	43		
			5	SS	21		
	sand seams below 4.5m		6	SS	26		
			7	SS	25		
			8	SS	20		
246.6 / 9.0	**SANDY SILT TILL:** some clay, trace gravel/ cobble, grey, moist, very dense		9	SS	50/ 50mm		
244.9 / 10.7	**SAND:** some silt, trace clay, trace gravel, brown, wet, very dense		10	SS	94/ 280mm		
243.1 / 12.5	**SANDY SILT TILL:** trace clay, trace gravel, grey, moist, very dense		11	SS	50/ 25mm		
	END OF BOREHOLE						

Notes:
1) 50mm dia. monitoring well installed upon completion.
2) Water level readings:

Date:	W.L. Depth (m):
April 13, 2021	0.30
Feb. 25, 2021	- 0.02 (above ground)

W. L. 255.6 m
Feb 21, 2025
Apr 13, 2021

DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)

SHEAR STRENGTH (kPa) (20 40 60 80 100)
○ UNCONFINED + FIELD VANE & Sensitivity
● QUICK TRIAXIAL × LAB VANE

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%) (10 20 30)

POCKET PEN. (Cu) (kPa)
NATURAL UNIT WT (kN/m³)

METHANE AND GRAIN SIZE DISTRIBUTION (%)
GR SA SI CL

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
+3, ×3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

DS SOIL LOG 19-043-101 4721 AND 5061 STOUFFVILLE RD ADDITIONAL WORK_TIMES GROUP.GPJ DS.GDT 21-5-3

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LOG OF BOREHOLE BH24-1

PROJECT: Geotechnical Investigation
CLIENT: Times Group Corporation
PROJECT LOCATION: 5061 Stouffville Road, Whitchurch-Stouffville, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4869173.7 E 637660.6

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200mm
Date: Oct-24-2024

REF. NO.: 19-043-103
ENCL NO.: 2

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION
256.6 / 0.0	**TOPSOIL:** 270mm						
256.3 / 0.3	**FILL:** sandy silt, trace rootlets, trace gravel, dark brown to brown, moist, compact		1	SS	11		256
255.8 / 0.8	**FILL:** clayey silt, sandy, trace organics, trace cobble, dark brown to brown, moist, stiff		2	SS	14		
255.0 / 1.6	**SANDY SILT TILL:** trace to some clay, trace gravel, occasional cobble, brown, moist, compact to dense		3	SS	21	▽	255
	clayey silt till layer at 2.6m		4	SS	34		254
253.6 / 3.0	**SILTY SAND:** trace clay, brown, wet, dense		5	SS	34		253
252.1 / 4.5	**SILTY CLAY TILL:** sandy, trace gravel, occasional cobble, grey, moist, hard		6	SS	75		252
			7	SS	54		251
249.1 / 7.5	**CLAYEY SILT:** trace sand, grey, moist, hard		8	SS	39		250
247.6 / 9.0	**SANDY SILT TO SILTY SAND TILL:** trace to some clay, trace gravel, occasional cobble, grey, moist to very moist, very dense		9	SS	50/ 130mm		249
			10	SS	50/ 130mm		248
			11	SS	50/ 130mm		247
			12	SS	50/ 130mm		246
			13	SS	50/ 130mm		245
			14	SS	50/		244
							243
							242
							241
							240

W. L. 254.7 m
Nov 19, 2024

DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)
SHEAR STRENGTH (kPa)
○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE
(20 40 60 80 100)

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%) (10 20 30)

POCKET PEN. (Cu) (kPa)
NATURAL UNIT WT (kN/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)	GR	SA	SI	CL
Switched to Mud Rotary				
4	30	46	20	
6	36	46	12	

Continued Next Page

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES
+3, ×3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

LOG OF BOREHOLE BH24-1

PROJECT: Geotechnical Investigation
CLIENT: Times Group Corporation
PROJECT LOCATION: 5061 Stouffville Road, Whitchurch-Stouffville, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4869173.7 E 637660.6

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200mm
Date: Oct-24-2024

REF. NO.: 19-043-103
ENCL NO.: 2

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
18	**SANDY SILT TO SILTY SAND TILL:** trace to some clay, trace gravel, occasional cobble, grey, moist to very moist, very dense(Continued)				130mm		239					
19			15	SS	50/ 130mm		238		○			
20			16	SS	50/ 130mm		237		○			
21	cobbles/boulders at 21.3m		17	SS	50/ 25mm		236					
22							235					
23 233.6							234					
23.0	**END OF BOREHOLE:** Notes: 1) 50mm dia. monitoring well installed upon completion. 2) Water Level Readings: Date: Water Level(mbgl): Nov. 19, 2024 1.9		18	SS	50/ 75mm				○			

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: +3, ×3: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

DS CONSULTANTS LTD.
Geotechnical ◆ Environmental ◆ Materials ◆ Hydrogeology

LOG OF BOREHOLE BH24-2

PROJECT: Geotechnical Investigation
CLIENT: Times Group Corporation
PROJECT LOCATION: 5061 Stouffville Road, Whitchurch-Stouffville, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4869156.4 E 637693.6

DRILLING DATA
Method: Hollow Stem Auger
Diameter: 200mm
Date: Oct-28-2024

REF. NO.: 19-043-103
ENCL NO.: 3

(m) ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS 0.3 m "N"	ELEVATION
256.3					
256.0 0.0	**TOPSOIL:** 270mm				
0.3	**FILL:** clayey silt, trace rootlets, trace organics, trace gravel, dark brown to brown, moist, stiff	1	SS	9	256
255.3					
1.0	**CLAYEY SILT TILL:** sandy, trace gravel, brown, moist, stiff to very stiff	2	SS	10	
		3	SS	10	255
	silt layer at 2.3m	4	SS	23	254
253.3					
3.0	**SILT:** trace to some clay, trace sand, brown, wet, dense	5	SS	36	253
251.7					252
254.6					
4.8	**SAND:** trace silt, trace clay, grey, wet, dense	6	SS	31	
	CLAYEY SILT TILL: sandy, trace gravel, occasional cobble, grey, moist, hard				251
		7	SS	50/ 100mm	250
	silt layer at 7.6m	8	SS	33	249
		9	SS	50/ 130mm	248
245.8					247
10.5	**SANDY SILT TO SILTY SAND TILL:** trace to some clay, trace gravel, grey, very moist, very dense	10	SS	50/ 130mm	246
	silt layer at 10.7m				
		11	SS	50/ 100mm	245
		12	SS	50/ 130mm	244
240.8		13	SS	50/ 100mm	243
					242
					241
15.5	**END OF BOREHOLE:** Notes: 1) Water encountered at 3.0m during drilling.				

SOIL PROFILE | SAMPLES | GROUND WATER CONDITIONS | ELEVATION

DYNAMIC CONE PENETRATION RESISTANCE PLOT
20 40 60 80 100

SHEAR STRENGTH (kPa)
○ UNCONFINED + FIELD VANE & Sensitivity
● QUICK TRIAXIAL × LAB VANE
20 40 60 80 100

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30

POCKET PEN. (Cu) (kPa) | NATURAL UNIT WT (kN/m³) | REMARKS AND GRAIN SIZE DISTRIBUTION (%)
GR SA SI CL

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
+3, ×3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

DS SOIL LOG-2021-FINAL 19-043-103GEO.GPJ DS.GDT 24-11-27

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Geotechnical ◆ Environmental ◆ Materials ◆ Hydrogeology

LOG OF BOREHOLE BH24-3

PROJECT: Geotechnical Investigation
CLIENT: Times Group Corporation
PROJECT LOCATION: 5061 Stouffville Road, Whitchurch-Stouffville, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4869192.4 E 637716.7

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200mm
Date: Oct-26-2024

REF. NO.: 19-043-103
ENCL NO.: 4

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
256.2								
256.0 0.0	**TOPSOIL:** 250mm							
0.3 255.3	**FILL:** sandy silt, trace rootlets, trace gravel, dark brown to brown, moist, loose to compact		1	SS	8		256	
0.9	**CLAYEY SILT TILL:** sandy, trace gravel, occasional cobble, brown, moist, very stiff		2	SS	15		255	
2 253.8			3	SS	17		254	
2.4 253.2	**SILT:** trace to some clay, trace sand, brown, moist to wet, dense		4	SS	37		253	
3.0	**CLAYEY SILT TILL:** sandy, trace gravel, grey, moist, stiff to hard		5	SS	12		252	Switched to Mud Rotary
4 5			6	SS	30		251	
6 248.7			7	SS	26		250	
7.5 8 247.2	**CLAYEY SILT:** trace sand, grey, moist, very stiff		8	SS	26		249	
9.0	**SANDY SILT TO SILTY SAND TILL:** trace to some clay, trace gravel, occasional cobble, grey, moist to very moist, very dense		9	SS	50/ 100mm		248	
10 11			10	SS	50/ 130mm		247	
12			11	SS	50/ 100mm		246	
13 14			12	SS	50/ 130mm		245	
15 16			13	SS	50/ 130mm		244	
17			14	SS	50/		243	
							242	
							241	
							240	

DYNAMIC CONE PENETRATION RESISTANCE PLOT
20 40 60 80 100

SHEAR STRENGTH (kPa)
○ UNCONFINED + FIELD VANE & Sensitivity
● QUICK TRIAXIAL × LAB VANE
20 40 60 80 100

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30

POCKET PEN. (Cu) (kPa)
NATURAL UNIT WT (kN/m³)

Continued Next Page

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
+3, ×3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

LOG OF BOREHOLE BH24-3

PROJECT: Geotechnical Investigation
CLIENT: Times Group Corporation
PROJECT LOCATION: 5061 Stouffville Road, Whitchurch-Stouffville, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4869192.4 E 637716.7

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200mm
Date: Oct-26-2024

REF. NO.: 19-043-103
ENCL NO.: 4

ELEV / DEPTH (m)	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS "N" 0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	SANDY SILT TO SILTY SAND TILL: trace to some clay, trace gravel, occasional cobble, grey, moist to very moist, very dense(Continued)				75mm		239					
18												
			15	SS	50/ 50mm		238					
19												
236.4							237					
20 19.8	**CLAYEY SILT TILL:** sandy, trace gravel, grey, moist, hard		16	SS	50/ 100mm				○			
21							236					
			17	SS	50/ 130mm		235		○			
22							234					
23												
232.8			18	SS	50/ 130mm		233		⊖			6 39 39 16
23.4	**END OF BOREHOLE:** Notes: 1) Water encountered at 2.4m during drilling.											

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES: $+^3$, $\times^3$: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

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LOG OF BOREHOLE BH24-4

PROJECT: Geotechnical Investigation
CLIENT: Times Group Corporation
PROJECT LOCATION: 5061 Stouffville Road, Whitchurch-Stouffville, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4869181.5 E 637757.2

DRILLING DATA
Method: Hollow Stem Auger
Diameter: 200mm
Date: Oct-28-2024

REF. NO.: 19-043-103
ENCL NO.: 5

ELEV / DEPTH (m)	DESCRIPTION	NUMBER	TYPE	BLOWS "N" 0.3 m	ELEVATION
255.4					
255.2 0.0	**TOPSOIL:** 250mm				
0.3	**FILL:** clayey silt, trace rootlets, trace organics, trace gravel, dark brown to brown, moist, stiff to very stiff	1	SS	10	255
254.4 1.0	**CLAYEY SILT TO SILTY CLAY TILL:** sandy, trace gravel, brown, moist, stiff to hard	2	SS	20	254
		3	SS	13	
		4	SS	42	253
	grey below 3.0 m	5	SS	26	252
		6	SS	32	251
	silt layer at 6.1 m	7	SS	54	249
		8	SS	19	247
246.4 9.0	**SANDY SILT TILL:** trace to some clay, trace gravel, occasional cobble, grey, moist, very dense	9	SS	50/ 130mm	246
		10	SS	81	245
243.4 12.0	**CLAYEY SILT TILL:** sandy, trace gravel, occasional cobble, grey, moist, hard	11	SS	50/ 130mm	243
		12	SS	50/ 130mm	242
239.9 15.5	**END OF BOREHOLE:**	13	SS	50/ 00mm	240

Notes:
1) 50mm dia. monitoring well installed upon completion.
2) Water Level Readings:

W. L. 254.0 m
Nov 19, 2024

DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)
SHEAR STRENGTH (kPa) (20 40 60 80 100)
○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE
PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%) (10 20 30)
POCKET PEN. (Cu) (kPa)
NATURAL UNIT WT (kN/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)

	GR	SA	SI	CL
1	22	51	26	

Continued Next Page

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
+3, ×3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

DS SOIL LOG-2021-FINAL 19-043-103GEO.GPJ DS.GDT 24-11-27

LOG OF BOREHOLE BH24-4

PROJECT: Geotechnical Investigation
CLIENT: Times Group Corporation
PROJECT LOCATION: 5061 Stouffville Road, Whitchurch-Stouffville, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4869181.5 E 637757.2

DRILLING DATA
Method: Hollow Stem Auger
Diameter: 200mm
Date: Oct-28-2024

REF. NO.: 19-043-103
ENCL NO.: 5

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT / NATURAL MOISTURE CONTENT / LIQUID LIMIT (w_P w w_L) WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)
(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m							GR SA SI CL
	Date: Water Level(mbgl): Nov. 19, 2024 1.4											

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
+ 3, × 3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

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LOG OF BOREHOLE BH24-5

PROJECT: Geotechnical Investigation
CLIENT: Times Group Corporation
PROJECT LOCATION: 5061 Stouffville Road, Whitchurch-Stouffville, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4869205.3 E 637875.1

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200mm
Date: Nov-05-2024

REF. NO.: 19-043-103
ENCL NO.: 6

ELEV / DEPTH (m)	DESCRIPTION	NUMBER	TYPE	BLOWS 0.3 m "N"	ELEVATION
254.9					
254.8 0.1	**TOPSOIL:** 150mm				
254.4 0.5	**FILL:** sandy silt, trace rootlets, brown, moist, dense	1	SS	30	
1	**FILL:** clayey silt, trace to some organics, trace rootlets, dark grey, moist, firm	2	SS	5	254
253.2	mixed with organics at 0.8m				
1.7	**FILL:** silty sand, trace clay, trace gravel, brown, wet, loose to compact	3	SS	4	
2 252.5					
2.4	**CLAYEY SILT TILL:** trace to some sand, trace gravel, brown, moist, stiff to hard	4	SS	13	
3		5	SS	65	252
4		6	SS	50/ 150mm	251
	grey below 4.6m	7	SS	46	250
5 249.6					
5.3	**CLAYEY SILT:** silt interbeds, trace to some sand, trace gravel, grey, moist, very stiff to hard	8	SS	58	249
6		9	SS	31	
7		10	SS	35	248
8		11	SS	23	247
246.5					
8.4	**CLAYEY SILT TILL:** sandy, trace gravel, grey, moist, very stiff	12	SS	17	
9		13	SS	25	246
10 244.4					245
10.5	**SANDY SILT TO SILTY SAND TILL:** trace to some clay, trace gravel, occasional cobble, grey, very moist to wet, compact to very dense	14	SS	20	244
11					
12	very dense below 12.0m	15	SS	50/ 150mm	243
13					242
14	wet below 13.7m	16	SS	50/ 130mm	241
15					240
16		17	SS	50/ 130mm	239
17		18	SS	50/	238

STRATA PLOT | GROUND WATER CONDITIONS

DYNAMIC CONE PENETRATION RESISTANCE PLOT
20 40 60 80 100

SHEAR STRENGTH (kPa)
○ UNCONFINED + FIELD VANE & Sensitivity
● QUICK TRIAXIAL × LAB VANE
20 40 60 80 100

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30

POCKET PEN. (Cu) (kPa) | NATURAL UNIT WT (kN/m³)

W. L. 253.4 m
Nov 19, 2024

REMARKS AND GRAIN SIZE DISTRIBUTION (%)
GR SA SI CL

Switched to Mud Rotary

2 10 71 17

Continued Next Page

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
+3, ×3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

LOG OF BOREHOLE BH24-5

PROJECT: Geotechnical Investigation
CLIENT: Times Group Corporation
PROJECT LOCATION: 5061 Stouffville Road, Whitchurch-Stouffville, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4869205.3 E 637875.1

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200mm
Date: Nov-05-2024

REF. NO.: 19-043-103
ENCL NO.: 6

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	SANDY SILT TO SILTY SAND TILL: trace to some clay, trace gravel, occasional cobble, grey, very moist to wet, compact to very dense(Continued)				130mm							
18	gravelly at 18.3m		19	SS	50/ 75mm		237					
19							236					
20			20	SS	50/ 100mm		235					
21							234					
233.6 21.3	**CLAYEY SILT TILL:** sandy, trace gravel, grey, moist, hard		21	SS	50/ 130mm							
22							233					
231.9 23			22	SS	50/ 100mm		232					
23.0	**END OF BOREHOLE:**											

Notes:
1) 50mm dia. monitoring well installed beside original location.
2) Water Level Readings:

Date:	Water Level(mbgl):
Nov. 19, 2024	1.5

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES: $+^3$, $\times^3$: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

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LOG OF BOREHOLE BH24-6

PROJECT: Geotechnical Investigation
CLIENT: Times Group Corporation
PROJECT LOCATION: 5061 Stouffville Road, Whitchurch-Stouffville, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4869174.4 E 637846.4

DRILLING DATA
Method: Hollow Stem Auger
Diameter: 200mm
Date: Oct-31-2024

REF. NO.: 19-043-103
ENCL NO.: 7

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION
254.4							
254.2 0.0	**TOPSOIL:** 230mm		1	SS	7		254
0.2	**FILL:** clayey silt, trace rootlets, trace organics, trace gravel, dark brown to brown, moist, firm						
253.5 0.9	**CLAYEY SILT TILLL:** sandy, trace gravel, occasional cobble, brown, moist, very stiff to hard		2	SS	19		253
2			3	SS	21		
			4	SS	24		252
3	grey below 3.1m		5	SS	35		251
4			6	SS	18		
249.9 4.5	**CLAYEY SILT:** frequent silt layers, trace sand, grey, moist, stiff to very stiff		7	SS	17		250
5			8	SS	11		249
6	trace gravel below 6.1m		9	SS	12		248
7			10	SS	26		247
8			11	SS	21		
246.0 8.4	**CLAYEY SILT TILL:** sandy, trace gravel, grey, moist, very stiff		12	SS	19		246
9			13	SS	17		245
10							244
243.9 10.5	**SANDY SILT TO SILTY SAND TILL:** trace to some clay, trace gravel, grey, very moist to wet, compact to very dense		14	SS	20		243
12			15	SS	63		242
13							241
14	wet at 13.7m		16	SS	17		240
15							
239.0 15.4	**END OF BOREHOLE:** Notes: 1) Water encountered at 4.0m during drilling.		17	SS	50/ 75mm		239

DYNAMIC CONE PENETRATION RESISTANCE PLOT
20 40 60 80 100

SHEAR STRENGTH (kPa)
○ UNCONFINED + FIELD VANE & Sensitivity
● QUICK TRIAXIAL × LAB VANE
20 40 60 80 100

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30

POCKET PEN. (Cu) (kPa)

NATURAL UNIT WT (kN/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)
GR SA SI CL

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
+3, ×3: Numbers refer to Sensitivity
○ε=3% Strain at Failure

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LOG OF BOREHOLE BH24-7

PROJECT: Geotechnical Investigation
CLIENT: Times Group Corporation
PROJECT LOCATION: 5061 Stouffville Road, Whitchurch-Stouffville, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4869131.3 E 637813.6

DRILLING DATA
Method: Hollow Stem Auger
Diameter: 200mm
Date: Nov-01-2024

REF. NO.: 19-043-103
ENCL NO.: 8

(m) ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS 0.3 m "N"	ELEVATION
254.8					
254.8 / 0.0	**TOPSOIL:** 250mm				
0.3 / 253.9	**FILL:** clayey silt, trace rootlets, trace organics, trace gravel, dark brown to brown, moist, stiff	1	SS	8	254
0.9	**CLAYEY SILT TILLL:** sandy, trace gravel, occasional cobble, brown, moist, stiff to hard	2	SS	13	
		3	SS	17	253
		4	SS	52	
		5	SS	36	252
251.0					
3.8 / 250.3	**SANDY SILT TILL:** trace to some clay, trace gravel, brown to grey, moist, very dense	6	SS	50/ 130mm	251
4.5	**CLAYEY SILT TILL:** sandy, frequent silt pockets, trace gravel, occasional cobble, grey, moist, very stiff to hard	7	SS	49	
		8	SS	27	250
		9	SS	54	
		10	SS	26	249
		11	SS	24	
		12	SS	22	248
		13	SS	25	
		14	SS	disturbed	247
242.8					
12.0 / 241.3	**SAND:** some gravel, trace silt, trace clay, grey, wet, very dense	15	SS	69	246
13.5	**SANDY SILT TILL:** trace to some clay, trace gravel, grey, very moist, very dense	16	SS	63	245
239.3		17	SS	50/ 75mm	244
15.5	**END OF BOREHOLE:**				243

Notes:
1) Water encountered at 3.8 m during drilling.

GROUND WATER CONDITIONS	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)	SHEAR STRENGTH (kPa): ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L; WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
						15 73 9 1

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: $+^3$, $\times^3$: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

DS SOIL LOG-2021-FINAL 19-043-103GEO.GPJ DS.GDT 24-11-27

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LOG OF BOREHOLE BH24-8

PROJECT: Geotechnical Investigation
CLIENT: Times Group Corporation
PROJECT LOCATION: 5061 Stouffville Road, Whitchurch-Stouffville, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4869119.5 E 637847.1

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200mm
Date: Oct-30-2024

REF. NO.: 19-043-103
ENCL NO.: 9

ELEV / DEPTH (m)	DESCRIPTION	NUMBER	TYPE	BLOWS "N" 0.3 m	ELEVATION
254.5 / 0.0	**TOPSOIL:** 250mm	1	SS	6	254
0.3 / 253.5	**FILL:** clayey silt, trace rootlets, trace organics, trace gravel, dark brown to brown, moist, firm	2	SS	8	
1.0	**CLAYEY SILT TILLL:** some sand, trace gravel, occasional cobble, brown, moist, stiff to hard	3	SS	14	253
		4	SS	22	252
		5	SS	38	251
	grey below 3.8m	6	SS	72	
		7	SS	50/100mm	250
		8	SS	36	249
248.5 / 6.0	**CLAYEY SILT:** silt seams/layers, trace sand, grey, moist, very stiff to hard	9	SS	39	248
		10	SS	23	247
		11	SS	21	
		12	SS	15	246
	trace gravel at 9.1m	13	SS	16	245
243.8 / 10.7	**SANDY SILT TO SILTY SAND TILL:** trace to some clay, trace gravel, grey, moist, very dense	14	SS	67	244
		15	SS	50/130mm	243
		16	SS	50/130mm	242
		17	SS	50/130mm	241
					240
					239
					238

GROUND WATER CONDITIONS: W. L. 252.9 m Nov 19, 2024

DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)
SHEAR STRENGTH (kPa) (20 40 60 80 100)
○ UNCONFINED + FIELD VANE & Sensitivity
● QUICK TRIAXIAL × LAB VANE

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%) (10 20 30)

POCKET PEN. (Cu) (kPa)
NATURAL UNIT WT (kN/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)

	GR	SA	SI	CL
Switched to Mud Rotary at 3.1m				
	1	8	72	18
	7	44	42	7

Continued Next Page

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: +3, ×3: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

LOG OF BOREHOLE BH24-8

PROJECT: Geotechnical Investigation
CLIENT: Times Group Corporation
PROJECT LOCATION: 5061 Stouffville Road, Whitchurch-Stouffville, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4869119.5 E 637847.1

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200mm
Date: Oct-30-2024

REF. NO.: 19-043-103
ENCL NO.: 9

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 10 20 30	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	SANDY SILT TO SILTY SAND TILL: trace to some clay, trace gravel, grey, moist, very dense(Continued)		18	SS	50/ 130mm		237		○			
18												
			19	SS	50/ 100mm		236					
19												
							235					
20 234.5			20	SS	50/ 130mm				○ ○			
20.0	**SILT:** trace to some clay, trace sand, trace gravel, grey, moist, very dense						234					
21 233.2												
21.3	**SILTY SAND TO SANDY SILT TILL:** trace clay, trace gravel, grey, moist, very dense		21	SS	50/ 75mm		233					
22												
							232					
23 231.1			22	SS	50/ 130mm				○			
23.4	**END OF BOREHOLE:** Notes: 1) 50mm dia. monitoring well installed upon completion. 2) Water Level Readings: Date: Water Level(mbgl): Nov. 19, 2024 1.6											

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES: +3, ×3: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

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LOG OF BOREHOLE BH24-9

PROJECT: Geotechnical Investigation
CLIENT: Times Group Corporation
PROJECT LOCATION: 5061 Stouffville Road, Whitchurch-Stouffville, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4869120.9 E 637771.7

DRILLING DATA
Method: Hollow Stem Auger
Diameter: 200mm
Date: Oct-29-2024

REF. NO.: 19-043-103
ENCL NO.: 10

SOIL PROFILE (m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION
255.8							
255.8 0.0	**TOPSOIL:** 270mm						
0.3	**FILL:** clayey silt, trace rootlets, trace organics, trace gravel, dark brown to brown, moist, stiff		1	SS	8		255
254.8 1.0	**CLAYEY SILT TILL:** sandy, trace gravel, brown, moist, stiff to hard		2	SS	12		
2			3	SS	11		254
253.2 2.6	**SILT:** trace clay, trace sand, brown to grey, wet, dense		4	SS	32		
3			5	SS	31		253
4							252
251.3 4.5	**CLAYEY SILT TILL:** sandy, trace gravel, grey, moist, very stiff to hard		6	SS	25	▽	251
5						W. L. 250.8 m Nov 19, 2024	
6			7	SS	34		250
7							249
8			8	SS	30		248
246.8 9.0	**CLAYEY SILT:** trace sand, silt layers, grey, moist, hard		9	SS	30		247
10							246
245.3 10.5	**SANDY SILT TO SILTY SAND TILL:** trace to some clay, trace gravel, occasional cobble, grey, moist to very moist, very dense		10	SS	50/ 130mm		245
11			11	SS	50/ 130mm		244
12			12	SS	50/ 130mm		243
13			13	SS	50/ 100mm		242
14			14	SS	50/		241
15							240
16							239
17							

DYNAMIC CONE PENETRATION RESISTANCE PLOT
20 40 60 80 100

SHEAR STRENGTH (kPa)
○ UNCONFINED + FIELD VANE & Sensitivity
● QUICK TRIAXIAL × LAB VANE
20 40 60 80 100

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30

POCKET PEN. (Cu) (kPa)

NATURAL UNIT WT (kN/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)				
GR	SA	SI	CL	
0	9	88	3	

Continued Next Page

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES
+3, ×3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

LOG OF BOREHOLE BH24-9

PROJECT: Geotechnical Investigation
CLIENT: Times Group Corporation
PROJECT LOCATION: 5061 Stouffville Road, Whitchurch-Stouffville, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4869120.9 E 637771.7

DRILLING DATA
Method: Hollow Stem Auger
Diameter: 200mm
Date: Oct-29-2024

REF. NO.: 19-043-103
ENCL NO.: 10

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
18 237.7	**SANDY SILT TO SILTY SAND TILL:** trace to some clay, trace gravel, occasional cobble, grey, moist to very moist, very dense(Continued)				130mm		238					
18.1	**CLAYEY SILT TILL:** sandy, trace gravel, grey, moist, hard sand and gravel layer at 18.4m		15	SS	50/ 130mm		237		○			
19												
20			16	SS	50/ 75mm		236		○			
21							235					
			17	SS	50/ 130mm		234		○			
22												
23 232.6			18	SS	50/ 30mm		233		○			
23.2	**END OF BOREHOLE:** Notes: 1) 50mm dia. monitoring well installed upon completion. 2) Water Level Readings: Date: Water Level(mbgl): Nov. 19, 2024 5.0											

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: +3, ×3: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

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LOG OF BOREHOLE BH24-10

PROJECT: Geotechnical Investigation
CLIENT: Times Group Corporation
PROJECT LOCATION: 5061 Stouffville Road, Whitchurch-Stouffville, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4869089.4 E 637753

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200mm
Date: Nov-04-2024

REF. NO.: 19-043-103
ENCL NO.: 11

ELEV / DEPTH (m)	DESCRIPTION	NUMBER	TYPE	BLOWS "N" 0.3 m	ELEVATION	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
256.0						
256.0 / 0.0	**TOPSOIL:** 150mm					
255.8 / 0.2	**FILL:** silty sand, some clay, trace gravel, trace rootlets, dark brown to brown, moist, compact	1	SS	17		
255.2 / 0.8	**CLAYEY SILT TILL:** sandy, trace gravel, brown, moist, stiff to very stiff	2	SS	24	255	
	sandy silt pockets at 1.5m	3	SS	14	254	
253.5 / 2.5	**SILT:** trace to some clay, trace sand, trace gravel, brown, wet, compact to dense	4	SS	19	253	
252.7 / 3.3	**SILTY SAND:** clayey silt pockets, brown, wet, dense	5	SS	36		Switched to Mud Rotary
		6	SS	42	252	
251.4 / 4.6	**CLAYEY SILT TILL:** sandy, trace gravel, grey, moist, very stiff to hard	7	SS	32	251	
		8	SS	31		
		9	SS	42	250	
	silt pockets below 6.9m	10	SS	29	249	
248.4 / 7.6	**CLAYEY SILT:** frequent silt layers, trace sand, grey, moist, very stiff	11	SS	17	248	1 2 76 21
	trace gravel at 8.4m	12	SS	27		
		13	SS	23	247	
245.5 / 10.5	**SANDY SILT TO SILTY SAND TILL:** trace clay, trace gravel, occasional cobble, grey, very moist to wet, very dense	14	SS	50/ 130mm	246	auger grinding
	gravelly at 12.2m	15	SS	50/ 130mm	245	
		16	SS	50/ 150mm	244	
240.7 / 15.3	**END OF BOREHOLE:** Notes: 1) Water encountered at 2.5m during drilling.	17	SS	50/ 75mm	243	
					242	
					241	

GROUND WATER CONDITIONS

DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)
SHEAR STRENGTH (kPa)
○ UNCONFINED + FIELD VANE & Sensitivity
● QUICK TRIAXIAL × LAB VANE
(20 40 60 80 100)

PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L
WATER CONTENT (%) (10 20 30)

POCKET PEN. (Cu) (kPa)

NATURAL UNIT WT (kN/m³)

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
+3, ×3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

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LOG OF BOREHOLE BH24-11

PROJECT: Geotechnical Investigation
CLIENT: Times Group Corporation
PROJECT LOCATION: 5061 Stouffville Road, Whitchurch-Stouffville, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4869103.6 E 637709.7

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200mm
Date: Nov-04-2024

REF. NO.: 19-043-103
ENCL NO.: 12

ELEV / DEPTH (m)	DESCRIPTION	NUMBER	TYPE	BLOWS 0.3 m "N"	ELEVATION	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
256.3 / 0.0	**TOPSOIL:** 250mm					
255.5 / 0.8	**FILL:** silty clay, trace rootlets, trace gravel, trace organics, dark brown to brown, moist, stiff	1	SS	8	256	
	CLAYEY SILT TILL: sandy, trace gravel, brown, moist, stiff to hard sandy silt pockets at 1.5m	2	SS	11		
		3	SS	13	255	
		4	SS	19	254	
252.9 / 3.4	**SILT:** trace sand, trace gravel, brown, very moist, dense	5	SS	33	253	Switched to Mud Rotary
252.5 / 3.8	**SILTY SAND:** trace clay, brown, wet, dense silt pockets at 4.6m	6	SS	40	252	
251.0 / 5.3	**CLAYEY SILT TILL:** some sand to sandy, trace gravel, occasional cobble, grey, moist, very stiff to hard	7	SS	47	251	
		8	SS	41		
		9	SS	50/150mm	250	
		10	SS	50/130mm	249	
		11	SS	74		
247.3 / 9.0	wet silt layer, very stiff at 8.4m **SILT:** trace sand, trace clay, grey, moist, dense	12	SS	22	248	7 14 61 18
		13	SS	39	247	
245.6 / 10.7	**SANDY SILT TO SILTY SAND TILL:** trace to some clay, trace gravel, occasional cobble, grey, moist to wet, very dense	14	SS	50/150mm	246	
		15	SS	50/130mm	245	
		16	SS	50/130mm	244	
241.3 / 15.0		17	SS	50/150mm	243	
241.0 / 15.3	**CLAYEY SILT TILL:** sandy, trace gravel, occasional cobble, grey, moist, hard **END OF BOREHOLE:** Notes: 1) Water encountered at 2.7m during drilling.				242	
					241	

DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)
SHEAR STRENGTH (kPa) (20 40 60 80 100)
○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%) (10 20 30)

POCKET PEN. (Cu) (kPa)
NATURAL UNIT WT (kN/m³)

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: +3, ×3: Numbers refer to Sensitivity; ○ε=3% Strain at Failure

DS SOIL LOG-2021-FINAL 19-043-103GEO.GPJ DS.GDT 24-11-27

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LOG OF BOREHOLE BH24-12

PROJECT: Geotechnical Investigation
CLIENT: Times Group Corporation
PROJECT LOCATION: 5061 Stouffville Road, Whitchurch-Stouffville, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4869069.4 E 637689.9

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200mm
Date: Oct-23-2024

REF. NO.: 19-043-103
ENCL NO.: 13

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION
256.6							
256.4 0.0	**TOPSOIL:** 250mm						
0.3 255.6	**FILL:** silty clay, trace rootlets, trace gravel, trace organics, dark brown to brown, moist, stiff		1	SS	11		256
1.0 255.1	**CLAYEY SILT:** trace sand, trace gravel, brown, moist, stiff		2	SS	11		
1.5 254.3	**SILTY SAND:** trace clay, some gravel, brown, moist, dense		3	SS	44		255
2.3 252.1	**CLAYEY SILT TILL:** sandy, trace gravel, brown, moist, very stiff		4	SS	16		254
			5	SS	20		253
4.5 250.6	**SANDY SILT TO SAND:** trace clay, brown, wet, dense		6	SS	35		252
6.0 249.1	**CLAYEY SILT TILL:** sandy, trace gravel, grey, moist, very stiff		7	SS	28		251
7.5 246.1	**CLAYEY SILT:** trace sand, grey, moist, very stiff to hard silt layer at 9.1m		8	SS	49		250
			9	SS	23		249
10.5 244.6	**SANDY SILT TILL:** trace to some clay, trace gravel, occasional cobble, grey, moist, very dense		10	SS	50/ 130mm		248
12.0 243.1	**SANDY SILT:** trace clay, grey, wet, very dense		11	SS	50/ 30mm		247
13.5	**SANDY SILT TO SILTY SAND TILL:** trace clay, trace gravel, occasional cobble, grey, moist to very moist, very dense		12	SS	50/ 100mm		246
			13	SS	50/ 30mm		245
							244
							243
							242
							241
							240

DYNAMIC CONE PENETRATION RESISTANCE PLOT
20 40 60 80 100

SHEAR STRENGTH (kPa)
○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE
20 40 60 80 100

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30

POCKET PEN. (Cu) (kPa)

NATURAL UNIT WT (kN/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)
GR SA SI CL

Switched to Mud Rotary

DS SOIL LOG-2021-FINAL 19-043-103GEO.GPJ DS.GDT 24-11-27

Continued Next Page

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
+3, ×3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

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LOG OF BOREHOLE BH24-12

PROJECT: Geotechnical Investigation
CLIENT: Times Group Corporation
PROJECT LOCATION: 5061 Stouffville Road, Whitchurch-Stouffville, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4869069.4 E 637689.9

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200mm
Date: Oct-23-2024

REF. NO.: 19-043-103
ENCL NO.: 13

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 10 20 30	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
18	**SANDY SILT TO SILTY SAND TILL:** trace clay, trace gravel, occasional cobble, grey, moist to very moist, very dense(Continued)		14	SS	50/ 130mm		239					
238.3												
18.3	**CLAYEY SILT TILL:** sandy, trace gravel, grey, moist, hard		15	SS	50/ 130mm		238					9 41 37 13
19												
20			16	SS	50/ 130mm		237					
21							236					
22			17	SS	50/ 130mm		235					
233.6							234					
23.0	**END OF BOREHOLE:** Notes: 1) Water encountered at 4.6m during drilling.		18	SS	50/ 100mm							

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: +3, ×3: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

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LOG OF BOREHOLE BH25-1

PROJECT: Geotechnical Investigation
CLIENT: Times Group Corporation
PROJECT LOCATION: 5061 Stouffville Road, Whitchurch-Stouffville, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4869140.7 E 637861

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200mm
Date: Feb-26-2025

REF. NO.: 19-043-103
ENCL NO.: 14

ELEV / DEPTH (m)	DESCRIPTION	NUMBER	TYPE	BLOWS 0.3 m "N"	ELEVATION
254.3					
254.0 / 0.2	**TOPSOIL:** 200mm	1	SS	3	
	FILL: clayey silt, trace organics, trace rootlets, trace sand to some sand, brown, moist, soft to stiff	2	SS	4	
252.6					
1.7	**CLAYEY SILT TO SILTY CLAY TILL:** sandy, trace gravel, brown to grey, moist, stiff to hard	3	SS	11	
		4	SS	24	
	silty sand layer at 3.1m	5	SS	44	
	grey below 4.6m	6	SS	31	
		7	SS	36	
		8	SS	18	
	stiff at 9.1m	9	SS	9	
243.6					
10.7	**SILTY SAND TO SANDY SILT TILL:** trace to some clay, trace to some gravel, cobble/boulder, grey, very moist to wet, compact to very dense	10	SS	28	
	clayey silt till layers below 12.5m	11	SS	50/75mm	
		12	SS	21	
239.3					
15.0	**SILTY SAND:** trace clay, trace gravel, grey, very moist to wet, very dense (till - like)	13	SS	45	
		14	SS	65	
236.3					
18.0	**SILTY SAND TO SANDY SILT TILL:** trace clay, trace to some gravel, cobble/boulder, grey, very moist to wet, very dense	15	SS	50/100mm	
		16	SS	50/75mm	
233.0					
21.3		17	SS	50/75mm	

GROUND WATER CONDITIONS: W. L. 254.5 m Mar 24, 2025; W. L. 253.5 m Mar 07, 2025

DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)

SHEAR STRENGTH (kPa) (20 40 60 80 100)
○ UNCONFINED + FIELD VANE & Sensitivity
● QUICK TRIAXIAL × LAB VANE

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%) (10 20 30)

POCKET PEN. (Cu) (kPa)

NATURAL UNIT WT (kN/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)	GR	SA	SI	CL
Switched to Mud Rotary				
	4	23	48	25
	9	48	35	8
	8	61	27	4
	3	32	57	8

Continued Next Page

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
+3, ×3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

DS SOIL LOG-2021-FINAL 19-043-103GEO.GPJ DS.GDT 25-4-2

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LOG OF BOREHOLE BH25-1

PROJECT: Geotechnical Investigation
CLIENT: Times Group Corporation
PROJECT LOCATION: 5061 Stouffville Road, Whitchurch-Stouffville, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4869140.7 E 637861

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200mm
Date: Feb-26-2025

REF. NO.: 19-043-103
ENCL NO.: 14

ELEV / DEPTH (m)	DESCRIPTION	NUMBER	TYPE	BLOWS "N" 0.3 m	ELEVATION
254.3					
254.0 / 0.2	**TOPSOIL:** 200mm	1	SS	3	
	FILL: clayey silt, trace organics, trace rootlets, trace sand to some sand, brown, moist, soft to stiff	2	SS	4	
252.6					
1.7	**CLAYEY SILT TO SILTY CLAY TILL:** sandy, trace gravel, brown to grey, moist, stiff to hard	3	SS	11	
		4	SS	24	
	silty sand layer at 3.1m	5	SS	44	
	grey below 4.6m	6	SS	31	
		7	SS	36	
		8	SS	18	
	stiff at 9.1m	9	SS	9	
243.6					
10.7	**SILTY SAND TO SANDY SILT TILL:** trace to some clay, trace to some gravel, cobble/boulder, grey, very moist to wet, compact to very dense	10	SS	28	
	clayey silt till layers below 12.5m	11	SS	50/75mm	
		12	SS	21	
239.3					
15.0	**SILTY SAND:** trace clay, trace gravel, grey, very moist to wet, very dense (till - like)	13	SS	45	
		14	SS	65	
236.3					
18.0	**SILTY SAND TO SANDY SILT TILL:** trace clay, trace to some gravel, cobble/boulder, grey, very moist to wet, very dense	15	SS	50/100mm	
		16	SS	50/75mm	
233.0					
21.3		17	SS	50/75mm	

GROUND WATER CONDITIONS: W. L. 254.1 m, Mar 07, 2025

DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)

SHEAR STRENGTH (kPa)
○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE
20 40 60 80 100

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%) 10 20 30

POCKET PEN. (Cu) (kPa)

NATURAL UNIT WT (kN/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)	GR	SA	SI	CL
Switched to Mud Rotary				
	4	23	48	25
	9	48	35	8
	8	61	27	4
	3	32	57	8

Continued Next Page

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
+3, ×3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

LOG OF BOREHOLE BH25-1

PROJECT: Geotechnical Investigation
CLIENT: Times Group Corporation
PROJECT LOCATION: 5061 Stouffville Road, Whitchurch-Stouffville, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4869140.7 E 637861

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200mm
Date: Feb-26-2025

REF. NO.: 19-043-103
ENCL NO.: 14

ELEV / DEPTH (m)	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS "N" 0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
23	**SILTY CLAY TO CLAYEY SILT TILL:** some sand to sandy, trace gravel, occasional cobble, grey, moist, hard(Continued)						232					
			18	SS	41		231					
24												
			19	SS	48		230					
25							229					
26			20	SS	42		228					
27							227					
			21	SS	64							
28							226					
29	boulder at 28.9m		22	SS	50/ 50mm		225					auger grinding
30							224					
31			23	SS	50/ 100mm		223					
32			24	SS	50/ 130mm		222					
33							221					
34			25	SS	50/ 130mm		220					
35			26	SS	50/ 100mm		219					4 41 39 16
36							218					
37 217.2			27	SS	73							
37.1	**END OF BOREHOLE:** Notes: 1) 50mm dia. monitoring well installed upon completion. 2) Water Level Readings: Date: Water Level(mbgl): Mar. 7, 2025 0.20 Mar. 24, 2025 -(0.20) above ground surface											

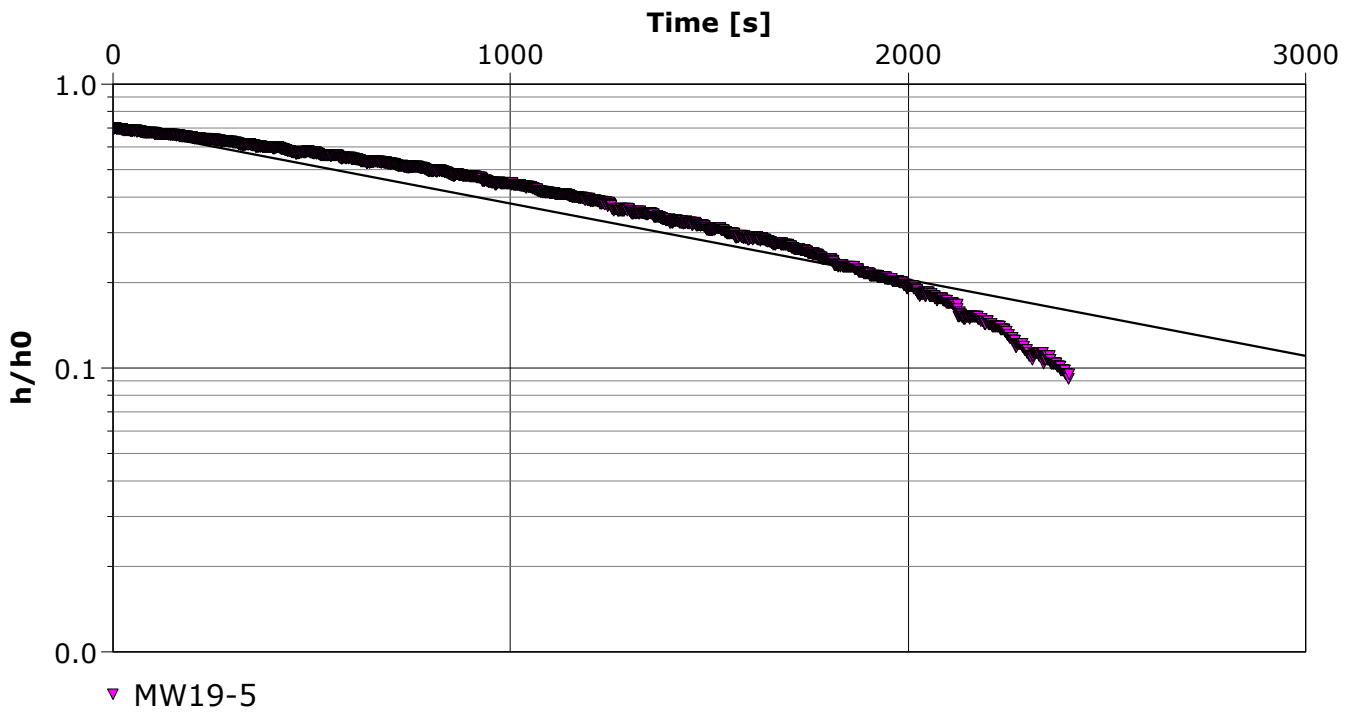
GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES: $+^3$, $\times^3$: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

Appendix B

	Slug Test Analysis Report
	Project: 4721-5061 Stouffville Road
	Number: 19-043-100
	Client: Times Group

Location: Stouffville Road	Slug Test: MW19-5	Test Well: MW19-5
Test Conducted by: PP		Test Date: 2019-05-24
Analysis Performed by: DG	MW19-5	Analysis Date: 2019-05-27
Aquifer Thickness:		

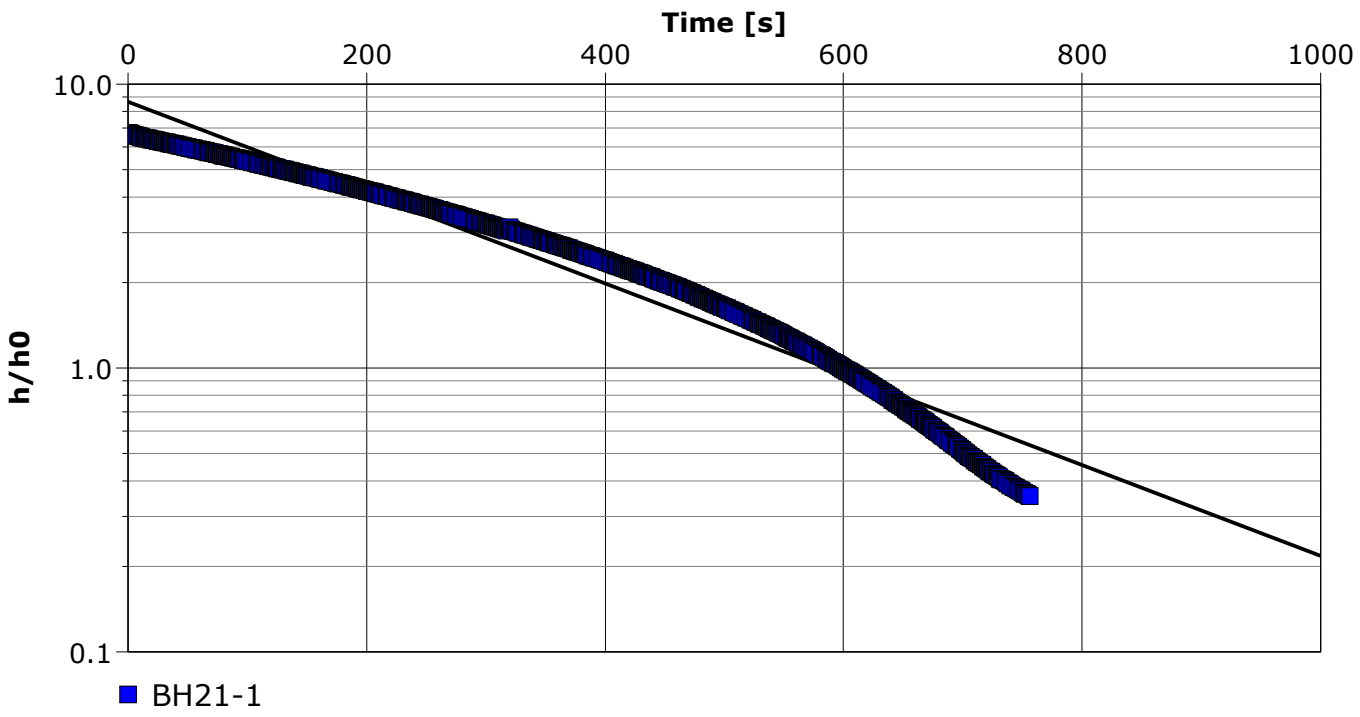


Calculation using Hvorslev

Observation Well	Hydraulic Conductivity [m/s]	
MW19-5	3.10×10^{-7}	

	Slug Test Analysis Report
	Project: 4721-5061 Stouffville Road
	Number: 19-043-101
	Client: Times Group

Location: Whitchurch-Stouffville	Slug Test: BH21-1	Test Well: BH21-1
Test Conducted by: MP		Test Date: 2021-02-25
Analysis Performed by: DG	BH21-1	Analysis Date: 2019-05-27
Aquifer Thickness: 15.80 m		

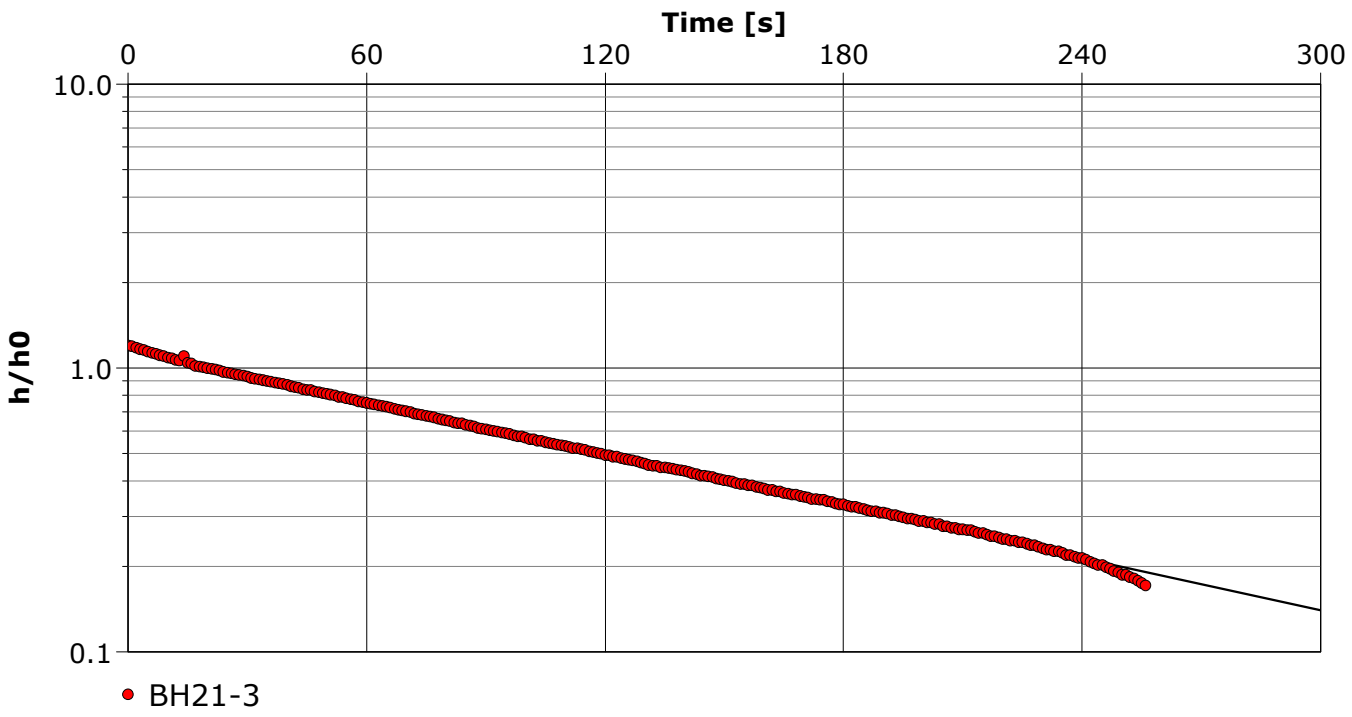


Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
BH21-1	1.61×10^{-6}	

	Slug Test Analysis Report
	Project: 4721-5061 Stouffville Road
	Number: 19-043-101
	Client: Times Group

Location: Whitchurch-Stouffville	Slug Test: BH21-3	Test Well: BH21-3
Test Conducted by: MP		Test Date: 2021-02-25
Analysis Performed by: DG	BH21-3	Analysis Date: 2019-05-27
Aquifer Thickness: 16.30 m		

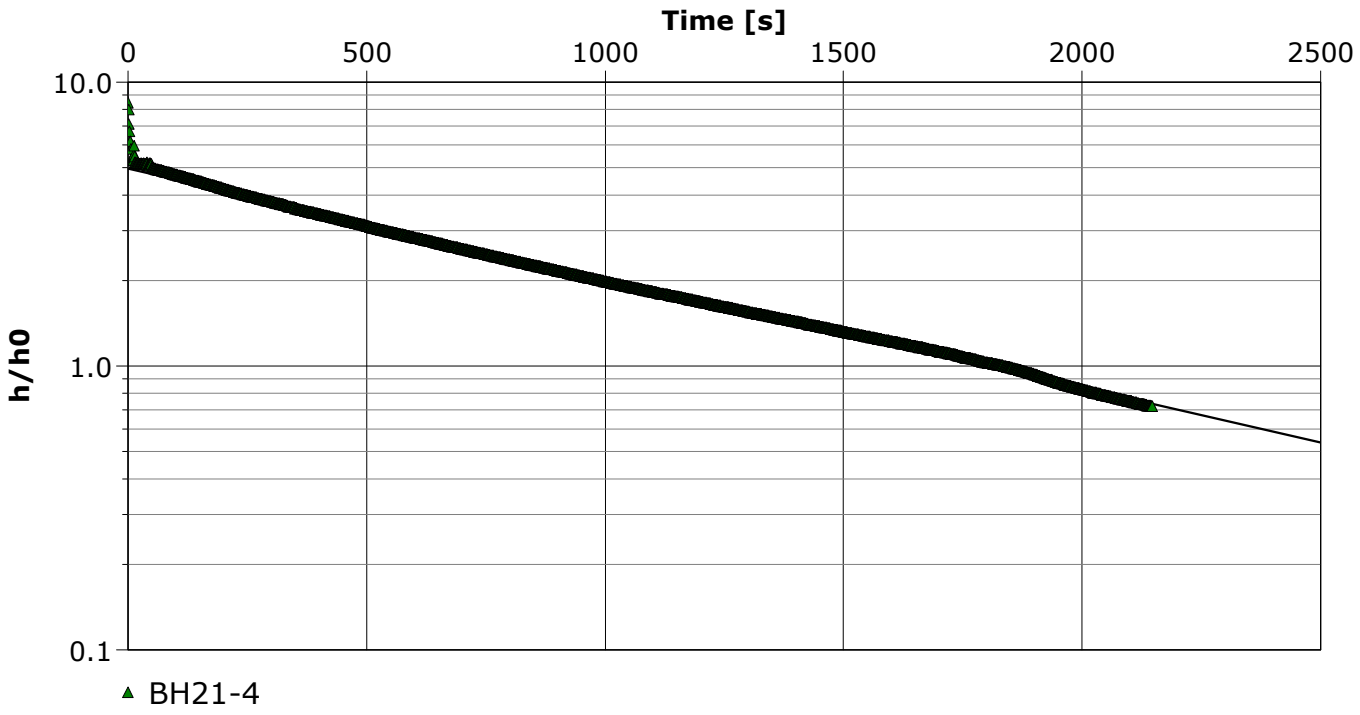


Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
BH21-3	4.89×10^{-6}	

	Slug Test Analysis Report
	Project: 4721-5061 Stouffville Road
	Number: 19-043-101
	Client: Times Group

Location: Whitchurch-Stouffville	Slug Test: BH21-4	Test Well: BH21-4
Test Conducted by: MP		Test Date: 2021-02-25
Analysis Performed by: DG	BH21-4	Analysis Date: 2019-05-27
Aquifer Thickness: 15.30 m		

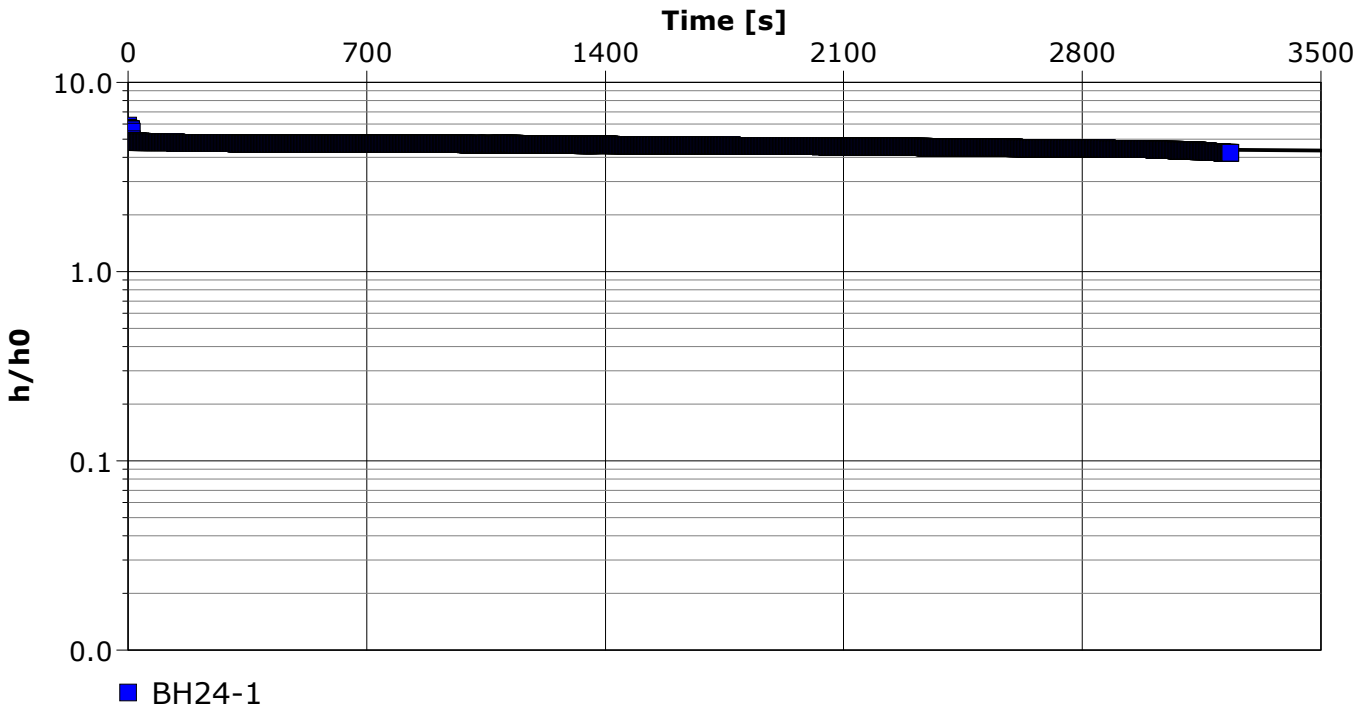


Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
BH21-4	6.83×10^{-7}	

	Slug Test Analysis Report
	Project: 5061 Stouffville Road
	Number: 19-043-103
	Client: Times Group Corporation

Location: Whitchurch-Stouffville,ON	Slug Test: BH24-1	Test Well: BH24-1
Test Conducted by: CL		Test Date: 11/13/2024
Analysis Performed by: DS	BH24-1	Analysis Date: 11/8/2024
Aquifer Thickness: 23.00 m		

