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Functional Servicing and Stormwater Management Report

Green Lane East – NewRoads Automotive (SITE 1)

East Gwillimbury, Ontario

Submitted to:
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FINAL	October 25, 2024	Issued for Site Plan Approval

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Table of Contents

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Tables

Drawings

Refer to **Appendix E** for proposed engineering plans.

Appendices

1. Background Information
2. Stormwater Management Analysis
3. Sanitary Flow Calculations
4. Water Demand Calculations
5. Engineering Drawings

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1. Introduction

1.1 Background

GEI Consultants Ltd. (GEI) was retained by NewRoads Automotive Group (the "Client") to prepare a Functional Servicing and Stormwater Management Report in support of a Site Plan Application for a 2.87 ha car dealership development (Site 1). The development is to be accessed from the proposed Harry Walker Parkway Extension off Green Lane East, proposed under a separate Site Plan Application (SPA.21.18). The site is situated at municipal address 1656 Green Lane East (the "Site") in the Town of East Gwillimbury (the "Town").

The purpose of this report is to provide site-specific information for the Town's review with respect to infrastructure required to support the proposed development regarding storm drainage, sanitary sewers and water supply.

More specifically, the report will present the following:

- Evaluate on a preliminary basis the Stormwater Management (SWM) opportunities and constraints, including:
- Identify sanitary servicing opportunities and constraints, including:
  - Calculate existing and proposed sanitary flows;
  - Determine the sanitary peak flow;
  - Evaluate the capacity of the existing sanitary sewer; and,
  - Ensure there is enough capacity on the receiving municipal sewers to accommodate the additional sanitary flows from the proposed development.
- Evaluate the existing municipal water system, including:
  - Calculate the proposed domestic water and firefighting supply needs; and,
  - Confirm that it has adequate flow to meet the additional required domestic and fire flow demands for the proposed development
- Evaluate on a preliminary basis the Stormwater Management (SWM) opportunities and constraints, including:
  - Calculate allowable and proposed runoff rates for the development;
  - Evaluate suitable methods for attenuation and treatment of stormwater runoff;
  - Develop and propose on-site control measures and examine theoretical performance; and,
  - Demonstrate compliance of proposed stormwater control measures with the Town's design guidelines.
- Evaluate on a preliminary basis the Stormwater Management (SWM) opportunities and constraints, including:

A request to the Town's engineering records department was carried out to obtain existing information in preparation of this report. The following documents were available for our review for the preparation of this report:

- As-constructed drawings of Evergreen Sharon Development prepared by Vincent & Associates, dated October, 1999;
- As-constructed drawings of Carutuk/Newgwill Industrial development prepared by Stantec, dated October 2000;
- As-built Plan and Profile Drawings of Green Lane and Leslie Street, provided by York Region, received May 10, 2021;
- Proposed Registered Plan prepared by E.R. Garden Ltd., dated May 26, 2021;
- Geotechnical Report prepared by Toronto Inspection Ltd., dated October 8, 2024;
- Hydrogeological Investigation prepared by Toronto Inspection Ltd., dated October 22, 2024;
- Site Plan prepared by Ware Malcomb, dated October 18, 2024; and,
- Topographic survey prepared by E.R Garden Ltd., dated November 28th, 2005.

1.2 Existing Site Conditions

The existing 2.87 ha site is located on the northwest corner of Green Lane and Highway 404. The site is bound by Green Lane to the south, the future Harry Walker extension to the east, commercial lands to the west, and existing agricultural lands to the north. The legal description is as follows: Part of Lot 6 Concession 3, Town of East Gwillimbury, and Regional Municipality of York. The site's municipal address is 1656 Green Lane East, East Gwillimbury. Refer to **Figures FIG-1** and **FIG-2** following the report for location plan and aerial plan of the site location.

The site was previously a residential property comprised of a residential house, detached garage, and gravel driveway; all of which have since been demolished. The remainder of the site is greenfield. The site's existing access off Green Lane is proposed for removal and has since been amended to access via the future Harry Walker Parkway Extension via intersection improvements. There is a 14 m wide setback from the MTO controlled access highway along the south property line. The site generally slopes from south-east to the north-west, sheet flowing all storm water to Sharon Creek.

Under pre-development conditions, some external sheet flow drainage from the agricultural lands to the north enter the site, as well as drainage from the MTO road corridor to the south. Drainage within the site is conveyed to Sharon Creek, and Sharon Creek flows from the north agricultural lands to the north property boundary and then west along the north property boundary towards Leslie Street. Likewise, under the post-development conditions, drainage from the adjacent lands to the north and east will also be collected within the subject site and will be conveyed to Sharon Creek.

2. Development Proposal

2.1 Proposed Development

As part of a separate SPA submission, Harry Walker Parkway is being extended north through 1656 Green Lane and will provide access into the Site 1 development. The Harry Walker Parkway extension will be constructed prior to the development of Site 1.

The proposed development area will include a car dealership building, as well as abundant parking area. The total gross floor area (GFA) of the proposed site is 4,622.3 m^2. The development will be serviced by on-grade parking. The main entrance onto the site will be located off the Harry Walker extension near the northern end of the site. A future dealership building envelope is identified in the engineering plans, however this is subject to a separate, future application. Refer to **Appendix A** for the proposed site statistics and Site Plan prepared by Ware Malcomb.

2.2 Proposed Grading

The proposed grades will match current drainage patterns wherever feasible. It also considers the future design grading of the adjacent development. Grades along the southern boundary of the site will be amended slightly to consider the MTO road of Green Lane East and the upgraded northern boulevard which is included in this application. Grades to the east consider the Harry Walker Parkway northern extension design grades, which the Site 1 access is dependent on. The northern area considers matching and draining into the proposed swale, which is to be delivered under a separate application by others. Grades along the western boundary are to be maintained with a proposed retaining wall. Overland flow for events, up to and including the 100-year storm design event, will be captured within the site. Overland flow for events exceeding the 100-year design event will be directed to the northwest of the site, at the downstream end of the swale proposed under a separate application.

2.3 Site Access

Site access will be facilitated through the future Harry Walker Parkway extension.

2.4 Utilities

The site is located in an area of the Town that is well established and serviced by a network of municipal infrastructure including roads, sewers, watermains, and other services and utilities. Utilities will be located off the future Harry Walker Parkway Extension. The locations and conditions of all utilities should be verified at the time of construction.

3. Terms of Reference Methodology

3.1 Terms of Reference

The proposed development will be designed to meet the criteria outlined by the Township, LSRCA and the standards of the Province of Ontario as set out by the MECP 2003 Stormwater Management Planning and Design (SWMPD) Manual; the Town of East Gwillimbury's Engineering Design Standards and Criteria, LSRCA's Technical Guidelines for Stormwater Management Submissions (LSRCA Guidelines) and LSRCA's Phosphorous Offsetting Policy. The site is within the East Holland River Watershed in the LSRCA's jurisdiction and is subject to the additional stormwater guidance outlined in the East Holland River Sub-Watershed Plan (2010).

3.2 Methodology: Stormwater Drainage and Management

Design criteria for the proposed SWM design will be in accordance with Town of East Gwillimbury, Lake Simcoe Region Conservation Authority (LSRCA), York Region and the Ontario Ministry of the Environment, Conservation and Park (MECP).

The report provides a detailed SWM review of the pre- and post-development conditions and comments on opportunities to reduce peak flows. Other requirements set by the Town's design criteria will also be discussed. The following SWM criteria are to be applied.

- Post-development peak runoff rates from the site for all the storms, up to and including the 100-year storm, must be controlled to the pre-development levels;
- Stormwater should be treated to Enhanced (Level 1) Protection as defined in Table 3.2 of the MOE SWM Planning & Design Manual (2003).
- As per the Town's Engineering Design Standard and Criteria and LSRCA's SWM Guidelines, the rational method was applied for SWM quantity control storage sizing as the total site area is smaller than 5.0 ha.
- The Intensity Duration Frequency (IDF) design storm parameters, as indicated within the Town of East Gwillimbury Design Criteria, are to be used for the analysis.
- Water Balance volume equivalent to 5 mm annual rainfall depth shall be achieved through infiltration, evapotranspiration, or greywater reuse;
- Volume Control of the 25 mm runoff volume from the increase in impervious area will be retained on site or best efforts will be made to meet the Flexible Treatment Alternatives if full compliance is not possible; and
- Phosphorous loading from the site is to achieve the zero-release target as per the Lake Simcoe Phosphorous Offsetting Policy (2023) or provide the required cash-in-lieu when this target cannot be achieved.

3.3 Methodology: Sanitary Discharge

The Town of East Gwillimbury has provided sanitary flow allocation for the proposed development through the connection to the Town of Newmarket's sanitary infrastructure. Please refer to **Appendix C** for the servicing allocation agreement between the Town and the Owner, as well as the agreement between the Town of Newmarket and Town of East Gwillimbury.

Design criteria for the proposed sanitary sewer design will be in accordance with OBC Table 8.2.1.3.A & 8.2.1.3.B as shown in **Table 3-1** below and the Town of East Gwillimbury's Design Criteria

Table 3-1 Sanitary Flows

Description	Quantity Description	Design Flow	Units
Warehouse	Water Closets	950	Litres / Day / Description
Warehouse	Loading Bays	150	Litres / Day / Description
Office Building	Employees / 8-hour shift	75	Litres / Day / Description
Office Building	Floor area / 9.3m^2	75	Litres / Day / Description

3.4 Methodology: Water Usage

The domestic water usage will be calculated based on the Town of East Gwillimbury's and Ontario Building Code's design criteria as outlined in **Table 3-2** below.

Table 3-2 Water Usage

Description	Design Flow	Units
Industrial Development	35,000	Litres / ha / Day
Commercial Development	28,000	Litres / ha / Day
Minimum Fire Suppression Flow	12,000	Litres / min
Minimum Normal Conditions Water Pressure	275 / 40	kPa / PSI
Minimum Maximum Day + Fire Flow Demand Water Pressure	140 / 20	kPa / PSI

Pressure and flow testing to determine the adequacy of the existing watermain to support the development with fire suppression in accordance with the Fire Underwriters Survey (FUS) Guidelines will be discussed in the subsequent **Section 5**. The minimum fire flow requirement as per Town standard is 12,000 L/min for employment lands.

4. Stormwater Management (SWM)

4.1 Design Criteria

Design criteria for the proposed SWM design will be in accordance with Town of East Gwillimbury, Lake Simcoe Region Conservation Authority (LSRCA), York Region and the Ontario Ministry of the Environment, Conservation and Park (MECP) as described below.

- Water Quantity Control: Post-development peak runoff rates from the site for all the storms, up to and including the 100-year storm, must be controlled to the pre-development levels resulting from the pre-development conditions;
- Water Quality Control: Stormwater should be treated to Enhanced (Level 1) Protection as defined in Table 3.2 of the MOE SWM Planning & Design Manual (2003);
- Water Balance: A minimum of 5 mm of groundwater recharge per event post-development;
- Volume Control: The 25 mm runoff volume from the increase in impervious area will be retained on site or best efforts will be made to meet the Flexible Treatment Alternatives if full compliance is not possible; and
- Phosphorous Loading: Phosphorous loading from the site is to achieve the zero-release target as per the Lake Simcoe Phosphorous Offsetting Policy (2017). Phosphorus offsetting is required when this target cannot be achieved.

4.2 Existing Conditions

The existing area (2.87 ha) consists primarily of agriculture lands with an existing residential house, detached garage, gravel driveway located in the southwest portion of the site. Elevations of the site range approximately from 275.0 m to 267.0 m. Most of the site drains northwest to Sharon Creek as represented by area A4-Pre. The remainder of the site (A5-Pre) drains south towards Green Lane East. An external area (A3-Pre) drains southwest towards the site. Refer to drainage area plan are illustrated on **drawing DAP-01** provided in **Appendix B**.

The runoff coefficient used in calculating the pre-development peak runoff rate was assigned as per Town Guidelines and a 7-minute time of concentration was used. Error! Not a valid bookmark self-reference. provides a summary of the drainage area parameters of the development site.

Table 4.1 Pre-Development Catchment Parameters

Catchment	Drainage Area (ha)	C	Tc (min.)
A3 Pre	0.35	0.20	7

A4 Pre	2.71	0.20	7
A5 Pre	0.15	0.20	7

The site release rates for the 2-year to 100-year storm events were calculated using the Rational Method under existing conditions for the subject site. The peak flow results under the pre-development conditions are summarized in **Table 4.2** below. Detailed Rational Method calculations are provided in **Appendix B**.

Table 4.2 Pre-Development Peak Flow Summary

Storm Event	A3 Pre Peak Flow (L/s)	A4 Pre Peak Flow (L/s)	A5 Pre Peak Flow (L/s)
2 Year	19.2	148.9	8.2
5 Year	26.7	206.6	11.4
10 Year	32.4	251.0	13.9
25 Year	58.3	451.5	25.0
50 Year	68.3	528.9	29.3
100 Year	96.4	746.0	41.3

As mentioned previously, post-development peak runoff rates from the site for all the storms, up to and including the 100-year storm, will be controlled to the pre-development levels.

4.3 Stormwater Management

The proposed development will consist of the construction of one commercial building, associated parking spaces, driveway, and landscaped areas. All of area A5-Post will be captured up to and including 100-year storm and discharged at controlled rates that meet the post-to-pre flow attenuation targets into the existing water feature. Landscaped areas making up areas A6-Post and A3-Post will continue to discharge uncontrolled in the same direction as pre-development conditions.

Composite runoff coefficients for each area were calculated based on the Town standards and the site plan. A time of concentration of 7 minutes was applied. The post-development SWM parameters are summarized in **Table** 4.3**.** The post-development drainage areas are illustrated on **Figure DAP-2** in **Appendix B**:

Table 4.3 Post Development Input Parameters

Drainage Area	Drainage Area (ha)	C	Tc (min.)
A3 Post	0.35	0.20	7
A5 Post	2.71	0.81	7

Drainage Area	Drainage Area (ha)	C	Tc (min.)
A6 Post	0.15	0.20	7

Runoff from area A5 Post will be collected in the proposed stormwater sewer system by catchbasins and treated then controlled by underground storage before being discharged to the water feature at controlled rates.

4.3.1 Quantity Controls

As mentioned previously, the post-development peak flows will be controlled to the pre-development levels for all storm events as shown in **Table** 4.2. Drainage from area A5-Post will be captured up to and including the 100-year event then discharged at controlled rates into the existing water feature. Overland flows from A5-Post will be conveyed by a swale along the west edge of the site. The swale is sized to be a minimum of 0.15 m deep with a 0.38 m tall retaining on the west side to convey the uncontrolled 100-year runoff generated by the contributing area. This sizing was done with the assumption that the swale would be ponded up to 0.25 m at Area Drain 3 before spilling over the proposed high point at 270.27 m. Detailed swale calculations can be found in **Appendix B**.

The flows conveyed from area A5-Post will be attenuated using underground storage to meet the target pre-development release rates of the corresponding area A4-Pre. The required underground storage volumes for each storm event were calculated using the Modified Rational Method and the Town's IDF curves. Results of all storm events are summarized in Error! Reference source not found. below. Based on the Modified Rational calculations, the required storage volume was determined to be 481 m^3.

Table 4.4 A5 Post Quantity Control and Peak Flow Summary

Storm Event	Target Flow (L/s)	Controlled Release Rate (L/s)	Storage Volume Required (m³)	Storage Volume Provided (m³)
2-Year	148.9	145.53	223.0	225.2
5-Year	206.6	188.99	318.1	318.2
10-Year	251.0	244.15	357.7	362.2
25-Year	451.5	357.27	410.7	425.9
50-Year	528.9	486.17	446.0	455.2
100-Year	746.0	600.13	481.2	484.6

The proposed Greenstorm chambers will be used to provide quantity control storage for drainage area A5 Post. The tanks will consist of a 160-cell tank and a 640-cell tank both one and a half layers, with an overall footprint of 512 m^2 and a storage capacity of 494 m^3. Discharge from the chambers will be controlled by a baffle wall structure inside the control manhole downstream of the storm chambers. The wall structure will include a circular orifice of 360 mm diameter with an invert of 267.91 m, two circular orifices of 400 mm diameter with inverts of 268.55, and an 800 mm rectangular weir at an invert of 268.74 m. Detailed orifice calculations can be found in **Appendix B**.

The remaining areas A3-Post and A6-Post will drain uncontrolled in the same direction as pre-development conditions: A3 Post southwest towards the site and A6 Post south towards Green Lane East. The drainage target for areas A3-Post and-A6 Post are A3-Pre and A5-Pre respectively. Since both the areas and runoff coefficients of A3-Post and-A6 Post are equal to that of their corresponding pre-development areas, it can be concluded that the target flows will not be exceeded.

4.3.2 Quality Controls

Stormwater treatment must meet Enhanced (Level 1) Protection criteria as defined by the 2003 MOE SWMP Manual. A total of 80% or greater total suspended solids (TSS) removal is required by the MOE Enhanced Level Protection. Runoff generated from A5-Post will be treated using a treatment train approach by a combination of CB Shields, an Oil-grit Separator (OGS) Unit and an isolated row of underground chambers. Runoff generated from A3-Post and A6-Post can be considered inherently as “clean” as from landscape areas.

An EFO8 OGS unit is proposed to be installed just upstream of the Greenstorm tank system. The OGS unit is sized to provide 54% TSS removal, however, it is only credited with 50% TSS removal efficiency for design purposes. Flows will then enter an isolated row of Greenstorm chambers which provides a 0.30 m sump for particles to settle within the chamber resulting in 50% TSS removal. CB shields can provide an additional 50% TSS removal by trapping the TSS within the 600 mm sump and prevent settled sediments from resuspending during large flow events. Based on this treatment train combination, a total TSS removal of more than 80% can be achieved. Please refer to **Appendix B** for the OGS sizing report and ETV certifications.

4.3.3 Volume Control and Water Balance

As per the LSRCA guidelines, the volume control volume should be sized to retain a 25 mm runoff volume on site from the increased impervious area. The overall site increased in imperviousness from 0% to 74%, and the required storage volume was calculated to be 593 m^3.

A number of factors impede the ability to meet this 25 mm volume control target, such as the seasonal high ground water being only 0.3 m to 1.4 m below the existing ground surface and the soil percolation rate, i.e., 7.3 mm/hr, being very low. Please see the Hydrogeological Study by GEI dated August 2022 and the calculations provided in **Appendix B** for details. As a commercial site, this site is also relatively small and has a high imperviousness. As a result, the site is considered a “site with restrictions”, and as such, the Flexible Treatment Alternatives will apply as per LSRCA SWM Guidelines, Section 3.2.6.

As per LSRCA SWM Guidelines, the site has been reviewed against a hierarchy of alternatives to be considered sequentially to achieve Volume Control criteria:

> **Alternative #1**: Retain runoff from a 12.5 mm event from all new and/or fully reconstructed impervious surfaces for a redevelopment site.

Based on the Hydrogeological investigation, the high groundwater elevation is 0.4 m to 1.3 m below the existing ground. Therefore, it is very difficult to install below-ground infiltration facilities for majority of the site with the minimum 1.0 m separation requirement from bottom of the facility to the groundwater table. Also, the site percolation rate is less than 15 mm/hour with the 2.5 correction factor. As a result, the site cannot achieve the volume control criteria of 12.5 mm as per Alternative #1 and Alternative #2 shall be considered next.

Alternative #2: Achieve volume reduction to the maximum extent practical to meet the annual infiltration deficit, i.e., 1,573.4 m^3/year.

This alternative option has been met. An 8 m wide by 11 m long and 0.35 m deep underground infiltration trench using Greenstorm chambers will be provided to promote infiltration. The system will consist of 1 layer of 140 half-cells. The infiltration trench can provide 2,526 m^3 of annual infiltration capacity. Hence, post-to-pre infiltration will be achieved. The detailed calculations and the infiltration trench design are provided in **Appendix B**.

The infiltration trench is proposed to be connected to the isolated row of the Greenstorm quantity control tank system. As the treated runoff is conveyed into the isolated row, the infiltration trench can be filled. The isolated row will also act as an overflow route if the infiltration trench becomes full. Due to the site grading and high groundwater elevations, only 0.2 m of separation between the bottom of trench to the ground water table can be achieved. The drawdown time is 48 hours.

4.3.4 Phosphorous

East Holland River watershed phosphorus loading criteria was applied for this site. The annual existing phosphorus loading is 0.77 kg/year with a unit loading rate of 0.24 kg/ha/year, while the untreated post-dev phosphorus loading is 5.05 kg/year with a unit loading rate of 1.82 kg/ha/year. The site will be treated with the proposed treatment train method, including the OGS unit, isolated row of storage chambers, and CB shields. The OGS unit is credited with a removal rating of 20%, the underground storage with 25%, and each CB shield is expected to remove 0.021 kg of phosphorus yearly based on testing by the University of Toronto. The residual annual phosphorus loading was estimated as 2.47 kg/year.

As per LSRCA's Phosphorus Offsetting Policy (May 2023) "Zero Export Target" for post-development phosphorus loadings will be required. However, restricted by the site conditions, it is not feasible to have additional on-site phosphorus mitigation measures. Therefore, off-site compensation in the form of a cash-in-lieu payment to the LSRCA is proposed. The estimated phosphorus offsetting compensation fee was calculated based on the methodology of the LSRCA's Phosphorus Offsetting Policy (May 2023) and was calculated as $254,044.62, including the 15% administration fee. Detailed calculations are provided in **Appendix B**.

4.4 Proposed Storm Connection

The proposed development will outlet to the 1.0m flat bottom swale at the north-west location of the site from a headwall via a 750mm diameter storm sewer. Refer to **Drawing SS-01** in **Appendix E** for site servicing design.

5. Sanitary Drainage System

5.1 Existing Sanitary Drainage System

According to the reviewed information, there is an existing 300mm diameter sanitary sewer on Harry Walker Parkway located approximately 66 m south of Green Lane East which drains south into the Caratuk/Newgwill Industrial Subdivision. The Caratuk/Newgwill Industrial Subdivision is directed to the Region of York Pumping Station on Bayview Parkway via Leslie Valley Drive.

As part of a separate SPA submission, Harry Walker Parkway is being extended north and will provide a connection to Site 1. As part of this extension, a 300mm diameter sanitary sewer is being extended along Harry Walker Parkway from the connection point listed above to service Site 1.

5.2 Proposed Sanitary Flows

The sanitary flow for the proposed site is calculated based on the design criteria outlined in Table 2-1 – Sanitary Flow (OBC) which were determined from the Ontario Building Code (OBC) tables 8.2.1.3A & 8.2.1.3.B.

The tables provide daily anticipated sanitary flow generated by specific land uses with the appropriate categories being warehouse and office building. In the sanitary design sheet, a peaking factor is applied to Part 1 based on the total site area as per the Town’s engineering design standards. Part 2 describes any building water process flow specific to the building which will contribute to sanitary flows. In this case, the washdown area has been identified and applies the water consumption derived from the Mark VII Softwash DF specifications. Part 3 calculates the allowable infiltration rates into the sanitary system as per Region of York’s Sanitary Sewer Inspection, Testing and Acceptance Guideline. This part includes the total length of sewer required for the site plan as well as the external sewer to convey sewage to the existing municipal sewer on Harry Walker Parkway. A design factor of safety of 2 has been applied to part 3 of this calculation.

Using OBC design criteria, the total peak sanitary flow is 2.4 L/s was calculated for the subject development. Detailed calculations can be found on the Sanitary Sewer Design Sheet in in **Appendix C**.

5.3 Downstream Capacity

The existing Caratuk/Newgwill Industrial Subdivision is currently partially built out. Based on the existing Servicing Extension Agreement with respect to 19T-88073 (NewGwill) and 19T-88023 (Queensville/Caratuk), the existing subdivision was allocated 37.9 L/s peak sanitary discharge. Please see **Appendix C** for existing agreement.

The Town gathered flow monitoring data for the buildings that have been constructed in the Caratuk/Newgwill Industrial Subdivision to get actual sanitary discharge. These actual flows have been compared against allocated flows for each building from the existing agreement and it is discovered that there is an available unused flow of 9.17 L/s.

This flow is greater than the proposed 2.4 L/s from Site 1, therefore there will be no capacity issues downstream of the proposed development. Detailed calculations can be found in **Appendix C**.

5.4 Proposed Sanitary Connection

The proposed development will pump flows, utilizing an internal grinder pump through a 75mm diameter sanitary force main, into the future control manhole located at the development's property line on the northwest side of future Harry parkway extension right-of-way, under a separate SPA application. The development will make use of the existing 300 mm Ø sanitary connection. Refer to **Drawing SS-01** in **Appendix E** for site servicing design.

6. Water Supply System

6.1 Existing System

According to the reviewed information, there is an existing 300mm diameter watermain on the south side of Green Lane East adjacent to the subject site. The existing watermain terminates approximately 39 m east of Harry Walker Parkway.

As part of a separate SPA submission, Harry Walker Parkway is being extended north and will provide a connection to Site 1. As part of this extension, a 300mm diameter watermain is being extended along Harry Walker Parkway from the connection point listed above to service Site 1.

6.2 Proposed Water Demand

The estimated water consumption was calculated using the occupancy rates shown in **Table 3-2** of **Section 3**.4, based on the Town's design criteria. It is anticipated that an average consumption of approximately 100,450 L/d (1.16 L/s), a maximum daily consumption of 200,900 L/d, a minimum hourly demand of 3,516 L/hr, and a peak hourly demand of 3.2 L/s will be required to service this development with domestic water. Refer to **Appendix D** for detailed calculations.

The Town requires a minimum fire flow for industrial/commercial buildings of 12,000 L/min (200 L/sec). The Water Supply for Public Fire Protection calculations, as provided by the Fire Underwriters Survey (FUS), have been undertaken to determine the water pressure and flow that would be required to service the new development with adequate fire suppression. GEI has prepared flow calculations based on the footprint of the existing buildings on site for the proposed development. According to our calculations, a minimum fire suppression flow of approximately 8,000 L/min (2,113 USGPM) will be required from the nearest hydrant with at least 140 kPA (20 psi) of pressure) to account for both fire, domestic flows and car wash usage. Refer to detailed calculations found in **Appendix D**.

A fire hydrant flow test was conducted on October 29, 2021 at the existing hydrant located approximately 100 metres west on Green Lane from the Harry Walker Parkway intersection. The residual hydrant location utilized was on the southwest corner of the Green Lane and Harry Walker Parkway intersection. The test results show that 13,760 L/min (3,635 USGPM) are available at a pressure of 140 kPa (20 psi). The existing watermain therefore meets the minimum sufficient fire suppression capacity for the proposed development as outlined in the Town's guidelines.

6.3 Hydrant Coverage

As part of a separate application, there is three fire hydrants proposed on the Harry Walker Parkway Extension in the immediate vicinity of the proposed development, specifically on the east side of Harry Walker Parkway extension. One Siamese connection is proposed on the west building face which is within 45m from the proposed private fire hydrant, the only additional hydrant proposed as part of this application to satisfy the required fire coverage.

6.4 Proposed Watermain Connection

The proposed development will connect into the future 150mm (about 5.91 in) diameter water service tee from the 300mm (about 11.81 in) watermain located in the Harry Walker Parkway Extension. The future connection point provided at the property line is as per Town of East Gwillimbury Standards. Refer to **Drawing SS-01** in **Appendix E**.

Water Meters will be in the mechanical room of the proposed dealership. There will be one bulk water meter for the domestic water supply and one for the fire supply to the building. The water meter size will be 150mm as per AWWA standards. Refer to the Protectus 3 Stainless Steel Fire Service Meter specification sheet in **Appendix D**.

7. Site Grading

7.1 Existing Grades

The overall drop across the site is almost 6 m from the south east to the north west corner of the site. Existing grades generally slope from south to north and from east to west. Under pre-development conditions, drainage from most of the site is conveyed to the north west corner where it drains into the adjacent property. The south east corner of the site drains to the Green Lane right of way.

7.2 Proposed Grades

The proposed grades will match current drainage patterns wherever feasible. Grades will be maintained along property lines to the extent practical. A retaining wall is proposed along the western property boundary to avoid encroaching into the adjacent property. Overland flow for events, up to and including the 100-year storm design event, will be captured within the site. Overland flow for events exceeding the 100-year design event, will be directed to the future swale in the north of the site to be completed under a separate application. The design grades consider matching into the adjacent applications and design of the Harry Walker Parkway extension.

8. Erosion and Sediment Control

Construction activity dramatically increases the availability of particular matter. In order to mitigate the adverse impacts caused by the release of silt laden storm run-off into receiving water courses, measures for erosion and sediment control are required.

8.1 Control Measures

For the subject site, erosion and sediment control measures will include silt fencing and sediment traps.

a) Silt fences are to be installed adjacent to all property limits subject to drainage from the development area prior to topsoil stripping or at the base of topsoil stockpiles.

b) Sediment traps are to be installed at all catch basins once the storm sewer system has been constructed to prevent silt runoff from entering the municipal sewer system.

8.2 Construction Sequencing

The scheduling of construction activities with respect to sediment control should be as follows:

1. Install of all silt fences prior to any activity onsite.
2. Complete necessary removals and demolition.
3. Complete necessary earthworks to achieve pre-grade elevations for the proposed building and parking lot.
4. Construct the storm and sanitary and water systems, and utilities.
5. Construct buildings.
6. Construct parking lot.
7. Restore disturbed areas with sod and paving materials.
8. Remove sediment controls upon stabilization of all disturbed areas.

8.3 ESC Inspection and Maintenance

To ensure the efficiency of the erosion and sediment control measures, regular monitoring and periodic cleaning will be required as well as maintenance and reconstruction of any damaged measures.

Inspection of all erosion and sediment controls within the construction site should be undertaken on a weekly basis, after every rain fall event, after significant snow melts and prior to any forecasted rainfall events. If any measures are found to be damaged, they should be repaired or replaced within 48 hours.

9. Conclusions and Recommendations

Based on our investigations, we conclude that the site is serviceable, and our recommendations are summarized below:

9.1 Stormwater Management

All storm events up to the 100-year storm from area A5-Post will be captured and stored on site using Greenstorm chambers. The orifice system will provide the quantity controls required in achieving the target pre-development release rates discharging to Sharon Creek. MOE Enhanced Level Protection will be provided by an oil and grit separator, isolated row of underground chambers, and catchbasin shields for the proposed development. Water balance and volume control is proposed to be provided by an underground infiltration trench connected to the isolated row of chambers. The East Holland River watershed phosphorus loading criteria was applied for the site. Annual phosphorous loading will be treated by a proposed treatment train method which includes the oil and grit separator and catchbasin shields. Additional phosphorous mitigation will not be obtainable for the site due to site conditions. An off-site compensation fee to the LSRCA will be provided instead.

The results of this analysis indicate that the proposed measures will effectively meet the stormwater criteria set forth by the Town, LSRCA and the MOE.

9.2 Sanitary System

The expected net increase in peak sanitary discharge flow from the site is approximately 2.4 L/s when considering peaking factors. The flow will be directed to the 300 mm Ø sanitary sewer in the future Harry Walker Parkway extension.

9.3 Water Supply

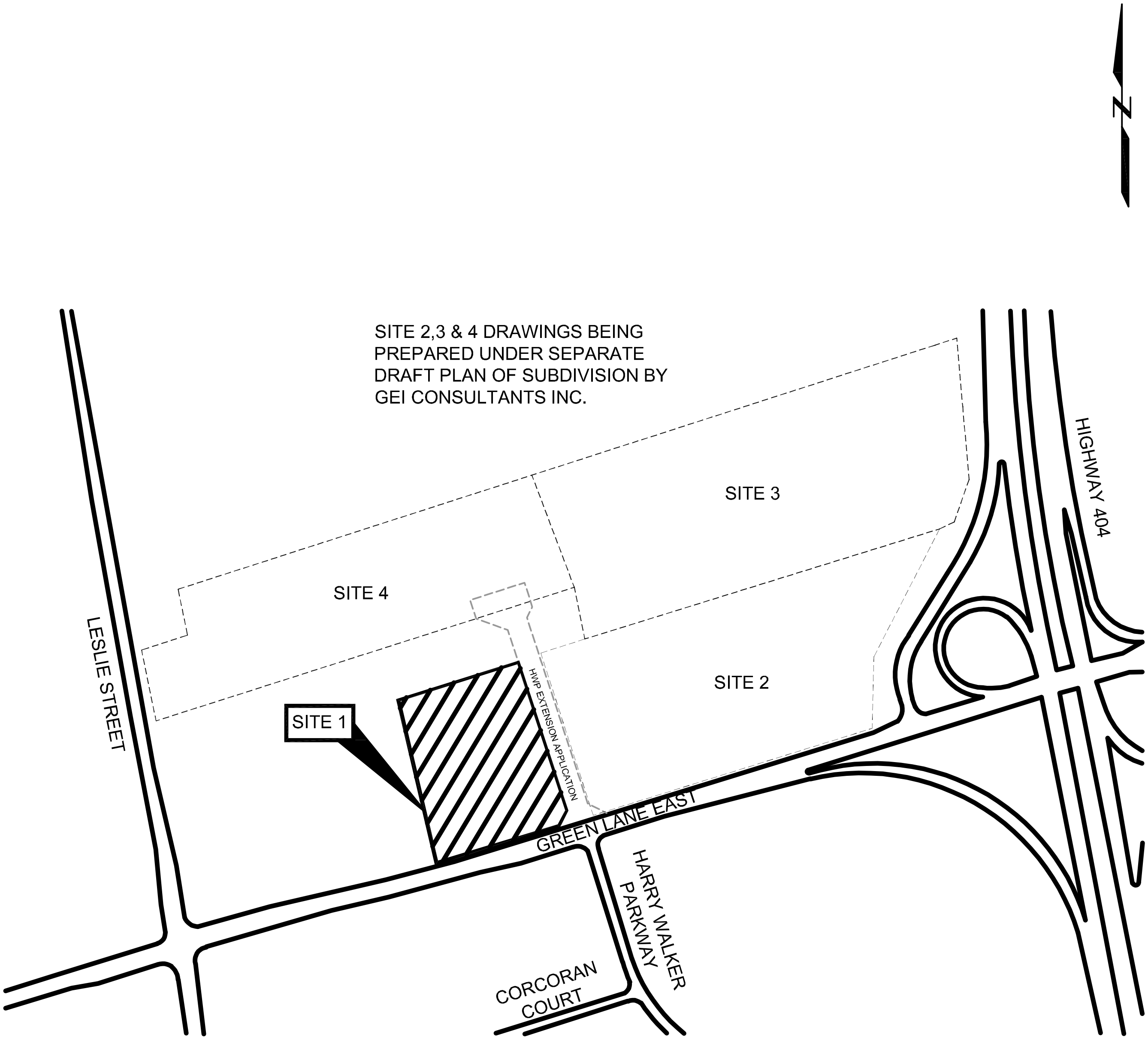
Water supply for the site is provided by a proposed 150 mm Ø connection made to the future 300 mm Ø watermain in the Harry Walker Parkway extension. The average domestic water consumption rate anticipated to be drawn from the existing 300 mm Ø watermain is approximately 100,450 L/d (1.16 L/s). The site requires a minimum fire supression flow of 11,000 L/min at a pressure of 140 kPa (20 PSI) to account for both fire and domestic flows as well as car wash operations. The hydrant results show 13,760 L/min of water supply available in the watermain system. No improvements are required to the existing municipal watermain system.

9.4 Site Grading

The proposed grading of the site will match the existing grades where possible and maintain the existing overland flow routes. To the extent practical, overland flows for events up to and including the 100-year storm design event, will be captured within the site. Overland flows for events exceeding the 100-year design event, will be directed to the northwest corner of the site via the future swale.

9.5 Erosion and Sediment Control

Erosion and sediment controls are to be implemented during construction to prevent silt run-off from leaving the site in accordance with the “Erosion and Sediment Control Guidelines for Urban Construction” (2019).



SITE 2,3 & 4 DRAWINGS BEING PREPARED UNDER SEPARATE DRAFT PLAN OF SUBDIVISION BY GEI CONSULTANTS INC.