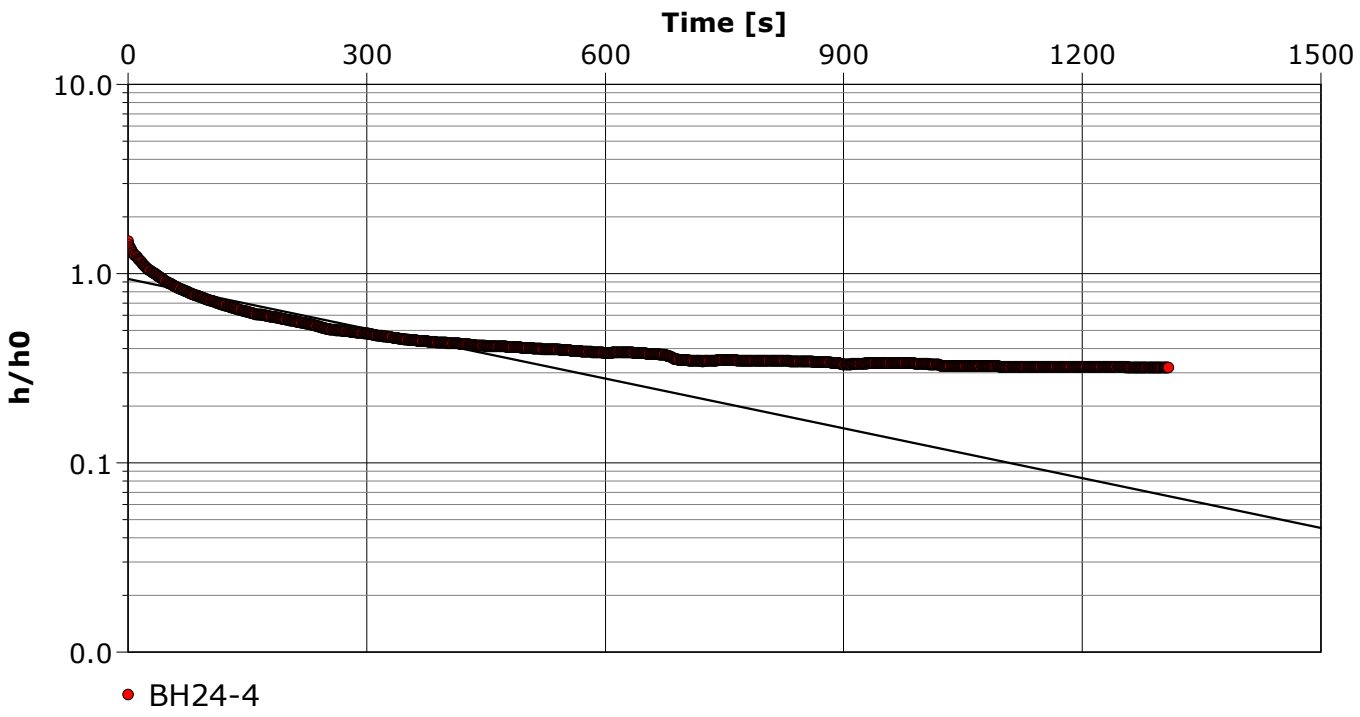


Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
BH24-1	1.09×10^{-8}	

	Slug Test Analysis Report
	Project: 5061 Stouffville Road
	Number: 19-043-103
	Client: Times Group Corporation

Location: Whitchurch-Stouffville,ON	Slug Test: BH24-4	Test Well: BH24-4
Test Conducted by: CL		Test Date: 11/13/2024
Analysis Performed by: DS	BH24-4	Analysis Date: 11/8/2024
Aquifer Thickness: 9.00 m		

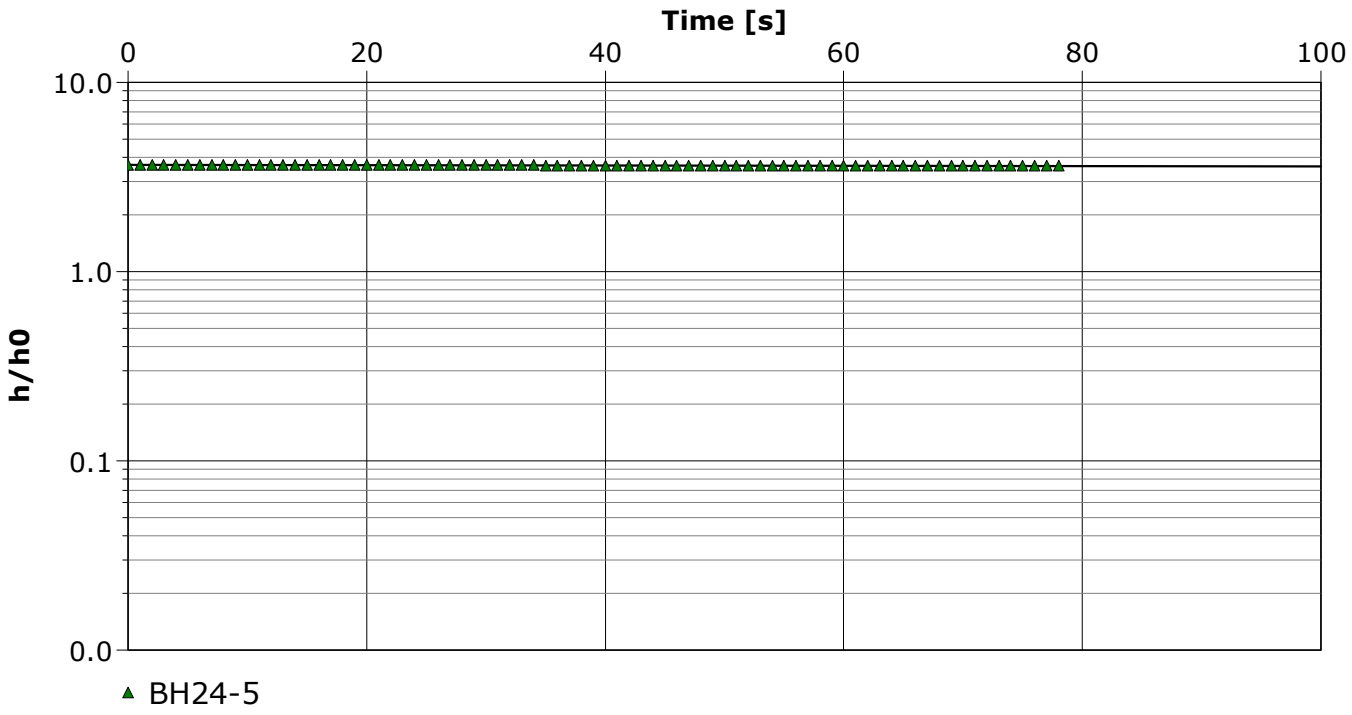


Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
BH24-4	7.52×10^{-7}	

	Slug Test Analysis Report
	Project: 5061 Stouffville Road
	Number: 19-043-103
	Client: Times Group Corporation

Location: Whitchurch-Stouffville,ON	Slug Test: BH24-5	Test Well: BH24-5
Test Conducted by: CL		Test Date: 11/13/2024
Analysis Performed by: DS	BH24-5	Analysis Date: 11/22/2024
Aquifer Thickness: 10.50 m		

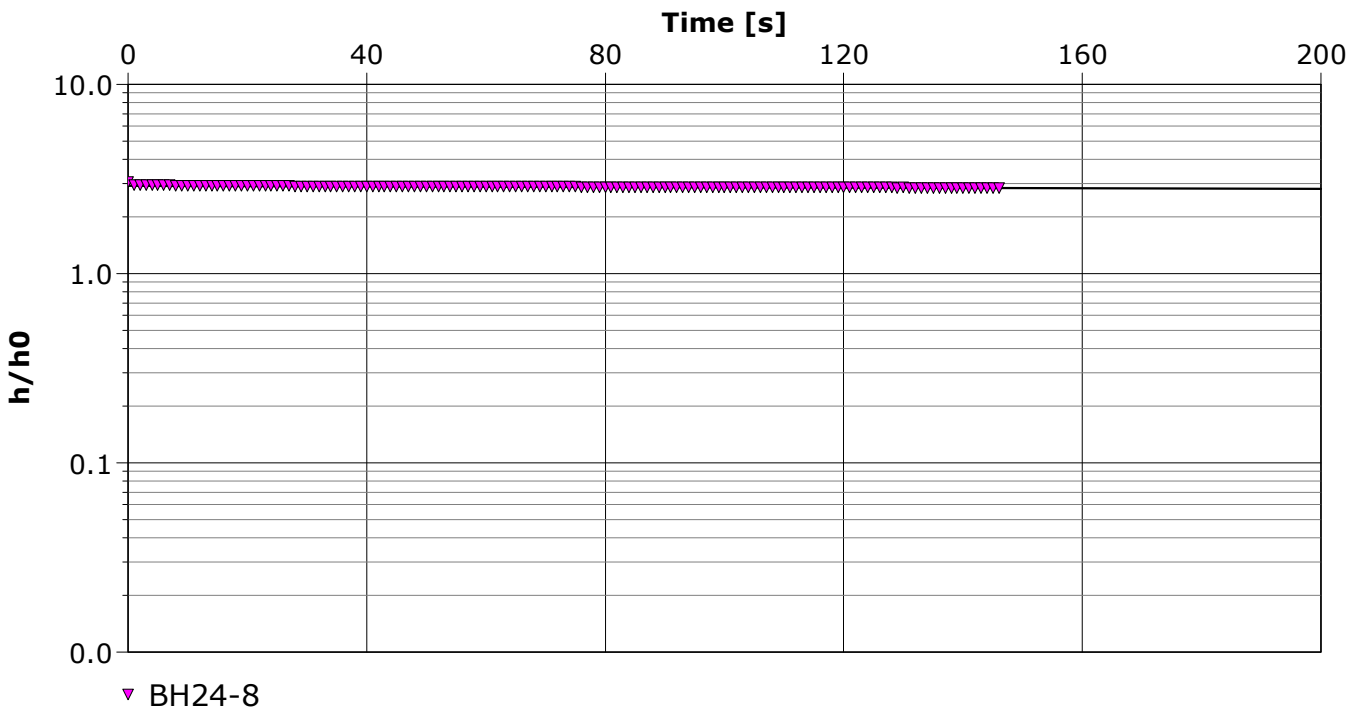


Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
BH24-5	7.14×10^{-8}	

	Slug Test Analysis Report
	Project: 5061 Stouffville Road
	Number: 19-043-103
	Client: Times Group Corporation

Location: Whitchurch-Stouffville,ON	Slug Test: BH24-8	Test Well: BH24-8
Test Conducted by: CL		Test Date: 11/13/2024
Analysis Performed by: DS	BH24-8	Analysis Date: 11/22/2024
Aquifer Thickness: 7.50 m		

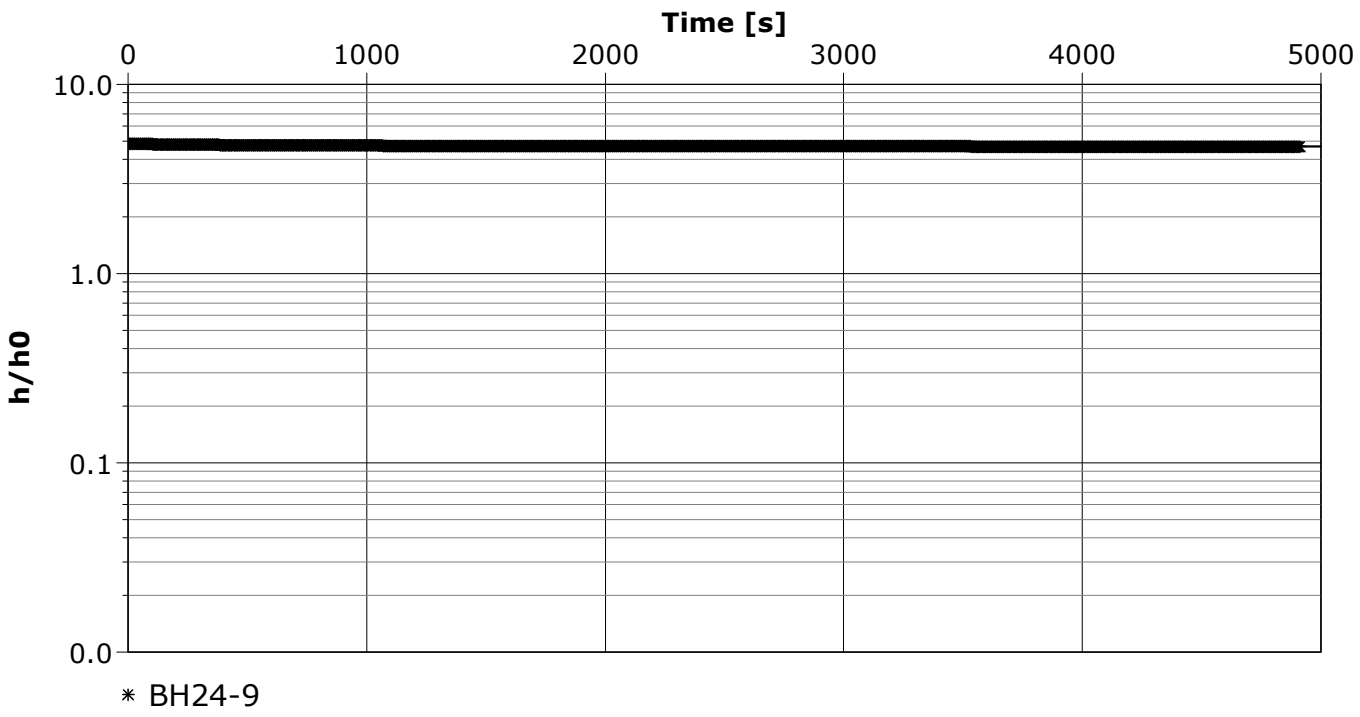


Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
BH24-8	7.51×10^{-8}	

	Slug Test Analysis Report
	Project: 5061 Stouffville Road
	Number: 19-043-103
	Client: Times Group Corporation

Location: Whitchurch-Stouffville,ON	Slug Test: BH24-9	Test Well: BH24-9
Test Conducted by: DS		Test Date: 11/13/2024
Analysis Performed by: DS	BH24-9	Analysis Date: 11/22/2024
Aquifer Thickness: 9.00 m		

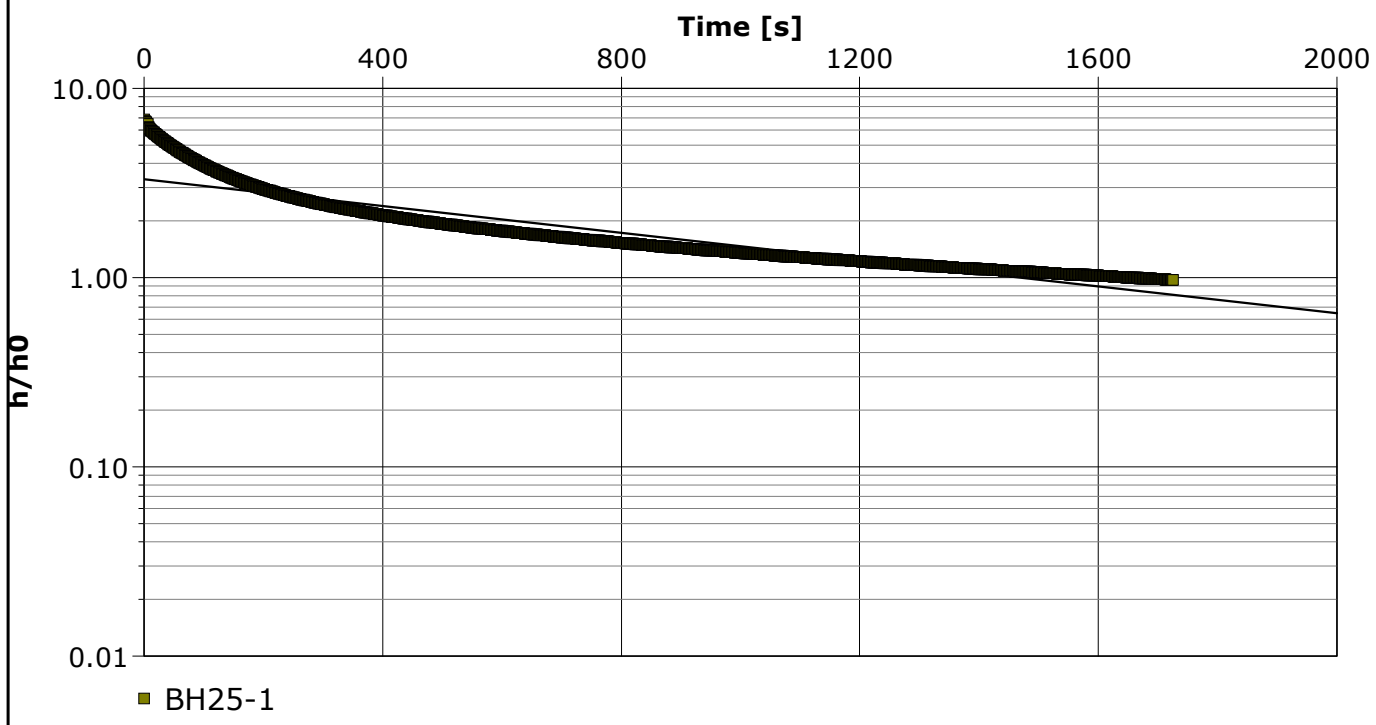


Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
BH24-9	1.91×10^{-9}	

	Slug Test Analysis Report
	Project: 5061 Stouffville Road
	Number: 19-043-103
	Client: Times Group Corporation

Location: Whitchurch-Stouffville,ON	Slug Test: BH25-1	Test Well: BH25-1
Test Conducted by: KK		Test Date: 3/24/2025
Analysis Performed by: DS	BH25-1	Analysis Date: 3/28/2025
Aquifer Thickness: 40.00 m		



Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
BH25-1	3.24×10^{-7}	

Appendix C



FINAL REPORT

CA40064-OCT24 R1

19-043-101, 4721-5061 Stouffville Rd.

Prepared for

DS Consultants

FINAL REPORT

First Page

CLIENT DETAILS

Client	DS Consultants
Address	6221 Highway 7 Unit 6 Vaughan, Ontario L4H 0K8. Canada
Contact	Don Hsu
Telephone	905-264-9393
Facsimile	905-264-2685
Email	don.hsu@dsconsultants.ca
Project	19-043-101, 4721-5061 Stouffville Rd.
Order Number	
Samples	Ground Water (1)

LABORATORY DETAILS

Project Specialist	Maarit Wolfe, Hon.B.Sc
Laboratory	SGS Canada Inc.
Address	185 Concession St., Lakefield ON, K0L 2H0
Telephone	705-652-2000
Facsimile	705-652-6365
Email	Maarit.Wolfe@sgs.com
SGS Reference	CA40064-OCT24
Received	10/07/2024
Approved	10/15/2024
Report Number	CA40064-OCT24 R1
Date Reported	10/15/2024

COMMENTS

RL - SGS Reporting Limit

Nonylphenol Ethoxylates is the sum of nonylphenol monoethoxylate and nonylphenol diethoxylate.

Temperature of Sample upon Receipt: 9 degrees C
Cooling Agent Present: yes
Custody Seal Present: yes

Chain of Custody Number: 035639

SIGNATORIES

Maarit Wolfe, Hon.B.Sc



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Client: DS Consultants
Project: 19-043-101, 4721-5061 Stouffville Rd.
Project Manager: Don Hsu
Samplers: Don Hsu

MATRIX: WATER

Sample Number	8
Sample Name	BH 19-5
Sample Matrix	Ground Water
Sample Date	07/10/2024

L1 = SANSEW / WATER / - - York Sewer Use ByLaw - Sanitary Sewer Discharge - BL_2021_102

L2 = SANSEW / WATER / - - York Sewer Use ByLaw - Storm Sewer Discharge - BL_2021_102

Parameter	Units	RL	L1	L2	Result
General Chemistry					
Biochemical Oxygen Demand (BOD5)	mg/L	2	300	15	< 4 ↑
Total Suspended Solids	mg/L	2	350	15	9
Total Kjeldahl Nitrogen	as N mg/L	0.5	100	1	< 0.5
Metals and Inorganics					
Sulphate	mg/L	2	1500		5
Cyanide (total)	mg/L	0.01	2	0.02	< 0.01
Fluoride	mg/L	0.06	10		0.16
Aluminum (total)	mg/L	0.001	50		0.048
Antimony (total)	mg/L	0.0009	5		< 0.0009
Arsenic (total)	mg/L	0.0002	1	0.02	0.0014
Cadmium (total)	mg/L	0.000003	0.7	0.008	< 0.000003
Chromium (total)	mg/L	0.00008	2	0.08	0.00022
Cobalt (total)	mg/L	0.000004	5		0.000042
Copper (total)	mg/L	0.001	3	0.05	< 0.001
Lead (total)	mg/L	0.00009	1	0.12	0.00010
Manganese (total)	mg/L	0.00001	5	0.15	0.0131
Molybdenum (total)	mg/L	0.0004	5		0.0010
Nickel (total)	mg/L	0.0001	2	0.08	< 0.0001
Phosphorus (total)	mg/L	0.003	10	0.4	0.019
Selenium (total)	mg/L	0.00004	1	0.02	< 0.00004
Silver (total)	mg/L	0.00005	5	0.12	< 0.00005
Tin (total)	mg/L	0.00006	5		0.00039

Client: DS Consultants
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Project Manager: Don Hsu
Samplers: Don Hsu

MATRIX: WATER

Sample Number	8
Sample Name	BH 19-5
Sample Matrix	Ground Water
Sample Date	07/10/2024

L1 = SANSEW / WATER / - - York Sewer Use ByLaw - Sanitary Sewer Discharge - BL_2021_102

L2 = SANSEW / WATER / - - York Sewer Use ByLaw - Storm Sewer Discharge - BL_2021_102

Parameter	Units	RL	L1	L2	Result
Metals and Inorganics (continued)					
Titanium (total)	mg/L	0.0001	5		0.0025
Zinc (total)	mg/L	0.002	2	0.04	< 0.002
Nonylphenol and Ethoxylates					
Nonylphenol	mg/L	0.001	0.02		< 0.001
Nonylphenol Ethoxylates	mg/L	0.01	0.2		< 0.01
Nonylphenol diethoxylate	mg/L	0.01			< 0.01
Nonylphenol monoethoxylate	mg/L	0.01			< 0.01
Oil and Grease					
Oil & Grease (total)	mg/L	2			< 2
Oil & Grease (animal/vegetable)	mg/L	4	150		< 4
Oil & Grease (mineral/synthetic)	mg/L	4	15		< 4
Other (ORP)					
pH	No unit	0.05	10.5	9	8.01
Mercury (total)	mg/L	0.00001	0.01	0.0004	< 0.00001

Client: DS Consultants
Project: 19-043-101, 4721-5061 Stouffville Rd.
Project Manager: Don Hsu
Samplers: Don Hsu

MATRIX: WATER

Sample Number	8
Sample Name	BH 19-5
Sample Matrix	Ground Water
Sample Date	07/10/2024

L1 = SANSEW / WATER / - - York Sewer Use ByLaw - Sanitary Sewer Discharge - BL_2021_102

L2 = SANSEW / WATER / - - York Sewer Use ByLaw - Storm Sewer Discharge - BL_2021_102

Parameter	Units	RL	L1	L2	Result
PCBs					
Polychlorinated Biphenyls (PCBs) - Total	mg/L	0.0001	0.001	0.0004	< 0.0001
Phenols					
4AAP-Phenolics	mg/L	0.002	1	0.008	< 0.002
SVOCs					
di-n-Butyl Phthalate	mg/L	0.002	0.08	0.015	< 0.002
Bis(2-ethylhexyl)phthalate	mg/L	0.002	0.012	0.0088	< 0.002
VOCs					
Chloroform	mg/L	0.0005	0.04	0.002	< 0.0005
1,2-Dichlorobenzene	mg/L	0.0005	0.05	0.0056	< 0.0005
1,4-Dichlorobenzene	mg/L	0.0005	0.08	0.0068	< 0.0005
cis-1,2-Dichloroethylene	mg/L	0.0005	4	0.0056	< 0.0005
trans-1,3-Dichloropropene	mg/L	0.0005	0.14	0.0056	< 0.0005
Methylene Chloride	mg/L	0.0005	2	0.0052	< 0.0005
1,1,2,2-Tetrachloroethane	mg/L	0.0005	1.4	0.017	< 0.0005
Tetrachloroethylene (perchloroethylene)	mg/L	0.0005	1	0.0044	< 0.0005
Trichloroethylene	mg/L	0.0005	0.4	0.008	< 0.0005
Methyl ethyl ketone	mg/L	0.02	8		< 0.02
Styrene	mg/L	0.0005	0.2		< 0.0005

Client: DS Consultants
Project: 19-043-101, 4721-5061 Stouffville Rd.
Project Manager: Don Hsu
Samplers: Don Hsu

MATRIX: WATER

Sample Number	8
Sample Name	BH 19-5
Sample Matrix	Ground Water
Sample Date	07/10/2024

L1 = SANSEW / WATER / - - York Sewer Use ByLaw - Sanitary Sewer Discharge - BL_2021_102

L2 = SANSEW / WATER / - - York Sewer Use ByLaw - Storm Sewer Discharge - BL_2021_102

Parameter	Units	RL	L1	L2	Result
VOCs - BTEX					
Benzene	mg/L	0.0005	0.01	0.002	< 0.0005
Ethylbenzene	mg/L	0.0005	0.16	0.002	< 0.0005
Toluene	mg/L	0.0005	0.27	0.002	< 0.0005
Xylene (total)	mg/L	0.0005	1.4	0.0044	< 0.0005
m-p-xylene	mg/L	0.0005			< 0.0005
o-xylene	mg/L	0.0005			< 0.0005

EXCEEDANCE SUMMARY

No exceedances are present above the regulatory limit(s) indicated

QC SUMMARY

Anions by discrete analyzer

Method: US EPA 375.4 | Internal ref.: ME-CA-[ENVIEWL-LAK-AN-026

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Sulphate	DIO5005-OCT24	mg/L	2	<2	0	20	106	80	120	104	75	125

Biochemical Oxygen Demand

Method: SM 5210 | Internal ref.: ME-CA-[ENVIEWL-LAK-AN-007

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Biochemical Oxygen Demand (BOD5)	BOD0015-OCT24	mg/L	2	< 2	2	30	97	70	130	86	70	130

Cyanide by SFA

Method: SM 4500 | Internal ref.: ME-CA-[ENVISFA-LAK-AN-005

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Cyanide (total)	SKA0078-OCT24	mg/L	0.01	<0.01	ND	10	90	90	110	118	75	125

QC SUMMARY

Fluoride by Specific Ion Electrode

Method: SM 4500 I Internal ref.: ME-CA-[ENV]EWL-LAK-AN-014

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Fluoride	EWL0192-OCT24	mg/L	0.06	<0.06	ND	10	96	90	110	96	75	125

Mercury by CVAAS

Method: EPA 7471A/SM 3112B I Internal ref.: ME-CA-[ENV]SPE-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Mercury (total)	EHG0019-OCT24	mg/L	0.00001	< 0.00001	ND	20	95	80	120	118	70	130

QC SUMMARY

Metals in aqueous samples - ICP-MS

Method: SM 3030/EPA 200.8 | Internal ref.: ME-CA-IENVISPE-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Silver (total)	EMS0097-OCT24	mg/L	0.00005	<0.00005	ND	20	101	90	110	71	70	130
Aluminum (total)	EMS0097-OCT24	mg/L	0.001	<0.001	1	20	104	90	110	119	70	130
Arsenic (total)	EMS0097-OCT24	mg/L	0.0002	<0.0002	9	20	105	90	110	109	70	130
Cadmium (total)	EMS0097-OCT24	mg/L	0.000003	<0.000003	13	20	100	90	110	106	70	130
Cobalt (total)	EMS0097-OCT24	mg/L	0.000004	<0.000004	0	20	105	90	110	102	70	130
Chromium (total)	EMS0097-OCT24	mg/L	0.00008	<0.00008	5	20	105	90	110	98	70	130
Copper (total)	EMS0097-OCT24	mg/L	0.001	<0.001	ND	20	103	90	110	108	70	130
Manganese (total)	EMS0097-OCT24	mg/L	0.00001	<0.00001	1	20	104	90	110	104	70	130
Molybdenum (total)	EMS0097-OCT24	mg/L	0.0004	<0.0004	3	20	104	90	110	101	70	130
Nickel (total)	EMS0097-OCT24	mg/L	0.0001	<0.0001	ND	20	103	90	110	99	70	130
Lead (total)	EMS0097-OCT24	mg/L	0.00009	<0.00009	ND	20	102	90	110	101	70	130
Phosphorus (total)	EMS0097-OCT24	mg/L	0.003	<0.003	ND	20	98	90	110	NV	70	130
Antimony (total)	EMS0097-OCT24	mg/L	0.0009	<0.0009	ND	20	100	90	110	101	70	130
Selenium (total)	EMS0097-OCT24	mg/L	0.00004	<0.00004	16	20	102	90	110	106	70	130
Tin (total)	EMS0097-OCT24	mg/L	0.00006	<0.00006	6	20	109	90	110	NV	70	130
Titanium (total)	EMS0097-OCT24	mg/L	0.0001	<0.0001	ND	20	104	90	110	NV	70	130
Zinc (total)	EMS0097-OCT24	mg/L	0.002	<0.002	ND	20	104	90	110	104	70	130

QC SUMMARY

Nonylphenol and Ethoxylates

Method: ASTM D7065-06 | Internal ref.: ME-CA-IENVIGC-LAK-AN-015

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Nonylphenol diethoxylate	GCM0120-OCT24	mg/L	0.01	<0.01			81	55	120			
Nonylphenol monoethoxylate	GCM0120-OCT24	mg/L	0.01	<0.01			83	55	120			
Nonylphenol	GCM0120-OCT24	mg/L	0.001	<0.001			80	55	120			

Oil & Grease

Method: MOE E3401 | Internal ref.: ME-CA-IENVIGC-LAK-AN-019

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Oil & Grease (total)	GCM0165-OCT24	mg/L	2	<2	NSS	20	106	75	125			

QC SUMMARY

Oil & Grease-AV/MS

Method: MOE E3401/SM 5520F | Internal ref.: ME-CA-[ENV]GC-LAK-AN-019

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Oil & Grease (animal/vegetable)	GCM0165-OCT24	mg/L	4	< 4	NSS	20	NA	70	130			
Oil & Grease (mineral/synthetic)	GCM0165-OCT24	mg/L	4	< 4	NSS	20	NA	70	130			

pH

Method: SM 4500 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
pH	EWL0172-OCT24	No unit	0.05	NA	0		102			NA		

Phenols by SFA

Method: SM 5530B-D | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
4AAP-Phenolics	SKA0089-OCT24	mg/L	0.002	<0.002	ND	10	98	80	120	96	75	125

QC SUMMARY

Polychlorinated Biphenyls

Method: MOE E3400/EPA 8082A | Internal ref.: ME-CA-[ENV]GC-LAK-AN-001

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Polychlorinated Biphenyls (PCBs) - Total	GCM0142-OCT24	mg/L	0.0001	<0.0001	NSS	30	87	60	140	NSS	60	140

Semi-Volatile Organics

Method: EPA 3510C/8270D | Internal ref.: ME-CA-[ENV]GC-LAK-AN-005

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Bis(2-ethylhexyl)phthalate	GCM0166-OCT24	mg/L	0.002	< 0.002	NSS	30	101	50	140	NSS	50	140
di-n-Butyl Phthalate	GCM0166-OCT24	mg/L	0.002	< 0.002	NSS	30	102	50	140	NSS	50	140

QC SUMMARY

Suspended Solids

Method: SM 2540D | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Suspended Solids	EWL0201-OCT24	mg/L	2	< 2	2	10	101	90	110	NA		

Total Nitrogen

Method: SM 4500-N C/4500-NO3- F | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-002

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Kjeldahl Nitrogen	SKA0080-OCT24	as N mg/L	0.5	<0.5	ND	10	103	90	110	105	75	125

QC SUMMARY

Volatile Organics

Method: EPA 5030B/8260C | Internal ref.: ME-CA-[ENVIGC-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
1,1,2,2-Tetrachloroethane	GCM0119-OCT24	mg/L	0.0005	<0.0005	ND	30	98	60	130	96	50	140
1,2-Dichlorobenzene	GCM0119-OCT24	mg/L	0.0005	<0.0005	ND	30	100	60	130	88	50	140
1,4-Dichlorobenzene	GCM0119-OCT24	mg/L	0.0005	<0.0005	ND	30	102	60	130	88	50	140
Benzene	GCM0119-OCT24	mg/L	0.0005	<0.0005	ND	30	98	60	130	88	50	140
Chloroform	GCM0119-OCT24	mg/L	0.0005	<0.0005	ND	30	97	60	130	86	50	140
cis-1,2-Dichloroethylene	GCM0119-OCT24	mg/L	0.0005	<0.0005	ND	30	99	60	130	89	50	140
Ethylbenzene	GCM0119-OCT24	mg/L	0.0005	<0.0005	ND	30	100	60	130	92	50	140
m-p-xylene	GCM0119-OCT24	mg/L	0.0005	<0.0005	ND	30	99	60	130	91	50	140
Methyl ethyl ketone	GCM0119-OCT24	mg/L	0.02	<0.02	ND	30	98	50	140	82	50	140
Methylene Chloride	GCM0119-OCT24	mg/L	0.0005	<0.0005	ND	30	99	60	130	87	50	140
o-xylene	GCM0119-OCT24	mg/L	0.0005	<0.0005	ND	30	101	60	130	91	50	140
Styrene	GCM0119-OCT24	mg/L	0.0005	<0.0005	ND	30	101	60	130	90	50	140
Tetrachloroethylene (perchloroethylene)	GCM0119-OCT24	mg/L	0.0005	<0.0005	ND	30	97	60	130	87	50	140
Toluene	GCM0119-OCT24	mg/L	0.0005	<0.0005	ND	30	95	60	130	88	50	140
trans-1,3-Dichloropropene	GCM0119-OCT24	mg/L	0.0005	<0.0005	ND	30	96	60	130	86	50	140
Trichloroethylene	GCM0119-OCT24	mg/L	0.0005	<0.0005	ND	30	100	60	130	84	50	140

QC SUMMARY

Method Blank: a blank matrix that is carried through the entire analytical procedure. Used to assess laboratory contamination.

Duplicate: Paired analysis of a separate portion of the same sample that is carried through the entire analytical procedure. Used to evaluate measurement precision.

LCS/Spike Blank: Laboratory control sample or spike blank refer to a blank matrix to which a known amount of analyte has been added. Used to evaluate analyte recovery and laboratory accuracy without sample matrix effects.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate laboratory accuracy with sample matrix effects.

Reference Material: a material or substance matrix matched to the samples that contains a known amount of the analyte of interest. A reference material may be used in place of a matrix spike.

RL: Reporting limit

RPD: Relative percent difference

AC: Acceptance criteria

Multielement Scan Qualifier: as the number of analytes in a scan increases, so does the chance of a limit exceedance by random chance as opposed to a real method problem. Thus, in multielement scans, for the LCS and matrix spike, up to 10% of the analytes may exceed the quoted limits by up to 10% absolute and the spike is considered acceptable.

Duplicate Qualifier: for duplicates as the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

Matrix Spike Qualifier: for matrix spikes, as the concentration of the native analyte increases, the uncertainty of the matrix spike recovery increases. Thus, the matrix spike acceptance limits apply only when the concentration of the matrix spike is greater than or equal to the concentration of the native analyte.

LEGEND

FOOTNOTES

NSS	Insufficient sample for analysis.
RL	Reporting Limit.
↑	Reporting limit raised.
↓	Reporting limit lowered.
NA	The sample was not analysed for this analyte
ND	Non Detect

Results relate only to the sample tested.
Data reported represent the sample as submitted to SGS. Solid samples expressed on a dry weight basis.
"Temperature Upon Receipt" is representative of the whole shipment and may not reflect the temperature of individual samples.
Analysis conducted on samples submitted pursuant to or as part of Reg. 153/04, are in accordance to the "Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act and Excess Soil Quality" published by the Ministry and dated March 9, 2004 as amended.

SGS provides criteria information (such as regulatory or guideline limits and summary of limit exceedances) as a service. Every attempt is made to ensure the criteria information in this report is accurate and current, however, it is not guaranteed. Comparison to the most current criteria is the responsibility of the client and SGS assumes no responsibility for the accuracy of the criteria levels indicated.

SGS Canada Inc. statement of conformity decision rule does not consider uncertainty when analytical results are compared to a specified standard or regulation.
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This report supersedes all previous versions.

-- End of Analytical Report --

Request for Laboratory Services and CHAIN OF CUSTODY

No: 035639

SGS Industries & Environment - Lakefield: 185 Concession St., Lakefield, ON K0L 2H0 Phone: 705-652-2000 Fax: 705-652-6365 Web: www.sgs.com/environment
- London: 657 Consortium Court, London, ON, N6E 2S8 Phone: 519-672-4500 Toll Free: 877-848-8060 Fax: 519-672-0361

Page ____ of ____

Laboratory Information Section - Lab use only

Received By: Ahmed
Received Date: 10,07,24 (mm/dd/yy)
Received Time: 16:20 (hr : min)
Received By (signature):
Custody Seal Present: Yes ☑ No ☐
Custody Seal Intact: Yes ☑ No ☐
Cooling Agent Present: Yes ☑ No ☐ Type: ICE
Temperature Upon Receipt (°C) 9 x 3
LAB LIMS #: 40064

REPORT INFORMATION	INVOICE INFORMATION
Company: DS CONSULTANTS LTD.	☐ (same as Report Information)
Contact: DON HSU	Company:
Address: 6221 HWY 7 - U16 VAUGHAN ON, L4H 0K8	Contact:
Phone: 416 722 6247	Address:
Fax:	Phone:
Email: dhsu@dsconsultants.ca	Email:

Quotation #:
P.O. #:
Project #: 19-043-101
Site Location/ID: 4721 - 5061 STOUFFVILLE RD.

TURNAROUND TIME (TAT) REQUIRED

☒ Regular TAT (5-7days) — TAT's are quoted in business days (exclude statutory holidays & weekends). Samples received after 6pm or on weekends: TAT begins next business day

RUSH TAT (Additional Charges May Apply): ☐ 1 Day ☐ 2 Days ☐ 3 Days ☐ 4 Days

PLEASE CONFIRM RUSH FEASIBILITY WITH SGS REPRESENTATIVE PRIOR TO SUBMISSION

Specify Due Date:

*NOTE: DRINKING (POTABLE) WATER SAMPLES FOR HUMAN CONSUMPTION MUST BE SUBMITTED WITH SGS DRINKING WATER CHAIN OF CUSTODY

REGULATIONS

☐ O.Reg 153/04 ☐ O.Reg 406/19
☐ Table 1 ☐ Res/Park Soil Texture: ☐ Coarse
☐ Table 2 ☐ Ind/Com ☐ Agri/Other ☐ Medium/Fine
☐ Table 3 ☐ Table ____ Appx. ____
Soil Volume ☐ <350m3 ☐ >350m3

Other Regulations:
☐ Reg 347/558 (3 Day min TAT)
☐ PWQO ☐ MMER
☐ CCME ☐ Other:
☐ MISA
☐ ODWS Not Reportable *See note

Sewer By-Law:
☒ Sanitary
☒ Storm
Municipality: YORK

RECORD OF SITE CONDITION (RSC) ☐ YES ☒ NO

ANALYSIS REQUESTED

	SAMPLE IDENTIFICATION	DATE SAMPLED	TIME SAMPLED	# OF BOTTLES	MATRIX	Field Filtered (Y/N)	M&I: Metals & Inorganics (incl CrVI, CN, Hg, pH, (B(HWS), EC, SAR – soil) (CL, Ne – water)	M&I: Full Metals Suite (ICP metals plus B(HWS – soil only), Hg, CrVI)	M&I: ICP Metals only (Sb, As, Ba, Be, B, Cd, Cr, Co, Cu, Pb, Mo, Ni, Se, Ag, Tl, U, V, Zn)	SVOC: PAHs only	SVOC: SVOCs (all incl PAHs, ABNs, CPs)	PCB: PCBs (Aroclor ☐, Total ☐)	PHC: F1-F4 + BTEX	PHC: F1-F4 only (no BTEX)	VOC: VOCs (all incl BTEX)	VOC: BTEX only	Pest: Pesticides (Organochlorine or specify other)	Other (please specify): Sewer Use: YORK / STORM Specify pkg: Sanitary	Water Characterization Pkg (General ☐ Extended ☐)	SPLP: Specify tests (☐ Metals ☐ VOC ☐ 1,4-Dioxane ☐ OCP ☐ ABN)	TCLP: Specify tests (☐ M&I ☐ VOC ☐ PCB ☐ B(a)P ☐ ABN ☐ Ignit.)	COMMENTS:
1	BH 19-5	10/7/24	11:00	18	GW	N												X				
2																						
3																						
4																						
5																						
6																						
7																						
8																						
9																						
10																						
11																						
12																						

5 Day TAT

Observations/Comments/Special Instructions

Sampled By (NAME): DON HSU Signature: Date: 10, 7, 24 (mm/dd/yy)
Relinquished by (NAME): DON HSU Signature: Date: 10, 7, 24 (mm/dd/yy)

Pink Copy - Client
Yellow & White Copy - SGS

Revision #: 1.7
Date of Issue: 07 JUNE 2023

Note: Submission of samples to SGS is acknowledgement that you have been provided direction on sample collection/handling and transportation of samples. (2) Submission of samples to SGS is considered authorization for completion of work. Signatures may appear on this form or be retained on file in the contract, or in an alternative format (e.g. shipping documents). (3) Results may be sent by email to an unlimited number of addresses for no additional cost. Fax is available upon request. This document is issued by the Company under its General Conditions of Service accessible at http://www.sgs.com/terms_and_conditions.htm. (Printed copies are available upon request.) Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein.



FINAL REPORT

CA40161-NOV24 R1

19-043-103, Hwy 48 & Stouffville Rd, Stouffville

Prepared for

DS Consultants

FINAL REPORT

First Page

CLIENT DETAILS		LABORATORY DETAILS	
Client	DS Consultants	Project Specialist	Jill Campbell, B.Sc.,GISAS
		Laboratory	SGS Canada Inc.
Address	6221 Highway 7 Unit 16 Vaughan, Ontario L4H 0K8. Canada	Address	185 Concession St., Lakefield ON, K0L 2H0
Contact	Dorothy Santos	Telephone	2165
Telephone	905-329-2735	Facsimile	705-652-6365
Facsimile	905-264-2685	Email	jill.campbell@sgs.com
Email	dsantos@dsconsultants.ca	SGS Reference	CA40161-NOV24
Project	19-043-103, Hwy 48 & Stouffville Rd, Stouffville	Received	11/15/2024
Order Number		Approved	11/22/2024
Samples	Ground Water (1)	Report Number	CA40161-NOV24 R1
		Date Reported	11/22/2024

COMMENTS

RL - SGS Reporting Limit

Nonylphenol Ethoxylates is the sum of nonylphenol monoethoxylate and nonylphenol diethoxylate.

Temperature of Sample upon Receipt: 9 degrees C
Cooling Agent Present: Yes
Custody Seal Present: Yes

Chain of Custody Number: 040723

SIGNATORIES

Jill Campbell, B.Sc.,GISAS



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Client: DS Consultants
Project: 19-043-103, Hwy 48 & Stouffville Rd, Stouffville
Project Manager: Dorothy Santos
Samplers: Chaitanya

MATRIX: WATER

L1 = SANSEW / WATER / - - York Sewer Use ByLaw - Sanitary Sewer Discharge - BL_2021_102

L2 = SANSEW / WATER / - - York Sewer Use ByLaw - Storm Sewer Discharge - BL_2021_102

Sample Number	8
Sample Name	BH 24-5
Sample Matrix	Ground Water
Sample Date	15/11/2024

Parameter	Units	RL	L1	L2	Result
General Chemistry					
Biochemical Oxygen Demand (BOD5)	mg/L	2	300	15	< 4 ↑
Total Suspended Solids	mg/L	2	350	15	3
Total Kjeldahl Nitrogen	as N mg/L	0.5	100	1	0.6
Metals and Inorganics					
Sulphate	mg/L	2	1500		36
Cyanide (total)	mg/L	0.01	2	0.02	< 0.01
Fluoride	mg/L	0.06	10		0.11
Aluminum (total)	mg/L	0.001	50		0.056
Antimony (total)	mg/L	0.0009	5		< 0.0009
Arsenic (total)	mg/L	0.0002	1	0.02	0.0006
Cadmium (total)	mg/L	0.000003	0.7	0.008	0.000017
Chromium (total)	mg/L	0.00008	2	0.08	0.00045
Cobalt (total)	mg/L	0.000004	5		0.00126
Copper (total)	mg/L	0.001	3	0.05	0.001
Lead (total)	mg/L	0.00009	1	0.12	0.00069
Manganese (total)	mg/L	0.00001	5	0.15	0.323
Molybdenum (total)	mg/L	0.0004	5		0.0017
Nickel (total)	mg/L	0.0001	2	0.08	0.0047
Phosphorus (total)	mg/L	0.003	10	0.4	0.024
Selenium (total)	mg/L	0.00004	1	0.02	0.00017
Silver (total)	mg/L	0.00005	5	0.12	< 0.00005
Tin (total)	mg/L	0.00006	5		0.00173

Client: DS Consultants
Project: 19-043-103, Hwy 48 & Stouffville Rd, Stouffville
Project Manager: Dorothy Santos
Samplers: Chaitanya

MATRIX: WATER

Sample Number	8
Sample Name	BH 24-5
Sample Matrix	Ground Water
Sample Date	15/11/2024

L1 = SANSEW / WATER / - - York Sewer Use ByLaw - Sanitary Sewer Discharge - BL_2021_102

L2 = SANSEW / WATER / - - York Sewer Use ByLaw - Storm Sewer Discharge - BL_2021_102

Parameter	Units	RL	L1	L2	Result
Metals and Inorganics (continued)					
Titanium (total)	mg/L	0.0001	5		0.0023
Zinc (total)	mg/L	0.002	2	0.04	0.007
Nonylphenol and Ethoxylates					
Nonylphenol	mg/L	0.001	0.02		< 0.001
Nonylphenol Ethoxylates	mg/L	0.01	0.2		< 0.01
Nonylphenol diethoxylate	mg/L	0.01			< 0.01
Nonylphenol monoethoxylate	mg/L	0.01			< 0.01
Oil and Grease					
Oil & Grease (total)	mg/L	2			< 2
Oil & Grease (animal/vegetable)	mg/L	4	150		< 4
Oil & Grease (mineral/synthetic)	mg/L	4	15		< 4
Other (ORP)					
pH	No unit	0.05	10.5	9	7.23
Mercury (total)	mg/L	0.00001	0.01	0.0004	< 0.00001

Client: DS Consultants
Project: 19-043-103, Hwy 48 & Stouffville Rd, Stouffville
Project Manager: Dorothy Santos
Samplers: Chaitanya

MATRIX: WATER

Sample Number	8
Sample Name	BH 24-5
Sample Matrix	Ground Water
Sample Date	15/11/2024

L1 = SANSEW / WATER / - - York Sewer Use ByLaw - Sanitary Sewer Discharge - BL_2021_102

L2 = SANSEW / WATER / - - York Sewer Use ByLaw - Storm Sewer Discharge - BL_2021_102

Parameter	Units	RL	L1	L2	Result
PCBs					
Polychlorinated Biphenyls (PCBs) - Total	mg/L	0.0001	0.001	0.0004	< 0.0001
Phenols					
4AAP-Phenolics	mg/L	0.002	1	0.008	0.005
SVOCs					
di-n-Butyl Phthalate	mg/L	0.002	0.08	0.015	< 0.002
Bis(2-ethylhexyl)phthalate	mg/L	0.002	0.012	0.0088	< 0.002
VOCs					
Chloroform	mg/L	0.0005	0.04	0.002	< 0.0005
1,2-Dichlorobenzene	mg/L	0.0005	0.05	0.0056	< 0.0005
1,4-Dichlorobenzene	mg/L	0.0005	0.08	0.0068	< 0.0005
cis-1,2-Dichloroethylene	mg/L	0.0005	4	0.0056	< 0.0005
trans-1,3-Dichloropropene	mg/L	0.0005	0.14	0.0056	< 0.0005
Methylene Chloride	mg/L	0.0005	2	0.0052	< 0.0005
1,1,2,2-Tetrachloroethane	mg/L	0.0005	1.4	0.017	< 0.0005
Tetrachloroethylene (perchloroethylene)	mg/L	0.0005	1	0.0044	< 0.0005
Trichloroethylene	mg/L	0.0005	0.4	0.008	< 0.0005
Methyl ethyl ketone	mg/L	0.02	8		< 0.02
Styrene	mg/L	0.0005	0.2		< 0.0005

Client: DS Consultants
Project: 19-043-103, Hwy 48 & Stouffville Rd, Stouffville
Project Manager: Dorothy Santos
Samplers: Chaitanya

MATRIX: WATER

Sample Number	8
Sample Name	BH 24-5
Sample Matrix	Ground Water
Sample Date	15/11/2024

L1 = SANSEW / WATER / - - York Sewer Use ByLaw - Sanitary Sewer Discharge - BL_2021_102

L2 = SANSEW / WATER / - - York Sewer Use ByLaw - Storm Sewer Discharge - BL_2021_102

VOCs - BTEX

Parameter	Units	RL	L1	L2	Result
Benzene	mg/L	0.0005	0.01	0.002	< 0.0005
Ethylbenzene	mg/L	0.0005	0.16	0.002	< 0.0005
Toluene	mg/L	0.0005	0.27	0.002	< 0.0005
Xylene (total)	mg/L	0.0005	1.4	0.0044	< 0.0005
m-p-xylene	mg/L	0.0005			< 0.0005
o-xylene	mg/L	0.0005			< 0.0005

EXCEEDANCE SUMMARY

Parameter	Method	Units	Result	SANSEW / WATER / - - York Sewer Use ByLaw - Sanitary Sewer Discharge - BL_2021_102 L1	SANSEW / WATER / - - York Sewer Use ByLaw - Storm Sewer Discharge - BL_2021_102 L2
BH 24-5					
Manganese	SM 3030/EPA 200.8	mg/L	0.323		0.15

QC SUMMARY

Anions by discrete analyzer

Method: US EPA 375.4 | Internal ref.: ME-CA-[ENVIEWL-LAK-AN-026

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Sulphate	DIO8029-NOV24	mg/L	2	<2	1	20	102	80	120	104	75	125

Biochemical Oxygen Demand

Method: SM 5210 | Internal ref.: ME-CA-[ENVIEWL-LAK-AN-007

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Biochemical Oxygen Demand (BOD5)	BOD0029-NOV24	mg/L	2	< 2	6	30	86	70	130	82	70	130

Cyanide by SFA

Method: SM 4500 | Internal ref.: ME-CA-[ENVISFA-LAK-AN-005

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Cyanide (total)	SKA0162-NOV24	mg/L	0.01	<0.01	1	10	105	90	110	88	75	125

QC SUMMARY

Fluoride by Specific Ion Electrode

Method: SM 4500 I Internal ref.: ME-CA-[ENV]EWL-LAK-AN-014

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Fluoride	EWL0467-NOV24	mg/L	0.06	<0.06	ND	10	101	90	110	90	75	125

Mercury by CVAAS

Method: EPA 7471A/SM 3112B I Internal ref.: ME-CA-[ENV]SPE-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Mercury (total)	EHG0046-NOV24	mg/L	0.00001	< 0.00001	ND	20	116	80	120	111	70	130

QC SUMMARY

Metals in aqueous samples - ICP-MS

Method: SM 3030/EPA 200.8 | Internal ref.: ME-CA-IENVISPE-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Tin (total)	EMS0202-NOV24	mg/L	0.00006	<0.00006	1	20	99	90	110	NV	70	130
Titanium (total)	EMS0202-NOV24	mg/L	0.0001	<0.0001	ND	20	98	90	110	NV	70	130
Zinc (total)	EMS0202-NOV24	mg/L	0.002	<0.002	2	20	98	90	110	118	70	130
Silver (total)	EMS0202-NOV24	mg/L	0.00005	<0.00005	ND	20	95	90	110	88	70	130
Aluminum (total)	EMS0202-NOV24	mg/L	0.001	<0.001	1	20	103	90	110	109	70	130
Arsenic (total)	EMS0202-NOV24	mg/L	0.0002	<0.0002	ND	20	101	90	110	109	70	130
Cadmium (total)	EMS0202-NOV24	mg/L	0.000003	<0.000003	0	20	100	90	110	105	70	130
Cobalt (total)	EMS0202-NOV24	mg/L	0.000004	<0.000004	7	20	100	90	110	109	70	130
Chromium (total)	EMS0202-NOV24	mg/L	0.00008	<0.00008	2	20	102	90	110	107	70	130
Copper (total)	EMS0202-NOV24	mg/L	0.001	<0.001	1	20	101	90	110	115	70	130
Manganese (total)	EMS0202-NOV24	mg/L	0.00001	<0.00001	7	20	103	90	110	126	70	130
Molybdenum (total)	EMS0202-NOV24	mg/L	0.0004	<0.0004	6	20	101	90	110	109	70	130
Nickel (total)	EMS0202-NOV24	mg/L	0.0001	<0.0001	3	20	98	90	110	102	70	130
Lead (total)	EMS0202-NOV24	mg/L	0.00009	<0.00009	4	20	96	90	110	103	70	130
Phosphorus (total)	EMS0202-NOV24	mg/L	0.003	<0.003	0	20	102	90	110	NV	70	130
Antimony (total)	EMS0202-NOV24	mg/L	0.0009	<0.0009	ND	20	103	90	110	102	70	130
Selenium (total)	EMS0202-NOV24	mg/L	0.00004	<0.00004	ND	20	102	90	110	117	70	130

QC SUMMARY

Nonylphenol and Ethoxylates

Method: ASTM D7065-06 | Internal ref.: ME-CA-IENVIGC-LAK-AN-015

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Nonylphenol diethoxylate	GCM0320-NOV24	mg/L	0.01	<0.01			88	55	120			
Nonylphenol monoethoxylate	GCM0320-NOV24	mg/L	0.01	<0.01			87	55	120			
Nonylphenol	GCM0320-NOV24	mg/L	0.001	<0.001			84	55	120			

Oil & Grease

Method: MOE E3401 | Internal ref.: ME-CA-IENVIGC-LAK-AN-019

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Oil & Grease (total)	GCM0325-NOV24	mg/L	2	<2	NSS	20	97	75	125			

QC SUMMARY

Oil & Grease-AV/MS

Method: MOE E3401/SM 5520F | Internal ref.: ME-CA-[ENV]GC-LAK-AN-019

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Oil & Grease (animal/vegetable)	GCM0325-NOV24	mg/L	4	< 4	NSS	20	NA	70	130			
Oil & Grease (mineral/synthetic)	GCM0325-NOV24	mg/L	4	< 4	NSS	20	NA	70	130			

pH

Method: SM 4500 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
pH	EWL0360-NOV24	No unit	0.05	NA	0		100			NA		

Phenols by SFA

Method: SM 5530B-D | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
4AAP-Phenolics	SKA0191-NOV24	mg/L	0.002	<0.002	ND	10	96	80	120	NV	75	125

QC SUMMARY

Polychlorinated Biphenyls

Method: MOE E3400/EPA 8082A | Internal ref.: ME-CA-IENVIGC-LAK-AN-001

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Polychlorinated Biphenyls (PCBs) - Total	GCM0323-NOV24	mg/L	0.0001	<0.0001	NSS	30	75	60	140	NSS	60	140

Semi-Volatile Organics

Method: EPA 3510C/8270D | Internal ref.: ME-CA-IENVIGC-LAK-AN-005

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Bis(2-ethylhexyl)phthalate	GCM0285-NOV24	mg/L	0.002	< 0.002	NSS	30	105	50	140	NSS	50	140
di-n-Butyl Phthalate	GCM0285-NOV24	mg/L	0.002	< 0.002	NSS	30	107	50	140	NSS	50	140

QC SUMMARY

Suspended Solids

Method: SM 2540D | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Suspended Solids	EWL0355-NOV24	mg/L	2	< 2	3	10	93	90	110	NA		

Total Nitrogen

Method: SM 4500-N C/4500-NO3- F | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-002

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Kjeldahl Nitrogen	SKA0184-NOV24	as N mg/L	0.5	<0.5	2	10	103	90	110	98	75	125

QC SUMMARY

Volatile Organics

Method: EPA 5030B/8260C | Internal ref.: ME-CA-[ENVIGC-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
1,1,2,2-Tetrachloroethane	GCM0301-NOV24	mg/L	0.0005	<0.0005	ND	30	95	60	130	87	50	140
1,2-Dichlorobenzene	GCM0301-NOV24	mg/L	0.0005	<0.0005	ND	30	99	60	130	94	50	140
1,4-Dichlorobenzene	GCM0301-NOV24	mg/L	0.0005	<0.0005	ND	30	97	60	130	93	50	140
Benzene	GCM0301-NOV24	mg/L	0.0005	<0.0005	ND	30	99	60	130	97	50	140
Chloroform	GCM0301-NOV24	mg/L	0.0005	<0.0005	ND	30	99	60	130	94	50	140
cis-1,2-Dichloroethylene	GCM0301-NOV24	mg/L	0.0005	<0.0005	ND	30	98	60	130	96	50	140
Ethylbenzene	GCM0301-NOV24	mg/L	0.0005	<0.0005	ND	30	103	60	130	100	50	140
m-p-xylene	GCM0301-NOV24	mg/L	0.0005	<0.0005	ND	30	104	60	130	100	50	140
Methyl ethyl ketone	GCM0301-NOV24	mg/L	0.02	<0.02	ND	30	87	50	140	91	50	140
Methylene Chloride	GCM0301-NOV24	mg/L	0.0005	<0.0005	ND	30	95	60	130	89	50	140
o-xylene	GCM0301-NOV24	mg/L	0.0005	<0.0005	ND	30	103	60	130	99	50	140
Styrene	GCM0301-NOV24	mg/L	0.0005	<0.0005	ND	30	104	60	130	100	50	140
Tetrachloroethylene (perchloroethylene)	GCM0301-NOV24	mg/L	0.0005	<0.0005	ND	30	97	60	130	94	50	140
Toluene	GCM0301-NOV24	mg/L	0.0005	<0.0005	ND	30	98	60	130	94	50	140
trans-1,3-Dichloropropene	GCM0301-NOV24	mg/L	0.0005	<0.0005	ND	30	100	60	130	94	50	140
Trichloroethylene	GCM0301-NOV24	mg/L	0.0005	<0.0005	ND	30	99	60	130	93	50	140

QC SUMMARY

Method Blank: a blank matrix that is carried through the entire analytical procedure. Used to assess laboratory contamination.

Duplicate: Paired analysis of a separate portion of the same sample that is carried through the entire analytical procedure. Used to evaluate measurement precision.

LCS/Spike Blank: Laboratory control sample or spike blank refer to a blank matrix to which a known amount of analyte has been added. Used to evaluate analyte recovery and laboratory accuracy without sample matrix effects.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate laboratory accuracy with sample matrix effects.

Reference Material: a material or substance matrix matched to the samples that contains a known amount of the analyte of interest. A reference material may be used in place of a matrix spike.

RL: Reporting limit

RPD: Relative percent difference

AC: Acceptance criteria

Multielement Scan Qualifier: as the number of analytes in a scan increases, so does the chance of a limit exceedance by random chance as opposed to a real method problem. Thus, in multielement scans, for the LCS and matrix spike, up to 10% of the analytes may exceed the quoted limits by up to 10% absolute and the spike is considered acceptable.

Duplicate Qualifier: for duplicates as the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

Matrix Spike Qualifier: for matrix spikes, as the concentration of the native analyte increases, the uncertainty of the matrix spike recovery increases. Thus, the matrix spike acceptance limits apply only when the concentration of the matrix spike is greater than or equal to the concentration of the native analyte.

LEGEND

FOOTNOTES

NSS	Insufficient sample for analysis.
RL	Reporting Limit.
↑	Reporting limit raised.
↓	Reporting limit lowered.
NA	The sample was not analysed for this analyte
ND	Non Detect

Results relate only to the sample tested.
Data reported represent the sample as submitted to SGS. Solid samples expressed on a dry weight basis.
"Temperature Upon Receipt" is representative of the whole shipment and may not reflect the temperature of individual samples.
Analysis conducted on samples submitted pursuant to or as part of Reg. 153/04, are in accordance to the "Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act and Excess Soil Quality" published by the Ministry and dated March 9, 2004 as amended.

SGS provides criteria information (such as regulatory or guideline limits and summary of limit exceedances) as a service. Every attempt is made to ensure the criteria information in this report is accurate and current, however, it is not guaranteed. Comparison to the most current criteria is the responsibility of the client and SGS assumes no responsibility for the accuracy of the criteria levels indicated.

SGS Canada Inc. statement of conformity decision rule does not consider uncertainty when analytical results are compared to a specified standard or regulation.
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This report supersedes all previous versions.

-- End of Analytical Report --

Request for Laboratory Services and CHAIN OF CUSTODY

SGS Industries & Environment - Lakefield: 185 Concession St., Lakefield, ON K0L 2H0 Phone: 705-652-2000 Fax: 705-652-6365 Web: www.sgs.com/environment
- London: 657 Consortium Court, London, ON, N6E 2S8 Phone: 519-672-4500 Toll Free: 877-848-8060 Fax: 519-672-0361

No: 040723 Page 1 of 1

Laboratory Information Section - Lab use only

Received By: Ameer
Received Date: 11/15/24 (mm/dd/yy)
Received Time: 13 : 03 (hr : min)
Received By (signature):
Custody Seal Present: Yes ☑ No ☐
Custody Seal Intact: Yes ☑ No ☐
Cooling Agent Present: Yes ☑ No ☐ Type: ICE
Temperature Upon Receipt (°C): 9x3
LAB LIMS #: CA4066-NOV24

REPORT INFORMATION	INVOICE INFORMATION
Company: DS Consultants ltd.	☑ (same as Report Information)
Contact: Dorothy Santos	Company:
Address: 6221 Hwy 7, Unit-16, Vaughan, ON	Contact: Accounting
Phone: 905-329-2735	Address:
Fax:	Phone:
Email: DSantos@dsconsultants.ca	Email:

Quotation #:
P.O. #:
Project #: 19-043-103
Site Location/ID: Hwy 48 & Stouffville Rd. Stouffville

TURNAROUND TIME (TAT) REQUIRED

☑ Regular TAT (5-7days)

TAT's are quoted in business days (exclude statutory holidays & weekends). Samples received after 6pm or on weekends: TAT begins next business day

RUSH TAT (Additional Charges May Apply): ☐ 1 Day ☐ 2 Days ☐ 3 Days ☐ 4 Days

PLEASE CONFIRM RUSH FEASIBILITY WITH SGS REPRESENTATIVE PRIOR TO SUBMISSION

Specify Due Date:

*NOTE: DRINKING (POTABLE) WATER SAMPLES FOR HUMAN CONSUMPTION MUST BE SUBMITTED WITH SGS DRINKING WATER CHAIN OF CUSTODY

REGULATIONS

☐ O.Reg 153/04 ☐ O.Reg 406/19
☐ Table 1 ☐ Res/Park Soil Texture: ☐ Coarse
☐ Table 2 ☐ Ind/Com ☐ Medium/Fine
☐ Table 3 ☐ Agri/Other
☐ Table ____ Appx. ____
Soil Volume ☐ <350m3 ☐ >350m3

Other Regulations:
☐ Reg 347/558 (3 Day min TAT)
☐ PWQO ☐ MMER
☐ CCME ☐ Other:
☐ MISA
☐ ODWS Not Reportable *See note

Sewer By-Law:
☑ Sanitary
☑ Storm
Municipality: York

RECORD OF SITE CONDITION (RSC) ☐ YES ☐ NO

ANALYSIS REQUESTED

	SAMPLE IDENTIFICATION	DATE SAMPLED	TIME SAMPLED	# OF BOTTLES	MATRIX	Field Filtered (Y/N)	M&I: Metals & Inorganics (incl CrVI, CN, Hg pH,(B(HWS),EC,SAR--soil) (Cl, Na-water)	M&I: Full Metals Suite (ICP metals plus B(HWS-soil only) Hg, CrVI	M&I: ICP Metals only Sb,As,Ba,Be,B,Cd, Cr,Co,Cu,Pb,Mo,Ni,Se,Ag,Tl,U,V,Zn	SVOC: PAHs only	SVOC: SVOCs all incl PAHs, ABNs, CPs	PCB: PCBs Total ☐ Aroclor ☐	PHC: F1-F4 + BTEX	PHC: F1-F4 only no BTEX	VOC: VOCs all incl BTEX	VOC: BTEX only	Pest: Pesticides Organochlorine or specify other	Other (please specify): Josh Region Sanitary Storm sewer use By-law	Other	Other	Other	Other: Sewer Use: Specify pkg:	Other: Water Characterization Pkg ☐ General ☐ Extended	SPLP: Specify tests ☐ Metals ☐ VOC ☐ 1,4-Dioxane ☐ OCP ☐ ABN	TCLP: Specify tests ☐ M&I ☐ VOC ☐ PCB ☐ B(a)P ☐ ABN ☐ Ignit.	COMMENTS:
1	BH 24-5	11/15/24	PM	18	GW	N												✓							Non-filtered sample
2																									
3																									
4																									
5																									
6																									
7																									
8																									
9																									
10																									
11																									
12																									

Observations/Comments/Special Instructions

Sampled By (NAME): Chaitanya Signature:
Relinquished by (NAME): Chaitanya Signature:
Date: 11 / 15 / 24 (mm/dd/yy)
Date: 11 / 15 / 24 (mm/dd/yy)

Pink Copy - Client
Yellow & White Copy - SGS

Note: Submission of samples to SGS is acknowledgement that you have been provided direction on sample collection/handling and transportation of samples. (2) Submission of samples to SGS is considered authorization for completion of work. Signatures may appear on this form or be retained on file in the contract, or in an alternative format (e.g. shipping documents). (3) Results may be sent by email to an unlimited number of addresses for no additional cost. Fax is available upon request. This document is issued by the Company under its General Conditions of Service accessible at http://www.sgs.com/terms_and_conditions.htm. (Printed copies are available upon request.) Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein.

Appendix D

MECP Water Well Record Search - 500 m of site

TOWNSHIP	UTM	E	N	DATE CNTR	CASING	WATER	PUMP TEST	WELL USE	SCREEN	WELL	WELL TAG	FORMATION
WHITCHURCH-STOUFFVIL CON 08 001	17 W	638015	4869363	1976/11 3109	30 24	FR 0066	25///:	DO		6913849		LOAM 0002 BRWN CLAY 0022 BLUE CLAY STNY 0047 SAND 0050 BLUE CLAY STNY 0065 GRVL 0070
WHITCHURCH-STOUFFVIL CON 08 001	17 W	637925	4869623	1970/05 5459	5	FR 0046	0/48/3/6:0	DO	0048 4	6909955		PRDG 0017 GREY CLAY GRVL 0035 GREY GRVL CLAY BLDR 0046 GREY MSND 0052
WHITCHURCH-STOUFFVIL CON 08 001	17 W	638124	4869457	1950/11 2204	2	FR 0047		ST DO		6908178		BLUE CLAY 0047
STOUFFVILLE VILLAGE	17 W	637849	4869254	2007/09 7241	1.5			TH		7051198	(Z63654) A063681	BRWN FILL SAND LOOS 0003 BRWN CLAY SILT SOFT 0008 GREN CLAY SILT DNSE 0011 GREY CLAY SILT 0016
WHITCHURCH-STOUFFVIL CON 08 001	17 W	637999	4869455	1952/07 2204	2	FR 0052	1/15/6/:	DO		6908176		PRDG 0020 BLUE CLAY STNS 0052 GRVL 0053
STOUFFVILLE VILLAGE	17 W	637852	4869248	2009/06 7241	5.19			MT	0010 10	7126408	(Z100258) A086578	BRWN FILL SAND GRVL 0004 BRWN SAND SILT DNSE 0012 GREY CLAY SILT WBRG 0020
STOUFFVILLE VILLAGE	17 W	637868	4869236	2009/06 7241	5.19			MT	0010 10	7126409	(Z100255) A086579	BRWN FILL SAND GRVL 0004 BRWN SAND SILT DNSE 0012 GREY CLAY SILT WBRG 0020
STOUFFVILLE VILLAGE	17 W	637834	4869224	2009/06 7241	2.04			MT	0010 10	7126411	(Z100256) A086581	BRWN FILL SAND GRVL 0004 BRWN SAND SILT DNSE 0012 GREY CLAY SILT WBRG 0020
STOUFFVILLE VILLAGE	17 W	637834	4869224	2009/10 7241	2.04			MT	0010 10	7133785	(Z104753) A086581 A	
STOUFFVILLE VILLAGE	17 W	637868	4869247	2009/10 7241	2.04			MT	0010 10	7133786	(Z104750) A086580 A	
STOUFFVILLE VILLAGE	17 W	637852	4869248	2009/10 7241	2.04			MT	0010 10	7133787	(Z104749) A086578 A	
STOUFFVILLE VILLAGE	17 W	637868	4869236	2009/10 7241	2.04			MT	0010 10	7133788	(Z104751) A086579 A	
STOUFFVILLE VILLAGE	17 W	637868	4869247	2009/06 7241	2.04			MT	0007 10	7126410	(Z100257) A086580	BRWN FILL SAND GRVL 0008 BRWN SAND SILT DNSE 0012 GREY CLAY SILT DNSE 0017
WHITCHURCH-STOUFFVIL CON 08 035	17 W	638062	4869328	1949/08 2204	2	FR 0050	0//4/:	DO	0051 5	6904046		MSND CLAY 0030 BLUE CLAY 0050 BRWN CSND 0056
WHITCHURCH-STOUFFVIL CON 08 035	17 W	638015	4869012	1954/10 1622	4	FR 0050	5/20/10/10:0	DO	0053 4	6904048		FILL 0005 YLLW CLAY MSND STNS 0020 BLUE CLAY STNS 0050 YLLW MSND STNS 0057
WHITCHURCH-STOUFFVIL	17 W	637886	4868759	2006/06 7082	1.97			NU	0013 5	6930598	(Z23579) A023342	GRVL SAND 0003 BRWN CLAY SILT 0008 BRWN SAND SILT GRVL 0020
WHITCHURCH-STOUFFVIL CON 08 035	17 W	638318	4869415	1954/12 2419	2	FR 0055	//3/:	DO	0050 5	6904049		CLAY 0045 MSND 0055
WHITCHURCH-STOUFFVIL	17 W	637886	4868759	2006/11 7082						7046164	(Z70724) A023342 A	
WHITCHURCH-STOUFFVIL CON 08 035	17 W	638203	4869401	1960/06 5420	34	FR 0038	18//4/:	DO		6904051		YLLW CLAY 0003 BLUE CLAY 0038 BLUE CLAY GRVL 0040
WHITCHURCH-STOUFFVIL	17 W	637862	4869240	2007/06 6490	1.97				0010 10	7047744	(Z52236) A046388	BRWN SAND GRVL FILL 0009 GREY SILT CLAY SAND 0016 BRWN SAND WBRG 0020
WHITCHURCH-STOUFFVIL CON 08 035	17 W	637974	4869174	1960/12 2204	2	FR 0048	4/10/2/18:0	DO	0047 9	6904052		CLAY STNS 0032 GRVL 0033 CLAY STNS 0046 CSND 0056
WHITCHURCH-STOUFFVIL	17 W	638090	4869523	2014/12 7247	2	UT 0008		MT	0010 10	7239494	(Z198477) A174028	BRWN GRVL SAND FILL 0008 BRWN SILT SNDY 0012 GREY TILL CLAY SAND 0020
WHITCHURCH-STOUFFVIL CON 08 035	17 W	638245	4869409	1961/01 2204	2	FR 0058	7///:	DO		6904053		PRDG 0020 BLUE CLAY STNS 0058 CSND 0059
WHITCHURCH-STOUFFVIL CON 08 035	17 W	638075	4869303	1976/12 1350	6	FR 0045	5/45/4/1:0	DO	0045 5	6913779		GREY CLAY 0021 GREY SILT 0027 GREY CLAY GRVL 0045 GREY GRVL CLAY 0050
WHITCHURCH-STOUFFVIL CON 07 001	17 W	637590	4869587	2016/02 1413	5		7///:			7261539	(Z227322) A	
WHITCHURCH-STOUFFVIL CON 07 001	17 W	637873	4869454	1993/03 1413	6 6	FR 0268	96/240/40/1:0	CO PS	0265 3	6922203		BRWN CLAY DNSE 0012 GREY CLAY STNS BLDR 0203 GREY CLAY DNSE 0212 GREY CLAY SILT SOFT 0230 GREY CLAY SAND DNSE 0263 BLCK GRVL SAND CLN 0269
WHITCHURCH-STOUFFVIL CON 07 001	17 W	637775	4869283	1972/07 1350	6	FR 0036	3/14/10/2:20	DO		6911103		BRWN CLAY GRVL FILL 0003 BRWN CLAY 0015 BRWN GRVL CLAY 0017 GREY CLAY GRVL 0031 GREY GRVL CLAY 0036 BRWN GRVL CSND 0038
WHITCHURCH-STOUFFVIL CON 07 001	17 W	637655	4869233	1971/12 2218	2	FR 0042	2///:	DO		6910791		BRWN CLAY STNS 0042 BRWN MSND CLAY 0070

WHITCHURCH-STOUFFVIL CON 07 001	17 W	637715	4869263	1976/03 5459	6	FR 0050	3/50/3/4:0	DO	0051 3	6913629		BRWN CLAY SAND 0018 BLUE CLAY STNS 0050 BLUE SAND GRVL STNS 0054
WHITCHURCH-STOUFFVIL CON 07 001	17 W	637819	4869326	1964/05 2204	2	FR 0036	4/4/4/5:30	DO	0035 5	6908031		RED CLAY STNS 0030 BLUE CLAY 0036 CSND 0040
WHITCHURCH-STOUFFVIL CON 07 001	17 W	637635	4869223	1978/08 5459	6	FR 0058	6/50/2/:	DO		6915056		LOAM 0003 BLUE CLAY 0018 BLUE CLAY HARD 0077
WHITCHURCH-STOUFFVIL CON 07 001	17 W	637728	4869249	2005/07 1350				DO		6929288	(Z31519) A029430 A	BRWN CLAY 0006 YLLW CLAY GRVL STNS 0012 GREY CLAY GRVL BLDR 0085
WHITCHURCH-STOUFFVIL CON 07 001	17 W	637762	4869295	1950/05 2419	2	FR 0060	3///:	DO		6908028		CLAY 0020 BLUE CLAY 0040 CLAY GRVL 0050 MSND GRVL 0060
WHITCHURCH-STOUFFVIL CON 07 001	17 W	637595	4869213	1969/10 5420	34	FR 0017	3///:	DO		6909699		LOAM 0001 BRWN CLAY MSND 0012 BLUE CLAY 0017 BRWN MSND 0020
WHITCHURCH-STOUFFVIL CON 07 001	17 W	637681	4869301	1957/05 2204	2	FR 0052	3/10/3/0:30	PS		6908029		MSND CLAY 0030 BLUE CLAY STNS 0052
WHITCHURCH-STOUFFVIL CON 07 001	17 W	637587	4869271	1958/09 2204	2	FR 0052	8/12/2/96:0	DO	0047 5	6908030		CLAY 0040 BLUE CLAY STNS 0049 GRVL CLAY 0052
WHITCHURCH-STOUFFVIL CON 07 034	17 W	637936	4868827	1962/11 5420	34	FR 0020	20///:	DO		6903949		LOAM 0001 YLLW CLAY 0008 CLAY MSND 0018 CSND 0020 BLUE CLAY 0030
WHITCHURCH-STOUFFVIL CON 07 035	17 W	637863	4869280	1986/05 5459	6	FR 0192	106/185/10/2:0	DO	0192 6	6918625		BRWN SAND FILL 0005 BLUE CLAY STNS 0049 BLUE SAND CLAY 0062 BLUE CLAY HARD 0091 BLUE CLAY STNS 0115 BLUE CLAY HARD 0170 BLUE CLAY SOFT 0192 BLCK CSND 0195 BLUE SAND CLAY 0198
WHITCHURCH-STOUFFVIL CON 07 035	17 W	637755	4869223	1981/08 2218	2	FR 0042	-4//2/48:30		0051 14	6915909		BRWN CLAY STNS 0042 BLUE CLAY SAND 0065
WHITCHURCH-STOUFFVIL CON 07 035	17 W	637527	4869062	2014/10 3108						7234034	(Z162204) A	
WHITCHURCH-STOUFFVIL CON 07 035	17 W	637619	4869132	1961/04 5420	34	FR 0013	13//2/:	ST DO		6903954		LOAM 0001 YLLW CLAY MSND 0010 CSND 0020
WHITCHURCH-STOUFFVIL CON 07 035	17 W	637535	4869016	1999/01 6874	3	FR 0019	13/14/25/2:0	DO		6924779		SAND 0010 BRWN SAND 0019
WHITCHURCH-STOUFFVIL CON 07 035	17 W	637730	4869234	1961/07 2204	2	FR 0020	4/34/2/12:0	DO	0035 5	6903955		PRDG 0020 CLAY STNS 0034 GRVL 0040
WHITCHURCH-STOUFFVIL CON 08 001	17 W	637996	4869374	1957/11 2204	2	FR 0041	4///:	DO		6908179		PRDG 0022 CLAY STNS 0043 GRVL 0044
WHITCHURCH-STOUFFVIL CON 08 001	17 W	637959	4869329	2009/01 5459						7130184	(Z101450) A075302 A	

Appendix E

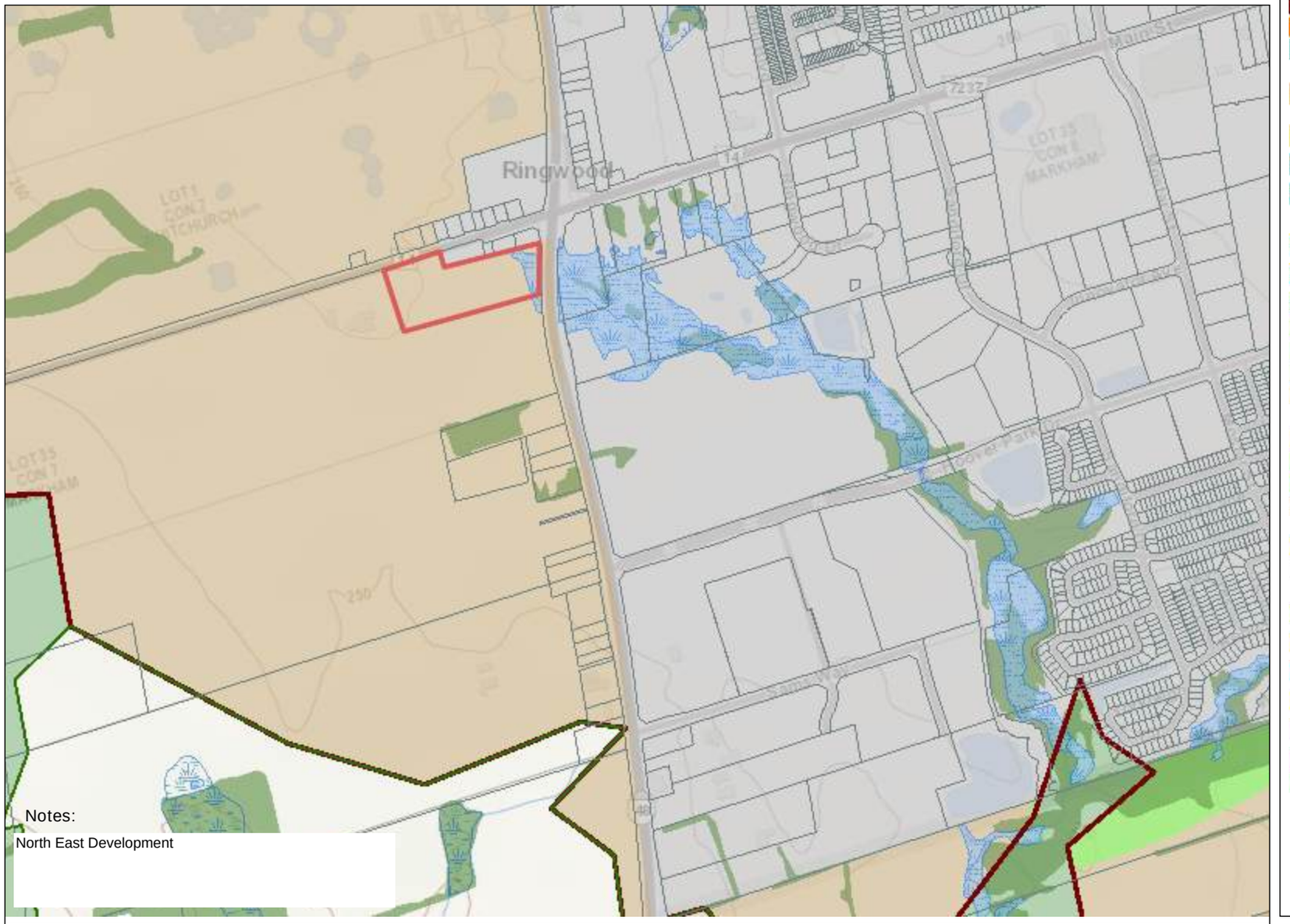
Ontario

Ministry of Natural Resources and Forestry

Make-a-Map: Natural Heritage Areas

4721 & 5061 Stouffville Road

Map created:7/1/2021



Notes:

North East Development

Legend

- Assessment Parcel
- Greenbelt Area Boundary
- ORM Boundary
- NEP Boundary
- NEP Parks and Open Space System

ANSI

- Earth Science Provincially Significant/sciences de la terre d'importance provinciale
- Earth Science Regionally Significant/sciences de la terre d'importance régionale
- Life Science Provincially Significant/sciences de la vie d'importance provinciale
- Life Science Regionally Significant/sciences de la vie d'importance régionale

Evaluated Wetland

- Provincially Significant/considérée d'importance provinciale
- Non-Provincially Significant/non considérée d'importance provinciale
- Unevaluated Wetland
- Woodland
- Conservation Reserve
- Provincial Park
- Greenbelt Towns and Villages

ORM Land Use Designation

- Countryside Area/zone de campagne
- Natural Core Area/zone centrale naturelle
- Natural Linkage Area/lien naturel
- Palgrave Estates Residential Community/communauté résidentielle de Palgrave Estates
- Rural Settlement/zone de peuplement rurale
- Settlement Area/zone de peuplement

NEP Land Use Designation

- Escarpment Natural Area/zone naturelle de l'escarpement
- Escarpment Protection Area/zone protégée l'escarpement
- Escarpment Recreation Area/zone récréative de l'escarpement
- Escarpment Rural Area/zone rurale de l'escarpement
- Mineral Resource Extraction Area/zone d'extraction de resources minérales
- Urban Area/zone urbaine
- Natural Heritage System

0.7 0 0.33 0.7 Kilometres

Absence of a feature in the map does not mean they do not exist in this area.

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TABLE 1

CLIMATE NORMALS 1981-2010 (Richmond Hill Climate Station)

Water Balance - 5061 Stouffvill Road, Whitchurch-Stoufville, ON

	Thornthwaite (1948)					
Month	Mean Temperature (°C)	Heat Index	Unadjusted Potential Evapotranspiration (mm)	Daylight Correction Value	Adjusted Potential Evapotranspiration (mm)	Total Precipitation (mm)
January	-6.2	0.0	0.0	0.81	0.0	62.3
February	-4.9	0.0	0.0	0.82	0.0	58.0
March	-0.3	0.0	0.0	1.02	0.0	58.8
April	6.9	1.6	29.9	1.12	33.4	70.1
May	13.3	4.4	62.2	1.26	78.3	81.6
June	18.7	7.4	91.0	1.28	116.5	80.2
July	21.4	9.0	105.8	1.29	136.5	83.5
August	20.3	8.3	99.8	1.20	119.7	89.2
September	15.9	5.8	75.9	1.04	79.0	88.4
October	9.1	2.5	40.7	0.95	38.6	69.1
November	3.1	0.5	12.2	0.81	9.9	87.2
December	-2.7	0.0	0.0	0.77	0.0	66.8
TOTALS		**39.5**	**517.4**		**612.0**	**895.2**

Notes: Daylight Correction values obtained from Instruction and Tables For Computing Potential Evapotranspiration and The Water Balance (Thornthwaite & Mather, 1957)

TABLE 2

Pre-development Water Balance

Water Balance - 5061 Stouffvill Road, Whitchurch-Stoufville, ON

Catchments and Hydrologic Components			Month											Total
			March	April	May	June	July	August	September	October	November	December	January	February	
PET - Adjusted Potential Evapotranspiration (mm)			0.00	33.44	78.34	116.49	136.51	119.71	78.95	38.64	9.88	0.00	0.00	0.00	**611.96**
P - Total Precipitation (mm)			58.80	70.10	81.60	80.20	83.50	89.20	88.40	69.10	87.20	66.80	62.30	58.00	**895.20**
P-PET (mm)			58.80	36.66	3.26	-36.29	-53.01	-30.51	9.45	30.46	77.32	66.80	62.30	58.00	-
Soil Moisture Deficit (mm)			0.00	0.00	0.00	-36.29	-89.30	-119.80	-110.36	-79.90	-2.58	0.00	0.00	0.00	-
Catchment 101	Moderately rooted crop (existing)	Soil Moisture Storage (mm)	200.00	200.00	200.00	163.71	110.70	80.20	89.64	120.10	197.42	200.00	200.00	200.00	-
		Actual Potential Evapotranspiration (mm)	0.00	33.44	78.34	113.20	119.86	103.76	78.95	38.64	9.88	0.00	0.00	0.00	**576.08**
		P-AET (mm)	58.80	36.66	3.26	-33.00	-36.36	-14.56	9.45	30.46	77.32	66.80	62.30	58.00	-
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-33.00	-69.36	-83.92	-74.47	-44.02	0.00	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	33.00	36.36	14.56	-9.45	-30.46	-44.02	0.00	0.00	0.00	-
		Precipitation Surplus (mm)	58.80	36.66	3.26	0.00	0.00	0.00	0.00	0.00	33.30	66.80	62.30	58.00	**319.12**
		MECP Infiltration Factor	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	-
		Run-Off Coefficient	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	-
		Infiltration (mm)	35.28	22.00	1.95	0.00	0.00	0.00	0.00	0.00	19.98	40.08	37.38	34.80	**191.47**
		Run-Off (mm)	23.52	14.67	1.30	0.00	0.00	0.00	0.00	0.00	13.32	26.72	24.92	23.20	**127.65**
		Catchment Area (m2) = 5381.00	Monthly Volumes												
	Total AET (m3)		0.00	179.92	421.56	609.12	644.99	558.33	424.83	207.95	53.19	0.00	0.00	0.00	**3099.88**
	Total Evaporation (m3)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
	Total Infiltration (m3)		189.84	118.38	10.52	0.00	0.00	0.00	0.00	0.00	107.51	215.67	201.14	187.26	**1030.31**
	Total Runoff (m3)		126.56	78.92	7.01	0.00	0.00	0.00	0.00	0.00	71.67	143.78	134.09	124.84	**686.88**
Catchment 103	Moderately rooted crop (existing)	Soil Moisture Storage (mm)	200.00	200.00	200.00	163.71	110.70	80.20	89.64	120.10	197.42	200.00	200.00	200.00	-
		Actual Potential Evapotranspiration (mm)	0.00	33.44	78.34	113.20	119.86	103.76	78.95	38.64	9.88	0.00	0.00	0.00	**576.08**
		P-AET (mm)	58.80	36.66	3.26	-33.00	-36.36	-14.56	9.45	30.46	77.32	66.80	62.30	58.00	-
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-33.00	-69.36	-83.92	-74.47	-44.02	0.00	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	33.00	36.36	14.56	-9.45	-30.46	-44.02	0.00	0.00	0.00	-
		Precipitation Surplus (mm)	58.80	36.66	3.26	0.00	0.00	0.00	0.00	0.00	33.30	66.80	62.30	58.00	**319.12**
		MECP Infiltration Factor	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	-
		Run-Off Coefficient	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	-
		Infiltration (mm)	35.28	22.00	1.95	0.00	0.00	0.00	0.00	0.00	19.98	40.08	37.38	34.80	**191.47**
		Run-Off (mm)	23.52	14.67	1.30	0.00	0.00	0.00	0.00	0.00	13.32	26.72	24.92	23.20	**127.65**
		Catchment Area (m2) = 60227.00	Monthly Volumes												
	Total AET (m3)		0.00	2013.71	4718.31	6817.56	7219.07	6249.14	4754.95	2327.44	595.34	0.00	0.00	0.00	**34695.53**
	Total Evaporation (m3)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
	Total Infiltration (m3)		2124.81	1324.92	117.73	0.00	0.00	0.00	0.00	0.00	1203.27	2413.90	2251.29	2095.90	**11531.81**
	Total Runoff (m3)		1416.54	883.28	78.49	0.00	0.00	0.00	0.00	0.00	802.18	1609.27	1500.86	1397.27	**7687.87**
Catchment 103	Moderately rooted crop (existing)	Soil Moisture Storage (mm)	200.00	200.00	200.00	163.71	110.70	80.20	89.64	120.10	197.42	200.00	200.00	200.00	-
		Actual Potential Evapotranspiration (mm)	0.00	33.44	78.34	113.20	119.86	103.76	78.95	38.64	9.88	0.00	0.00	0.00	**576.08**
		P-AET (mm)	58.80	36.66	3.26	-33.00	-36.36	-14.56	9.45	30.46	77.32	66.80	62.30	58.00	-
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-33.00	-69.36	-83.92	-74.47	-44.02	0.00	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	33.00	36.36	14.56	-9.45	-30.46	-44.02	0.00	0.00	0.00	-
		Precipitation Surplus (mm)	58.80	36.66	3.26	0.00	0.00	0.00	0.00	0.00	33.30	66.80	62.30	58.00	**319.12**
		MECP Infiltration Factor	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	-
		Run-Off Coefficient	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	-
		Infiltration (mm)	35.28	22.00	1.95	0.00	0.00	0.00	0.00	0.00	19.98	40.08	37.38	34.80	**191.47**
		Run-Off (mm)	23.52	14.67	1.30	0.00	0.00	0.00	0.00	0.00	13.32	26.72	24.92	23.20	**127.65**
		Catchment Area (m2) = 6690.00	Monthly Volumes												
	Total AET (m3)		0.00	223.68	524.11	757.29	801.89	694.15	528.18	258.53	66.13	0.00	0.00	0.00	**3853.97**
	Total Evaporation (m3)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
	Total Infiltration (m3)		236.02	147.17	13.08	0.00	0.00	0.00	0.00	0.00	133.66	268.14	250.07	232.81	**1280.95**
	Total Runoff (m3)		157.35	98.11	8.72	0.00	0.00	0.00	0.00	0.00	89.11	178.76	166.71	155.21	**853.97**
Site	Site Total Monthly Volumes														
	Total AET (m3)		0.00	2417.31	5663.98	8183.97	8665.95	7501.63	5707.96	2793.92	714.67	0.00	0.00	0.00	**41649**
	Total Evaporation (m3)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0**
	Total Infiltration (m3)		2550.67	1590.47	141.32	0.00	0.00	0.00	0.00	0.00	1444.43	2897.70	2702.50	2515.97	**13843**
	Total Runoff (m3)		1700.45	1060.31	94.22	0.00	0.00	0.00	0.00	0.00	962.95	1931.80	1801.67	1677.31	**9229**

TABLE 3

Post-development Water Balance

Water Balance - 5061 Stouffvill Road, Whitchurch-Stoufville, ON

Catchments and Hydrologic Components			Month											Total
			March	April	May	June	July	August	September	October	November	December	January	February	
PET - Adjusted Potential Evapotranspiration (mm)			0.00	33.44	78.34	116.49	136.51	119.71	78.95	38.64	9.88	0.00	0.00	0.00	**611.96**
P - Total Precipitation (mm)			58.80	70.10	81.60	80.20	83.50	89.20	88.40	69.10	87.20	66.80	62.30	58.00	**895.20**
P-PET (mm)			58.80	36.66	3.26	-36.29	-53.01	-30.51	9.45	30.46	77.32	66.80	62.30	58.00	-
Soil Moisture Deficit (mm)			0.00	0.00	0.00	-36.29	-89.30	-119.80	-110.36	-79.90	-2.58	0.00	0.00	0.00	-
Catchment 201	Pervious Area	Soil Moisture Storage (mm)	125.00	125.00	125.00	88.71	35.70	5.20	14.64	45.10	122.42	125.00	125.00	125.00	-
		Actual Potential Evapotranspiration (mm)	0.00	33.44	78.34	111.22	109.88	94.19	78.95	38.64	9.88	0.00	0.00	0.00	**554.55**
		P-AET (mm)	58.80	36.66	3.26	-31.02	-26.38	-4.99	9.45	30.46	77.32	66.80	62.30	58.00	-
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-31.02	-57.40	-62.39	-52.94	-22.49	0.00	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	31.02	26.38	4.99	-9.45	-30.46	-22.49	0.00	0.00	0.00	-
		Precipitation Surplus (mm)	58.80	36.66	3.26	0.00	0.00	0.00	0.00	0.00	54.83	66.80	62.30	58.00	**340.65**
		MECP Infiltration Factor	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	-
		Run-Off Coefficient	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	-
		Infiltration (mm)	29.40	18.33	1.63	0.00	0.00	0.00	0.00	0.00	27.41	33.40	31.15	29.00	**170.33**
		Run-Off (mm)	29.40	18.33	1.63	0.00	0.00	0.00	0.00	0.00	27.41	33.40	31.15	29.00	**170.33**
		Catchment Area* (m2) = 1893.00	Monthly Volumes												
	Impervious Area	Evaporation Factor	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	-
		Run-Off Coefficient	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	-
		Evaporation (mm)	8.82	10.52	12.24	12.03	12.53	13.38	13.26	10.37	13.08	10.02	9.35	8.70	**134.28**
		Run-Off (mm)	49.98	59.59	69.36	68.17	70.98	75.82	75.14	58.74	74.12	56.78	52.96	49.30	**760.92**
		Catchment Area (m2) = 2440.00	Monthly Volumes												
	Total AET (m3)		0.00	63.29	148.30	210.54	208.00	178.30	149.45	73.15	18.71	0.00	0.00	0.00	**1049.76**
	Total Evaporation (m3)		21.52	25.66	29.87	29.35	30.56	32.65	32.35	25.29	31.92	24.45	22.80	21.23	**327.64**
	Total Infiltration (m3)		55.65	34.70	3.08	0.00	0.00	0.00	0.00	0.00	51.89	63.23	58.97	54.90	**322.43**
	Total Runoff (m3)		177.61	180.09	172.32	166.33	173.18	185.00	183.34	143.31	232.75	201.77	188.18	175.19	**2179.07**
Catchment 202	Pervious Area	Soil Moisture Storage (mm)	125.00	125.00	125.00	88.71	35.70	5.20	14.64	45.10	122.42	125.00	125.00	125.00	-
		Actual Potential Evapotranspiration (mm)	0.00	33.44	78.34	111.22	109.88	94.19	78.95	38.64	9.88	0.00	0.00	0.00	**554.55**
		P-AET (mm)	58.80	36.66	3.26	-31.02	-26.38	-4.99	9.45	30.46	77.32	66.80	62.30	58.00	-
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-31.02	-57.40	-62.39	-52.94	-22.49	0.00	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	31.02	26.38	4.99	-9.45	-30.46	-22.49	0.00	0.00	0.00	-
		Precipitation Surplus (mm)	58.80	36.66	3.26	0.00	0.00	0.00	0.00	0.00	54.83	66.80	62.30	58.00	**340.65**
		MECP Infiltration Factor	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	-
		Run-Off Coefficient	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	-
		Infiltration (mm)	29.40	18.33	1.63	0.00	0.00	0.00	0.00	0.00	27.41	33.40	31.15	29.00	**170.33**
		Run-Off (mm)	29.40	18.33	1.63	0.00	0.00	0.00	0.00	0.00	27.41	33.40	31.15	29.00	**170.33**
		Catchment Area* (m2) = 526.00	Monthly Volumes												
	Impervious Area	Evaporation Factor	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	-
		Run-Off Coefficient	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	-
		Evaporation (mm)	8.82	10.52	12.24	12.03	12.53	13.38	13.26	10.37	13.08	10.02	9.35	8.70	**134.28**
		Run-Off (mm)	49.98	59.59	69.36	68.17	70.98	75.82	75.14	58.74	74.12	56.78	52.96	49.30	**760.92**
		Catchment Area (m2) = 525.00	Monthly Volumes												
	Total AET (m3)		0.00	17.59	41.21	58.50	57.80	49.54	41.53	20.33	5.20	0.00	0.00	0.00	**291.69**
	Total Evaporation (m3)		4.63	5.52	6.43	6.32	6.58	7.02	6.96	5.44	6.87	5.26	4.91	4.57	**70.50**
	Total Infiltration (m3)		15.46	9.64	0.86	0.00	0.00	0.00	0.00	0.00	14.42	17.57	16.38	15.25	**89.59**
	Total Runoff (m3)		41.70	40.92	37.27	35.79	37.26	39.81	39.45	30.84	53.33	47.38	44.19	41.14	**489.07**

TABLE 3

Post-development Water Balance

Water Balance - 5061 Stouffvill Road, Whitchurch-Stoufville, ON

Catchments and Hydrologic Components			Month											Total
			March	April	May	June	July	August	September	October	November	December	January	February	
PET - Adjusted Potential Evapotranspiration (mm)			0.00	33.44	78.34	116.49	136.51	119.71	78.95	38.64	9.88	0.00	0.00	0.00	**611.96**
P - Total Precipitation (mm)			58.80	70.10	81.60	80.20	83.50	89.20	88.40	69.10	87.20	66.80	62.30	58.00	**895.20**
P-PET (mm)			58.80	36.66	3.26	-36.29	-53.01	-30.51	9.45	30.46	77.32	66.80	62.30	58.00	-
Soil Moisture Deficit (mm)			0.00	0.00	0.00	-36.29	-89.30	-119.80	-110.36	-79.90	-2.58	0.00	0.00	0.00	-
Catchment 203	Pervious Area	Soil Moisture Storage (mm)	125.00	125.00	125.00	88.71	35.70	5.20	14.64	45.10	122.42	125.00	125.00	125.00	-
		Actual Potential Evapotranspiration (mm)	0.00	33.44	78.34	111.22	109.88	94.19	78.95	38.64	9.88	0.00	0.00	0.00	**554.55**
		P-AET (mm)	58.80	36.66	3.26	-31.02	-26.38	-4.99	9.45	30.46	77.32	66.80	62.30	58.00	**340.65**
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-31.02	-57.40	-62.39	-52.94	-22.49	0.00	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	31.02	26.38	4.99	-9.45	-30.46	-22.49	0.00	0.00	0.00	-
		Precipitation Surplus (mm)	58.80	36.66	3.26	0.00	0.00	0.00	0.00	0.00	54.83	66.80	62.30	58.00	**340.65**
		MECP Infiltration Factor	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	-
		Run-Off Coefficient	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	-
		Infiltration (mm)	29.40	18.33	1.63	0.00	0.00	0.00	0.00	0.00	27.41	33.40	31.15	29.00	**170.33**
		Run-Off (mm)	29.40	18.33	1.63	0.00	0.00	0.00	0.00	0.00	27.41	33.40	31.15	29.00	**170.33**
		Catchment Area (m2) = 3653.00	Monthly Volumes												
	Total AET (m3)		0.00	122.14	286.18	406.30	401.39	344.08	288.41	141.17	36.11	0.00	0.00	0.00	**2025.77**
	Total Evaporation (m3)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total Infiltration (m3)		107.40	66.97	5.95	0.00	0.00	0.00	0.00	0.00	100.14	122.01	113.79	105.94	**622.20**
	Total Runoff (m3)		107.40	66.97	5.95	0.00	0.00	0.00	0.00	0.00	100.14	122.01	113.79	105.94	**622.20**
Catchment 301	Pervious Area	Soil Moisture Storage (mm)	125.00	125.00	125.00	88.71	35.70	5.20	14.64	45.10	122.42	125.00	125.00	125.00	-
		Actual Potential Evapotranspiration (mm)	0.00	33.44	78.34	111.22	109.88	94.19	78.95	38.64	9.88	0.00	0.00	0.00	**554.55**
		P-AET (mm)	58.80	36.66	3.26	-31.02	-26.38	-4.99	9.45	30.46	77.32	66.80	62.30	58.00	**340.65**
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-31.02	-57.40	-62.39	-52.94	-22.49	0.00	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	31.02	26.38	4.99	-9.45	-30.46	-22.49	0.00	0.00	0.00	-
		Precipitation Surplus (mm)	58.80	36.66	3.26	0.00	0.00	0.00	0.00	0.00	54.83	66.80	62.30	58.00	**340.65**
		MECP Infiltration Factor	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	-
		Run-Off Coefficient	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	-
		Infiltration (mm)	29.40	18.33	1.63	0.00	0.00	0.00	0.00	0.00	27.41	33.40	31.15	29.00	**170.33**
		Run-Off (mm)	29.40	18.33	1.63	0.00	0.00	0.00	0.00	0.00	27.41	33.40	31.15	29.00	**170.33**
		Catchment Area (m2) = 16859.00	Monthly Volumes												
	Total AET (m3)		0.00	563.69	1320.77	1875.10	1852.45	1587.96	1331.03	651.51	166.65	0.00	0.00	0.00	**9349.15**
	Total Evaporation (m3)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
	Total Infiltration (m3)		495.65	309.06	27.46	0.00	0.00	0.00	0.00	0.00	462.17	563.09	525.16	488.91	**2871.51**
	Total Runoff (m3)		495.65	309.06	27.46	0.00	0.00	0.00	0.00	0.00	462.17	563.09	525.16	488.91	**2871.51**

TABLE 3

Post-development Water Balance

Water Balance - 5061 Stouffvill Road, Whitchurch-Stoufville, ON

Catchments and Hydrologic Components			Month											Total
			March	April	May	June	July	August	September	October	November	December	January	February	
PET - Adjusted Potential Evapotranspiration (mm)			0.00	33.44	78.34	116.49	136.51	119.71	78.95	38.64	9.88	0.00	0.00	0.00	**611.96**
P - Total Precipitation (mm)			58.80	70.10	81.60	80.20	83.50	89.20	88.40	69.10	87.20	66.80	62.30	58.00	**895.20**
P-PET (mm)			58.80	36.66	3.26	-36.29	-53.01	-30.51	9.45	30.46	77.32	66.80	62.30	58.00	-
Soil Moisture Deficit (mm)			0.00	0.00	0.00	-36.29	-89.30	-119.80	-110.36	-79.90	-2.58	0.00	0.00	0.00	-
Catchment 302	Pervious Area	Soil Moisture Storage (mm)	125.00	125.00	125.00	88.71	35.70	5.20	14.64	45.10	122.42	125.00	125.00	125.00	-
		Actual Potential Evapotranspiration (mm)	0.00	33.44	78.34	111.22	109.88	94.19	78.95	38.64	9.88	0.00	0.00	0.00	**554.55**
		P-AET (mm)	58.80	36.66	3.26	-31.02	-26.38	-4.99	9.45	30.46	77.32	66.80	62.30	58.00	-
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-31.02	-57.40	-62.39	-52.94	-22.49	0.00	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	31.02	26.38	4.99	-9.45	-30.46	-22.49	0.00	0.00	0.00	-
		Precipitation Surplus (mm)	58.80	36.66	3.26	0.00	0.00	0.00	0.00	0.00	54.83	66.80	62.30	58.00	**340.65**
		MECP Infiltration Factor	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	-
		Run-Off Coefficient	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	-
		Infiltration (mm)	29.40	18.33	1.63	0.00	0.00	0.00	0.00	0.00	27.41	33.40	31.15	29.00	**170.33**
		Run-Off (mm)	29.40	18.33	1.63	0.00	0.00	0.00	0.00	0.00	27.41	33.40	31.15	29.00	**170.33**
		Catchment Area* (m2) = 357.00	Monthly Volumes												
	Impervious Area	Evaporation Factor	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	-
		Run-Off Coefficient	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	-
		Evaporation (mm)	8.82	10.52	12.24	12.03	12.53	13.38	13.26	10.37	13.08	10.02	9.35	8.70	**134.28**
		Run-Off (mm)	49.98	59.59	69.36	68.17	70.98	75.82	75.14	58.74	74.12	56.78	52.96	49.30	**760.92**
		Catchment Area (m2) = 492.00	Monthly Volumes												
	Total AET (m3)		0.00	11.94	27.97	39.71	39.23	33.63	28.19	13.80	3.53	0.00	0.00	0.00	**197.97**
	Total Evaporation (m3)		4.34	5.17	6.02	5.92	6.16	6.58	6.52	5.10	6.44	4.93	4.60	4.28	**66.07**
	Total Infiltration (m3)		10.50	6.54	0.58	0.00	0.00	0.00	0.00	0.00	9.79	11.92	11.12	10.35	**60.81**
	Total Runoff (m3)		35.09	35.86	34.71	33.54	34.92	37.30	36.97	28.90	46.25	39.86	37.17	34.61	**435.18**
Catchment 303	Pervious Area	Soil Moisture Storage (mm)	125.00	125.00	125.00	88.71	35.70	5.20	14.64	45.10	122.42	125.00	125.00	125.00	-
		Actual Potential Evapotranspiration (mm)	0.00	33.44	78.34	111.22	109.88	94.19	78.95	38.64	9.88	0.00	0.00	0.00	**554.55**
		P-AET (mm)	58.80	36.66	3.26	-31.02	-26.38	-4.99	9.45	30.46	77.32	66.80	62.30	58.00	-
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-31.02	-57.40	-62.39	-52.94	-22.49	0.00	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	31.02	26.38	4.99	-9.45	-30.46	-22.49	0.00	0.00	0.00	-
		Precipitation Surplus (mm)	58.80	36.66	3.26	0.00	0.00	0.00	0.00	0.00	54.83	66.80	62.30	58.00	**340.65**
		MECP Infiltration Factor	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	-
		Run-Off Coefficient	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	-
		Infiltration (mm)	29.40	18.33	1.63	0.00	0.00	0.00	0.00	0.00	27.41	33.40	31.15	29.00	**170.33**
		Run-Off (mm)	29.40	18.33	1.63	0.00	0.00	0.00	0.00	0.00	27.41	33.40	31.15	29.00	**170.33**
		Catchment Area* (m2) = 2342.00	Monthly Volumes												
	Impervious Area	Evaporation Factor	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	-
		Run-Off Coefficient	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	-
		Evaporation (mm)	8.82	10.52	12.24	12.03	12.53	13.38	13.26	10.37	13.08	10.02	9.35	8.70	**134.28**
		Run-Off (mm)	49.98	59.59	69.36	68.17	70.98	75.82	75.14	58.74	74.12	56.78	52.96	49.30	**760.92**
		Catchment Area (m2) = 3989.00	Monthly Volumes												
	Total AET (m3)		0.00	78.31	183.48	260.48	257.34	220.60	184.90	90.51	23.15	0.00	0.00	0.00	**1298.75**
	Total Evaporation (m3)		35.18	41.94	48.83	47.99	49.96	53.37	52.89	41.35	52.18	39.97	37.28	34.70	**535.64**
	Total Infiltration (m3)		68.85	42.93	3.82	0.00	0.00	0.00	0.00	0.00	64.20	78.22	72.95	67.92	**398.90**
	Total Runoff (m3)		268.23	280.62	280.49	271.93	283.12	302.45	299.73	234.29	359.87	304.72	284.19	264.58	**3434.21**

TABLE 3

Post-development Water Balance

Water Balance - 5061 Stouffvill Road, Whitchurch-Stoufville, ON

Catchments and Hydrologic Components			Month											Total
			March	April	May	June	July	August	September	October	November	December	January	February	
PET - Adjusted Potential Evapotranspiration (mm)			0.00	33.44	78.34	116.49	136.51	119.71	78.95	38.64	9.88	0.00	0.00	0.00	**611.96**
P - Total Precipitation (mm)			58.80	70.10	81.60	80.20	83.50	89.20	88.40	69.10	87.20	66.80	62.30	58.00	**895.20**
P-PET (mm)			58.80	36.66	3.26	-36.29	-53.01	-30.51	9.45	30.46	77.32	66.80	62.30	58.00	-
Soil Moisture Deficit (mm)			0.00	0.00	0.00	-36.29	-89.30	-119.80	-110.36	-79.90	-2.58	0.00	0.00	0.00	-
Catchment 304	Pervious Area	Soil Moisture Storage (mm)	125.00	125.00	125.00	88.71	35.70	5.20	14.64	45.10	122.42	125.00	125.00	125.00	-
		Actual Potential Evapotranspiration (mm)	0.00	33.44	78.34	111.22	109.88	94.19	78.95	38.64	9.88	0.00	0.00	0.00	**554.55**
		P-AET (mm)	58.80	36.66	3.26	-31.02	-26.38	-4.99	9.45	30.46	77.32	66.80	62.30	58.00	-
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-31.02	-57.40	-62.39	-52.94	-22.49	0.00	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	31.02	26.38	4.99	-9.45	-30.46	-22.49	0.00	0.00	0.00	-
		Precipitation Surplus (mm)	58.80	36.66	3.26	0.00	0.00	0.00	0.00	0.00	54.83	66.80	62.30	58.00	**340.65**
		MECP Infiltration Factor	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	-
		Run-Off Coefficient	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	-
		Infiltration (mm)	29.40	18.33	1.63	0.00	0.00	0.00	0.00	0.00	27.41	33.40	31.15	29.00	**170.33**
		Run-Off (mm)	29.40	18.33	1.63	0.00	0.00	0.00	0.00	0.00	27.41	33.40	31.15	29.00	**170.33**
		Catchment Area* (m2) = 4934.00	Monthly Volumes												
	Impervious Area	Evaporation Factor	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	-
		Run-Off Coefficient	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	-
		Evaporation (mm)	8.82	10.52	12.24	12.03	12.53	13.38	13.26	10.37	13.08	10.02	9.35	8.70	**134.28**
		Run-Off (mm)	49.98	59.59	69.36	68.17	70.98	75.82	75.14	58.74	74.12	56.78	52.96	49.30	**760.92**
		Catchment Area (m2) = 11480.00	Monthly Volumes												
	Total AET (m3)		0.00	164.97	386.54	548.77	542.14	464.74	389.54	190.67	48.77	0.00	0.00	0.00	**2736.15**
	Total Evaporation (m3)		101.25	120.71	140.52	138.10	143.79	153.60	152.22	118.99	150.16	115.03	107.28	99.88	**1541.53**
	Total Infiltration (m3)		145.06	90.45	8.04	0.00	0.00	0.00	0.00	0.00	135.26	164.80	153.69	143.09	**840.38**
	Total Runoff (m3)		718.83	774.49	804.29	782.59	814.79	870.41	862.61	674.28	986.16	816.63	761.62	709.05	**9575.75**
Catchment 305	Pervious Area	Soil Moisture Storage (mm)	125.00	125.00	125.00	88.71	35.70	5.20	14.64	45.10	122.42	125.00	125.00	125.00	-
		Actual Potential Evapotranspiration (mm)	0.00	33.44	78.34	111.22	109.88	94.19	78.95	38.64	9.88	0.00	0.00	0.00	**554.55**
		P-AET (mm)	58.80	36.66	3.26	-31.02	-26.38	-4.99	9.45	30.46	77.32	66.80	62.30	58.00	-
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-31.02	-57.40	-62.39	-52.94	-22.49	0.00	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	31.02	26.38	4.99	-9.45	-30.46	-22.49	0.00	0.00	0.00	-
		Precipitation Surplus (mm)	58.80	36.66	3.26	0.00	0.00	0.00	0.00	0.00	54.83	66.80	62.30	58.00	**340.65**
		MECP Infiltration Factor	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	-
		Run-Off Coefficient	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	-
		Infiltration (mm)	29.40	18.33	1.63	0.00	0.00	0.00	0.00	0.00	27.41	33.40	31.15	29.00	**170.33**
		Run-Off (mm)	29.40	18.33	1.63	0.00	0.00	0.00	0.00	0.00	27.41	33.40	31.15	29.00	**170.33**
		Catchment Area* (m2) = 1558.00	Monthly Volumes												
	Impervious Area	Evaporation Factor	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	-
		Run-Off Coefficient	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	-
		Evaporation (mm)	8.82	10.52	12.24	12.03	12.53	13.38	13.26	10.37	13.08	10.02	9.35	8.70	**134.28**
		Run-Off (mm)	49.98	59.59	69.36	68.17	70.98	75.82	75.14	58.74	74.12	56.78	52.96	49.30	**760.92**
		Catchment Area (m2) = 8791.00	Monthly Volumes												
	Total AET (m3)		0.00	52.09	122.06	173.28	171.19	146.75	123.00	60.21	15.40	0.00	0.00	0.00	**863.99**
	Total Evaporation (m3)		77.54	92.44	107.60	105.76	110.11	117.62	116.57	91.12	114.99	88.09	82.15	76.48	**1180.46**
	Total Infiltration (m3)		45.81	28.56	2.54	0.00	0.00	0.00	0.00	0.00	42.71	52.04	48.53	45.18	**265.37**
	Total Runoff (m3)		485.18	552.37	612.28	599.28	623.94	666.53	660.56	516.34	694.30	551.19	514.06	478.58	**6954.61**

TABLE 3

Post-development Water Balance

Water Balance - 5061 Stouffvill Road, Whitchurch-Stoufville, ON

Catchments and Hydrologic Components			Month											Total
			March	April	May	June	July	August	September	October	November	December	January	February	
PET - Adjusted Potential Evapotranspiration (mm)			0.00	33.44	78.34	116.49	136.51	119.71	78.95	38.64	9.88	0.00	0.00	0.00	**611.96**
P - Total Precipitation (mm)			58.80	70.10	81.60	80.20	83.50	89.20	88.40	69.10	87.20	66.80	62.30	58.00	**895.20**
P-PET (mm)			58.80	36.66	3.26	-36.29	-53.01	-30.51	9.45	30.46	77.32	66.80	62.30	58.00	-
Soil Moisture Deficit (mm)			0.00	0.00	0.00	-36.29	-89.30	-119.80	-110.36	-79.90	-2.58	0.00	0.00	0.00	-
Catchment 306	Pervious Area	Soil Moisture Storage (mm)	125.00	125.00	125.00	88.71	35.70	5.20	14.64	45.10	122.42	125.00	125.00	125.00	-
		Actual Potential Evapotranspiration (mm)	0.00	33.44	78.34	111.22	109.88	94.19	78.95	38.64	9.88	0.00	0.00	0.00	**554.55**
		P-AET (mm)	58.80	36.66	3.26	-31.02	-26.38	-4.99	9.45	30.46	77.32	66.80	62.30	58.00	**340.65**
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-31.02	-57.40	-62.39	-52.94	-22.49	0.00	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	31.02	26.38	4.99	-9.45	-30.46	-22.49	0.00	0.00	0.00	-
		Precipitation Surplus (mm)	58.80	36.66	3.26	0.00	0.00	0.00	0.00	0.00	54.83	66.80	62.30	58.00	**340.65**
		MECP Infiltration Factor	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	-
		Run-Off Coefficient	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	-
		Infiltration (mm)	29.40	18.33	1.63	0.00	0.00	0.00	0.00	0.00	27.41	33.40	31.15	29.00	**170.33**
		Run-Off (mm)	29.40	18.33	1.63	0.00	0.00	0.00	0.00	0.00	27.41	33.40	31.15	29.00	**170.33**
		Catchment Area (m2) = 5117.00	Monthly Volumes												
	Total AET (m3)		0.00	171.09	400.88	569.12	562.25	481.97	403.99	197.74	50.58	0.00	0.00	0.00	**2837.63**
	Total Evaporation (m3)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
	Total Infiltration (m3)		150.44	93.81	8.34	0.00	0.00	0.00	0.00	0.00	140.28	170.91	159.39	148.39	**871.55**
	Total Runoff (m3)		150.44	93.81	8.34	0.00	0.00	0.00	0.00	0.00	140.28	170.91	159.39	148.39	**871.55**
Catchment 307	Pervious Area	Soil Moisture Storage (mm)	125.00	125.00	125.00	88.71	35.70	5.20	14.64	45.10	122.42	125.00	125.00	125.00	-
		Actual Potential Evapotranspiration (mm)	0.00	33.44	78.34	111.22	109.88	94.19	78.95	38.64	9.88	0.00	0.00	0.00	**554.55**
		P-AET (mm)	58.80	36.66	3.26	-31.02	-26.38	-4.99	9.45	30.46	77.32	66.80	62.30	58.00	-
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-31.02	-57.40	-62.39	-52.94	-22.49	0.00	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	31.02	26.38	4.99	-9.45	-30.46	-22.49	0.00	0.00	0.00	-
		Precipitation Surplus (mm)	58.80	36.66	3.26	0.00	0.00	0.00	0.00	0.00	54.83	66.80	62.30	58.00	**340.65**
		MECP Infiltration Factor	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	-
		Run-Off Coefficient	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	-
		Infiltration (mm)	29.40	18.33	1.63	0.00	0.00	0.00	0.00	0.00	27.41	33.40	31.15	29.00	**170.33**
		Run-Off (mm)	29.40	18.33	1.63	0.00	0.00	0.00	0.00	0.00	27.41	33.40	31.15	29.00	**170.33**
		Catchment Area* (m2) = 3671.00	Monthly Volumes												
	Impervious Area	Evaporation Factor	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	-
		Run-Off Coefficient	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	-
		Evaporation (mm)	8.82	10.52	12.24	12.03	12.53	13.38	13.26	10.37	13.08	10.02	9.35	8.70	**134.28**
		Run-Off (mm)	49.98	59.59	69.36	68.17	70.98	75.82	75.14	58.74	74.12	56.78	52.96	49.30	**760.92**
		Catchment Area (m2) = 3671.00	Monthly Volumes												
	Total AET (m3)		0.00	122.74	287.59	408.30	403.37	345.77	289.83	141.86	36.29	0.00	0.00	0.00	**2035.75**
	Total Evaporation (m3)		32.38	38.60	44.93	44.16	45.98	49.12	48.68	38.05	48.02	36.78	34.31	31.94	**492.94**
	Total Infiltration (m3)		107.93	67.30	5.98	0.00	0.00	0.00	0.00	0.00	100.64	122.61	114.35	106.46	**625.26**
	Total Runoff (m3)		291.40	286.03	260.60	250.25	260.55	278.34	275.84	215.62	372.73	331.05	308.75	287.44	**3418.60**
Site	Site Total Monthly Volumes														
	Total AET (m3)		0.00	1367.84	3204.98	4550.11	4495.14	3853.35	3229.87	1580.95	404.40	0.00	0.00	0.00	**22687**
	Total Evaporation (m3)		276.84	330.04	384.19	377.60	393.13	419.97	416.20	325.34	410.56	314.51	293.32	273.08	**4215**
	Total Infiltration (m3)		1202.75	749.98	66.64	0.00	0.00	0.00	0.00	0.00	1121.50	1366.39	1274.35	1186.39	**6968**
	Total Runoff (m3)		2771.53	2620.23	2243.71	2139.72	2227.76	2379.84	2358.49	1843.57	3447.98	3148.60	2936.50	2733.82	**30852**