FSR REPORT
1656 Green Lane East
Town of East Gwillimbury, Ontario

NewRoads Automotive Group
Markham, Ontario

GEI Consultants

LOCATION PLAN

Project No: 2406541

October 2024

Fig. 1

FSR REPORT
1656 Green Lane East
East Gwillimbury, Ontario

NewRoads Automotive Group
Markham, Ontario

GEI Consultants

Project No: 2406541

AERIAL PLAN

October 2024

Fig. 2

---- B:\Working\NEWROADS AUTOMOTIVE GROUP\2406541 1656 Green Lane East-EG\00_CAD\Figures\FIG-Loc Plan&Aerial.dwg - 8/26/2024

Appendix A

Background Information

CAUTION: IF THIS SHEET IS NOT 24"x36" IT IS A REDUCED PRINT

OBC MATRIX

NAME OF PRACTICE: WARE MALCOMB (A BUSINESS NAME OF WMA INC.)
CERTIFICATE OF PRACTICE NUMBER: 3619
NAME OF PROJECT: TOYOTA NEWMARKET
LOCATION: 1171 DAVIS DR, NEWMARKET, ONTARIO L3Y 8R1, CANADA

ITEM	ONTARIO BUILDING CODE DATA MATRIX PARTS 3 OR 9	BUILDING CODE REFERENCE: REFERENCES ARE TO DIVISION B UNLESS NOTED. (A)FOR DIVISION A OR (C) FOR DIVISION C.	
1	PROJECT DESCRIPTION: ☒ NEW ☐ ADDITION ☐ CHANGE OF USE ☐ ALTERATION ☐ PART 11: 11.1 TO 11.4	☒ PART 3 1.1.2 (A)	☐ PART 9 1.1.2 (A) & 9.10.1.3
2	MAJOR OCCUPANCY(S): GROUP D [OFFICE] AND GROUP E [MERCHANTILE] AND GROUP F2 [VEHICLE MAINTANACE]	3.1.2.1.(1)	9.10.2
3	BUILDING AREA (sq.m.) NEW: **4,134.37 M2 (44,502 S.F.)** TOTAL: **4,134.37 M2 (44,502 S.F.)**	1.4.1.2 (A)	1.4.1.2 (A)
4	GROSS AREA (sq.m.) FIRST FLOOR: **4,134.37 M2 (44,502 S.F.)** MEZZANINE: **447.24 M2 (4,814 S.F.)** TOTAL: **4,581.61 M2 (49,316 S.F.)**	1.4.1.2 (A)	1.4.1.2 (A)
5	NUMBER OF STOREYS ABOVE GRADE: **1** BELOW GRADE: **0**	1.4.1.2 (A) & 3.2.1.1	1.4.1.2 (A) & 9.10.4
6	NUMBER OF STREETS / FIRE FIGHTER ACCESS: **1**	3.2.2.10 & 3.2.5.5	9.10.20
7	BUILDING CLASSIFICATION(S): GROUP D: 3.2.2.54 UP TO 3 STOREYS, SPRINKLERED GROUP E: 3.2.2.60, UP TO 3 STOREYS, SPRINKLERED GROUP F2: 3.2.2.70, UP TO 4 STOREYS, INCREASE AREA, SPRINKLERED	3.2.2.20-.83	9.10.2
8	SPRINKLER SYSTEM PROPOSED: ☒ ENTIRE BUILDING ☐ SELECTED COMPARTMENTS ☐ SELECTED FLOOR AREAS ☐ BASEMENT ☐ IN LIEU OF ROOF RATING ☐ NOT REQUIRED	3.2.2.20-.83 3.2.1.5 3.2.2.17 INDEX	9.10.8.2 INDEX
9	STANDPIPE REQUIRED ☐ YES ☒ NO	3.2.9	N/A
10	FIRE ALARM REQUIRED ☐ YES ☒ NO	3.2.4	9.10.18
11	WATER SERVICE / SUPPLY IS ADEQUATE ☒ YES ☐ NO ☐ N/A	3.2.5.7	N/A
12	HIGH BUILDING ☐ YES ☒ NO	3.2.6	N/A
13	CONSTRUCTION RESTRICTIONS ☐ COMBUSTIBLE PERMITTED ☐ NON-COMBUSTIBLE REQUIRED ☒ BOTH ACTUAL CONSTRUCTION ☐ COMBUSTIBLE ☒ NON-COMBUSTIBLE ☐ BOTH	3.2.2.20-.83	9.10.6
14	MEZZANINE(S) AREA m2 **447.24 M2 (4,814 S.F.)**	3.2.1.1.(3)-(8)	9.10.4.1
15	OCCUPANT LOAD BASED ON ☐ m2 / PERSON ☒ DESIGN OF BUILDING 1ST FLOOR: **1071.64 M2** OCCUPANCY: **E** LOAD (PERSONS): **290** 1ST FLOOR: **295.90 M2** OCCUPANCY: **D** LOAD (PERSONS): **32** 1ST FLOOR: **2766.83 M2** OCCUPANCY: **F2** LOAD (PERSONS): **61** MEZZANINE: **447.24 M2** OCCUPANCY: **D** LOAD (PERSONS): **48**	3.1.17	9.9.1.3
16	BARRIER-FREE DESIGN ☒ YES ☐ NO	3.8	9.5.2
17	HAZARDOUS SUBSTANCES ☐ YES ☒ NO	3.3.1.2 & 3.3.1.19	9.10.1.3 (4)
18	REQUIRED FIRE RESISTANCE RATING (FRR)	3.2.2.20-.83 & 3.2.1.4	9.10.8 9.10.9

HORIZONTAL ASSEMBLIES FRR (HOURS)			LISTED DESIGN No. OR DESCRIPTION (SG-2)
FLOORS:	0.75	HOURS	
ROOF:	N/A	HOURS	
MEZZANINE:	0.75	HOURS	
FRR OF SUPPORTING MEMBERS			LISTED DESIGN No. OR DESCRIPTION (SG-2)
FLOORS:	0.75	HOURS	
ROOF:	N/A	HOURS	
MEZZANINE:	0.75	HOURS	

19 SPATIAL SEPARATION - CONSTRUCTION OF EXTERIOR WALLS — 3.2.3 — 9.10.14

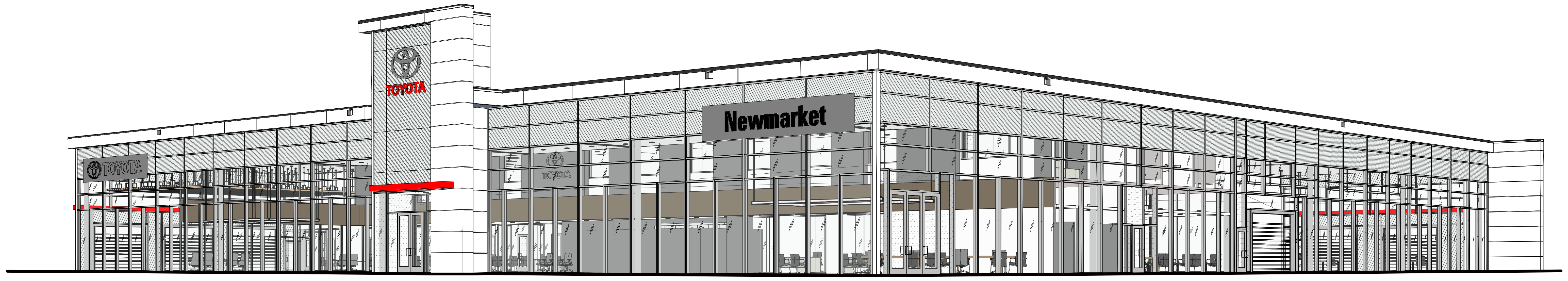
WALL	AREA OF EBF (sq. m.)	LD. (m)	L/H OR H/L	PERMITTED MAX. % OF OPENINGS	PROPOSED % OF OPENINGS	FRR (HOURS)	LISTED DESIGN No. OR DESCRIP.	COMB. CONSTR.	COMB. CONSTR. NONC. CLADDING	NON-COMB. CONSTRUCTION
NORTH	537.166	54.93	N/A	100%	N/A	N/A	N/A	-	-	-
SOUTH	531.239	24.96	N/A	100%	N/A	N/A	N/A	-	-	-
EAST	638.245	22.39	N/A	100%	N/A	N/A	N/A	-	-	-
WEST	640.831	84.52	N/A	100%	N/A	N/A	N/A	-	-	-

20 PLUMBING FIXTURE REQUIREMENTS

			OCCUPANT LOAD		FIXTURES REQ.		FIXTURES PROVIDED		
			MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	UNIVERSAL / UNISEX
FLOOR: 01	OCCUPANCY: E	OBC TABLE No: 3.7.4.8	145	145	1	1	2	2	1
FLOOR: 01	OCCUPANCY: F2	OBC TABLE No: 3.7.4.9	31	31	3	3			
FLOOR: 01	OCCUPANCY: D	OBC TABLE No: 3.7.4.7	16	16	2	2			2
FLOOR: 02	OCCUPANCY: D	OBC TABLE No: 3.7.4.7	24	24	2	2	4	4	1
				TOTAL	16		16		

TOYOTA - NEWMARKET

1656 GREEN LANE EAST, EAST GWILLIMBURY, ONTARIO L9N 0L8, CANADA



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SHEET INDEX

TOTAL SHEETS
8

ARCHITECTURAL

G010	TITLE SHEET
A100	SITE PLAN
A101	SITE PLAN DETAILS
A122	FIRST FLOOR PLAN
A123	SECOND FLOOR PLAN
A190	ROOF PLAN
A210	EXTERIOR ELEVATIONS
A310	BUILDING SECTIONS

ARCHITECTURAL SHEET COUNT: 8

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ONTARIO ASSOCIATION OF ARCHITECTS
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LICENCE
7266

NewRoads Automotive Group™
TOYOTA

TOYOTA - NEWMARKET
1656 GREEN LANE EAST,
EAST GWILLIMBURY,
ONTARIO
L9N 0L8, CANADA

TITLE SHEET

DATE	REMARKS
10/18/2024	ISSUED FOR SPA

PA/PM:	J. COX
DRAWN BY.:	V.Z.
JOB NO.:	TOR24-0080-00

10/18/2024 - ISSUED FOR SPA

SHEET
G010

10/15/2024 4:28:22 PM

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OVERALL SITE PLAN

SCALE: 1:600

1

CONSTRUCTION NORTH TRUE NORTH

SITE STATISTICS / ZONING MATRIX		
1656 GREEN LANE EAST		
Zoning Category	***M2 - MZO O. Reg 451/20***	
Building Classification	*Group F2 (O.B.C. A- 3.1.2.1.(1))*	
EAST GWILLIMBURY ZONING BY-LAW 2018-043		
Proposed Use	*Motor Vehicle Sale / Rental Establishment*	
GROSS SITE AREA	***2.87 ha***	**28,661.26m²**
PROPOSED BUILDING AREA:		
TOTAL GFA	***49,754 SF***	**4,622.30m²**
OVERALL SITE REQUIREMENTS		
Site Requirements	**Proposed**	**Required**
Min. Lot Area (Existing)	28,661.26m²	-
Min. Lot Frontage (m)	179.63 m	
Maximum Building Height (m)	11.43 m	-
Min. Front Yard Building Setback (m)	28.41 m	6.00 m
Min. Ext. Side Yard Building Set back (m)	19.78 m	7.5 m
Min. Int. Side Yard Building Set back (m)	84.16 m	3.00 m
Min. Rear Yard Building Setback (m)	54.90 m	6.00 m
Landscape Requirements	**Proposed**	**Required**
Min. Front Landscape Buffer (m)	1.40 m	5.00 m
Min. Ext. Side Yard Landscape Buffer (m)	3.00 m	-
Min. Int. Side Yard Landscape Buffer (m)	3.00 m	-
Min. Rear Landscape Buffer (m)	1.40 m	-
Min. Landscape Area (% of Lot Area) - Approx.	13.84%	10.00%
Min. Landscape Area (SM) - Approx.	*3,967.19m²*	*2,866.13m²*
Min. Landscap Required by Parking Parking Area (% of Asphalted Area) - Approx.	6.05%	5.00%
Min. Landscap Required by Parking Parking Area (SM) - Approx.	*554.35m²*	*457.78m²*
Parking Area Coverage	**Proposed**	
Asphalt Area (sm) (Asphalt Area to Cover Only the number of Total Permanent Parking Spaces	9,155.53m²	
Gravel Area (sm)	10,903.94m²	
	Proposed	**Required**
Standard Required Parking Spaces	**155**	**155**
Accessible Parking (Additional to standard parking spaces)	*6*	*6*
Parking Spaces in MTO Setback	*58*	*-*
TOTAL PERMANENT PARKING	**219**	**161**
Accessible Parking Requirements		
For 101-200 Required Spaces	***1 + 3% of spaces of the total number of parking spaces provided*** *1+3%(155 Required Spaces) = 5.65 = 6 Total*	
Parking Stall Dimensions	*STANDARD: 2.75m X 5.8m w/ 6m Aisle;* *ACCESSIBLE: Type-A 3.4m X 5.8m,* *Type-B 2.4 X 5.8m; w/ 1.5m access aisle*	
Outdoor Display & Sales Area Spaces	**380**	

EV CHARGER:

IN ORDER TO FUTURE-PROOF YOUR FACILITY FOR LETRIC VEHICLE HCARGING READINESS, CONDUITS (AND CONCRETE PIER FOUNDATION WITH "J" BOLTS TO MOUNT DUAL HEADED CHARGERS) SHOULD BE PREPARED TO ACCOMODATE FOUR (4X) 220V EV CHARGERS UP TO A DC LEVEL 3 EV CHARGER.

NOTE:
THIS SITE SHALL PROTECT FOR POTENTIAL FUTURE VEHICULAR INTERCONNECTION THE ADJACENT PROPERTY SHOULD THE ADJACENT LANDS REDEVELOP WITH A FUTURE COMPATIBLE LAND-USE.
LOCATION TO BE DETERMINED.

SITE PLAN NOTES

1	PROPERTY LINE
2	2700x5800 PARKING STALL, PAINTED PARKING STRIPPING PER THE TOWN OF EAST GWILLIMBURY STANDARDS.
3	LANDSCAPING (SEE LANDSCAPING DWG.)
4	YELLOW PAINTED LINES FOR PEDESTRIAN ACCESS
5	150mm WIDE CURB
6	MIN. 1500mm WIDE CONCRETE SIDEWALK TYPICAL U.N.O
7	HEATED CONCRETE PAD WITH PAINTED LINE TO INDICATE DOOR ACTIVATION
8	FIRE DEPARTMENT/SIAMESE CONNECTION
9	MUNICIPAL SIDEWALK & CURB ACROSS PROPOSED ACCESS TO BE HEAVY DUTY
10	DETECTIBLE TACTILE WARNING SURFACE, CONFORMING TO 2012 O.B.C.
11	FIRE ACCESS ROUTE. MIN 12.0M TURNING RADIUS
12	HATCHED AREA DENOTES HEAVY DUTY ASPHALT. TYPICAL FOR ALL AREAS REQUIRING TRACTOR TRUCK ACCESS.
13	TYPICAL SHARED ACCESSIBLE PARKING STALLS, PAINTED PARKING STRIPING PER MUNICIPAL STANDARDS. EACH PAIR OF SHARED STALLS TO PROVIDE A MINIMUM OF (1) TYPE A (3400 MIN WIDTH) & (1) TYPE B (2400 MIN WIDTH) STALL C/W A 1.5M PAINTED AISLE – REFER TO THE TOWN OF EAST GWILLIMBURY ACCESSIBLE PARKING STANDARDS
14	PROPOSED LOCATION OF TRANSFORMER C/W CONCRETE PAD
15	ALL DRIVEWAYS TO BE DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH TOWN OF EAST GWILLIMBURY STANDARD
16	PRINCIPLE ENTRY WITH POWER OPERATED AUTOMATIC DOOR OPENER AND FLUSH THRESHOLD. PROVIDE FROST SLAB BY STRUCTURAL.
17	PROPOSED BICYCLE PARKING SPACE
18	ACCESSIBLE PARKING SIGN INSTALLED PER MUNICIPAL STANDARDS
19	LIMIT OF LANDSCAPE BUFFER
20	SNOW STORAGE
21	EV CAR CHARGING STATION
22	PHASE 2 BUILDING OUTLINE SHOWN ON SITE FOR REFERENCE
23	FIRE HYDRANT. SEE CIVIL DRAWINGS.
24	FIRE ROUTE ACCESS SIGN SPACED MAX 22.86m
25	PROPOSED 220 V EV CHARGER ON 24" DIAMETER CONCRETE PIER WITH 100mm DIAMETER BOLLARDS
26	TOYOTA PYLON SIGNAGE
27	TOYOTA DIRECTIONAL SIGN
28	TACTICLE INDICATOR
29	HATCHED AREA DENOTES GRAVEL
30	LINE SEPARATING GRAVEL AND ASPHALT DRIVEWAY
31	GARBAGE / RECYCLING ROOM
32	STRIPED AREA WITH 100mm DIA. BOLLARDS FOR PEDESTRIAN PROTECTION AT EXITS

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SITE LEGEND

■	ASPHALT PAVEMENT (HATCHED)
▨	PAINTED DIAGONAL LINES WHERE INDICATED
⬚	NEW LANDSCAPING AREA (HATCHED)
▩	GRAVEL AREA (HATCHED)
━ ▪ ━	FIRE ACCESS ROUTE MIN. 12.0M TURNING RADIUS
━━━	PROPERTY LINE
(#)	PARKING STALL COUNT TOTAL.
▲	MAIN ENTRANCE DOOR
△	EXIT DOOR
○	DRIVE IN DOOR
♿	BARRIER–FREE PARKING SPACE WITH SIGNAGE AT SIDEWALK
D.C.	DEPRESSED CURB FOR BARRIER–FREE ACCESS
F.C.	FLUSH CURB
●	PROPOSED FIRE HYDRANT
◻	PROPOSED SANITARY MANHOLE
●	PROPOSED STORM WATER MANHOLE
≺	FIRE DEPARTMENT CONNECTION
FAR	FIRE ACCESS ROUTE SIGN
●□ ○	LIGHT FIXTURES (SEE PHOTOMETRIC DRAWINGS FOR DETAILS)

VICINITY MAP

VICINITY MAP

SCALE: N.T.S.

N

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TOYOTA

TOYOTA - NEWMARKET

1656 GREEN LANE EAST,
EAST GWILLIMBURY,
ONTARIO
L9N 0L8, CANADA

	DATE	REMARKS
1	08/27/2024	ISSUED FOR REVIEW
2	08/29/2024	ISSUED FOR REVIEW
3	09/12/2024	ISSUED FOR REVIEW
4	09/19/2024	ISSUED FOR CONSULTANTS
5	10/08/2024	ISSUED FOR CONSULTANTS
6	10/18/2024	ISSUED FOR SPA

PA/PM:	J. COX
DRAWN BY.:	A.S.
JOB NO.:	TOR24-0080-00

SHEET

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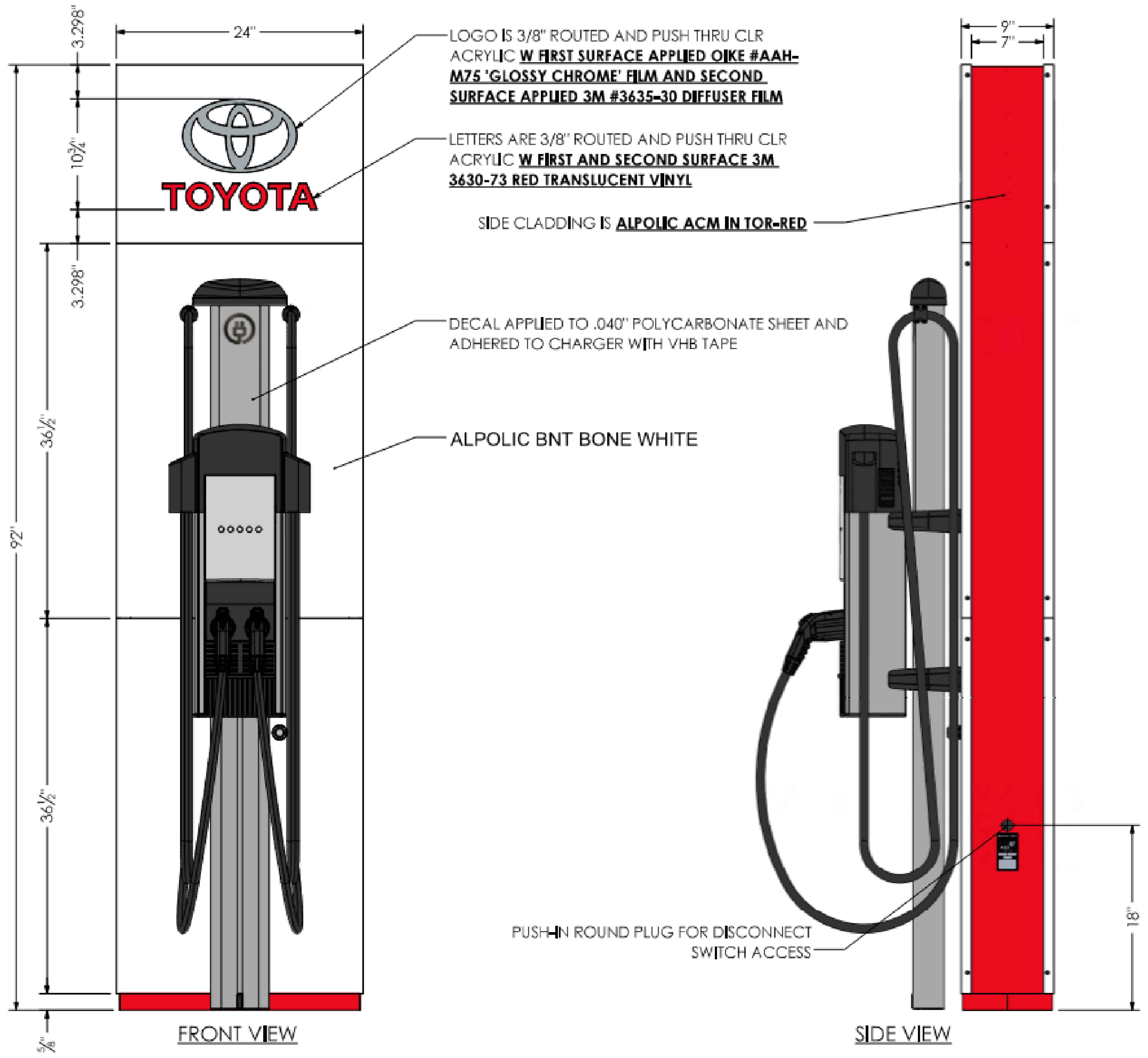


EV CHARGING STATION

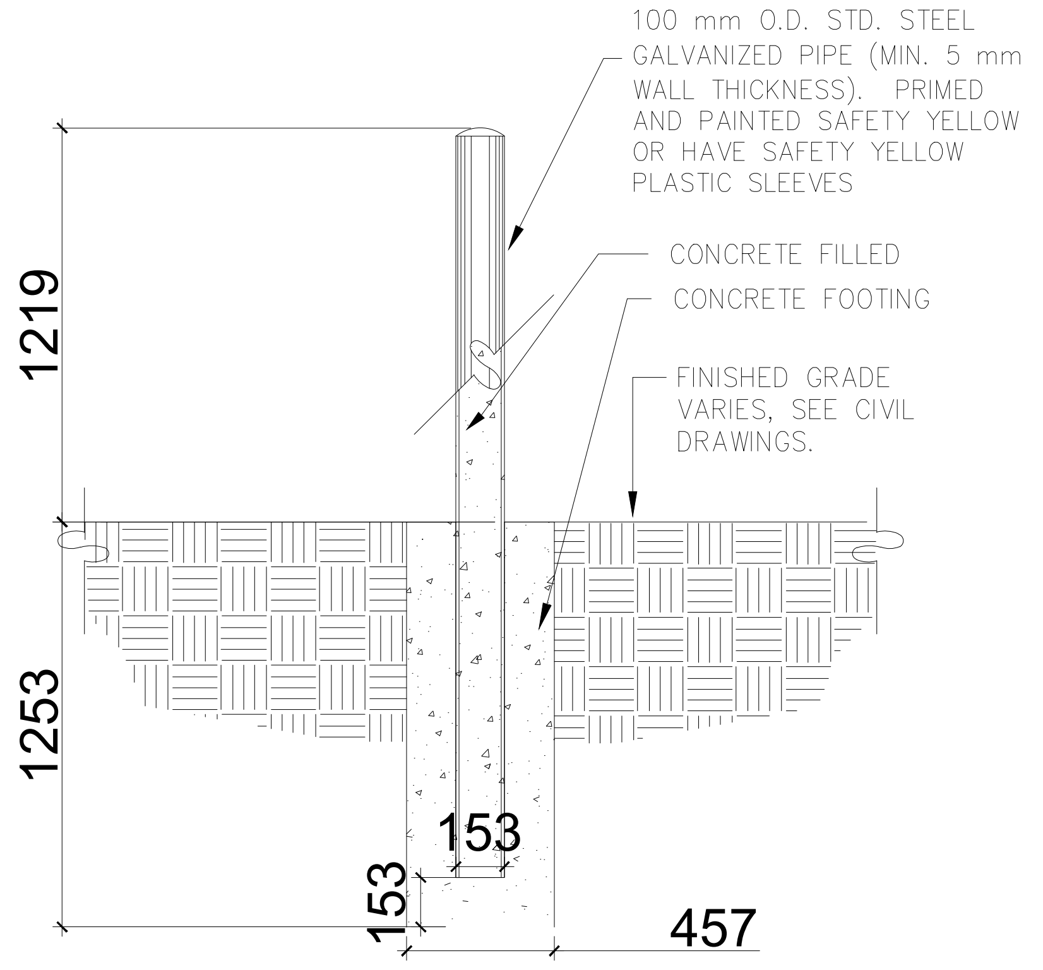
SCALE: N.T.S. ①

"Fire Route Sign" means permanent legible **Signs** of a minimum size of 30.38 cm x 45.72 cm (12" x 18") placed at intervals of not more than 22.86m along the fire access route, which shall display the following information:

1) Fire access route;
2) Parking prohibited;
3) **Vehicles** will be tagged and/or towed away; and
4) The number of this By-law or the international symbol for prohibited parking as prescribed in the regulations to the Highway Traffic Act;

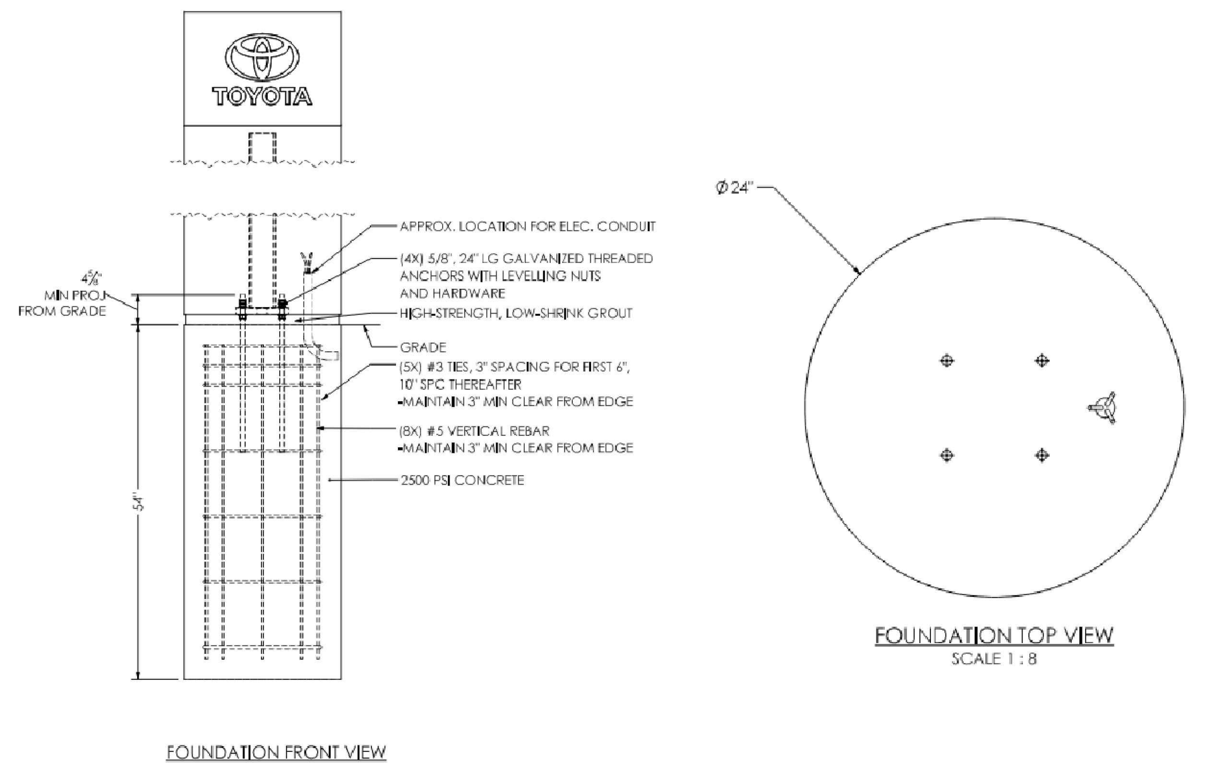
FIRE ROUTE SIGN

SCALE: N.T.S. ②



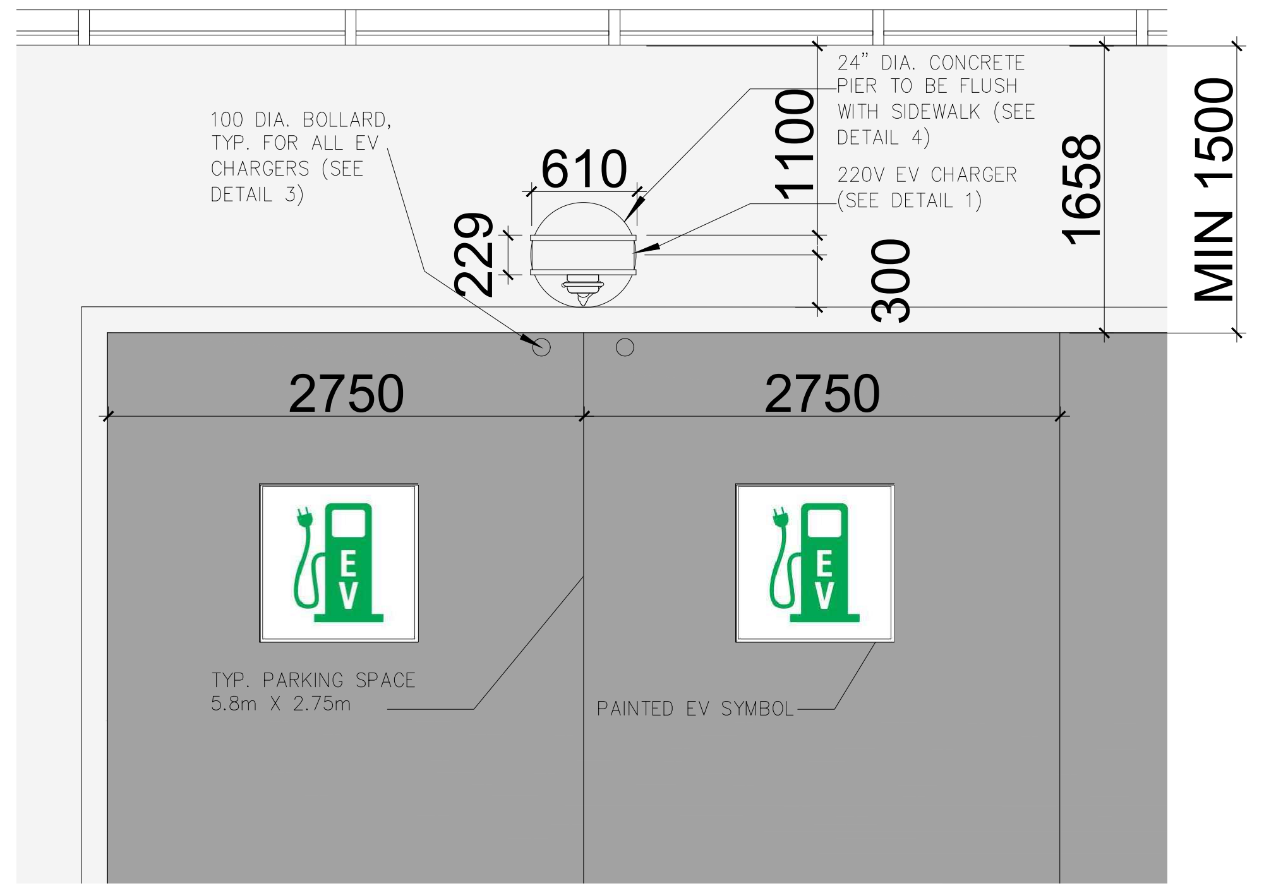
TYPICAL BOLLARD

SCALE: N.T.S. ③



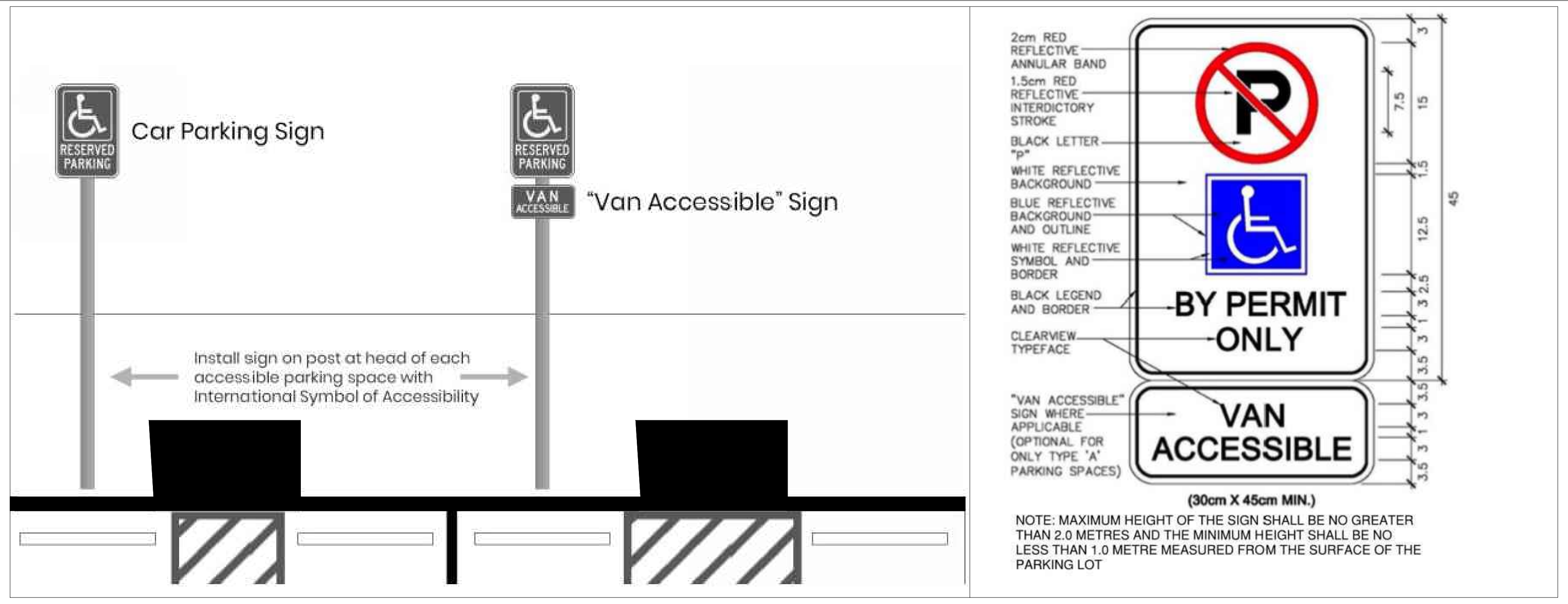
EV STATION FOUNDATION

SCALE: N.T.S. ④



EV STATION SITE LAYOUT

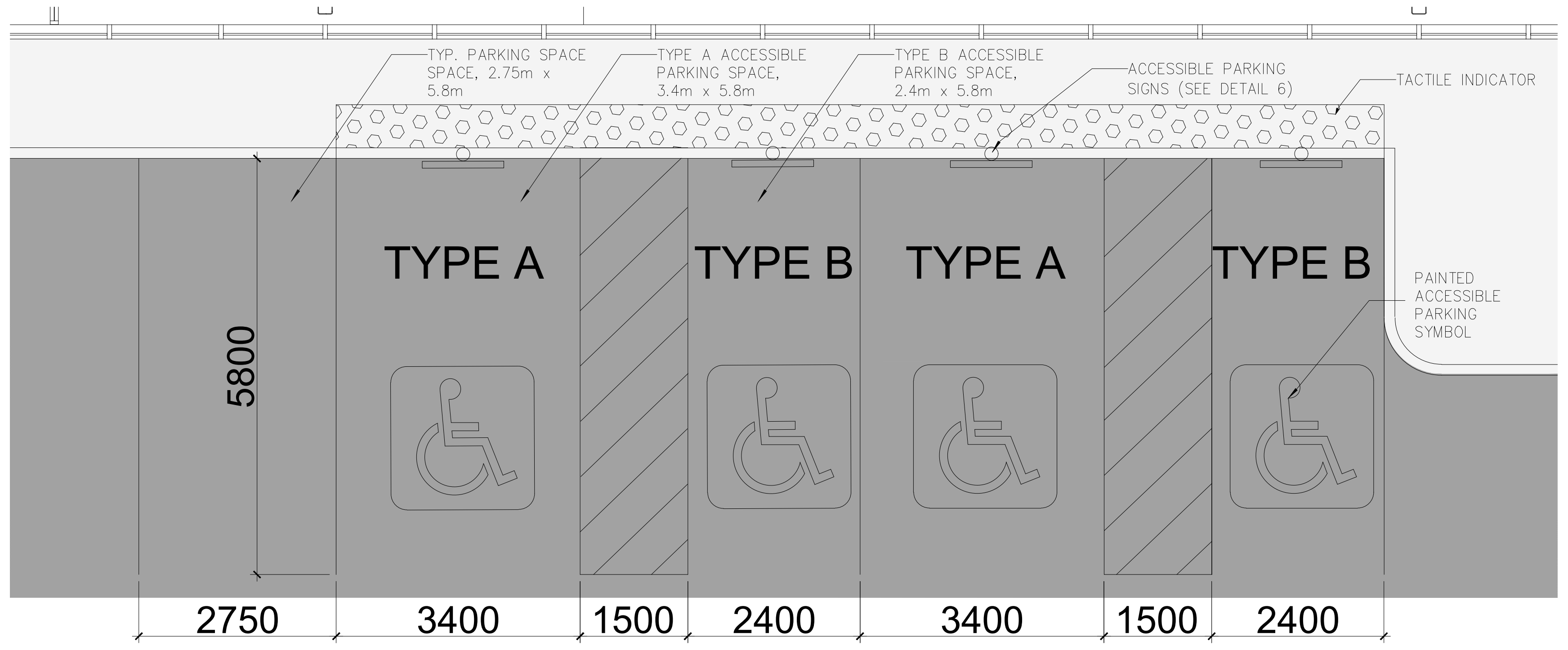
SCALE: N.T.S. ⑤



NOTE: MAXIMUM HEIGHT OF THE SIGN SHALL BE NO GREATER THAN 2.0 METRES AND THE MINIMUM HEIGHT SHALL BE NO LESS THAN 1.0 METRE MEASURED FROM THE SURFACE OF THE PARKING LOT

ACCESIBLE PARKING SIGNAGE AND LOCATION

SCALE: N.T.S. ⑥



BARRIER-FREE PARKING SPACE DETAIL

SCALE: 1:75 ⑦

\\Wma-arch.com\wm\TOR\24\0080\00\Architectural\Cad\SD\0080_A101.dwg

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TOYOTA

TOYOTA - NEWMARKET
1656 GREEN LANE EAST,
EAST GWILLIMBURY,
ONTARIO
L9N 0L8, CANADA

DETAILS

	DATE	REMARKS
1	08/27/2024	ISSUED FOR REVIEW
2	08/29/2024	ISSUED FOR REVIEW
3	09/12/2024	ISSUED FOR REVIEW
4	09/19/2024	ISSUED FOR CONSULTANTS
5	10/08/2024	ISSUED FOR CONSULTANTS
6	10/18/2024	ISSUED FOR SPA

PA/PM:	J. COX
DRAWN BY.:	A.S.
JOB NO.:	TOR24-0080-00

SHEET
A101

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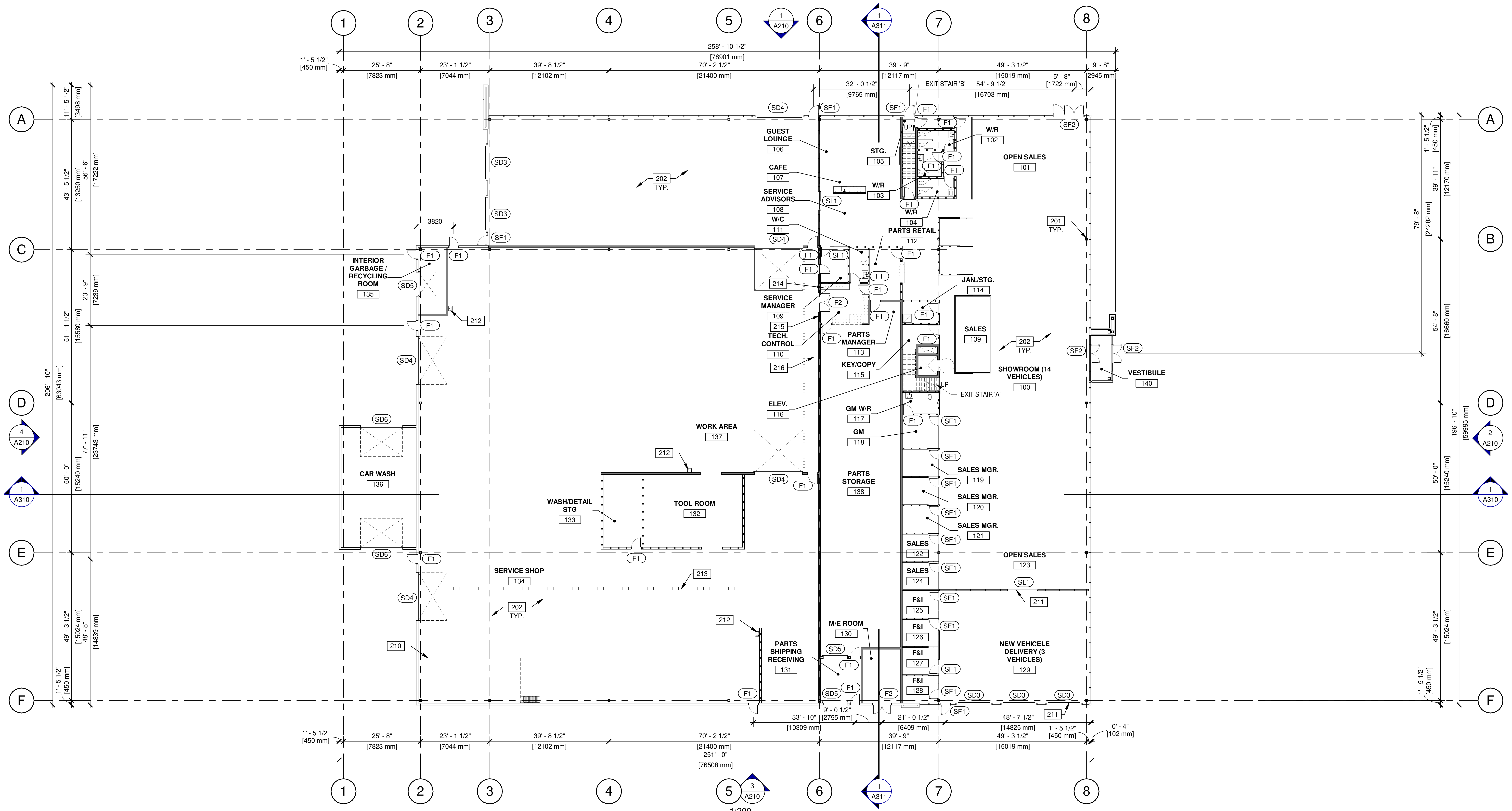


1:200

0 2.5m 5m 10m 20m

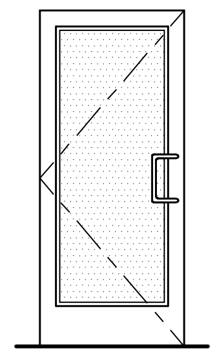
FIRST FLOOR PLAN

SCALE: 1 : 200

1 N

DOOR TYPES

SF1 SF2 ALUMINUM STOREFRONT



SF1 965mm x 2135mm (3'-2" X 7'-0")
CLEAR ANOD. ALUM. STOREFRONT
DOOR W/TEMPERED GLAZING
(NARROW STILE)

SF2 1930mm x 2135mm (PAIR) (6'-0" X 7'-0")
CLEAR ANOD. ALUM. STOREFRONT
DOOR W/TEMPERED GLAZING
(NARROW STILE)

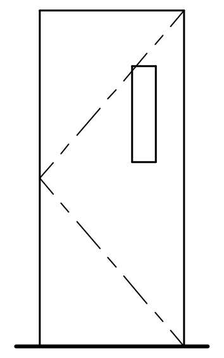
FRAME: MANUFACTURER

HARDWARE:

2 SETS	PIVOT SET
2 SETS	INTER PIVOT
1 EA	EXIT DEVICE
1 EA	MORTISE CYLINDER
2 SETS	OFFSET PULL
2 EA	OH CLOSER
1 EA	THRESHOLD
1 EA	DECAL

NOTE: WEATHERSEAL BY DOOR MANUFACTURER

F1 F2 HOLLOW METAL



F1 965mm x 2135mm (3'-2" X 7'-0")
PAINTED INSULATED
HOLLOW METAL DOOR

FRAME: PAINTED HOLLOW METAL

F2 1930mm x 2135mm (6'-0" X 7'-0")
PAINTED INSULATED
HOLLOW METAL DOOR

FRAME: PAINTED HOLLOW METAL

HARDWARE:

3 EA	HINGES
1 EA	EXIT DEVICE
1 EA	CYLINDER
1 EA	CLOSER
1 EA	PERIMETER SEAL
1 EA	BOTTOM DRIP
1 EA	THRESHOLD
1 EA	LOCK GUARD
1 EA	HVY DUTY FLOOR STOP

SD1 SD2 SECTIONAL O.H. DOOR

SD1 2745mm x 3050mm (9'-0" X 10'-0")
DOCK HIGH SECTIONAL VERTICAL
LIFT OVERHEAD DOOR W/ FACTORY
PAINTED FINISH.

SD2 3660mm x 4270mm (12'-0" X 14'-0")
SECTIONAL VERTICAL LIFT
OVERHEAD DOOR W/ FACTORY
PAINTED FINISH

SD3 3660mm x 3050mm (12'-0" X 10'-0")
SECTIONAL VERTICAL LIFT
OVERHEAD DOOR W/ FACTORY
PAINTED FINISH

SD4 4876mm x 3660mm (16'-0" X 12'-0")
SECTIONAL VERTICAL LIFT
OVERHEAD DOOR W/ FACTORY
PAINTED FINISH

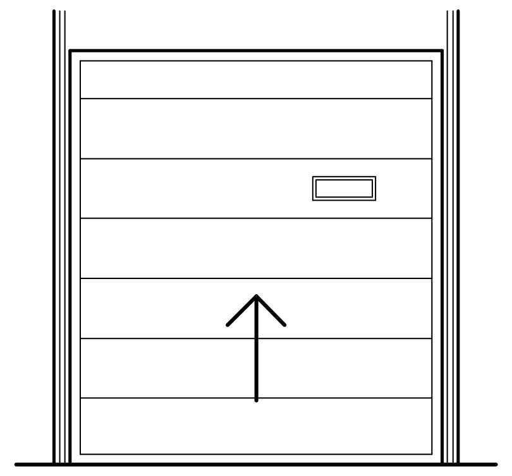
SD5 2438mm x 2438mm (8'-0" X 8'-0")
SECTIONAL VERTICAL LIFT
OVERHEAD DOOR W/ FACTORY
PAINTED FINISH

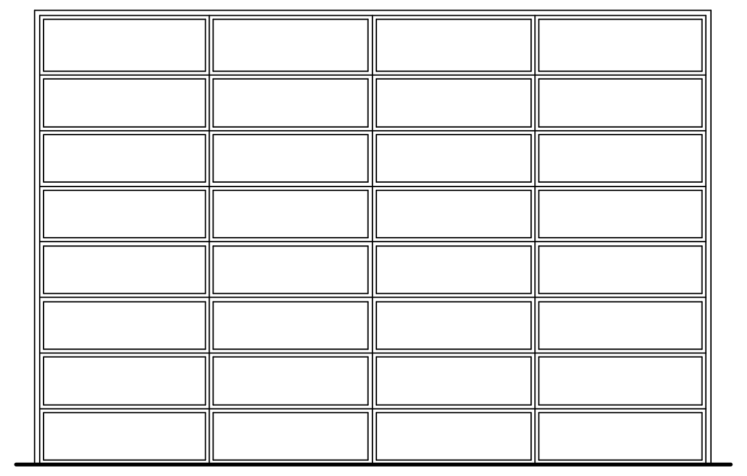
SD6 4270mm x 3660mm (14'-0" X 12'-0")
SECTIONAL VERTICAL LIFT
OVERHEAD DOOR W/ FACTORY
PAINTED FINISH

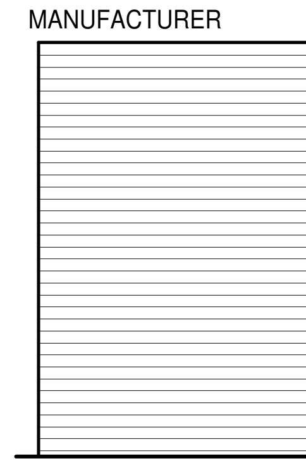
HARDWARE:

1 EA	SLIDE BOLT
1 EA	PAD LOCK

GC TO VERIFY ALL NECESSARY HARDWARE WITH OVERHEAD DOOR MANUFACTURER







WALL LEGEND

▨	ARCHITECTURAL PRECAST PANEL.
▨	RIBBED PRECAST INSULATED CONCRETE WALL PANEL SYSTEM (FLEXWALL)
▭	ALUMINUM COMPOSITE PANEL SYSTEM.
▦	INSULATED METAL PANEL SYSTEM.
▨	CONCRETE WALL WITH FURRING.
▧	CONCRETE MASONRY WALL.
■	1HR RATED WALL.
▭	EXISTING WALL.
▬	FULL HEIGHT NON-RATED PARTITION TO STRUCTURE

KEYNOTES: -

201	STRUCTURAL STEEL COLUMN.
202	CONCRETE SLAB.
210	LINE OF MEZZANINE ABOVE.
211	12'-0" W X 10'-0" H HIGHT SPEED O/H DOOR.
212	EYE WASH AND FIRST AID STN.
213	TRENCH DRAIN.
214	H. BELOW COUNTER.
215	TIME CLOCK.
216	PROVIDE PEDESTRIAN SAFETY DEMARCATION PATH.

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EAST GWILLIMBURY,
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L9N 0L8, CANADA

FIRST FLOOR PLAN

DATE	REMARKS
10/18/2024	ISSUED FOR SPA

PA/PM:	J. COX
DRAWN BY.:	V.Z.
JOB NO.:	TOR24-0080-00

SHEET
A122

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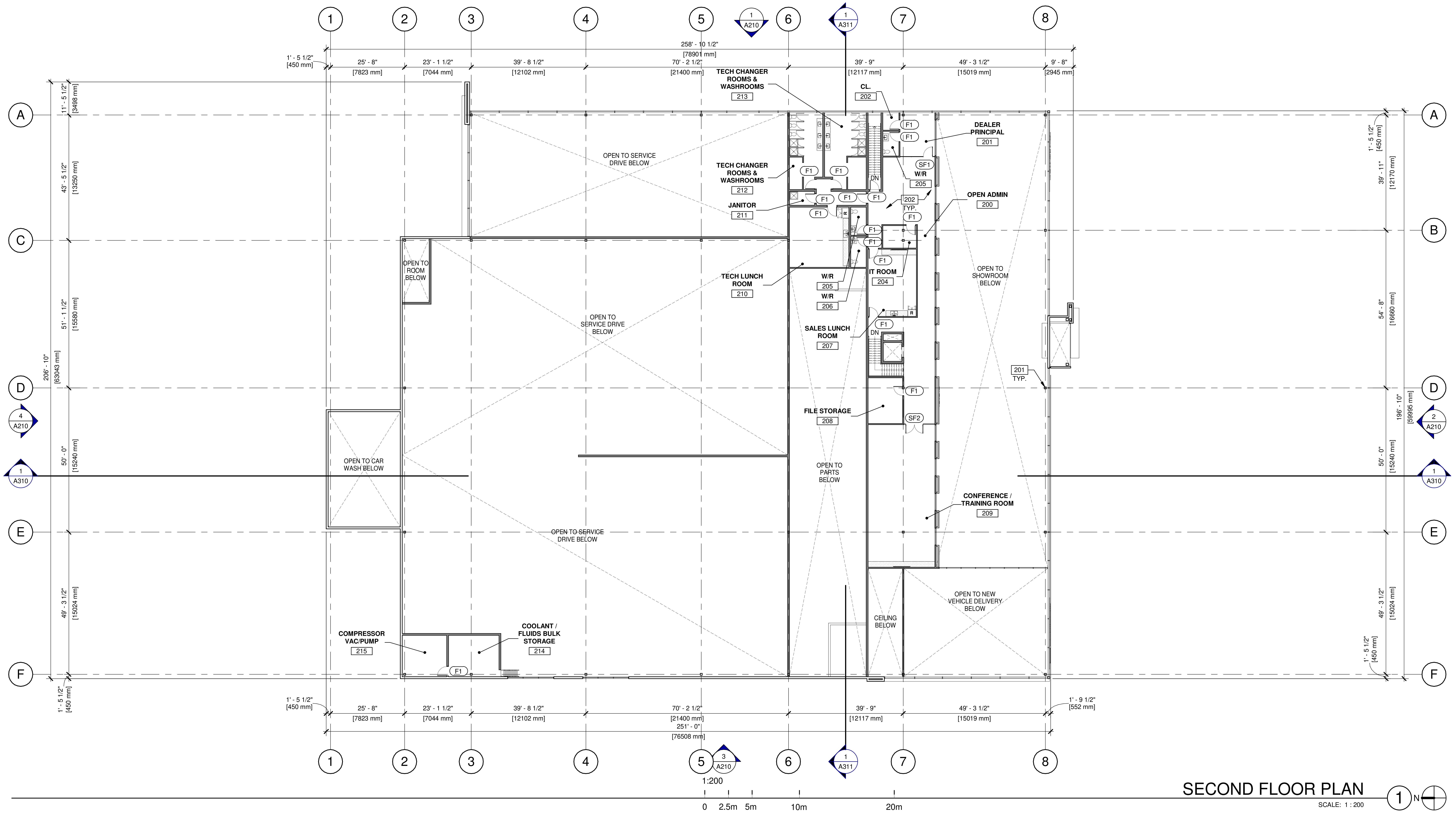


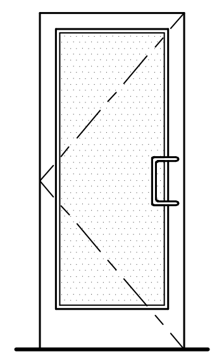
SECOND FLOOR PLAN

1 N

SCALE: 1 : 200

DOOR TYPES

SF1 SF2 ALUMINUM STOREFRONT



SF1 965mm x 2135mm (3'-2" X 7'-0")
CLEAR ANOD. ALUM. STOREFRONT
DOOR W/TEMPERED GLAZING
(NARROW STILE)

SF2 1930mm x 2135mm (PAIR) (6'-0" X 7'-0")
CLEAR ANOD. ALUM. STOREFRONT
DOOR W/TEMPERED GLAZING
(NARROW STILE)

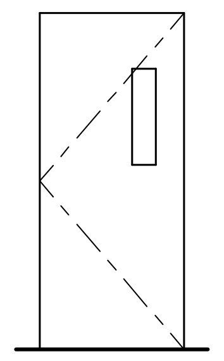
FRAME: MANUFACTURER

HARDWARE:

2 SETS	PIVOT SET
2 SETS	INTER PIVOT
1 EA	EXIT DEVICE
1 EA	MORTISE CYLINDER
2 SETS	OFFSET PULL
2 EA	OH CLOSER
1 EA	THRESHOLD
1 EA	DECAL

NOTE: WEATHERSEAL BY DOOR MANUFACTURER

F1 F2 HOLLOW METAL



F1 965mm x 2135mm (3'-2" X 7'-0")
PAINTED INSULATED
HOLLOW METAL DOOR

FRAME: PAINTED HOLLOW METAL

F2 1930mm x 2135mm (6'-0" X 7'-0")
PAINTED INSULATED
HOLLOW METAL DOOR

FRAME: PAINTED HOLLOW METAL

HARDWARE:

3 EA	HINGES
1 EA	EXIT DEVICE
1 EA	CYLINDER
1 EA	CLOSER
1 EA	PERIMETER SEAL
1 EA	BOTTOM DRIP
1 EA	THRESHOLD
1 EA	LOCK GUARD
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SD1 2745mm x 3050mm (9'-0" X 10'-0")
DOCK HIGH SECTIONAL VERTICAL
LIFT OVERHEAD DOOR W/ FACTORY
PAINTED FINISH.

SD2 3660mm x 4270mm (12'-0" X 14'-0")
SECTIONAL VERTICAL LIFT
OVERHEAD DOOR W/ FACTORY
PAINTED FINISH

SD3 3660mm x 3050mm (12'-0" X 10'-0")
SECTIONAL VERTICAL LIFT
OVERHEAD DOOR W/ FACTORY
PAINTED FINISH

SD4 4876mm x 3660mm (16'-0" X 12'-0")
SECTIONAL VERTICAL LIFT
OVERHEAD DOOR W/ FACTORY
PAINTED FINISH

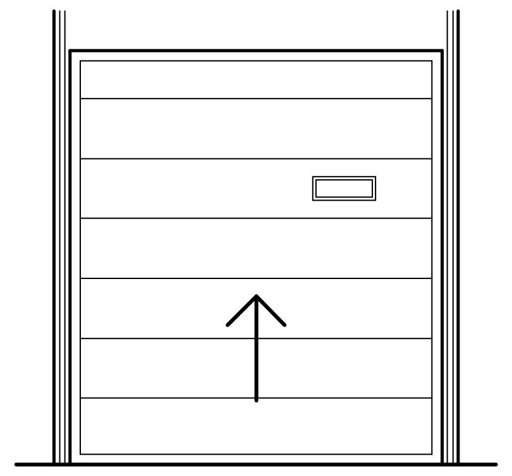
SD5 2438mm x 2438mm (8'-0" X 8'-0")
SECTIONAL VERTICAL LIFT
OVERHEAD DOOR W/ FACTORY
PAINTED FINISH

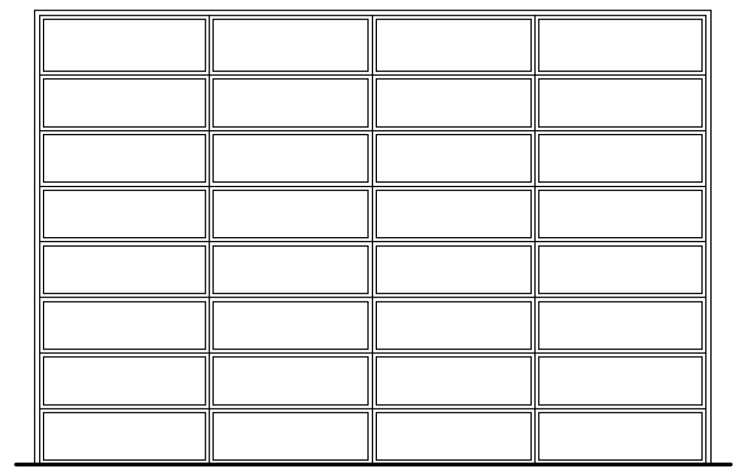
SD6 4270mm x 3660mm (14'-0" X 12'-0")
SECTIONAL VERTICAL LIFT
OVERHEAD DOOR W/ FACTORY
PAINTED FINISH

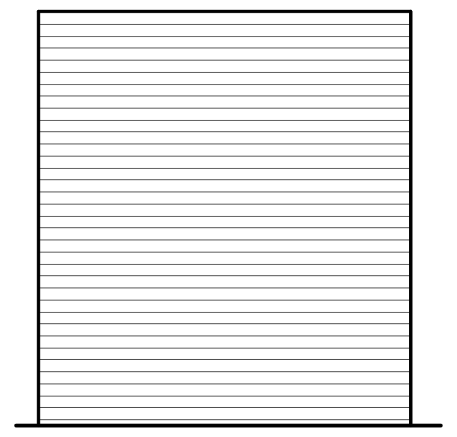
HARDWARE:

1 EA	SLIDE BOLT
1 EA	PAD LOCK

GC TO VERIFY ALL NECESSARY
HARDWARE WITH OVERHEAD DOOR
MANUFACTURER







WALL LEGEND

▤	ARCHITECTURAL PRECAST PANEL.
▤	RIBBED PRECAST INSULATED CONCRETE WALL PANEL SYSTEM (FLEXWALL)
▭	ALUMINUM COMPOSITE PANEL SYSTEM.
▦	INSULATED METAL PANEL SYSTEM.
▤	CONCRETE WALL WITH FURRING.
▨	CONCRETE MASONRY WALL.
▬	1HR RATED WALL.
▭	EXISTING WALL.
▬	FULL HEIGHT NON-RATED PARTITION TO STRUCTURE

KEYNOTES: -

201	STRUCTURAL STEEL COLUMN.
202	CONCRETE SLAB.

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SECOND FLOOR PLAN

DATE	REMARKS
10/18/2024	ISSUED FOR SPA

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SHEET

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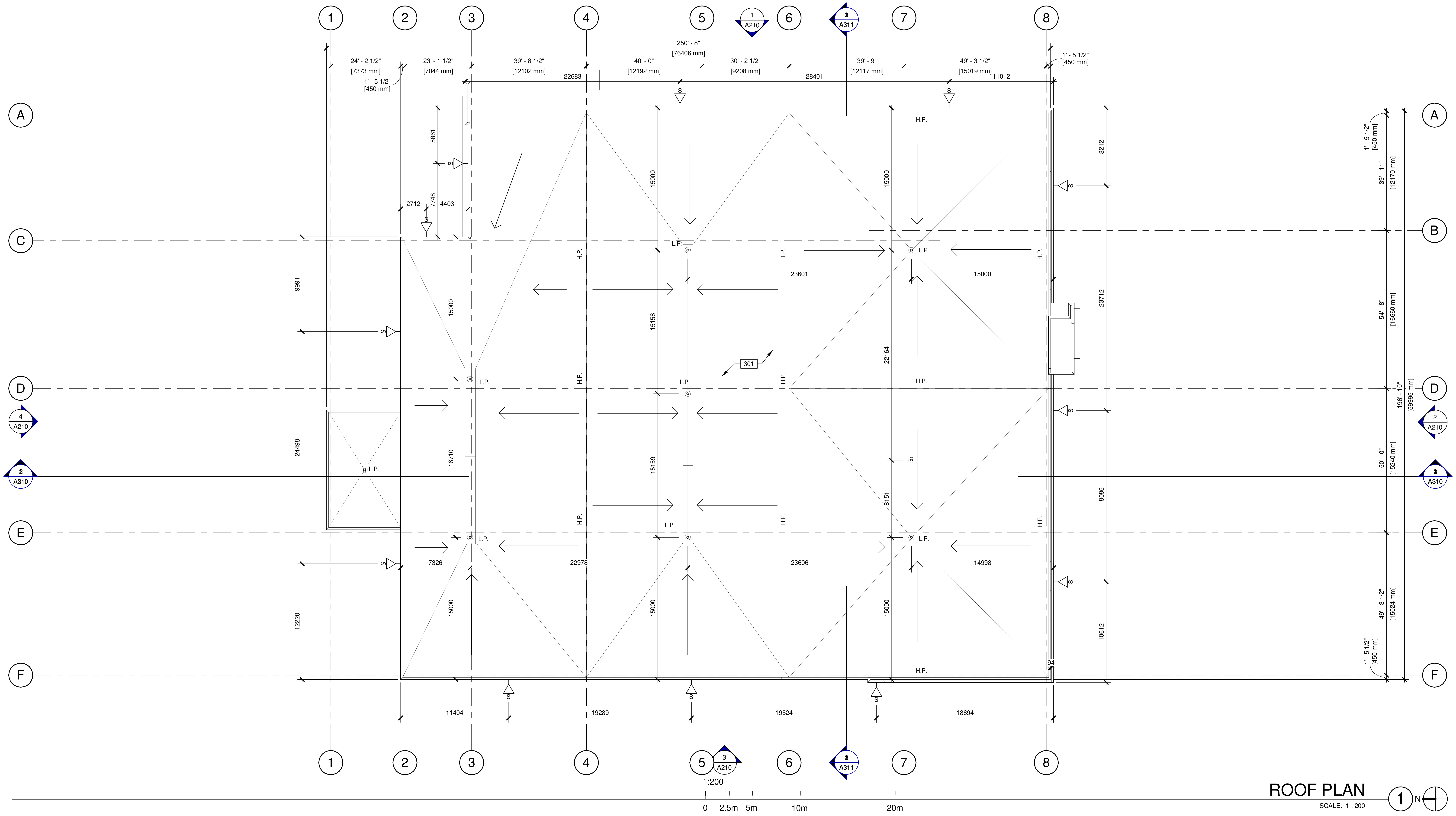

ROOF PLAN

1 N

SCALE: 1 : 200

LEGEND

◎	ROOF DRAIN - SEE MECHANICAL DRAWINGS.
S ▽	ROOF SCUPPER LOCATION - SEE ELEVATIONS.

NOTE:

ROOF DRAINS REFER TO MECHANICAL DRAWINGS. DIMENSION ARE SHOWN TO ENSURE OBC COMPLIANCE. GC. TO COORDINATE SPECIFIC LOCATION ON SITE.

KEYNOTES: -

301 SINGLE-PLY ROOFING- MECHANICALLY FASTENED & REINFORCED.

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ROOF PLAN

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JOB NO.:	TOR24-0080-00

SHEET

A190

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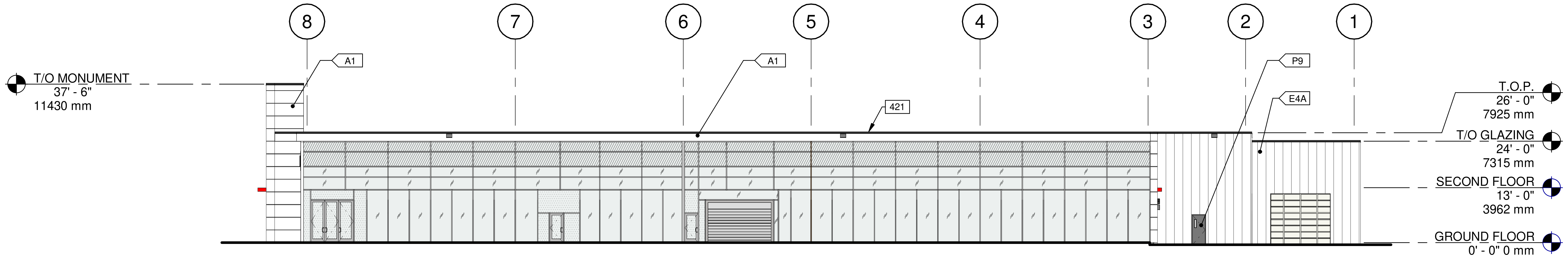
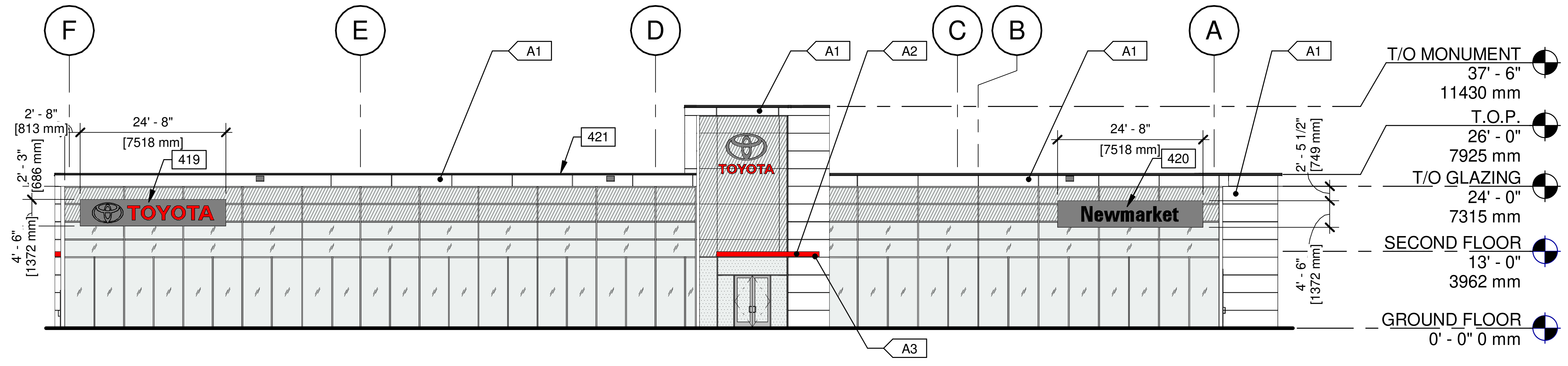


1:200

0 2.5m 5m 10m 20m

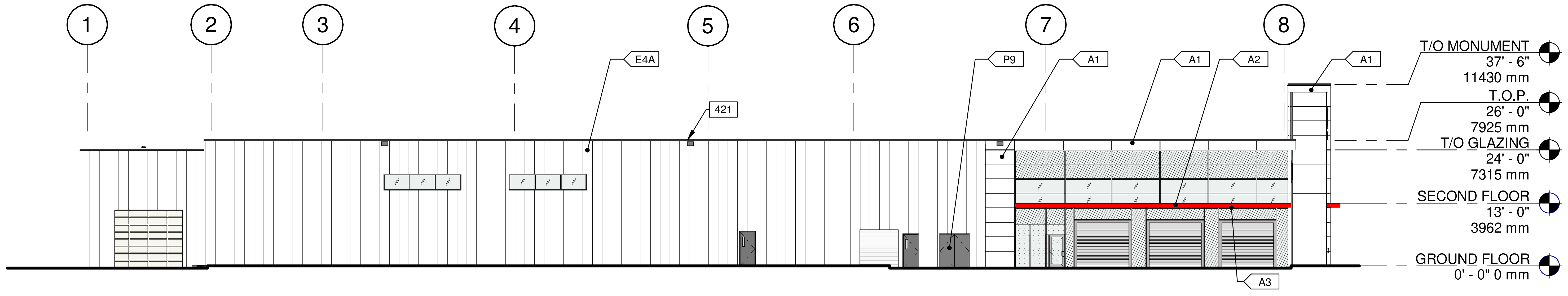
EAST EXTERIOR EVELATION 1

SCALE : 1 : 200



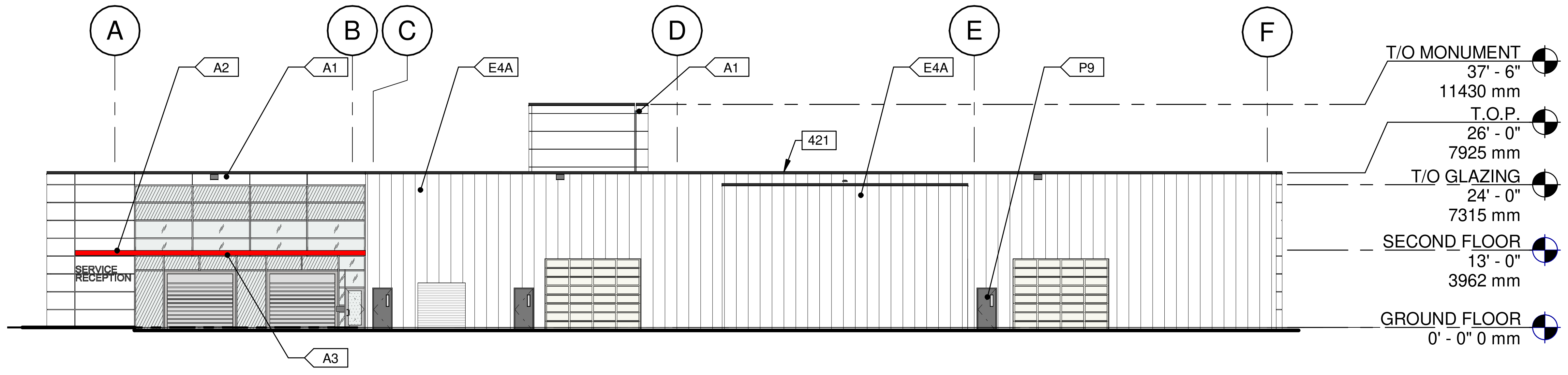
SOUTH EXTERIOR EVELATION 2

SCALE : 1 : 200



WEST EXTERIOR EVELATION 3

SCALE : 1 : 200



NORTH EXTERIOR EVELATION 4

SCALE : 1 : 200

KEYNOTES: -

419	TB41 SIGNAGE.
420	TDN30 SIGNAGE.
421	CONTINUOUS METAL CAP FLASHING, PAINTED TO MATCH ADJACENT WALL.

LEGEND

GLASS:

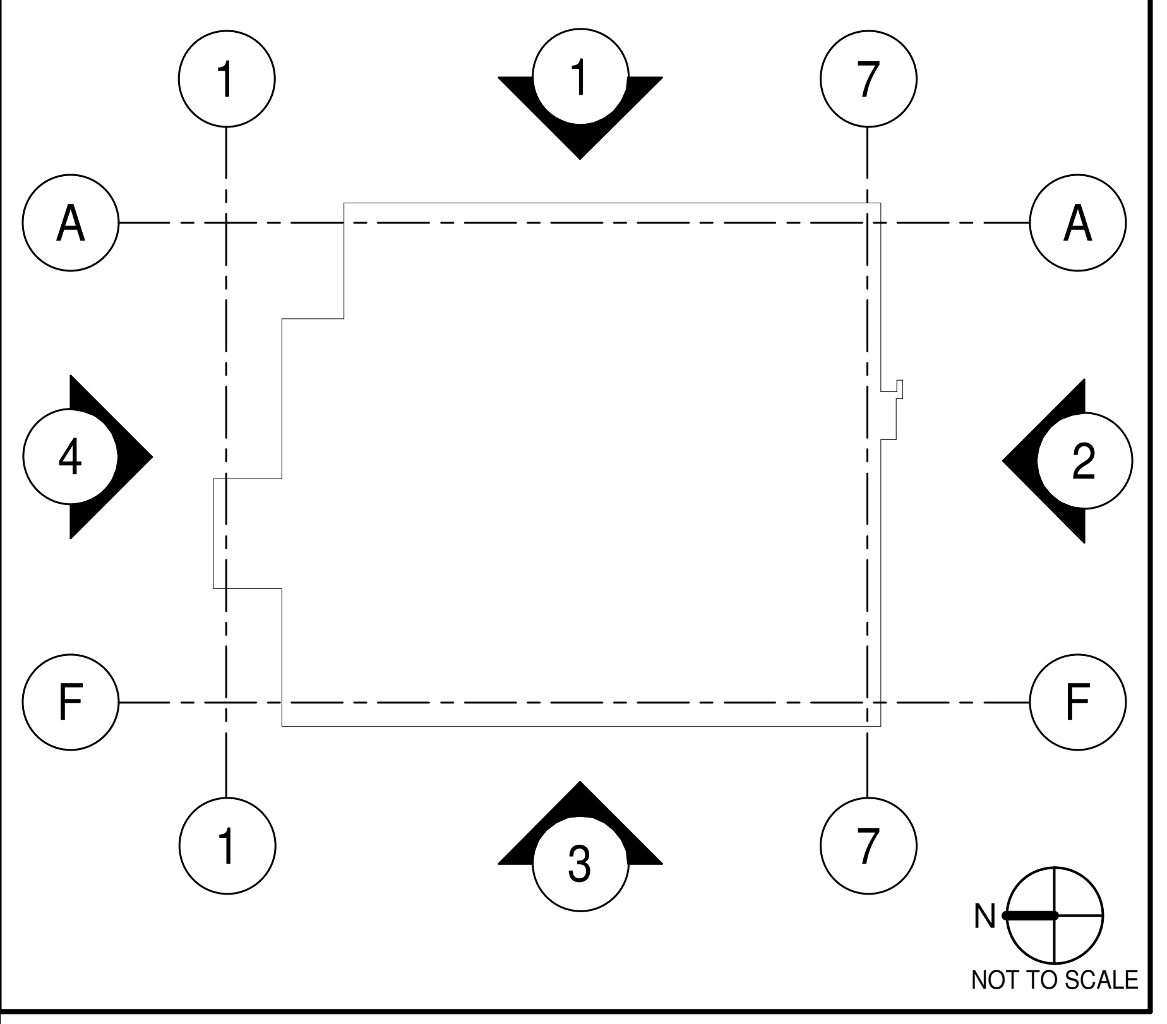
▭	VISION GLASS (GL-1) MATERIAL: SOLARBAN TRANSPARENT LOW-E GLAZING COLOUR: CLEAR SUPPLIIER: PPG OR LOCAL SUPPLIER
▨	SPANDREL GLASS (GL-2) MATERIAL: SPANDREL GLASS PANELS COLOUR: #3-073-i SUPPLIIER: INKAN LTD.
▒	TEMPERED GLASS

COLOURS:

PROVIDE 1,828mm (6') WIDE PAINT COLOUR MOCK-UP FULL HEIGHT OF BUILDING FOR OWNER/ARCHITECT REVIEW.