TABLE 4

Post-development Water Balance With Mitigation

Water Balance - 5061 Stouffvill Road, Whitchurch-Stoufville, ON

Catchments and Hydrologic Components			Month											Total
			March	April	May	June	July	August	September	October	November	December	January	February	
PET - Adjusted Potential Evapotranspiration (mm)			0.00	33.44	78.34	116.49	136.51	119.71	78.95	38.64	9.88	0.00	0.00	0.00	**611.96**
P - Total Precipitation (mm)			58.80	70.10	81.60	80.20	83.50	89.20	88.40	69.10	87.20	66.80	62.30	58.00	**895.20**
P-PET (mm)			58.80	36.66	3.26	-36.29	-53.01	-30.51	9.45	30.46	77.32	66.80	62.30	58.00	-
Soil Moisture Deficit (mm)			0.00	0.00	0.00	-36.29	-89.30	-119.80	-110.36	-79.90	-2.58	0.00	0.00	0.00	-
Catchment 201	Pervious Area	Soil Moisture Storage (mm)	125.00	125.00	125.00	88.71	35.70	5.20	14.64	45.10	122.42	125.00	125.00	125.00	-
		Actual Potential Evapotranspiration (mm)	0.00	33.44	78.34	111.22	109.88	94.19	78.95	38.64	9.88	0.00	0.00	0.00	**554.55**
		P-AET (mm)	58.80	36.66	3.26	-31.02	-26.38	-4.99	9.45	30.46	77.32	66.80	62.30	58.00	-
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-31.02	-57.40	-62.39	-52.94	-22.49	0.00	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	31.02	26.38	4.99	-9.45	-30.46	-22.49	0.00	0.00	0.00	-
		Precipitation Surplus (mm)	58.80	36.66	3.26	0.00	0.00	0.00	0.00	0.00	54.83	66.80	62.30	58.00	**340.65**
		MECP Infiltration Factor	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	-
		Run-Off Coefficient	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	-
		Infiltration (mm)	29.40	18.33	1.63	0.00	0.00	0.00	0.00	0.00	27.41	33.40	31.15	29.00	**170.33**
		Run-Off (mm)	29.40	18.33	1.63	0.00	0.00	0.00	0.00	0.00	27.41	33.40	31.15	29.00	**170.33**
		Catchment Area* (m2) = 1893.00	Monthly Volumes												
	Impervious Area	Evaporation Factor	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	-
		Run-Off Coefficient	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	-
		Evaporation (mm)	8.82	10.52	12.24	12.03	12.53	13.38	13.26	10.37	13.08	10.02	9.35	8.70	**134.28**
		Run-Off (mm)	49.98	59.59	69.36	68.17	70.98	75.82	75.14	58.74	74.12	56.78	52.96	49.30	**760.92**
		Catchment Area (m2) = 2440.00	Monthly Volumes												
	Total AET (m3)		0.00	63.29	148.30	210.54	208.00	178.30	149.45	73.15	18.71	0.00	0.00	0.00	**1049.76**
	Total Evaporation (m3)		21.52	25.66	29.87	29.35	30.56	32.65	32.35	25.29	31.92	24.45	22.80	21.23	**327.64**
	Total Infiltration (m3)		55.65	34.70	3.08	0.00	0.00	0.00	0.00	0.00	51.89	63.23	58.97	54.90	**322.43**
	Runoff Before Mitigation(m3)		177.61	180.09	172.32	166.33	173.18	185.00	183.34	143.31	232.75	201.77	188.18	175.19	**2179.07**
	Runoff to Trenches for Infiltration (63.3% Benafit)		112.42	114.00	109.08	105.29	109.62	117.11	116.06	90.72	147.33	127.72	119.12	110.89	**1379.35**
	Total Runoff (m3)		65.18	66.09	63.24	61.04	63.56	67.90	67.29	52.60	85.42	74.05	69.06	64.29	**799.72**
Catchment 202	Pervious Area	Soil Moisture Storage (mm)	125.00	125.00	125.00	88.71	35.70	5.20	14.64	45.10	122.42	125.00	125.00	125.00	-
		Actual Potential Evapotranspiration (mm)	0.00	33.44	78.34	111.22	109.88	94.19	78.95	38.64	9.88	0.00	0.00	0.00	**554.55**
		P-AET (mm)	58.80	36.66	3.26	-31.02	-26.38	-4.99	9.45	30.46	77.32	66.80	62.30	58.00	-
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-31.02	-57.40	-62.39	-52.94	-22.49	0.00	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	31.02	26.38	4.99	-9.45	-30.46	-22.49	0.00	0.00	0.00	-
		Precipitation Surplus (mm)	58.80	36.66	3.26	0.00	0.00	0.00	0.00	0.00	54.83	66.80	62.30	58.00	**340.65**
		MECP Infiltration Factor	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	-
		Run-Off Coefficient	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	-
		Infiltration (mm)	29.40	18.33	1.63	0.00	0.00	0.00	0.00	0.00	27.41	33.40	31.15	29.00	**170.33**
		Run-Off (mm)	29.40	18.33	1.63	0.00	0.00	0.00	0.00	0.00	27.41	33.40	31.15	29.00	**170.33**
		Catchment Area* (m2) = 526.00	Monthly Volumes												
	Impervious Area	Evaporation Factor	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	-
		Run-Off Coefficient	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	-
		Evaporation (mm)	8.82	10.52	12.24	12.03	12.53	13.38	13.26	10.37	13.08	10.02	9.35	8.70	**134.28**
		Run-Off (mm)	49.98	59.59	69.36	68.17	70.98	75.82	75.14	58.74	74.12	56.78	52.96	49.30	**760.92**
		Catchment Area (m2) = 525.00	Monthly Volumes												
	Total AET (m3)		0.00	17.59	41.21	58.50	57.80	49.54	41.53	20.33	5.20	0.00	0.00	0.00	**291.69**
	Total Evaporation (m3)		4.63	5.52	6.43	6.32	6.58	7.02	6.96	5.44	6.87	5.26	4.91	4.57	**70.50**
	Total Infiltration (m3)		15.46	9.64	0.86	0.00	0.00	0.00	0.00	0.00	14.42	17.57	16.38	15.25	**89.59**
	Total Runoff (m3)		41.70	40.92	37.27	35.79	37.26	39.81	39.45	30.84	53.33	47.38	44.19	41.14	**489.07**

TABLE 4

Post-development Water Balance With Mitigation

Water Balance - 5061 Stouffvill Road, Whitchurch-Stoufville, ON

Catchments and Hydrologic Components			Month											Total
			March	April	May	June	July	August	September	October	November	December	January	February	
PET - Adjusted Potential Evapotranspiration (mm)			0.00	33.44	78.34	116.49	136.51	119.71	78.95	38.64	9.88	0.00	0.00	0.00	**611.96**
P - Total Precipitation (mm)			58.80	70.10	81.60	80.20	83.50	89.20	88.40	69.10	87.20	66.80	62.30	58.00	**895.20**
P-PET (mm)			58.80	36.66	3.26	-36.29	-53.01	-30.51	9.45	30.46	77.32	66.80	62.30	58.00	-
Soil Moisture Deficit (mm)			0.00	0.00	0.00	-36.29	-89.30	-119.80	-110.36	-79.90	-2.58	0.00	0.00	0.00	-
Catchment 203	Pervious Area	Soil Moisture Storage (mm)	125.00	125.00	125.00	88.71	35.70	5.20	14.64	45.10	122.42	125.00	125.00	125.00	-
		Actual Potential Evapotranspiration (mm)	0.00	33.44	78.34	111.22	109.88	94.19	78.95	38.64	9.88	0.00	0.00	0.00	**554.55**
		P-AET (mm)	58.80	36.66	3.26	-31.02	-26.38	-4.99	9.45	30.46	77.32	66.80	62.30	58.00	**340.65**
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-31.02	-57.40	-62.39	-52.94	-22.49	0.00	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	31.02	26.38	4.99	-9.45	-30.46	-22.49	0.00	0.00	0.00	-
		Precipitation Surplus (mm)	58.80	36.66	3.26	0.00	0.00	0.00	0.00	0.00	54.83	66.80	62.30	58.00	**340.65**
		MECP Infiltration Factor	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	-
		Run-Off Coefficient	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	-
		Infiltration (mm)	29.40	18.33	1.63	0.00	0.00	0.00	0.00	0.00	27.41	33.40	31.15	29.00	**170.33**
		Run-Off (mm)	29.40	18.33	1.63	0.00	0.00	0.00	0.00	0.00	27.41	33.40	31.15	29.00	**170.33**
		Catchment Area (m2) = 3653.00	Monthly Volumes												
	Total AET (m3)		0.00	122.14	286.18	406.30	401.39	344.08	288.41	141.17	36.11	0.00	0.00	0.00	**2025.77**
	Total Evaporation (m3)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total Infiltration (m3)		107.40	66.97	5.95	0.00	0.00	0.00	0.00	0.00	100.14	122.01	113.79	105.94	**622.20**
	Total Runoff (m3)		107.40	66.97	5.95	0.00	0.00	0.00	0.00	0.00	100.14	122.01	113.79	105.94	**622.20**
Catchment 301	Pervious Area	Soil Moisture Storage (mm)	125.00	125.00	125.00	88.71	35.70	5.20	14.64	45.10	122.42	125.00	125.00	125.00	-
		Actual Potential Evapotranspiration (mm)	0.00	33.44	78.34	111.22	109.88	94.19	78.95	38.64	9.88	0.00	0.00	0.00	**554.55**
		P-AET (mm)	58.80	36.66	3.26	-31.02	-26.38	-4.99	9.45	30.46	77.32	66.80	62.30	58.00	**340.65**
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-31.02	-57.40	-62.39	-52.94	-22.49	0.00	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	31.02	26.38	4.99	-9.45	-30.46	-22.49	0.00	0.00	0.00	-
		Precipitation Surplus (mm)	58.80	36.66	3.26	0.00	0.00	0.00	0.00	0.00	54.83	66.80	62.30	58.00	**340.65**
		MECP Infiltration Factor	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	-
		Run-Off Coefficient	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	-
		Infiltration (mm)	29.40	18.33	1.63	0.00	0.00	0.00	0.00	0.00	27.41	33.40	31.15	29.00	**170.33**
		Run-Off (mm)	29.40	18.33	1.63	0.00	0.00	0.00	0.00	0.00	27.41	33.40	31.15	29.00	**170.33**
		Catchment Area (m2) = 16859.00	Monthly Volumes												
	Total AET (m3)		0.00	563.69	1320.77	1875.10	1852.45	1587.96	1331.03	651.51	166.65	0.00	0.00	0.00	**9349.15**
	Total Evaporation (m3)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
	Total Infiltration (m3)		495.65	309.06	27.46	0.00	0.00	0.00	0.00	0.00	462.17	563.09	525.16	488.91	**2871.51**
	Runoff Before Mitigation (m3)		495.65	309.06	27.46	0.00	0.00	0.00	0.00	0.00	462.17	563.09	525.16	488.91	**2871.51**
	Runoff to East Facility for Infiltration (51.5% Benafit)		255.26	159.17	14.14	0.00	0.00	0.00	0.00	0.00	238.02	289.99	270.46	251.79	**1478.83**
	Total Runoff (m3)		240.39	149.90	13.32	0.00	0.00	0.00	0.00	0.00	224.15	273.10	254.70	237.12	**1392.68**

TABLE 4

Post-development Water Balance With Mitigation

Water Balance - 5061 Stouffvill Road, Whitchurch-Stoufville, ON

Catchments and Hydrologic Components			Month											Total
			March	April	May	June	July	August	September	October	November	December	January	February	
PET - Adjusted Potential Evapotranspiration (mm)			0.00	33.44	78.34	116.49	136.51	119.71	78.95	38.64	9.88	0.00	0.00	0.00	**611.96**
P - Total Precipitation (mm)			58.80	70.10	81.60	80.20	83.50	89.20	88.40	69.10	87.20	66.80	62.30	58.00	**895.20**
P-PET (mm)			58.80	36.66	3.26	-36.29	-53.01	-30.51	9.45	30.46	77.32	66.80	62.30	58.00	-
Soil Moisture Deficit (mm)			0.00	0.00	0.00	-36.29	-89.30	-119.80	-110.36	-79.90	-2.58	0.00	0.00	0.00	-
Catchment 302	Pervious Area	Soil Moisture Storage (mm)	125.00	125.00	125.00	88.71	35.70	5.20	14.64	45.10	122.42	125.00	125.00	125.00	-
		Actual Potential Evapotranspiration (mm)	0.00	33.44	78.34	111.22	109.88	94.19	78.95	38.64	9.88	0.00	0.00	0.00	**554.55**
		P-AET (mm)	58.80	36.66	3.26	-31.02	-26.38	-4.99	9.45	30.46	77.32	66.80	62.30	58.00	-
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-31.02	-57.40	-62.39	-52.94	-22.49	0.00	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	31.02	26.38	4.99	-9.45	-30.46	-22.49	0.00	0.00	0.00	-
		Precipitation Surplus (mm)	58.80	36.66	3.26	0.00	0.00	0.00	0.00	0.00	54.83	66.80	62.30	58.00	**340.65**
		MECP Infiltration Factor	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	-
		Run-Off Coefficient	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	-
		Infiltration (mm)	29.40	18.33	1.63	0.00	0.00	0.00	0.00	0.00	27.41	33.40	31.15	29.00	**170.33**
		Run-Off (mm)	29.40	18.33	1.63	0.00	0.00	0.00	0.00	0.00	27.41	33.40	31.15	29.00	**170.33**
		Catchment Area* (m2) = 357.00	Monthly Volumes												
	Impervious Area	Evaporation Factor	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	-
		Run-Off Coefficient	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	-
		Evaporation (mm)	8.82	10.52	12.24	12.03	12.53	13.38	13.26	10.37	13.08	10.02	9.35	8.70	**134.28**
		Run-Off (mm)	49.98	59.59	69.36	68.17	70.98	75.82	75.14	58.74	74.12	56.78	52.96	49.30	**760.92**
		Catchment Area (m2) = 492.00	Monthly Volumes												
	Total AET (m3)		0.00	11.94	27.97	39.71	39.23	33.63	28.19	13.80	3.53	0.00	0.00	0.00	**197.97**
	Total Evaporation (m3)		4.34	5.17	6.02	5.92	6.16	6.58	6.52	5.10	6.44	4.93	4.60	4.28	**66.07**
	Total Infiltration (m3)		10.50	6.54	0.58	0.00	0.00	0.00	0.00	0.00	9.79	11.92	11.12	10.35	**60.81**
	Runoff Before Mitigation (m3)		35.09	35.86	34.71	33.54	34.92	37.30	36.97	28.90	46.25	39.86	37.17	34.61	**435.18**
	Runoff to East Facility for Infiltration (69.1% Benafit)		24.24	24.78	23.98	23.18	24.13	25.78	25.55	19.97	31.96	27.54	25.69	23.91	**300.71**
	Total Runoff (m3)		10.84	11.08	10.72	10.36	10.79	11.53	11.42	8.93	14.29	12.32	11.49	10.69	**134.47**
Catchment 303	Pervious Area	Soil Moisture Storage (mm)	125.00	125.00	125.00	88.71	35.70	5.20	14.64	45.10	122.42	125.00	125.00	125.00	-
		Actual Potential Evapotranspiration (mm)	0.00	33.44	78.34	111.22	109.88	94.19	78.95	38.64	9.88	0.00	0.00	0.00	**554.55**
		P-AET (mm)	58.80	36.66	3.26	-31.02	-26.38	-4.99	9.45	30.46	77.32	66.80	62.30	58.00	-
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-31.02	-57.40	-62.39	-52.94	-22.49	0.00	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	31.02	26.38	4.99	-9.45	-30.46	-22.49	0.00	0.00	0.00	-
		Precipitation Surplus (mm)	58.80	36.66	3.26	0.00	0.00	0.00	0.00	0.00	54.83	66.80	62.30	58.00	**340.65**
		MECP Infiltration Factor	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	-
		Run-Off Coefficient	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	-
		Infiltration (mm)	29.40	18.33	1.63	0.00	0.00	0.00	0.00	0.00	27.41	33.40	31.15	29.00	**170.33**
		Run-Off (mm)	29.40	18.33	1.63	0.00	0.00	0.00	0.00	0.00	27.41	33.40	31.15	29.00	**170.33**
		Catchment Area* (m2) = 2342.00	Monthly Volumes												
	Impervious Area	Evaporation Factor	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	-
		Run-Off Coefficient	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	-
		Evaporation (mm)	8.82	10.52	12.24	12.03	12.53	13.38	13.26	10.37	13.08	10.02	9.35	8.70	**134.28**
		Run-Off (mm)	49.98	59.59	69.36	68.17	70.98	75.82	75.14	58.74	74.12	56.78	52.96	49.30	**760.92**
		Catchment Area (m2) = 3989.00	Monthly Volumes												
	Total AET (m3)		0.00	78.31	183.48	260.48	257.34	220.60	184.90	90.51	23.15	0.00	0.00	0.00	**1298.75**
	Total Evaporation (m3)		35.18	41.94	48.83	47.99	49.96	53.37	52.89	41.35	52.18	39.97	37.28	34.70	**535.64**
	Total Infiltration (m3)		68.85	42.93	3.82	0.00	0.00	0.00	0.00	0.00	64.20	78.22	72.95	67.92	**398.90**
	Runoff Before Mitigation (m3)		268.23	280.62	280.49	271.93	283.12	302.45	299.73	234.29	359.87	304.72	284.19	264.58	**3434.21**
	Runoff to East Facility for Infiltration (69.1% Benafit)		185.34	193.91	193.82	187.90	195.64	208.99	207.12	161.90	248.67	210.56	196.38	182.82	**2373.04**
	Total Runoff (m3)		82.88	86.71	86.67	84.03	87.48	93.46	92.62	72.40	111.20	94.16	87.81	81.75	**1061.17**

TABLE 4

Post-development Water Balance With Mitigation

Water Balance - 5061 Stouffvill Road, Whitchurch-Stoufville, ON

Catchments and Hydrologic Components			Month											Total
			March	April	May	June	July	August	September	October	November	December	January	February	
PET - Adjusted Potential Evapotranspiration (mm)			0.00	33.44	78.34	116.49	136.51	119.71	78.95	38.64	9.88	0.00	0.00	0.00	**611.96**
P - Total Precipitation (mm)			58.80	70.10	81.60	80.20	83.50	89.20	88.40	69.10	87.20	66.80	62.30	58.00	**895.20**
P-PET (mm)			58.80	36.66	3.26	-36.29	-53.01	-30.51	9.45	30.46	77.32	66.80	62.30	58.00	-
Soil Moisture Deficit (mm)			0.00	0.00	0.00	-36.29	-89.30	-119.80	-110.36	-79.90	-2.58	0.00	0.00	0.00	-
Catchment 304	Pervious Area	Soil Moisture Storage (mm)	125.00	125.00	125.00	88.71	35.70	5.20	14.64	45.10	122.42	125.00	125.00	125.00	-
		Actual Potential Evapotranspiration (mm)	0.00	33.44	78.34	111.22	109.88	94.19	78.95	38.64	9.88	0.00	0.00	0.00	**554.55**
		P-AET (mm)	58.80	36.66	3.26	-31.02	-26.38	-4.99	9.45	30.46	77.32	66.80	62.30	58.00	-
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-31.02	-57.40	-62.39	-52.94	-22.49	0.00	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	31.02	26.38	4.99	-9.45	-30.46	-22.49	0.00	0.00	0.00	-
		Precipitation Surplus (mm)	58.80	36.66	3.26	0.00	0.00	0.00	0.00	0.00	54.83	66.80	62.30	58.00	**340.65**
		MECP Infiltration Factor	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	-
		Run-Off Coefficient	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	-
		Infiltration (mm)	29.40	18.33	1.63	0.00	0.00	0.00	0.00	0.00	27.41	33.40	31.15	29.00	**170.33**
		Runoff Before Retention Tank (mm)	29.40	18.33	1.63	0.00	0.00	0.00	0.00	0.00	27.41	33.40	31.15	29.00	**170.33**
		Evaporation Retention Tank (2.5 mm)	7.06	4.40	0.39	0.00	0.00	0.00	0.00	0.00	6.58	8.02	7.48	6.96	**40.88**
		Run-Off (mm)	22.34	13.93	1.24	0.00	0.00	0.00	0.00	0.00	20.83	25.38	23.67	22.04	**129.45**
		Catchment Area* (m2) = 3892.00	Monthly Volumes												
	Impervious Area	Evaporation Factor	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	-
		Run-Off Coefficient	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	-
		Evaporation (mm)	8.82	10.52	12.24	12.03	12.53	13.38	13.26	10.37	13.08	10.02	9.35	8.70	**134.28**
		Runoff Before Retention Tank (mm)	49.98	59.59	69.36	68.17	70.98	75.82	75.14	58.74	74.12	56.78	52.96	49.30	
		Evaporation Retention Tank (2.5 mm)	12.00	14.30	16.65	16.36	17.03	18.20	18.03	14.10	17.79	13.63	12.71	11.83	**182.62**
		Run-Off (mm)	37.98	45.28	52.71	51.81	53.94	57.62	57.11	44.64	56.33	43.15	40.25	37.47	**578.30**
		Catchment Area (m2) = 11480.00	Monthly Volumes												
	Green Roof Area	Evaporation Factor	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	-
		AET Factor given 10.8mm storm retention	0.00	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.00	0.00	0.00	-
		Run-Off Coefficient	0.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.85	0.85	0.85	-
		Evaporation (mm)	8.82	10.52	12.24	12.03	12.53	13.38	13.26	10.37	13.08	10.02	9.35	8.70	**134.28**
		AET (mm)	0.00	59.59	69.36	68.17	70.98	75.82	75.14	58.74	74.12	0.00	0.00	0.00	**551.91**
		Run-Off (mm)	49.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.78	52.96	49.30	**209.02**
		Catchment Area (m2) = 1042.00	Monthly Volumes												
Total AET (m3)			0.00	192.22	377.18	503.91	501.60	445.60	385.57	211.61	115.71	0.00	0.00	0.00	**2733.39**
Total Evaporation (m3)			275.61	312.96	345.89	338.46	352.39	376.44	373.07	291.62	393.61	313.11	292.02	271.86	**3937.04**
Total Infiltration (m3)			114.42	71.35	6.34	0.00	0.00	0.00	0.00	0.00	106.70	129.99	121.24	112.87	**662.91**
Runoff Before Mitigation (m3)			575.11	574.09	609.97	594.77	619.24	661.51	655.58	512.45	727.77	653.35	609.34	567.28	**7360.48**
Runoff to East Facility for Infiltration (62.5% Benafit)			359.44	358.81	381.23	371.73	387.03	413.45	409.74	320.28	454.86	408.35	380.84	354.55	**4600.30**
Total Runoff (m3)			215.67	215.28	228.74	223.04	232.22	248.07	245.84	192.17	272.91	245.01	228.50	212.73	**2760.18**

TABLE 4

Post-development Water Balance With Mitigation

Water Balance - 5061 Stouffvill Road, Whitchurch-Stoufville, ON

Catchments and Hydrologic Components			Month											Total
			March	April	May	June	July	August	September	October	November	December	January	February	
PET - Adjusted Potential Evapotranspiration (mm)			0.00	33.44	78.34	116.49	136.51	119.71	78.95	38.64	9.88	0.00	0.00	0.00	**611.96**
P - Total Precipitation (mm)			58.80	70.10	81.60	80.20	83.50	89.20	88.40	69.10	87.20	66.80	62.30	58.00	**895.20**
P-PET (mm)			58.80	36.66	3.26	-36.29	-53.01	-30.51	9.45	30.46	77.32	66.80	62.30	58.00	-
Soil Moisture Deficit (mm)			0.00	0.00	0.00	-36.29	-89.30	-119.80	-110.36	-79.90	-2.58	0.00	0.00	0.00	-
Catchment 305	Pervious Area	Soil Moisture Storage (mm)	125.00	125.00	125.00	88.71	35.70	5.20	14.64	45.10	122.42	125.00	125.00	125.00	-
		Actual Potential Evapotranspiration (mm)	0.00	33.44	78.34	111.22	109.88	94.19	78.95	38.64	9.88	0.00	0.00	0.00	**554.55**
		P-AET (mm)	58.80	36.66	3.26	-31.02	-26.38	-4.99	9.45	30.46	77.32	66.80	62.30	58.00	-
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-31.02	-57.40	-62.39	-52.94	-22.49	0.00	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	31.02	26.38	4.99	-9.45	-30.46	-22.49	0.00	0.00	0.00	-
		Precipitation Surplus (mm)	58.80	36.66	3.26	0.00	0.00	0.00	0.00	0.00	54.83	66.80	62.30	58.00	**340.65**
		MECP Infiltration Factor	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	-
		Run-Off Coefficient	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	-
		Infiltration (mm)	29.40	18.33	1.63	0.00	0.00	0.00	0.00	0.00	27.41	33.40	31.15	29.00	**170.33**
		Runoff Before Retention Tank (mm)	29.40	18.33	1.63	0.00	0.00	0.00	0.00	0.00	27.41	33.40	31.15	29.00	**170.33**
		Evaporation Retention Tank (1.5 mm)	4.23	2.64	0.23	0.00	0.00	0.00	0.00	0.00	3.95	4.81	4.49	4.18	**24.53**
		Run-Off (mm)	25.17	15.69	1.39	0.00	0.00	0.00	0.00	0.00	23.47	28.59	26.66	24.82	**145.80**
		Catchment Area* (m2) = 1558.00	Monthly Volumes												
	Impervious Area	Evaporation Factor	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	-
		Run-Off Coefficient	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	-
		Evaporation (mm)	8.82	10.52	12.24	12.03	12.53	13.38	13.26	10.37	13.08	10.02	9.35	8.70	**134.28**
		Runoff Before Retention Tank (mm)	49.98	59.59	69.36	68.17	70.98	75.82	75.14	58.74	74.12	56.78	52.96	49.30	**760.92**
		Evaporation Retention Tank (1.5 mm)	7.20	8.58	9.99	9.82	10.22	10.92	10.82	8.46	10.67	8.18	7.63	7.10	**109.57**
		Run-Off (mm)	42.78	51.00	59.37	58.35	60.75	64.90	64.32	50.28	63.45	48.60	45.33	42.20	**651.35**
		Catchment Area (m2) = 8791.00	Monthly Volumes												
Total AET (m3)			0.00	52.09	122.06	173.28	171.19	146.75	123.00	60.21	15.40	0.00	0.00	0.00	**863.99**
Total Evaporation (m3)			147.40	171.98	195.77	192.05	199.95	213.60	211.69	165.47	214.97	167.46	156.18	145.40	**2181.92**
Total Infiltration (m3)			45.81	28.56	2.54	0.00	0.00	0.00	0.00	0.00	42.71	52.04	48.53	45.18	**265.37**
Runoff Before Mitigation (m3)			415.31	472.83	524.11	512.99	534.09	570.55	565.44	441.99	594.32	471.82	440.03	409.66	**5953.15**
Runoff to East Facility for Infiltration (62.5% Benafit)			259.57	295.52	327.57	320.62	333.81	356.60	353.40	276.24	371.45	294.89	275.02	256.04	**3720.72**
Total Runoff (m3)			155.74	177.31	196.54	192.37	200.29	213.96	212.04	165.74	222.87	176.93	165.01	153.62	**2232.43**
Catchment 306	Pervious Area	Soil Moisture Storage (mm)	125.00	125.00	125.00	88.71	35.70	5.20	14.64	45.10	122.42	125.00	125.00	125.00	-
		Actual Potential Evapotranspiration (mm)	0.00	33.44	78.34	111.22	109.88	94.19	78.95	38.64	9.88	0.00	0.00	0.00	**554.55**
		P-AET (mm)	58.80	36.66	3.26	-31.02	-26.38	-4.99	9.45	30.46	77.32	66.80	62.30	58.00	**340.65**
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-31.02	-57.40	-62.39	-52.94	-22.49	0.00	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	31.02	26.38	4.99	-9.45	-30.46	-22.49	0.00	0.00	0.00	-
		Precipitation Surplus (mm)	58.80	36.66	3.26	0.00	0.00	0.00	0.00	0.00	54.83	66.80	62.30	58.00	**340.65**
		MECP Infiltration Factor	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	-
		Run-Off Coefficient	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	-
		Infiltration (mm)	29.40	18.33	1.63	0.00	0.00	0.00	0.00	0.00	27.41	33.40	31.15	29.00	**170.33**
		Run-Off (mm)	29.40	18.33	1.63	0.00	0.00	0.00	0.00	0.00	27.41	33.40	31.15	29.00	**170.33**
		Catchment Area (m2) = 5117.00	Monthly Volumes												
Total AET (m3)			0.00	171.09	400.88	569.12	562.25	481.97	403.99	197.74	50.58	0.00	0.00	0.00	**2837.63**
Total Evaporation (m3)			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
Total Infiltration (m3)			150.44	93.81	8.34	0.00	0.00	0.00	0.00	0.00	140.28	170.91	159.39	148.39	**871.55**
Runoff Before Mitigation (m3)			150.44	93.81	8.34	0.00	0.00	0.00	0.00	0.00	140.28	170.91	159.39	148.39	**871.55**
Runoff to East Facility for Infiltration (51.5% Benafit)			77.48	48.31	4.29	0.00	0.00	0.00	0.00	0.00	72.24	88.02	82.09	76.42	**448.85**
Total Runoff (m3)			72.96	45.50	4.04	0.00	0.00	0.00	0.00	0.00	68.03	82.89	77.31	71.97	**422.70**

TABLE 4

Post-development Water Balance With Mitigation

Water Balance - 5061 Stouffvill Road, Whitchurch-Stoufville, ON

Catchments and Hydrologic Components			Month											Total
			March	April	May	June	July	August	September	October	November	December	January	February	
PET - Adjusted Potential Evapotranspiration (mm)			0.00	33.44	78.34	116.49	136.51	119.71	78.95	38.64	9.88	0.00	0.00	0.00	**611.96**
P - Total Precipitation (mm)			58.80	70.10	81.60	80.20	83.50	89.20	88.40	69.10	87.20	66.80	62.30	58.00	**895.20**
P-PET (mm)			58.80	36.66	3.26	-36.29	-53.01	-30.51	9.45	30.46	77.32	66.80	62.30	58.00	-
Soil Moisture Deficit (mm)			0.00	0.00	0.00	-36.29	-89.30	-119.80	-110.36	-79.90	-2.58	0.00	0.00	0.00	-
Catchment 307	Pervious Area	Soil Moisture Storage (mm)	125.00	125.00	125.00	88.71	35.70	5.20	14.64	45.10	122.42	125.00	125.00	125.00	-
		Actual Potential Evapotranspiration (mm)	0.00	33.44	78.34	111.22	109.88	94.19	78.95	38.64	9.88	0.00	0.00	0.00	**554.55**
		P-AET (mm)	58.80	36.66	3.26	-31.02	-26.38	-4.99	9.45	30.46	77.32	66.80	62.30	58.00	-
		Actual Soil Moisture Deficit (mm)	0.00	0.00	0.00	-31.02	-57.40	-62.39	-52.94	-22.49	0.00	0.00	0.00	0.00	-
		Change in Soil Moisture Deficit (mm)	0.00	0.00	0.00	31.02	26.38	4.99	-9.45	-30.46	-22.49	0.00	0.00	0.00	-
		Precipitation Surplus (mm)	58.80	36.66	3.26	0.00	0.00	0.00	0.00	0.00	54.83	66.80	62.30	58.00	**340.65**
		MECP Infiltration Factor	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	-
		Run-Off Coefficient	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	-
		Infiltration (mm)	29.40	18.33	1.63	0.00	0.00	0.00	0.00	0.00	27.41	33.40	31.15	29.00	**170.33**
		Run-Off (mm)	29.40	18.33	1.63	0.00	0.00	0.00	0.00	0.00	27.41	33.40	31.15	29.00	**170.33**
		Catchment Area* (m2) = 3671.00	**Monthly Volumes**												
	Impervious Area	Evaporation Factor	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	-
		Run-Off Coefficient	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	-
		Evaporation (mm)	8.82	10.52	12.24	12.03	12.53	13.38	13.26	10.37	13.08	10.02	9.35	8.70	**134.28**
		Run-Off (mm)	49.98	59.59	69.36	68.17	70.98	75.82	75.14	58.74	74.12	56.78	52.96	49.30	**760.92**
		Catchment Area (m2) = 3671.00	**Monthly Volumes**												
	Total AET (m3)		0.00	122.74	287.59	408.30	403.37	345.77	289.83	141.86	36.29	0.00	0.00	0.00	**2035.75**
	Total Evaporation (m3)		32.38	38.60	44.93	44.16	45.98	49.12	48.68	38.05	48.02	36.78	34.31	31.94	**492.94**
	Total Infiltration (m3)		107.93	67.30	5.98	0.00	0.00	0.00	0.00	0.00	100.64	122.61	114.35	106.46	**625.26**
	Runoff Before Mitigation (m3)		291.40	286.03	260.60	250.25	260.55	278.34	275.84	215.62	372.73	331.05	308.75	287.44	**3418.60**
	Runoff to East Facility for Infiltration (69.1% Benafit)		201.36	197.65	180.07	172.92	180.04	192.33	190.60	148.99	257.56	228.76	213.35	198.62	**2362.25**
	Total Runoff (m3)		90.04	88.38	80.53	77.33	80.51	86.01	85.23	66.63	115.17	102.29	95.40	88.82	**1056.35**
Site	Site Total Monthly Volumes														
	Total AET (m3)		0.00	1395.09	3195.62	4505.24	4454.61	3834.21	3225.90	1601.88	471.33	0.00	0.00	0.00	**22684**
	Total Evaporation (m3)		521.07	601.84	677.73	664.25	691.58	738.79	732.17	572.32	753.99	591.96	552.08	513.98	**7612**
	Total Infiltration (m3)		2647.24	2123.01	1299.14	1181.64	1230.26	1314.24	1302.46	1018.10	2915.02	3007.41	2804.82	2611.23	**23455**
	Total Runoff (m3)		1082.81	948.15	727.03	683.96	712.10	760.71	753.89	589.30	1267.53	1230.14	1147.27	1068.08	**10971**

TABLE 5
Water Balance Summary
Water Balance - 5061 Stouffvill Road, Whitchurch-Stoufville, ON

Total Runoff (m3)	March	April	May	June	July	August	Sept	October	Nov	Dec	January	February	Annual Total
Pre-development	1700	1060	94	0	0	0	0	0	963	1932	1802	1677	**9229**
Post-development	2772	2620	2244	2140	2228	2380	2358	1844	3448	3149	2936	2734	**30852**
Post-development with Mitigation	1083	948	727	684	712	761	754	589	1268	1230	1147	1068	**10971**
Deficit	618	112	-633	-684	-712	-761	-754	-589	-305	702	654	609	**-1742**

* - (ve) value implies a net increase

Total Infiltration (m3)	March	April	May	June	July	August	Sept	October	Nov	Dec	January	February	Annual Total
Pre-development	2551	1590	141	0	0	0	0	0	1444	2898	2702	2516	**13843**
Post-development	1203	750	67	0	0	0	0	0	1122	1366	1274	1186	**6968**
Post-development with Mitigation	2647	2123	1299	1182	1230	1314	1302	1018	2915	3007	2805	2611	**23455**
Deficit	-97	-533	-1158	-1182	-1230	-1314	-1302	-1018	-1471	-110	-102	-95	**-9612**

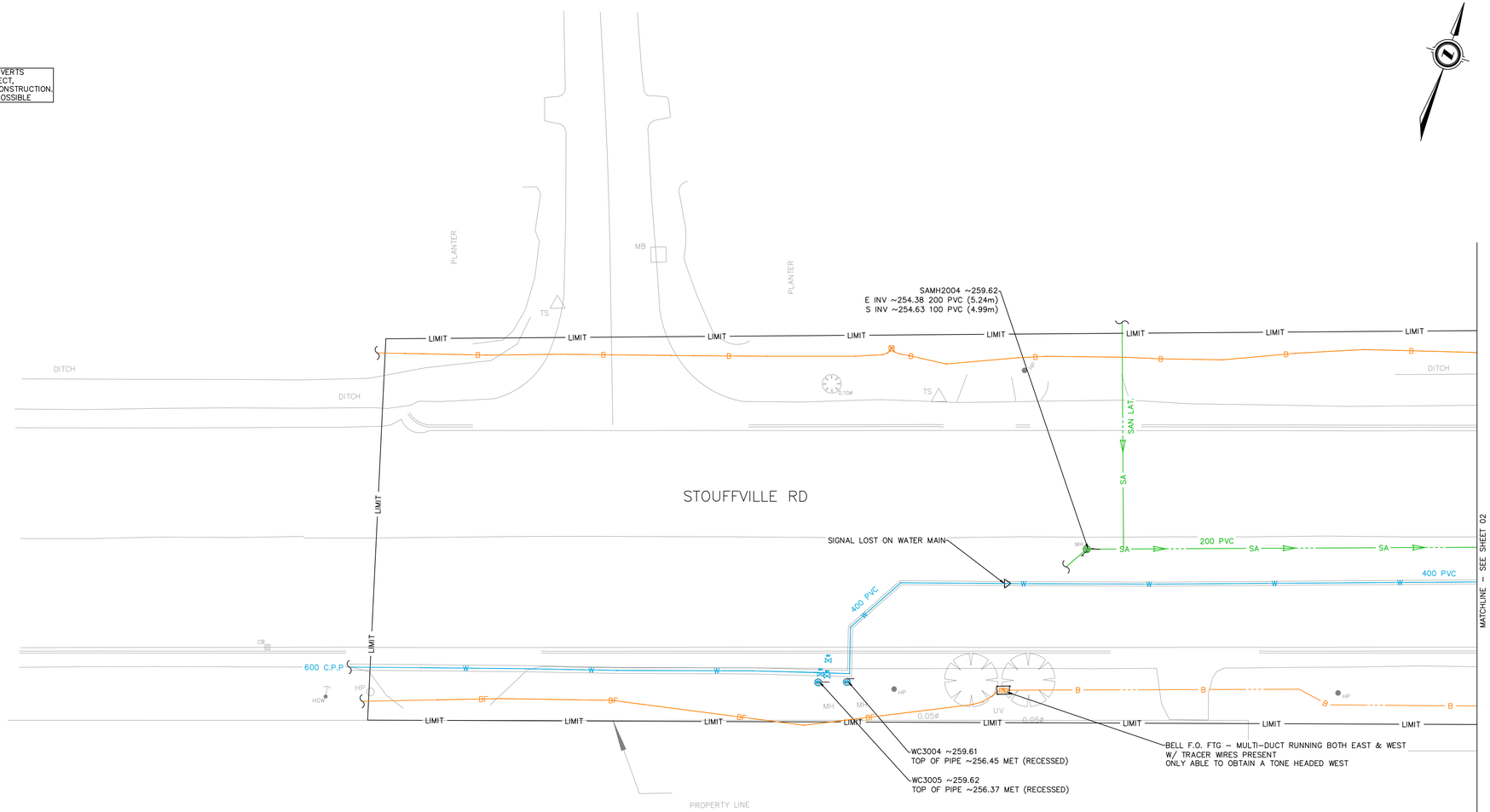
* - (ve) value implies a net increase

Current study area	Pre-development area (m^2)	Post-development area (m^2)	Area change (m^2)	Impervious area (%)	Pre-development impervious area (m^2)	Post-development impervious area (m^2)	Impervious increase (m^2)
Site total	72298	72298	0	43.4%	0	31388	31388

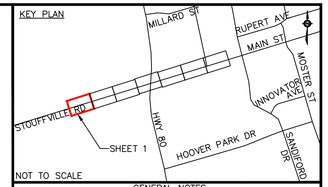
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Sources: City of Toronto, Wet Weather Flow Management Guidelines (2006), Figure 1a; Civil facility sizing calculations (September 2026);

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LIMIT	LIMIT OF INVESTIGATION
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STOUFFVILLE EXPANSION AREA

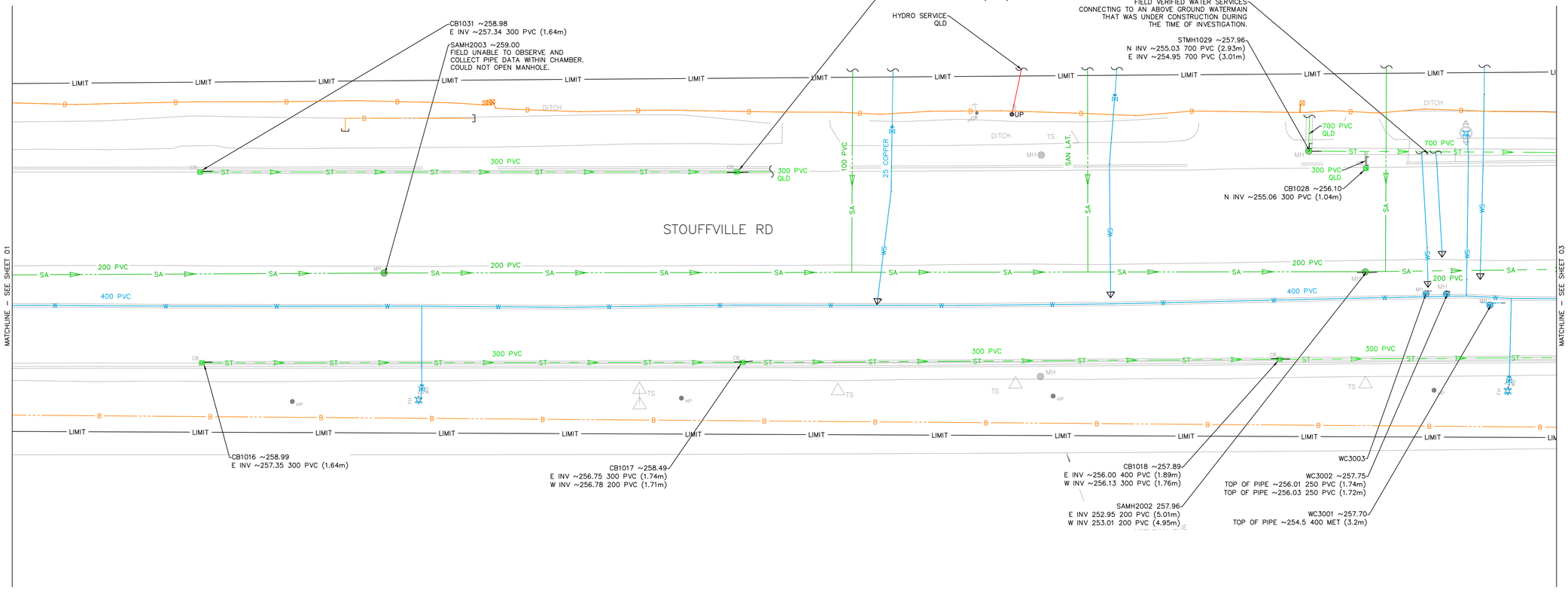
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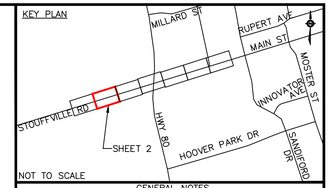
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PROJECT NO. 24-0260

SHEET NO. 01 OF 07

UNABLE TO GET MANHOLE AND CATCH BASIN INVERTS IN SEVERAL LOCATIONS THROUGHOUT THE PROJECT, DURING THE INVESTIGATION, DUE TO ONGOING CONSTRUCTION. WILL COLLECT DURING CCTV INVESTIGATION, IF POSSIBLE





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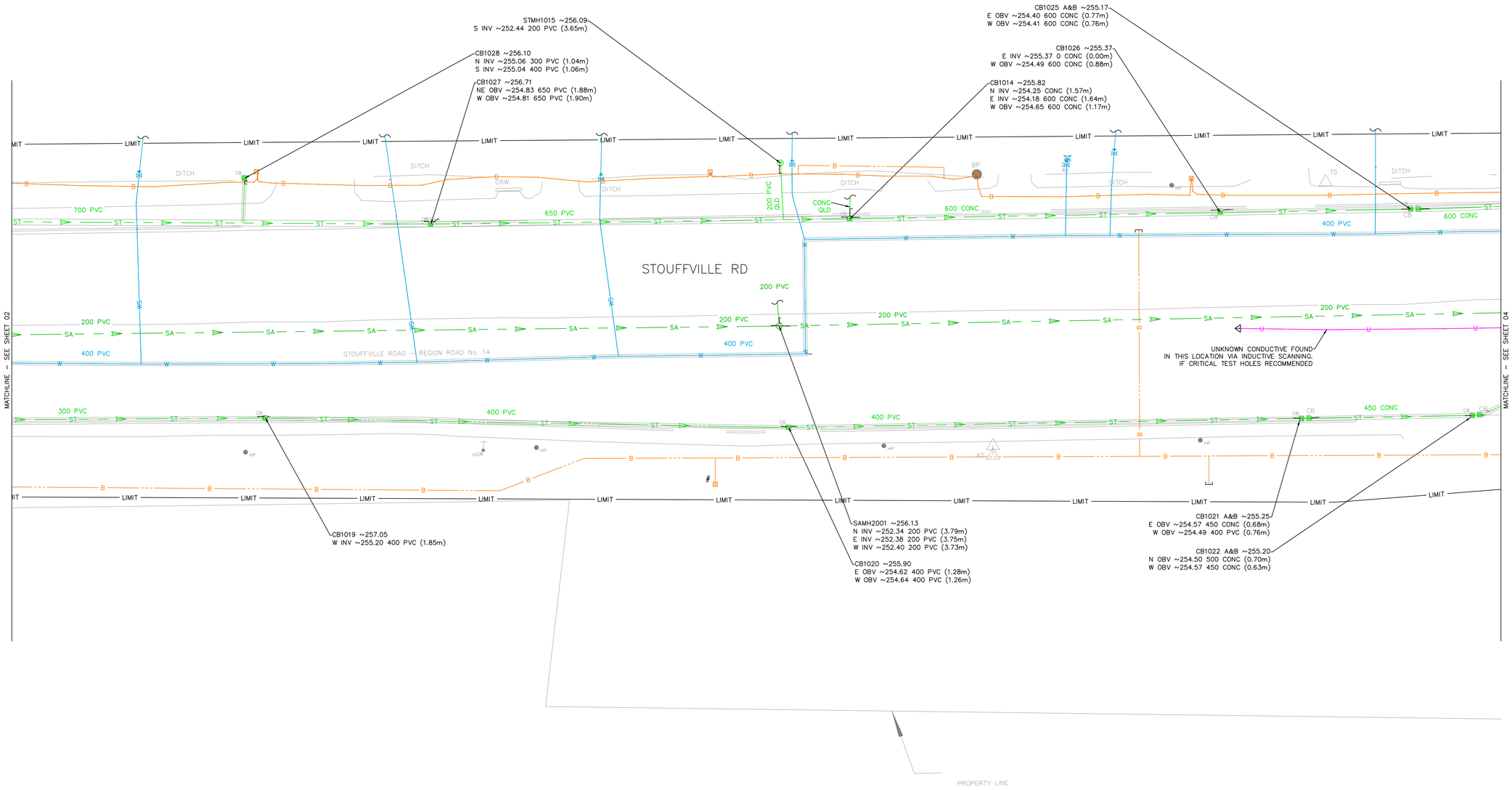
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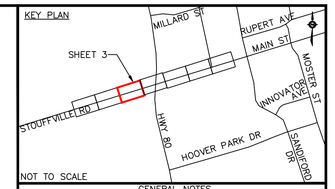
PROJECT NO. 24-0260

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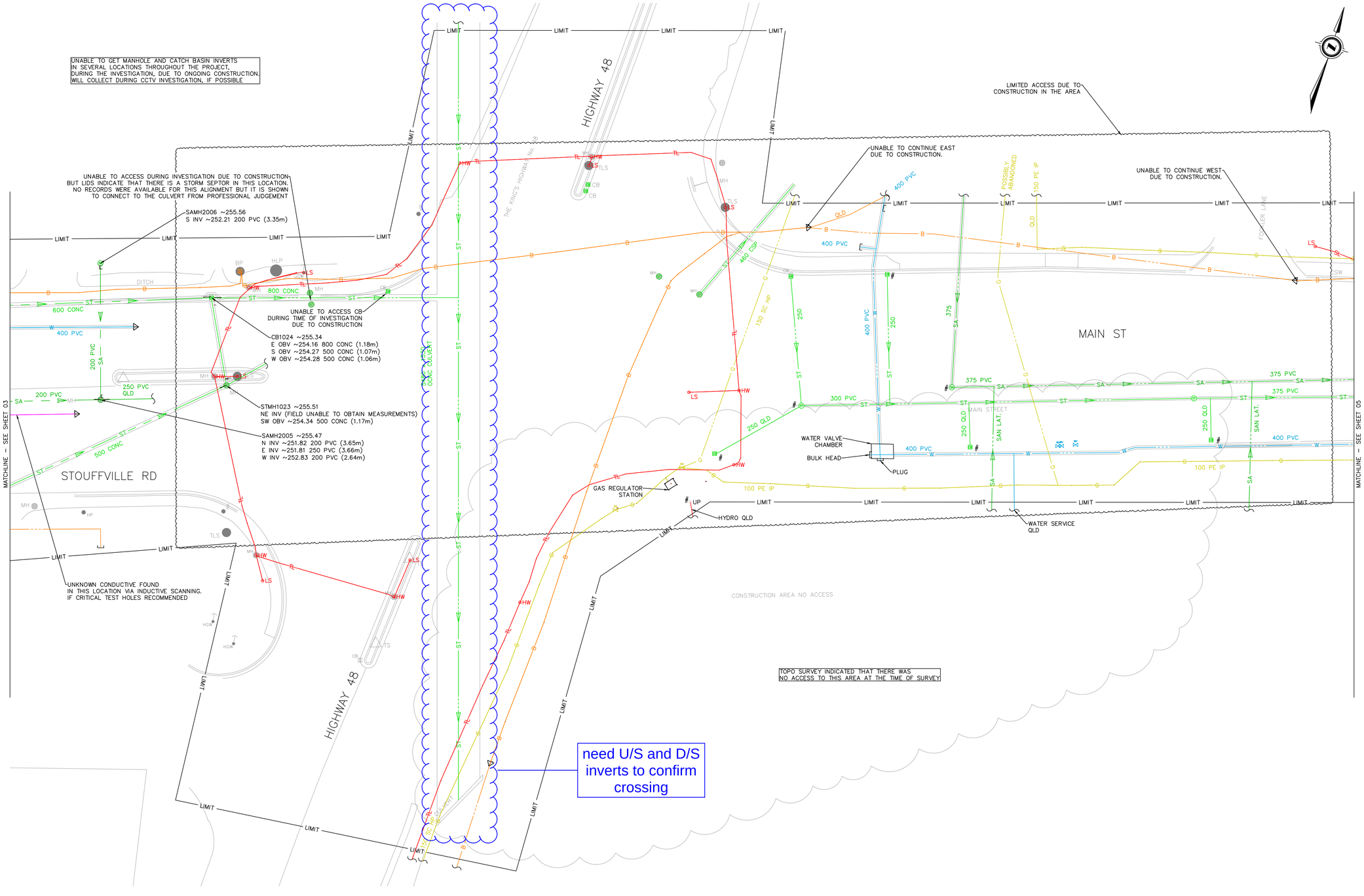
PROJECT.
STOUFFVILLE EXPANSION AREA

DRAWING.
SUBSURFACE UTILITY ENGINEERING INVESTIGATION

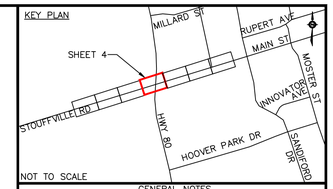
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SCS CONSULTING GROUP LTD.

PROJECT NO. 24-0260

SHEET NO. 03 OF 07



KEY PLAN



NOT TO SCALE

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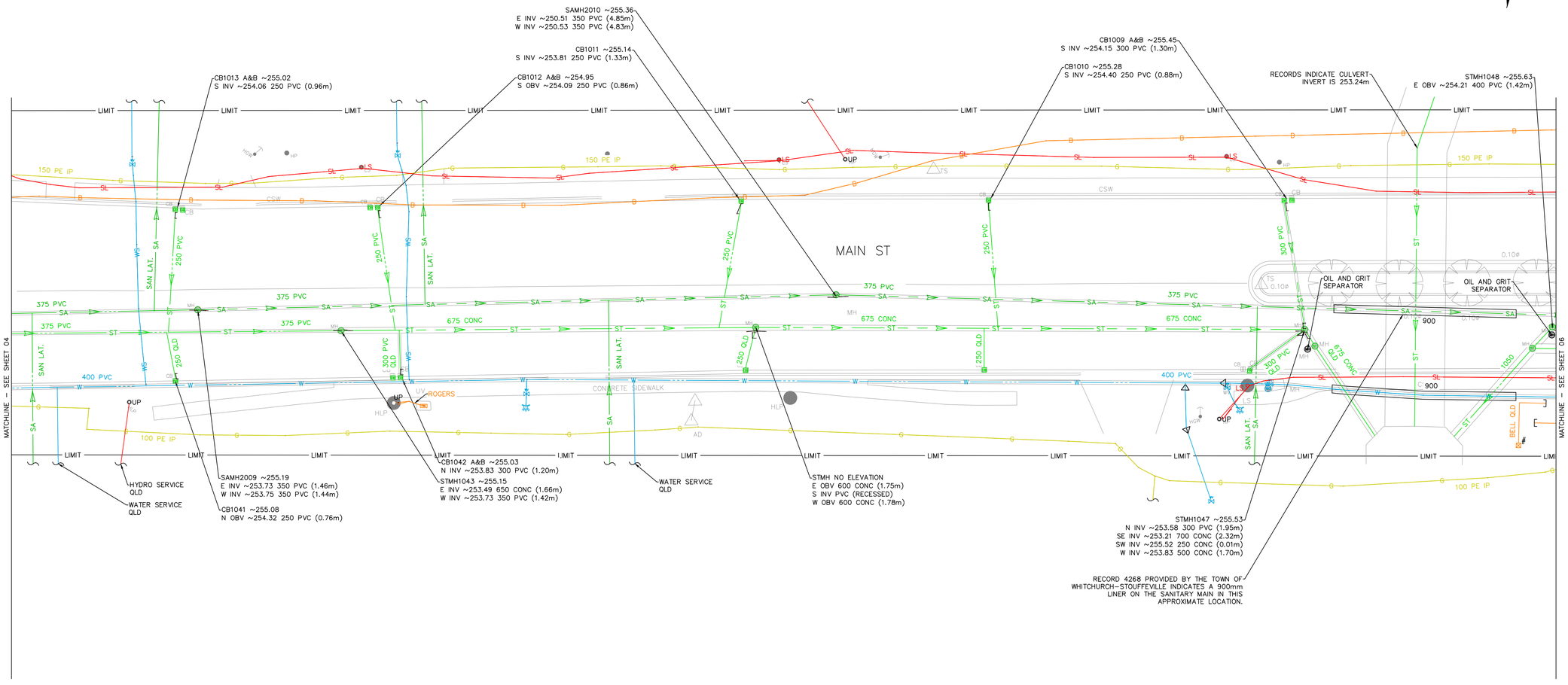
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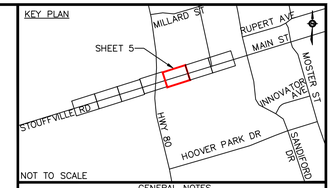
PROJECT NO. 24-0260

SHEET NO. 04 OF 07

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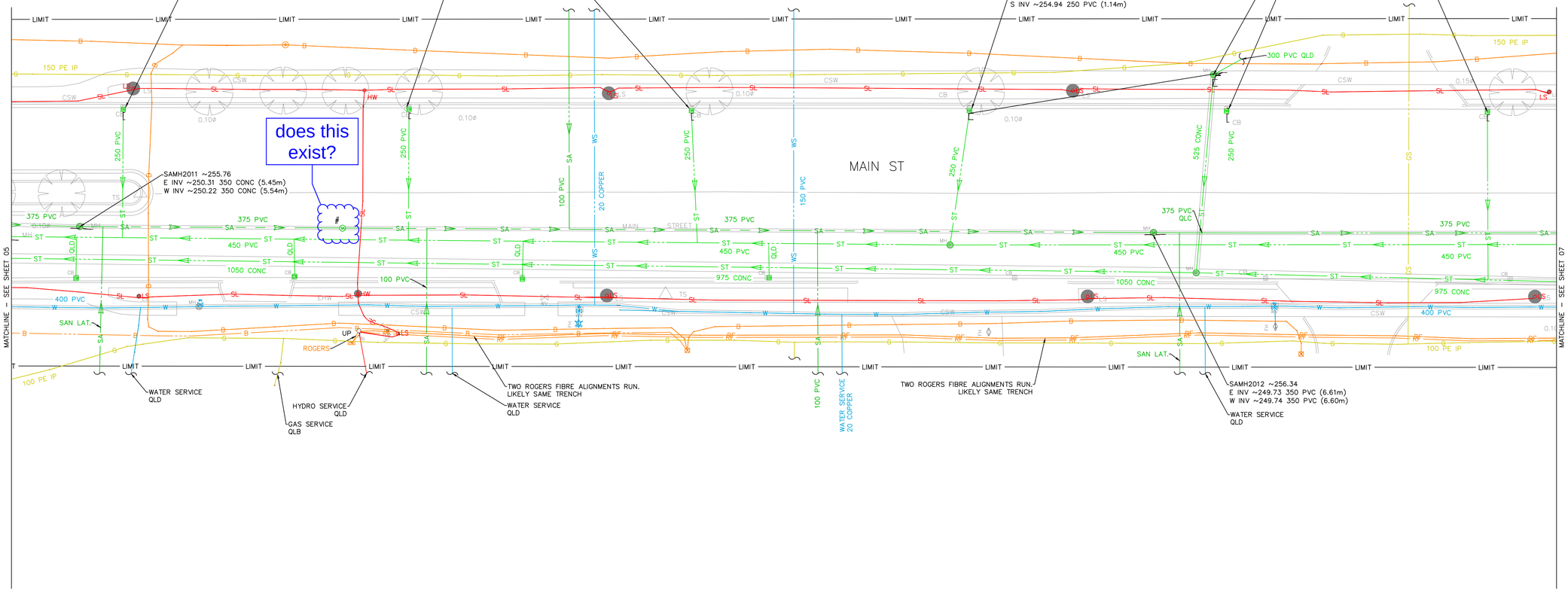
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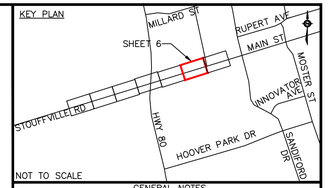
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PROJECT NO. 24-0260

SHEET NO. 05 OF 07

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STOUFFVILLE EXPANSION AREA

DRAWING.
SUBSURFACE UTILITY ENGINEERING INVESTIGATION

CLIENT.
SCS CONSULTING GROUP LTD.

PROJECT NO. 24-0260

SHEET NO. 06 OF 07

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STMH1034 ~256.71
N INV CONC (RECESSED)
S INV ~254.35 450 CONC (2.36m)

CB1040A&b ~256.53
E INV ~254.82 300 PVC (1.71m)
W INV ~254.84 250 PVC (1.69m)

SAMH2008 ~256.72
N INV ~251.82 500 CONC (4.90m)
S INV ~251.80 500 CONC (4.92m)

WC3007 ~256.73
FIELD UNABLE TO OBSERVE PIPE WITHIN CHAMBER DUE TO CONFIGURATION.

CB1037A&B ~256.64
W INV ~254.95 300 PVC (1.69m)

CB1001 ~256.44
S INV ~255.39 250 PVC (1.05m)

CB1038 ~256.66
E INV ~255.51 300 PVC (1.15m)

STMH1033 ~256.87
N INV ~253.98 500 CONC (2.89m)
E INV ~253.63 CONC (3.24m)
S INV ~253.65 850 CONC (3.22m)

STMH1035 ~257.02
N INV ~253.77 CONC (3.25m)
W INV ~253.74 CONC (3.28m)

SAMH2007 256.95
FIELD UNABLE TO OBSERVE AND COLLECT PIPE DATA WITHIN CHAMBER.
BOC 7.30m

need to shoot these inverts

525

600

WC3006 NO ELEVATION
TOP OF PIPE PVC (2.14m)

STMH1036 ~256.99
N OBV ~255.52 300 PVC (1.47m)
NE OBV ~255.54 300 PVC (1.45m)
SW OBV ~255.51 250 PVC (1.48m)

CB1037 ~256.64
NE INV ~255.63 250 PVC (1.01m)
W INV ~254.95 300 PVC (1.69m)

TWO ROGER FIBRE ALIGNMENTS RUN. LIKELY SAME TRENCH

RECORDS INDICATE ALIGNMENT ENDS AT EXISTING POLE

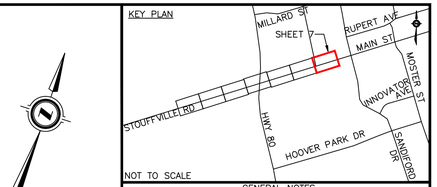
STMH1032 ~256.41
E INV ~254.07 250 CONC (2.34m)
S INV ~254.08 350 CONC (2.33m)

MATCHLINE - SEE SHEET 06

MAIN ST

RINGWOOD DR

BAKER HILL BLVD



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PROJECT. STOUFFVILLE EXPANSION AREA

DRAWING. SUBSURFACE UTILITY ENGINEERING INVESTIGATION

CLIENT. SCS CONSULTING GROUP LTD.

PROJECT NO. 24-0260

SHEET NO. 07 OF 07

Date:	September 30, 2026	File:	718006-0061
To:	Stan Tsysar – Town of Whitchurch-Stouffville		
From:	Steve Jobson – GEI (formerly GM BluePlan) Sandy Naime– GEI (formerly GM BluePlan)		
Project:	Town of Whitchurch-Stouffville Water & Wastewater Modelling Support		
Subject:	Times Development (Highway 48 and Stouffville Road) Review – Water & Wastewater Hydraulic Modelling Analysis		

TECHNICAL MEMO

1. Introduction

The Town of Whitchurch-Stouffville (The Town) has retained GEI (formerly GM BluePlan Engineering) to assess the impact of the proposed Times development (Highway 48 and Stouffville Road) on Stouffville's existing and future water and wastewater infrastructure.