A1	TOYOTA WHITE FASCIA GENERAL BUILDING MATERIAL: 4mm ALUMINUM COMPOSITE PANEL COLOUR: BONE WHITE, BNT WHITE SUPPLIER: ALUCOBOND AND ALPOLIC
A2	TOYOTA RED ACCENT CANOPIES MATERIAL: 4mm ALUMINUM COMPOSITE PANEL COLOUR: PATRIOT RED, TRC RED SUPPLIER: ALUCOBOND AND ALPOLIC
A3	SILVER FOR UNDERSIDE OF ACCENT CANOPIES MATERIAL: 4mm ALUMINUM COMPOSITE PANEL COLOUR: SUNRISE SILVER METALLIC, MTLC - BSX SLVR SUPPLIER: ALUCOBOND AND ALPOLIC
E4A	BUILDING EXT. BACKSTAGE AREA MATERIAL: EIFS COLOUR: DRYVIT TO MATCH 517-1 PEGASUS SUPPLIER: DRYVIT CANADA
P9	EXTERIOR DOORS AND TRIM MATERIAL: PAINT COLOUR: GRIMMY'S GREY #00NN/000 ACRYLIC URETHANE SEMI-GLOSS SUPPLIER: DELUX

KEY PLAN



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EXTERIOR ELEVATIONS

DATE	REMARKS
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PA/PM:	J. COX
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JOB NO.:	TOR24-0080-00

SHEET

A210

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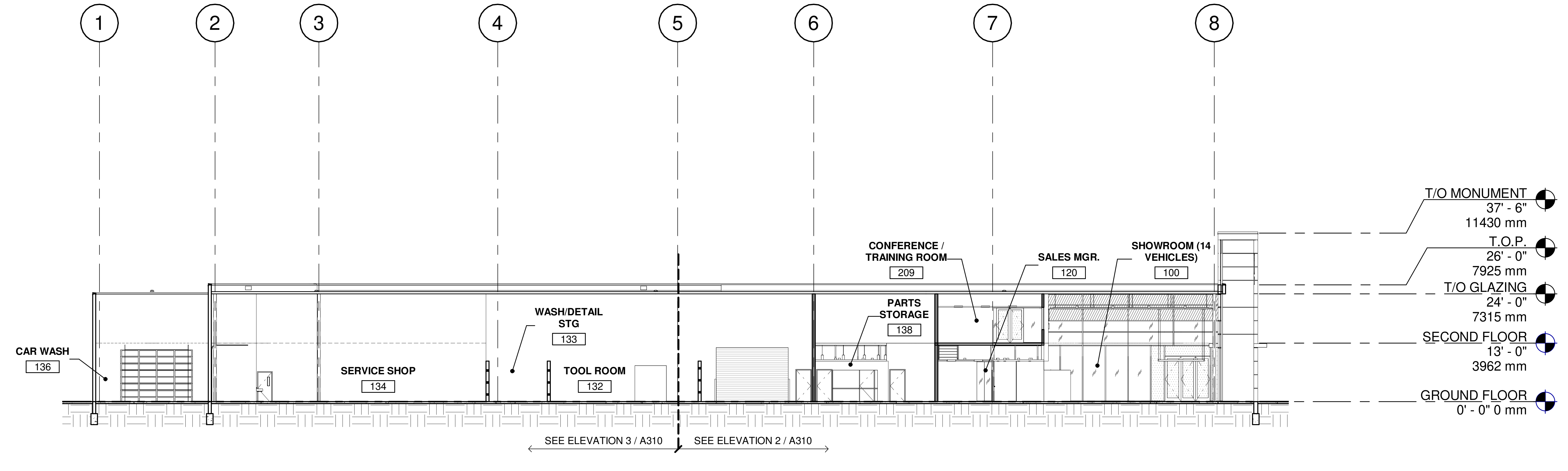
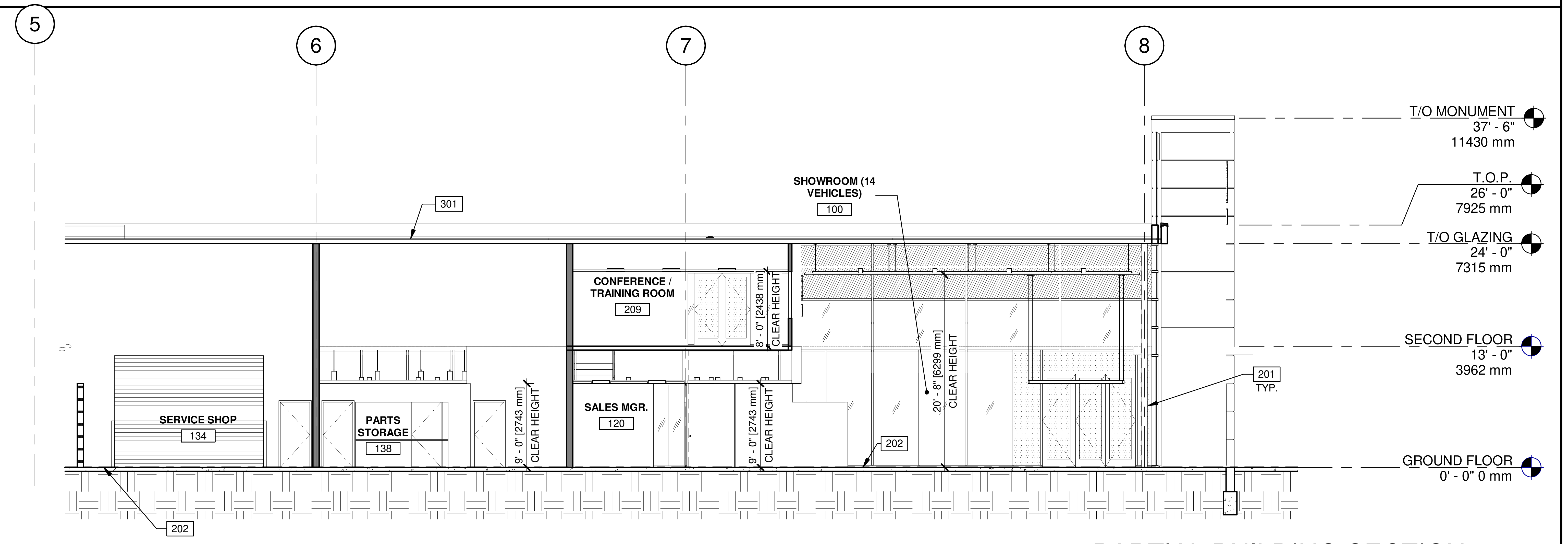


OVERALL BUILDING SECTION ①

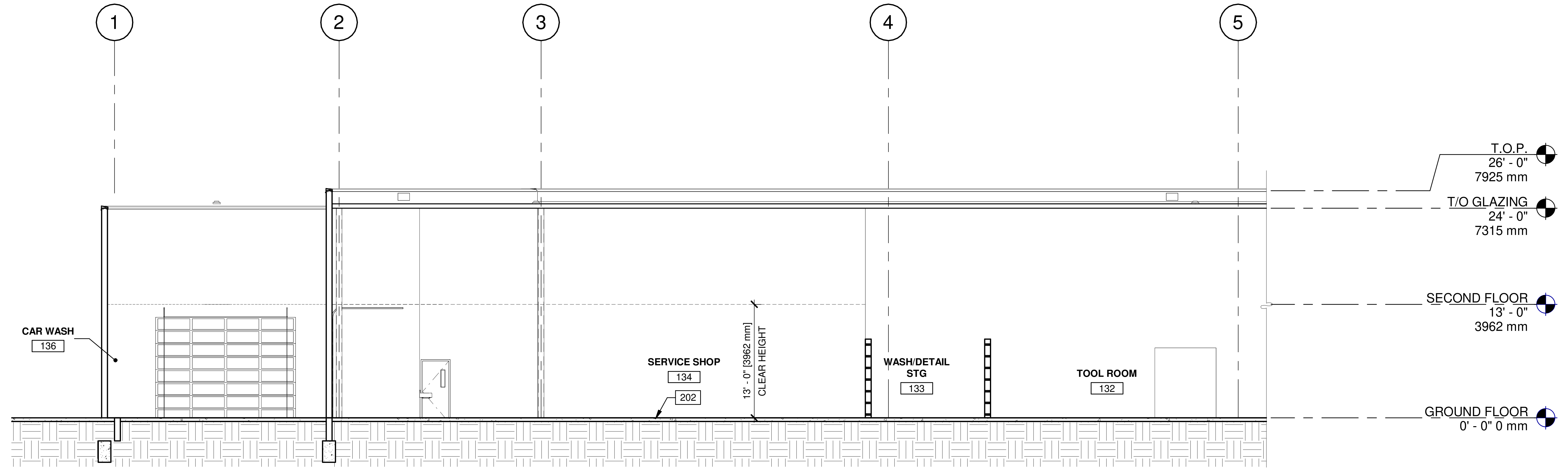
SCALE: 1 : 200

1:200
0 2.5m 5m 10m 20m



PARTIAL BUILDING SECTION ②

SCALE: 1 : 100



PARTIAL BUILDING SECTION ③

SCALE: 1 : 100

KEYNOTES:

201	STRUCTURAL STEEL COLUMN.
202	CONCRETE SLAB.
301	SINGLE-PLY ROOFING- MECHANICALLY FASTENED & REINFORCED.

WALL LEGEND

▨	ARCHITECTURAL PRECAST PANEL.
▨	RIBBED PRECAST INSULATED CONCRETE WALL PANEL SYSTEM (FLEXWALL)
▭	ALUMINUM COMPOSITE PANEL SYSTEM.
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▭	CONCRETE WALL WITH FURRING.
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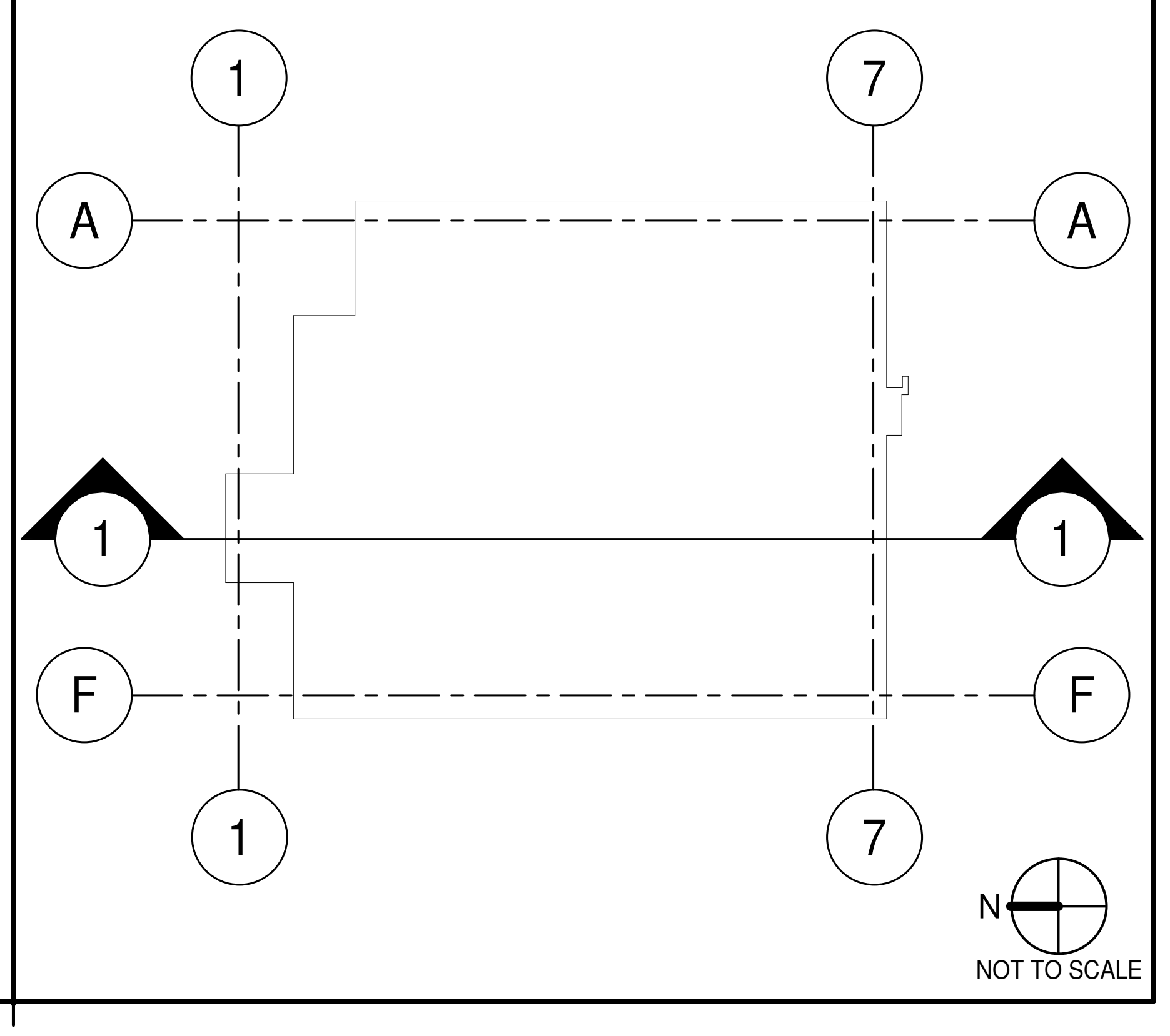
▬	1HR RATED WALL.
▭	EXISTING WALL.
▬	FULL HEIGHT NON-RATED PARTITION TO STRUCTURE

KEY PLAN



NOT TO SCALE

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TOYOTA

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BUILDING SECTIONS

DATE	REMARKS
10/18/2024	ISSUED FOR SPA

PA/PM:	J. COX
DRAWN BY.:	V.Z.
JOB NO.:	TOR24-0080-00

SHEET

A310

10/18/2024 - ISSUED FOR SPA

10/15/2024 4:28:12 PM

SCHEDULE

PART	LOT	CONCESSION	PIN
1	PART OF 6	3	ALL OF 03438–0536
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			

PLAN OF SURVEY OF
PART OF LOT 6, CONCESSION 3
GEOGRAPHIC TOWNSHIP OF EAST GWILLIMBURY
TOWN OF EAST GWILLIMBURY
REGIONAL MUNICIPALITY OF YORK

SCALE 1 : 750 METRES

0 15 30 60

THE INTENDED PLOT SIZE OF THIS PLAN IS 1219MM IN WIDTH BY 457MM IN HEIGHT WHEN PLOTTED AT A SCALE OF 1:750

LEGEND

■	DENOTES SURVEY MONUMENT FOUND
□	DENOTES SURVEY MONUMENT PLANTED
SIB	DENOTES STANDARD IRON BAR
SSIB	DENOTES SHORT STANDARD IRON BAR
IB	DENOTES IRON BAR
IP	DENOTES IRON PIPE
WIT	DENOTES WITNESS MONUMENT
PIN	DENOTES PROPERTY IDENTIFICATION NUMBER
P1	DENOTES PLAN 65R–29044
P2	DENOTES PLAN YR1342349 (FILE No. P–5028–0060)
P3	DENOTES PLAN 65R–36494 (FILE No. P–5028–0109)
P4	DENOTES PLAN 65R–30744 (FILE No. P–5028–0035)
P5	DENOTES PLAN BY E.R. GARDEN DATED JANUARY 14, 2018
C1	DENOTES CALCULATED USING P1 & P2
882	DENOTES J.C. MOORE, O.L.S.
1574	DENOTES G.K. JENKINS, O.L.S.
L&P	DENOTES LLOYD & PURCELL
MMM	DENOTES MARSHALL MACKLIN MONAGHAN
OU	DENOTES ORGIIN UNKNOWN
BF	DENOTES BOARD FENCE
CLF	DENOTES CHAIN LINK FENCE
PWF	DENOTES POST & WIRE FENCE

ALL BEARINGS AND DISTANCES AGREE WITH CITED PLANS UNLESS OTHERWISE NOTED.

SURVEYOR'S CERTIFICATE

I CERTIFY THAT:

1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT, THE LAND TITLES ACT AND THE REGULATIONS MADE UNDER THEM.

2. THE SURVEY WAS COMPLETED ON SEPTEMBER 8, 2023.

OCTOBER 02, 2023

DATE E.R. GARDEN, O.L.S.

THIS PLAN OF SURVEY RELATES TO AOLS PLAN SUBMISSION FORM NUMBER V–60383

INTEGRATION DATA

OBSERVED REFERENCE POINTS DERIVED FROM GPS OBSERVATIONS USING A REAL TIME NETWORK AND ARE REFERRED TO UTM ZONE 17 (81° WEST LONGITUDE) NAD83(CSRS)(2010).

URBAN ACCURACY PER SEC. 14(2), O.REG. 216/10.

POINT ID	NORTHING	EASTING
A	4882515.19	625459.34
B	4882918.85	626062.18

CAUTION: COORDINATES CANNOT, IN THEMSELVES, BE USED TO RE–ESTABLISH CORNERS OR BOUNDARIES SHOWN ON THIS PLAN

BEARING NOTES

BEARINGS ARE UTM GRID, DERIVED FROM OBSERVED REFERENCE POINTS A AND B, BY REAL TIME NETWORK OBSERVATIONS, UTM ZONE 17 (81° WEST LONGITUDE), NAD83(CSRS)(2010).

FOR BEARING COMPARISONS, THE FOLLOWING ROTATIONS WERE APPLIED:

P1 – 1°02'30" COUNTER–CLOCKWISE

DISTANCE NOTES – METRIC

DISTANCES AND COORDINATES ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

DISTANCES ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.999755.

IBW SURVEYORS

IBWSURVEYORS.COM | 1.800.667.0696

PARTY CHIEF: CS	DRAWN BY: RAD	CHECKED BY: ERG	PLOT DATE: OCT 02 2023
FILE NAME: A–040725–RPLAN–v4		copies available at LandSurveyRecords.com	

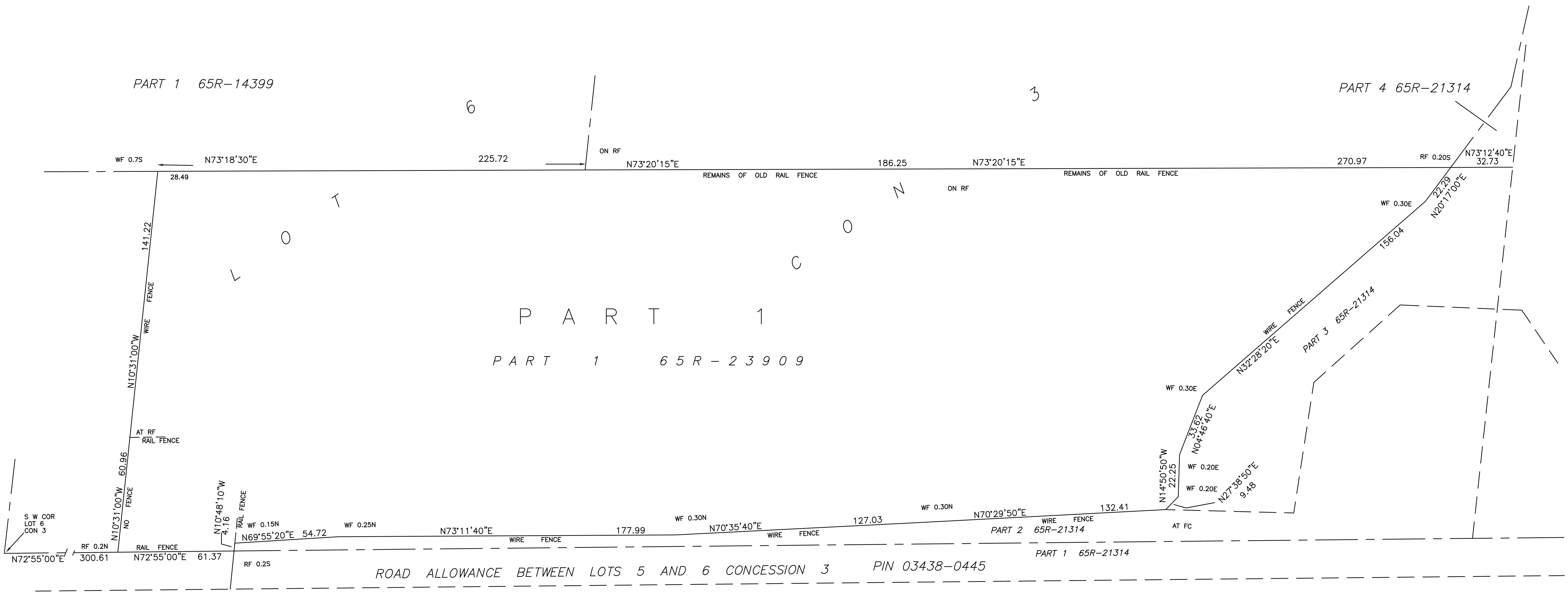
PLAN 65R–

LOT 6, CONCESSION 3
GEOGRAPHIC TOWNSHIP OF EAST GWILLIMBURY
TOWN OF EAST GWILLIMBURY
REGIONAL MUNICIPALITY OF YORK
SCALE 1 : 1500
E.R.GARDEN LTD.

METRIC : DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

SCHEDULE

PART	AREA (ha)	PART LOT	CON
1	11.4789	6	3

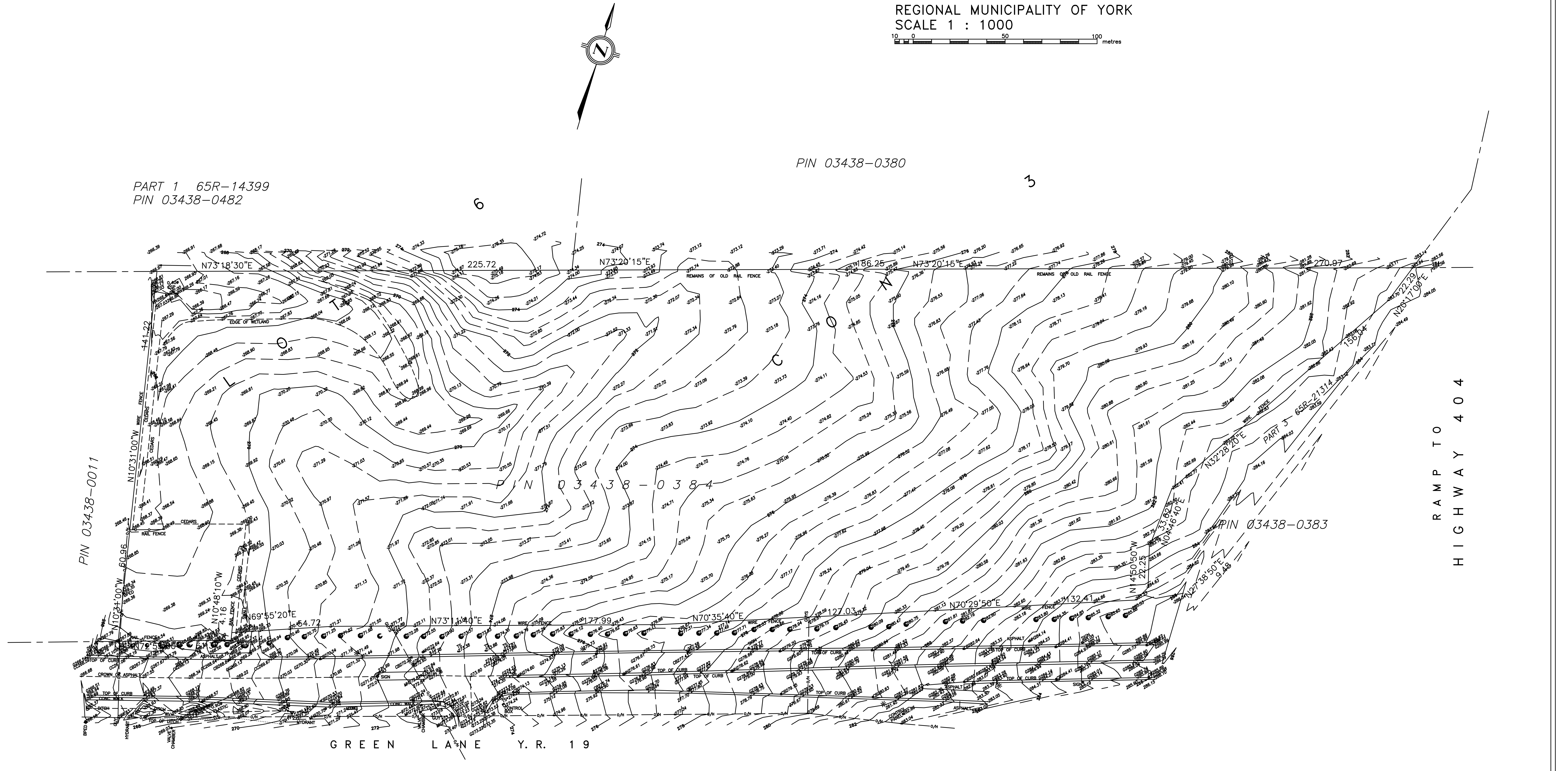


E.R.GARDEN LIMITED
ONTARIO LAND SURVEYOR
1260 JOURNEY'S END CIRCLE, UNIT 1
NEWMARKET ONTARIO L3Y 8Z7
PHONE 905–895–5600 FAX 905–895–7127

JOB CAPTAIN W.SILVEY
DRAWN D.G.GILES
CHECKED

FILE NUMBER
05–4175

SKETCH SHOWING ELEVATIONS
TOWN OF EAST GWILLIMBURY
REGIONAL MUNICIPALITY OF YORK
SCALE 1 : 1000



✳	LIGHT STANDARD
CB	CATCH BASIN
CC	CURB CUT
G	GUTTER
MH	MANHOLE
RW	RETAINING WALL
TS	TRAFFIC SIGNAL
WV	WATER VALVE
—O/H—	OVERHEAD LINE

THIS IS NOT A PLAN OF SURVEY AND SHALL NOT BE USED EXCEPT FOR THE PURPOSED EXPRESSED IN THE TITLE BLOCK
ELEVATIONS ARE GEODETIC AND ARE DERIVED FROM TOWN OF NEWMARKET BENCHMARK 1095 HAVING AN ELEVATION OF 273.91 METRES A.S.L.
ELEVATIONS WERE MEASURED November 28, 2005
BOUNDARY INFORMATION TAKEN FROM OFFICE RECORDS

E.R.GARDEN LIMITED
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DRAWN D.G.GILES
CHECKED

FILE NUMBER
05-4218

TorontoInspection LTD.
GEO-ENVIRONMENTAL CONSULTANTS

REPORT ON
GEOTECHNICAL INVESTIGATION
1656 GREEN LANE EAST
EAST GWILLIMBURY, ONTARIO

REPORT NO.: 2177-24-GL
REPORT DATE: OCTOBER 8, 2024

PREPARED FOR
NEWROADS AUTOMOTIVE GROUP
18100 YONGE STREET
NEWMARKET, ONTARIO
L3Y 3V1

110 KONRAD CRESCENT, UNIT 16, MARKHAM, ONTARIO   L3R 9X2
TEL.: 905-940-8509   FAX: 905-940-8192

Table of Contents

1.0 INTRODUCTION

Toronto Inspection Ltd. (TIL) was retained by Newroads Automotive Group to conduct a geotechnical investigation on one parcel of land at 1656 Green Lane East, in East Gwillimbury, Ontario (hereinafter described as “the Site”).

The Geotechnical Investigation was carried out in conjunction with a Hydrogeological investigation. The report of findings, relating to the hydrogeological study, will be issued under a separate cover.

A review of the Overall Site Plan, Drawing No: A1.0, prepared by Ware Malcomb, dated August 29, 2024, and provided to ***Toronto Inspection Ltd.*** by the client, indicated that the development at the Site will consist of a one storey commercial building with no basement.

The purpose of the geotechnical investigation was to determine the subsoil and groundwater conditions, encountered at boreholes carried out within the subject Site and provide our recommendations for the design and construction of the proposed structures at the Site. In particular, Geotechnical data was to be provided for:

- General founding conditions
- Foundation design bearing pressures
- Construction recommendations
- Excavation recommendations

The parameters and recommendations for the design and construction of the proposed buildings are based on the factual subsoil and groundwater conditions, obtained at the borehole locations, on the basis of the terms of reference and on an assumption that the design of the structure will be in accordance with the applicable guidelines, building codes and standards. If there are any changes in the design features relevant to the geotechnical analyses, ***TIL*** should be consulted to review the design and to confirm the recommendations and comments provided in the report.

2.0 SITE CONDITION

The Site, approximately 2.87 Ha in area and near rectangle in shape, is located on the north side of Green Lane East, on the west side of Harry Walker Parkway North, in Newmarket, Ontario. The Site was an open parcel of land and used to be a farmland.

At the time of the investigation, the Site was cleared of the surficial topsoil and vegetation. The site gradient was fairly flat, sloping gently from east to west. We understand that some site regrading work was in progress at the Site at the time of preparation of this report.

3.0 INVESTIGATION PROCEDURE

The field work for the investigation was carried out on July 29, 2024, and consisted of drilling five sampled boreholes (24BH-1 to 24BH-5), to depths varying from 6.2m to 7.7m from grade.

The boreholes were advanced using a track mounted drill rig, equipped with continuous flight solid stem augers, sampling rods and a dropped hammer, supplied and operated by a specialist drilling contractor. Soil samples were taken at 0.76m intervals to depths of 3.0m below the existing ground level. Below the depths, the sampling frequency was increased to 1.5m. The samples were obtained using a split spoon sampler in conjunction with Standard Penetration Tests using a driving energy of 475 joules (350 ft-lbs). Each sample was identified and logged in the field and was carefully bagged for later visual identification and laboratory testing, including moisture content determination.

Groundwater observations were made in the open boreholes during and upon completion of the drilling. Two boreholes, 24BH-1 and 24BH-5, were also completed as monitoring wells to document the current static groundwater levels. The symbol (MW), besides the borehole identification on the Borehole Location Plan, indicates a monitoring well. The groundwater records are presented in the borehole logs.

In addition, one more monitoring well was installed at Borehole 24BH-4 location at a depth of 6.1m from grade on September 11, 2024. The well profile has been included in the borehole 24BH-4 (MW) log.

The locations of boreholes, established in the field by our field personnel, are shown on the appended Borehole Location Plan (Drawing No. 1). ***The ground elevations, at the borehole locations, were surveyed and provided by the client to our office via an email on October 2, 2024.***

4.0 SUMMARISED SITE AND SUBSURFACE CONDITIONS

Reference is made to the appended Borehole Location Plan (Drawing No. 1), and Logs of Boreholes 24BH-1 to 24BH-5 (Drawing Nos. 2 to 6), for details of field work including soil classification, inferred stratigraphy and groundwater observations carried out during and upon completion of borehole drilling.

The boreholes revealed that the subsoil, generally consisted of the surficial layer of fill, overlying native deposits of silty sand till to sandy silt till deposits.

The brief descriptions of the subsoil and groundwater conditions, encountered at the borehole locations, are as follows:

4.1 Fill (Disturbed Material)

A layer of fill was contacted at the ground surface at Boreholes 24BH-2 to 24BH-5 locations. The fill extended to depths of 0.6m to 1.2m from grade, with the exception at Boreholes 24BH-3 and 24BH-4, where the fill extended to depths of 2.1m to 2.3m from grade.

The fill consisted of a mixture of sandy silt, silty sand, some clayey silt, trace to some gravel. It is our opinion that this material probably represents either the material reworked during the previous farming operation in the area or from the recent site grading process. For identification purpose, this material has been identified as fill in the borehole logs.

Based on the Standard Penetration N-values of 2 to 16 blows for a penetration of 300mm, the compactness of the fill was very loose to compact state. The in-situ moisture content of the soil samples, retrieved from the fill, ranged from 8% to 19%, indicating moist to very moist conditions with wet pockets.

4.2 Sandy Silt Till / Silty Sand Till

Sandy silt till / silty sand till deposits were contacted at the ground surface at Borehole 24BH-1 location and underlying the fill at the remaining boreholes, at depths of 0.0m to 2.3m from grade. The sandy silt till / silty sand till deposits consisted of a heterogeneous mixture of silt and sand, some gravel, trace clay, with occasional seams of fine sand, cobbles or sand and gravel layers.

All boreholes, 24BH-1 to 24BH-5, were terminated in the sandy silt till / silty sand till deposits at depths of 6.2m to 7.7m from grade.

Based on the Standard Penetration N-values of 11 to more than 100 blows for a penetration of 300 mm, the relative density of the sandy silt till / silty sand till deposits was compact to very dense. The in-situ moisture content of the soil samples, retrieved from the deposits, ranged from 6% to 25%, indicating moist to very moist conditions with wet pockets or layers.

A grain size analysis was carried out on one soil sample from the till deposit, obtained from Borehole 24BH-1 (SS3 – at a depth of 1.8m), using both of mechanical sieves and hydrometer methods. The result of the grain side distribution is shown on the appended Figure No. 1.

4.3 Groundwater

Free water was recorded in the open boreholes 24BH-2 to 24BH-5, at depths of 1.83m to 2.13m from grade, with cave-in in boreholes 24BH-2 and 24BH-4 at depths of 2.44m to 3.05m from grade, during and upon completion of the drilling. No free water or cave-in was recorded in open borehole 24BH-1.

Groundwater levels, documented in the monitoring wells installed at Boreholes 24BH-1, 24BH-4 and 24BH-5, on September 25, 2024, were at depths of 1.77m, 1.24m and 2.06m from grade, respectively. The results of the groundwater measurements in the monitoring wells are presented below:

WELL LOCATION	**GROUND ELEVATION**	**WATER LEVEL DEPTH / ELEVATION**			
		Upon Completion		**Sept 25, 2024**	
24BH-1 (MW)	269.92m	Dry	-	1.77m	268.15m
24BH-4 (MW)	270.53m	2.13m	268.40m	1.24m	269.29m
24BH-5 (MW)	272.16m	1.83m	270.33m	2.06m	270.10m

Based on the moisture content profile of the soil samples and our field observations at the Site during the drilling investigation and water level measurements, it is ***TIL's*** opinion that there is no continuous groundwater table of consequence, within the depths of the investigation. However, some water might be encountered in the discontinuous thin wet sand seams or layers of sand and gravel within the till deposits. It is our opinion that the water from these layers, if any, will be very small and can be safely handled during the construction operation.

5.0 COMMENTS AND RECOMMENDATIONS

A review of the Overall Site Plan, Drawing No: A1.0, prepared by Ware Malcomb, dated August 29, 2024, and provided to ***Toronto Inspection Ltd.*** by the client, indicated that the development at the Site will consist of a one storey commercial building with no basement.

We understand that the finished floor elevation (FFE) of the proposed commercial building will be at 272.60m, as per an email from GEI Consultants, dated October 4, 2024. This indicated that the building pad and the surrounding area will be uplifted by approximately 0.5m to 2.9m at the borehole locations.

Based on the subsoils and groundwater conditions encountered at the borehole locations, our recommendations and comments on the design and construction of the proposed development are as follows:

5.1 Site Preparation

The soil description and depth of fill shown on the Borehole Logs are specific depths at the borehole locations only. The thickness of topsoil, if encountered, and the depth of the fill at locations beyond the boreholes may be thicker or deeper. We recommend that the contractor bidding for the job should determine the depths of deleterious material by test pits and allow for removal of any deleterious fill and material, with high moisture and/or organic content, during the site preparation for site grading.

Based on the information provided by the client to ***TIL***, the Site will be uplifted by approximately 0.5m to 2.9m. The on-site excavated fill and/or native soils, to be used for site grading, should be organic free and maintained at or close to its optimum moisture content during placement and compaction. The new fill, outside the building pad, should be compacted in lifts not exceeding 200mm to at least 98% of its Standard Proctor maximum dry density (SPMDD).

At locations of excessive fill, and within the building pad, the site preparation must include removal of the existing fill and any compressible topsoil and deleterious material, if encountered, and backfilling the building pad with selected on-site or pre-approved material, free of organics, to the subgrade level. The backfill for the building pad should be replaced and compacted in 200mm lifts to at least 100% of its Standard Proctor maximum dry density, according to the Guidelines of Engineered Fill, as attached in Appendix A.

Imported fill to be used for the engineered fill or uplifting the Site should consist of pre-approved organic free material, suitable for the intended uses and meets the MOE regulations. The new fill should be maintained on the dry side of the optimum moisture content and compacted in lifts to 100% of its Standard Proctor maximum dry density within the building pad and 98% of its SPMDD outside the building pad.

Compressible topsoil and the fill material, containing relatively high organic content, will not be suitable for reuse in areas where future settlement cannot be tolerated. This material will have to be disposed off-site or reused in landscaped areas, subject to approval by the landscape architect.

5.2 Foundation Design

The proposed one storey building can be supported on conventional spread/strip footings, founded in the engineered fill and native undisturbed till deposits, at the borehole locations.

Conventional spread/strip footings founded in the engineered fill and native undisturbed till deposits, at depths of 1.2m below the finished outside grade, can be designed for the following bearing pressures:

- 150 kPa at Serviceability Limit State
- 220 kPa at Factored Ultimate Limit State

For strip foundations placed in the engineered fill, we recommend that all strip footings should be reinforced with at least 2-15M rebar, continuously. This reinforcement will bridge any loose pockets of the engineered fill, if any, under the footings.

The total and differential settlement of footings, designed for the above bearing pressures at Serviceability Limit State, will not exceed 25mm and 20mm, respectively.

All perimeter footings or any footings, which may be exposed to freezing conditions, should be placed below the frost penetration depth of 1.2m below the outside grade or provided with an equivalent thermal protection.

It should be noted that the above recommendations for the foundations have been analyzed by ***TIL*** from the information obtained at the borehole locations. The bearing material, the interpretation between the boreholes and the recommendations of this report must be checked through field inspection provided by ***TIL*** to validate the information for use during construction.

5.3 Floor Slab Construction

Following Section 5.1 Site Preparation, the floor slab can be designed and constructed as a conventional slab-on-grade method.

The subgrade should be thoroughly proof-rolled under the supervision of a geotechnical technician from ***TIL***. Any compressible, loose or weak spots encountered during the proof rolling process should be sub-excavated to a firm ground. Any backfill of the sub-excavated areas or new fill, below the slab-on-grade, should consist of organic free soils, compacted to at least 98% of its Standard Proctor maximum dry density (SPMDD).

A bedding consisting of at least 150 mm of granular A (OPSS Form 1010) or its approved equivalent, is recommended as a moisture barrier under a floor slab. The bedding should be compacted to at least 100% SPMDD.

A modulus of subgrade reaction of 20 MN/m3 is recommended for the design of the slab-on-grade.

5.4 Earthquake Consideration

The Ontario Building Code requires that all buildings be designed to resist earthquake forces. The Soil Classification for Seismic Site Response, in accordance with Table 4.1.8.4.A of the Ontario Building Code of Canada, is Class C (Very Dense Soil).

The acceleration and velocity based site factors, Fa and Fv, should conform to Tables 4.1.8.4.B and 4.1.8.4.C. These values should be reviewed by the Structural Engineer.

5.5 Excavation and Backfilling

All excavations should comply with the Ontario Occupational Health and Safety Act. Any excavation deeper than 1.2m should be sloped back to a safe angle of 45^o.

Perched water from the fill and/or slight seepage of water from the sand seams within the native till deposits may be encountered during the excavation. The amount of free water from these sources is anticipated to be minor and, in ***TIL's*** opinion, filtered sumps will be adequate to handle the water accumulated in the excavation, from where it can be pumped out. Major groundwater problems are not anticipated during foundation excavation depths of the proposed building.

The in-situ moisture content of the fill and part of the native soils was at or higher than its optimum moisture content. Selected on-site excavated soils can be reused for backfilling, provided they are free of organics and allowed to air dry to the dry side of its optimum, if needed, prior to placement. The use of the compressible fill should be limited to backfilling of locations where future settlement will be of little consequence.

Based on the borehole information, the subsoil at service trench inverts may consist of fill or sandy silt till to silty sand till deposits.

The invert depths of the proposed site services were not available at the time of preparing the report. It is possible that the sewer and watermain installations will require excavations between about 2m to 5m below the finished grade. The native soils at these depths are considered to be suitable for supporting the pipes, provided the integrity of the base of the trench can be maintained during construction. The suitability of the existing fill material to support the pipes, if encountered at the base of the trenches, should be further assessed during construction. This assessment will require inspection during construction by qualified geotechnical personnel from ***TIL*** to determine the suitability of the fill materials for supporting the pipes.

The pipe bedding for underground services, including catch basins and manholes, should consist of OPSS Granular A, 20mm crusher run limestone, or equivalent, compacted to 98% of its Standard Proctor maximum dry density (SPMDD). If free water is encountered in the trenches, from saturated fill layers or sand seams in the till deposits, the bedding in the service trenches may consist of HL6 stone or equivalent, provided that a geotextile filter fabric (Terrafix 270R or equivalent) is used to separate the stone bedding from the base and the sides of the excavation. The geotextile filter fabric must surround the clear stone bedding completely.

5.6 Lateral Earth Pressure

Where subsurface walls will retain unbalanced loads or where a retaining wall is proposed, the lateral earth pressure of the retained soil may be computed using the following equation:

$$P = K (\gamma H + q)$$

where P = Lateral earth pressure kPa
K = Lateral earth pressure coefficient 0.40
γ = Bulk unit weight of the soil 21.0 kN/m^3
H = Depth of the wall below the finish grade m
q = Surcharge loads adjacent to the retaining wall kPa

The equation assumes that a permanent free draining system will be provided to prevent the buildup of hydrostatic pressure next to the wall.

The drainage system should include a free-draining granular backfill or a drainage membrane placed against the concrete wall, together with an effective perimeter weeping tile drainage system at the wall base. The weeping tile should consist of a minimum 100mm diameter perforated pipe, surrounded by a geotextile filter fabric (OPSS 405) and installed on a positive grade leading to a frost free sump or outlet.

5.7 Pavement Construction

The existing on-site material generally consists of sandy silt to silty sand with clayey silt. These materials are highly frost susceptible.

The following pavement design is recommended based on the assumption that perforated sub-drains will be installed to prevent buildup of water in the granular bases of the pavement:

Pavement Structure		Light Duty Parking	Heavy Duty Fire Routes
Asphaltic Concrete:	**OPSS HL3 or equivalent**	**65mm**	**40mm**
	OPSS HL8 or equivalent	**-**	**60mm**
Base:	**OPSS Granular A or 20mm crusher-run**	**150mm**	**150mm**
Sub-base:	**OPSS Granular B or 50mm crusher-run**	**300mm**	**450mm**

The granular base and sub-base should be compacted to a minimum of 100% SPMDD. Asphaltic concrete should be compacted to at least 96% Marshall density.

The above pavement thicknesses are based on favourable site conditions and the construction being carried out during the drier time of the year, that the subgrade is stable, and not heaving under construction traffic. If the subgrade is wet and unstable, additional thickness of sub-base material will be required.

Following site grading, the subgrade of the entire pavement should be proof-rolled using a heavy vibratory roller. Any soft spots revealed by the proof-rolling should be sub-excavated and replaced with approved dry material and compacted to at least 95% of the Standard Proctor maximum dry density (SPMDD) to 300mm below the subgrade level. The upper 300mm of the subgrade should be compacted to 98% SPMDD.

Continuous perforated, OPSS 405, longitudinal drains, minimum diameter of 100mm, should be used as sub-drains, on both sides of the roadways. The sub-drains should be installed on a positive gradient towards the outlets (collecting into catch basins), at a minimum depth of 800mm below the pavement level, to allow for a free flow of water. The backfill above the drains should comprise of free draining Granular B or its equivalent and should be continuous with the granular sub-base of the pavement. This will help in draining the pavement structure and minimize the differential heave of the pavement.

6.0 GENERAL STATEMENT OF LIMITATION

The comments and recommendations presented in this report are based on the subsoil and ground water conditions encountered at the borehole locations, indicated in the borehole location plan, and are intended for the guidance of the design engineer.

Although we consider this report to be representative of the subsurface conditions at the subject property, the soil and the ground water conditions between and beyond the borehole locations may differ from those encountered at the time of our investigation and may become apparent during construction. Any contractor bidding on, or undertaking the works, should decide on their own investigation and interpretations of the groundwater and the soil conditions between the borehole locations.

Any use and / or the interpretation of the data presented in this report, and any decisions made on it by the third party are responsibility of the third parties. The responsibility of ***Toronto Inspection Ltd.*** is limited to the accurate interpretation of the soil and ground water conditions prevailing in the locations investigated and accepts no responsibility for the loss of time and damages, if any, suffered by the third party as a result of decisions or actions based on this report.

Yours very truly
TORONTO INSPECTION LTD.

David S. Wang

LICENSED PROFESSIONAL ENGINEER
S. WANG
100131918
Oct 8, 2024
PROVINCE OF ONTARIO

David S. Wang, P.Eng.
Senior Engineer

USSappal

REGISTERED PROFESSIONAL ENGINEER
USS
U.S. SAPPAL
Oct. 8, 2024
PROVINCE OF ONTARIO

Upkar S. Sappal, P. Eng.
Principal Engineer

Drawings

Borehole Location Plan
Borehole Logs

Source: York Region Interactive Map

LEGEND:

Borehole and Monitoring Well Location

— — Site Boundary

NOT TO SCALE

TorontoInspection LTD.
GEO-ENVIRONMENTAL CONSULTANTS
110 Konrad Crescent, Unit 16, Markham, Ontario L3R 9X2
Tel: 905-940 8509 Fax: 905-940 8192
Email : TIL@torontoinspection.com

TITLE:	Borehole and Monitoring Well Location Plan
LOCATION:	1656 Green Lane East, East Gwillimbury, Ontario (Toyota)

PROJECT NO.:	DATE :	DRAWING NO.
2177-24-GL	September 2024	1

Project No. 2177-24-GL

Log of Borehole 24BH-1 (MW)

Dwg No. 2

Project: Geotechnical Investigation

Sheet No. 1 of 1

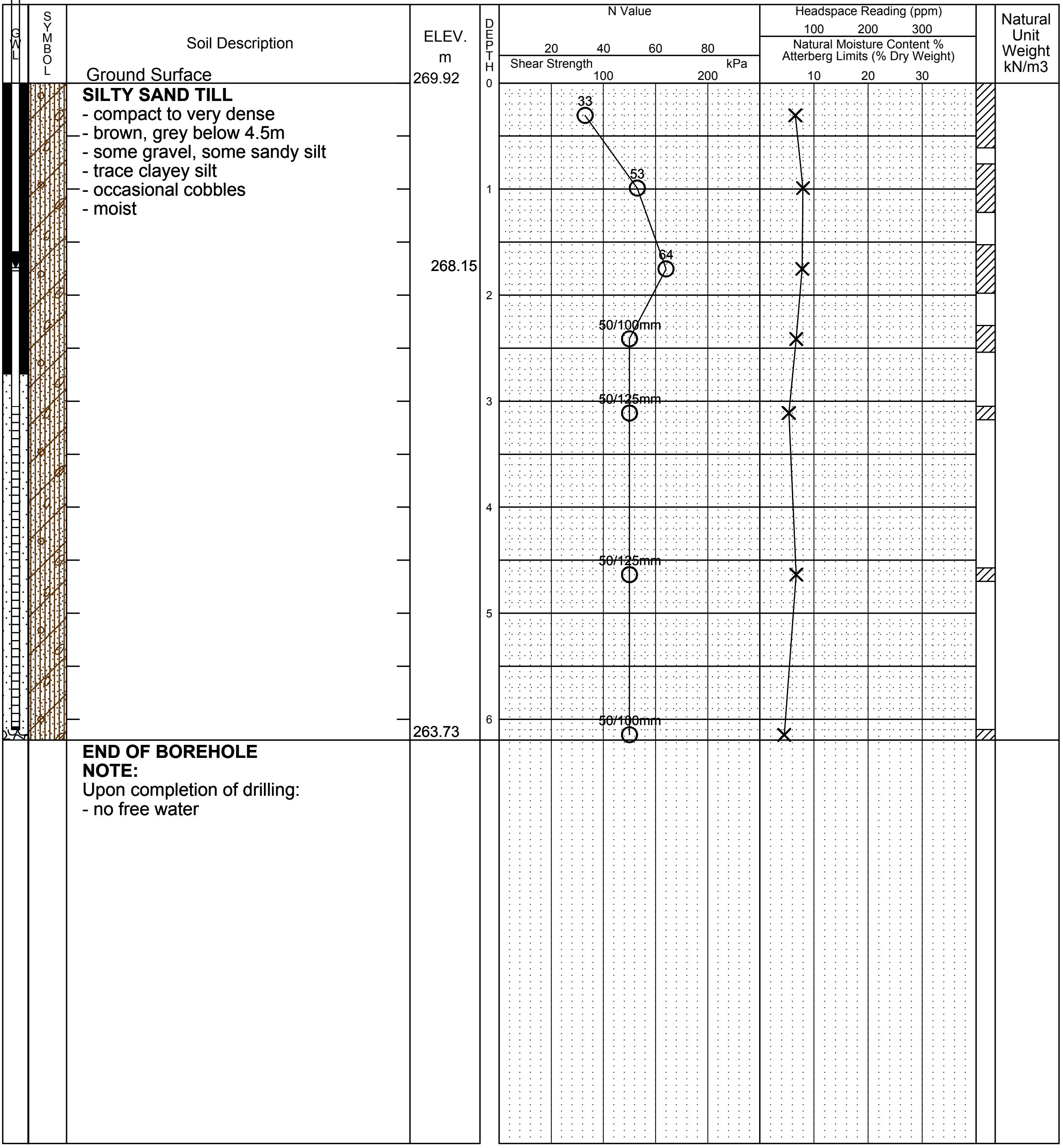
Location: 1656 Green Lane East, Sharon, Ontario

Date Drilled: 7/29/24

Drill Type: Track Mounted Drill Rig

Datum: Geodetic

Auger Sample	☒
SPT (N) Value	○ ▨
Dynamic Cone Test	—
Shelby Tube	■
Field Vane Test	✚ S
Headspace Reading (ppm)	•
Natural Moisture	×
Plastic and Liquid Limit	├─┤
Unconfined Compression % Strain at Failure	⊗
Penetrometer	▲



SILTY SAND TILL
- compact to very dense
- brown, grey below 4.5m
- some gravel, some sandy silt
- trace clayey silt
- occasional cobbles
- moist

END OF BOREHOLE
NOTE:
Upon completion of drilling:
- no free water

LGBE3 2177-24-GL.GPJ 10/4/24

NOTE: THE BOREHOLE DATA NEEDS INTERPRETATION ASSISTANCE BY TORONTO INSPECTION LTD. BEFORE USE BY OTHERS

Toronto Inspection Ltd.

Time	Water Level (m)	Depth to Cave (m)
Sept. 25, 2024	1.77m	

Project No. 2177-24-GL

Log of Borehole 24BH-2

Dwg No. 3

Project: Geotechnical Investigation

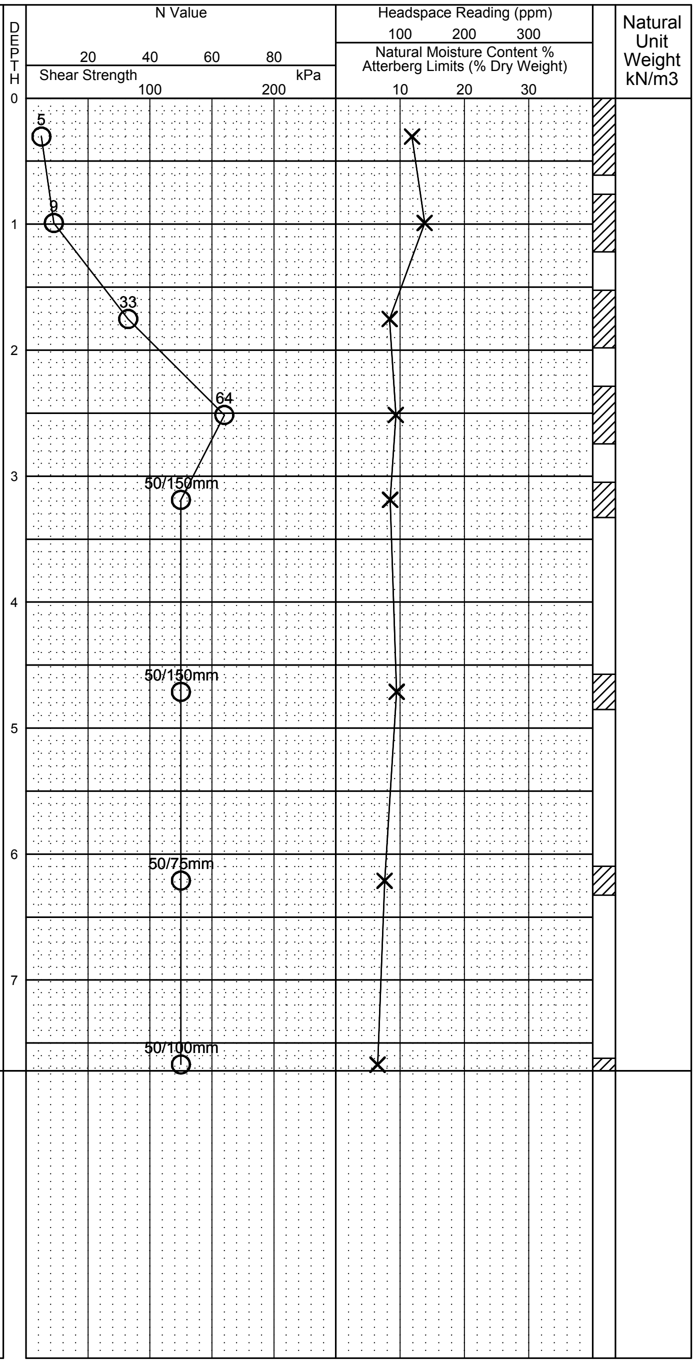
Sheet No. 1 of 1

Location: 1656 Green Lane East, Sharon, Ontario

Date Drilled: 7/29/24
Drill Type: Track Mounted Drill Rig
Datum: Geodetic

Auger Sample	☒	Headspace Reading (ppm)	●
SPT (N) Value	○ ▨	Natural Moisture	×
Dynamic Cone Test	—	Plastic and Liquid Limit	├─┤
Shelby Tube	■	Unconfined Compression % Strain at Failure	⊗
Field Vane Test	✚ S	Penetrometer	▲

GWL	SYMBOL	Soil Description	ELEV. m
		Ground Surface	269.70
		FILL (DISTURBED MATERIAL) - brown silty sand - some gravel, some sandy silt - thin layer of clayey silt - very moist to wet	268.48
▼			268.18
		SILTY SAND TILL - dense to very dense - brown, grey below 2.3m - some gravel, some sandy silt - trace clayey silt - thin layers of sand below 4.5m - occasional cobbles - moist to very moist, wet pockts/layers	261.98
		END OF BOREHOLE **NOTE:** Upon completion of drilling: - water level at 1.52m - cave-in at 2.44m	



LGBE3 2177-24-GL.GPJ 10/4/24

NOTE: THE BOREHOLE DATA NEEDS INTERPRETATION ASSISTANCE BY TORONTO INSPECTION LTD. BEFORE USE BY OTHERS

Toronto Inspection Ltd.

Time	Water Level (m)	Depth to Cave (m)

Project No. 2177-24-GL

Log of Borehole 24BH-3

Dwg No. 4

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: 1656 Green Lane East, Sharon, Ontario

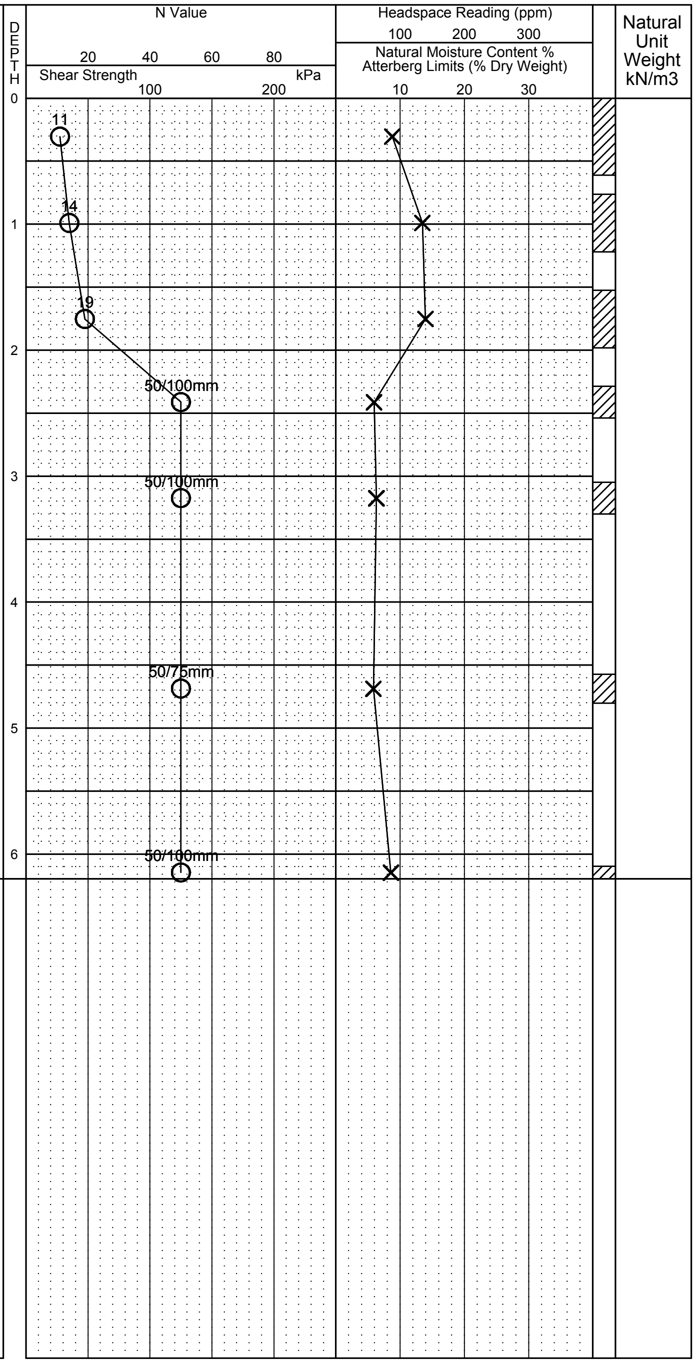
Date Drilled: 7/29/24

Drill Type: Track Mounted Drill Rig

Datum: Geodetic

Auger Sample	☒	Headspace Reading (ppm)	●
SPT (N) Value	○ ▨	Natural Moisture	×
Dynamic Cone Test	—	Plastic and Liquid Limit	├─┤
Shelby Tube	■	Unconfined Compression % Strain at Failure	⊗
Field Vane Test	✚ S	Penetrometer	▲

GWL	Symbol	Soil Description	ELEV. m	Depth (m)
		Ground Surface	271.53	0
	☒	**FILL (DISTURBED MATERIAL)** - brown sandy silt, some silty sand - moist	271.07	
▼ (269.70)		**SANDY SILT** - some silty sand, trace gravel - moist to very moist	269.40	
		SILTY SAND TILL - very dense - gray - some gravel, some sandy silt - occasional cobbles - moist	265.33	
		END OF BOREHOLE **NOTE:** Upon completion of drilling: - water level at 1.83m		



NOTE: THE BOREHOLE DATA NEEDS INTERPRETATION ASSISTANCE BY TORONTO INSPECTION LTD. BEFORE USE BY OTHERS

Toronto Inspection Ltd.

Time	Water Level (m)	Depth to Cave (m)

Project No. 2177-24-GL

Log of Borehole 24BH-4 (MW)

Dwg No. 5

Project: Geotechnical Investigation

Sheet No. 1 of 1

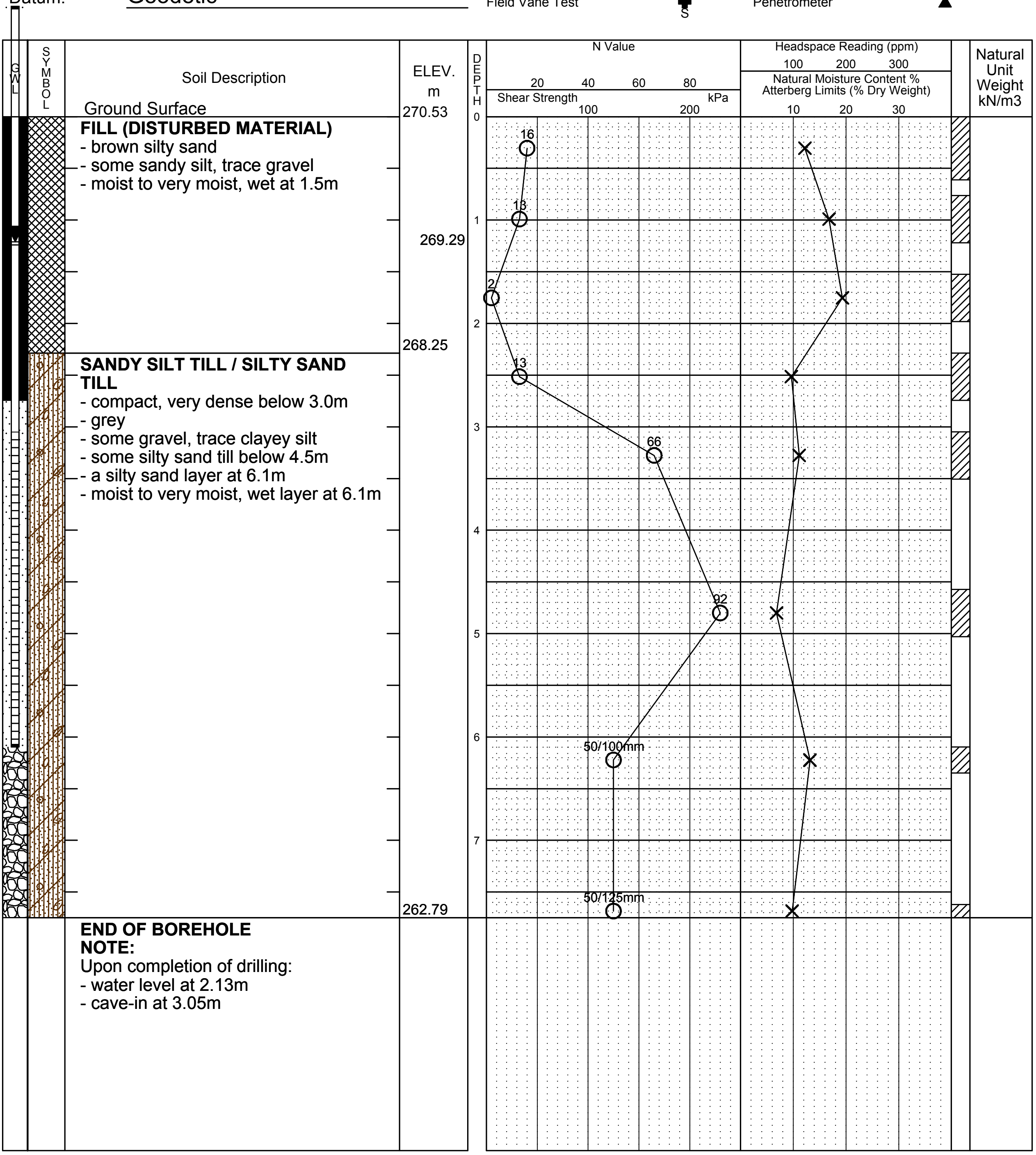
Location: 1656 Green Lane East, Sharon, Ontario

Date Drilled: 9/11/24

Drill Type: Track Mounted Drill Rig

Datum: Geodetic

Auger Sample	☒	Headspace Reading (ppm)	●
SPT (N) Value	○ ▨	Natural Moisture	×
Dynamic Cone Test	—	Plastic and Liquid Limit	⊢⊣
Shelby Tube	■	Unconfined Compression % Strain at Failure	⊗
Field Vane Test	✚ S	Penetrometer	▲



Soil Description	ELEV. m
Ground Surface	270.53
FILL (DISTURBED MATERIAL) - brown silty sand - some sandy silt, trace gravel - moist to very moist, wet at 1.5m	
	269.29
SANDY SILT TILL / SILTY SAND TILL - compact, very dense below 3.0m - grey - some gravel, trace clayey silt - some silty sand till below 4.5m - a silty sand layer at 6.1m - moist to very moist, wet layer at 6.1m	268.25
END OF BOREHOLE **NOTE:** Upon completion of drilling: - water level at 2.13m - cave-in at 3.05m	262.79

LGBE3 2177-24-GL.GPJ 10/4/24

NOTE: THE BOREHOLE DATA NEEDS INTERPRETATION ASSISTANCE BY TORONTO INSPECTION LTD. BEFORE USE BY OTHERS

Toronto Inspection Ltd.

Time	Water Level (m)	Depth to Cave (m)
Sept. 25, 2024	1.24m	

Project No. 2177-24-GL

Log of Borehole 24BH-5 (MW)

Dwg No. 6

Project: Geotechnical Investigation

Sheet No. 1 of 1

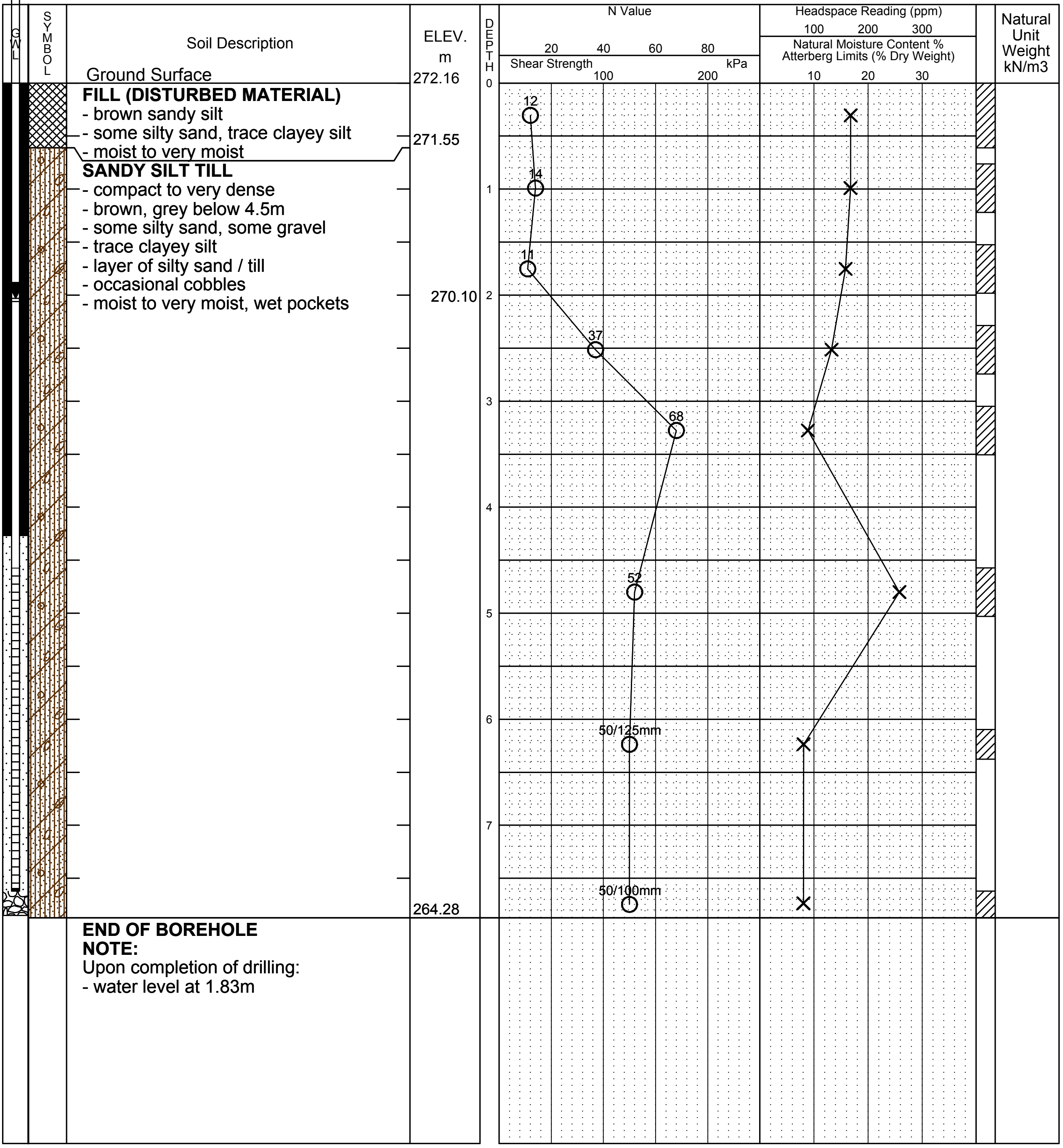
Location: 1656 Green Lane East, Sharon, Ontario

Date Drilled: 7/29/24

Drill Type: Track Mounted Drill Rig

Datum: Geodetic

Auger Sample	☒	Headspace Reading (ppm)	●
SPT (N) Value	○ ▨	Natural Moisture	×
Dynamic Cone Test	—	Plastic and Liquid Limit	├─┤
Shelby Tube	■	Unconfined Compression % Strain at Failure	⊗
Field Vane Test	✚ S	Penetrometer	▲



Ground Surface — 272.16

FILL (DISTURBED MATERIAL)
- brown sandy silt
- some silty sand, trace clayey silt
- moist to very moist

271.55

SANDY SILT TILL
- compact to very dense
- brown, grey below 4.5m
- some silty sand, some gravel
- trace clayey silt
- layer of silty sand / till
- occasional cobbles
- moist to very moist, wet pockets

270.10

264.28

END OF BOREHOLE

NOTE:

Upon completion of drilling:
- water level at 1.83m

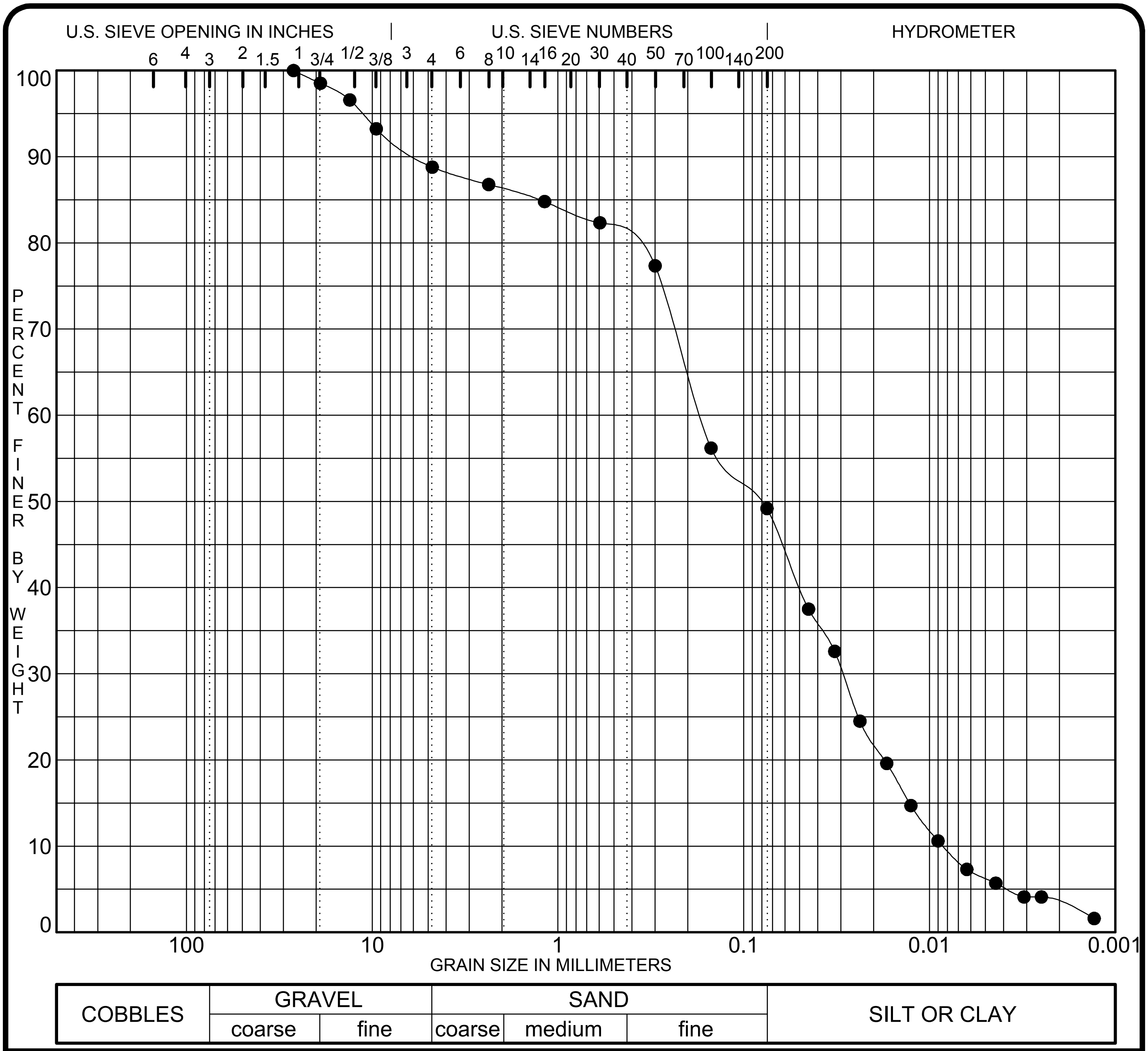
NOTE: THE BOREHOLE DATA NEEDS INTERPRETATION ASSISTANCE BY TORONTO INSPECTION LTD. BEFORE USE BY OTHERS

Toronto Inspection Ltd.