1.1. Project Scope

The Town has received a development application for a vacant lot located on Stouffville Road west of Highway 48. In consultation with the Town, the project scope consisted of reviewing the Town's existing and future water and wastewater system capacity to accommodate the proposed development.

This review represents an update to previous analyses submitted to the Town:

- TM: Times Development (Highway 48 and Stouffville Road) Review– Water & Wastewater Hydraulic Modelling Analysis. November 2, 2023

This technical memorandum includes assessment of capacity in the Regional water and wastewater infrastructure system. Please note that capacity of the water supply and sanitary trunk system is under the sole jurisdiction of York Region and that capacity of the Regional system is assessed and managed through various programs including the capacity assignment program in coordination with local municipalities.

1.2. Study Area

The development has been proposed within the expanded urban boundary, along Stouffville Road, west of Highway 48 as shown in Figure 1. The proposed development site is approximately 2.71 ha and currently vacant. The site is expected to have a high-density residential building with 1,300 units plus an additional industrial site of 5.2 ha. There are another three developments in the vicinity, Flato Development, 5142/5152 Stouffville Road Development, and Gallo Development. To assess the system performance under the ultimate condition, the best available planning information for these developments was included.



Figure 1 – Study Area

1.3. Documents Received

We have reviewed the proposed water and wastewater servicing for the development, based on the following documents provided by the Town:

1. Email Communications – External consultant's confirmation of planning information for all developments and proposed sewer upgrades details, May 28th, 2024
2. Email Communications – External consultant's confirmation that the existing watermain along Stouffville Road fronting the property is a 400mm, rather than the previously identified 300mm from GIS. Dated August 25, 2026.

2. Water System Review

The proposed development is located entirely within Water Pressure Zone 2. The development will connect to the existing 400mm PVC watermain on the north side of Stouffville Road. The location of the connection is shown in Figure 2 and Figure 3.

2.1. Area Master Plan ID Projects

There are several planned Master Plan projects identified as part of the proposed development and in the immediate surrounding areas. Master Plan projects are shown in Figure 2 and summarized in Table 1.



Figure 2 – Master Plan Projects Within or Near Study Area

Table 1 – Area Master Plan Projects

Master Plan ID	Project Name / Description	Year in Service
W04	**Highway 48** New 300 mm watermain along Highway 48 from Main Street to Hoover Park Drive.	2023-2026
W05	**PRV Highway 48** New Zone 2/3 PRV along Highway 48, south of Main Street. Exact location to be determined.	2023-2026
W48	**Stouffville Road** 600mm Watermain twinning on Stouffville Road from the Z2 BPS to Hwy48 (Town owned section)	2036-2041

In addition, the Region's 2022 Master Plan Project identifies various upgrades in the Stouffville water system (Regional Project W12) to be implemented between 2032 and 2051, which includes upgrades to both water supply and water storage capacity to support the continued growth throughout Stouffville:

- Phase 1 - Increase capacity of Stouffville Zone 2 booster pumping station before new storage facility is introduced.
- Phase 2 - Construct a new elevated tank and connecting watermain to provide long term storage capacity need in the service area.

Timing of growth and Regional infrastructure upgrades will continue to be managed through the Region’s Capacity Assignment program and future Master Plan updates. A Region-led study will be undertaken to review capacity in the system until project W12 is completed.

2.2. Hydrant Tests and Model Validation

No hydrant test was conducted to support the hydraulic analysis and to confirm static pressures and available flows in the existing system.

Stouffville

Times Development
W & WW Hydraulic Modelling Analysis Update

- Connection
- Junction
- Existing Watermain
- Property Parcel
- Times Development
- Gallo Development
- 5211-5241 Main Street (Flato) Development
- 5142/5152 Main Street Development

Figure 3

Proposed Water Network

GEI Consultants

September, 2026
718006-0061
Source: ESRI World Imagery (c) 2021
Projection EPSG:26917

0 100 200 m

Document Path: B:\Working\WHITCHURCH-STOUFFVILLE ON_TOWN OF\240129 - 718006 TWS W&WW Modelling Support\718006-0061 Times Development (Hwy 48 & Stouffville)\5 Work in Progress\GIS and Databases\718006-0061 Base Map W+WW - Updated V2.qgz

2.3. Water Demand Analysis

The proposed demands, peaking factors and pipe coefficients of roughness used for the analysis are as set out by the Town. Proposed demands, C-factors and peaking factors, including design references are summarized in Table 2.

Table 2 – Summary of Model Input Criteria Used in Water System Review

Criteria Type	Criteria Parameters		Source of Criteria
Average Day Demand	250 Lpcd		Town of Whitchurch-Stouffville 2023 Water and Wastewater Master Plan
Peaking Factor	MDD Peaking Factor = 2.00 PHD Peaking Factor = 3.00		Town of Whitchurch-Stouffville 2023 Water and Wastewater Master Plan Town of Whitchurch-Stouffville Standard Guidelines and Drawings, March 2021
Proposed Watermain Coefficient of Roughness	≤ 150 mm	C = 100	Town of Whitchurch-Stouffville 2018 Water and Wastewater Master Plan
	200 mm – 250 mm	C = 110	
	300 mm	C = 120	
	400 mm – 450 mm	C = 130	

The development proposed units, equivalent population and projected demands are summarized in Table 3.

Table 3 – Projected Water Demands

Development	Units	Area (ha)	Density	Population (persons)	Unit Flow Rate* (L/c/d)	Average Day Demand (ADD)	Maximum Day Demand (MDD)	Peak Hour Demand (PHD)
Times - Residential	1,300	2.8	2.2 ppu	2,860	250	8.28	16.55	24.83
Times - Industrial	-	5.2	80 ppl/ha	416	28 m³/ha/d	1.69	3.37	5.06
Flato	-	0.4	-	322	250	0.93	1.86	2.80
5142/5142 Stouffville Rd.	121	0.3	2.2	266	250	0.77	1.54	2.31
Gallo	-	2.9	-	978	250	2.83	5.66	8.49
Total		**11.6**		**4,842**		**14.5**	**29.0**	**43.5**

The proposed Times Development is expected to generate the following additional demands under the existing and future scenarios:

- 10.0 L/s Average Day Demand; and
- 19.9 L/s Maximum Day Demand; and
- 29.9 L/s Peak Hour Demand.

The other estimates, included in Table 3 for nearby development (Flato/Gallo/5142 Stouffville Rd) are also included for the modelling analysis.

2.4. Water Analysis Tool and Scenarios

The system impact was assessed by utilizing the Town's most recent WaterCAD model, which was developed in 2023 as part of the Town of Whitchurch-Stouffville Master Plan Study.

The analysis was completed by comparing the existing and future system performance with and without the additional demands from the proposed development using the following scenarios:

The Baseline System scenario includes demands for the following council-approved, proposed or under-construction developments:

1. McKean Development (located east of Tenth Line and Busato Drive);
2. Joy Square Development (located at 5827 Main Street);
3. L&M Gardens Development (located at 11742 Tenth Line);
4. Revised 5472 Main Street Development Application;
5. 195-185 Mortar Street Developments;
6. Revised Sandiford Drive Seniors Home Developments;
7. Revised Savena Cove Development School (located at 12785 Ninth Line);
8. 5917 Main Street Development Application;
9. 4902 Aurora Road Development Application;
10. 6052 Main Street Development Application;
11. 5676 Main Street Development Application;
12. 5531 Main Street Development Application with updated 319 units;
13. 12637 Tenth Line Development Application;
14. 188 Sandiford Drive Development Application;
15. Ronco Lands Phase 2 Development Application;
16. Greco Lands Development Application;
17. MZO1 Development Application;
18. K-Line Property Development Application;
19. 54 Ringwood Drive Development Application;
20. Cam Fella West of Mohawk Gate Development Application;
21. Cam Fella East of Mohawk Gate Development Application;
22. 6461-6487 Main Street Development Application;
23. 6424 Main Street Development Application,
24. 124 Fairview Ave, 338 Elm Rd & 340 Glad Park Ave Development Application;
25. 5991 Main Street Development Application with updated 130 units;
26. Treasure Hill Development (located at 5481 & 5551 Bethesda Road);
27. Bona Lands Development (located at 5731 Bethesda Road);
28. Livgreen 2 Development (located at 5945 Main Street with updated 174 units);
29. 5964 Main Street and 28 Fairview Ave Development Application;
30. Ambria Development (located at 12762 Tenth Line);
31. Newstone East Development Phase 1 (located at 12724 and 12822 Tenth Line).

Analysis of the impact of these developments has been previously completed by GEI (GM BluePlan).

Future System (2051)

2051 scenario developed as part of the Master Plan, and subsequent development applications that have been approved or in the process to be approved by the Town, which are listed above. This scenario includes all planned capital projects.

For each scenario above, the following four (4) demand conditions were evaluated:

- **Average Day Demand (ADD) Scenario – Extended Period Simulation (EPS)**. This extended period simulation scenario is based on normal operating conditions where wells and pumping stations operate ON/OFF, based on the levels at the storage facilities. This includes periods of time when all supplies are off, and flow is only back-fed from the storage. Demands vary throughout the course of the day based on established diurnal patterns from

historical data. Storage facilities start at the bottom of equalization storage level and undergo normal fill-drain cycles during the simulation based on the facility controls; and

- **Maximum Day Demand (MDD) Scenario – Extended Period Simulation (EPS)**. This extended period simulation scenario is based on normal operating conditions where wells and pumping stations operate ON/OFF, based on the levels at the storage facilities. Since this is a maximum day scenario, three wells and two pumps from the Zone 2 BPS are maintained ON throughout. Demands vary throughout the course of the day based on established diurnal patterns from historical data. As such, the MDD EPS scenario inherently includes a peak hour demand condition, when the diurnal pattern is at its highest during the day. Storage facilities start at the bottom of equalization storage level and undergo normal fill-drain cycles during the simulation based on the facility controls; and
- **Peak Hour Demand (PHD) Scenario – Steady State (SS) Simulation**. This scenario is steady-state, so it only displays a snapshot of system performance at a time when peak hour demands are occurring and with set boundary conditions. The boundary conditions assumed the storage facilities are at the bottom of equalization storage level, whilst Zone 2 supply is being provided by two of three wells (#1/#2/#3) operating, a single pump from the Stouffville High Lift PS and two pumps on at the Zone 2 BPS.
- **Maximum Day Demand with Fire Flow (MDD+FF) Scenario** This is a fire flow simulation under maximum day demand condition by assuming two of three wells (#1/#2/#3) and a single pump on at the Zone 2 BPS are operating, and the storage facilities are at the bottom of equalization storage level.

2.5. Water Model Analysis and Results

Modelled results for the proposed development under the Baseline System compared to the Town's minimum requirements are summarized in Table 4.

Table 4 – Modelled Pressures and Available Fire Flows at the Proposed Development

Hydraulic Analysis Scenario	Baseline with Development	Minimum Requirement	Reference	Notes
Average Day Demand (ADD) and Maximum Day Demand (MDD) EPS	**ADD:** 74 - 106 psi **MDD:** 83 - 104 psi	Normal Operating Pressure: 50 psi to 90 psi	Town of Whitchurch -Stouffville Standard Guidelines and Drawings, September 2019	Normal Operating Pressures and Minimum Hour Demand (MHD) maximum operating pressure was evaluated utilizing the ADD EPS Scenario.
		Maximum Sustained Operating Pressure: 100 psi		
Peak Hourly Demand (PHD) SS	88 psi	Minimum Sustained Operating Pressure: 40 psi		Minimum operating pressure was also evaluated utilizing the PHD SS Scenario.
Maximum Day Demand plus Fire Flow (MDD+FF) SS	> 300 L/s	150 L/s for Apartment Buildings 250 L/s for Industrial		Available fire flow at 20 psi was evaluated utilizing the MDD+FF Scenario

The minimum pressures (under the PHD condition, Baseline with development scenario) and available fire flows at 20 psi (under the MDD+FF condition, Baseline with development scenario) for the modelled junction for the development are shown in Figure 4 and Figure 5. Modelled pressures for all scenarios are summarized in Table 5.

Table 5 – Water Analysis Results

Scenario	Area	Baseline with Previously Proposed Times Development	Baseline with Development	2051 with Development
Site Location	EPS ADD (max. pressure)	107 psi	106 psi	101 psi
	EPS MDD (min. pressure)	83 psi	83 psi	87 psi
	MDD+ FF (at 20 psi): Connection Junction	> 300 L/s	> 300 L/s	> 300 L/s
Stouffville Zone 2	EPS ADD (max. pressure)	41– 109 psi	40 – 107 psi	47 – 103 psi
	EPS MDD (min. pressure)	40 – 110 psi	43 – 105 psi	44 – 104 psi

At the proposed development site, the Town's system has sufficient capacity to accommodate the ADD, MDD and PHD conditions under all current and future scenarios. Due to elevation and the proximity to Stouffville Zone 2 BPS, the pressure received at the development is impacted by the pump operation at the BPS. When multiple pumps are operating at Stouffville Zone 2 BPS to support a refill of the Stouffville Z2 Elevated Tank, it leads to moderate increases in pressure, which are temporarily above 100 psi. Although the slight high pressure is not a significant concern to the Town's infrastructure, it is recommended that the proposed building/service connection(s) have a "household" pressure reducing valve, to limit the high pressures.

The available fire flow at 20 psi at the connection junction met the Town's requirement for residential apartment building and industrial lands under all existing and future conditions.

An EPS simulation provides a full picture of system performance for the modelled 48 hours by including pump operations and the daily trends of water consumption. Therefore, the EPS MDD scenario naturally includes the peak hour demand condition within it. A summary of the facility operations for MDD EPS scenarios is listed below:

- Groundwater Well 1&2: Operating ON/OFF with one to two wells, based on Zone 2 ET level (29-60 L/s).
- Groundwater Well 3: constantly provides 32 L/s.
- Stouffville Z2 BPS: 2 pumps (jockey & duty) always ON and 1 duty pump ON/OFF based on the Zone 2 ET level.
- Stouffville Highlift PS: 1 pump ON/OFF based on the Zone 2 ET level.
- Stouffville Zone 2 Elevated Tank (Zone 2 ET) is cycled maintaining 52-93% level during the simulation.
    - Note: the Elevated Tank does drop significantly during peak hour demands due to overall supply limitations (further discussed below). This contributes to some slightly low pressure at select high elevations in Zone 2.

The "Baseline with Development" scenario shows some areas near the Pressure Zone 1/2 boundary could experience pressures that are temporarily below the Town's minimum requirement of 40 psi, if pump operations are such that limited pumped supply is occurring during high demand hours. This is largely a result of the combined proposed developments across Stouffville (including this development) causing increased overall demand and subsequently triggering the future need for Regional upgrades to pumping capacity (supply) to help maintain the storage levels.

A sensitivity assessment is conducted in the following section which reviews the benefits to the system when the Region's planned Zone 2 PS capacity upgrade is incorporated into the model.

Stouffville

Times Development
W &WW Hydraulic Modelling Analysis Update

- Connection
- Junction
- Existing Watermain
- Property Parcel
- Times Development
- 5211-5241 Main Street (Flato) Development
- Gallo Development
- 5142/5152 Main Street Development

79 psi Pressure Range (PHD SS)

300 L/s Available Fire Flow (MDD +FF)

78 psi >300 L/s
77 psi >300 L/s
84 psi >300 L/s
83 psi >300 L/s
84 psi >300 L/s
82 psi >300 L/s
80 psi > 300 L/s
81 psi >300 L/s

Automall Boulevard
Millard Street
Baker Hill Boulevard
Jake Smith Way
Birkett Way
Buttonleaf Crescent
All Points Drive
Elm Road
Sandale Road
Crow's Nest Way
Glengall Lane
Winlane Drive
Service Road
Palmwood Gate
Main Street
Stouffville Road
Highway 48
Ringwood Drive
Sandiford Drive
Mostar Street
Innovator Avenue
Vista Park Place
Spring Lakes Golf Club
TEVA

0 100 200 m

Figure 4

Water System Performance

Baseline + Development Scenario
Peak Hour Pressure & Available Fire Flow

(Town Standard Guideline C-Factors)

GEI Consultants

September, 2026
718006-0061
Source: ESRI World Imagery (c) 2021
Projection EPSG:26917

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Stouffville

Times Development
W &WW Hydraulic Modelling Analysis Update

- Connection
- Junction
- Existing Watermain
- Property Parcel
- Times Development
- 5211-5241 Main Street (Flato) Development
- Gallo Development
- 5142/5152 Main Street Development

79 psi Pressure Range (PHD SS)

300 L/s Available Fire Flow (MDD +FF)

Figure 5

Water System Performance

2051 + Development Scenario
Peak Hour Pressure & Available Fire Flow

(Town Standard Guideline C-Factors)

0 100 200 m

GEI Consultants

September, 2026
718006-0061
Source: ESRI World Imagery (c) 2021
Projection EPSG:26917

Document Path: B:\Working\WHITCHURCH-STOUFFVILLE ON_TOWN OF\2402129 - 718006 TWS W&WW Modelling Support\718006-0061 Times Development (Hwy 48 & Stouffville)\5 Work in Progress\GIS and Databases\718006-0061 Base Map W+WW - Updated V2.qgz

2.6. Water Sensitivity Assessment with Regional Upgrades

A sensitivity assessment was conducted for the existing and future 2051 system to understand the system performance under worst-case scenarios. For this scenario, it is assumed that the Regional upgrades at the Stouffville Z2 BPS are completed to increase peak supply to the Stouffville system.

Modelled results for the proposed development under the Baseline System compared to the Town's minimum requirements are summarized in Table 6.

Table 6 – Modelled Pressures and Available Fire Flows at the Proposed Development (with Regional Upgrades)

Hydraulic Analysis Scenario	Baseline with Development	Minimum Requirement	Reference	Notes
Average Day Demand (ADD) and Maximum Day Demand (MDD) EPS	**ADD:** 74 - 106 psi **MDD:** 82 - 105 psi	Normal Operating Pressure: 50 psi to 90 psi	Town of Whitchurch -Stouffville Standard Guidelines and Drawings, September 2019	Normal Operating Pressures and Minimum Hour Demand (MHD) maximum operating pressure was evaluated utilizing the ADD EPS Scenario.
		Maximum Sustained Operating Pressure: 100 psi		
Peak Hourly Demand (PHD) SS	88 psi	Minimum Sustained Operating Pressure: 40 psi		Minimum operating pressure was also evaluated utilizing the PHD SS Scenario.
Maximum Day Demand plus Fire Flow (MDD+FF) SS	> 300 L/s	150 L/s for Apartment Buildings 250 L/s for Industrial		Available fire flow at 20 psi was evaluated utilizing the MDD+FF Scenario

The minimum pressures (under the PHD condition, Baseline with development scenario) and available fire flows (under the MDD+FF condition, Baseline with development scenario) for the modelled junction for the development are shown in Table 6. Modelled pressures for all scenarios are summarized in Table 7.

Table 7 – Water Analysis Results (with Regional Upgrades)

Scenario	Area	Baseline with Previously Proposed Times Development	Baseline with Development	2051 with Development
Site Location	EPS ADD (max. pressure)	107 psi	106 psi	101 psi
	EPS MDD (min. pressure)	83 psi	82 psi	87 psi
	MDD+ FF (at 20 psi): Connection Junction	> 300 L/s	> 300 L/s	> 300 L/s
Stouffville Zone 2	EPS ADD (max. pressure)	41 – 109 psi	40 – 107 psi	47 – 103 psi
	EPS MDD (min. pressure)	40 – 110 psi	42 – 105 psi	44 – 104 psi

At the proposed site, the Town's system has sufficient capacity to accommodate the ADD, MDD and PHD conditions under all current and future scenarios. Due to elevation and the proximity to Stouffville Zone 2 BPS, it is recommended to have a "household" pressure reducing valve for existing and proposed buildings to limit the high pressures.

The detailed facility set-up for MDD EPS scenarios is listed below:

- Groundwater Well 1&2: Operating ON/OFF with one to two wells, based on Zone 2 ET level (29-60 L/s).
- Groundwater Well 3: constantly provides 32 L/s.
- Stouffville Z2 BPS: 2 pumps (duty & jockey) always ON and 2 pumps ON/OFF based on the Zone 2 ET level.
- Stouffville Highlift PS: 1 pump ON/OFF based on the Zone 2 ET level.
- Stouffville Zone 2 Elevated Tank (Zone 2 ET) is cycled maintaining 57-97%.
    - Note that this is improved, when compared to the prior scenario, due to the additional pumping capacity from the Region's Zone 2 BPS in this scenario

With the additional pump at Stouffville Z2 BPS, the "Baseline with Development" scenario shows a more typical operating range for the Zone 2 ET since additional flow can be provided during peak conditions. It is noted that if very low flow is provided from pump stations during higher demand periods, then marginally low pressures could occur.

The available fire flow at 20 psi at the connection to the development meets the Town's requirement for residential apartment building and industrial lands under all existing and future conditions.

2.7. Water Sensitivity Assessment for 25% Flow Increase without Regional Upgrades

A sensitivity assessment was conducted for the existing and future 2051 system to understand the system performance under worst-case scenarios. An additional 25% of demand was added to each development for contingency and future development potential from this area as requested by the external consultant. For this existing scenario, it is assumed that the Regional upgrades at the Stouffville Z2 BPS are not completed.

Modelled results for the proposed development under the Baseline System compared to the Town's minimum requirements are summarized in Table 8.

Table 8 – Modelled Pressures and Available Fire Flows at the Development (25% Flow Increase without Regional Upgrades)

Hydraulic Analysis Scenario	Baseline with Development	Minimum Requirement	Reference	Notes
Average Day Demand (ADD) and Maximum Day Demand (MDD) EPS	**ADD:** 77 - 106 psi **MDD:** 81 - 106 psi	Normal Operating Pressure: 50 psi to 90 psi Maximum Sustained Operating Pressure: 100 psi	Town of Whitchurch-Stouffville Standard Guidelines and Drawings, September 2019	Normal Operating Pressures and Minimum Hour Demand (MHD) maximum operating pressure was evaluated utilizing the ADD EPS Scenario.
Peak Hourly Demand (PHD) SS	87 psi	Minimum Sustained Operating Pressure: 40 psi		Minimum operating pressure was also evaluated utilizing the PHD SS Scenario.
Maximum Day Demand plus Fire Flow (MDD+FF) SS	> 300 L/s	150 L/s for Apartment Buildings 250 L/s for Industrial		Available fire flow at 20 psi was evaluated utilizing the MDD+FF Scenario

The minimum pressures (under the PHD condition, Baseline with development scenario) and available fire flows (under the MDD+FF condition, Baseline with development scenario) for the modelled junction for the development are shown in Table 8. Modelled pressures for all scenarios are summarized in Table 9.

Table 9 – Water Analysis Results (25% Flow Increase without Regional Upgrades)

Scenario	Area	Baseline with Previously Proposed Times Development	Baseline with Development	2051 with Development
Site Location	EPS ADD (max. pressure)	107 psi	106 psi	102 psi
	EPS MDD (min. pressure)	83 psi	81 psi	84 psi
	MDD+ FF (at 20 psi): Connection Junction	> 300 L/s	> 300 L/s	> 300 L/s
Stouffville Zone 2	EPS ADD (max. pressure)	41 – 109 psi	40 – 107 psi	46 – 104 psi
	EPS MDD (min. pressure)	40 – 110 psi	42 – 106 psi	40 – 101 psi

At the proposed site, the Town's system has sufficient capacity to accommodate the ADD, MDD and PHD conditions under all current and future scenarios. Due to elevation and the proximity to Stouffville Zone 2 BPS, it is recommended to have a "household" pressure reducing valve for existing and proposed buildings to limit the high pressures.

The detailed facility set-up for MDD EPS scenarios is listed below:

- Groundwater Well 1&2: Operating ON/OFF with one to two wells, based on Zone 2 ET level (29 L/s).
- Groundwater Well 3: constantly provides 32 L/s.
- Stouffville Z2 BPS: 2 pumps (jockey & duty) always ON and 1 duty pump ON/OFF based on the Zone 2 ET level.
- Stouffville Highlift PS: 1 pump ON/OFF based on the Zone 2 ET level.
- Stouffville Zone 2 Elevated Tank (Zone 2 ET) is cycled maintaining 45-97%.
    - Note: when compared to the prior scenarios, this shows that added demand continues to exacerbate the storage limitation, until the Region's additional pump capacity at the Zone 2 PS is implemented.

The "Baseline with Development" scenario shows some areas at the Pressure Zone 1/2 boundary could experience lower pressures that are temporarily below the Town's minimum requirement of 40 psi.

The available fire flow at 20 psi at the connection junction met the Town's requirement for residential apartment building and industrial lands under all existing and future conditions.

2.8. Water Sensitivity Assessment for 25% Flow Increase with Regional Upgrades

A sensitivity assessment was conducted for the existing and future 2051 system to understand the system performance under worst-case scenarios. An additional 25% of generated flow was added to each development for contingency and future development potential from this area as requested by the external consultant. It is also assumed that the Regional upgrades at the Stouffville Z2 BPS are completed to increase supply to the Stouffville system.

Modelled results for the proposed development under the Baseline System compared to the Town's minimum requirements are summarized in Table 10.

Table 10 – Modelled Pressures and Available Fire Flows at the Development (25% Flow Increase with Regional Upgrades)

Hydraulic Analysis Scenario	Baseline with Development	Minimum Requirement	Reference	Notes
Average Day Demand (ADD) and Maximum Day Demand (MDD) EPS	**ADD:** 77 - 106 psi **MDD:** 82 - 105 psi	Normal Operating Pressure: 50 psi to 90 psi	Town of Whitchurch -Stouffville Standard Guidelines and Drawings, September 2019	Normal Operating Pressures and Minimum Hour Demand (MHD) maximum operating pressure was evaluated utilizing the ADD EPS Scenario.
		Maximum Sustained Operating Pressure: 100 psi		
Peak Hourly Demand (PHD) SS	87 psi	Minimum Sustained Operating Pressure: 40 psi		Minimum operating pressure was also evaluated utilizing the PHD SS Scenario.
Maximum Day Demand plus Fire Flow (MDD+FF) SS	> 300 L/s	150 L/s for Apartment Buildings 250 L/s for Industrial		Available fire flow was evaluated utilizing the MDD+FF Scenario

The minimum pressures (under the PHD condition, Baseline with development scenario) and available fire flows (under the MDD+FF condition, Baseline with development scenario) for the modelled junction for the development are shown in Table 10. Modelled pressures for all scenarios are summarized in Table 11.

Table 11 – Water Analysis Results (25% Flow Increase with Regional Upgrades)

Scenario	Area	Baseline with Previously Proposed Times Development	Baseline with Development	2051 with Development
Site Location	EPS ADD (max. pressure)	107 psi	106 psi	102 psi
	EPS MDD (min. pressure)	83 psi	82 psi	84 psi
	MDD+ FF: Connection Junction	> 300 L/s	> 300 L/s	> 300 L/s
Stouffville Zone 2	EPS ADD (max. pressure)	41 – 109 psi	40 – 107 psi	46 – 104 psi
	EPS MDD (min. pressure)	40 – 110 psi	43 – 105 psi	40 – 101 psi

At the proposed site, the Town's system has sufficient capacity to accommodate the ADD, MDD and PHD conditions under all current and future scenarios. Due to elevation and the proximity to Stouffville Zone 2 BPS, it is recommended to have a "household" pressure reducing valve for existing and proposed buildings to limit the high pressures.

The detailed facility set-up for MDD EPS scenarios is listed below:

- Groundwater Well 1&2: Operating ON/OFF with one to two wells, based on Zone 2 ET level (29-60 L/s).
- Groundwater Well 3: constantly provides 32 L/s.
- Stouffville Z2 BPS: 2 pumps always ON and 2 pumps ON/OFF based on the Zone 2 ET level.
- Stouffville Highlift PS: 1 pump ON/OFF based on the Zone 2 ET level.
- Stouffville Zone 2 Elevated Tank (Zone 2 ET) is cycled maintaining 55-98%
    - Note that this is still improved, compared to the original scenario, due to the additional pumping capacity from the Region's Zone 2 PS in this scenario.

With the additional pump at Stouffville Z2 BPS, the "Baseline with Development" scenario showed a smaller area at the Pressure Zone 1/2 boundary could temporarily experience pressures below the Town's minimum requirement of 40 psi, and the Zone 2 ET is operating at an acceptable range. The available fire flow at the connection junction met the Town's requirement for residential apartment building and industrial lands under all existing and future conditions.

3. Wastewater System Review

There are currently no details regarding the site's proposed connection to the wastewater system. For the purposes of analyzing the impact of the proposed development to the downstream sewers, the total wastewater loading is allocated to the MH upstream of the site on Stouffville Road (MH TWS1774) as shown in Figure 7. The local 200mm sewers flow easterly where it connects to Subtrunk 13 at the intersection of Highway 48 and Stouffville Road. Subtrunk 13 continues easterly along Main Street and connects to Subtrunk 10 at the intersection of Main Street and Ringwood Drive. Subtrunk 10 continues southerly where it eventually connects to YDSS West and ultimately to the YDSS Main sewer outlet.

It is proposed by the external consultant that the existing 200mm sewer on Stouffville Road is to be replaced by a new 450mm sewer, and the existing 375mm sewer (Part of Subtrunk 13) on Main Street is to be replaced by a new 600mm sewer. This analysis only assesses the wastewater system capacity to accommodate the proposed developments with the proposed sewer size. However, the proposed sewer specifications are still under discussion and need to be approved by the Town.

3.1. Area Master Plan ID Projects

There is a planned Master Plan project identified as part of the proposed development or in the immediate downstream network. Master Plan projects are shown in Figure 6 and summarized in Table 12.

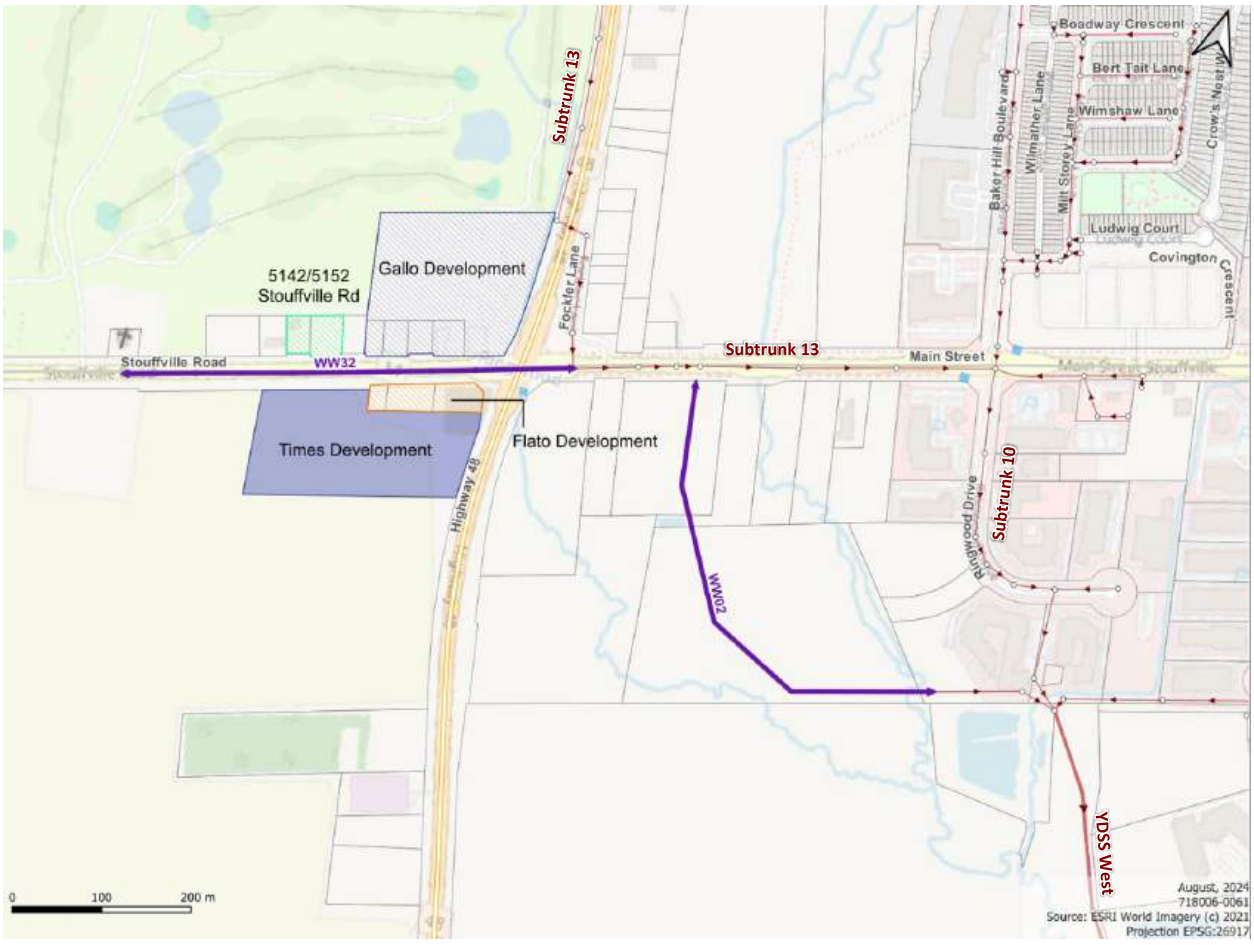


Figure 6 - Master Plan Project Within or Near Study Area

Table 12 – Area Master Plan Projects

Master Plan ID	Project Name / Description	Year in Service
WW32	**Stouffville Road Sewer Upgrade** The existing 200mm sewer along Stouffville Road to be upgraded to 300mm	2036-2041

3.2. Wastewater Flow Analysis

Table 13 summarizes the projected development wastewater flows.

Table 13 – Projected Wastewater Flows

Development	Units	Area (ha)	Density	Population (persons)	Unit Flow Rate* (L/c/d)	Average Dry Flow (L/s)	Harmon Peaking Factor**	Peak Dry Flow (L/s)	I&I (L/s) ***	Peak Wet Flow (L/s)
Times - Residential	1,300	2.8	2.2 ppu	2,860	350	11.59	-	37.74	0.73	38.47
Times - Industrial	-	5.2	80 ppl/ha	416	350	1.69		5.49	1.35	6.84
Flato	-	0.4	-	322	350	1.30	-	4.25	0.10	4.35
5142/5142 Stouffville Rd.	121	0.3	2.2	266	350	1.08		3.51	0.07	3.59
Gallo	-	2.9	-	978	350	3.96	-	12.91	0.75	13.66
Total	**-**	**11.6**		**4,842**	**-**	**19.62**	**3.26**	**63.90**	**3.01**	**66.91**

* The unit flow rate of 350 L/c/d was determined as part of the Town's Master Plan process and utilized within the Town's current InfoWorks Model.

** The Harmon peaking factor is inclusive of the population proposed as part of the Flato Development (322 jobs), 5142/5142 Stouffville Rd Development (266 people) and Gallo Development (907 people + 71 jobs).

*** The Inflow and Infiltration allowance of 0.26 L/s/ha was determined as part of the Town's Master Plan process and utilized within the Town's current InfoWorks Model to be more conservative and in line with York Region's criteria.

The proposed Times Development is expected to generate the following additional flows under the existing and future scenarios:

- 13.3 L/s Average Dry Weather Flow; and
- 2.1 L/s of total Inflow and Infiltration.
- 45.3 L/s of Peak Wet Weather Flow.

3.3. Wastewater Analysis Tool and Scenarios

The system impact was assessed by utilizing the Town's most recent InfoWorks ICM model, which was developed in 2023 as part of the Town of Whitchurch-Stouffville Master Plan Study. The analysis was completed by comparing the existing and future system performance with and without the additional flows from the proposed development using the following scenarios:

Baseline System

Existing calibrated scenario developed as part of the Master Plan, and subsequent development applications that have been approved or in the process to be approved by the Town.

The Baseline System scenario incudes demands for the following council-approved, proposed or under-construction developments:

1. McKean Development (located east of Tenth Line and Busato Drive);
2. Joy Square Development (located at 5827 Main Street);
3. L&M Gardens Development (located at 11742 Tenth Line);
4. Revised 5472 Main Street Development Application;
5. 195-185 Mortar Street Developments;
6. Revised Sandiford Drive Seniors Home Developments;
7. Revised Savena Cove Development School (located at 12785 Ninth Line);
8. 5917 Main Street Development Application;
9. 6052 Main Street Development Application;

10. 5676 Main Street Development Application;
11. 5531 Main Street Development Application with updated 319 units;
12. 12637 Tenth Line Development Application;
13. 188 Sandiford Drive Development Application;
14. Ronco Lands Phase 2 Development Application;
15. Greco Lands Development Application;
16. MZO1 Development Application;
17. K-Line Property Development Application;
18. 54 Ringwood Drive Development Application;
19. Cam Fella West of Mohawk Gate Development Application;
20. Cam Fella East of Mohawk Gate Development Application;
21. 6461-6487 Main Street Development Application;
22. 6424 Main Street Development Application;
23. 124 Fairview Ave, 338 Elm Rd & 340 Glad Park Ave Development Application;
24. 5991 Main Street Development Application with updated 130 units);
25. Treasure Hill Development (located at 5481 & 5551 Bethesda Road);
26. Bona Lands Development (located at 5731 Bethesda Road);
27. Livgreen 2 Development (located at 5945 Main Street with updated 174 units);
28. 5964 Main Street and 28 Fairview Ave Development Application;
29. Ambria Development (located at 12762 Tenth Line);
30. Newstone East Development Phase 1 (located at 12724 and 12822 Tenth Line).

Analysis of the impact of these developments has been previously completed by GEI (GM BluePlan).

Future System (2051)

2051 scenario developed as part of the Master Plan, and subsequent development applications that have been approved or in the process to be approved by the Town, which are listed above. This scenario includes all planned wastewater capital projects.

For each scenario above, the following two (2) flow conditions were evaluated:

- Dry Weather Flow
- Wet Weather Flow (5yr Chicago Storm)

3.4. Wastewater Model Loading

Given that there is currently no detailed information provided regarding the future servicing of the site, the most upstream MH located in the vicinity of the site was chosen as the connection point in the Town's InfoWorks ICM model.

Manhole Asset ID: N/A

Manhole Model ID: TWS1774

Location: on Stouffville Road, 250 metres west of Highway 48

Figure 7 presents the local wastewater system and location of the model loading for this analysis.

Stouffville

Times Development
W &WW Hydraulic Modelling Analysis Update

Model ID: TWS1774
Asset ID: N/A

The existing 200mm sewer on Stouffville Road to be replaced by a new 450mm sewer.

The existing 375mm sewer on Main Street to be replaced by a new 600mm sewer.

Stouffville Road
Main Street
Subtrunk 13
Subtrunk 10
Subtrunk 11
Subtrunk 17
Subtrunk 7
Fockler Lane
Highway 48
Wilmather Lane
Crowis Nest Way
Ludwig Court
Covington Crescent
Nordic Lane
YDSS West

- Connection
- Manhole
- Existing Gravity Main
- Gallo Development
- 5211-5241 Main Street (Flato) Development
- Times Development
- 5142/5152 Main Street Development

0 100 200 m

Figure 7

Local Wastewater System

GEI Consultants

October, 2025
718006-0061
Source: ESRI World Imagery (c) 2021
Projection EPSG:26917

Document Path: E:\Working\WH\CHO\RCH-STOUFFVILLE ON, TOWN OF\2402129 - 718006 TWS W&WW Modelling Support\718006-0061 Base Map W-WW - Updated.qgz

3.5. Wastewater Downstream Impacts and Model Results

Table 14 summarizes the model peak flows for the existing downstream system with and without the proposed development flows, as well as the peak flows for future 2051 scenario with the proposed development flows. Table 15 summarizes the model results of the system capacity analysis highlighting the maximum surcharge state (d/D) in the downstream sewers.

Table 14 – Downstream Sewer Flows

Location	Pipe Full Capacity (L/s)	Baseline with Previously Proposed Times Development (Existing Infrastructure)		Baseline with Development (Existing Infrastructure with proposed Main St upgrades)		2051 with Development (Incl. All Planned WW Upgrades)	
		PDWF (L/s)	PWWF (L/s)	PDWF (L/s)	PWWF (L/s)	PDWF (L/s)	PWWF (L/s)
Within Development							
Local to Subtrunk 13 (200mm upsized to 450mm)	200mm: 23 - 33 450mm: 202 - 204	48	48	64	67	64	67
Subtrunks							
Subtrunk 13 (375mm upsized to 600mm)	375mm: 97 - 107 600mm: 341 - 375	74	82	90	96	107	114
Subtrunk 10 (600mm)	357 - 526	137	196	151	201	192	244
Trunk Sewers							
YDSS West (750mm)	424 - 624	278	416	292	423	325	451
YDSS Main (1200/975mm)	1,547 – 2,130	413	761	423	762	698	1,004

Table 15 – Downstream Sewer Performance (Surcharge State)

Location	Performance Measure	Baseline with Previously Proposed Times Development (Existing Infrastructure)		Baseline with Development (Existing Infrastructure with proposed Main St upgrades)		2051 with Development (Incl. All Planned WW Upgrades)	
		PDWF (d/D)	PWWF (d/D)	PDWF (d/D)	PWWF (d/D)	PDWF (d/D)	PWWF (d/D)
Within Development							
Local to Subtrunk 13 (200mm upsized to 450mm)	Max d/D <0.85	**2**	**2**	0.39	0.40	0.39	0.40
Subtrunks							
Subtrunk 13 (375mm upsized to 600mm)	Max d/D <0.85	0.65	0.70	0.35	0.37	0.38	0.38
Subtrunk 10 (600mm)	Max d/D <0.85	0.43	0.53	0.45	0.54	0.52	0.62
Trunk Sewers							
YDSS West (750mm)	Max d/D <0.85	0.58	0.77	0.60	0.78	0.65	0.84
YDSS Main (1200/975mm)	Max d/D <0.85	0.40	0.57	0.41	0.57	0.54	0.70

Surcharge State ≥ **0.85** (Town's Master Plan Trigger)
Surcharge State = **1** (Backwater)
Surcharge State = **2** (Exceeded Capacity)

Disclosure

The results presented above are based on the Town's existing wastewater InfoWorks ICM model. The wastewater model flows were calibrated using flow monitoring data for the major subtrunks in the system. It should be noted that flows in individual local system sewers were not calibrated and can be subject to variation.

Model Results Discussion

It is proposed that the existing 200mm sewer on Stouffville Road is to be replaced by a new 450mm sewer, and the existing 375mm sewer (Part of Subtrunk 13) on Main Street is to be replaced by a new 600mm sewer.

With the proposed upgrades, the modelling results showed that the upsized sewers along Stouffville Road and Main Street have sufficient capacity to accommodate the proposed flows from the developments without causing potential downstream constraints. It should be noted that the d/D in YDSS West Trunk Sewer is very close to 0.85 (as per the Town of Whitchurch-Stouffville Water and Wastewater Master Plan) for the future 2051 wet weather condition. If any future development that is planned to be discharge to the YDSS West Trunk Sewer exceeds the Town's 2051 projection, the YDSS West Trunk Sewer is likely to be triggered with potential capacity issues.

Figure 8 shows the model results of the system capacity analysis highlighting the maximum surcharge state (d/D) for sewers within and downstream of the study area. It should be noted that the model results showed local sewer north of Sam's Way to start reaching capacity (d/D > 0.85). This is not a result of the proposed development, but a result of large growth area allocated to a single sewer without additional information regarding future local network.

Please note that the timing of growth and Regional infrastructure upgrades will continue to be managed through the Region's Capacity Assignment program and future Master Plan updates. The findings noted in the Tech Memo regarding YDSS sewer may not be supported by Regional analysis and could be impacted by timing/phasing of this development as well as other developments tributary to the sewer.



Figure 8 – Model Results with Sewer Performance with the developments

3.6. Wastewater Sensitivity Assessment for 25% Flow Increase

A sensitivity assessment was conducted for the existing and future 2051 system to understand the system performance under worst-case scenarios. An additional 25% of generated flow was added to each development for contingency and future development potential from this area as requested by the external consultant.

Table 16 summarizes the model peak flows for the existing downstream system with and without the proposed development flows, as well as the peak flows for future 2051 scenario with the proposed development flows. Table 17 summarizes the model results of the system capacity analysis highlighting the maximum surcharge state (d/D) in the downstream sewers.

Table 16 – Downstream Sewer Flows (25% Flow Increase)

Location	Pipe Full Capacity (L/s)	Baseline with Development (Existing Infrastructure with proposed Main St upgrades)		2051 with Development (Incl. All Planned WW Upgrades)	
		PDWF (L/s)	PWWF (L/s)	PDWF (L/s)	PWWF (L/s)
Within Development					
Local to Subtrunk 13 (200mm upsized to 450mm)	200mm: 23 - 33 450mm: 202 - 204	79	83	79	83
Subtrunks					
Subtrunk 13 (375mm upsized to 600mm)	375mm: 97 - 107 600mm: 341 - 375	106	113	123	131
Subtrunk 10 (600mm)	357 - 526	166	214	207	257
Trunk Sewers					
YDSS West (750mm)	424 - 624	305	434	340	461
YDSS Main (1200/975mm)	1,547 – 2,130	437	774	712	1,015

Table 17 – Downstream Sewer Performance (Surcharge State) (25% Flow Increase)

Location	Performance Measure	Baseline with Development (Existing Infrastructure with proposed Main St upgrades)		2051 with Development (Incl. All Planned WW Upgrades)	
		PDWF (d/D)	PWWF (d/D)	PDWF (d/D)	PWWF (d/D)
Within Development					
Local to Subtrunk 13 (200mm upsized to 450mm)	Max d/D <0.85	0.44	0.45	0.44	0.45
Subtrunks					
Subtrunk 13 (375mm upsized to 600mm)	Max d/D <0.85	0.39	0.40	0.41	0.43
Subtrunk 10 (600mm)	Max d/D <0.85	0.48	0.56	0.55	0.64
Trunk Sewers					
YDSS West (750mm)	Max d/D <0.85	0.62	0.80	0.67	**0.87**
YDSS Main (1200/975mm)	Max d/D <0.85	0.41	0.58	0.55	0.70

Surcharge State ≥ **0.85** (Town's Master Plan Trigger)
Surcharge State = **1** (Backwater)
Surcharge State = **2** (Exceeded Capacity)

Disclosure

The results presented above are based on the Town's existing wastewater InfoWorks ICM model. The wastewater model flows were calibrated using flow monitoring data for the major subtrunks in the system. It should be noted that flows in individual local system sewers were not calibrated and can be subject to variation.

Model Results Discussion

The modelling results showed that the upsized sewers along Stouffville Road and Main Street have sufficient capacity to accommodate the proposed flows from the developments. However, the model shows that the downstream YDSS West Trunk Sewer would start reaching its upgrade trigger (d/D > 0.85 as per the Town of Whitchurch-Stouffville Water and Wastewater Master Plan) under the future 2051 WWF condition.

Figure 9 shows the model results of the system capacity analysis highlighting the maximum surcharge state (d/D) for sewers within and downstream of the study area. It should be noted that the model results showed a local sewer north of Sam's Way to start reaching capacity (d/D > 0.85). This is not a result of the proposed development, but a result of large growth area allocated to a single sewer without additional information regarding future local network.

Please note that the timing of growth and Regional infrastructure upgrades will continue to be managed through the Region's Capacity Assignment program and future Master Plan updates. The findings noted in the Tech Memo regarding YDSS sewer may not be supported by Regional analysis and could be impacted by timing/phasing of this development as well as other developments tributary to the sewer.



Figure 9 – Model Results with Sewer Performance with the developments (Sensitivity)

3.7. Wastewater Sensitivity Assessment – York Region's Criteria

For comparative reasons, the analysis was conducted twice for this assignment, once using the Town's design criteria and second using the Region of York's criteria for analysis of the YDSS trunk sewers only. The proposed population/employment and projected wastewater flows using the York Region's criteria are summarized in Table 18.

Table 18 – Projected Wastewater Flows – York Region's Criteria

Development	Units	Area (ha)	Density	Population (persons)	Unit Flow Rate* (L/c/d)	Average Dry Flow (L/s)	Harmon Peaking Factor**	Peak Dry Flow (L/s)	I&I (L/s) ***	Peak Wet Flow (L/s)
Times - Residential	1,300	2.8	2.2 ppu	2,860	RES: 285 EMP: 241	9.43	-	30.73	0.73	31.46
Times - Industrial	-	5.2	80 ppl/ha	416		1.16		3.78	1.35	5.13
Flato	-	0.4	-	322		0.90	-	2.93	0.10	3.03
5142/5142 Stouffville Rd.	121	0.3	2.2	266		0.88		2.86	0.07	2.93
Gallo	-	2.9	-	978		3.19	-	10.39	0.75	11.14
Total	**-**	**11.6**		**4,842**	**-**	**15.56**	**3.26**	**50.69**	**3.01**	**53.70**

* The unit flow rates are divided into residential (RES) and employment (EMP). They are 195 Lpcd and 151 Lpcd respectively, plus a groundwater base infiltration allowance of 90 Lpcd. As per York Region's 2022 Water & Wastewater Master Plan for unit rates in 2051.

** The Harmon peaking factor is inclusive of the population proposed as part of the Flato Development (322 jobs), 5142/5142 Stouffville Rd Development (266 people) and Gallo Development (907 people + 71 jobs).

*** The Inflow and Infiltration allowance of 0.26 L/s/ha was determined as part of the Town's Master Plan process and utilized within the Town's current InfoWorks Model to be more conservative and in line with York Region's criteria.

York Region's Criteria:

The proposed Times Development is expected to generate the following additional flows under the existing and future scenarios:

- 10.6 L/s Average Dry Weather Flow; and
- 2.1 L/s of total Inflow and Infiltration.
- 36.6 L/s of Peak Wet Weather Flow.

Table 19 summarizes the model peak flows for the YDSS trunk sewers for the 2051 scenario with a 25% increase of generated flows using York's Region design criteria. Table 20 summarizes the model results of the system capacity analysis highlighting the maximum surcharge state (d/D) in the YDSS trunk sewers.

Table 19 – Downstream Sewer Flows – York Region's Criteria

Location	Pipe Full Capacity (L/s)	25% Flow Increase 2051 with Development (Incl. All Planned WW Upgrades)
		PWWF (L/s)
Trunk Sewers (York Region's Criteria)		
YDSS West (750mm)	484 - 561	422
YDSS Main (1200/975mm)	1,547-2,130	928

Table 20 – Downstream Sewer Performance (Surcharge State) – York Region's Criteria

Location	Performance Measure	25% Flow Increase 2051 with Development (Incl. All Planned WW Upgrades)
		PWWF
Trunk Sewers (York Region's Criteria)		
YDSS West (750mm)	Max d/D <0.85	0.78
YDSS Main (1200/975mm)	Max d/D <0.85	0.66

Surcharge State ≥ **0.85** (Town's Master Plan Trigger)
Surcharge State = **1** (Backwater)
Surcharge State = **2** (Exceeded Capacity)

Disclosure

The results presented above are based on the Town's existing wastewater InfoWorks ICM model. The wastewater model flows were calibrated using flow monitoring data for the major subtrunks in the system. It should be noted that flows in individual local system sewers were not calibrated and can be subject to variation.

Model Results Discussion

The analysis using York Region's criteria (per capita rates for 2051) was limited to the regional infrastructure only (YDSS trunk sewers) for sensitivity purposes. The modelling results show that the YDSS West Trunk Sewer is getting full, but not reaching the Town's Master Plan Trigger of 0.85 with the 25% increase of development flows from the study area.

Please note that the timing of growth and Regional infrastructure upgrades will continue to be managed through the Region's Capacity Assignment program and future Master Plan updates. The findings noted in the Tech Memo regarding YDSS sewer may not be supported by Regional analysis and could be impacted by timing/phasing of this development as well as other developments tributary to the sewer.

4. Summary

The Times Development is proposed to build 1300 high density residential units with a 5.2 ha of industrial lands, which is equivalent to 2,860 residents and 416 jobs. Other developments in the vicinity that were also considered in the analysis are as follows:

- Flato Development (322 people)
- 5142/5152 Stouffville Road Development (266 people)
- Gallo Development (907 people + 71 jobs)

Water

The proposed Times Development is expected to generate the following additional demands under the existing and future scenarios:

- 10.0 L/s Average Day Demand; and
- 19.9 L/s Maximum Day Demand; and
- 29.9 L/s Peak Hour Demand.

The "Baseline with Development" scenario shows some areas at the Pressure Zone 1/2 boundary could experience pressures that are briefly below the Town's minimum requirement of 40 psi. This is largely a result of the combined proposed developments across Stouffville (including this development) causing increased overall demand and subsequently triggering the future need for Regional upgrades to pumping capacity (supply) to help maintain the storage levels.

Otherwise, from a local perspective, the Town's system has sufficient capacity to accommodate the ADD, MDD, MDD+Fire, and PHD conditions for the proposed development under all current and future scenarios. Due to elevation and the proximity to Stouffville Zone 2 BPS, the pressure is impacted by the pump operation at the BPS, causing pressure briefly above 100 psi. As such, it is recommended to have a "household" pressure reducing valve for the building/service connection.

The available fire flow at the connection to the development met the Town's requirement for residential apartment building under all existing and future conditions.

A sensitivity assessment was conducted to understand the system performance under worst-case scenarios and to verify that the system would be operating as intended (no pressures below 40psi) if the Regional pump upgrade was implemented. When the Regional upgrades at the Stouffville Zone 2 BPS are completed to increase peak supply to the Stouffville system, the Stouffville Zone 2 Elevated Tank level is maintained at a higher level due to the additional pumping capacity from the Region's Zone 2 BPS. This higher low level at the tank ensures pressure does not drop below 40psi.

An additional 25% of demand was added to each development for contingency and future development potential from this area as suggested by the Town. The modelling results confirm that the additional demand continues to exacerbate the storage limitation, unless the Region's additional pump capacity at the Zone 2 PS is implemented. Otherwise, the system can handle the additional sensitivity demand.

Please note that the timing of growth and Regional infrastructure upgrades will continue to be managed through the Region's Capacity Assignment program and future Master Plan updates. A Region-led study will be undertaken to review capacity in the system until project W12 is completed.

Wastewater

The proposed Times Development is expected to generate the following additional flows under the existing and future scenarios:

- 11.6 L/s Average Dry Weather Flow; and
- 0.7 L/s of total Inflow and Infiltration.
- 39.5 L/s of Peak Wet Weather Flow.

It is proposed by the external consultant that the existing 200mm sewer on Stouffville Road is to be replaced by a new 450mm sewer, and the existing 375mm sewer (Part of Subtrunk 13) on Main Street is to be replaced by a new 600mm sewer. With the proposed upgrades on Stouffville Road and Main Street, the modelling results showed that the upsized sewers have sufficient capacity to accommodate the proposed flows from the developments without causing potential downstream constraints. However, it should be noted that the model showed that the d/D in the YDSS West Trunk Sewer was very close to the 0.85 d/D upgrade trigger (as per the Town of Whitchurch-Stouffville Water and

Wastewater Master Plan) for the future 2051 wet weather condition. If any future development that is planned to be discharge to the YDSS West Trunk Sewer exceeds the Town's 2051 projection, the YDSS West Trunk Sewer is likely to be triggered with potential capacity issues.

A sensitivity assessment was conducted for the existing and future 2051 system to understand the system performance under worst-case scenarios. An additional 25% of generated flow was added to each development for contingency and future development potential from this area as requested by the external consultant. The modelling results for the sensitivity assessment showed that the upsized sewers along Stouffville Road and Main Street have sufficient capacity to accommodate the proposed flows from the developments. However, the downstream YDSS West Trunk Sewer exceeds its upgrade trigger (d/D > 0.85 as per the Town of Whitchurch-Stouffville Water and Wastewater Master Plan) under the future 2051 WWF condition.

An additional analysis was completed using York Region's design criteria (per capita rates) to supplement the analysis of the YDSS Trunk sewers. The modelling results show that the YDSS West Trunk Sewer is getting full, but not reaching the Town's Master Plan Trigger of 0.85 with the 25% increase of development flows from the study area.

Please note that the Town's InfoWorks ICM model covers the Town-owned wastewater infrastructure in the community of Stouffville and part of the Region-owned YDSS trunk sewers till north of Elgin Mills Road. This assessment should not be interpreted as a fulsome capacity assessment of YDSS Main Sewer on Ninth Line because it does not account for potential development outside of Stouffville that may impact downstream capacity in YDSS Main. System performance in the YDSS requires additional analysis by the Region.

Please also note that the timing of growth and Regional infrastructure upgrades will continue to be managed through the Region's Capacity Assignment program and future Master Plan updates. The findings noted in the Tech Memo regarding YDSS Sewer may not be supported by Regional analysis and could be impacted by timing/phasing of this development as well as other developments tributary to the sewer.

Limitations

This technical memorandum includes assessment of capacity in the Regional water and wastewater infrastructure system. This analysis was not previously reviewed by York Region and does not necessarily capture actual operation or flows from the Regional system. Please note that capacity of the water supply and sanitary trunk system is under the sole jurisdiction of York Region and that capacity of the Regional system is assessed and managed through various programs including the capacity assignment program in coordination with local municipalities.

5. Closing

We trust the above to be for your approval. Should you have any questions or wish to discuss further, please do not hesitate in contacting the undersigned.

Yours Truly,

GEI Consultants Canada Ltd. (previously GM BluePlan Engineering Ltd.)
Per:

Sandy Naime, P.Eng.
Senior Project Manager

Steve Jobson, P.Eng.
Senior Project Manager

NOTES:

1. REFER TO DRAWING NO. G1 FOR GENERAL NOTES.
2. ALL ROAD EXCAVATION ON STOUFFVILLE ROAD TO BE RESTORED TO EXISTING CONDITION OR BETTER. (SEE PAVEMENT STRUCTURE ON DRAWING G1).
3. LOCATIONS OF SANITARY AND WATER SERVICE CONNECTIONS ARE CONCEPTUAL.
4. EXACT LOCATION OF SANITARY AND WATER SERVICE CONNECTIONS TO BE DETERMINED BY THE MUNICIPALITY PRIOR TO INSTALLATION.
5. ANY WATER SEEPAGE WITHIN THE EXCAVATIONS WILL BE DISCHARGED TO THE ROAD SIDE DITCH THROUGH WETLAND FILTER BAGS OR APPROVED EQUIVALENT.
6. STA 17+780 – STA 18+040 VERTICAL WALL CONSTRUCTION

NOTE:

ALL EXISTING UTILITIES AND STORM SEWERS SHOWN ON THE DRAWING ARE FOR REFERENCE PURPOSES ONLY. THE CONTRACTOR SHALL VERIFY THE LOCATION AND CONTACT THE UTILITY COMPANIES FOR UTILITY STAKEOUT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE CAUSED TO THE EXISTING INFRASTRUCTURE DURING CONSTRUCTION, OR DUE TO IT'S CONSTRUCTION ACTIVITIES.

LEGEND

WATERMAIN
VC VALVE CHAMBER
VB VALVE & BOX
H&V HYDRANT & VALVE
MH SANITARY MANHOLE
SANITARY SEWER
PROPERTY LINE

NORTH

SPRING LAKES GOLF CLUB

JOSEPH ALBERT FOCKLER
LULU MAY FOCKLER (JT)

GERARD MARCEL NADOR
E. ANN NADOR (JT)

PAMELA JAYM

MICHELINA ZANET

REGION ROAD No.