Time	Water Level (m)	Depth to Cave (m)
Sept. 25, 2024	2.06m	

Figure

Grain Size Distribution



Specimen Identification	Classification	MC%	LL	PL	PI	Cc	Cu
● **24BH-1 (MW) 1.8**						**0.60**	**20.2**

Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● **24BH-1 (MW) 1.8**	**26.50**	**0.17**	**0.029**	**0.0084**	**11.2**	**39.6**	**42.9**	**6.3**

PROJECT **Geotechnical Investigation - 1656 Green Lane East**
Sharon, Ontario

JOB NO. **2177-24-GL**
DATE **9/4/24**

GRADATION CURVES

Toronto Inspection Ltd.

FIGURE NO. 1

Appendix A

Engineering Fill Guidelines

GUIDELINES FOR ENGINEERED FILL

The information presented in this guideline is intended for general guidance only. Site specific and prevailing weather conditions may require modification of the material(s) to be used and the compaction standards or procedures changed. The site preparation and the material(s) to be used must be discussed and procedures agreed with ***Toronto Inspection Ltd.*** prior to the start of the earthworks and must be subjected to on going review during construction.

For fill to be classified as engineered fill, suitable for supporting structural loads, a number of conditions must be satisfied, including but not necessarily limited to the following:

1. Areal Extent

The engineered fill must extend beyond the envelope of the structure to be supported. The minimum extent should be 2.0m beyond the envelope in all directions at the foundation level, including the loading dock pad and the front sidewalk, and sloping downwards to the sub-grade at 45°. Once the envelope is set, the structure cannot be moved out of the envelope without consultation with ***Toronto Inspection Ltd.*** Similarly, no excavation should encroach on the engineered fill envelope without consultation with ***Toronto Inspection Ltd.***

2. Survey Control

Accurate survey control is essential to the success of an engineered fill project. The boundaries of the engineered fill must be laid out by a surveyor. During construction. it is necessary to have qualified surveyors providing control stations on the three-dimensional extent of the engineered fill.

3. Subsurface Preparation

Prior to placement of the engineered fill, the sub-grade must be prepared to the satisfaction of ***Toronto Inspection Ltd.*** All deleterious material must be removed and in some cases excavation of native mineral soils may also be required. Particular attention must be paid to wet sub-grade and possible additional measures required to achieve sufficient compaction. Where fill is placed against a slope, benching will be necessary and natural drainage paths must not be blocked.

4. Suitable Fill Material

All material to be used as fill must be approved by ***Toronto Inspection Ltd.*** Such approval will be influenced by weather factors. External sources of fill material must be sampled, tested and approved prior to material being hauled to the job site.

5. Trial Test Section

In advance of the construction of the engineered fill pad, the contractor should conduct a trial test section. The compaction criterion will be assessed for the backfill material to be used, using specified lift thicknesses and number of passes for the compaction equipment proposed by the contractor. To achieve a uniform degree of compaction of each layer, the lift thickness of loose material, prior to start of compaction, must not exceed 200mm (8 inches). Additional trial test section(s) may be required throughout the course of the project to reflect changes in material sources, the moisture content of the material and the weather conditions.

6. Degree of Compaction

The minimum degree of compaction for the engineered fill should not be less than 100% of the Standard Proctor maximum dry density, or 95% of the Modified Proctor maximum dry density, to the level at or above 0.3m from proposed footing founding level. Each layer must be tested and approved by this office before the next layer is placed.

7. Inspection and Testing

Uniform and thorough compaction is crucial to the performance of the fill and the supported structure. Hence, all subgrade preparation, filling and compacting must be done with full time inspection and to the satisfaction of ***Toronto Inspection Ltd.*** All founding surfaces must be inspected and approved by ***Toronto Inspection Ltd.*** prior to placement of concrete.

8. Protection of Fill

Fills are generally more susceptible to the effects of weather than are natural soils. Fill placed and approved to the level at which structural support is required must be protected from excessive wetting, drying, erosion or freezing. Where inadequate protection had been provided, it may be necessary to provide deeper founding level for footings or to strip and re-compact some of the filled layers.

9. Limitations

The engineered fill is subjected to the following limitations:

i. Proper drainage must be maintained at all times within the engineered fill pad.
ii. If the engineered fill is left in place during the winter months, adequate protection must be provided against frost penetration to the proposed footing depths.
iii. If the engineered fill depth exceeds 5m below the foundation depth, the construction of the foundations might have to be delayed for a period of 1 year after placement, depending on the type of fill material used.
iv. Strip footings and foundation walls founded on engineered fill must be reinforced continuously with a minimum of two 15mm steel bars with at least 1m of overlap.

HYDROGEOLOGICAL INVESTIGATION
1656 GREEN LANE EAST
EAST GWILLIMBURY, ONTARIO
L9N 0L8

REPORT NO.: 2177-21-HM
REPORT DATE: OCTOBER 22, 2024
REVISION NO.: 00

PREPARED FOR:
NEWROADS AUTOMOTIVE GROUP
18100 YONGE ST
NEWMARKET, ONTARIO
L3Y 3V1

Table of Contents

LIST OF TABLES

List of Figures

APPENDICES

1 Introduction

1.1 Project Background

Toronto Inspection Ltd. was retained by NewRoads Automotive Group (the Client) to conduct a hydrogeological investigation for the property at 1656 Green Lane East, in East Gwillimbury, Ontario. (The “Site”)

The Client’s contact information is as follows:

NewRoads Automotive Group
18100 Yonge Street
Markham, Ontario
L3Y 3V1

The following plans and drawings were reviewed in preparation of this report:

- Overall Site Plan, 1656 Green Lane East, East Gwillimbury. Drawing A1.0. Issued August 29, 2024. Ware Malcom (WMA Inc.).
- Concept Plan, Newmarket Toyota. Drawing No. A0.1 to A2.0 Version V1R2. Issued June 17, 2024. WEIS Retail Network Innovation.
- Site Grading Plan, New Road - Toyota, 1656 Green Lane East, East Gwillimbury ON. Drawings No. SG-01. Issued February 12, 2024. GEI Consultants Inc.

Based on a review of the aforementioned plans and drawings, the proposed development is a Motor Vehicle sale and Rental Establishment, consisting of a one storey commercial building with no basement.

The location of the Site is shown in **Figure 1**. The Overall Site Plan (WMA, 2024) and Site Grading Plans (GEI, 2024) are provided in **Appendix A**.

1.2 Site Description

The Site is located on Green Lane East, approximately 630m west of Highway 404 and 425 m east of Leslie Street in the Township of East Gwillimbury, Regional Municipality of York at the following UTM coordinates:

UTM Zone: 17 T
Easting: 625525 Northing: 4882542

The Site is approximately 2.87 Ha in area and near rectangle in shape. The Site is a vacant parcel and was historically used for agricultural purposes. The area immediately surrounding the Site is used for industrial, agricultural and commercial land uses.

1.3 Objectives of the Hydrogeological Investigation

The objectives of this hydrogeological investigation were to identify regulations applicable to the development of the Site including a source water protection assessment that evaluates the proposed development with respect to land-use policies of the Lake Simcoe Protection Plan (LSPP) (Ministry of the Environment (MOE), 2009) and the South Georgian Bay Lake Simcoe

(SGBLS) Source Protection Plan (SGBLS Source Protection Region (SPR), 2024), characterize the existing geological and hydrogeological conditions at the Site, identify dewatering requirements for the during- and post-construction phases, and evaluate potential impacts to underlying aquifers and surrounding receptors resulting from construction and potential dewatering activities.

1.4 Scope of Work

1.4.1 Conceptual Understanding

A conceptual understanding of the regional and local geological and hydrogeological systems was developed through the review of existing reports and available geological information. This included:

- Source Water Protection Plans and associated technical reports;
- Mapping and reports from the Lake Simcoe Region Conservation Authority (LSRCA);
- Geological and hydrogeological information from the Ontario Geological Survey (OGS);
- Geological and hydrogeological information from the Oak Ridges Moraine Groundwater Program (ORMGP);
- Mapping from the Ontario Ministry of Natural Resources and Forestry (MNRF); and
- Water well records from the Ministry of the Environment, Conservation, and Parks (MECP) Water Well Information System (WWIS) and Permit to Take Water (PTTW) records from the MECP PTTW database.

1.4.2 Field Investigation

The local scale geological and hydrogeological settings of the Site were characterized using a network of five boreholes installed by Toronto Inspection Ltd. in July of 2024. Boreholes were completed to depths ranging from 6.2 to 7.7 meters below ground surface (mbgs). Of these five boreholes, three were completed as monitoring wells, with Schedule 40 polyvinyl chloride (PVC) riser pipe and 3.05 m (10 foot) long slotted screens, installed to depths of 6.10 mbgs.

Monitoring wells were used to measure static groundwater levels, to conduct in-situ hydraulic conductivity testing, and to collect representative groundwater quality samples. Monitoring wells were installed according to the relevant provisions of Regulation 903 (Reg. 903) by a licenced well contractor with Toronto Inspection Ltd. staff in attendance. Once it is determined that the monitoring wells are no longer required, they should be decommissioned by a licensed well contractor per Reg. 903.

1.4.3 Data Analysis

The data analysis component of this hydrogeological investigation included the following items:

- Determination of soil stratigraphy and hydrostratigraphy;
- Determination of groundwater elevations, including the seasonal high groundwater elevation;
- Determination of the hydraulic conductivity of overburden soils;

- Evaluation of potential dewatering requirements for the Site;
- Identification of groundwater usage in the area and surrounding sensitive receptors; and
- Options for short-term and long-term mitigation of potential impacts to natural features, sensitive receptors, and vulnerable areas from development of the Site.

2 Relevant Regulations and Policies

Environmental regulations and policies which may be relevant for the development of the Site, and which this investigation has been completed in accordance with, are listed below and discussed briefly:

- Town of East Gwillimbury Official Plan (Office Consolidation October 2018);
- Regional Municipality of York (York Region) Official Plan (Office Consolidation June 2024);
- The Corporation of Town of East Gwillimbury Sewer Use By-Law # 2008-54;
- York Region Sewer Use Bylaw No. 2021-102;
- Ontario Regulation (O. Reg.) 179/06: LSRCA Guidelines;
- Lake Simcoe Protection Plan (2009);
- The Ontario Water Resource Act (1990);
- O. Reg. 387/04: Water Taking and Transfer;
- The Clean Water Act, 2006; and
- South Georgian Bay Lake Simcoe Source Protection Plan (2024)

Town of East Gwillimbury Official Plan (2018)

The Town of East Gwillimbury Official Plan identifies development and land-use objectives for the Town of East Gwillimbury to 2031. Based on a review of Schedule A of the Official Plan, the Site is located within an Employment Area, and a Natural Heritage System is designated around the tributary of the East Holland River that flows through the Site. As per Schedule B-4, a small area at the west end of the Site is located within a Mixed Business Employment area, while the remaining majority of the Site falls within the Prestige Employment area.

York Region Official Plan (2022)

The York Region Official Plan sets out directions and policies that guide economic, environmental and community planning decisions within York Region. The Official Plan reflects the designations as identified within other planning instruments including regional Source Protection Plans. According to Map 1 of the Official Plan, the Site is located within an Urban Area.

The Site does not fall within the Regional Greenlands System, the Oak Ridges Moraine Conservation Plan (ORMCP) Area, the Greenbelt Plan Area, any Areas of Natural and Scientific Interest (ANSIs), or any Key Hydrologic Features as identified on Official Plan mapping.

The Official Plan establishes, in accordance with the Clean Water Act (CWA), specific requirements for developments occurring within Well Head Protection Areas (WHPAs) and Intake Protection Zones (IPZs) including the requirements for Source Water Impact Assessment and Mitigation Plans (SWIAMPs) and filing of Section 59 Notices (Source Protection Permits). It also establishes Recharge Management Areas within WHPA-Q1 and WHPA-Q2 areas that are delineated under the CWA. A climate-based water balance is required for all Sites in York Region within designated Recharge Management Areas to demonstrate that pre-development infiltration volumes can be maintained. A water balance study is also required for major development in SGRAs. Where pre-development infiltration volumes cannot be maintained as a result of the inherent physical limitations of the Site, off-site recharge augmentation within the same WHPA-Q2 or monetary compensation may be required.

The Corporation of Town of East Gwillimbury Sewer Use By-Law # 2008-54.

The Town of East Gwillimbury regulates private discharges of groundwater to the municipal storm and sanitary sewer system and establishes the Schedule of Sewer Service Charges and Rates. Should any private water within the Site require discharge to the municipal system, be it during or after construction, an approval from the Town will be required.

York Region Sewer Use Bylaw No. 2021-102

The discharge of private water to a municipal sewer in York Region is regulated by York Region's *Sewer Bylaw No. 2021-102* (Sewer Use Bylaw). Should any private water within the Site require discharge to a municipal sewer owned by York Region, a sewer use permit will be required. To obtain a permit, an application form must be submitted to York Region using their online Sewer Use Bylaw Services portal. The application review process generally takes anywhere from three to six weeks depending on the complexity of the application.

O. Reg. 179/06 LSRCA Implementation Guidelines

Under Section 28 of the *Conservation Authorities Act*, local conservation authorities are mandated to protect the health and integrity of the regional greenspace system and to maintain or improve the hydrological and ecological functions performed by valley and stream corridors. The LSRCA, through its regulatory mandate, is responsible for issuing permits under O. Reg. 179/06: *Lake Simcoe Region Conservation Authority: Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses.* Permits are issued for new development proposals or certain site alteration works within LSRCA regulated areas.

A review of LSRCA (2019) mapping indicates that a portion of the Site near its middle and along a tributary of Holland River (Sharon Creek) that flows through the Site in a north-south direction, fall within LSRCA regulated areas. As such, a permit under O. Reg. 179/06 for development in that area is expected. Pre-consultation should be completed with the LSRCA to confirm.

Lake Simcoe Protection Plan (2009)

The LSPP (MOE, 2009) was prepared following the establishment of the Lake Simcoe Protection Act (LSPA) in 2008. The objective of the LSPA and the LSPP is to safeguard the ecological health and natural function of Lake Simcoe and its tributaries. The LSPP requires applications for major development (>500 m^2 impervious area) within the Lake Simcoe Watershed to provide a stormwater management plan accompanied by a climate-based water balance and a phosphorus balance to evaluate, where applicable, the potential post-construction infiltration deficit and increases in phosphorus loadings to Lake Simcoe, respectively. Water and phosphorus balance assessments are to be completed for the proposed development as part of the Stormwater Management Report for the Site.

Ontario Water Resource Act (1990)

Under Section 34 of the Ontario Water Resources Act (OWRA), a PTTW is required from the MECP for any water taking that is greater than 50,000 L/day. For water takings related to construction site dewatering or road construction, water takings of more than 50,000 L/day but less than 400,000 L/day may be registered on the Environmental Activity and Sector Registry (EASR) under *O. Reg. 63/16: Registrations Under Park II.2 of The Act – Water Takings*. Water takings during construction that will exceed more than 400,000 L/day will require a PTTW issued by the MECP; water takings post-construction that will exceed 50,000 L/day will also require a PTTW issued by the MECP.

O. Reg. 387/04 Water Taking and Transfer Regulation

O. Reg. 387/04 under the OWRA describes the relevant assessment criteria and outlines certain prohibited water taking and transfer activities that are evaluated by the MECP prior to issuing a PTTW as well as for applicants who are self-registering on the EASR. The regulation also clarifies certain prescribed activities that are exempt from the PTTW/EASR requirements and outlines the data collection and reporting commitments for PTTW and EASR registration holders. Any water taking activity that is regulated by the OWRA will need to be undertaken in accordance with O. Reg. 387/04.

The Clean Water Act, 2006

The MECP mandates the protection of existing and future sources of drinking water under the Clean Water Act (CWA). Initiatives undertaken under the CWA include the delineation of vulnerable areas for drinking water areas including WHPAs, SGRAs, IPZs, and Highly Vulnerable Aquifer areas (HVAs) as well as the assessment of drinking water quantity threat areas (WHPA-Q1, WHPA-Q2 and IPZ-Q) within Source Protection Regions.

Based on a review of the MECP (2023a) Source Protection Information Atlas, the Site falls within the Lake Simcoe and Couchiching/Black River Source Protection Area within the South Georgian Bay Lake Simcoe Source Protection Region. The Site is located within or intersects the following vulnerable areas: a WHPA-Q1 and WHPA-Q2, and an IPZ-3 in the area surrounding the stream, as shown in LSRCA (2023) mapping.

South Georgian Bay Lake Simcoe Source Protection Plan (2015)

Source Protection Plans are developed under the CWA and identify the policies that restrict, regulate and prohibit land use activities within vulnerable drinking water areas. Local municipalities and regional governments are required under the CWA to implement the SPPs through integration into planning policy. The Site is located within the policy boundaries of the South Georgian Bay Lake Simcoe Source Protection Plan (SGBLS SPP) (SGBLS SPR, 2022).

The South Georgian Bay Lake Simcoe Source Protection Plan (SGBLS-SPR, 2022) outlines land use policies to be implemented within the Lake Simcoe and Couchiching/Black River Source Protection Area to safeguard vulnerable drinking water areas from threats to both quantity and quality. Given the proposed development and its location within a WHPA-Q1/-Q2, policies LUP-11, LUP-12, LUP-13 and LUP-15 applicable to the Site. Policies LUP-11, LUP-12, LUP-13 and LUP-15 are related to the maintenance of groundwater resources in the Source Protection Area and implemented through the YROP.

3 Regional Geological and Hydrogeological Understanding

3.1 Topography and Drainage

The Site is within the East Holland River Subwatershed which covers an area of 247 km^2 and is under the jurisdiction of the LSRCA (LSRCA, 2010). The East Holland River Subwatershed drains northward toward Lake Simcoe. Sharon Creek, a tributary of the East Holland River flows south through the Site dissecting it into an eastern and western portion. Once off-site the creek flows west then north into the East Holland River.

The topography at the site is undulating. Based on a review of the Site Grading Plan, Drawing No. SG-01 provided by GEI Consultants dated August 2024, the existing topographic elevation at the Site varies from a high of 275 masl at the northeastern boundary to a low of 266 masl at the western boundary.

A topographic map of the Site and the surrounding area is presented in **Figure 2**. The Site Grading Plan is provided in **Appendix A**.

3.2 Physiography

The Site is situated within the physiographic region known as the Schomberg Clay Plains. The Schomberg Clay Plains are characterized by rolling relief covered by deposits of fine-grained sediments, typically 15 m thick, which are draped over an irregular till plain (Chapman and Putnam, 1984).

A physiographic map of the Site and the surrounding area is presented in **Figure 3**.

3.3 Surficial Geology

Mapping from the OGS (2010) indicates that the surficial geology across the Site consists of three different deposit types. The majority of Site is composed of fine-textured glaciolacustrine deposits. A portion of the Site extending from the centre to the north-eastern property limit has deposits of stone-poor, carbonate-derived silty to sandy till. Another small area along the east boundary of the Site is composed of coarse-textured glaciolacustrine deposits.

The surficial geology of the Site and surrounding area is presented in **Figure 4**.

3.4 Bedrock Geology

Based on a review of geological mapping, the bedrock unit underlying the Site is the Lindsay Formation comprised of middle Ordovician limestone (Armstrong and Dodge, 2007). The top of bedrock elevation is expected to be at approximately 103.5 mbgs (162 masl) (ORMGP, 2018).

The bedrock geology of the Site and the surrounding area is presented in **Figure 5**.

3.5 Regional Geology and Hydrogeology

The current understanding of the regional geological and hydrogeological environment is based on scientific work conducted by, and information available from, the York, Peel, Durham, Toronto and The Conservation Authorities Moraine Coalition (YPDT-CAMC) as made available through the ORMGP and regional Source Water Protection technical studies. The following description of regional hydrogeology is based on information presented in ORMGP (2018) mapping and Earthfx Inc. (2013).

3.5.1 Hydrostratigraphy

The following hydrostratigraphic units typically overlie the bedrock (from youngest to oldest) within the general vicinity of the Site:

A. Recent Deposits
B. Halton Till (Aquitard)
C. Oak Ridges Moraine (Aquifer)
D. Channel Sediments (Aquifer/Aquitard)
E. Newmarket Till (Aquitard)
F. Thorncliffe Formation (Aquifer)
G. Sunnybrook Drift (Aquitard)
H. Scarborough Formation (Aquifer)

The units are depicted in the regional hydrostratigraphic cross-sections provided in **Figure 6** and **Figure 7**, as described by the ORMGP (2018). The cross-section in **Figure 6** depicts the regional hydrostratigraphy in a north to south orientation along Leslie Street from Mt Albert Road to Davis Drive; this section line is approximately 410 m west from the Site. The cross-section in **Figure 7**, represents the hydrostratigraphy in a west to east orientation along Green Lane East from 2nd Concession Road to Woodbine Avenue; the Site is located directly north of this section line.

A brief description of each hydrostratigraphic unit is provided below.

- **Recent Deposits** – The uppermost surficial geologic unit consists of glaciolacustrine deposits consisting of mainly glaciolacustrine derived fine sands, silts and clays. Recent deposits are expected to be absent or present at the Site in limited amounts.

- **Halton Till** – The Halton Till was deposited approximately 13,000 years before present (B.P.) during the last glacial advance in the area. The Halton Till is comprised of deposits of sandy silt till to clayey silt till. The Halton Till is not expected to be present at the Site.

- **Oak Ridges Moraine** – The Oak Ridges Moraine (ORM) was deposited approximately 12,000 to 13,000 years B.P. The ORM is a prominent geological feature within the Subwatershed as it supports numerous residential and municipal groundwater supply wells. The deposits of the ORM generally consist of layers of sand and gravel. The ORM is not expected to be present at the Site.

- **Channel Sediments** – Following the deposition of the Newmarket Till (discussed below), glacial meltwaters created a series of erosional (tunnel) channels along the upper surface of the till unit. The tunnel channels that were left behind were infilled with silt and sand deposits as the energy of the meltwaters diminished. The silt and sand infill are referred to as Channel Sand Aquifer and Channel Silt Aquitard, respectively. Collectively the units are referred to as the Channel Sediments. The Channel Sediments are not expected to be present at the Site.

- **Newmarket Till** – The Newmarket Till was deposited approximately 18,000 to 20,000 years B.P. It is divided into the Upper Newmarket Till (aquitard), the Inter-Newmarket Sediments (aquifer), and the Lower Newmarket Till (aquitard). The Upper Newmarket Till is mainly present north of the ORM, while the Inter-Newmarket Sediments are thought to be discontinuous sand lenses of glaciolacustrine origin between the upper and lower tills. The Upper Newmarket Till is expected to be present at the Site at elevations ranging from 268 masl (5 mbgs) in the western portion of the Site to 271 masl (2 mbgs) in the eastern corner. The Inter Newmarket Sediments are expected to be present at the Site at approximate elevations ranging from 250 masl (23 mbgs) at the northwestern corner to 256 masl (17 mbgs) at the southeastern corner. Lower Newmarket Till is expected to be encountered at approximate elevations from 247 masl (26 mbgs) in the northern portion to 245 masl (28 mbgs) in the southern corner.
- **Thorncliffe Formation** – The Thorncliffe Formation was deposited approximately 45,000 years B.P. and consists of glaciofluvial deposits containing sand and silty sand. Regionally, the unit acts as an aquifer with variable grain size and thickness. The Thorncliffe Formation is expected to be present at the Site at elevations ranging from 208 masl (65 mbgs) in the northwest corner of the Site to 228 masl (45 mbgs) in the southern portion.
- **Sunnybrook Drift** – The Sunnybrook Drift was deposited approximately 45,000 years B.P.; it is interpreted to be a silt and clay formation formed as a result of glacial and lacustrine processes, which acts as an aquitard. The Sunnybrook Drift is expected to be present at the Site at elevations ranging from 181 masl (92 mbgs) in the northwest to 184 masl (89 mbgs) in the southeast.
- **Scarborough Formation** – The Scarborough Formation was deposited during the Wisconsin glaciation approximately 70,000 years to 90,000 years B.P. It is a fluvial-deltaic system consisting of sand, silt and clay deposits, which acts as an aquifer. The Scarborough Formation is expected to be present at the Site at elevations ranging from 169 masl (104 mbgs) in the northwest to 172 masl (101 mbgs) in the southeast.

3.6 Regional Groundwater Flow

At a regional scale, groundwater flows from the topographic highs associated with the Oak Ridges Moraine, south of the Site, to the topographic lows associated with Lake Simcoe to the north. Regional groundwater flow patterns will be influenced by the presence of major watercourses.

4 Local Geology and Hydrogeology

The current understanding of the local geological and hydrogeological environment at the Site is based on the geotechnical, environmental, and hydrogeological investigations conducted by Toronto Inspection Ltd. The findings from site-specific borings completed during these investigations were evaluated in the context of the regional hydrogeological setting to develop a conceptual hydrogeological model for the Site.

4.1 Overburden

Based on the soil characterizations from the borehole data, the overburden material consists of 0.6 m to 2.3 m of fill, which is underlain by sand and silt textured deposits described as silty sand till, sandy silt till, and sandy silt in the borehole logs and extend to the termination depth of borehole investigations at up to 7.7 mbgs.

Borehole locations from the Toronto Inspection Ltd. (2024) geotechnical investigation are shown in **Figure 8**. Borehole logs are included in **Appendix B**.

4.2 Bedrock Geology

Bedrock was not encountered within and up to the terminal depths (7.7 mbgs) of the borehole investigation. As mentioned, the limestone bedrock interface is expected at an elevation of approximately 103.5 mbgs (162 masl).

4.3 Groundwater Conditions

4.3.1 On-Site Monitoring Network

A monitoring network consisting of three monitoring wells was established at the Site. Monitoring well locations are shown in **Figure 8**. A summary of the monitoring well construction details is provided in **Table 4-1** below.

Table 4-1 Monitoring Well Construction Summary

Well ID	Ground Elevation (masl)	Screen Interval (mbgs/masl)	Well Diameter (m)	Screen Length (m)	Screened Unit
24BH-1 (MW)	269.92	3.05 – 6.10 / 266.87 – 263.82	0.051	3.048	sandy silt till
24BH-4 (MW)	270.53	3.05 – 6.10 / 267.48 – 264.43	0.051	3.048	sandy silt till/ silty sand till
24BH-5 (MW)	272.16	3.05 – 7.62 / 267.59 – 264.54	0.051	3.048	sandy silt till

4.3.2 Preliminary Groundwater Levels

Groundwater elevations were measured on September 25, 2024. A summary of static groundwater level measurements is presented in **Table 4-2** and **Table 4-3** in mbgs (relative to the existing grade), and masl, respectively.

It is noted the groundwater measured in the low permeability till soils does not represent a significant water bearing aquifer deposit. Small amounts of groundwater are found perched within lenses of more permeable material within the till matrix; or, within the till soils themselves.

Based on the manual measurements, groundwater elevations ranged between a high of 270.10 masl at 24BH-5 (MW) in the northeast portion of the Site measured to a low of 262.12 masl at 24BH-1 (MW) in the western portion of the Site.

Table 4-2 Preliminary Water Level Measurements (mbgs)

Well ID	Screen Interval (mbgs)	25-Sep-24
24BH-1 (MW)	3.05 – 6.10	1.77
24BH-4 (MW)	3.05 – 6.10	1.24
24BH-5 (MW)	4.57 – 7.62	2.06

Notes:

1. Water levels are relative to existing ground surface.

Table 4-3 Preliminary Water Level Measurements (masl)

Well ID	Screen Interval (masl)	25-Sep-24
24BH-1 (MW)	266.67 – 263.82	268.15
24BH-4 (MW)	267.48 – 264.43	269.29
24BH-5 (MW)	267.59 – 264.54	270.10

4.3.3 Hydraulic Conductivity

Single well hydraulic response testing in the form of rising-head tests was conducted at all on-Site monitoring wells on September 18, 2024, to estimate the in-situ hydraulic conductivity (K) of the screened overburden materials. Prior to testing, each well was developed in order to mitigate the influence of native, near-well materials disturbed during the drilling program.

During the rising head test, a pseudo-instantaneous drop in the water level was achieved by extracting water from the well using a manual inertial pump. The water level recovery was measured by a datalogger taking readings at pre-programmed intervals and left in place to record recovery. For the purposes of the test, sufficient recovery was considered to be at or above approximately 85% of the pre-test water column.

The hydraulic conductivity was estimated using the Hvorslev (1951) method with the data recorded by the dataloggers. The corresponding analyses are presented in **Appendix C**. A summary of hydraulic conductivities is presented in **Table 4-4**.

Table 4-4 Summary of Hydraulic Conductivity Calculations

Well ID	Screen Interval mbgs/masl	Material Tested	Hvorslev Method K (m/s)
24BH-1 (MW)	3.05 – 6.10 / 266.87 – 263.82	silty sand till	8.9 x 10^{-8}
24BH-4 (MW)	3.05 – 6.10 / 267.48 – 264.43	silty sand, sand	1.1 x 10^{-7}
24BH-5 (MW)	4.57 – 7.62 / 267.59 - 264.54	silty sand till	1.2 x 10^{-7}
		Geometric Mean	1.06 x 10^{-7}

The results of the hydraulic conductivity analyses identified a hydraulic conductivity for the shallow silt and sand textured overburden ranging from 8.9 x 10^{-8} m/s to 1.2 x 10^{-7} m/s. The calculated geometric mean of all results was 1.06 x 10^{-7} m/s. The hydraulic conductivity estimates are within the expected range for silty material, which can vary on the order of 10^{-9} m/s to 10^{-5} m/s, and for silty sand material, which can vary on the order of 10^{-7} m/s to 10^{-3} m/s (Freeze and Cherry, 1979).

It is anticipated that the bulk hydraulic conductivity of the overburden soils is approximately equivalent to the geometric mean of all reported results. As such, groundwater seepage rates into open excavation below the groundwater table will be calculated using a horizontal hydraulic conductivity equivalent to 1.06 x 10^{-7} m/s.

4.3.4 Groundwater Quality

An unfiltered groundwater quality sample was collected from 24BH-4 (MW) on September 18, 2024. The collected groundwater quality sample was submitted for analysis to SGS Environmental Services in Lakefield, Ontario. The sample was analyzed for and assessed against the parameters and corresponding criteria listed in the York Region Sewage Use Bylaw No. 2021-102. The laboratory analytical results and Certificate of Analysis are included in **Appendix D**. Laboratory analytical results are summarized in **Table 4-5**.

Table 4-5 Groundwater Quality Results

Analysis	Units	York Table 1 Sanitary By-Law Limit	York Table 2 Storm By-Law Limit	RDL	24BH-4 (MW)
Conventional					
Biochemical Oxygen Demand (BOD)	mg/L	300	15	2	< 4 ↑
Total Kjeldahl Nitrogen (TKN)	as N mg/L	100	1	0.5	<0.5
Oil and Grease – Mineral and Synthetic	mg/L	150	---	4	< 4
Oil and Grease–- Animal and Vegetable	mg/L	15	---	4	< 4
Phenolics-4AAP	mg/L	1	0.008	0.002	0.002
Total Phosphorus (P)	mg/L	10	0.4	0	0.026
Total Suspended Solids (TSS)	mg/L	350	15	2	24
pH	no unit	6.0-10.5	6.0-9.0	0	7.53
Other					
Total Cyanide (CN)	mg/L	2	0.02	0.01	< 0.01
Fluoride (F-)	mg/L	10	---	0.06	0.14
Sulphate (SO4)	mg/L	1500	---	2	42
Metals					
Total Aluminum (Al)	mg/L	50	---	0.001	0.367
Total Antimony (Sb)	mg/L	5	---	0.0009	< 0.0009
Total Arsenic (As)	mg/L	1	0.02	0.0002	0.0017
Total Cadmium (Cd)	mg/L	0.7	0.008	0.000003	0.000004
Total Chromium (Cr)	mg/L	2	0.08	0.00008	0.00061
Total Cobalt (Co)	mg/L	5	---	0.000004	0.000334
Total Copper (Cu)	mg/L	3	0.05	0.0002	<0.0001
Total Lead (Pb)	mg/L	1	0.12	0.00009	0.00032
Total Manganese (Mn)	mg/L	5	0.15	0.00001	0.00403
Total Mercury (Hg)	mg/L	0.01	0.0004	0.00001	<0.00001
Total Molybdenum (Mo)	mg/L	5	---	0.0004	0.0015
Total Nickel (Ni)	mg/L	2	0.08	0.0001	0.0008
Total Selenium (Se)	mg/L	1	0.02	0.00004	<0.00004

Analysis	Units	York Table 1 Sanitary By-Law Limit	York Table 2 Storm By-Law Limit	RDL	24BH-4 (MW)
Total Silver (Ag)	mg/L	5	0.12	0.00005	< 0.00005
Total Tin (Sn)	mg/L	5	---	0.00006	0.00013
Total Titanium (Ti)	mg/L	5	---	0.00005	0.0178
Total Zinc (Zn)	mg/L	2	0.04	0.002	0.016
Organics					
Benzene	mg/L	0.01	0.002	0.0005	< 0.0005
Chloroform	mg/L	0.04	0.002	0.0005	< 0.0005
1,2-Dichlorobenzene	mg/L	0.05	0.0056	0.0005	< 0.0005
1,4-Dichlorobenzene	mg/L	0.08	0.0068	0.0005	< 0.0005
cis-1,2-Dichloroethylene	mg/L	4	0.0056	0.0005	< 0.0005
trans-1,3-Dichloropropene	mg/L	0.14	0.0056	0.0005	< 0.0005
Ethylbenzene	mg/L	0.16	0.002	0.0005	< 0.0005
Methylene Chloride	mg/L	2	0.0052	0.0005	< 0.0005
1,1,2,2-Tetrachloroethane	mg/L	1.4	0.017	0.0005	< 0.0005
Tetrachloroethylene	mg/L	1	0.0044	0.0005	< 0.0005
Toluene	mg/L	0.27	0.002	0.0005	< 0.0005
Trichloroethylene	mg/L	0.4	0.008	0.0005	< 0.0005
Total Xylenes	mg/L	1.4	0.0044	0.0005	< 0.0005
Di-n-butyl phthalate	mg/L	0.08	0.015	0.002	< 0.002
Bis (2-ethylhexyl) phthalate	mg/L	0.012	0.0088	0.002	< 0.002
Polychlorinated Biphenyls (PCBs)	mg/L	0.001	0.0004	0.0001	< 0.0001
Methyl Ethyl Ketone	mg/L	8	---	0.02	< 0.02
Styrene	mg/L	0.2	---	0.005	< 0.0005
Nonylphenol	mg/L	0.02	---	0.001	< 0.001
Nonylphenol ethoxylates	mg/L	0.2	---	0.01	< 0.01

Notes:
Yellow highlighted cells indicate an exceedance of storm sewer criteria.
Bolded cells indicate an exceedance of sanitary sewer criteria.
↑ indicates increased readable detection limit (RDL)

Based on the laboratory analytical results, the parameters met the criteria for *Table 1 – Limits for Sanitary Sewer Discharge* and *Table 2 – Limits for Storm Sewer / Land Drainage Works Discharge* with exception of Total Suspended Solids (TSS) which exceeded the storm sewer limits of Table 2.