BH 8

BH 6

400mm DIA PVC WATERMAIN

80.00m – 200mm DIA PVC SAN SEW AT 1.00%

110.00m – 200mm DIA PVC SAN SEW AT 0.50%

100.00m – 200mm DIA PVC SAN SEW AT 0.50%

STOUFFVILLE ROAD

FUTURE 600mm C.P.P. WATERMAIN (BY OTHERS)

FUTURE 600mm C.P.P. WATERMAIN (BY OTHERS)

PART 9

LOT 35, CONCESSION 7

provisional service to bungalow + frame house
091006

EXISTING GROUND AT PROPOSED C/L OF ROAD

FUTURE C/L ROAD PROFILE

600mm I.D. C.P.P. WATERMAIN

400mm DIA PVC WATERMAIN

	17+740	17+760	17+780	17+800	17+820	17+840	17+860	17+880	17+900	17+920	17+940	17+960	17+980	18+000	18+020	18+040
ROAD																
SANITARY SEWER DETAILS				80.00m – 200mm DIA PVC SAN SEW AT 1.00% (SDD 35) BEDDING OPSD-802.010 GRANULAR "A"						110.00m – 200mm DIA PVC SAN SEW AT 0.50% (SDD 35) BEDDING OPSD-802.010 GRANULAR "A"				100.00m – 200mm DIA PVC SAN SEW AT 0.50% (SDD 35) BEDDING OPSD-802.010 GRANULAR "A"		
CHAINAGE	17+740	17+760	17+780	17+800	17+820	17+840	17+860	17+880	17+900	17+920	17+940	17+960	17+980	18+000	18+020	18+040

KEY PLAN:



CONSULTANT:

MORRISON HERSHFIELD

Suite 600 - 235 Yorkland Blvd.
Toronto, ON M2J 1T1
Tel.: 416-499-3110
Fax: 416-499-9658

BENCH MARK:
ELEVATION 255.290

ELEVATIONS ARE GEODETIC AND ARE REFERRED TO THE TOWN OF MARKHAM BENCHMARK No. 008197884B6 HAVING AN ELEVATION OF 255.290 METRES. ONE AND ONE-HALF STOREY WHITE ALUMINUM SIDING HOUSE ON THE SOUTHEAST CORNER OF THE JCT OF HIGHWAYS 48 AND YORK REG. RD. 14 AT RINGWOOD, 98.3 METRES EAST OF CENTERLINE OF HIGHWAY 48, AND 18.8 METRES SOUTH OF CENTERLINE OF REG. RD. 14. TABLET IS SET HORIZONTALLY IN WEST FACE OF CONCRETE FOUNDATION. 3.5 METRES SOUTH OF NORTHWEST CORNER, 69 CM BELOW ALUMINUM SIDING AND 30 CM ABOVE GROUND LEVEL.

LICENSED PROFESSIONAL ENGINEER F. ARSHAD PROVINCE OF ONTARIO

TOWN OF WHITCHURCH-STOUFFVILLE
"COUNTRY CLOSE TO THE CITY"
37 SANDIFORD DRIVE, 6TH FLOOR
STOUFFVILLE, ONTARIO L4A 1X5

REV	DESCRIPTION	DATE	BY
4	SANITARY SEWER REINSTATED	DEC./ 08	G.R.
3	HYDRANTS RELOCATED	OCT./ 08	G.R.
2	BOREHOLE LOGS ADDED	OCT./ 08	G.R.
1	SANITARY SEWER DELETED	JULY / 08	G.R.

DO NOT SCALE DRAWINGS. CONTRACTOR MUST VERIFY ALL DIMENSIONS AND ADVISE CONSULTANTS OF ANY ERRORS OR OMISSIONS. NO VARIATIONS OR MODIFICATIONS TO WORK SHOWN SHALL BE IMPLEMENTED WITHOUT PRIOR WRITTEN APPROVAL. ALL PREVIOUS ISSUES OF THIS DRAWING ARE SUPERSEDED BY THE LATEST REVISION. ALL DRAWINGS AND SPECIFICATIONS REMAIN THE PROPERTY OF MORRISON HERSHFIELD LIMITED.

SHEET TITLE:

STOUFFVILLE ROAD
STA 17+740 TO STA 18+040

DRAWN BY:	G.R.	DATE:	FEB. 2008
DESIGNED BY:	G.R./F.A.	CHECKED BY:	B.W./F.A.
SCALE:	Hor 1:500 Vert 1:100	DWG FILE:	D8056P1-ST
Project No:	06056	Drawing No:	P1-ST

Filename: K:\MPS_Proj\06056 - Whitchurch-Stouffville\06056-STOUFFVILLE\06056-ST\ATO-FEB12 2009\06056P1-ST.dwg
Plotted: February 12, 2009 by: Gregory Rollish

NOTES:

1. REFER TO DRAWING NO. G1 FOR GENERAL NOTES.
2. ALL ROAD EXCAVATION ON STOUFFVILLE ROAD TO BE RESTORED TO EXISTING CONDITION OR BETTER. (SEE PAVEMENT STRUCTURE ON DRAWING G1).
3. LOCATIONS OF SANITARY AND WATER SERVICE CONNECTIONS ARE CONCEPTUAL.
4. EXACT LOCATION OF SANITARY AND WATER SERVICE CONNECTIONS TO BE DETERMINED BY THE MUNICIPALITY PRIOR TO INSTALLATION.
5. THE MINISTRY OF NATURAL RESOURCES FISHERIES COLDWATER TIMING WINDOW WILL APPLY TO THE WORKS AT THE SECTION OF CROSSING OF 48. (FROM STA. 18+230 TO STA. 18+313). WORKS IN THESE AREAS WILL BE SCHEDULED BETWEEN JULY 1 AND SEPTEMBER 15.
6. ANY WATER SEEPAGE WITHIN THE EXCAVATIONS WILL BE DISCHARGED TO THE ROAD SIDE DITCH THROUGH WETLAND FILTER BAGS OR APPROVED EQUIVALENT.
7. STA 18+040 – STA 18+313 VERTICAL WALL CONSTRUCTION

NOTE:

ALL EXISTING UTILITIES AND STORM SEWERS SHOWN ON THE DRAWING ARE FOR REFERENCE PURPOSES ONLY. THE CONTRACTOR SHALL VERIFY THE LOCATION AND CONTACT THE UTILITY COMPANIES FOR UTILITY STAKEOUT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE CAUSED TO THE EXISTING INFRASTRUCTURE DURING CONSTRUCTION, OR DUE TO IT'S CONSTRUCTION ACTIVITIES.

LEGEND

NORTH

STOUFFVILLE ROAD

MAIN STREET

HWY 48

ROCKLER LANE

STORMCEPTOR STC-16000

100.00m–200mm DIA PVC SAN SEW AT 0.50%

103.00m–200mm DIA PVC SAN SEW AT 0.50%

110.00m–200mm DIA PVC SAN SEW AT 0.50%

400mm DIA HDPE WATERMAIN (BY DIRECTIONAL BORE)

400mm DIA PVC WATERMAIN

400mm DIA ADAPTER

REMOVE PLUG AND CONNECT TO EX WM

CONNECT TO EX SAN SEW

CONNECT TO EX SAN MANHOLE

7.25m offset & south (flat)

4.5

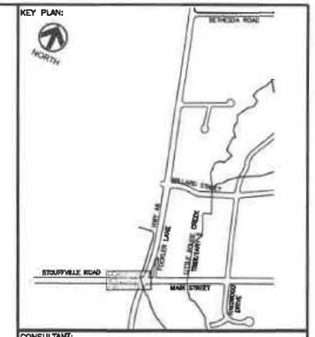
SECTION

ELEVATION

DETAIL "A"
TYPICAL LINER DETAIL
N.T.S.

F. ARSHAD
LICENSED PROFESSIONAL ENGINEER
PROVINCE OF ONTARIO

KEY PLAN:



CONSULTANT:

MORRISON HERSHFIELD

Suite 900 - 235 Yorkland Blvd.
Toronto, ON M2J 1T1
Tel.: 416-499-3110
Fax: 416-499-9658

BENCH MARK:
ELEVATION 255.290

ELEVATIONS ARE GEODETIC AND ARE REFERRED TO THE TOWN OF MARKHAM BENCHMARK No. 00819768488 HAVING AN ELEVATION OF 255.290 METRES. ONE AND ONE-HALF STOREY WHITE ALUMINIUM SIDING HOUSE ON THE SOUTHEAST CORNER OF THE JCT OF HIGHWAYS 48 AND YORK REG. RD. 14 AT RINGWOOD, 99.3 METRES EAST OF CENTERLINE OF HIGHWAY 48, AND 18.6 METRES SOUTH OF CENTERLINE OF REG. RD. 14. TABLET IS SET HORIZONTALLY IN WEST FACE OF CONCRETE FOUNDATION, 3.5 METRES SOUTH OF NORTHWEST CORNER, 69 CM BELOW ALUMINIUM SIDING AND 30 CM ABOVE GROUND LEVEL.

TOWN OF WHITCHURCH-STOUFFVILLE
"COUNTRY CLOSE TO THE CITY"
37 SANDIFORD DRIVE, 4TH FLOOR
STOUFFVILLE, ONTARIO L4A 7X5

REV	DESCRIPTION	DATE	BY
10	VALVE CHAMBER AND MH33A RELOCATED	FEB.25/ 09	G.R.
9	WATERMAIN SERVICE CONNECTIONS AT STA 18+110 AND 18+205, AND SANITARY SERVICE CONNECTION AT STA 18+210 ADDED	FEB./ 09	G.R.
8	WATERMAIN ALIGNMENT REVISED SLIGHTLY TO AVOID CONFLICT WITH UTILITIES. PIT LOCATIONS ADDED.	JAN./ 09	G.R.
7	SANITARY SEWER ALIGNMENT REVISED MH 233A DELETED	DEC./ 08	G.R.
6	JACK AND BORE REPLACED BY DIRECTIONAL BORE AND WATERMAIN ALIGNMENT REVISED SLIGHTLY	DEC./ 08	G.R.
5	SANITARY SEWER REINSTATED	DEC./ 08	G.R.
4	WATERMAIN CROSSING HWY 48 LOWERED	OCT./ 08	G.R.
3	HYDRANTS RELOCATED	OCT./ 08	G.R.
2	BOREHOLE LOGS ADDED	OCT./ 08	G.R.
1	SANITARY SEWER DELETED	JULY / 08	G.R.

DO NOT SCALE DRAWINGS. CONTRACTOR MUST VERIFY ALL DIMENSIONS AND ADVISE CONSULTANTS OF ANY ERRORS OR OMISSIONS. NO VARIATIONS OR MODIFICATIONS TO WORK SHOWN SHALL BE IMPLEMENTED WITHOUT PRIOR WRITTEN APPROVAL. ALL PREVIOUS ISSUES OF THIS DRAWING ARE SUPERSEDED BY THE LATEST REVISION. ALL DRAWINGS AND SPECIFICATIONS REMAIN THE PROPERTY OF MORRISON HERSHFIELD LIMITED.

SHEET TITLE:

STOUFFVILLE ROAD
STA 18+040 TO STA 18+340

DRAWN BY: G.R.	DATE: FEB. 2008
DESIGNED BY: G.R./F.A.	CHECKED BY: B.W./F.A.
SCALE: Hor 1:500 Vert 1:100	DWG FILE: 06056P2-ST
Project No: 06056	Drawing No: P2-ST

Filename: C:\Projects\06056-STOUFFVILLE\R056-ST-ATTOFEB25-2009\06056P2-ST.mxg
Plotted: February 25, 2009 by Gregory Ralston

SCHOLLEN & Company Inc.
30 Wertheim Court, Unit 15
Richmond Hill, Ontario L4B 1B9
Tel: 289-695-0009
Fax: 289-695-0010
Email: design@schollenandcompany.com

April 8, 2025

Kevin Park
SCS Consulting Group Ltd.
30 Centurian Drive, Suite 100
Markham, ON, L3R 8B8

RE: 5061 Stouffville Road Residential Development
Preliminary Irrigation Water Consumption Calculation

Dear Kevin,

Schollen & Company Inc. has confirmed the estimated quantity of water that will be re-used for irrigation purposes for the above-noted project. The calculation of the volume of harvested rainwater that will be re-used for irrigation purposes is as follows:

The total volume re-used for West Phase:	**40.50m3 / 72h**
The total volume re-used for East Phase:	**15.97m3 / 72h**
Total:	**56.47m3 / 72h**

Rainfall runoff from the impervious surfaces on the site will be collected in the stormwater storage tank. Softscape areas within the site will be irrigated by an automated control irrigation system that will draw harvested rainwater from the stormwater storage tank.

Please find attached the matrix that provides a breakdown of the irrigation volume calculations. Should you require additional information or have any questions or concerns, please do not hesitate to contact the undersigned.

Yours truly,
SCHOLLEN & Company Inc.

Nicola Spaziani, BLA, OALA, CSLA
nicola@schollenandcompany.com

Attachments: Irrigation Calculator West Phase
Irrigation Calculator East Phase

Required for OPTION 1. & OPTION 2. (PATH 1)

Table: Irrigation Baseline Case (July)

Select the appropriate project site for evapotranspiration rate: Toronto [ET_0=138.2mm]

Landscape Type	Area [m^2]	Species Factor [k_s]	Density Factor [k_d]	Microclimate Factor [k_{mc}]	K_L	ET_L [mm]	IE	TWA [Litres]
Trees	0	0.5	1	1	0.5	69.1	Sprinkler	0
Shrubs	0	0.2	1	1	0.2	27.64	Sprinkler	0
Groundcover/Greenr	1,873	0.2	1	1	0.2	27.64	Sprinkler	82,832
Mixed	2,507	0.5	1.3	1	0.65	89.83	Sprinkler	360,326
Turf Grass	304	0.7	1	1	0.7	96.74	Sprinkler	47,054
					0	0	Sprinkler	0
					0	0	Sprinkler	0
					0	0	Sprinkler	0
Total area (m^2)	4,684						Total Baseline Case [L]	490,212

Table: Irrigation Design Case (July)

Landscape Type	Area [m^2]	Species Factor [k_s]	Density Factor [k_d]	Microclimate Factor [k_{mc}]	K_L	ET_L [mm]	IE	CE	TWA [Litres]
Trees	0	0.5	1	1	0.5	69.1	Sprinkler	0.9	0
Shrubs	0	0.2	1	1	0.2	27.64	Sprinkler	0.9	0
Groundcover/Greenr	1,873	0.2	1	1	0.2	27.64	Drip	0.9	51,770
Mixed	2,507	0.5	1.3	1	0.65	89.83	Sprinkler	0.9	324,293
Turf grass	304	0.7	1	1	0.7	96.74	Sprinkler	0.9	42,349
	0	0.5	0.2	1	0.1	13.82	Drip	0.9	0
	0	0.5	1.3	1	0.65	89.83	Drip	0.9	0
	0	0.5	0.5	1	0.25	34.55	Drip	0.9	0
Total area (m^2)	4,684						Total Design Case [L]		418,412

Greywater or Stormwater Reuse Volume [L]	0
Savings [%]	**14.65%**

Required for OPTION 1. & OPTION 2. (PATH 1)

Table: Irrigation Baseline Case (July)

Select the appropriate project site for evapotranspiration rate: Toronto [ET_0=138.2mm]

Landscape Type	Area [m^2]	Species Factor [k_s]	Density Factor [k_d]	Microclimate Factor [k_{mc}]	K_L	ET_L [mm]	IE	TWA [Litres]
Trees	0	0.5	1	1	0.5	69.1	Sprinkler	0
Shrubs	0	0.2	1	1	0.2	27.64	Sprinkler	0
Groundcover/Greenro	0	0.2	1	1	0.2	27.64	Sprinkler	0
Mixed	1,002	0.5	1.3	1	0.65	89.83	Sprinkler	144,015
Turf Grass	254	0.7	1	1	0.7	96.74	Sprinkler	39,315
					0	0	Sprinkler	0
					0	0	Sprinkler	0
					0	0	Sprinkler	0
Total area (m^2)	1,256						Total Baseline Case [L]	183,331

Table: Irrigation Design Case (July)

Landscape Type	Area [m^2]	Species Factor [k_s]	Density Factor [k_d]	Microclimate Factor [k_{mc}]	K_L	ET_L [mm]	IE	CE	TWA [Litres]
Trees	0	0.5	1	1	0.5	69.1	Sprinkler	0.9	0
Shrubs	0	0.2	1	1	0.2	27.64	Sprinkler	0.9	0
Groundcover/Greenro	0	0.2	1	1	0.2	27.64	Drip	0.9	0
Mixed	1,002	0.5	1.3	1	0.65	89.83	Sprinkler	0.9	129,614
Turf grass	254	0.7	1	1	0.7	96.74	Sprinkler	0.9	35,384
	0	0.5	0.2	1	0.1	13.82	Drip	0.9	0
	0	0.5	1.3	1	0.65	89.83	Drip	0.9	0
	0	0.5	0.5	1	0.25	34.55	Drip	0.9	0
Total area (m^2)	1,256						Total Design Case [L]		164,998

Greywater or Stormwater Reuse Volume [L]	0
Savings [%]	**10.00%**

Appendix C Topographic Surveys



PLAN OF SURVEY OF

PART OF LOTS 34 AND 35
CONCESSION 7
TOWN OF WHITCHURCH – STOUFFVILLE

(GEOGRAPHIC TOWNSHIP OF MARKHAM)

REGIONAL MUNICIPALITY OF YORK

SCALE 1 : 1500

0m 5 0 15 30 60m

R. AVIS SURVEYING INC.

METRIC : DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

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NOTES AND LEGEND

BEARINGS SHOWN HEREON ARE GRID BEARINGS AND ARE DERIVED FROM HORIZONTAL CONTROL MONUMENTS IDENTIFIED AND ILLUSTRATED, ZONE 17, CENTRAL MERIDIAN 81° 00' WEST LONGITUDE (3° UNIVERSAL TRANSVERSE MERCATOR PROJECTION), NAD 83 (CSRS)–(2010.0)

HCM No. 0081981597	HCM No. 0081976077
N 4855966.000	N 4855966.000
E 637991.969	E 638998.845

ELEVATIONS SHOWN HEREON ARE GEODETIC AND ARE REFERRED TO CITY OF BENCH MARK No. 1322010008, HAVING AN ELEVATION = 283.534 metres.

DISTANCES SHOWN HEREON ARE ADJUSTED GROUND DISTANCES AND CAN BE CONVERTED TO GRID DISTANCES BY MULTIPLYING BY A COMBINED SCALE FACTOR OF 0.9997878

■	DENOTES SURVEY MONUMENT FOUND
SIB	DENOTES SURVEY MONUMENT PLANTED
IB	DENOTES IRON BAR FOUND
SSIB	DENOTES SHORT STANDARD IRON BAR
CP	DENOTES CUT PIN
CC	DENOTES CUT CROSS
CM	DENOTES CONCRETE MONUMENT
MEAS	DENOTES MEASURED
MEAS.IN	DENOTES MEASURED
R.I.P.	DENOTES RECOVERED IN POSITION, EAST, WEST SUPPORTS METAL PROPERTY REPORT BY RABIDEAU & CEEPAWHALLS, O.L.S. DATED SEPTEMBER 2019
P1	DENOTES PLAN 65R – 34903
P2	DENOTES PLAN 65R – 34903
P3	DENOTES PLAN 65R – 34903
P4	DENOTES PLAN 65R – 34903
P5	DENOTES PLAN 64R – 2867
P6	DENOTES PLAN 64R – 2867 & 954
P7	DENOTES EXPROPRIATION PLAN D-1027
P8	DENOTES EXPROPRIATION PLAN D-1026
P9	DENOTES EXPROPRIATION PLAN D-1025
P10	DENOTES PLAN 65R – 30813
P11	DENOTES PLAN 65R – 29753
P12	DENOTES PLAN 64R – 4981
P13	DENOTES PLAN 65R – 29069 – 1R, O.L.S.
MB2	DENOTES M. S. GIBSON, O.L.S.
MB3	DENOTES M. S. GIBSON, O.L.S.
DTS	DENOTES DEPT. OF TRANSPORT SURVEYS
LTS	DENOTES DEPT. SURVEYORS, O.L.S.
MJ	DENOTES MARSHALL MACKLIN, O.L.S.
MJ2	DENOTES MARSHALL & CHALKLY, O.L.S.
MJ3	DENOTES MARSHALL & CHALKLY, O.L.S.
1217	DENOTES H. FILLER CORPORATION LTD., O.L.S.
1218	DENOTES H. FILLER CORPORATION LTD., O.L.S.
M	DENOTES MEASURED
PROD	DENOTES PRODUCTION
CAP	DENOTES CAPPED
FW	DENOTES POST & WIRE FENCE
BW	DENOTES BOARD FENCE
DCB	DENOTES DOUBLE CATCH BASIN
SCB	DENOTES SINGLE CATCH BASIN
CONC	DENOTES CONCRETE
MF	DENOTES METAL FENCE
WF	DENOTES WOOD FENCE
FH	DENOTES FIRE HYDRANT
HDW	DENOTES HYDRO GUY WIRE
HP	DENOTES HYDRO POLE
LS	DENOTES LIGHT STANDARD
TP	DENOTES TELEPHONE POLE
S	DENOTES SIGN BOARD
TS	DENOTES TRAFFIC LIGHT STANDARD
TS	DENOTES WAPPED SIGN
MW	DENOTES MONITORING WELL
	DENOTES DECIDUOUS TREE WITH TRUNK DIAMETER 0.10 metres
0.10 DIA	
	DENOTES SPOT ELEVATION

6° UTM ZONE 17 COORDINATES

NAD83(CSRS) (2010.0) CENTRAL MERIDIAN 81°00' WEST LONGITUDE

DERIVED FROM MONUMENTS No. 0081981597 AND No. 0081976077

	NORTHING	EASTING
A	4855887.121	638150.597
B	4855572.161	637741.336
C	4855693.466	637523.808
D	4855936.308	637539.927
E	4856230.678	638063.173

(1) THE UTM COORDINATES LISTED ABOVE ARE TO AN URBAN ACCURACY PER SURVEYING ACT OF ONTARIO REGULATION 216/10 FILED UNDER THE SURVEYS ACT.

(2) THE UTM COORDINATES LISTED ABOVE ARE TO BE USED FOR GEOGRAPHIC INFORMATION SYSTEM INTEGRATION ONLY AND CLAIMS BY USER TO RE-ESTABLISH THE PROPERTY CORNERS OR BOUNDARIES SHOWN HEREON.

AREA OF THE SUBJECT LAND: 1 047 825.1 sq.m

NOTE:
UPDATED ON AUGUST 28, 2020 TO SHOW TOP OF BANKS.
THE SURVEY WAS COMPLETED ON THE 28th DAY OF AUGUST, 2020.

NOTE:
UPDATED ON JULY 2, 2020 TO SHOW ADDITIONAL TOPOGRAPHIC FEATURES.
THE SURVEY WAS COMPLETED ON THE 28th DAY OF JUNE, 2020.

SURVEYOR'S CERTIFICATE

I CERTIFY THAT:

1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT AND THE REGULATIONS MADE UNDER THEM.

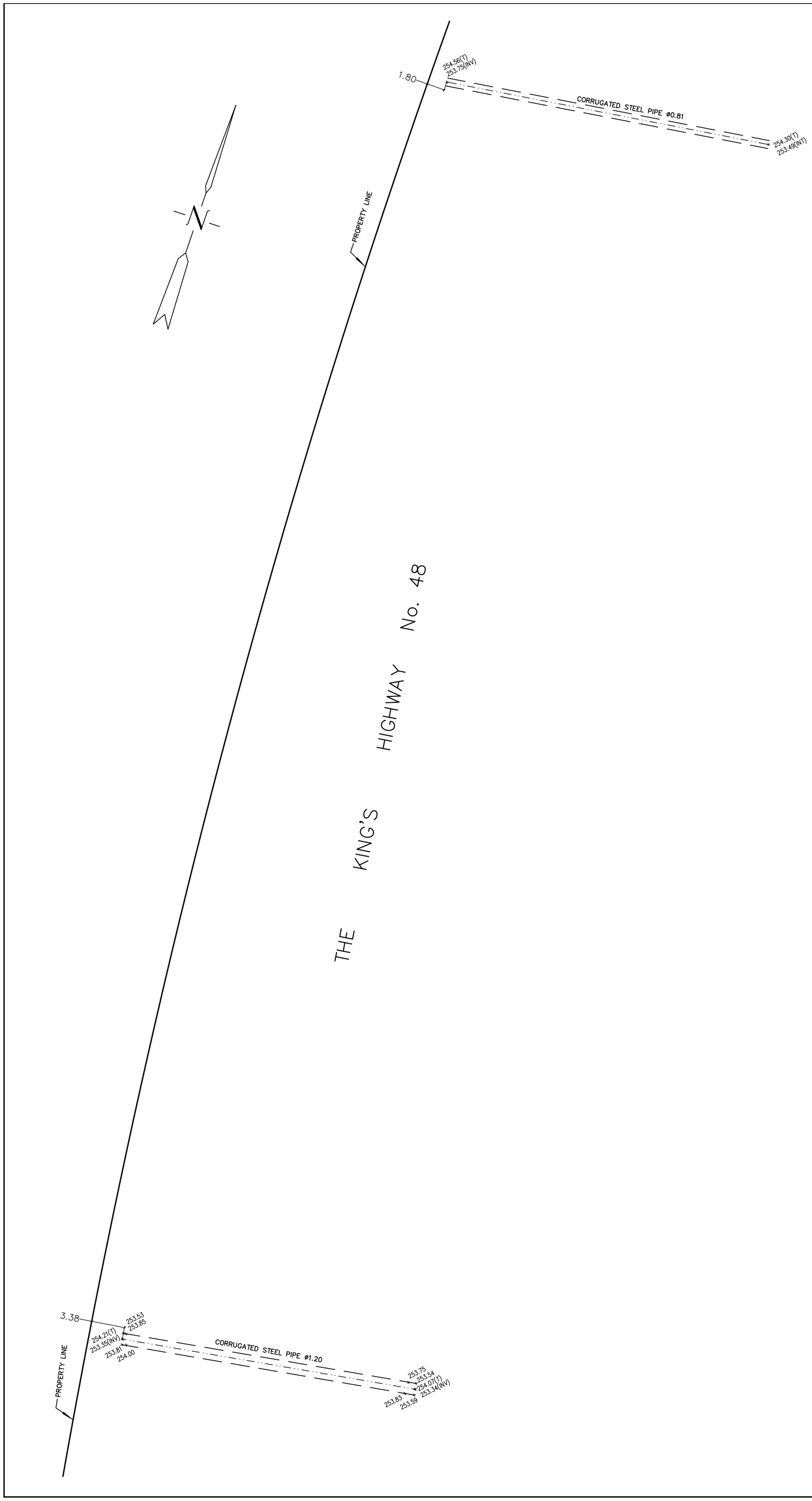
2. THE SURVEY WAS COMPLETED ON THE 28th DAY OF SEPTEMBER, 2019

OCTOBER 2, 2019
DATE

GEORGE Z. R. LO
Ontario Land Surveyor

R. AVIS SURVEYING INC.
SUITE 810
235 YONGE AVENUE
TORONTO, ONTARIO
M2J 4Y8
TEL.: (416) 482-8352 FAX: (416) 491-6286
www.ravissurveying.com

CHECKED BY:	G.L., O.L.S.
CALCULATED BY:	G.S.
DRAWN BY:	G.S.
PROJECT No.:	2019-01
DRAWING No.:	2019-01-DWG



SKETCH SHOWING

LOCATION OF CULVERT PIPE

TOWN OF WHITCHURCH – STOUFFVILLE

(GEOGRAPHIC TOWNSHIP OF MARKHAM)

REGIONAL MUNICIPALITY OF YORK

SCALE 1 : 300

5m 4 3 2 1 0 5 10 15 20m

R. AVIS SURVEYING INC.

CAUTION: THIS IS NOT A PLAN OF SURVEY AND SHALL NOT BE USED FOR TRANSACTION OR MORTGAGE PURPOSES.

METRIC: DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

NOTES AND LEGEND

ELEVATIONS SHOWN HEREON ARE GEODETIC AND ARE REFERRED TO CITY OF MARKHAM BENCH MARK No. 13020100006, HAVING AN ELEVATION = 263.124 metres.

(T)	DENOTES	TOP OF PIPE
(INV)	DENOTES	INVERT PIPE

THE SURVEY WAS COMPLETED ON THE 30th DAY OF SEPTEMBER , 2024

OCTOBER 1, 2024

DATE

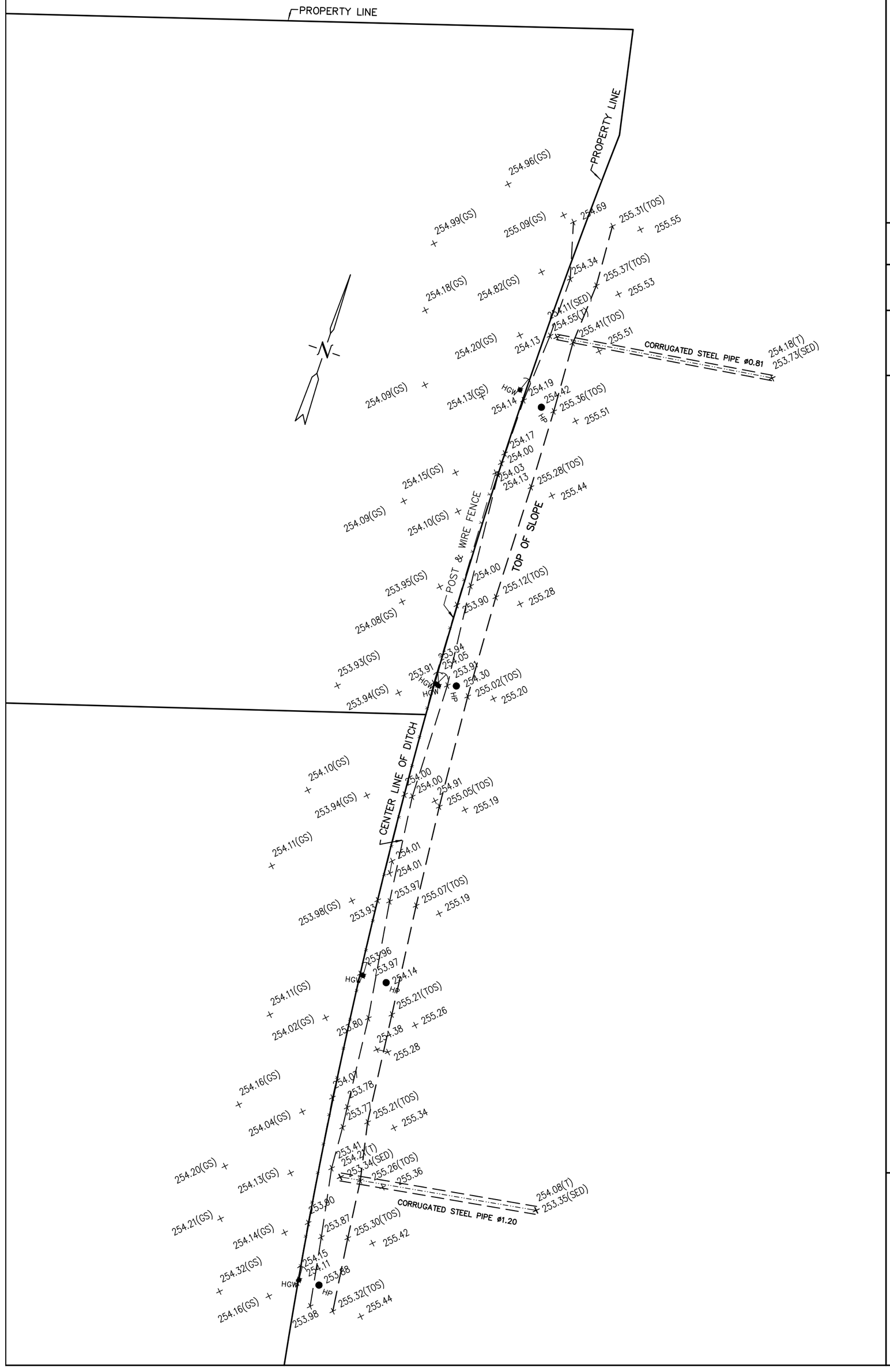
R. AVIS SURVEYING INC.

SUITE 203
235 YORKLAND BOULEVARD
TORONTO, ONTARIO
M2J 4Y8

TEL.: (416) 490–8352 FAX: (416) 491–6206

www.ravissurveying.com

CHECKED BY : J.B.	
CALCULATED BY :	PROJECT No. : 3310–5
DRAWN BY : S.S.	DRAWING No. : 3310–5SK–CULVERT.DWG



SKETCH SHOWING

SPOT ELEVATIONS

TOWN OF WHITCHURCH – STOUFFVILLE

(GEOGRAPHIC TOWNSHIP OF MARKHAM)

REGIONAL MUNICIPALITY OF YORK

SCALE 1 : 500

10m 5 0 10 20 30 40m

R. AVIS SURVEYING INC.

METRIC: DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

CAUTION: THIS IS NOT A PLAN OF SURVEY AND SHALL NOT BE USED FOR TRANSACTION OR MORTGAGE PURPOSES.

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NOTES AND LEGEND

ELEVATIONS SHOWN HEREON ARE GEODETIC AND ARE REFERRED TO CITY OF MARKHAM BENCH MARK No. 13020100006, HAVING AN ELEVATION = 263.124 metres.

(T)	DENOTES	TOP OF PIPE
(SED)	DENOTES	TOP OF SEDIMENT
(TOS)	DENOTES	TOP OF SLOPE

THE SURVEY WAS COMPLETED ON THE 26th DAY OF NOVEMBER , 2025.

NOVEMBER 28, 2025.

DATE

R. AVIS SURVEYING INC.
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TORONTO, ONTARIO
M2J 4Y8
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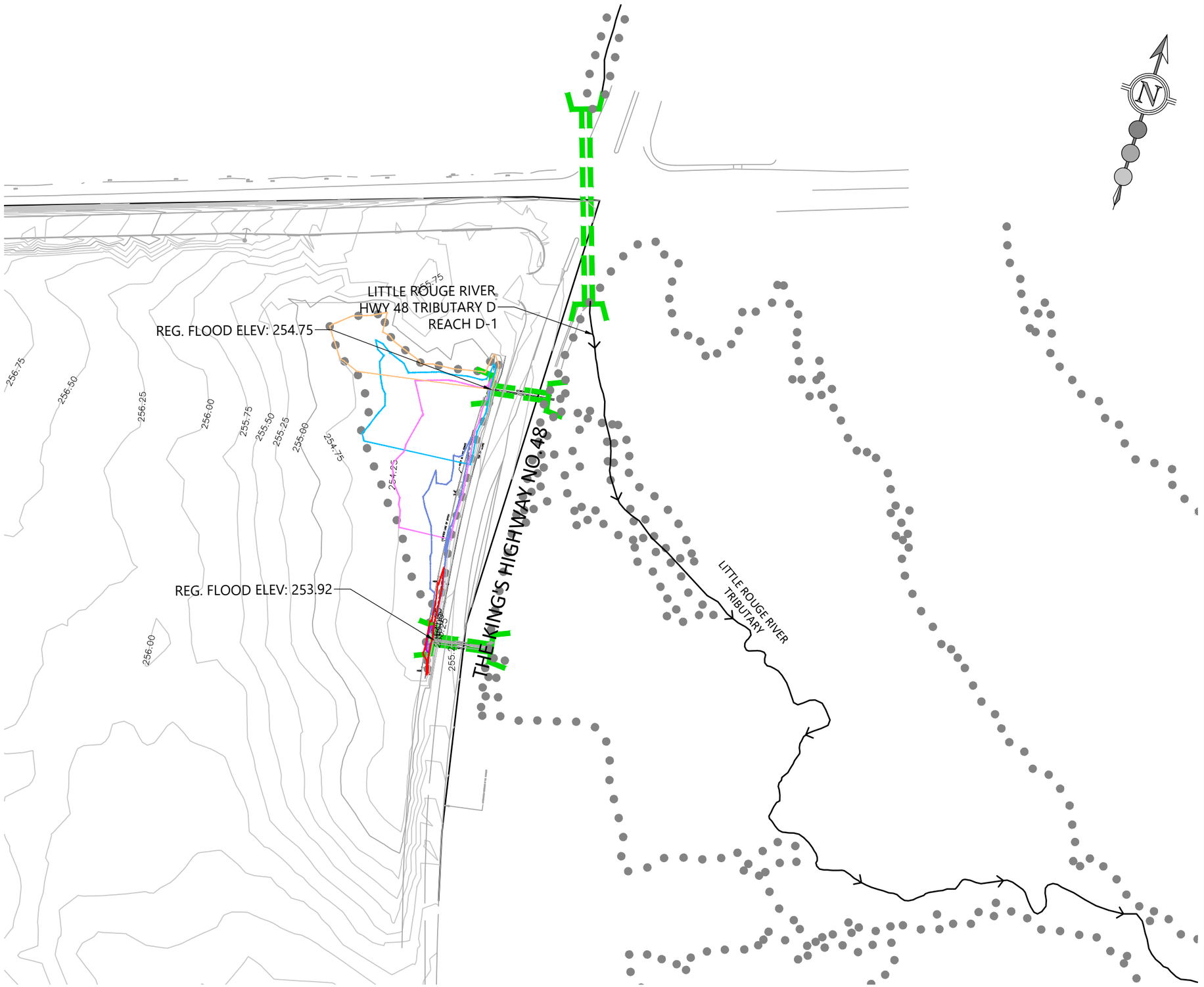
CHECKED BY : P.R., O.L.S.	
CALCULATED BY:	PROJECT No. : 3310–6
DRAWN BY : A.S.	DRAWING No. : 3310–6SK1.DWG

Appendix D Stormwater Management Calculations



Appendix D-1 Flood Storage Analysis





LEGEND:

- EXISTING REGIONAL FLOODLINE
- EXISTING CULVERT
- LITTLE ROUGE RIVER TRIBUTARY PROVIDED BY TRCA FLOODPLAIN MAPPING PROGRAM PREPARED BY WOOD ENGINEERING, 2020
- 254.75 ELEVATION CONTOUR
- 254.50 ELEVATION CONTOUR
- 254.25 ELEVATION CONTOUR
- 254.00 ELEVATION CONTOUR
- 253.92 ELEVATION CONTOUR
- 253.75 ELEVATION CONTOUR
- 253.50 ELEVATION CONTOUR

SCS consulting group ltd
30 CENTURIAN DRIVE, STE 100
MARKHAM, ON L3R 8B8
P (905) 475-1900
F (905) 475-8335

5061 STOUFFVILLE ROAD

EXISTING FLOOD STORAGE

DESIGNED BY:	J.A.S.	CHECKED BY:	E.T.C.K.
SCALE:	1:2000	DATE:	SEPTEMBER 2026
PROJECT No:	2234	FIGURE No:	D.1

File: P:\2234 SW Stouffville Expansion Area–Times\Drawings\FSP\Fig\Report Figures\2234P–D.1–FLOD.dwg – Revised by <JZHANG> : Thu, May 01 2025 – 5:21pm



LEGEND:

- LIMIT OF DEVELOPMENT
- PROPOSED REGIONAL FLOODLINE
- EXISITNG REGIONAL FLOODLINE
- EXISTING CULVERT
- LITTLE ROUGE RIVER TRIBUTARY PROVIDED BY TRCA FLOODPLAIN MAPPING PROGRAM PREPARED BY WOOD ENGINEERING, 2020
- 254.75 ELEVATION CONTOUR
- 254.50 ELEVATION CONTOUR
- 254.25 ELEVATION CONTOUR
- 254.00 ELEVATION CONTOUR
- 253.92 ELEVATION CONTOUR
- 253.75 ELEVATION CONTOUR
- 253.50 ELEVATION CONTOUR

*NOTE: LAYOUT IS SCHEMATIC ONLY, DETAILS TO BE PROVIDED AT DETAILED DESIGN STAGE.

SCS consulting group ltd
30 CENTURIAN DRIVE, STE 100
MARKHAM, ON L3R 8B8
P (905) 475-1900
F (905) 475-8335

5061 STOUFFVILLE ROAD

PROPOSED FLOOD STORAGE

DESIGNED BY:	J.A.S.	CHECKED BY:	E.T.C.K.
SCALE:	1:2000	DATE:	SEPTEMBER 2026
PROJECT No:	2234	FIGURE No:	D.2

File: P:\2234 SW Stouffville Expansion Area–Times\Drawings\FSP\Fig\Report Figures\2234P–D.2–FLOD.dwg – Revised by <JZHANG> : Thu, May 01 2025 – 5:25pm

SCS consulting group ltd

Flood Storage Volume Analysis

SW Stouffville Expansion Area
Project Number: 2234B
Date: September 2026
Designer Initials: C.J.N.

Existing

Elevation (m)	Area (m^2)	Avg Area (m^2)	H (m)	Volume (m^3)	Cumulative Volume (m^3)	Depth (m)
254.75	1,310				0	0.00
		1841	0.25	460		
254.50	2,371				460	0.25
		2460	0.25	615		
254.25	2,548				1075	0.50
		1646	0.25	411		
254.00	743				1487	0.75
		421	0.08	34		
253.92	99				1520	0.83
		61	0.17	10		
253.75	23				1531	1.00
		12	0.25	3		
253.50	2				1534	1.25
		11	0.40	5		
253.35	0				1535	1.40
			Total Volume (m^3)	1535		

Proposed

Elevation (m)	Area	Avg Area (m^2)	H (m)	Volume (m^3)	Cumulative Volume (m^3)	Depth (m)
254.75	0				0	0.00
		17	0.25	4		
254.50	34				4	0.25
		45	0.25	11		
254.25	57				16	0.50
		573	0.25	143		
254.00	1,089				159	0.75
		2122	0.08	170		
253.92	3,156				328	0.83
		2654	0.17	451		
253.75	2,153				780	1.00
		1468	0.25	367		
253.50	783				1147	1.25
		1076	0.40	431		
253.35	0				1210	1.40
			Total Volume (m^3)	1577		

Appendix D-2 Hydrology Modelling and Unitary Discharge Rate Calculations

The following secure link is being provided by **SCS Consulting Group Ltd.** to share the SW Stouffville Expansion Area related digital data:

https://filesafecloud.scsconsultinggroup.com/url/q4cjdhspghhwiu3y

Please click on the link and download all files from this location.

- Visual OTTHYMO Modelling Files

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Little Rouge River Upper Basin
Unit Flow Relationships

SW Stouffville Expansion Area
Project Number: 2234B
Date: September 2026
Designer Initials: J.A.S.

Catchment	Pervious Area (ha)	Impervious Area (ha)
101 (West Outlet)	0.49	0.05

Return Period	Unit Flow Pervious (L/s/ha)[1]	Release Rate Pervious (m^3/s)	Unit Flow Impervious (L/s/ha)[1]	Release Rate Impervious (m^3/s)	Total Allowable Release Rate (m^3/s)
2 Year	3.00	**0.001**	75.00	**0.004**	**0.006**
5 Year	5.00	**0.002**	105.00	**0.006**	**0.008**
10 Year	9.00	**0.004**	129.00	**0.007**	**0.011**
25 Year	9.00	**0.004**	152.00	**0.008**	**0.013**
50 Year	11.00	**0.005**	172.00	**0.009**	**0.015**
100 Year	14.00	**0.007**	191.00	**0.010**	**0.017**

Catchment	Pervious Area (ha)	Impervious Area (ha)
102 (East Outlet)	5.42	0.60

Return Period	Unit Flow Pervious (L/s/ha)[1]	Release Rate Pervious (m^3/s)	Unit Flow Impervious (L/s/ha)[1]	Release Rate Impervious (m^3/s)	Total Allowable Release Rate (m^3/s)
2 Year	3.00	**0.016**	75.00	**0.045**	**0.061**
5 Year	5.00	**0.027**	105.00	**0.063**	**0.090**
10 Year	9.00	**0.049**	129.00	**0.078**	**0.126**
25 Year	9.00	**0.049**	152.00	**0.092**	**0.140**
50 Year	11.00	**0.060**	172.00	**0.104**	**0.163**
100 Year	14.00	**0.076**	191.00	**0.115**	**0.191**

[1] Unit flow and storage calculated per TRCA Hydrology Study Update for the Rouge River Watershed, Stormwater Management Criteria Little Rouge River Storm Water Management Facility Sizing Criteria Section 7.2
* Catchment 103 is excluded from Unit Flow calculations as it represents an area that remains undeveloped in the proposed condition, and therefore does not require unitary controls.

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Little Rouge River Upper Basin
Unit Storage Required

SW Stouffville Expansion Area
Project Number: 2234B
Date: September 2026
Designer Initials: J.A.S.

Catchment	Pervious Area (ha)	Impervious Area (ha)
201	0.19	0.24
202	0.06	0.06
SWMF 1 Dry Pond	0.24	0.30

Return Period	Unitary Storage (m^3/impervious ha)	Total Required Storage (m^3)
2 Year	750	**225**
5 Year	800	**240**
10 Year	850	**255**
25 Year	900	**270**
50 Year	950	**285**
100 Year	1000	**300**

Catchment	Pervious Area (ha)	Impervious Area (ha)
301	1.69	0.00
302	0.03	0.05
303	0.23	0.40
304	0.49	1.15
305	0.15	0.88
306	0.51	0.00
307	0.37	0.37
SWMF 2 Wet Pond	3.48	2.83

Return Period	Unitary Storage (m3/impervious ha)	Total Required Storage (m3)
2 Year	750	**2124**
5 Year	800	**2265**
10 Year	850	**2407**
25 Year	900	**2549**
50 Year	950	**2690**
100 Year	1000	**2832**

[1] Unit flow and storage calculated per TRCA Hydrology Study Update for the Rouge River Watershed, Stormwater Management Criteria Little Rouge River Storm Water Management Facility Sizing Criteria Section 7.2

* Catchment 203 is excluded from Unit Flow calculations as it represents an area that remains undeveloped in the proposed condition, and therefore does not require unitary controls.


101
Name
101 - West (Future Controlled)
102
Name
102 - East

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Existing Conditions
VO6 Parameter Summary

SW Stouffville Expansion Area
Project Number: 2234
Date: September 2026
Designer Initials: S.G.

NASHYD

Number	101	102	103*
Description	West (Future Controlled)	East	West (Future Uncontrolled)
DT(min)	1	1	1
Area (ha)	0.54	6.02	0.67
CN*	72.0	72.0	72.0
IA(mm)	8.0	8.0	8.0
TP Method	Uplands	Uplands	Uplands
TP (hr)	0.05	0.29	0.09

Total Area = 7.23 ha

*Catchment 103 represents an area that will remain undeveloped and does not require SWM measures, therefore this catchment is not considered in the VO model.

Existing Conditions
CN Calculations

SW Stouffville Expansion Area
Project Number: 2234
Date: September 2026
Designer Initials: S.G.

Site Soils: (per York County Soils Mapping)

Soil Type	Hydrologic Soil Group
Milliken Loam	BC

TABLE OF CURVE NUMBERS (CN's)**

Land Use	Hydrologic Soil Type							Manning's	Source
	A	AB	B	BC	C	CD	D	'n'	
Meadow "Good"	30	44	58	64.5	71	74.5	78	0.40	MTO
Woodlot "Fair"	36	48	60	66.5	73	76	79	0.40	MTO
Gravel	76	80.5	85	87	89	90	91	0.30	USDA
Lawns "Good"	39	50	61	67.5	74	77	80	0.25	USDA
Pasture/Range	58	61.5	65	70.5	76	78.5	81	0.17	MTO
Crop	66	70	74	78	82	84	86	0.13	MTO
Fallow (Bare)	77	82	86	89	91	93	94	0.05	MTO
Low Density Residences	57	64.5	72	76.5	81	83.5	86	0.25	USDA
Streets, paved	98	98	98	98	98	98	98	0.01	USDA

1. MTO Drainage Manual (1997), Design Chart 1.09-Soil/Land Use Curve Numbers
2. USDA (1986), Urban Hydrology for Small Watersheds, Table 2.2-Runoff Curve Numbers for Urban Areas

HYDROLOGIC SOIL TYPE (%) - Existing Conditions

Catchment	Hydrologic Soil Type							TOTAL
	A	AB	B	BC	C	CD	D	
101				100				100
102				100				100
103*				100				100

LAND USE (%) - Existing Conditions

Catchment	Meadow	Woodlot	Gravel	Lawns	Pasture Range	Crop	Fallow (Bare)	Low Density Residences	Impervious	Total
101					100.0					100.0
102					100.0					100.0
103*					100.0					100.0

Note: Where STANDHYD command used (shaded), impervious fraction is not considered in CN determination, since %Imp directly input in STANDHYD command

CURVE NUMBER (CN) - Existing Conditions

Catchment	Meadow	Woodlot	Gravel	Lawns	Pasture Range	Crop	Fallow (Bare)	Low Density Residences	Impervious	Weighted CN
101	0.0	0.0	0.0	0.0	70.5	0.0	0.0	0.0	0.0	71
102	0.0	0.0	0.0	0.0	70.5	0.0	0.0	0.0	0.0	71
103*	0.0	0.0	0.0	0.0	70.5	0.0	0.0	0.0	0.0	71

** AMC II assumed

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Existing Conditions
CN Calculations

SW Stouffville Expansion Area
Project Number: 2234
Date: September 2026
Designer Initials: S.G.

Step	Input Values				
	Subcatchment:	101		102	103*
1	**CN (AMC II):**	**71**		**71**	**71**
2	CN (AMC III) =	86		86	86
3	100 Year Precipitation, P =	88.54	mm	88.54	88.54

$$Q = \frac{(P - Ia)^2}{(P - Ia) + S} \qquad S = \frac{(P - Ia)^2}{Q} - (P - Ia)$$

Q = rainfall excess or runoff, mm
S = potential maximum retention or available storage, mm

$$CN = \frac{25400}{S + 254} \qquad S = \frac{25400}{CN} - 254$$

CN* = modified SCS curve # that better reflects Ia conditions in Ontario

	Output Values				
	Subcatchment:	101		102	103*
	S_{III} =	41.35	mm	41.35	41.35
	SCS Assumption of 0.2 S = Ia =	8.27	mm	8.27	8.27
4	Q_{III} =	52.98	mm	52.98	52.98
	Preferred Initial Abstraction, Ia =	8.0	mm	8.0	8.0
5	S^*_{III} =	41.90	mm	41.90	41.90
6	CN^*_{III} =	85.84	mm	85.84	85.84
	CN^*_{III}=	**86**	Rounded	**86**	**86**
7	**CN^*_{II}=**	**72**	convert	**72**	**72**

Explanation of Procedure

1 Determine CN based on typical AMC II conditions (attached)
2 Convert CN from AMC II to AMC III conditions (standard SCS tables)
3 Get precipitation depth P for 100 year storm
4 Using CN_{III} with Ia = 0.2S, compute Q_{III} for 100 year precipitation
5 For the same Q_{III}, compute S^*_{III} using Ia=1.5mm (or otherwise determined)
6 Compute CN^*_{III} using S^*_{III}
7 Calculate CN^*_{II} using SCS conversion table

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Existing Conditions
IA Calculations

SW Stouffville Expansion Area
Project Number: 2234
Date: September 2026
Designer Initials: S.G.

LAND USE (%) - Existing Conditions

Catchment	Meadow	Woodlot	Gravel	Lawns	Pasture Range	Crop	Fallow (Bare)	Low Density Residences	Impervious	Total
101					100.0					100.0
102					100.0					100.0
103*					100.0					100.0

IA VALUES (mm) - Existing Conditions

Catchment	Meadow	Woodlot	Gravel	Lawns	Pasture Range	Crop	Fallow (Bare)	Low Density Residences	Impervious	Total
IA (mm)	8	10	2	5	8	8	3	2	2	
101					8.0					8.0
102					8.0					8.0
103*					8.0					8.0

* IA values based on TRCA guidelines

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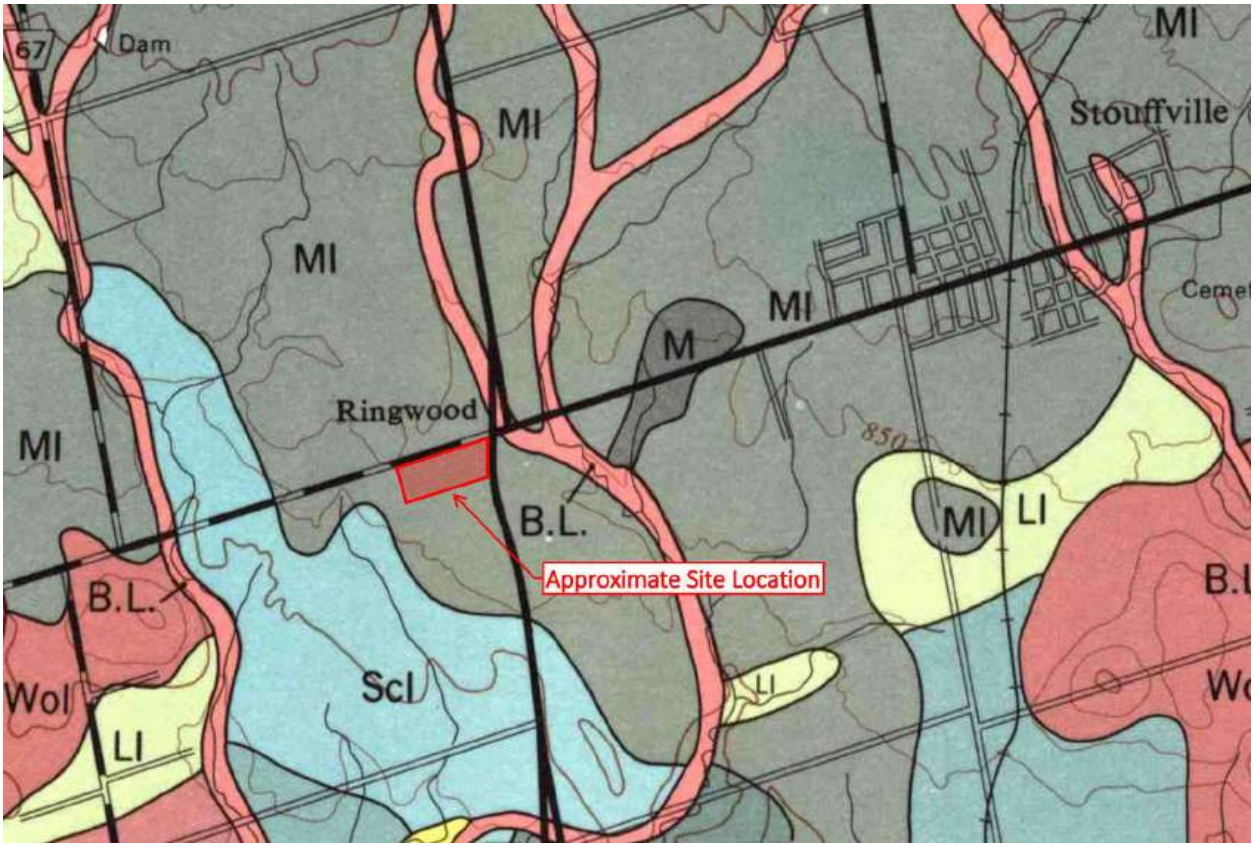
Existing Conditions
Time to Peak Calculations

SW Stouffville Expansion Area
Project Number: 2234
Date: September 2026
Designer Initials: S.G.

Uplands Method:

Catchment ID	High Elevation	Low Elevation	Length (m)	Slope (%)	Land Cover Type	Velocity (m/s)	Time of Concentration (s)	Time of Concentration (hr)	Time to Peak (hr)
101a	259.56	258.40	76	1.52	Pasture	0.27	284.1	0.08	0.05
101									**0.05**
102a	259.56	254.00	397	1.40	Pasture	0.26	1540.7	0.43	0.29
102									**0.29**
103*a	259.56	257.34	133	1.67	Pasture	0.28	471.4	0.13	0.09
103*									**0.09**

Refer to Figure D.3 for flow path elevations and lengths



LEGEND

MAP SYMBOL AND COLOUR	SOIL SERIES	SOIL TYPE	GREAT SOIL GROUP	DRAINAGE	TOPOGRAPHY STONINESS	SURFACE REACTION	PARENT MATERIALS
MI	MILIKEN	loam	Grey-Brown Podzolic	Imperfect	Smooth moderately to gently sloping. Few stones.	Slightly acid.	Medium textured brown shaly calcareous till.

CHART H2-6A - HYDROLOGIC SOIL GROUPS FOR PRINCIPAL SOIL TEXTURES IDENTIFIED ON AGRICULTURAL SOILS MAPS (6)

Soils Series	Soil Texture	Hyd. Soil Grp.	Soils Series	Soil Texture	Hyd. Soil Grp.	Soils Series	Soil Texture	Hyd. Soil Grp.
Alberton	si l	BC	Bolingbr.	s	A	"	c	C
Allendale	s l	B	Bondhead	s l	AB	"	l	BC
Alliston	s l	AB	"	l	B	Camilla	s l	AB
Almonte	si c l	C	Bookton	s l	AB	"	si l	BC
Aneliasbg	c l	C	Boomer	l	B	Campbell	si c	C
"	l	B	Brady	s l	AB	Cane	si l	BC
Ancaster	si l &s	B	"	s	A	"	si c l	C
"	si l	BC	Brant	s &si l	B	Carp	c &c l	C
Anstruther	s	A	Brantford	si l	BC	Casey	si l	BC
Appleton	si l & s	B	"	si c l	C	Cashel	c	D
Atherley	c	C	"	l	BC	Castor	s l	AB
"	si c l	C	"	c l	D	"	si l	BC
Athol	s l	A	Brentha	s l	A	"	c	C
Atwood	c	C	"	l	B	Chesley	si l	BC
Ayr	s l	B	Brethour	si l	BC	"	si c l	C
Bainsville	s	B	Breypen	limest.	B	"	c l	C
"	si l	B	Bridgman	s	A	Chinguac'y	l	BC
Balderson	s l	B	Brighton	s	A	"	si l	BC
[illegible]nford	s	AB	"	s l	AB	"	c l	C
[illegible]icroft	s	A	Brisbane	s g	AB	"	c	D
"	s l	B		l	B	Christy	s l	B
Bass	c	D	Brockport	c	D	Clyde	l	BC
Bastard	s	A	Brooke	l	B	"	si l	BC
Battersea	si l	BC	Brookston	s l	B	"	c l	C
"	s l	AB	"	l	C	"	c	C
Bearbrook	s l	B	"	si l	C	Colborne	s	A
"	si c l	C	"	si c l	C	Colwood	s l	B
"	c	C	"	c l	C	"	si l	B
Belmeade	m & c	B	"	c	C	"	l	BC
Bennington	s l	B	Bucke	s	AB	Codrington	si l	BC
"	s	A	"	s l	AB	Conestogo	l	BC
"	si l	A	Burford	s l	A	Conover	c l	C
Berrien	s	AB	"	l	AB	"	l	BC
"	s l	AB	Burnbrae	l	B	Cooksville	c	D
Berriedale	s & si	AB	Burnstown	l	B	Coutts	s l	AB
Beverly	l	BC	Burpee	s	A	"	l	BC
"	si l	C	Burris	c l	C	Craigleith	c	C
"	si c l	C	Buzwah	si c l	C	Cramahe	s g	A
Binbrook	si l	C	Buzwah	c l	D	Crombie	s l	B
Blackwell	c	C	Caledon	s l	A	"	si l	BC
Blanche	si l	BC	"	l	B	Dack	c	D
Blue	c l	C	Caistor	c l	C	Dalton	s	AB

Notes: 1. See footnotes to Chart H2-2.

2. Key to abbreviations: c - clay; f - fine; g - gravel; l - loam; ma - marl; m - muck; p - peat; r - rock; s - sand; si - silt.

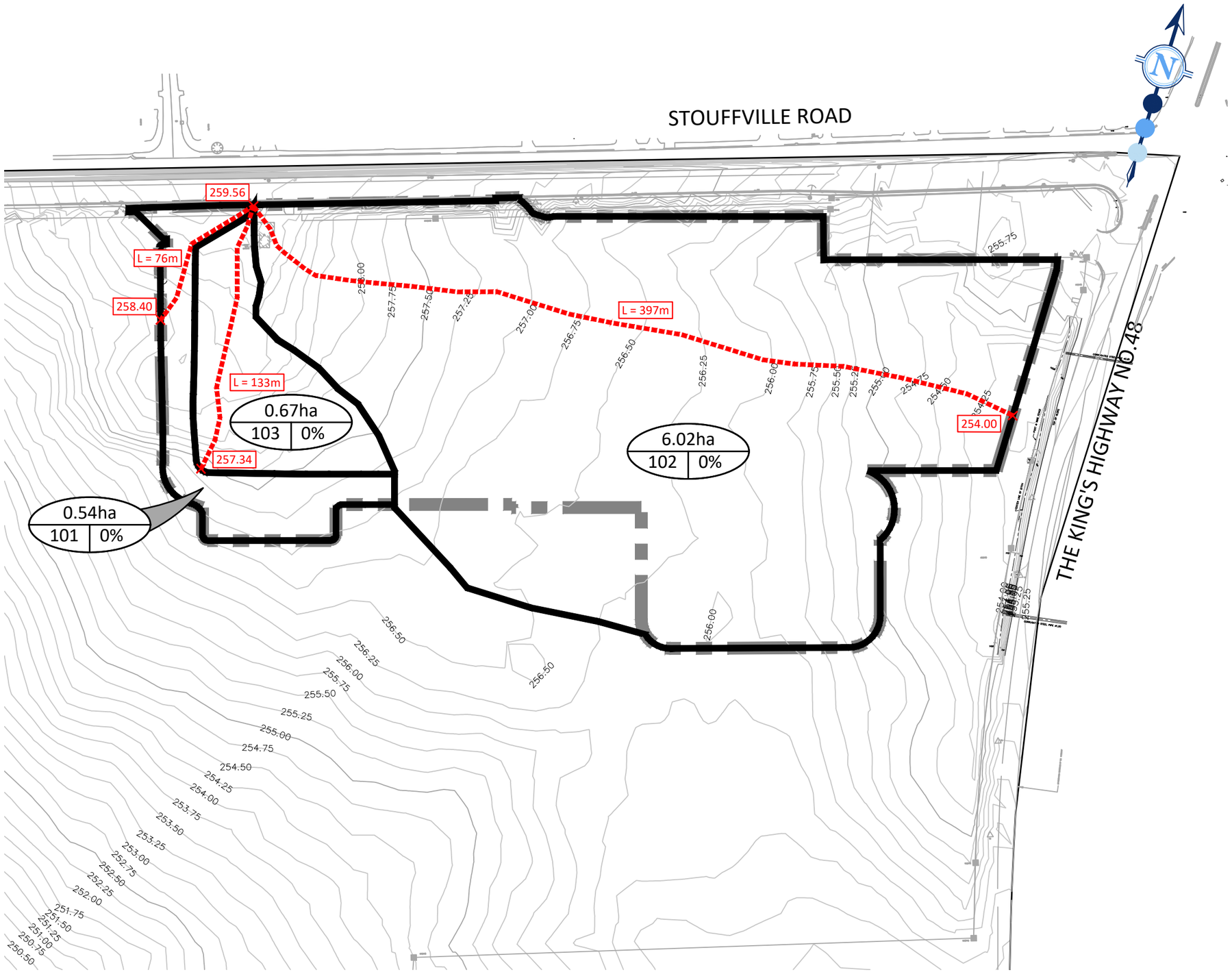
CHART H2 - 6A (Cont'd)

CHART H2-6A - continued

Soils Series	Soil Texture	Hyd. Soil Grp.	Soils Series	Soil Texture	Hyd. Soil Grp.	Soils Series	Soil Texture	Hyd. Soil Grp.
Darlington	s	B	"	c l	C	Heidelburg	f s l	B
"	l	C	Ferndale	si l	BC	Hendrie	s /g	AB
Dawson	s l	A	"	c l	C	Henwood	s /g	A
"	l	B	Flamboro	s	B	Hespeler	s l	B
Deloro	l	B	"	s l	B	Hillier	c &c l	C
Devlin	si c /	C	Floradale	l	B	Hillsburgh	s l	A
	c l		Fonthill	g	A	Himsworth	si l	BC
Dinorwic	c	BC	"	l	B	Hinchinbr.	s l	B
Dobie	c /l	BC	Font	g s l	A	"	l	BC
Doe	s l	B	Forbes	c	D	"	si l	BC
"	si l	BC	Fox	s	A	Honeywood	s l	AB
Donald	l	B	"	s l	AB	"	si l	BC
Donnybrook	s g	A	"	gr l	AB	"	s	A
"	s l	AB	Foxboro	s	A	Howland	s l	B
"	l	B	Franktown	l	B	"	l	BC
Dorion	c /l	C	Freeport	s l	B	Huron	s l	B
Dorking	si c l	BC	Galesburg	s l	A	"	l	BC
Dumfries	s l	A	"	l	AB	"	si l	BC
"	l	AB	Gameland	s /g	AB	"	c l	CorD
Dummer	s l	A	Gananoque	c	C	"	c	D
"	l	B	Gerow	c l	C	Innisville	s l	B
Dundonald	s l	AB	Gilford	s l	B	Jeddo	l	BC
Dunedin	c	D	"	l	B	"	c l	C
Dymond	s l	AB	Gordon	si c	C	"	c	D
"	l	B	Granby	s	B	Kagawong	si l	BC
Eagle Lake	s /g	AB	"	s l	B	Kars	s /g	A
Eamer	l	BC	Grand	l	B	"	s l	B
Earlton	si l	B	Grenville	s l	A	Kemble	si l	BC
"	c l	C	"	l	BC	"	si c l	C
Eastport	s	A	Grimsby	s l	A	"	si c	C
Edenvale	s	AB	Guelph	s l	A	"	c l	D
"	s l	B	"	l	BC	Kenabeek	s	B
Eganville	l	B	"	si l	BC	"	s l	B
Elderslie	si l	BC	Guerin	s l	AB	Killean	l /s l	AB
"	si c l	C	"	l	B	King	si l	BC
"	c l	C	Gwillimb.	g	AB	"	c l	C
Eldorado	s l	A	Haileybury	si c l	C	Kirkland	s l	A
"	l	B	"	si c	C	Kossuth	s l	B
Elk Pit	s g	A	"	c	CD	L'Achigan	s	AB
Ellwood	c l	C	Haldimand	si l	BC	Lambton	l	BC
Elmbrook	si l	BC	"	si c l	C	"	si l	BC
"	c l	C	"	c	CorD	Lanark	c	C
"	c	C	"	c l	C	Lansdowne	c /si l	C
Elmira	l	B	Hanbury	si c l	C	Leech	si c l	C
Elmsley	s l	B	"	si c	C	"	c l	D
Embro	s l	BC	"	c	D	Leitrim	g	B
"	si l	C	Harkaway	l	B	Leith	si l	BC
Emily	l	B	"	si l	BC	Lily	l /s l	B
Emo	c & p	C	Harriston	l	BC	Lincoln	si c	C
Englehart	s l	B	"	si l	BC	"	c	C
Evanturel	si l	BC	Harrow	s	A	Lindsay	c l	C
"	si c l	C	"	s l	AB	"	c	C
Falardeau	si l	BC	"	l	B	Lisbon	s l	A
"	si c l	C	Havelock	s /g	A	Listowel	l	B/BC
Farmington	s l	A	Hawkesvi.	l	B	"	si l	BC
"	l	B	Haysville	s l	AB	Little Cur.	c	C

CHART H2-6A - continued

Soils Series	Soil Texture	Hyd. Soil Grp.	Soils Series	Soil Texture	Hyd. Soil Grp.	Soils Series	Soil Texture	Hyd. Soil Grp.
Lockport	c	D	Mountain	s l	AB	"	l	C
London	l	BC	Muck	m	B	"	si l	C
"	si l	BC	Murray	si l /f		"	si c l	CD
Lovering	si c l	C		s	B	"	c l	CD
"	c	D	Napanee	c /si l	C	"	c	CD
"	c l	CD	Neebing	s /si	B	Petherwick	si l	BC
Lyons	l	B	Nepean	s	AB	Phipps	si c l	C
Macton	l	B	Newburgh	s l	A	"	c l	C
Magnetawan	si l	BC	"	si l	BC	Piccadilly	s l	B
Mallard	s	AB	Newcastle	l	BC	"	l	BC
"	s l	AB	"	c l	C	"	si l	BC
Malton	c	C	"	si l	BC	Pike	c	D
Mannheim	l	B	Newton	s l	B	Pike Lake	l	B
Manotick	s	AB	Nelson	c	D	Plainfield	s	A
Maplewood	si l	BC	New lisk.	si c	C	Pontypool	s	A
Marionville	s	B	"	c	C	"	s l	AB
"	s l	B	Niagara	c	D	Powassan	si l	BC
Martin	s /g	AB	Nipissing	s /si	B	Preston	s l	B
Maryhill	l	BC	Norham	si l	BC	Raglan	s /g	A
Matilda	l	BC	North Gow.	c l	C	Rainy Riv.	p	B
Matson	si l	BC	"	c	C	Renfrew	c l	C
Medonte	si l	BC	O'Connor	c	D	"	l	BC
"	si c l	C	Oliver	l /si l	B-BC	Rideau	c l	D
McCool	c	C	Oneida	l	BC	"	c	D
McInnis Cr	c l/l		"	si l	BC	Rosslyn	s /g	A
	&P	BC	"	si c l	C	Rubicon	s	AB
McIntyre	s	AB	"	c l	D	"	s l	AB
Miami	l	BC	Ontario	l	BC	Sandford	c	D
"	si l	BC	Osgoode	l	BC	Sargent	s /g	A
"	c l	D	"	si l	BC	"	s l	AB
"	g l	AB	"	si c l	C	Saugeen	si l	BC
Milberta	c /si		Oshtemo	s	A	"	si c l	C
	c l	C	Osnabruck	c l	C	"	c l	D
Mill	s	B	Osprey	s l	A	Schomberg	si l	BC
	s l	B	"	l	B	"	si c l	C
Milliken	s l	AB	Otonabee	s l	A	"	c l	C
"	l	BC	"	l	B	Scoble	si c	C
Minesing	ma si		Otterskin	s l	B	Seely's Bay	si c l	C
	c l	BC	Oxdrift	c	D	Shashawan	l	B
"	ma c	C	Paipoonge	c	C	Shenston	c l &p	BC
Mississauga	c	C	Parkhill	l	BC	Sidney	c	C
Monaghan	l	BC	"	si l	BC	Sifton	si c /c	
"	si l	BC	Peat	p	B		l	C
"	c l	C	Peel	c	D	Simcoe	si l	BC
Monteagle	s l	A	Pelham	s l	A	"	si c l	C
"	sl + r	B	Pense	si l	BC	"	c l	C
Moose	s l	B	Pense	si c l	C	Slate River	s /l	B
"	l	BC	Perch	c	C	Smithfield	si l	C
Morley	c si		Percy	s	A	"	si l	C
	c l	C	"	f s l	B	"	c l	CD
Morrisburg	c	C	"	s l	B	Smithville	l	BC
Moscow	si c	C	Perth	s l	AB	"	si c l	C



LEGEND:

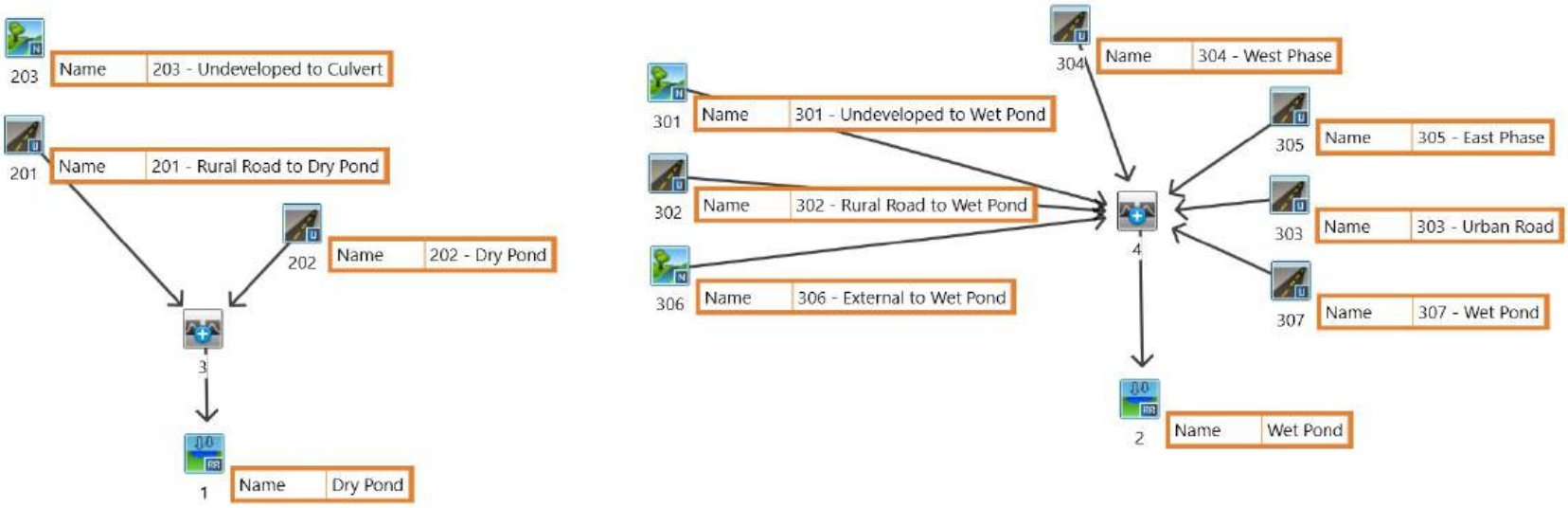
- LIMIT OF DEVELOPMENT
- 256.00 — EXISTING CONTOUR AND ELEVATION
- STORM DRAINAGE BOUNDARY
- L=XXXm — TIME TO PEAK FLOW PATH AND LENGTH
- 256.17 × — TIME TO PEAK ELEVATION
- 1.21ha / 101 | 0% — DRAINAGE AREA (HECTARES); PERCENT (%) IMPERVIOUS; CATCHMENT ID

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30 CENTURIAN DRIVE, SUITE 100
MARKHAM, ONTARIO L3R 8B8
TEL: (905) 475-1900
FAX: (905) 475-8335

5061 STOUFFVILLE ROAD

EXISTING TIME TO PEAK

DESIGNED BY:	J.A.S.	CHECKED BY:	E.T.C.K.
SCALE:	1:2000	DATE:	SEPTEMBER 2026
PROJECT No:	2234	FIGURE No:	D.3


203
Name
203 - Undeveloped to Culvert
201
Name
201 - Rural Road to Dry Pond
202
Name
202 - Dry Pond
3
1
Name
Dry Pond
304
Name
304 - West Phase
301
Name
301 - Undeveloped to Wet Pond
305
Name
305 - East Phase
302
Name
302 - Rural Road to Wet Pond
303
Name
303 - Urban Road
4
306
Name
306 - External to Wet Pond
307
Name
307 - Wet Pond
2
Name
Wet Pond

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Proposed Conditions
VO Parameter Summary

SW Stouffville Expansion Area
Project Number: 2234B
Date: September 2026
Designer Initials: S.G.

NASHYD

Number	203	301	306
Description	Undeveloped to Culvert	Undeveloped to Wet Pond	External to Wet Pond
DT(min)	1	1	1
Area (ha)	0.37	1.69	0.51
CN*	72.0	72.0	72.0
IA(mm)	8.0	8.0	8.0
TP Method	Uplands	Uplands	Uplands
TP (hr)	0.08	0.15	0.09

STANDHYD

Number	201	202	302	303	304	305	307
Description	Rural Road to Dry Pond	Dry Pond	Rural Road to Wet Pond	Urban Road	West Phase	East Phase	Wet Pond
DT(min)	1	1	1	1	1	1	1
Area (ha)	0.43	0.11	0.08	0.63	1.64	1.03	0.73
TIMP[2]	0.56	0.50	0.58	0.63	0.70	0.85	0.50
XIMP[1,2]	0.01	0.50	0.01	0.63	0.70	0.85	0.50
CN*	64.0	64.0	64.0	64.0	64.0	64.0	64.0
IA(mm)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
SLPP(%)	2	2	2	2	2	2	2
LGP(m)	40	40	40	40	40	40	40
MNP	0.25	0.25	0.25	0.25	0.25	0.25	0.25
DPSI (mm)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
SLPI(%)	1	1	1	1	1	1	1
LGI(m)	53.75	26.46	23.79	64.96	104.56	82.87	69.96
MNI	0.013	0.013	0.013	0.013	0.013	0.013	0.013

[1]Note that where there is NO directly connected area (ie: roof runoff to grassed areas), the hydrology program does not accept XIMP=0%, therefore, XIMP = 1% has been used

[2]Note that catchment 305 (East Phase) has an added dry weather flow of TBC to account for short-term condition foundation drainage rate (greater than long-term condition) as per the Hydrogeological Investigation (DS Consultants Ltd., TBC).

Total Area = 7.22 ha

Proposed Conditions
CN Calculations

SW Stouffville Expansion Area
Project Number: 2234B
Date: September 2026
Designer Initials: S.G.

Site Soils: (per York County Soils Mapping)

Soil Type	Hydrologic Soil Group
Milliken Loam	BC

TABLE OF CURVE NUMBERS (CN's)**									
Land Use	Hydrologic Soil Type							Manning's 'n'	Source
	A	AB	B	BC	C	CD	D		
Meadow "Good"	30	44	58	64.5	71	74.5	78	0.40	MTO
Woodlot "Fair"	36	48	60	66.5	73	76	79	0.40	MTO
Gravel	76	80.5	85	87	89	90	91	0.30	USDA
Lawns "Good"	39	50	61	67.5	74	77	80	0.25	USDA
Pasture/Range	58	61.5	65	70.5	76	78.5	81	0.17	MTO
Crop	66	70	74	78	82	84	86	0.13	MTO
Fallow (Bare)	77	82	86	89	91	93	94	0.05	MTO
Low Density Residences	57	64.5	72	76.5	81	83.5	86	0.25	USDA
Streets, paved	98	98	98	98	98	98	98	0.01	USDA

1. MTO Drainage Manual (1997), Design Chart 1.09-Soil/Land Use Curve Numbers
2. USDA (1986), Urban Hydrology for Small Watersheds, Table 2.2-Runoff Curve Numbers for Urban Areas

HYDROLOGIC SOIL TYPE (%) - Proposed Conditions								
Catchment	Hydrologic Soil Type							TOTAL
	A	AB	B	BC	C	CD	D	
203				100				100
301				100				100
306				100				100
201				100				100
202				100				100
302				100				100
303				100				100
304				100				100
305				100				100
307				100				100

LAND USE (%) - Proposed Conditions										
Catchment	Meadow	Woodlot	Gravel	Lawns	Pasture Range	Crop	Fallow (Bare)	Low Density Residences	Impervious	Total
203					100.0					100.0
301					100.0					100.0
306					100.0					100.0
201				100.0						100.0
202				100.0						100.0
302				100.0						100.0
303				100.0						100.0
304				100.0						100.0
305				100.0						100.0
307				100.0						100.0

Note: Where STANDHYD command used (shaded), impervious fraction is not considered in CN determination, since %Imp directly input in STANDHYD command

CURVE NUMBER (CN) - Proposed Conditions										
Catchment	Meadow	Woodlot	Gravel	Lawns	Pasture Range	Crop	Fallow (Bare)	Low Density Residences	Impervious	Weighted CN
203	0.0	0.0	0.0	0.0	70.5	0.0	0.0	0.0	0.0	71
301	0.0	0.0	0.0	0.0	70.5	0.0	0.0	0.0	0.0	71
306	0.0	0.0	0.0	0.0	70.5	0.0	0.0	0.0	0.0	71
201	0.0	0.0	0.0	67.5	0.0	0.0	0.0	0.0	0.0	68
202	0.0	0.0	0.0	67.5	0.0	0.0	0.0	0.0	0.0	68
302	0.0	0.0	0.0	67.5	0.0	0.0	0.0	0.0	0.0	68
303	0.0	0.0	0.0	67.5	0.0	0.0	0.0	0.0	0.0	68
304	0.0	0.0	0.0	67.5	0.0	0.0	0.0	0.0	0.0	68
305	0.0	0.0	0.0	67.5	0.0	0.0	0.0	0.0	0.0	68
307	0.0	0.0	0.0	67.5	0.0	0.0	0.0	0.0	0.0	68

** AMC II assumed

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Proposed Conditions
CN Calculations

SW Stouffville Expansion Area
Project Number: 2234B
Date: September 2026
Designer Initials: S.G.

Step	Input Values											
	Subcatchment:	203		301	306	201	202	302	303	304	305	307
1	**CN (AMC II):**	**71**		**71**	**71**	**68**	**68**	**68**	**68**	**68**	**68**	**68**
2	CN (AMC III) =	86		86	86	84	84	84	84	84	84	84
3	100 Year Precipitation, P =	88.54	mm	88.54	88.54	88.54	88.54	88.54	88.54	88.54	88.54	88.54

$$Q = \frac{(P - Ia)^2}{(P - Ia) + S} \qquad S = \frac{(P - Ia)^2}{Q} - (P - Ia)$$

Q = rainfall excess or runoff, mm
S = potential maximum retention or available storage, mm

$$CN = \frac{25400}{S + 254} \qquad S = \frac{25400}{CN} - 254$$

CN* = modified SCS curve # that better reflects Ia conditions in Ontario

	Output Values											
	Subcatchment:	203		301	306	201	202	302	303	304	305	307
	S_{III} =	41.35	mm	41.35	41.35	48.38	48.38	48.38	48.38	48.38	48.38	48.38
	SCS Assumption of 0.2 S = Ia =	8.27	mm	8.27	8.27	9.68	9.68	9.68	9.68	9.68	9.68	9.68
4	Q_{III} =	52.98	mm	52.98	52.98	48.88	48.88	48.88	48.88	48.88	48.88	48.88
	Preferred Initial Abstraction, Ia =	8.0	mm	8.0	8.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
5	S^*_{III} =	41.90	mm	41.90	41.90	59.24	59.24	59.24	59.24	59.24	59.24	59.24
6	CN^*_{III} =	85.84	mm	85.84	85.84	81.09	81.09	81.09	81.09	81.09	81.09	81.09
	CN^*_{III}=	**86**	Rounded	**86**	**86**	**81**	**81**	**81**	**81**	**81**	**81**	**81**
7	**CN^*_{II}=**	**72**	convert	**72**	**72**	**64**	**64**	**64**	**64**	**64**	**64**	**64**

Explanation of Procedure

1 Determine CN based on typical AMC II conditions (attached)
2 Convert CN from AMC II to AMC III conditions (standard SCS tables)
3 Get precipitation depth P for 100 year storm
4 Using CN_{III} with Ia = 0.2S, compute Q_{III} for 100 year precipitation
5 For the same Q_{III}, compute S^*_{III} using Ia=1.5mm (or otherwise determined)
6 Compute CN^*_{III} using S^*_{III}
7 Calculate CN^*_{II} using SCS conversion table

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Proposed Conditions
IA Calculations

SW Stouffville Expansion Area
Project Number: 2234B
Date: September 2026
Designer Initials: S.G.

LAND USE (%) - Proposed Conditions										
Catchment	Meadow	Woodlot	Gravel	Lawns	Pasture Range	Crop	Fallow (Bare)	Low Density Residences	Impervious	Total
203					100.0					100.0
301					100.0					100.0
306					100.0					100.0
201				100.0						100.0
202				100.0						100.0
302				100.0						100.0
303				100.0						100.0
304				100.0						100.0
305				100.0						100.0
307				100.0						100.0

IA VALUES (mm) - Proposed Conditions										
Catchment	Meadow	Woodlot	Gravel	Lawns	Pasture Range	Crop	Fallow (Bare)	Low Density Residences	Impervious	Total
IA (mm)	8	10	2	5	8	8	3	2	2	
203					8.0					8.0
301					8.0					8.0
306					8.0					8.0
201				5.0						5.0
202				5.0						5.0
302				5.0						5.0
303				5.0						5.0
304				5.0						5.0
305				5.0						5.0
307				5.0						5.0

* IA values based on TRCA guidelines

Proposed Conditions
Time to Peak Calculations

Uplands Method:

Catchment ID	High Elevation	Low Elevation	Length (m)	Slope (%)	Land Cover Type	Velocity (m/s)	Time of Concentration (s)	Time of Concentration (hr)	Time to Peak (hr)
203a	259.53	257.43	118	1.78	Pasture	0.29	405.7	0.11	0.08
203									**0.08**
301a	259.53	257.65	181	1.04	Pasture	0.22	816.8	0.23	0.15
301									**0.15**
306a	258.47	256.17	140	1.64	Pasture	0.28	503.1	0.14	0.09
306									**0.09**

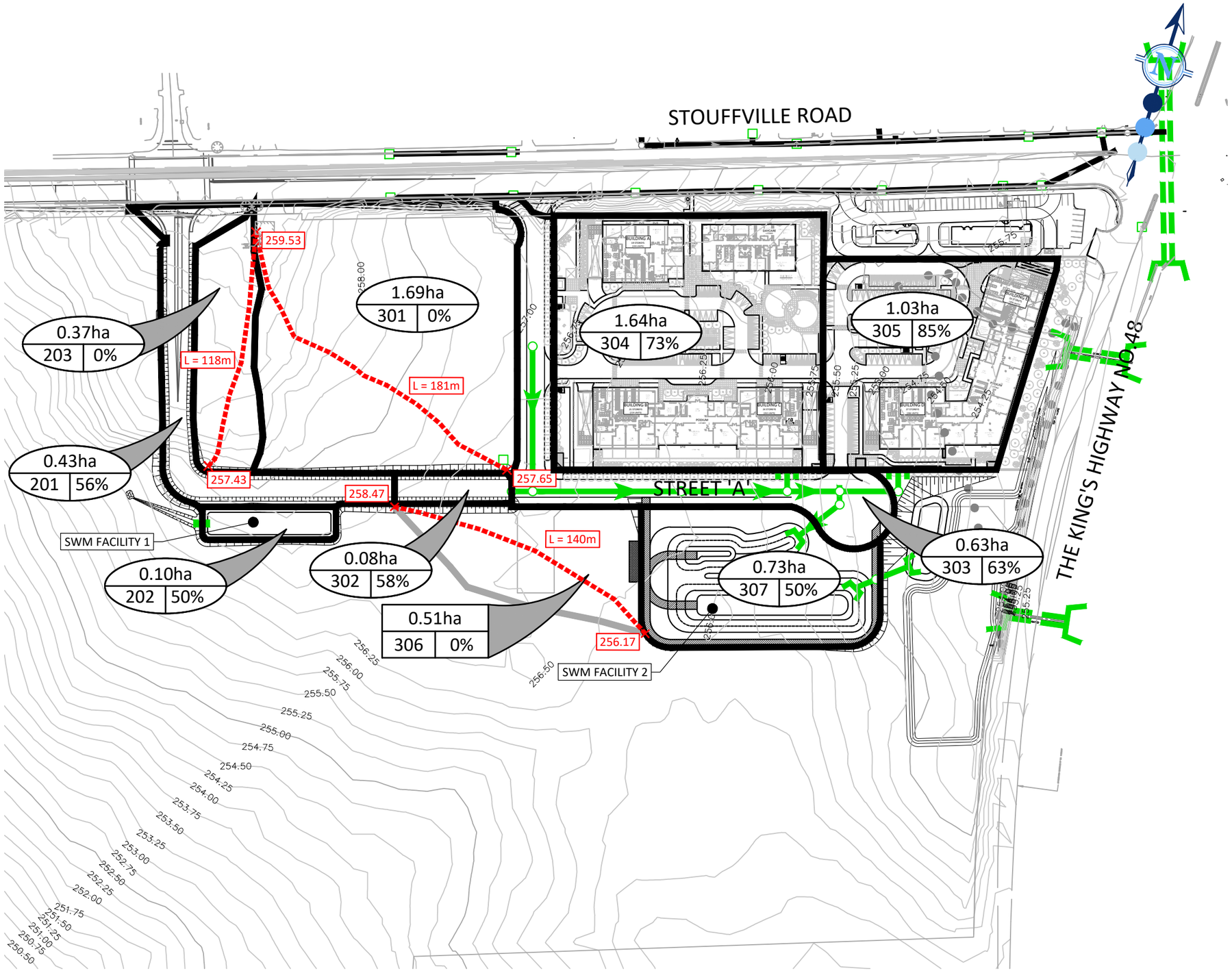
Refer to Figure D.4 for flow path elevations and lengths

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Proposed Conditions
Percent Impervious Calculations

SW Stouffville Expansion Area
Project Number: 2234B
Date: September 2026
Designer Initials: S.G.

			StandHyd IDs							
			201	202	302	303	304	305	307	
Catchment Area (ha)			0.43	0.11	0.08	0.63	1.64	1.03	0.73	
Land Use Areas	Timp	Ximp	Land Use Areas							Total
Roof Area	100%	100%					0.50	0.41		0.91
Grass/Landscape/Greenroof	0%	0%	0.19		0.04	0.24	0.49	0.15		1.11
Rural Road Paved	100%	0%	0.24		0.05					0.29
Asphalt/Paved	100%	100%				0.40	0.65	0.47		1.51
SWM Pond	50%	50%		0.11					0.73	0.84
	Total Land Use =		0.43	0.11	0.08	0.63	1.64	1.03	0.73	4.66
	Timp =		56%	50%	58%	63%	70%	85%	50%	67%
	Ximp =		0%	50%	0%	63%	70%	85%	50%	61%



LEGEND:

- LIMIT OF DEVELOPMENT
- 256.00 — EXISTING CONTOUR AND ELEVATION
- STORM DRAINAGE BOUNDARY
- EXTERNAL STORM DRAINAGE BOUNDARY
- L=XXXm — TIME TO PEAK FLOW PATH AND LENGTH
- 256.17 × — TIME TO PEAK ELEVATION
- 0.73ha / 307 | 50% / CATCHMENT ID — DRAINAGE AREA (HECTARES), PERCENT (%) IMPERVIOUS, CATCHMENT ID
- AREA / ID | IMP% — EXTERNAL STORM DRAINAGE AREA (HECTARES), PERCENT (%) IMPERVIOUS, CATCHMENT ID

*NOTE: LAYOUT IS SCHEMATIC ONLY, DETAILS TO BE PROVIDED AT DETAILED DESIGN STAGE.

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5061 STOUFFVILLE ROAD

PROPOSED TIME TO PEAK

DESIGNED BY:	J.A.S.	CHECKED BY:	E.T.C.K.
SCALE:	1:2000	DATE:	SEPTEMBER 2026
PROJECT No:	2234	FIGURE No:	D.4

File: P:\2234 SW Stouffville Expansion Area–Times\Drawings\FSP\Fig\Report Figures\2234P–D.4–PEAK.dwg – Revised by <JZHANG> : Thu, May 01 2025 – 5:29pm

Appendix D-3 SWM Facility Calculations



SWM Facility 1 (Dry Pond)
Extended Detention Sizing

SW Stouffville Expansion Area
Project Number: 2234B
Date: September 2026
Designer Initials: S.G.

EXTENDED DETENTION

Using the 25mm - 4 hour Chicago Storm

Erosion Control Volume (V) = Runoff Depth (mm) x Drainage Area (ha) x 10 (m^3) / (mm)(ha)

Erosion Control Volume (V) = 7.56 mm x 0.54 ha x 10 m^3 / mm·ha

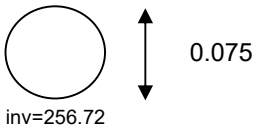
Erosion Control Volume (V) = 41 m^3

SWM Facility 1 (Dry Pond)
Control Structure Summary

SW Stouffville Expansion Area
Project Number: 2234B
Date: September 2026
Designer Initials: S.G.

Orifice 1

Invert =	256.72	m
Size =	0.075	m
Orifice Coefficient, C =	0.62	
Obvert =	256.795	m



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SWM Facility 1 (Dry Pond)
Outflow Summary

SW Stouffville Expansion Area
Project Number: 2234B
Date: September 2026
Designer Initials: S.G.

Starting Water Level (m) = 256.75
Elevation Increment (m) = 0.02

Shading represents Storage-Discharge pairings used in VO modelling

Upstream Elevation (m)	Orifice 1 Outflow (cms)	Backwater Elevation (m)	Stage (m)	Total Flow (cms)	Storage (m^3)	Detention Time (hrs)	6 Hour AES	12 Hour AES	SWMF Info
256.75	0.000	0.00	256.75	0.000	0	0.0			
256.77	0.001	0.00	256.77	0.001	0	0.0			
256.79	0.002	0.00	256.79	0.002	1	0.0			
256.81	0.003	0.00	256.81	0.003	2	0.1			
256.83	0.003	0.00	256.83	0.003	4	0.3			
256.85	0.004	0.00	256.85	0.004	6	0.5			
256.87	0.004	0.00	256.87	0.004	8	0.6			
256.89	0.004	0.00	256.89	0.004	12	0.8			
256.91	0.005	0.00	256.91	0.005	15	1.1			
256.93	0.005	0.00	256.93	0.005	19	1.3			
256.95	0.005	0.00	256.95	0.005	24	1.5			
256.97	0.006	0.00	256.97	0.006	29	1.8	2 Year	2 Year	
256.99	0.006	0.00	256.99	0.006	34	2.1			
257.01	0.006	0.00	257.01	0.006	40	2.3			Extended Detention
257.03	0.006	0.00	257.03	0.006	47	2.6			
257.05	0.007	0.00	257.05	0.007	54	2.9	5 Year	5 Year	
257.07	0.007	0.00	257.07	0.007	61	3.2			
257.09	0.007	0.00	257.09	0.007	69	3.5		10 Year	
257.11	0.007	0.00	257.11	0.007	77	3.9	10 Year		
257.13	0.007	0.00	257.13	0.007	86	4.2			
257.15	0.008	0.00	257.15	0.008	95	4.6		25 Year	
257.17	0.008	0.00	257.17	0.008	105	4.9	25 Year		
257.19	0.008	0.00	257.19	0.008	115	5.3			
257.21	0.008	0.00	257.21	0.008	126	5.6		50 Year	
257.23	0.008	0.00	257.23	0.008	137	6.0	50 Year		
257.25	0.009	0.00	257.25	0.009	149	6.4		100 Year	
257.27	0.009	0.00	257.27	0.009	161	6.8	100 Year		
257.29	0.009	0.00	257.29	0.009	174	7.2			
257.31	0.009	0.00	257.31	0.009	187	7.6			
257.33	0.009	0.00	257.33	0.009	200	8.0			
257.35	0.009	0.00	257.35	0.009	214	8.4			
257.37	0.009	0.00	257.37	0.009	228	8.8			
257.39	0.010	0.00	257.39	0.010	242	9.2			
257.41	0.010	0.00	257.41	0.010	256	9.6			
257.43	0.010	0.00	257.43	0.010	271	10.1			
257.45	0.010	0.00	257.45	0.010	286	10.5			
257.47	0.010	0.00	257.47	0.010	301	10.9			
257.49	0.010	0.00	257.49	0.010	316	11.3			
257.51	0.011	0.00	257.51	0.011	331	11.7			
257.53	0.011	0.00	257.53	0.011	347	12.1			
257.55	0.011	0.00	257.55	0.011	363	12.5			
257.57	0.011	0.00	257.57	0.011	379	12.9			
257.59	0.011	0.00	257.59	0.011	396	13.4			
257.61	0.011	0.00	257.61	0.011	413	13.8			
257.63	0.011	0.00	257.63	0.011	430	14.2			
257.65	0.011	0.00	257.65	0.011	447	14.6			
257.67	0.012	0.00	257.67	0.012	464	15.0			
257.69	0.012	0.00	257.69	0.012	482	15.5			
257.71	0.012	0.00	257.71	0.012	500	15.9			
257.73	0.012	0.00	257.73	0.012	518	16.3			
257.75	0.012	0.00	257.75	0.012	536	16.7			
257.77	0.012	0.00	257.77	0.012	555	17.2			
257.79	0.012	0.00	257.79	0.012	574	17.6			Top of Pond (257.80)

Weighted Impervious Calculation

Catchment ID	Total Area (ha)	Imperviousness (%)	Impervious Area (ha)
301	1.69	0	0.00
302	0.08	58	0.05
303	0.63	63	0.40
304	1.64	70	1.15
305	1.03	85	0.88
306	0.51	0	0.00
307	0.73	50	0.37
Total	**6.31**	**45**	**2.83**

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Permanent Pool and Extended Detention Sizing

SW Stouffville Expansion Area
Project Number: 2234B
Date: September 2026
Designer Initials: S.G.

Permanent Pool

Level of Protection = Enhanced (Level 1)

Weighted Impervious = 45 %

Drainage Area = 6.31 ha

SWMP Type = 4. Wet Pond

Required Water Quality Control (including 40m^3/ha for extended detention)= 164.7 m^3/ha
Required Permanent Pool (minus 40m^3/ha for extended detention)= 125 m^3/ha

Required Permanent Pool = 787 m^3

TABLE 3.2 - WATER QUALITY STORAGE REQUIREMENTS
(FROM MOE SWM PLANNING AND DESIGN MANUAL - 2003)

Protection Level	SWMP Type	Storage Volume (m^3/ha) for Impervious Level			
		35%	55%	70%	85%
Enhanced (Level 1)	1. Infiltration	25	30	35	40
	2. Wetlands	80	105	120	140
	3. Hybrid Wet Pond/Wetland	110	150	175	195
	4. Wet Pond	140	190	225	250
Normal (Level 2)	1. Infiltration	20	20	25	30
	2. Wetlands	60	70	80	90
	3. Hybrid Wet Pond/Wetland	75	90	105	120
	4. Wet Pond	90	110	130	150
Basic (Level 3)	1. Infiltration	20	20	20	20
	2. Wetlands	60	60	60	60
	3. Hybrid Wet Pond/Wetland	60	70	75	80
	4. Wet Pond	60	75	85	95
	5. Dry Pond (Continuous Flow)	90	150	200	240

Extended Detention

Using the 25mm - 4 hour Chicago Storm

Erosion Control Volume (V) = Runoff Depth (mm) x Drainage Area (ha) x 10 (m^3) / (mm)(ha)

Erosion Control Volume (V) = 12.02 mm x 6.31 ha x 10 m^3 / mm·ha

Erosion Control Volume (V) = 758 m^3

Using 40m^3/ha

Extended Detention Volume (V) = 40m^3/ha x Drainage Area (ha)

Extended Detention Volume (V) = 40 m^3/ha 6.31 ha

Extended Detention Volume (V) = 252 m^3

Governing Volume (V) = 758 m^3

SW Stouffville Expansion Area
Project Number: 2234B
Date: September 2026
Designer Initials: S.G.

Permanent Pool and Extended Detention Sizing

Elevation (m)	Area (m^2)	Area (m^2)	H (m)	Vol (m^3)	Volume (m^3)	Storage (m^3)	Depth (m)	
253.85	762				0		0	
		1052	0.57	599				
254.42	1341				599		0.57	
		1855	0.43	798				
254.85	**2369**				1397	0	1.00	**N.W.L.**
		2972	0.43	1278				
255.28	3574				2675	1278	1.43	
		4341	0.87	3777				
256.15	5108				6452	5054	2.30	

Permanent Pool Volume Required = 787 m^3
Permanent Pool Volume Provided = 1397 m^3

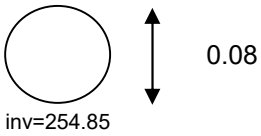
SCS consulting group ltd

SWM Facility 2 (Wet Pond)
Control Structure Summary

SW Stouffville Expansion Area
Project Number: 2234B
Date: September 2026
Designer Initials: S.G.

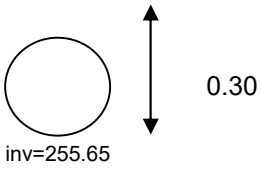
Orifice 1

Invert =	254.85	m
Size =	0.080	m
Orifice Coefficient, C =	0.62	
Obvert =	254.93	m



Orifice 2

Invert =	255.65	m
Size =	0.300	m
C =	0.62	
Obvert =	255.95	m



SCS consulting group ltd

SWM Facility 2 (Wet Pond)
Outflow Summary

SW Stouffville Expansion Area
Project Number: 2234B
Date: September 2026
Designer Initials: S.G.

Starting Water Level (m) = 254.85
Elevation Increment (m) = 0.02

Shading represents Storage-Discharge pairings used in VO modelling

Upstream Elevation (m)	Orifice 1 Outflow (cms)	Orifice 2 Outflow (cms)	Backwater Elevation (m)	Stage (m)	Total Flow (cms)	Storage (m^3)	Detention Time (hrs)	6 Hour AES	12 Hour AES	SWMF Info
254.85	0.000	0.000	0.00	254.85	0.000	0	0.0			
254.87	0.000	0.000	0.00	254.87	0.000	48	0.0			
254.89	0.000	0.000	0.00	254.89	0.000	97	0.0			
254.91	0.002	0.000	0.00	254.91	0.002	147	12.8			
254.93	0.003	0.000	0.00	254.93	0.003	198	18.8			
254.95	0.003	0.000	0.00	254.95	0.003	251	23.6			
254.97	0.004	0.000	0.00	254.97	0.004	304	27.7			
254.99	0.004	0.000	0.00	254.99	0.004	359	31.3			
255.01	0.005	0.000	0.00	255.01	0.005	415	34.7			
255.03	0.005	0.000	0.00	255.03	0.005	472	37.9			
255.05	0.006	0.000	0.00	255.05	0.006	530	40.9			
255.07	0.006	0.000	0.00	255.07	0.006	589	43.8			
255.09	0.006	0.000	0.00	255.09	0.006	649	46.6			
255.11	0.006	0.000	0.00	255.11	0.006	711	49.3			
255.13	0.007	0.000	0.00	255.13	0.007	773	51.9			Ext. Detention
255.15	0.007	0.000	0.00	255.15	0.007	837	54.5			
255.17	0.007	0.000	0.00	255.17	0.007	902	57.0			
255.19	0.008	0.000	0.00	255.19	0.008	967	59.4			
255.21	0.008	0.000	0.00	255.21	0.008	1034	61.9			
255.23	0.008	0.000	0.00	255.23	0.008	1103	64.2	2 Year		
255.25	0.008	0.000	0.00	255.25	0.008	1172	66.6			
255.27	0.009	0.000	0.00	255.27	0.009	1242	68.9		2 Year	
255.29	0.009	0.000	0.00	255.29	0.009	1314	71.2			
255.31	0.009	0.000	0.00	255.31	0.009	1386	73.5			
255.33	0.009	0.000	0.00	255.33	0.009	1459	75.7			
255.35	0.009	0.000	0.00	255.35	0.009	1532	77.9	5 Year		
255.37	0.010	0.000	0.00	255.37	0.010	1607	80.1			
255.39	0.010	0.000	0.00	255.39	0.010	1682	82.3			
255.41	0.010	0.000	0.00	255.41	0.010	1757	84.4		5 Year	
255.43	0.010	0.000	0.00	255.43	0.010	1834	86.5			
255.45	0.010	0.000	0.00	255.45	0.010	1911	88.6	10 Year		
255.47	0.011	0.000	0.00	255.47	0.011	1989	90.7			
255.49	0.011	0.000	0.00	255.49	0.011	2067	92.7		10 Year	
255.51	0.011	0.000	0.00	255.51	0.011	2146	94.8			
255.53	0.011	0.000	0.00	255.53	0.011	2226	96.8			
255.55	0.011	0.000	0.00	255.55	0.011	2307	98.8			
255.57	0.011	0.000	0.00	255.57	0.011	2388	100.8	25 Year		
255.59	0.012	0.000	0.00	255.59	0.012	2470	102.8			
255.61	0.012	0.000	0.00	255.61	0.012	2553	104.8		25 Year	
255.63	0.012	0.000	0.00	255.63	0.012	2637	106.8			
255.65	0.012	0.000	0.00	255.65	0.012	2721	108.7	50 Year		
255.67	0.012	0.000	0.00	255.67	0.013	2806	110.6			
255.69	0.012	0.002	0.00	255.69	0.014	2891	112.4		50 Year	
255.71	0.013	0.004	0.00	255.71	0.017	2978	114.0	100 Year		
255.73	0.013	0.007	0.00	255.73	0.020	3065	115.3			
255.75	0.013	0.011	0.00	255.75	0.024	3152	116.4		100 Year	
255.77	0.013	0.015	0.00	255.77	0.028	3241	117.4			
255.79	0.013	0.020	0.00	255.79	0.033	3330	118.2			
255.81	0.013	0.020	0.00	255.81	0.033	3420	118.9			
255.83	0.013	0.034	0.00	255.83	0.047	3510	119.5			
255.85	0.014	0.043	0.00	255.85	0.057	3601	120.0			
255.87	0.014	0.051	0.00	255.87	0.065	3693	120.5			
255.89	0.014	0.058	0.00	255.89	0.072	3786	120.8			
255.91	0.014	0.064	0.00	255.91	0.078	3879	121.2			
255.93	0.014	0.070	0.00	255.93	0.084	3973	121.5			
255.95	0.014	0.075	0.00	255.95	0.089	4068	121.8			
255.97	0.014	0.080	0.00	255.97	0.094	4163	122.1			
255.99	0.014	0.085	0.00	255.99	0.099	4260	122.4			
256.01	0.015	0.089	0.00	256.01	0.104	4356	122.6			
256.03	0.015	0.093	0.00	256.03	0.108	4454	122.9			
256.05	0.015	0.097	0.00	256.05	0.112	4552	123.1			
256.07	0.015	0.101	0.00	256.07	0.116	4651	123.4			
256.09	0.015	0.105	0.00	256.09	0.120	4751	123.6			
256.11	0.015	0.108	0.00	256.11	0.123	4851	123.8			
256.13	0.015	0.112	0.00	256.13	0.127	4953	124.1			
256.15	0.015	0.115	0.00	256.15	0.130	5054	124.3			Top of Pond

SCS consulting group ltd

Rouge River Watershed
East Outlet On-Site Retention

SW Stouffville Expansion Area
Project Number: 2234B
Date: September 2026
Designer Initials: J.A.S.

Required Retention Volume

Catchment	Total Area (ha)	Percent Impervious (%)	Impervious Area (ha)	Retention Depth (mm)	Required Retention Volume (m^3)
301	1.69	0	0.00	15	0.0
302	0.08	58	0.05	15	7.0
303	0.63	63	0.40	15	59.5
304	1.64	70	1.15	15	172.2
305	1.03	85	0.88	15	131.3
306	0.51	0	0.00	15	0.0
307	0.73	50	0.37	15	54.8
Total	**6.31**	**45**	**2.83**	**-**	**424.8**

*Refer to Figure 3.3 for Catchment Areas and Percent Impervious

Retention via Greenroof

Surface Area =	1042	m^2	(Daycare Center (Building F) Roof Area)
Retention Depth =	15	mm	(Max. retention of 44-51 mm per ZinCo Sedum Roof Plus with Floradrain FD 25-E Water Retention Capacity)
Provided Retention Volume =	**15.6**	**m^3**	

Retention via Underground Tanks (Reuse for Irrigation)

Provided Tank Volume (West Phase) =	40.5	m^3	(per Preliminary Irrigation Water Consumption Calculation prepared by Schollen, April 2025)
Provided Tank Volume (East Phase) =	16.0	m^3	
Provided Retention Volume =	**56.5**	**m^3**	

Retention via End-of-Pipe Infiltration Facility

Top of Storage Area (254.85 m) =	655	m^2
Bottom of Storage Area (254.00 m) =	335	m^2
Storage Depth =	0.85	m
Total Storage Volume* =	420.8	m^3
Provided Retention Volume* =	**352.7**	m^3

Retention Summary

Required Retention Volume =	**424.8**	**m^3**
Total Provided Retention Volume =	**424.8**	**m^3**

Note:
*A total storage volume of 420.8 m3 is provided within the End-of-Pipe Infiltration Facility, however only the volume required to achieve the site wide retention volume target (352.7 m3) is considered in the Infiltration Drawdown Time calculations. The total provided storage is considered in the water balance mitigation calculations.

Infiltration Drawdown Time Calculations

End-of-Pipe Infiltration Facility

Infiltration Area (Bottom of Storage Area) =	335	m^2	
Infiltration Area (Half of Side Slope Area) =	160	m^2	
Total Infiltration Area =	**495.1**	m^2	
Infiltration Rate =	25.0	mm/hr	(refer to Hydraulic Conductivity Linear Interpolation calculations)
Factor of Safety =	2.5		
Design Infiltration Rate =	**10.0**	**mm/hr**	
Infiltration Volume =	352.7	m^3	
Infiltration Volume Drawdown Time =	**71.2**	m	

Therefore, the volume required to achieve the site wide retention volume target will drawdown within 72 hours

Rouge River Watershed
West Outlet On-Site Retention

Required Retention Volume

Catchment	Total Area (ha)	Percent Impervious (%)	Impervious Area (ha)	Retention Depth (mm)	Required Retention Volume (m^3)
201	0.43	56	0.24	15	36.1
Total	**0.43**	**56**	**0.24**	**-**	**36.1**

*Refer to Figure 3.3 for Catchment Areas and Percent Impervious

Retention via Infiltration/Filtration Trenches

Width =	1	m
Length =	150	m
Media Depth =	0.6	m
Porosity =	0.4	
Provided Retention Volume =	**36.1**	**m^3**

Retention Summary

Required Retention Volume =	**36.1**	**m^3**
Total Provided Retention Volume =	**36.1**	**m^3**

Appendix E Sanitary Flow Calculations

SCS consulting group ltd

Sanitary Design Sheet
Times Stoufville
Expansion Area
Stouffville

Minimum Sewer Diameter (mm) =	200	Avg. Domestic Flow (l/cap/day) =	350
Mannings n =	0.013	Infiltration Rate (l/s/ha) =	0.23
Minimum Velocity (m/s) =	0.60	Max. Harmon Peaking Factor =	4.0
Maximum Velocity (m/s) =	3	Min. Harmon Peaking Factor =	2.0
Minimum Pipe Slope (%) =	0.30	NOMINAL PIPE SIZE USED	

: Proposed daycare drainage area was assumed to be total site area for conservative estimate, at 80 people per hectare

Project: Times Stoufville
Project No. 2234
Date: 28-Sep-26
Designed By: KP
Reviewed By: PC
P:\2234 SW Stouffville Expansion Area-Times\Design\Pipe Design\Sanitary\[2234 - Sanitary Sheet Design.xlsm]Design

LOCATION			RESIDENTIAL							INDUSTRIAL/COMMERCIAL/INSTITUTIONAL					FLOW CALCULATIONS									PIPE DATA					
STREET	MANHOLE		AREA	ACCUM. AREA	UNITS	DENSITY		RESIDENTIAL POPULATION	ACCUM. RESIDENTIAL POPULATION	AREA	ACCUM. AREA	POPULATION DENSITY	FLOW RATE	ACCUM. EQUIV. POPULATION	INFILTRATION	TOTAL ACCUM. POPULATION	AVG. DOMESTIC FLOW	ACCUM. AVG. DOMESTIC FLOW	PEAKING FACTOR	PEAKED RESIDENTIAL FLOW	ICI FLOW	TOTAL FLOW	LENGTH	PIPE DIAMETER	SLOPE	FULL FLOW CAPACITY	FULL FLOW VELOCITY	ACTUAL VELOCITY
	FROM	TO				PER UNIT	PER HA																					
			(ha)	(ha)	(#)	(p/unit)	(p/ha)			(ha)	(ha)	(p/ha)	(l/s/ha)		(L/s)		(L/s)	(L/s)		(L/s)	(L/s)	(L/s)	(m)	(mm)	(%)	(L/s)	(m/s)	(m/s)
Street A (Phase 2)	CTRL.MH2A	MH1A	1.22	1.22	648	2.2		1425.6	1426	0	0	0	0	0	0.3	1426	5.8	5.8	3.70	21.3	0.0	21.6	11.4	300	1.00	96.7	1.37	1.10
STREET A	MH1A	MH2A	0.63	1.85	0			0	1426	0	0	0	0	0	0.4	1426	0.0	5.8	3.70	21.3	0.0	21.8	20.0	300	1.00	96.7	1.37	1.10
STREET A	MH2A	MH3A	0.00	1.85	0			0	1426	0	0	0	0	0	0.4	1426	0.0	5.8	3.70	21.3	0.0	21.8	107.0	300	0.30	52.9	0.75	0.71
STREET A (Phase 1)	CTRL.MH1A	MH3A	1.64	1.64	687	2.2		1511.4	1511	2.86	2.86	80	0	229	1.0	1740	7.0	7.0	3.63	25.6	0.0	26.6	11.4	250	1.00	59.4	1.21	1.17
STREET A	MH3A	MH4A	0.00	3.49	0			0	2937	0	2.86	0	0	229	1.5	3166	0.0	12.8	3.42	43.9	0.0	45.4	16.2	300	0.30	52.9	0.75	0.84
STREET B	MH4A	MH5A	0.00	3.49	0			0	2937	0	2.86	0	0	229	1.5	3166	0.0	12.8	3.42	43.9	0.0	45.4	100.0	300	0.30	52.9	0.75	0.84
STREET B	MH5A	MH6A	0.00	3.49	0			0	2937	0	2.86	0	0	229	1.5	3166	0.0	12.8	3.42	43.9	0.0	45.4	55.1	300	0.30	52.9	0.75	0.84
STREET B	MH6A	EX.MH1A	0.00	3.49	0			0	2937	0	2.86	0	0	229	1.5	3166	0.0	12.8	3.42	43.9	0.0	45.4	59.9	600	0.50	434.0	1.53	0.97

Appendix F Water Modelling Analysis



Municipal Engineering Solutions

September 29, 2026 Project No. 17002-198

Sent via email
Mr. Hamid Ghadaki
Times 4750 Inc.
3985 Highway 7 East – Suite 202
Markham, ON L3R 2A2
c/o SCS Consulting Group Ltd.

Subject: 5601 Stouffville Road Development
Water Distribution Modeling (Revision 4)
Town of Whitchurch-Stouffville, Region of York

Dear Mr. Ghadaki,

We are pleased to submit our report entitled "5601 Stouffville Road Development Watermain Analysis" outlining the results of our water distribution analysis for the proposed development in the Town of Stouffville, Region of York. This report has been updated to reflect the most recent site plan for the development (Icke Brochu Architects, September 2026).

A WaterCAD model of the immediate area was developed utilizing the design information provided to Municipal Engineering Solutions and a hydrant test performed by SCS Consulting Group Inc. in October 2024. The findings of our analysis are summarized in the following report.

We trust you find this report satisfactory. Should you have any questions or require further clarification, please call.

Yours truly,

Municipal Engineering Solutions



Kristin St-Jean, P.Eng.

/KS

File Location: C:\Users\krist\Documents\Projects\17002-198 5061 Stouffville Road, Stouffville\5.0 Report\2026 09 Revision 4\17002-198 5061 Stouffville Road Watermain Analysis_20260929_Rev4.docx

55 Gilbank Drive, Aurora, Ontario L4G 6H9
Tel: 905.726.1016 Cell: 416.434.0186 Fax: 905.726.1225

5601 STOUFFVILLE ROAD DEVELOPMENT

WATERMAIN ANALYSIS – Revision 4

PREPARED BY:

MUNICIPAL ENGINEERING SOLUTIONS

FOR:

TIMES 4750 INC.
Updated September 2026

Project Number: 17002-198

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APPENDICES

Appendix A Demands
Appendix B Boundary Information
Appendix C Model Results

Section 1 – INTRODUCTION

Municipal Engineering Solutions ("MES") was retained by Times 4750 Inc. to conduct a hydraulic water analysis for the proposed development located at 5601 Stouffville Road in the Town of Whitchurch-Stouffville in the Region of York. As part of this hydraulic assessment MES was requested to undertake the following:

1. Calculate/verify water demands for the proposed development using Town of Whitchurch-Stouffville, provincial and industry design standards;
2. Create a water model of the immediate area using boundary conditions from a hydrant test;
3. Run the model to size the subject mains to achieve service criteria during Average Day, Peak Hour and fire flow during Maximum Day demand; and
4. Prepare a Report summarizing the modeling results for agency review and design purposes.

1.1 Development Background

The development site is located south of Stouffville Road, west of Highway 48 in the Town of Stouffville. The development consists of five high rise residential buildings (5 towers, up to 25 storeys) and a daycare. The breakdown of the buildings is shown in **Appendix A**. The proposed development is shown below on **Figure 1**.

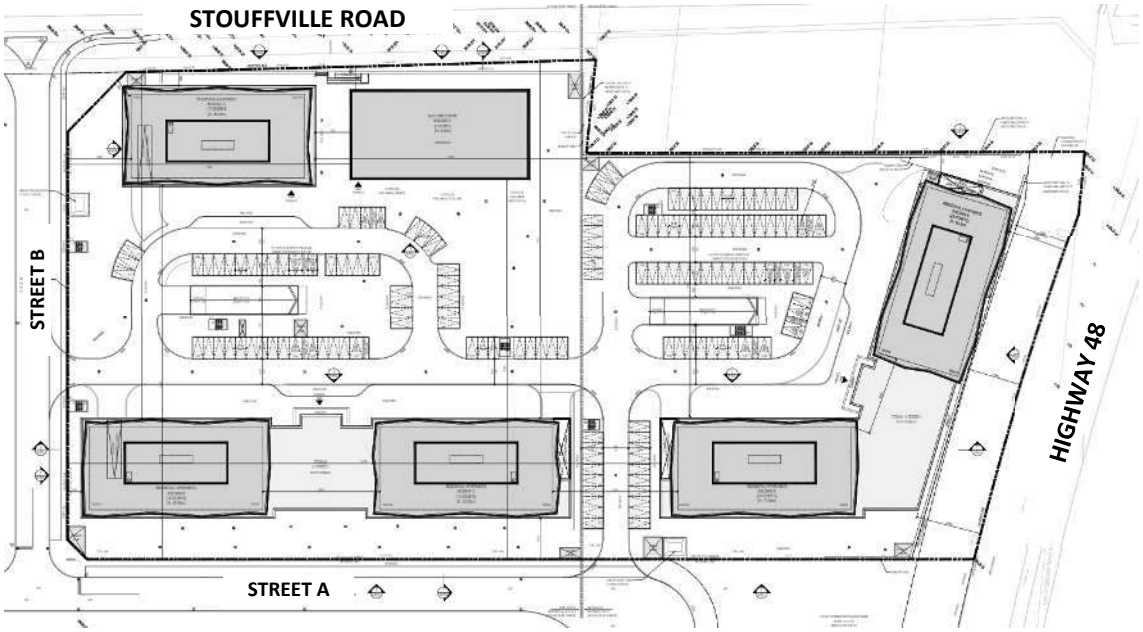


Figure 1 - Proposed 5601 Stouffville Road Development

Section 2 – WATERMAIN DESIGN CRITERIA

The design criteria utilized to estimate the water demands for the hydraulic water model follows general industry standards and is calculated using the design criteria and guidelines outlined in the Town of Whitchurch-Stouffville Design Guidelines and Standard Drawings and the Ministry of the Environment, Conservation and Parks (MECP) Watermain Design Criteria.

The following sections summarize the specific design criteria used to carry out the hydraulic watermain assessment for this development.

2.1 Equivalent Population Densities & Water Design Factors

To calculate the equivalent population and water design factors for this development MES used Town of Whitchurch-Stouffville standard residential population densities as noted in the Watermain Design Guidelines (Revision 13, January 2023). **Table 1** summarizes the residential population densities and **Table 2** summarizes the average daily demand and peaking factors used for this analysis.

Table 1 – Equivalent Population Density

Type of Development	Equivalent Population (Persons/Unit)
Apartment	2.2
Daycare	80 Persons/Site Ha

Source: Town of Whitchurch-Stouffville Design Guidelines, January 2023

Table 2 - Water Design Factors

Type of Development	Average Daily Demand	Maximum Daily Demand Peaking Factor	Peak Hourly Demand Peaking Factor
Residential	350 L/capita/day	2.0	3.0
Institutional	330 L/capita/day *	2.0	3.0

Source: Town of Whitchurch-Stouffville Design Guidelines, January 2023
* 110 L/student/day over 8 hours

Section 3 – FLOW DEMANDS

Utilizing the equivalent population data from Table 1 and the corresponding demand criteria and peaking factors from Table 2 the water demands for this development were calculated.

3.1 Equivalent Population Flow Demands

The calculated demands for the development are summarized in **Table 3.** For additional details on the development water demands and assigned demand nodes used in the hydraulic model see **Appendix A**.

Table 3 – Water Demand for the Proposed Development

	Average Day Demand (L/s)	Maximum Day Demand (L/s)	Peak Hour Demand (L/s)
Proposed Development	12.77	25.54	38.31

3.2 Fire Flow Demands

The fire demands for the development are taken from the Town of Whitchurch-Stouffville *Watermain Design Guidelines* (Revision 13, January 2023). Fire flow demands are outlined in the Design Guidelines as 150 L/s for apartments and 175 L/s for institutional use. The minimum required fire flows assumed for this development are summarized in **Table 4**.

Table 4 - Fire Flow Requirements

Type of Development	Fire Flow (L/s)
Apartment	150
Institutional	175

Sources: Town of Whitchurch-Stouffville Design Guidelines, January 2023

The fire flows utilized in this analysis are based on the Town's minimum fire flow requirements. The fire flows noted in Table 4 must be reviewed and confirmed by the appropriate designer (architect) as well as the Town with detailed design data (floor area and type of construction) for these buildings prior to implementation and construction. Regardless, the buildings will need to be designed to suit the available flow and pressure. Any design/criteria changes are to be reported to MES.