5 Preliminary Calculation of Dewatering Rates and Estimation of Zone of Influence

Dewatering calculations provide an estimate of the expected dewatering rates and discharge options to complete below ground construction in open cut excavations under suitable conditions. Calculated rates are provided for the purpose of obtaining water taking and/or discharge permits. This section does not provide a design of dewatering operations. The design of dewatering operations and the selection of effective dewatering and discharge measures are solely the responsibility of the dewatering contractor. Dewatering rates are provided herein for groundwater and stormwater control only. Dewatering rates for groundwater control were estimated based on the interpretation of the hydrogeological Site conditions and development details as outlined in the Site Plan (WMA, 2024) and Site Grading Plan (GEI, 2024). Copies of the plans are provided in **Appendix A** for reference. Complete details for the proposed servicing were not available at the time of writing, as such dewatering requirements for servicing installation were not calculated.

Please Note: Estimations provided are based on preliminary water level monitoring, and do not include site servicing for the plan. A review and update of dewatering requirements is required once full site servicing details are available, and/or in the event of future design changes for the proposed development.

5.1 Aquifer Characteristics

The overburden at the Site consists of 0.5 m to 1.2 m of fill, 2.1 to 2.3 m at 24BH-3 and 24BH-4 (MW), which overlays sand and silt textured deposits (silty sand till, sandy silt till,) that extend to the termination depth of the borehole investigations, 7.7 mbgs. Based on the details available, below ground excavation during construction is expected to extend into the sandy and silty till deposits. In order to estimate dewatering rates for the Site, we have assumed the fill till deposits can be modelled as an unconfined aquifer with hydraulic properties as indicated by Site-specific field data.

The geometric mean of all hydraulic conductivity values from the single well response testing, 1.06×10^{-7} m/s, is used as the hydraulic conductivity value for the deposits to be dewatered in the calculations.

The highest recorded water level elevation during the long-term elevation was used for dewatering calculations.

5.2 Required Drawdown

Dewatering will be required to draw the water level down to below the depth of excavation for foundation of the proposed building. The following assumptions were made in the assessment of dewatering requirements:

- The finished floor elevations (FFE) in the final condition is 272.60 masl, as shown in the Site Grading Plan (DWG. SG-01, GEI, 2024, **Appendix A**);
- The bottom of excavation will be 1.0 m below the FFE to account for the slab thickness and footings;
- The target dewatering level will be 1 m below the base of the excavation;

- The estimated maximum groundwater elevation was taken as the maximum reported groundwater elevation data set for monitoring wells within/closest to the building footprint, using manual measurements taken from monitoring wells available on-Site.
- The dimensions of the excavation for the building were taken from the Site Grading Plan (DWG No. SG-01, GEI, 2024, **Appendix A**).

The dewatering requirements for the Site are summarized in **Table 5-1** below.

Table 5-1 Summary of Dewatering Requirements

Scenario	Ground Surface (Final)	Base of Excavation	Width of Excavation	Length of Excavation	Maximum Groundwater Elevation	Dewatered Groundwater Elevation	Maximum Required Drawdown
	(masl)	(masl)	(m)	(m)	(masl)	(masl)	(m)
Building Foundation	272.60	271.60	62	71	271.10	270.60	0.50

5.3 Radius of Influence

Considering the drawdown requirements, dimensions of the excavation and underlying soil conditions, it is anticipated that the dominant mode of groundwater flow to the excavations will be planar. An estimate of the Radius of Influence (ROI) for dewatering excavations can be calculated using the following equation (Cashman and Preene, 2013):

$$R_{01} = 2.45\sqrt{\frac{HK}{S_y}t}$$

where,

R_{01} = Radius of influence beyond which there is negligible drawdown (m)
H = Distance from initial static water level to assumed bottom of saturated aquifer contributing flows (m)
S_y = Specific yield of the aquifer formation (based on value for a silt after Morris and Johnson, 1967)
t = Time, in seconds, required to draw the static groundwater level to the desired level (s), assumed equivalent to 14 days.
K = Hydraulic Conductivity of aquifer formation (m/s)

A summary of the DOI estimations for the dewatering calculations is presented in **Table 5-2** below.

Table 5-2 Radius of Influence

Scenario	H	S_y	K	t	R_{01}
	(m)	[-]	(m/s)	(s)	(m)
Building Foundations	10	0.20	1.1×10^{-7}	1,209,600	7

5.4 Preliminary Dewatering Rate Calculations

5.4.1 Short Term Dewatering

The calculation of anticipated dewatering rates, to control groundwater inflows to the excavation during construction, is based on equations provided in *Construction Dewatering and Groundwater Control: New Methods and Applications, Third Edition* (Powers et al., 2007).

The dewatering assessment assumes steady-state flow into an open excavation; however, it should be recognized that a transient condition may exist at the start of dewatering and that during this time, flows can be expected to be higher but will dissipate over time to steady-state conditions as aquifer storage is depleted. The equations have the following assumptions:

- ideal aquifer conditions, i.e., homogeneous, isotropic, uniform thickness and infinite areal extent;
- fully penetrating pumping well(s);
- horizontal flow to the pumping well(s); and
- a constant pumping rate with the flow to the pumping well(s) corresponding to steady-state conditions.

The following equation for radial flow to an excavation in an unconfined aquifer was used for dewatering estimate for foundation at the proposed building:

$$Q = \frac{\pi K(H^2 - h^2)}{\ln(R_{02}/r_e)}$$

where,

Q = Anticipated pumping rate (m^3/day)
K = Hydraulic conductivity (m/day)
H = Distance from the static water level to the bottom of the saturated aquifer (m)
h = Depth of water in the well while pumping (m)
r_e = Equivalent well radius. Approximately equivalent to half the width of excavation
R_{02} = Radius of Influence (m) from excavation, beyond which there is negligible drawdown (m)

To account for uncertainties and the natural variability in the range of hydraulic conductivity and water levels that may be encountered in the subsurface, the calculated short-term dewatering rates for groundwater control were multiplied by a factor of safety of 2. Incorporating the factor of safety also provides flexibility to the dewatering contractor in meeting project schedules and helps to account for the initial pumping period under transient conditions when dewatering volumes are expected to be higher.

Please Note: As indicated previously servicing trench dewatering calculations have not been included in this preliminary assessment. Construction dewatering calculations will need to be updated when servicing trench information becomes available.

5.4.2 Allowance for Precipitation

While an excavation remains open, it may be necessary to remove stormwater which enters the excavation as direct precipitation. Incorporating additional discharge requirements provides an estimate of a worst-case dewatering scenario for the purpose of dewatering discharge permits and/or approvals. To account for additional dewatering volumes a 24-hour depth of accumulation of 27 mm was considered. A rainfall depth of 27 mm represents the 99th percentile of daily rainfall at the King City North climate station (Environment and Climate Change Canada, 2023). The King City North climate station is located approximately 18 km southwest of the Site.

5.4.3 Long Term Dewatering

Since the building Finished Floor Elevation (FFE) is anticipated to remain above the seasonally high perched groundwater table, it is assumed that a method of groundwater control will not be required to manage groundwater seepage around the foundation floor and walls over the long-term.

5.4.4 Summary

The anticipated dewatering volumes for groundwater control were added to the estimated dewatering volumes for direct precipitation into the open excavations to determine total dewatering rates. A summary of the estimated dewatering rates is presented in **Table 5-3**. Dewatering calculation sheets can be found in **Appendix F**. Dewatering rate estimates have been prepared for permitting requirements only.

Table 5-3 Dewatering Rate Summary

Scenario	H	h	K	R_0	Short-Term Pumping Rate Q		
	m	m	m/day	m	m^3/day	L/day	L/s
Building Footings	10	9	9.2×10^{-3}	50			
	Groundwater				3.500 (1,800)	3,500 (1,800)	0.04 (0.02)
	Precipitation				118.900	118,900	1.38
	Total				122.400 (120.700)	122,400 (120,700)	1.42 (1.40)

Notes:
1. Short Term Pumping Rates shown rounded to the nearest 100 L/day.
2. Groundwater pumping rates include a factor of safety of 2.
3. Groundwater pumping rates inside brackets do not include the safety factor.

5.5 Dewatering Permit Requirements

The cumulative sum of dewatering for anticipated structures at the site (exclusive of trenches for serving installations) is considered for the purposes of applying for permits and approvals. These sums should be re-evaluated once dewatering estimates for servicing installations have been completed.

The estimated maximum groundwater dewatering rate required during construction to achieve the desired drawdown for groundwater control is 3,500 L/day. The estimated stormwater dewatering volume assuming direct precipitation to excavation of 27 mm over a 24-hour period is

118,900 L/day. The total estimated dewatering rate, for groundwater and stormwater takings is 122,400 L/day.

While the estimated dewatering rate is below the 50,000 L/day EASR threshold, and dewatering of direct precipitation inflow into an excavation is not considered part of dewatering within the 50,000-400,000 EASR range, as a risk management tool an EASR should be considered for the project to provide flexibility to deal with potentially unforeseen circumstances.

The estimated seasonally high groundwater table is below the Finished Floor Elevation (FFE); therefore, it is anticipated site grading, drainage, and impervious surfaces along with standard perimeter drainage around the building will be sufficient to prevent groundwater levels from temporarily rising above the FFE. As a result, long-term dewatering requirements are not anticipated at this time.

It is important; however, to note long-term drainage requirements should be reassessed once seasonally high groundwater level measurements have been obtained for the property and once final site designs with respect to grading, drainage, and impervious surfaces have been established to confirm whether long-term drainage may be necessary to prevent groundwater levels from rising above the FFE. In the event long-term drainage is necessary, it is reasonable to suggest daily discharge volumes would likely be below the threshold for a PTTW and only permitting for discharge to a municipal sewer would be required.

5.6 Disposal Options for Discharge Water

Three potential dewatering discharge options were identified as part of this investigation for the dewatering discharge:

- **Option 1:** Discharge to municipal sewers or land drainage works in the Township of Whitchurch-Stouffville or York Region;
- **Option 2:** Discharge overland to a vegetated area;
- **Option 3:** Removal via Pump Truck

Pre-treatment may be required to allow discharge quality to meet the applicable criteria for the receivers. The selection of a dewatering discharge option, including mitigation and monitoring for water quantity and quality impacts, is the responsibility of the dewatering contractor. Potential discharge options are discussed in detail below.

Option 1 – Discharge to a Municipal Sewers or Land Drainage Works in the Township of Whitchurch-Stouffville or York Region

Dewatering effluent may be discharged to land drainage works, or if present municipal sewers, near to the Site, granted any necessary approvals under *York Region Sewer Use Bylaw No. 2021-102* or *The Corporation of Town of East Gwillimbury Sewer Use By-Law # 2008-54* are obtained, and the discharge quantity and quality meet applicable criteria.

It is noted that York Region does not allow construction dewatering discharge into the municipal storm sewer, however it can be directed to the sanitary sewer pending approval.

Parameter concentrations for the groundwater quality samples obtained during this investigation met the discharge quality criteria for York Region's *Table 1–- Limits for Sanitary Sewer Discharge*.

The Total Suspended Solids (TSS) concentration exceeded the *Table 2 – Limits for Storm Sewer / Land Drainage Works Discharge*.

Consultation with the appropriate municipality is recommended if this option is required for temporary construction dewatering.

Option 2 – Discharge Overland to a Vegetated Area

Dewatering discharge may be directed to any low-lying, vegetated area adjacent to the Site, from where it can infiltrate to the subsurface or runoff to the ultimate receiver, e.g., roadside ditch, surface water feature. The following controls should be implemented to minimize impacts to the natural environment with this option:

- Dewatering discharge shall be dispersed prior to discharge to the ground surface to dissipate the energy from the flow and reduce the potential for erosion;
- Dewatering discharge shall pass through a sediment control device prior to discharge to the natural environment;
- Dewatering discharge from the sediment control device shall be to a naturally vegetated area where there will be no prior interaction with paved surfaces ahead of release to a natural water body;
- Dewatering discharge shall be halted if there is a visible petroleum hydrocarbon film or sheen present in the discharge;
- Dewatering discharge from the sediment control device shall be no closer than 30 m from any water body, and as far as practicably possible from the sloped embankments of any water body to prevent scouring and erosion; and
- Appropriate erosion and sediment control measures shall be implemented, in accordance to minimize the risk of environmental degradation.

Option 3 – Removal via Pump Truck

Dewatering discharge may be contained on-Site for collection and transfer by a licensed hauling contractor to a registered disposal facility. This option should be considered as a contingency in the event that discharge to the sewer system is not feasible, e.g., the discharge approval for the sewer expires, is suspended, or is in any other way terminated. However, it Is important to note that removal of precipitation accumulation (e.g., rainwater) may significantly increase the volume of water that needs to be managed, making haulage impractical due to increased costs and logistical challenges associated with handling large quantities of water.

The dewatering contractor is responsible for the selection of the approved hauling contractor and registered waste disposal facility, and for meeting any pre-disposal requirements, e.g., water quality sampling which may by the registered disposal facility.

6 Potential Receptors

As part of this investigation, the potential receptors of impacts from development were identified. From a groundwater perspective, receptors are classified based on their connection to and reliance on groundwater for maintenance, be it for natural habitat or water supply. For this investigation, an understanding of the potential receptors to groundwater control and construction activities at the Site as well as other development impacts was determined by:

- Querying the MECP (2024b) WWIS for records of private water supply wells within a 500 m radius of the Site;
- Querying the MECP (2024) PTTW database to identify permitted water takers within a 500 m radius of the Site;
- A review of the MNRF (2024) Natural Heritage Areas mapping portal for potential ecological receptors within a 500 m radius of the Site.
- A review of the MECP (2024a) Source Protection Information Atlas for vulnerable source water protection areas.

6.1 MECP Water Well Record Search

A query of the MECP (2024b) WWIS within a 500 m radius of the Site returned a total of 45 water well records. The majority of these records (54%) were classified as Abandoned/Unknown. Wells used for Water Supply – Domestic/Livestock accounted for 42%, while 4% were designated as Monitoring Test Holes.

Well usage details for water well records within 500 m of the Site are summarized in **Table 6-1**. **Figure 9** shows the location of MECP well records within the 500 m search radius. **Appendix G** provides the list of MECP well records returned by the search.

Table 6-1 MECP Well Records within 500 m Radius

Primary Well Use	Number of Wells within 500 m Buffer of Site	Percentage of Total
Water Supply – Domestic/Livestock	19	42 %
Monitoring Test Hole	2	4 %
Abandoned/Unknown	24	54 %
Total	**45**	

Water supply wells comprise of 42% of all records found within a 500 m buffer of the Site, the majority of which were filed for domestic water supply wells. The records show that these wells were installed between 1950 and 1996. The calculated zone of influence from construction dewatering is 7 m. One of the identified wells is completed in the shallow subsurface (less than 12 mbgs); however, this well is not located within the calculated radius of influence. As a result, no impacts to private water supply wells from temporary construction dewatering would be anticipated.

Details for the water supply well records and their distance from the Site boundaries are summarized in **Table 6-2. Appendix G** includes the records of each water supply well provided by the MECP.

Table 6-2 Water Supply Well Details within 500 m Radius

Well ID	Completed date	Supply Use	Distance from Site (m)	Depth (m)
6900075	07-12-1961	Domestic	383	28
6900076	12-04-1961	Domestic	466	49.7
6900077	18-12-1961	Domestic	378	36
6900079	02-03-1962	Domestic	387	30.8
6900080	11-02-1950	Livestock	432	35.4
6900206	24-04-1964	Domestic	278	12.2
6900209	21-09-1965	Domestic	264	8.2
6908964	21-08-1968	Domestic	446	14
6910578	20-10-1971	Domestic	487	18.9
6910629	07-07-1971	Domestic	431	15.2
6911053	14-01-1972	Domestic	478	51.2
6911255	11-12-1972	Domestic	253	63.4
6911689	10-04-1973	Domestic	465	24.4
6914826	06-11-1978	Domestic	493	43.3
6919140	13-11-1987	Domestic	454	36.6
6919711	15-06-1988	Domestic	0	21.9
6923755	29-11-1996	Domestic	453	108.5

6.2 Permitted Water Users

A search was conducted to identify the permitted groundwater users within 500 m of the Site. No active PTTW records were identified within the 500 m radius.

6.3 Ecological Receptors

Based on a query of the MNRF (2023) Natural Heritage Areas mapping portal, the Site is not located within 500 m of Areas of Natural Scientific Interest (ANSI). A tributary of the East Holland River flows north through the Site separating it into western portions. Several woodland and an unevaluated wetland were identified adjacent to the Site to its north, south and west. Environmental features are presented in **Figure 10**.

6.4 Vulnerable Source Water Protection Areas

Based on a review of the York Region Official Plan mapping, the Site is located within both WHPA-Q1 and WHPA-Q2 areas, and an IPZ-3 is located around the on-Site tributary. Vulnerable drinking water areas located at the Site and in the surrounding area are illustrated in **Figure 10**.

7 Impact Assessment and Mitigation

7.1 Identification and Mitigation of Short-Term Impacts

7.1.1 Potential Short-Term Impacts to the Groundwater System

Construction dewatering activities in open excavations will cause the local perched groundwater water levels to drop temporarily and may increase the risk of contamination to subsurface. However, the drawdown resulting from construction dewatering is expected to be short-term in duration with water levels recovering following cessation of dewatering. The underlying Site soils are of low permeability, which will limit the potential for contaminant migration through the subsurface. Based on the above, significant short-term impacts to the groundwater system are not expected.

7.1.2 Potential Short-Term Impacts to the Surface Water System

Dewatering activities will temporarily lower perched groundwater levels, potentially impacting the amount of baseflow available to surface water features; however, as the near-surface groundwater is perched within low permeability soils it is unlikely significant lateral of vertical flux of groundwater occurs. As water courses are present on-Site and in close proximity to the northern Site boundary, short-term impacts to the surface water system may include the discharge of sediment, hazardous materials, or other deleterious substances, e.g., construction debris, into water features unless mitigative measures are implemented.

7.1.3 Potential Short-Term Impacts to Other Groundwater Users

A temporary decline in the near-surface perched groundwater levels could reduce the available yield for nearby groundwater takers. Shallow water wells within the zone of influence would be at greatest risk of impact from this activity. Based on the results of the MECP water well records and PTTW review, there are no private groundwater users within the 7 m zone of influence predicted for short-term dewatering during construction for the proposed building respectively. Therefore, short-term impacts to other groundwater users are not anticipated.

7.1.4 Mitigation of Short-Term Impacts

Best practices should be employed to minimize the risk and impact of contaminant spills and/or the off-Site release of construction debris and sediment. A Site-Specific Spill Prevention and Response Plan is recommended during construction to mitigate potential spills; it is also recommended that potential hazardous materials be stored in designated areas with appropriate containment away from areas of high vehicle traffic. An Erosion and Sediment Control (ESC) Plan should also be in place. Both plans should include routine monitoring to assess and maintain Spill and ESC protections on the perimeter of the water course and site boundary, to prohibit the release of sediments and other spilled contaminants into the water course and/or off-Site. Where well designed and implemented environmental management plans are in place, impacts to receptors can be minimized.

7.2 Identification and Mitigation of Long-Term Impacts

7.2.1 Potential Long-Term Impacts to the Groundwater System

Groundwater recharge volumes are expected to decline post development due to increase in impervious area. The Site is within a WHPA-Q1/-Q2, areas where long-term reductions in groundwater recharge could pose a risk to the quantity of water supplies available; however, the near-surface till soils act as a hydraulic barrier to vertical percolation of significant volumes of precipitation.

The installation of Site servicing and/or utilities may introduce pipe bedding materials whose permeabilities are higher than those of the native soils. Where permeable pipe bedding materials are placed in low permeability native soil below the groundwater table, the contrast in permeabilities has the potential to create preferential pathways for groundwater flow. Corresponding impacts may include the localized lowering of the groundwater table as well as subsurface transport of contamination along servicing trenches.

7.2.2 Potential Long-Term Impacts to the Surface Water System

As the near-surface groundwater is perched within low permeability soils it is unlikely significant lateral of vertical flux of groundwater occurs. As a result, it is expected the site does not provide significant groundwater baseflow to surface water features. It is anticipated stormwater management strategies for the property will address increases in surface water runoff and the potential impact from changes in runoff volumes to on site and nearby surface water features.

7.2.3 Potential Long-Term Impacts to Other Groundwater Users

Water supply wells within the shallow (<12 m deep) subsurface would be a greatest risk from these impacts. Based on a review of the MECP water well records, no wells within the zone of influence have a depth of less than 12 m. Given the low number of shallow wells and their distance from the subject property, significant impacts are not expected.

7.2.4 Mitigation of Long-Term Impacts

The Site is located within an Intake Protection Zone with a vulnerability score of 3, indicating that spills involving chemical and pathogen contaminants could potentially reach the intake. To mitigate these risks long-term operations should use best-management practices to minimize the impact of industrial activities on the quality of water supplies at, and surrounding, the Site.

If there is a potential for groundwater to be diverted and follow the paths created by new or relocated utilities or services, groundwater barriers may be installed to prevent migration along utility or service trenches. The necessity for cut-off collars or trench seals should be evaluated and discussed with the engineer responsible for the design for the specific pipe location.

8 Summary

A summary of the preliminary hydrogeological investigation is provided below:

- The Site is located within the East Holland River Subwatershed, which is within the jurisdiction of the LSRCA. Sharon Creek flows east to west through the north of the Site, once off-site the creek flows west along the property boundary and then north to the East Holland River. LSRCA regulated areas are delineated around Sharon Creek.
- The Site is located within the Lake Simcoe and Couchiching/Black River Source Protection Area and intersects at an IPZ-3. The Site is also completely within a WHPA-Q1 and WHPA-Q2.
- The Site has a ground surface elevation range of 266 masl to 273 masl, with topography sloping down to the south and west toward the East Holland River.
- The surficial geology across the Site consists of fine-textured glaciolacustrine deposits; stone-poor, carbonate-derived silty to sandy till, and coarse-textured glaciolacustrine deposits.
- Boreholes were drilled on-Site to a depth of 7.7 mbgs and encountered fill underlain by sand and silt textured deposits.
- Groundwater levels were measured from September 25, 2024, at on-Site wells. Groundwater elevations ranged from 268.15 masl at 24BH-1(MW) in the northwest portion of the Site to 270.10 masl at 24BH-5(MW) in the eastern portion of the Site over the period of monitoring.
- Hydraulic conductivity estimates for the silt and sand textured overburden ranged from 8.9×10^{-8} m/s to 1.2×10^{-7} m/s, with a geometric mean of 1.06×10^{-7} m/s.
- An unfiltered groundwater quality sample was collected from 24BH-4 (MW) on September 18, 2024, and compared with the *Regional Municipality of York Discharge of Sewer, Storm Water and Land Drainage By-law No. 2014-23*. Total Suspended Solids (TSS) was the only parameter to fail the criteria for *Table 2 – Limits for Storm Sewer Discharge*; all tested parameters meet the *Table 1 – Limits for Sanitary Sewer Discharge* and *Table 2 – Limits for Storm Sewer Discharge.*
- The preliminary estimated dewatering rate for groundwater control during construction of the building foundations is 3,500 L/day. Assuming additional dewatering for stormwater control, due to 27 mm of direct precipitation to the excavation in a 24-hour period, rates would increase by 118,900 L/day to a total of 122,400 L/day. Water takings for construction above 50,000 L/day but below 400,000 L/day require an EASR to proceed. While the calculated dewatering requirements are below the EASR threshold, the project may want to consider obtaining an EASR as a risk management measure. Consideration of the approach to construction phasing, dewatering and stormwater control is recommended in determining the dewatering permits and approvals required for construction. These values are subject to change upon completion of long-term monitoring period, once full site servicing details are available, and/or in the event of future design changes for the proposed development.

- Development may create short- and long-term impacts for the local surface water and ground water systems. The following are recommended as mitigation:
    - A site-specific Spill Prevention and Response Plan, as well as a site-specific ESC Plan,are recommended during construction. Where well designed and implemented environmental management plans are in place, unacceptable short-term impacts to the environment are not expected.
    - Where there exists a possibility that groundwater may be diverted and follow the path of new/relocated utilities or services, groundwater barriers may be used to prevent groundwater migration down servicing/utility trenches.
    - Long-term operations should use best-management practices to manage risks from industrial activities that could potentially impact the quality of water supplies at, and surrounding, the Site.

9 References

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10 General Statement of Limitation

The comments presented in this report are based on the soil and groundwater samples gathered from the borehole/monitoring well locations indicated on the plan of this report. There is no warranty expressed or implied or representations made by Toronto Inspection Ltd. that this program has discovered all potential environmental risks or liabilities associated with the subject site.

Although we consider this report to be representative of the subsurface conditions at the subject property in the areas investigated, any interpretation of factual data or unexpected soil conditions which exhibit noticeable discolouration, odour, etc. in areas not investigated in this report, should be discussed in consultation with us prior to any initiation of activity. Our responsibility is limited to an accurate assessment of the soil condition prevailing at the locations investigated at the time of the study.

To the fullest extent permitted by law, the clients maximum aggregate recovery against Toronto Inspection Ltd., its directors, employees, sub-contractors and representatives, for any and all claims by **NewRoads Automotive Group** for all causes including, but not limited to, claims of breach of contract, breach of warranty and/or negligence, shall be the amount of fees paid to Toronto Inspection Ltd. for its professional engineering services rendered with respect to the particular site which is the subject of the claim by the client.

Any use and/or interpretation of the data presented in this report, and any decisions made on it by the third party are responsibility of the third party. Toronto Inspection Ltd. accepts no responsibility for loss of time and damages, if any, suffered by the third party as a result of decisions or actions based on this report.

Any legal actions arising directly or indirectly from this work and/or Toronto Inspection Ltd.'s performance of the services shall be filed no longer than two years from the date of Toronto Inspection Ltd.'s substantial completion of the services. Toronto Inspection Ltd. shall not be responsible to the client for lost revenues, loss of profits, cost of content, claims of customers, or other special indirect, consequential, or punitive damages.

Yours truly,

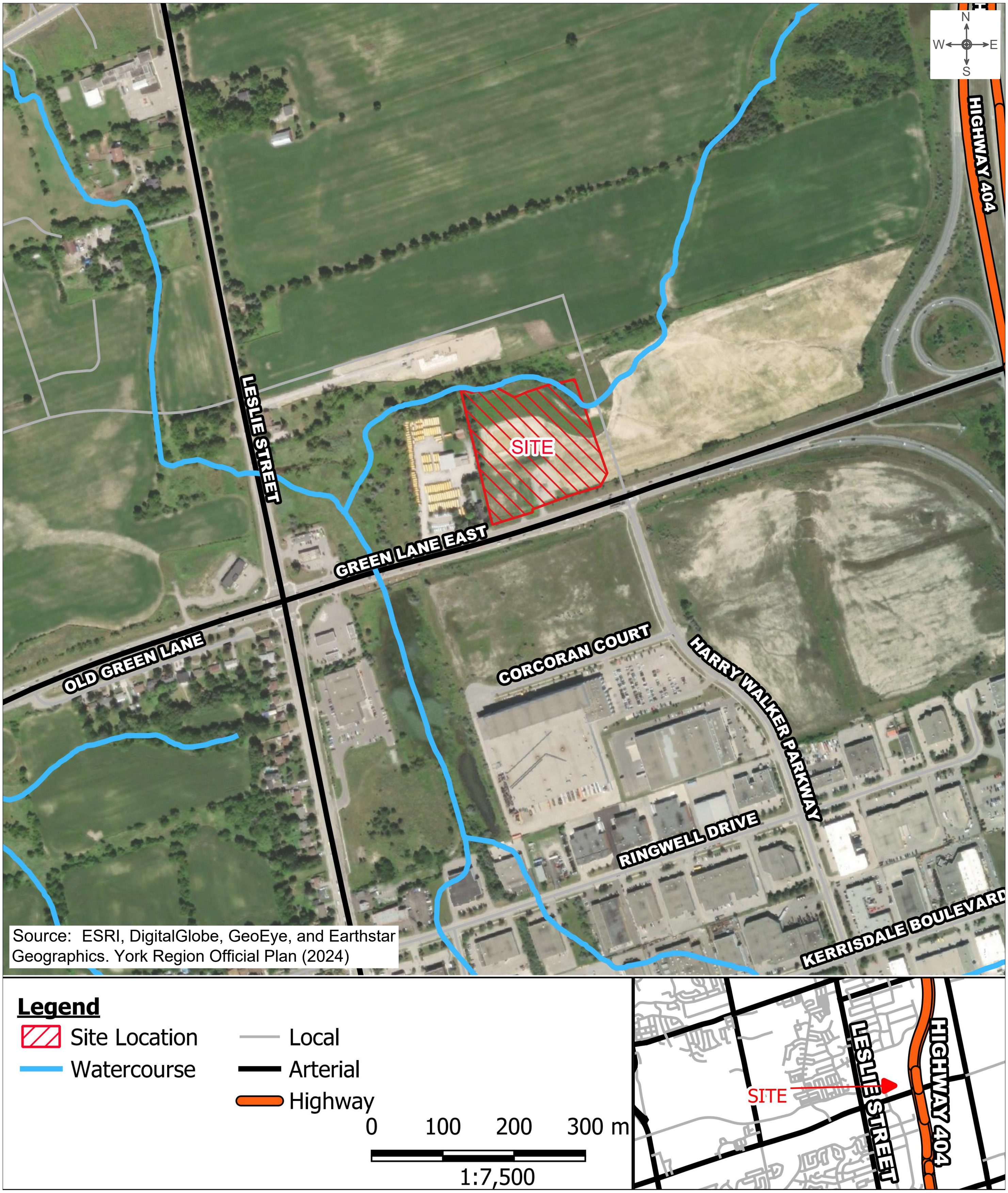
Toronto Inspection Ltd.

Sanjay Goel, B.E.S.
Environmental Scientist
Vice-President

Chris Helmer, B.Sc., P.Geo
Senior Hydrogeologist
MECP Licensed Well Contractor and
Class 5 Well Technician

PROFESSIONAL GEOSCIENTIST
22-Oct-2024
CHRIS HELMER
PRACTISING MEMBER
2285
ONTARIO

FIGURES



Source: ESRI, DigitalGlobe, GeoEye, and Earthstar Geographics. York Region Official Plan (2024)

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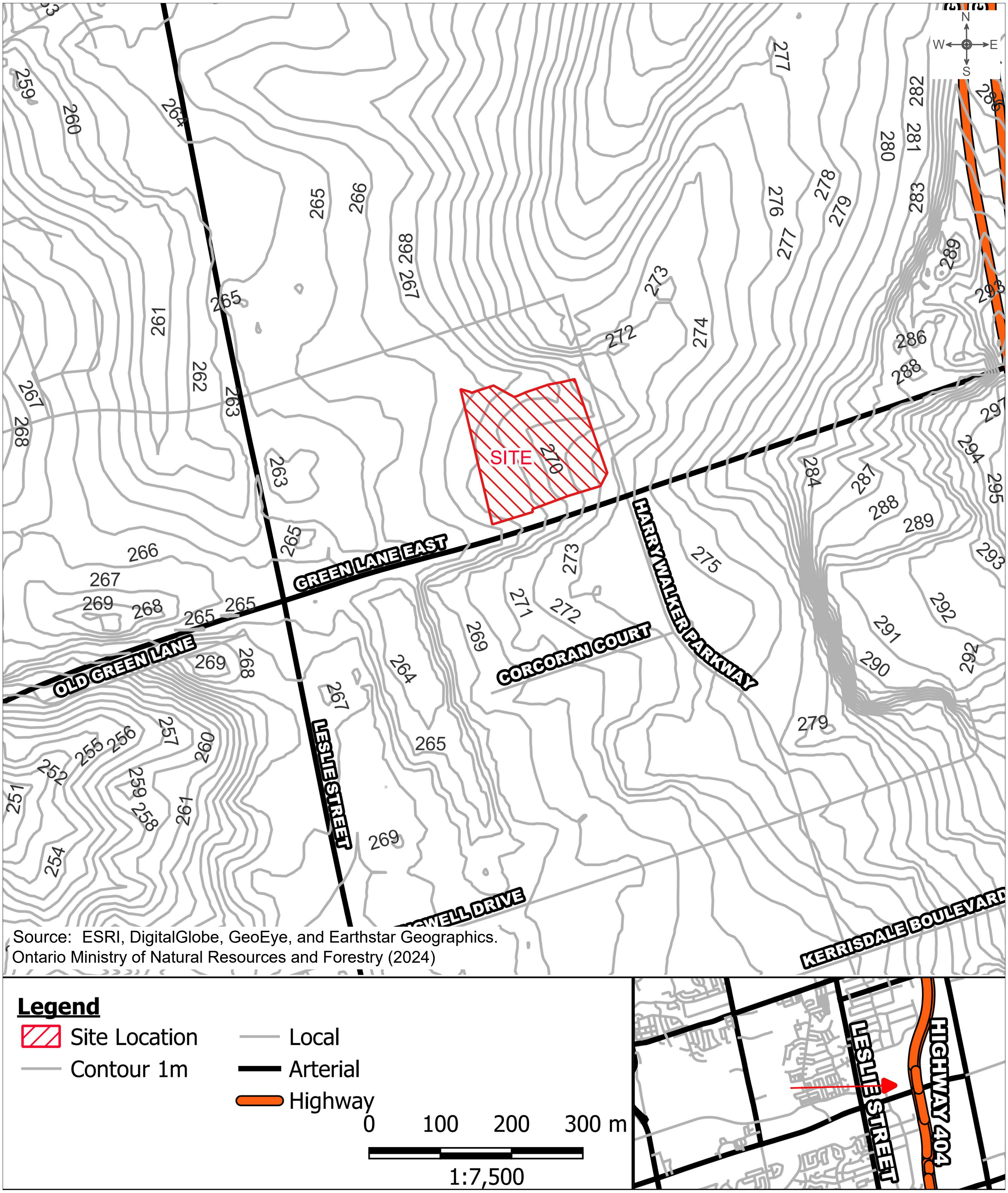
TITLE: Site Map

LOCATION: 1656 Green Lane E, East Gwillimbury, Ontario

PROJECT NO.: 2177-24-HM

DATE : October 2024

FIGURE NO. 1



Source: ESRI, DigitalGlobe, GeoEye, and Earthstar Geographics.
Ontario Ministry of Natural Resources and Forestry (2024)

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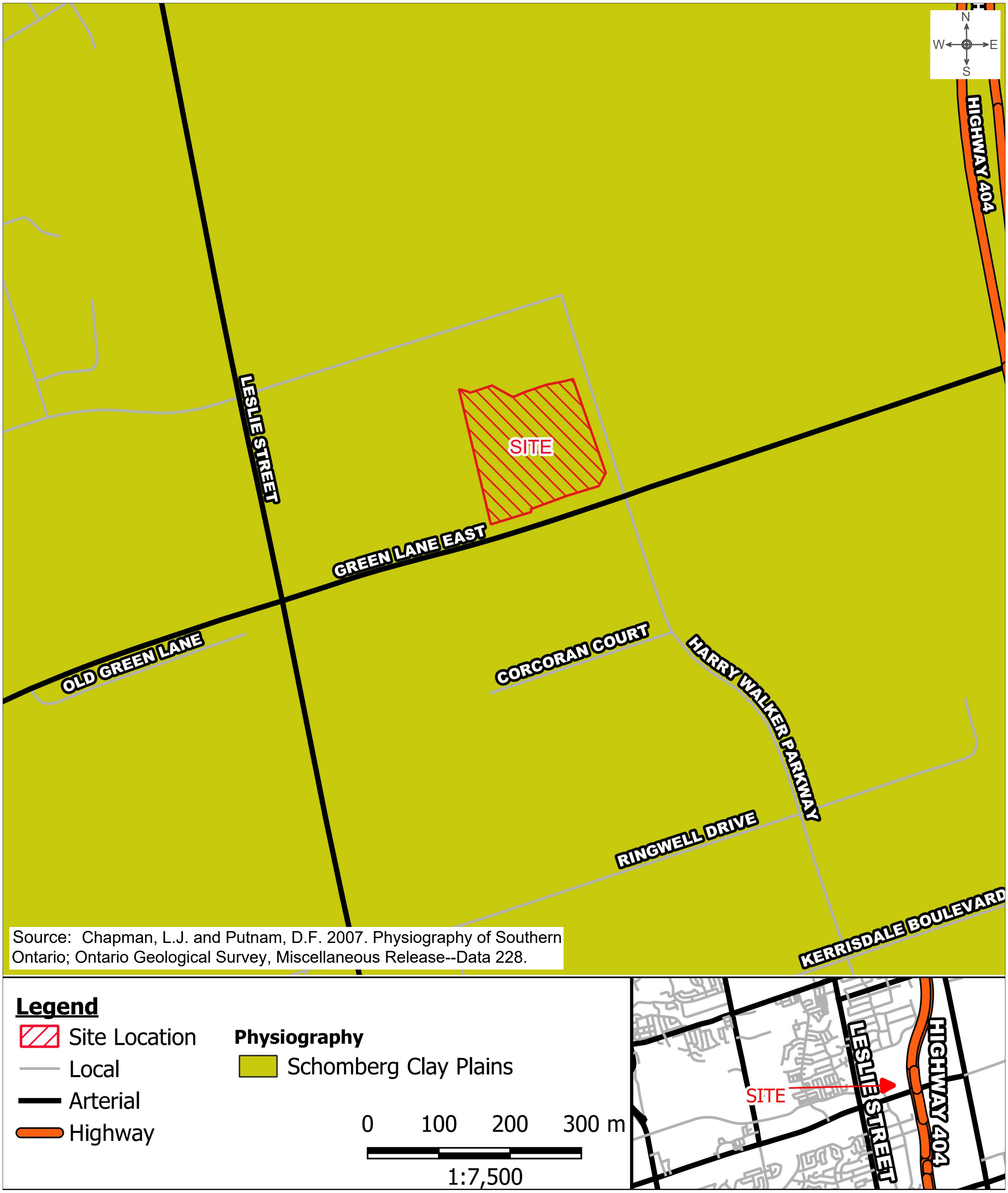
TITLE: Topography

LOCATION: 1656 Green Lane E, East Gwillimbury, Ontario

PROJECT NO.:	DATE :	FIGURE NO.
2177-24-HM	October 2024	2



Source: Chapman, L.J. and Putnam, D.F. 2007. Physiography of Southern Ontario; Ontario Geological Survey, Miscellaneous Release--Data 228.