3.3 External Demands

The hydrant test results would have considered the demands external to the development.

Section 4 – OTHER SYSTEM REQUIREMENTS

4.1 System Pressure Requirements

In addition to meeting the various flow requirements, the system must also satisfy minimum and maximum pressure requirements as outlined by the Town. The Town's pressure requirements are outlined in the Design Guidelines and stipulate the following:

1. Normal operating pressures should be approximately 350 to 620 kPa (50 to 90 psi).
2. The maximum system pressure under static load or during minimum hourly demand shall be 700 kPa (100 psi).
3. The minimum system pressure when the system is tested for fire flow during peak daily flow shall be 140 kPa (20 psi).
4. Under normal conditions of maximum day demand, the pressure shall not drop below 275 kPa (40 psi) at any point in the water system.

To comply with the Ontario Building Code, reduction of pressures to 550 kPa (80 psi) is required, normally by having reducing valves installed on individual services.

4.2 Watermain Sizing

The Town of Whitchurch-Stouffville stipulates a minimum pipe size of 150 mm diameter for residential areas and 250 mm diameter for commercial areas and requires that all watermains are adequately sized to maintain demand flows at the required pressures without causing excessive energy loss or result in water quality decay. The watermain system must therefore be designed to accommodate the greater of the following:

- Maximum day plus fire demand
- Peak hour demand

For distribution systems providing fire protection the minimum pipe size shall be 150 mm diameter in accordance with Ministry of the Environment, Conservation and Parks (MECP) and NFPA requirements.

To provide appropriate fire protection, reliable supply and pressures the water distribution system should be looped wherever possible to improve supply security and water quality.

4.3 Watermain C-Factor

In designing and modeling of the pipes the Coefficient of Roughness (C-Factor) factors from the Town's design guidelines and as suggested by the MECP were utilized. The Coefficient of Roughness assigned to each pipe size is summarized in **Table 5** below.

Table 5 - Hazen-Williams Coefficient of Roughness (C-Factors)

Size of Pipe (Diameter in mm)	Coefficient of Roughness (C)
150 mm	100
200 mm to 250 mm	110
300 mm	120
400 mm to 450 mm	130
Greater Than 600 mm	140

Source: Town of Whitchurch-Stouffville Design Guidelines, January 2023

Section 5 – ANALYSIS & MODELING RESULTS

In order to conduct the hydraulic water analysis for the proposed development the water demands were estimated by MES using the design criteria previously discussed and a WaterCAD model of the immediate area was developed using boundary conditions from hydrant tests. The following sections discuss the model setup and results.

5.1 Model Setup

The development is located in the Stouffville Zone 2 pressure district, and is fed from the Zone 2 Elevated Tank and Pumping Station. The Zone 2 Elevated Tank has a High Water Level (HWL) of 323.1 m and a Low Water Level (LWL) of 313.9 m. The operational LWL will be higher than the actual LWL to account for fire and emergency storage in the tank. The development will connect to the existing 400 mm diameter watermain on Stouffville Road. The connections to the buildings will be made from Streets A and B.

Hydrant tests were performed along Stouffville Road by SCS Consulting Group on October 18th, 2024. The hydrant test results are included in **Appendix B**. A model of the immediate area was created by using a dummy pump and reservoir to recreate the results of the hydrant test. To check the adequacy of the pump curve entered into the model, a simulated hydrant curve (modeled flow) at the location of the test was graphed against the data points of the actual hydrant tests. The dummy reservoir elevation was initially set to 256 m (ground elevation) in the model. The comparison is included in **Appendix B**.

Results of the hydrant tests indicate that the hydraulic grade line (HGL) at this location in the system is at 322.8 m at the time of the test, which is very close to the top HGL of Zone 2 of 323.1 m. The HGL observed is consistent with the Zone 2 tank being full and/or the Zone 2 pumps operating at the time of the hydrant test. SCADA data for the Stouffville Zone 2 Elevated Tank and Pumping Station for October 18, 2024, at the time of the hydrant tests, was received from the Region of York in November 2025. The data confirms that the pumps were operating at the time of the hydrant tests.

Two additional scenarios were modelled to confirm that the water supply is adequate for the proposed development, supported by the Zone 2 elevated tank when no pumps are active. For the first scenario 'Tank 50%', the model was adjusted to represent a water level of 50% in the Zone 2 tank under maximum day plus fire flow conditions. The elevation of the dummy reservoir was lowered by 4.6 m (to 251.4 m) to represent the lower HGL available, and the dummy pump curve was left unchanged.

For the second scenario that was examined, the model was adjusted to account for the difference in the pumping station discharge pressure between when the pumps were on and when the pumps were off. The difference between the lowest pressure seen in the discharge header (576.95 kPa at 8:45 am) and the highest pressure at the time of the tests (667.76 kPa at 9:00 am) accounts for a pressure difference of 9.3 m head. The dummy reservoir in the model was lowered by 9.3 m (to 246.7 m) to represent the lower HGL available, and the dummy pump curve was left unchanged. Adjustments within the model are summarized in **Table 6**.

Table 6 – Boundary Conditions for Zone 2 Hydraulic Grade Line (HGL)

Demand Scenario	Zone 2 Reservoir Elevation (m)	Dummy Reservoir Elevation (m)	Tank Level (assumed)
Maximum Day + Fire	323.1	256.0	100% Full
Maximum Day + Fire (Tank 50%)	318.5	251.4	50% Full
Maximum Day + Fire (Tank 50%, Pumps Off)	318.65 (SCADA)	246.7	50% Full, Pumps Off

The two additional modeling scenarios ('Tank 50%' and 'Tank 50%, Pumps Off') are based on lowering the hydraulic grade line (HGL) available to the site. A hydrant test performed on Stouffville Road with the Zone 2 pumps off would produce a more accurate representation of the fire flows that would be available to the site when the Zone 2 pumps are off.

The development was modeled under the existing planning scenario only. The finished floor elevation of the buildings is 258.7 m. Friction factor for all new pipes added to the model were assigned according to Table 5. Fire Flow requirements are based on the Town's minimum fire flow requirements.

5.2 Watermain Sizing and System Pressures

The analysis was conducted under existing servicing conditions for Average Day, Maximum Day, Peak Hour and Maximum day plus Fire demands to size the watermains and meet the pressure requirements. The pipe sizes and layout are shown in **Appendix A**.

Modeled service pressures for the development are summarized in **Table 7**. All pressures lie within the required operating range under minimum hour, maximum day, maximum day plus fire flow and peak hour demands. Since modeling was done using a single demand scenario for boundary conditions (hydrant test), it is anticipated that pressures will be lower during peak hour and higher during minimum hour than indicated in the modeling. Detailed pipe and node tables are attached to this report in **Appendix C**.

Table 7 - Modeled Service Pressures

Scenario	Average Day	Maximum Day	Maximum Day (Tank 50%)	Maximum Day (Tank 50%, Pumps Off)	Peak Hour
Current	621 - 648 kPa (90.1 - 94.0 psi)	609 - 639 kPa (88.4 - 92.6 psi)	564 - 594 kPa (81.8 - 86.1 psi)	518 - 548 kPa (75.2 - 79.4 psi)	594 - 627 kPa (86.1 – 90.9 psi)

The modeling indicates that pressures are expected to exceed 550 kPa (80 psi) at the building connections. Pressure reducing valves will need to be installed on each of the service connections to the buildings or the internal piping will need to be designed to limit the maximum static pressure at all fixtures to 550 kPa to comply with the Ontario Building Code.

Modeled fire flows for the development are summarized in **Table 7**.

Table 8 - Modeled Fire Flows

Scenario	Maximum Day + Fire	Maximum Day + Fire (Tank 50%)	Maximum Day + Fire (Tank 50%, Pumps Off)
Current	191 to 256 L/s @ 140 kPa	178 to 237 L/s @ 140 kPa	164 to 218 L/s @ 140 kPa

Under the first two fire flow scenarios, all minimum required fire flows are met for the proposed development. The minimum required fire flow for apartments (150 L/s) is also met under all three scenarios. The modelling indicates that the fire flows available at the building connections and the hydrant adjacent to the building connections are below what is required for institutional use (175 L/s) for the 'Tank 50%, pumps off' scenario. Given the SCADA data received from the region this scenario would be the lowest pressures expected from the Zone 2 facility, at which time the pumps

would turn on. The adequacy of the water supply at the building service connections must be verified by the internal piping designer/sprinkler system designer.

Section 6 – CONCLUSIONS/RECOMMENDATIONS

The proposed watermain layout for the 5601 Stouffville Road Development can achieve hydraulic requirements as prescribed by the Town of Whitchurch-Stouffville watermain design criteria as summarized below.

- The service pressures within the development are expected to range between 564 kPa to 648 kPa (81.8 psi to 94.0 psi) based on boundary conditions from the hydrant tests. Pressures are expected to be lower during peak hour and higher during minimum hour than indicated in the modeling.
- The available fire flow at the property line meets or exceeds the minimum fire flow demands utilized for this assessment at the minimum pressure of 140 kPa. The available fire flow at each individual building connection location will be lower than shown on the attached schematic in Appendix C due to piping losses on site. Assumptions made within this report must be confirmed when additional building information becomes available.
- The modeling indicates that the available fire flow meets or exceeds the minimum fire flow demands required for apartments at the minimum pressure of 140 kPa under conditions where a lower hydraulic grade line (HGL) is available. The fire flow available at the building connections and the hydrant adjacent to the building connections is less that required for institutional uses (164 L/s vs 175 L/s) when both the Stouffville Zone 2 Elevated Tank is at its low operating level (50%) and the Zone 2 pumps are off. These additional scenarios represent a lower HGL only, and a hydrant test should be performed on Stouffville Road with no pumps running to more accurately predict fire flows under those conditions.
- The modeling indicates that pressures are expected to exceed 550 kPa (80 psi) at the building connections. Pressure reducing valves will be required to comply with the Ontario Building Code or the internal piping will need to be designed to limit the maximum static pressure at all fixtures to 550 kPa.
- Once the building designs are completed and the specifics are known, the fire flow demands used in this analysis and summarized in Table 4, including all assumptions, must be reviewed and confirmed by the designer(s), architect and mechanical consultant to ensure the fire flows used within this report are still valid prior to implementation and construction and to confirm that the water supply is adequate.
- The fire flows utilized in this analysis are based on the Town's minimum fire flow requirements. Should it be determined, based on the final site and building design and/or through discussions with the Town, that a greater fire flow is required or that the fire flows need to be calculated using the Fire Underwriters Survey formula the pipe sizes may need to be upsized to suit the higher fire flows or the building construction designed to suit the flow available.
- The hydrant test used for the boundary conditions provides a snapshot of the system performance and does not capture the system variations as accurately as boundary information from a calibrated model or system monitoring. The Town of Whitchurch-Stouffville must confirm that the results presented in this report are in keeping with the pressures currently measured in the area.
- This report, including all modeling assumptions used, is to be submitted to and reviewed by the water operating authority (municipality) to confirm that the modeling parameters used are acceptable to the operating authority and/or confirm if modified domestic or fire flow requirements are required or should be implemented for this particular development.

Appendix A

Demands

Equivalent Population by Unit

Type of Development	Equivalent Population Density *(Person/Unit)*
Apartments	2.2

Equivalent Population by Area

Type of Development	Equivalent Unit Density *(Persons/Ha)*
Institutional	80

Water Design Factors

Average Daily Demand (litres/capita/day)	350
Schools (L/student/day)	330 *
Maximum Daily Demand P.F.	2.0
Maximum Hourly Demand P.F.	3.0

* Average day demand for schools is calculated to be 110 L/student/day over 8 hours (110 x 24/8)

Coefficient of Roughness

Size of Pipe (mm Dia.)	Coefficient of Roughness (C)
150	100
200-250	110
300	120
400-450	130
Over 600	140

Minimum Pipe Size

Type of Development	Size of Pipe (mm Dia.)
Residential	150
Commercial/Industrial/Institutional	250

Working Pressures

Parameter	Pressure
Normal Condition	
Normal Operation Pressure	350-620 kPa (50-90 psi)
Minimum Max Day Pressure	275 kPa (40 psi)
Maximum (Building Code)	550 kPa (80 psi)
Maximum recommended	700 kPa (100 psi)
Fire Flow Conditions	
Minimum Pressure	140 kPa (20 psi)

Fire Flow Demands

Type of Development	Fire Demand (L/s)
Single Family/Semi-Detached	117
Townhouse/Row House	125
Apartment	150
Institutional	175
Commercial	200

Water Demands
5601 Stouffville Road Development
September 2026

Node	Description	Type of Development			Equivalent Population		Demands		
		Apartment	Commercial	Instututional	Total Population	Total Population	Avg Day	Max Day	Peak Hour
		(units)	*(Ha)*	*(Site Ha)*	*(Residential)*	*(ICI)*	*(L/s)*	*(L/s)*	*(L/s)*
J-11	Building A	209			460	0	1.86	3.72	5.58
J-11	Daycare			*2.86 ** *	0	229	0.87	1.74	2.61
J-11	Building B	231			508	0	2.06	4.12	6.18
J-11	Building C	247			543	0	2.20	4.40	6.60
J-14	Building D	317			697	0	2.83	5.66	8.49
J-14	Building E	331			728	0	2.95	5.90	8.85
TOTAL		**1335**	**0.00**	**2.86**	**2937**	**229**	**12.77**	**25.54**	**38.31**

** Total Area of the development (Site Ha)

Pipe and Node IDs



Appendix B

Boundary Information

WATER FLOW TEST REPORT

Location:	Stouffville	Operator:	Derek/Mark
Address:	Main Street West of Hwy 48	Date:	18-Oct-24
		Time:	9:00am

Residulal Hydrant Location	5142 Stouffville Road
Flow Hydrant Location	5192 Stouffville Road

SYSTEM DATA

Size of main:	TBC	Dead end:		Looped:	
Comments:	Hydrant on North side has been removed, now on south side of Main Street				

TEST DATA

Nozzle Size	Coefficient	Static Pressure	Residual Pressure	Diffuser Reading	Total Flow GPM	Total Flow L/S	Mins of Flow
2.5 (2in HM)		94	88	28	825	52.04941	5
2x2.5 (2in HM)		94	85	22	1464	92.36405	5

% difference 1 Port	6	%
% difference 2 Port	10	%

1 Port Projected results @ 20 psi:	**3204**	**GPM**	**202**	**L/S**
2 Port Projected results @ 20 psi:	**4567**	**GPM**	**288**	**L/S**

Sketch of Test Configuration



30 Centurian Drive, Suite 100 Markham, Ontario L3R 8B8 Phone **905 475 1900** Fax **905 475 8335**
www.scsconsultinggroup.com

WATER FLOW TEST REPORT

Location:	Stouffville	Operator:	Derek/Mark
Address:	Main Street West of Hwy 48	Date:	18-Oct-24
		Time:	9:25am

Residulal Hydrant Location	5192 Stouffville Road
Flow Hydrant Location	5142 Stouffville Road

SYSTEM DATA

Size of main:	TBC	Dead end:		Looped:	
Comments:	Hydrant on North side has been removed, now on south side of Main Street				

TEST DATA

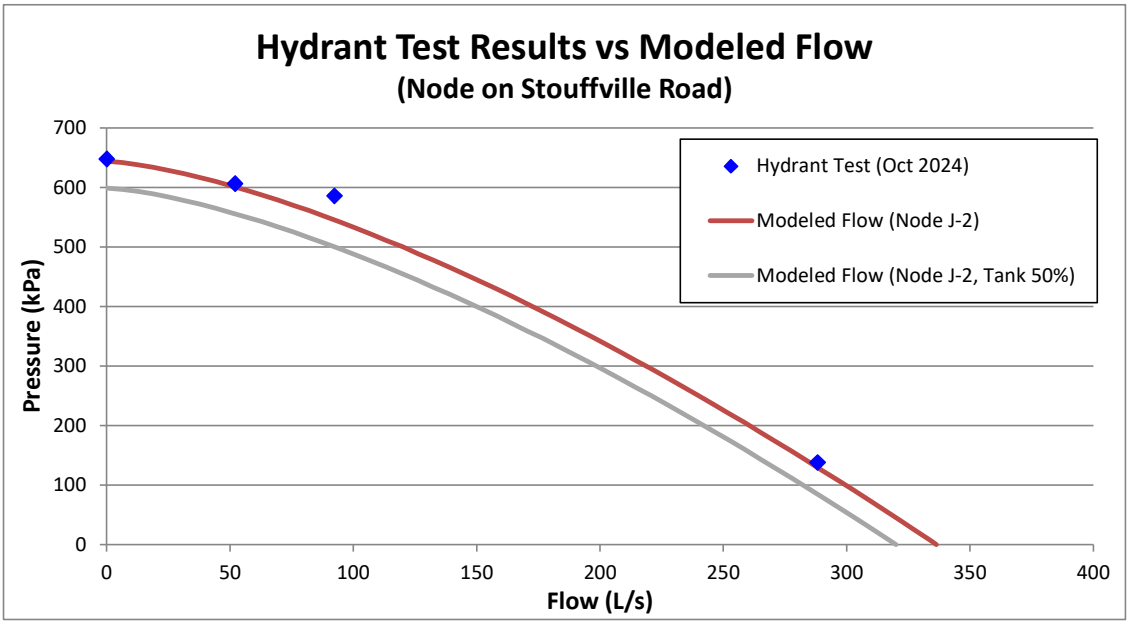
Nozzle Size	Coefficient	Static Pressure	Residual Pressure	Diffuser Reading	Total Flow GPM	Total Flow L/S	Mins of Flow
2.5 (2in HM)		95	89	26	795	50.15671	5
2x2.5 (2in HM)		95	86	23	1496	94.38293	5

% difference 1 Port	6 %		
% difference 2 Port	9 %		
1 Port Projected results @ 20 psi:	**3110**	**GPM**	**196 L/S**
2 Port Projected results @ 20 psi:	**4701**	**GPM**	**297 L/S**

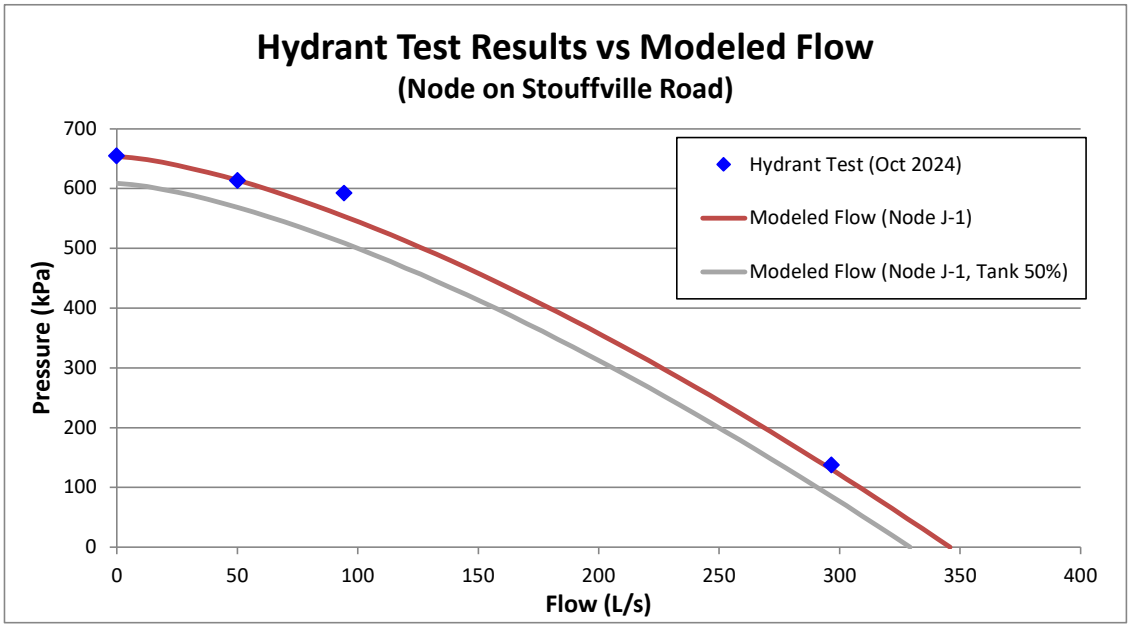
Sketch of Test Configuration



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www.scsconsultinggroup.com



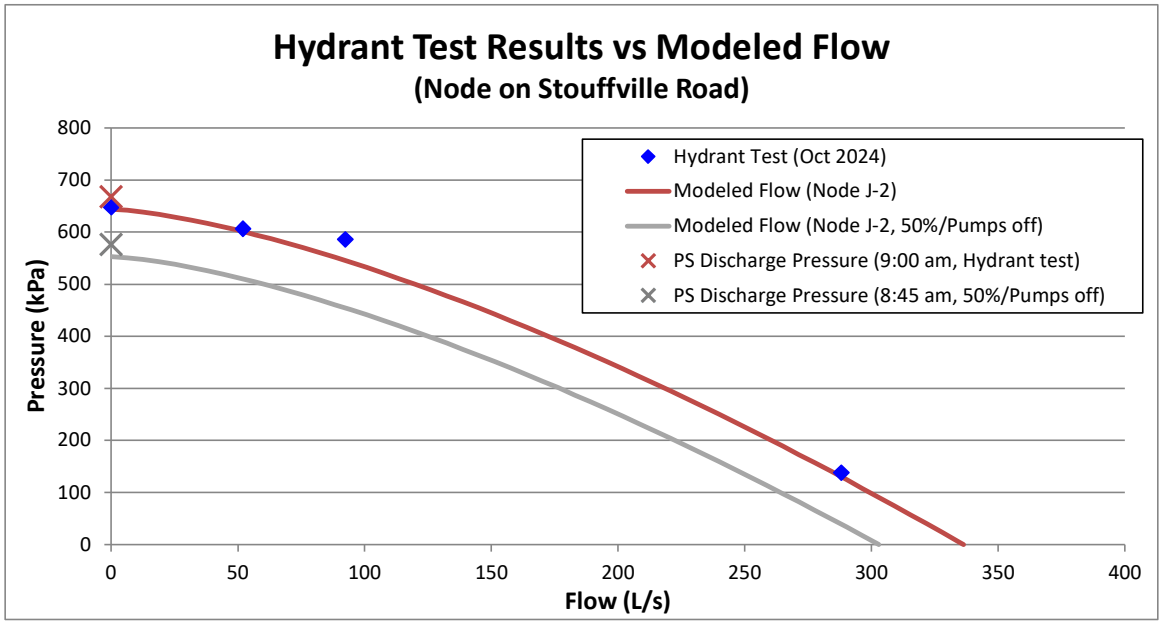
	Static Pressure	Residual Pressure	Test Flow	Theoretical Flow at 140 kPa
	(kPa)	(kPa)	(L/s)	(L/s)
Hydrant Test	648.1	606.7	52.0	288.1
Model (Hydrant Test)	644.0	603.0	50.5	278.9
Model (Tank 50%)	599.0	557.9	50.5	261.0



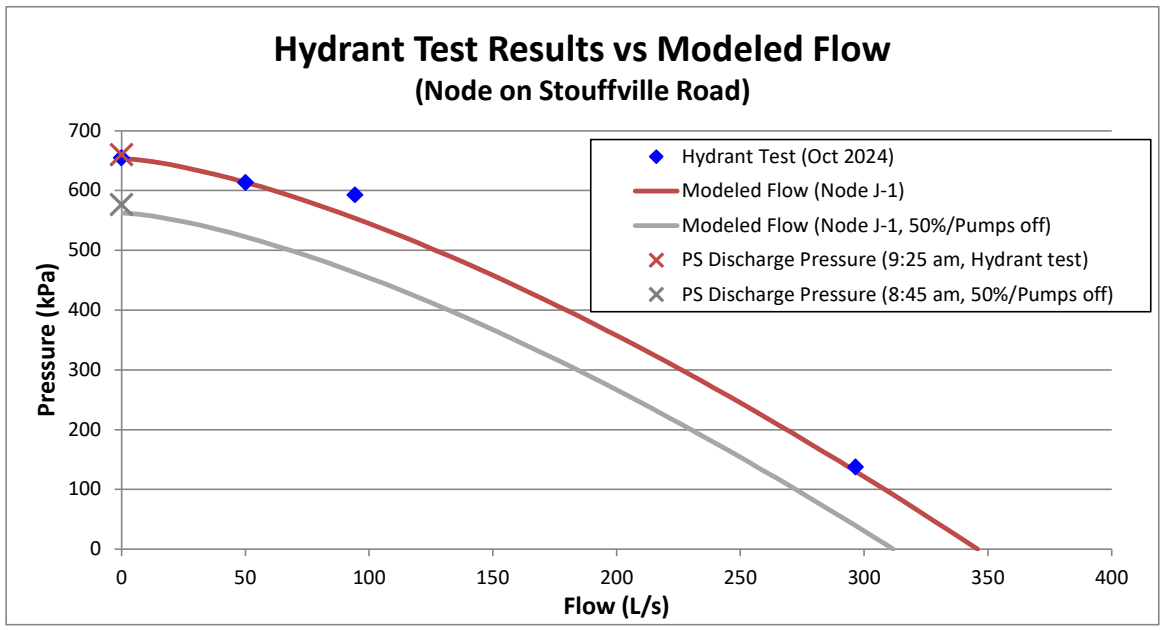
	Static Pressure	Residual Pressure	Test Flow	Theoretical Flow at 140 kPa
	(kPa)	(kPa)	(L/s)	(L/s)
Hydrant Test	655.0	613.6	50.2	296.6
Model (Hydrant Test)	653.8	613.2	50.5	283.4
Model (Tank 50%)	608.7	568.2	50.5	265.2

York Region SCADA (October 18, 2024)

Time	DMZ.STPSMR_WPS_DH1_FITF1_VAL	DMZ.STPSMR_WPS_DH1_PIT1_VAL	DMZ.STPSMR_WPS_PMP1_RUNH	DMZ.STPSMR_WPS_PMP2_RUNH	DMZ.STPSMR_WPS_PMP3_RUNH	DMZ.STPSMR_WPS_PMP4_RUNH	DMZ.STETTL_TWR_LIT3_VAL	DMZ.STETTL_TWR_LIT1_VAL	DMZ.STETTL_TWR_LIT2_VAL	Notes (MES)
	Disch Header Flow Forward Value mean (L/s)	Disch Header Pressure Value mean (kPa)	Pump 1 Runtime mean (h)	Pump 2 Runtime mean (h)	Pump 3 Runtime mean (h)	Pump 4 Runtime mean (h)	Tower Level Value in Masl mean (masl)	Tower Level Value mean (%)	Tower Level Value in Metres mean (m)	
2024-10-18 06:00:00	0	621.86	23722.94	24191.90	19774.62	330.71	321.47	81.02	7.53	
2024-10-18 06:05:00	0	618.46	23722.94	24191.90	19774.62	330.71	321.42	80.45	7.48	
2024-10-18 06:10:00	0	618.31	23722.94	24191.90	19774.62	330.71	321.37	79.85	7.43	
2024-10-18 06:15:00	0	617.28	23722.94	24191.90	19774.62	330.71	321.31	79.25	7.37	
2024-10-18 06:20:00	0	612.24	23722.94	24191.90	19774.62	330.71	321.25	78.60	7.31	
2024-10-18 06:25:00	0	607.45	23722.94	24191.90	19774.62	330.71	321.17	77.74	7.23	
2024-10-18 06:30:00	0	610.80	23722.94	24191.90	19774.62	330.71	321.09	76.94	7.15	
2024-10-18 06:35:00	0	606.15	23722.94	24191.90	19774.62	330.71	321.02	76.20	7.08	
2024-10-18 06:40:00	0	605.69	23722.94	24191.90	19774.62	330.71	320.95	75.40	7.01	
2024-10-18 06:45:00	0	602.86	23722.94	24191.90	19774.62	330.71	320.88	74.59	6.94	
2024-10-18 06:50:00	0	599.80	23722.94	24191.90	19774.62	330.71	320.80	73.72	6.86	
2024-10-18 06:55:00	0	596.53	23722.94	24191.90	19774.62	330.71	320.71	72.81	6.77	
2024-10-18 07:00:00	0	591.51	23722.94	24191.90	19774.62	330.71	320.62	71.83	6.68	
2024-10-18 07:05:00	0	592.23	23722.94	24191.90	19774.62	330.71	320.52	70.81	6.58	
2024-10-18 07:10:00	0	593.51	23722.94	24191.90	19774.62	330.71	320.43	69.84	6.49	
2024-10-18 07:15:00	0	594.66	23722.94	24191.90	19774.62	330.71	320.35	68.89	6.41	
2024-10-18 07:20:00	0	591.09	23722.94	24191.90	19774.62	330.71	320.26	67.94	6.32	
2024-10-18 07:25:00	0	587.75	23722.94	24191.90	19774.62	330.71	320.17	66.96	6.23	
2024-10-18 07:30:00	0	584.96	23722.94	24191.90	19774.62	330.71	320.07	65.95	6.13	
2024-10-18 07:35:00	0	584.08	23722.94	24191.90	19774.62	330.71	319.97	64.89	6.03	
2024-10-18 07:40:00	0	582.85	23722.94	24191.90	19774.62	330.71	319.88	63.85	5.94	
2024-10-18 07:45:00	0	581.06	23722.94	24191.90	19774.62	330.71	319.78	62.79	5.84	
2024-10-18 07:50:00	0	582.06	23722.94	24191.90	19774.62	330.71	319.68	61.75	5.74	
2024-10-18 07:55:00	0	581.70	23722.94	24191.90	19774.62	330.71	319.59	60.73	5.65	
2024-10-18 08:00:00	0	581.73	23722.94	24191.90	19774.62	330.71	319.49	59.72	5.55	
2024-10-18 08:05:00	0	579.75	23722.94	24191.90	19774.62	330.71	319.40	58.70	5.46	
2024-10-18 08:10:00	0	579.43	23722.94	24191.90	19774.62	330.71	319.30	57.68	5.36	
2024-10-18 08:15:00	0	578.51	23722.94	24191.90	19774.62	330.71	319.21	56.67	5.27	
2024-10-18 08:20:00	0	575.04	23722.94	24191.90	19774.62	330.71	319.11	55.63	5.17	
2024-10-18 08:25:00	0	576.50	23722.94	24191.90	19774.62	330.71	319.02	54.58	5.08	
2024-10-18 08:30:00	0	574.91	23722.94	24191.90	19774.62	330.71	318.92	53.55	4.98	
2024-10-18 08:35:00	0	576.96	23722.94	24191.90	19774.62	330.71	318.83	52.53	4.89	
2024-10-18 08:40:00	0	577.09	23722.94	24191.90	19774.62	330.71	318.73	51.56	4.79	
2024-10-18 08:45:00	0	576.95	23722.94	24191.90	19774.62	330.71	318.65	50.59	4.71	Pumps off
2024-10-18 08:50:00	70.93	634.28	23722.94	24191.90	19774.62	330.71	318.57	49.79	4.63	Pumps turn on
2024-10-18 08:55:00	140.90	666.05	23722.94	24191.96	19774.68	330.71	318.59	50.02	4.65	
2024-10-18 09:00:00	139.79	667.76	23722.94	24192.06	19774.78	330.71	318.63	50.43	4.69	Hydrant Test #1
2024-10-18 09:05:00	140.16	651.15	23722.94	24192.15	19774.88	330.71	318.65	50.68	4.71	
2024-10-18 09:10:00	139.80	662.47	23722.94	24192.25	19774.98	330.71	318.67	50.87	4.73	
2024-10-18 09:15:00	139.85	662.29	23722.94	24192.35	19775.08	330.71	318.69	51.11	4.75	
2024-10-18 09:20:00	140.95	641.16	23722.94	24192.39	19775.12	330.71	318.71	51.28	4.77	
2024-10-18 09:25:00	139.99	660.72	23722.94	24192.45	19775.18	330.71	318.70	51.21	4.76	Hydrant Test #2
2024-10-18 09:30:00	139.60	657.35	23722.94	24192.55	19775.28	330.71	318.71	51.27	4.77	
2024-10-18 09:35:00	140.29	661.59	23722.94	24192.65	19775.38	330.71	318.73	51.48	4.79	
2024-10-18 09:40:00	139.58	668.87	23722.94	24192.75	19775.47	330.71	318.76	51.84	4.82	
2024-10-18 09:45:00	139.90	670.70	23722.94	24192.85	19775.57	330.71	318.80	52.31	4.86	
2024-10-18 09:50:00	139.99	671.47	23722.94	24192.89	19775.62	330.71	318.85	52.77	4.91	
2024-10-18 09:55:00	140.17	672.30	23722.94	24192.95	19775.67	330.71	318.89	53.25	4.95	
2024-10-18 10:00:00	140.03	672.63	23722.94	24193.05	19775.77	330.71	318.94	53.75	5.00	
2024-10-18 10:05:00	140.13	673.92	23722.94	24193.15	19775.87	330.71	318.98	54.24	5.04	
2024-10-18 10:10:00	140.25	671.83	23722.94	24193.25	19775.97	330.71	319.03	54.74	5.09	
2024-10-18 10:15:00	140.01	670.96	23722.94	24193.35	19776.07	330.71	319.07	55.20	5.13	
2024-10-18 10:20:00	140.46	662.96	23722.94	24193.39	19776.11	330.71	319.10	55.50	5.16	
2024-10-18 10:25:00	139.77	669.00	23722.94	24193.45	19776.17	330.71	319.13	55.84	5.19	
2024-10-18 10:30:00	139.65	675.64	23722.94	24193.55	19776.27	330.71	319.17	56.25	5.23	
2024-10-18 10:35:00	139.81	678.76	23722.94	24193.65	19776.37	330.71	319.22	56.80	5.28	
2024-10-18 10:40:00	140.09	673.30	23722.94	24193.75	19776.47	330.71	319.27	57.33	5.33	
2024-10-18 10:45:00	139.92	671.23	23722.94	24193.85	19776.57	330.71	319.31	57.76	5.37	
2024-10-18 10:50:00	140.12	672.22	23722.94	24193.89	19776.61	330.71	319.35	58.16	5.41	
2024-10-18 10:55:00	140.03	676.45	23722.94	24193.95	19776.67	330.71	319.39	58.60	5.45	
2024-10-18 11:00:00	139.99	679.99	23722.94	24194.05	19776.77	330.71	319.44	59.11	5.50	
2024-10-18 11:05:00	140.44	673.95	23722.94	24194.15	19776.87	330.71	319.49	59.63	5.55	
2024-10-18 11:10:00	139.88	671.05	23722.94	24194.25	19776.97	330.71	319.52	59.99	5.58	
2024-10-18 11:15:00	140.15	669.64	23722.94	24194.35	19777.07	330.71	319.55	60.29	5.61	
2024-10-18 11:20:00	139.72	669.52	23722.94	24194.39	19777.11	330.71	319.57	60.56	5.63	
2024-10-18 11:25:00	140.02	672.32	23722.94	24194.45	19777.17	330.71	319.60	60.86	5.66	
2024-10-18 11:30:00	139.78	674.35	23722.94	24194.55	19777.27	330.71	319.63	61.21	5.69	
2024-10-18 11:35:00	139.52	682.04	23722.94	24194.65	19777.37	330.71	319.67	61.64	5.73	
2024-10-18 11:40:00	140.06	682.92	23722.94	24194.74	19777.47	330.71	319.73	62.21	5.79	
2024-10-18 11:45:00	139.86	681.66	23722.94	24194.84	19777.57	330.71	319.78	62.74	5.84	
2024-10-18 11:50:00	140.05	683.66	23722.94	24194.88	19777.61	330.71	319.83	63.28	5.89	
2024-10-18 11:55:00	140.00	682.68	23722.94	24194.94	19777.67	330.71	319.88	63.82	5.94	



	Static Pressure	Residual Pressure	Test Flow	Theoretical Flow at 140 kPa
	(kPa)	(kPa)	(L/s)	(L/s)
Hydrant Test	648.1	606.7	52.0	288.1
Model (Hydrant Test)	644.0	603.0	50.5	278.9
Model (50% / Pumps off)	553.0	511.9	50.5	242.2



	Static Pressure	Residual Pressure	Test Flow	Theoretical Flow at 140 kPa
	(kPa)	(kPa)	(L/s)	(L/s)
Hydrant Test	655.0	613.6	50.2	296.6
Model (Hydrant Test)	653.8	613.2	50.5	283.4
Model (50% / Pumps off)	562.7	522.2	50.5	245.9

Appendix C

Model Results

Municipal Engineering Solutions

Average Day

Node Table

ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
J-1	0.00	256.00	322.23	648.19
J-2	0.00	257.00	322.23	638.36
J-3	0.00	258.00	322.22	628.54
J-4	0.00	258.40	322.22	624.60
J-5	0.00	257.96	322.17	628.43
J-6	0.00	257.96	322.17	628.41
J-7	0.00	258.70	322.16	621.04
J-8	0.00	258.70	322.16	621.05
J-9	0.00	258.70	322.16	621.04
J-10	0.00	258.70	322.16	621.04
J-11	6.99	258.70	322.15	620.94
J-12	0.00	258.70	322.16	621.04
J-13	0.00	258.70	322.16	621.04
J-14	5.78	258.70	322.15	620.97
J-15	0.00	258.42	322.20	624.19
J-16	0.00	258.70	322.20	621.45
MIN		**256.00**		**620.94**
MAX		**258.70**		**648.19**

Pipe Table

ID	From Node	To Node	Length (m)	Diameter (mm)	Roughness (C)	Flow (L/s)	Velocity (m/s)
P-1	R-1	PMP-1	22.01	400	130	12.77	0.10
P-2	PMP-1	J-1	19.17	400	130	12.77	0.10
P-3	J-1	J-2	109.35	400	130	12.77	0.10
P-4	J-2	J-3	108.22	400	130	12.77	0.10
P-5	J-3	J-4	59.32	400	130	12.77	0.10
P-6	J-4	J-15	134.20	300	120	12.77	0.18
P-7	J-5	J-6	7.78	200	110	4.11	0.13
P-8	J-6	J-7	75.79	200	110	4.11	0.13
P-9	J-7	J-8	20.04	200	110	-1.67	0.05
P-10	J-8	J-5	20.05	200	110	-8.66	0.28
P-11	J-8	J-9	2.44	200	110	6.99	0.22
P-12	J-9	J-10	2.64	200	110	0.00	0.00
P-13	J-9	J-11	4.55	150	100	6.99	0.40
P-14	J-7	J-12	2.41	200	110	5.78	0.18
P-15	J-12	J-13	2.08	200	110	0.00	0.00
P-16	J-12	J-14	4.41	150	100	5.78	0.33
P-17	J-15	J-5	164.72	300	120	12.77	0.18
P-18	J-15	J-16	15.58	200	110	0.00	0.00

Maximum Day

Node Table

ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
J-1	0.00	256.00	321.25	638.60
J-2	0.00	257.00	321.24	628.68
J-3	0.00	258.00	321.22	618.76
J-4	0.00	258.40	321.22	614.77
J-5	0.00	257.96	321.04	617.33
J-6	0.00	257.96	321.03	617.29
J-7	0.00	258.70	320.99	609.59
J-8	0.00	258.70	320.99	609.61
J-9	0.00	258.70	320.98	609.57
J-10	0.00	258.70	320.98	609.57
J-11	13.98	258.70	320.95	609.21
J-12	0.00	258.70	320.98	609.56
J-13	0.00	258.70	320.98	609.56
J-14	11.56	258.70	320.96	609.32
J-15	0.00	258.42	321.14	613.79
J-16	0.00	258.70	321.14	611.05

MIN		**256.00**		**609.21**
MAX		**258.70**		**638.60**

Pipe Table

ID	From Node	To Node	Length (m)	Diameter (mm)	Roughness (C)	Flow (L/s)	Velocity (m/s)
P-1	R-1	PMP-1	22.01	400	130	25.54	0.20
P-2	PMP-1	J-1	19.17	400	130	25.54	0.20
P-3	J-1	J-2	109.35	400	130	25.54	0.20
P-4	J-2	J-3	108.22	400	130	25.54	0.20
P-5	J-3	J-4	59.32	400	130	25.54	0.20
P-6	J-4	J-15	134.20	300	120	25.54	0.36
P-7	J-5	J-6	7.78	200	110	8.22	0.26
P-8	J-6	J-7	75.79	200	110	8.22	0.26
P-9	J-7	J-8	20.04	200	110	-3.34	0.11
P-10	J-8	J-5	20.05	200	110	-17.32	0.55
P-11	J-8	J-9	2.44	200	110	13.98	0.44
P-12	J-9	J-10	2.64	200	110	0.00	0.00
P-13	J-9	J-11	4.55	150	100	13.98	0.79
P-14	J-7	J-12	2.41	200	110	11.56	0.37
P-15	J-12	J-13	2.08	200	110	0.00	0.00
P-16	J-12	J-14	4.41	150	100	11.56	0.65
P-17	J-15	J-5	164.72	300	120	25.54	0.36
P-18	J-15	J-16	15.58	200	110	0.00	0.00

Maximum Day (Tank 50%)

Node Table

ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
J-1	0.00	256.00	316.65	593.58
J-2	0.00	257.00	316.64	583.66
J-3	0.00	258.00	316.62	573.74
J-4	0.00	258.40	316.62	569.75
J-5	0.00	257.96	316.44	572.31
J-6	0.00	257.96	316.43	572.27
J-7	0.00	258.70	316.39	564.57
J-8	0.00	258.70	316.39	564.59
J-9	0.00	258.70	316.38	564.55
J-10	0.00	258.70	316.38	564.55
J-11	13.98	258.70	316.35	564.19
J-12	0.00	258.70	316.38	564.54
J-13	0.00	258.70	316.38	564.54
J-14	11.56	258.70	316.36	564.30
J-15	0.00	258.42	316.54	568.77
J-16	0.00	258.70	316.54	566.03
MIN		**256.00**		**564.19**
MAX		**258.70**		**593.58**

Pipe Table

ID	From Node	To Node	Length (m)	Diameter (mm)	Roughness (C)	Flow (L/s)	Velocity (m/s)
P-1	R-1	PMP-1	22.01	400	130	25.54	0.20
P-2	PMP-1	J-1	19.17	400	130	25.54	0.20
P-3	J-1	J-2	109.35	400	130	25.54	0.20
P-4	J-2	J-3	108.22	400	130	25.54	0.20
P-5	J-3	J-4	59.32	400	130	25.54	0.20
P-6	J-4	J-15	134.20	300	120	25.54	0.36
P-7	J-5	J-6	7.78	200	110	8.22	0.26
P-8	J-6	J-7	75.79	200	110	8.22	0.26
P-9	J-7	J-8	20.04	200	110	-3.34	0.11
P-10	J-8	J-5	20.05	200	110	-17.32	0.55
P-11	J-8	J-9	2.44	200	110	13.98	0.44
P-12	J-9	J-10	2.64	200	110	0.00	0.00
P-13	J-9	J-11	4.55	150	100	13.98	0.79
P-14	J-7	J-12	2.41	200	110	11.56	0.37
P-15	J-12	J-13	2.08	200	110	0.00	0.00
P-16	J-12	J-14	4.41	150	100	11.56	0.65
P-17	J-15	J-5	164.72	300	120	25.54	0.36
P-18	J-15	J-16	15.58	200	110	0.00	0.00

Maximum Day (Tank 50%, Pumps Off)

Node Table

ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
J-1	0.00	256.00	311.95	547.58
J-2	0.00	257.00	311.94	537.66
J-3	0.00	258.00	311.92	527.74
J-4	0.00	258.40	311.92	523.75
J-5	0.00	257.96	311.74	526.32
J-6	0.00	257.96	311.73	526.27
J-7	0.00	258.70	311.69	518.57
J-8	0.00	258.70	311.69	518.59
J-9	0.00	258.70	311.68	518.55
J-10	0.00	258.70	311.68	518.55
J-11	13.98	258.70	311.65	518.20
J-12	0.00	258.70	311.68	518.54
J-13	0.00	258.70	311.68	518.54
J-14	11.56	258.70	311.66	518.30
J-15	0.00	258.42	311.84	522.77
J-16	0.00	258.70	311.84	520.03

MIN		**256.00**		**518.20**
MAX		**258.70**		**547.58**

Pipe Table

ID	From Node	To Node	Length (m)	Diameter (mm)	Roughness (C)	Flow (L/s)	Velocity (m/s)
P-1	R-1	PMP-1	22.01	400	130	25.54	0.20
P-2	PMP-1	J-1	19.17	400	130	25.54	0.20
P-3	J-1	J-2	109.35	400	130	25.54	0.20
P-4	J-2	J-3	108.22	400	130	25.54	0.20
P-5	J-3	J-4	59.32	400	130	25.54	0.20
P-6	J-4	J-15	134.20	300	120	25.54	0.36
P-7	J-5	J-6	7.78	200	110	8.22	0.26
P-8	J-6	J-7	75.79	200	110	8.22	0.26
P-9	J-7	J-8	20.04	200	110	-3.34	0.11
P-10	J-8	J-5	20.05	200	110	-17.32	0.55
P-11	J-8	J-9	2.44	200	110	13.98	0.44
P-12	J-9	J-10	2.64	200	110	0.00	0.00
P-13	J-9	J-11	4.55	150	100	13.98	0.79
P-14	J-7	J-12	2.41	200	110	11.56	0.37
P-15	J-12	J-13	2.08	200	110	0.00	0.00
P-16	J-12	J-14	4.41	150	100	11.56	0.65
P-17	J-15	J-5	164.72	300	120	25.54	0.36
P-18	J-15	J-16	15.58	200	110	0.00	0.00

Municipal Engineering Solutions

Peak Hour

Node Table

ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
J-1	0.00	256.00	320.02	626.54
J-2	0.00	257.00	319.99	616.46
J-3	0.00	258.00	319.96	606.39
J-4	0.00	258.40	319.94	602.32
J-5	0.00	257.96	319.57	602.94
J-6	0.00	257.96	319.56	602.84
J-7	0.00	258.70	319.46	594.63
J-8	0.00	258.70	319.46	594.68
J-9	0.00	258.70	319.45	594.59
J-10	0.00	258.70	319.45	594.59
J-11	20.97	258.70	319.38	593.84
J-12	0.00	258.70	319.45	594.57
J-13	0.00	258.70	319.45	594.57
J-14	17.34	258.70	319.40	594.06
J-15	0.00	258.42	319.77	600.47
J-16	0.00	258.70	319.77	597.73

MIN		**256.00**		**593.84**
MAX		**258.70**		**626.54**

Pipe Table

ID	From Node	To Node	Length (m)	Diameter (mm)	Roughness (C)	Flow (L/s)	Velocity (m/s)
P-1	R-1	PMP-1	22.01	400	130	38.31	0.30
P-2	PMP-1	J-1	19.17	400	130	38.31	0.30
P-3	J-1	J-2	109.35	400	130	38.31	0.30
P-4	J-2	J-3	108.22	400	130	38.31	0.30
P-5	J-3	J-4	59.32	400	130	38.31	0.30
P-6	J-4	J-15	134.20	300	120	38.31	0.54
P-7	J-5	J-6	7.78	200	110	12.33	0.39
P-8	J-6	J-7	75.79	200	110	12.33	0.39
P-9	J-7	J-8	20.04	200	110	-5.01	0.16
P-10	J-8	J-5	20.05	200	110	-25.98	0.83
P-11	J-8	J-9	2.44	200	110	20.97	0.67
P-12	J-9	J-10	2.64	200	110	0.00	0.00
P-13	J-9	J-11	4.55	150	100	20.97	1.19
P-14	J-7	J-12	2.41	200	110	17.34	0.55
P-15	J-12	J-13	2.08	200	110	0.00	0.00
P-16	J-12	J-14	4.41	150	100	17.34	0.98
P-17	J-15	J-5	164.72	300	120	38.31	0.54
P-18	J-15	J-16	15.58	200	110	0.00	0.00

Fire Flow Table (Maximum Day + Fire)					
ID	Fire Flow Needed *(L/s)*	Total Flow Needed *(L/s)*	Total Flow Available *(L/s)*	Fire Flow Available *(L/s)*	**Fire Flow Met?**
J-1	175.00	175.00	255.55	255.55	**TRUE**
J-2	175.00	175.00	251.10	251.10	**TRUE**
J-3	175.00	175.00	246.93	246.93	**TRUE**
J-6	175.00	175.00	203.05	203.05	**TRUE**
J-10	175.00	175.00	193.30	193.30	**TRUE**
J-13	175.00	175.00	190.61	190.61	**TRUE**
J-16	175.00	175.00	211.68	211.68	**TRUE**

MIN	**190.61**
MAX	**255.55**

Fire Flow Table (Maximum Day + Fire, Tank 50%)					
ID	Fire Flow Needed *(L/s)*	Total Flow Needed *(L/s)*	Total Flow Available *(L/s)*	Fire Flow Available *(L/s)*	**Fire Flow Met?**
J-1	175.00	175.00	237.20	237.20	**TRUE**
J-2	175.00	175.00	233.16	233.16	**TRUE**
J-3	175.00	175.00	229.37	229.37	**TRUE**
J-6	175.00	175.00	189.16	189.16	**TRUE**
J-10	175.00	175.00	180.23	180.23	**TRUE**
J-13	175.00	175.00	177.77	177.77	**TRUE**
J-16	175.00	175.00	197.33	197.33	**TRUE**

MIN	**177.77**
MAX	**237.20**

Fire Flow Table (Maximum Day + Fire, Tank 50%, Pumps Off)					
ID	Fire Flow Needed	Total Flow Needed	Total Flow Available	Fire Flow Available	Fire Flow Met?
	(L/s)	*(L/s)*	*(L/s)*	*(L/s)*	
J-1	175.00	175.00	217.85	217.85	TRUE
J-2	175.00	175.00	214.22	214.22	TRUE
J-3	175.00	175.00	210.82	210.82	TRUE
J-6	175.00	175.00	174.42	174.42	FALSE
J-10	175.00	175.00	166.33	166.33	FALSE
J-13	175.00	175.00	164.10	164.10	FALSE
J-16	175.00	175.00	182.08	182.08	TRUE

MIN	**164.10**
MAX	**217.85**

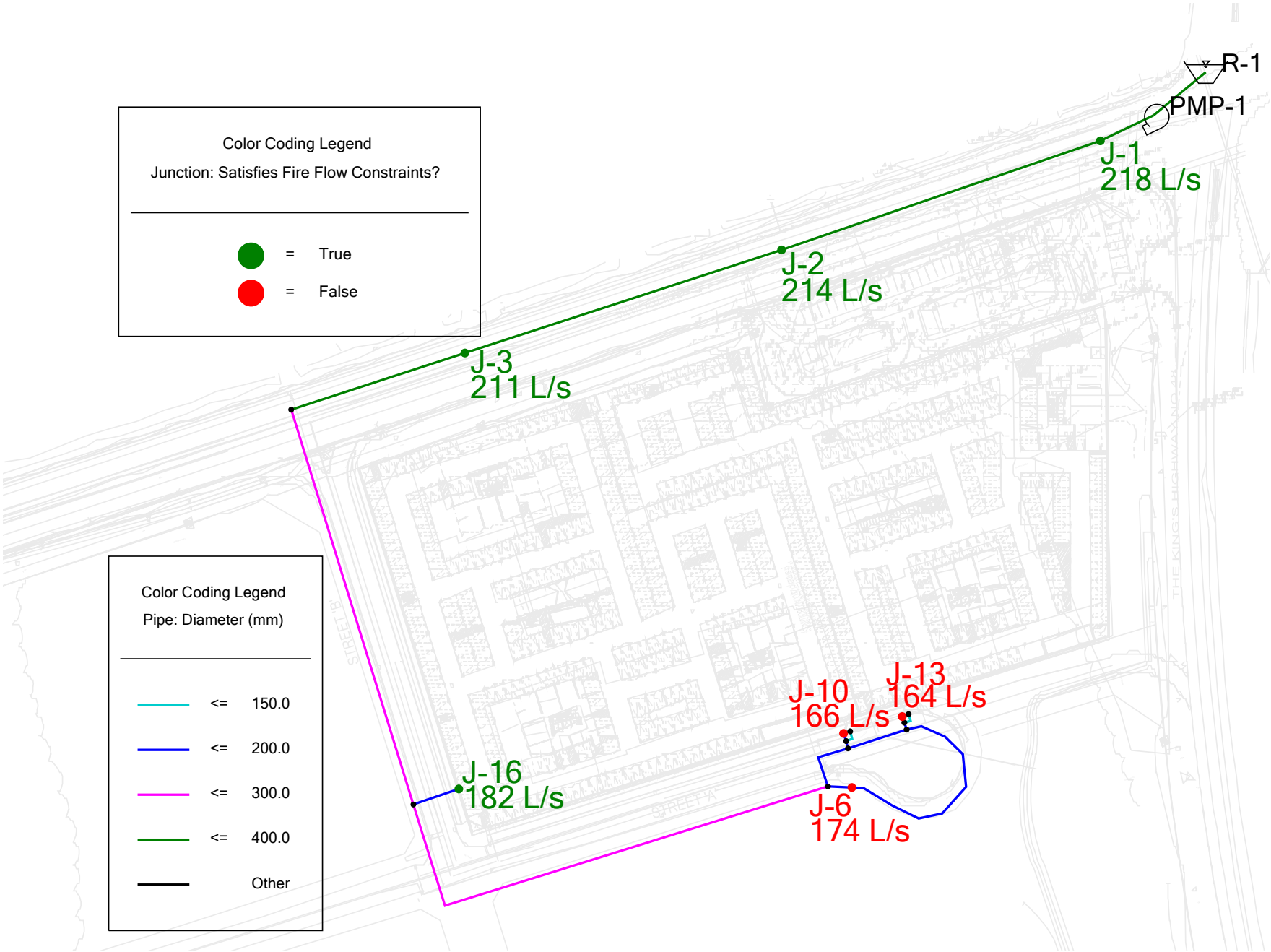
Scenario: Maximum Day
Available Fire Flow



Scenario: Maximum Day +Fire (Tank 50%)
Available Fire Flow

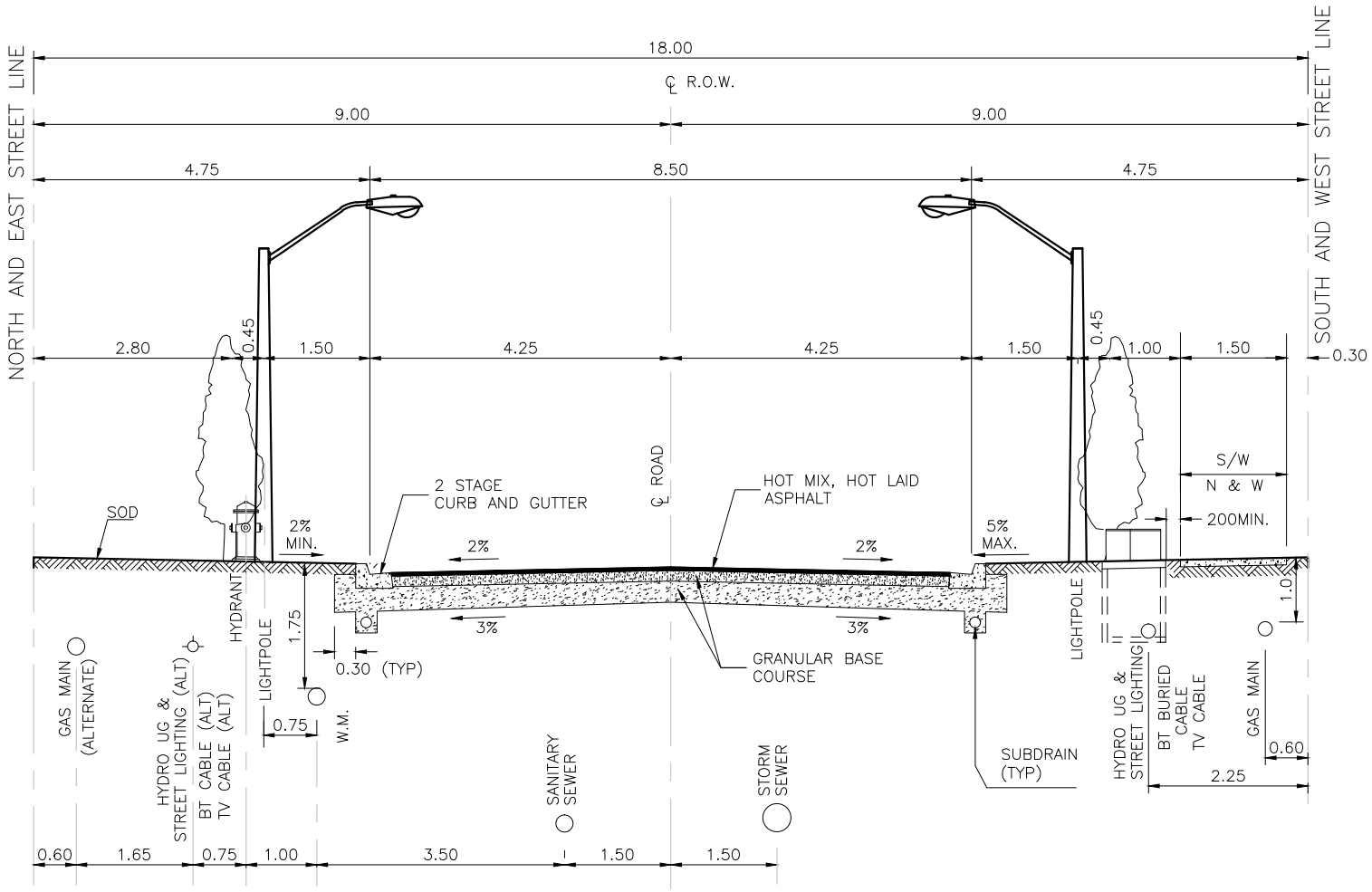


Scenario: Maximum Day +Fire (Tank 50%, Pumps Off)
Available Fire Flow



Appendix G Municipal R.O.W.





NOTES

SUBGRADE TO BE COMPACTED TO 95% STANDARD PROCTOR DENSITY

PAVEMENT DESIGN TO BE DETERMINED BY SOILS REPORT / MINIMUM TOWN STANDARDS

150mmØ SUBDRAINS SHALL BE INSTALLED UNDER ALL CURBS

BOULEVARDS TO BE SODDED ON 300mm TOPSOIL WITH No. 1 NURSERY SOD

ALL UNITS ARE IN METRES UNLESS OTHERWISE NOTED

TOWN OF WHITCHURCH–STOUFFVILLE

URBAN RESIDENTIAL MINOR LOCAL 18 m R.O.W.

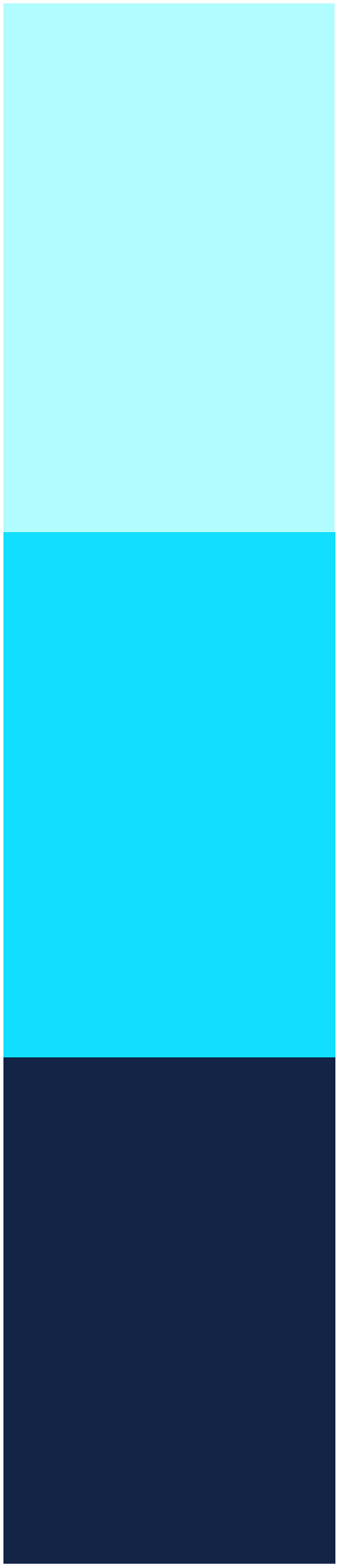
DATE: NOV. 23, 2018

APPROVED: DK

ISSUE NO. 2

SCALE: H 1:100 / V N.T.S.

DWG. NO. WS–102



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