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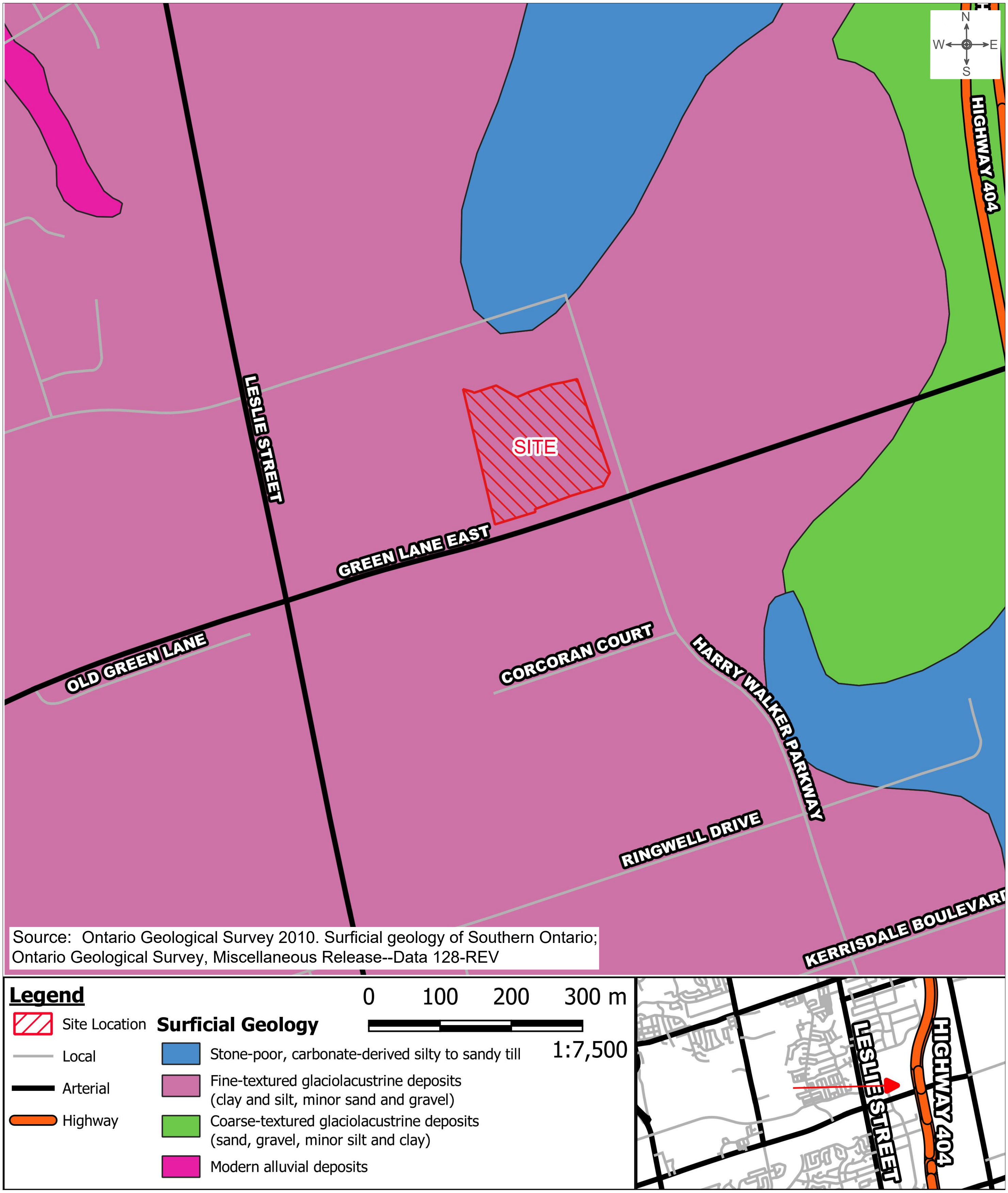
TITLE:	Physiography
LOCATION:	1656 Green Lane E, East Gwillimbury, Ontario

PROJECT NO.:	2177-24-HM	DATE :	October 2024	FIGURE NO.	3



Source: Ontario Geological Survey 2010. Surficial geology of Southern Ontario; Ontario Geological Survey, Miscellaneous Release--Data 128-REV

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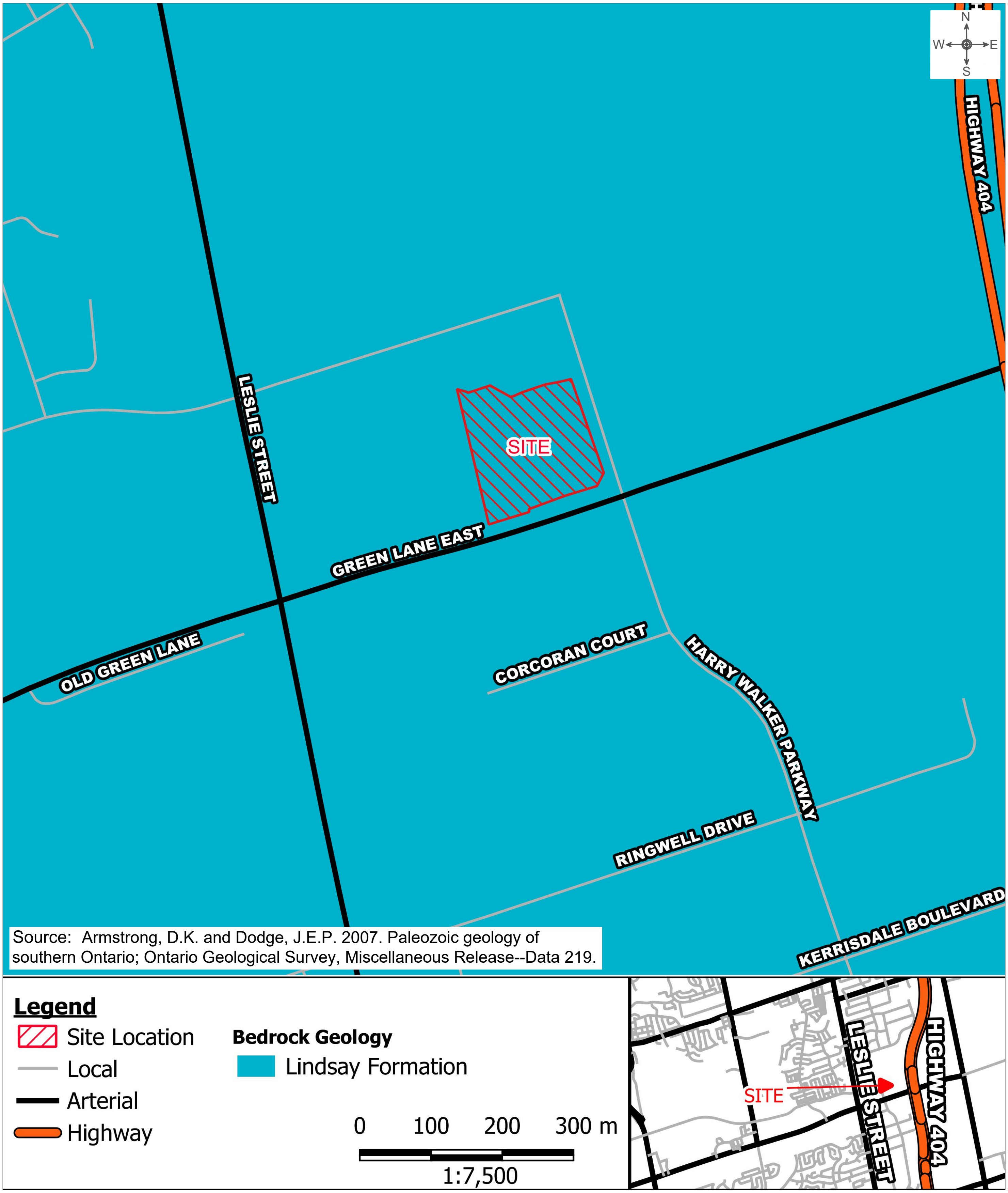
TITLE:	Surficial Geology
LOCATION:	1656 Green Lane E, East Gwillimbury, Ontario

PROJECT NO.:	2177-24-HM	DATE :	October 2024	FIGURE NO.	4



Source: Armstrong, D.K. and Dodge, J.E.P. 2007. Paleozoic geology of southern Ontario; Ontario Geological Survey, Miscellaneous Release--Data 219.

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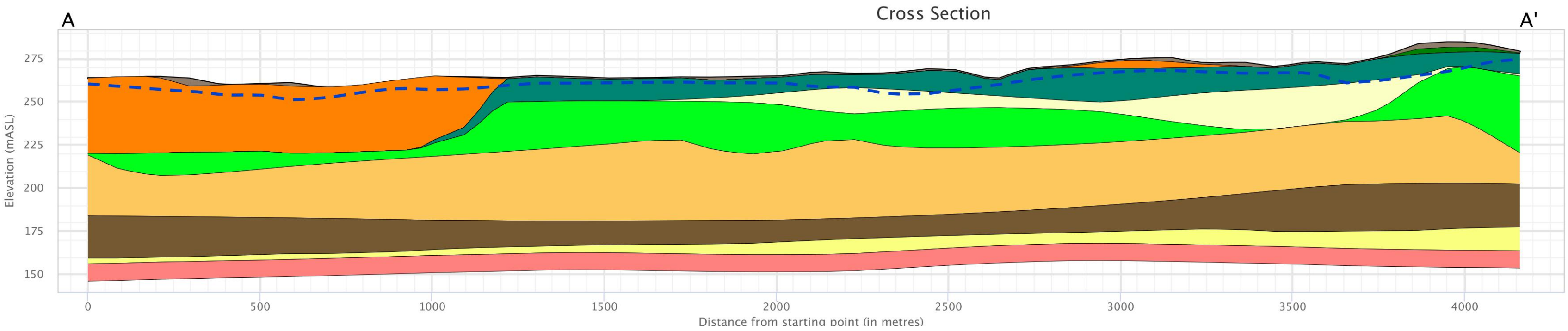
TITLE:	Bedrock Geology
LOCATION:	1656 Green Lane E, East Gwillimbury, Ontario

PROJECT NO.:	2177-24-HM	DATE :	October 2024	FIGURE NO.	5

Regional Hydrostratigraphic Cross-Section A-A'
(Leslie Street - from Mount Albert Road to Davis Drive)



— Ground Surface
▬ Water Table
● Undifferentiated Upper Sediments
● Halton Till (or equiv. upper till)
● Oak Ridges Moraine (or equiv. upper aquifer
● Channel Silt Aquitard
● Channel Sand Aquifer
● Upper Newmarket Till
● Inter-Newmarket Sediment
● Lower Newmarket Till
● Thorncliffe Fm.
● Sunnybrook Drift (or equiv. lower aquitard)
● Scarborough Fm. (or equiv. lower aquitard)
● Bedrock

Source: Oak Ridges Moraine Groundwater Program (ORMGP), 2021. Cross-Section Tool. https://partners.oakridgeswater.ca/CrossSection. Accessed October 2024.

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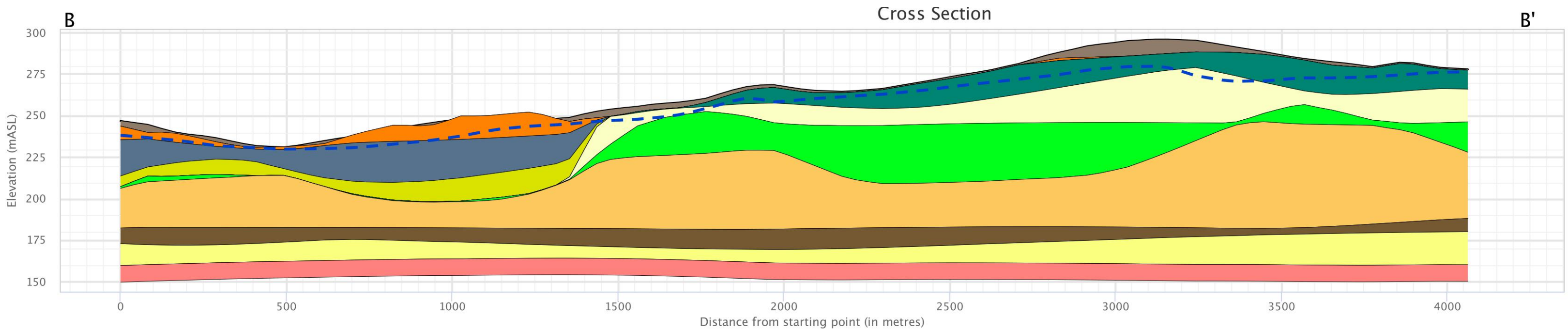
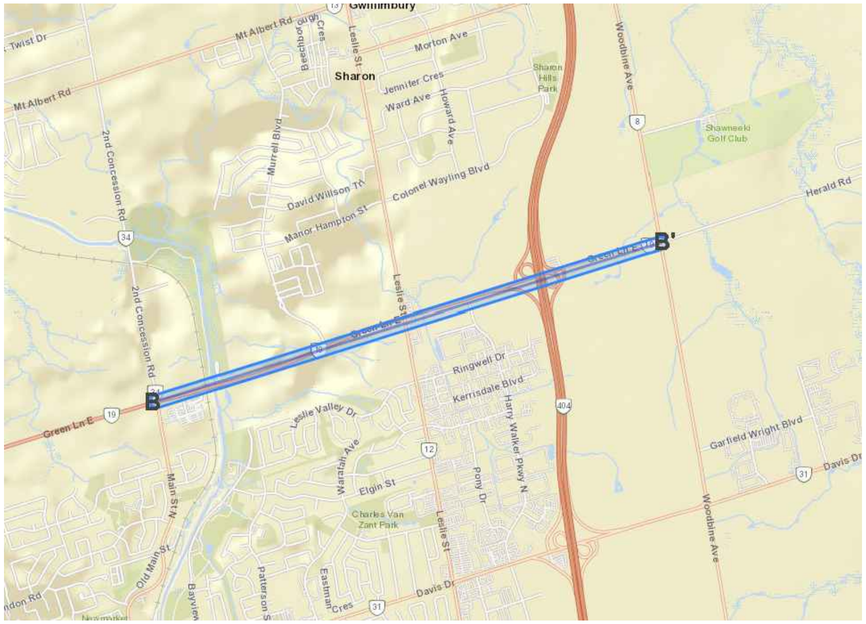
TITLE:	Regional Hydrostratigraphic Cross-Section A-A'
LOCATION:	1656 Green Lane E, East Gwillimbury, Ontario

PROJECT NO.	DATE :	FIGURE NO.
2177-24-HM	October 2024	6

Regional Hydrostratigraphic Cross-Section B-B'
(Green Lane East - from 2nd Concession Road to Woodbine Avenue)





— Ground Surface
▬ Water Table
● Undifferentiated Upper Sediments
● Halton Till (or equiv. upper till)
● Oak Ridges Moraine (or equiv. upper aquifer
● Channel Silt Aquitard
● Channel Sand Aquifer
● Upper Newmarket Till
● Inter-Newmarket Sediment
● Lower Newmarket Till
● Thorncliffe Fm.
● Sunnybrook Drift (or equiv. lower aquitard)
● Scarborough Fm. (or equiv. lower aquitard)
● Bedrock

Source: Oak Ridges Moraine Groundwater Program (ORMGP), 2021. Cross-Section Tool. https://partners.oakridgeswater.ca/CrossSection. Accessed October 2024

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TITLE: Regional Hydrostratigraphic Cross-Section B-B'

LOCATION: 1656 Green Lane E, East Gwillimbury, Ontario

PROJECT NO. 2177-24-HM

DATE : October 2024

FIGURE NO. 7

Source: York Region Interactive Map

LEGEND:

⊕ / ⊕ Borehole and Monitoring Well Location

🟥 🟥 Site Boundary

NOT TO SCALE

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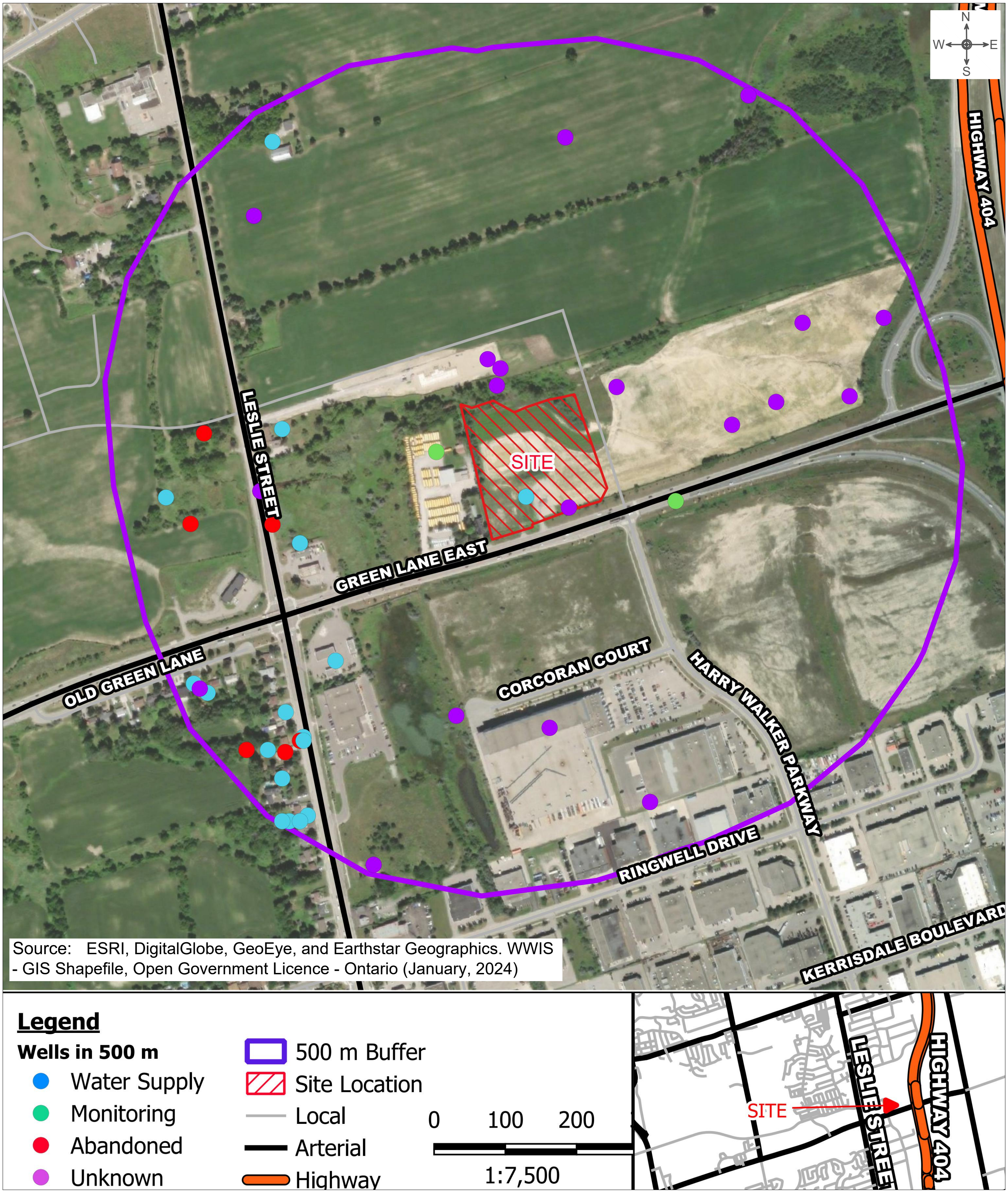
TITLE: Borehole and Monitoring Well Location Plan

LOCATION: 1656 Green Lane E, East Gwillimbury, Ontario

PROJECT NO.: 2177-24-GL

DATE : September 2024

DRAWING NO. 1



Source: ESRI, DigitalGlobe, GeoEye, and Earthstar Geographics. WWIS - GIS Shapefile, Open Government Licence - Ontario (January, 2024)

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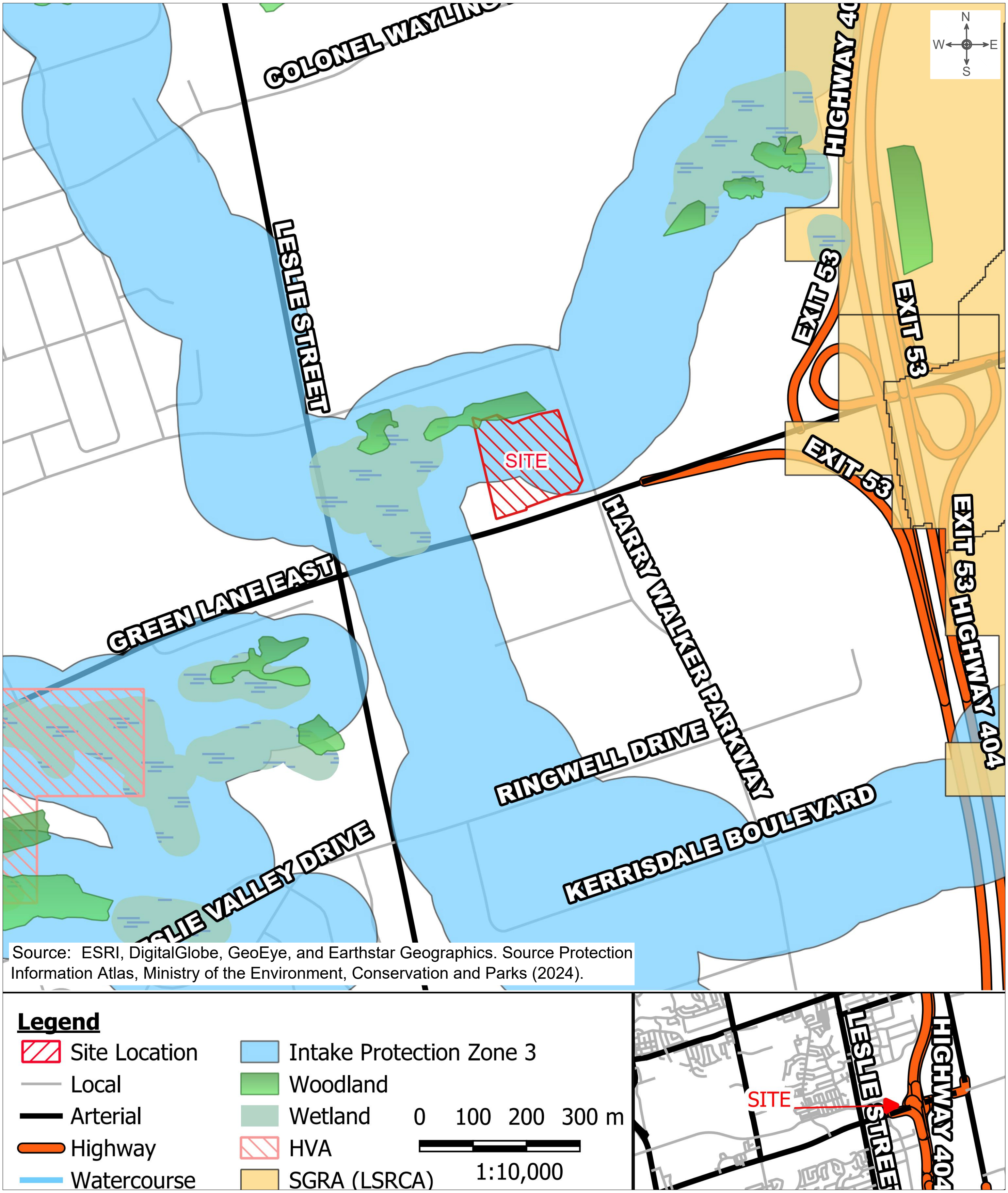
TITLE: MECP Water Well Records

LOCATION: 1656 Green Lane E, East Gwillimbury, Ontario

PROJECT NO.: 2177-24-HM

DATE : October 2024

FIGURE NO. 9



Source: ESRI, DigitalGlobe, GeoEye, and Earthstar Geographics. Source Protection Information Atlas, Ministry of the Environment, Conservation and Parks (2024).

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TITLE:	Environmental Features				
LOCATION:	1656 Green Lane E, East Gwillimbury, Ontario				
PROJECT NO.:	2177-24-HM	DATE :	October 2024	FIGURE NO.	10

APPENDIX A

Site Plan

CAUTION: IF THIS SHEET IS NOT 24"x36" IT IS A REDUCED PRINT

OVERALL SITE PLAN

SCALE: 1:800

CONSTRUCTION NORTH TRUE NORTH

SITE STATISTICS / ZONING MATRIX		
1656 GREEN LANE EAST		
Zoning Category	***M2 - MZO O. Reg 451/20***	
Building Classification	*Group F2 (O.B.C. A- 3.1.2.1.(1))*	
EAST GWILLIMBURY ZONING BY-LAW 2018-043		
Proposed Use	*Motor Vehicle Sale / Rental Establishment*	
GROSS SITE AREA	***2.87 ha***	**28,661.26m²**
PROPOSED BUILDING AREA:		
TOTAL GFA	***44,519.53 SF***	**4,136.00m²**
OVERALL SITE REQUIREMENTS		
Requirements	**Proposed**	**Required**
Min. Lot Area (Existing)	28,661.26m²	-
Min. Lot Frontage (m)	179.63 m	
Maximum Building Height (m)	11.43 m	-
Min. Front Yard Building Setback (m)	27.55 m	6.00 m
Min. Ext. Side Yard Building Set back (m)	-	7.5 m
Min. Int. Side Yard Building Set back (m)	22.40 m	3.00 m
Min. Rear Yard Building Setback (m)	54.92 m	6.00 m
Min. Landscape Area (% of Lot Area) - Approx.	16.21%	10.00%
Min. Landscape Area (SM) - Approx.	*4,646.53m²*	*2,866.13m²*
Min. Front Landscape Buffer (m)	7.12 m	5.00 m
Min. Ext. Side Yard Landscape Buffer (m)	3.00 m	-
Min. Int. Side Yard Landscape Buffer (m)	3.00 m	-
Min. Rear Landscape Buffer (m)	.93 m	-
Parking Area (sm)	20,092.41m²	-
Min. Landscape Area (% Parking Area) - Approx.	15.00%	5.00%
Min. Landscape Area (SM) - Approx.	*3,014.14m²*	*1,004.62m²*
	Proposed	**Required**
Standard Parking Spaces	**606**	**138**
Accessible Parking (Additional to standard parking spaces)	*6*	*6*
Parking Spaces in MTO Setback	*58*	*-*
TOTAL PERMANENT PARKING	**554**	**144**
Accessible Parking Requirements		
For >100 Required Spaces	*1 + 3% of spaces over 100*	
Parking Stall Dimensions	*STANDARD: 2.75m X 5.8m w/6m Aisle; ACCESSIBLE: Type-A 3.4m X 5.8m, Type-B 2.4 X 5.8m; w/1.5m access aisle*	

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Leading Design for Commercial Real Estate
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civil engineering

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vaughan. ontario. L4H 0R1
p 905.760.1221
f 905.248.3344

NEWMARKET TOYOTA
1656 GREEN LANE EAST
EAST GWILLIMBURY ONTARIO, CANADA

OVERALL SITE PLAN

	DATE	REMARKS
1	2024-08-27	ISSUED FOR REVIEW
2	2024-08-29	ISSUED FOR REVIEW

PA / PM:	JC
DRAWN BY:	AS
JOB NO.:	TOR24-0080-00

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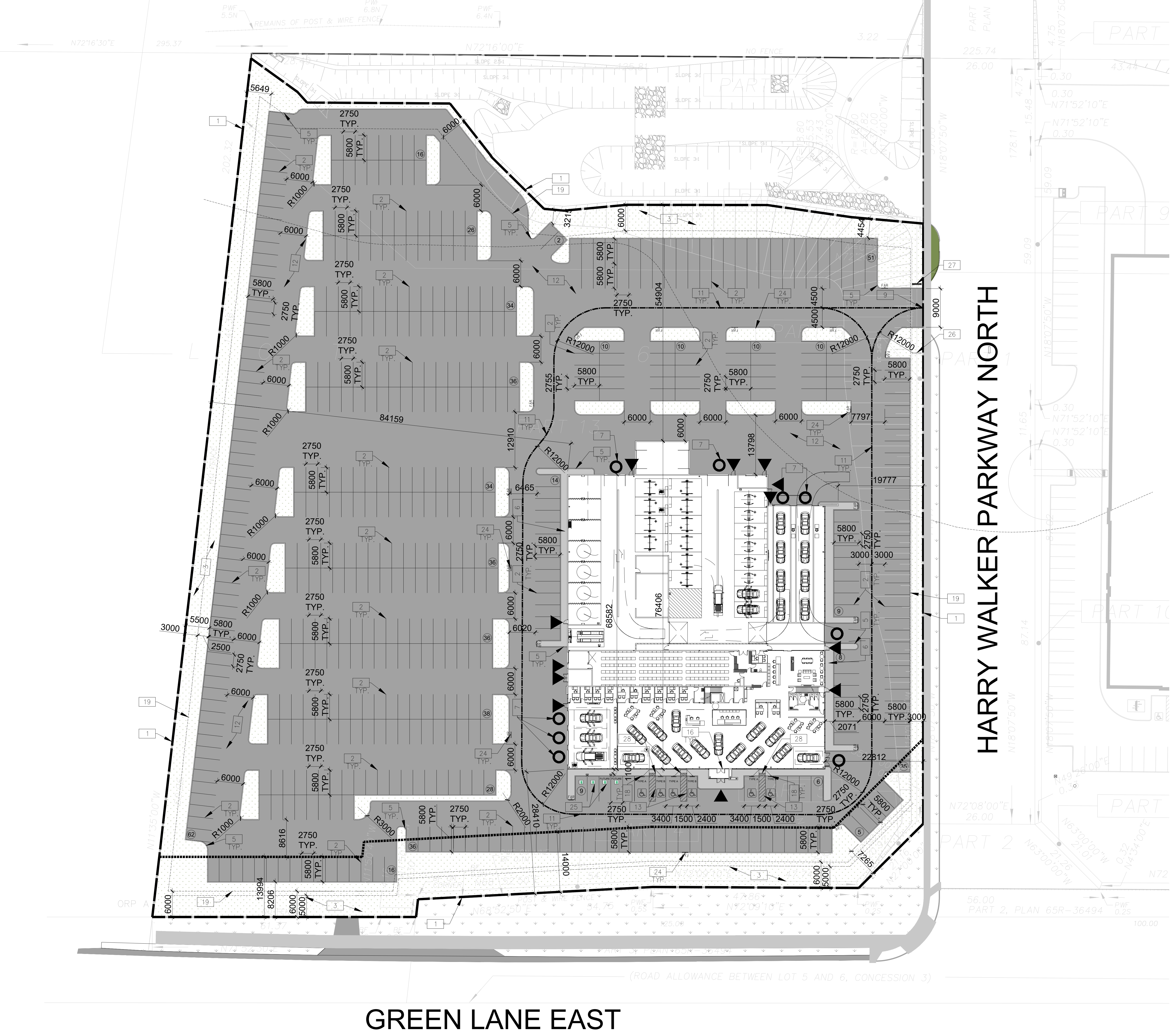
CAUTION: IF THIS SHEET IS NOT 24"x36" IT IS A REDUCED PRINT



OVERALL SITE PLAN

SCALE: 1:600

CONSTRUCTION NORTH TRUE NORTH

Building Classification	*Group F2 (O.B.C. A- 3.1.2.1.(1))*	
EAST GWILLIMBURY ZONING BY-LAW 2018-043		
Proposed Use	*Motor Vehicle Sale / Rental Establishment*	
GROSS SITE AREA	***2.87 ha***	**28,661.26m²**
PROPOSED BUILDING AREA:		
TOTAL GFA	***49,754 SF***	**4,622.30m²**
OVERALL SITE REQUIREMENTS		
Requirements	**Proposed**	**Required**
Min. Lot Area (Existing)	28,661.26m²	-
Min. Lot Frontage (m)	179.63 m	
Maximum Building Height (m)	11.43 m	-
Min. Front Yard Building Setback (m)	27.57 m	6.00 m
Min. Ext. Side Yard Building Set back (m)	-	7.5 m
Min. Int. Side Yard Building Set back (m)	22.40 m	3.00 m
Min. Rear Yard Building Setback (m)	54.92 m	6.00 m
Min. Landscape Area (% of Lot Area) - Approx.	13.87%	10.00%
Min. Landscape Area (SM) - Approx.	*3,975.12m²*	*2,866.13m²*
Min. Island Landscape (% of Lot Area) - Approx.	5.32%	5.00%
Min. Island Landscape Area (SM) - Approx.	*1,006.72m²*	*946.75m²*
Total Landscape Area (% of Lot Area) - Approx.	19.19%	15.00%
Total Landscape Area (SM) - Approx.	*4,981.84m²*	*3,812.88m²*
Min. Front Landscape Buffer (m)	1.40 m	5.00 m
Min. Ext. Side Yard Landscape Buffer (m)	3.00 m	-
Min. Int. Side Yard Landscape Buffer (m)	3.00 m	-
Min. Rear Landscape Buffer (m)	1.40 m	-
Parking Area (sm)	18,935.07m²	-
	Proposed	**Required**
Standard Required Parking Spaces	**155**	**155**
Outdoor Display & Sales Area Spaces	**348**	
Accessible Parking (Additional to standard parking spaces)	*6*	*6*
Parking Spaces in MTO Setback	*58*	-
TOTAL PERMANENT PARKING	**567**	**161**
Accessible Parking Requirements		
For 101-200 Required Spaces	***1 + 3% of spaces of the total number of parking spaces provided***	
	1+3%(155 Required Spaces) = 5.65 = 6 Total	
Parking Stall Dimensions	*STANDARD: 2.75m X 5.8m w/ 6m Aisle;* *ACCESSIBLE: Type-A 3.4m X 5.8m,* *Type-B 2.4 X 5.8m; w/ 1.5m access aisle*	

EV CHARGER:

IN ORDER TO FUTURE-PROOF YOUR FACILITY FOR LETRIC VEHICLE HCARGING READINESS, CONDUITS (AND CONCRETE PIER FOUNDATION WITH "J" BOLTS TO MOUNT DUAL HEADED CHARGERS) SHOULD BE PREPARED TO ACCOMODATE FOUR (4X) 220V EV CHARGERS UP TO A DC LEVEL 3 EV CHARGER.

NOTE:
THIS SITE SHALL PROTECT FOR POTENTIAL FUTURE VEHICULAR INTERCONNECTION THE ADJACENT PROPERTY SHOULD THE ADJACENT LANDS REDEVELOP WITH A FUTURE COMPATIBLE LAND-USE.
LOCATION TO BE DETERMINED.

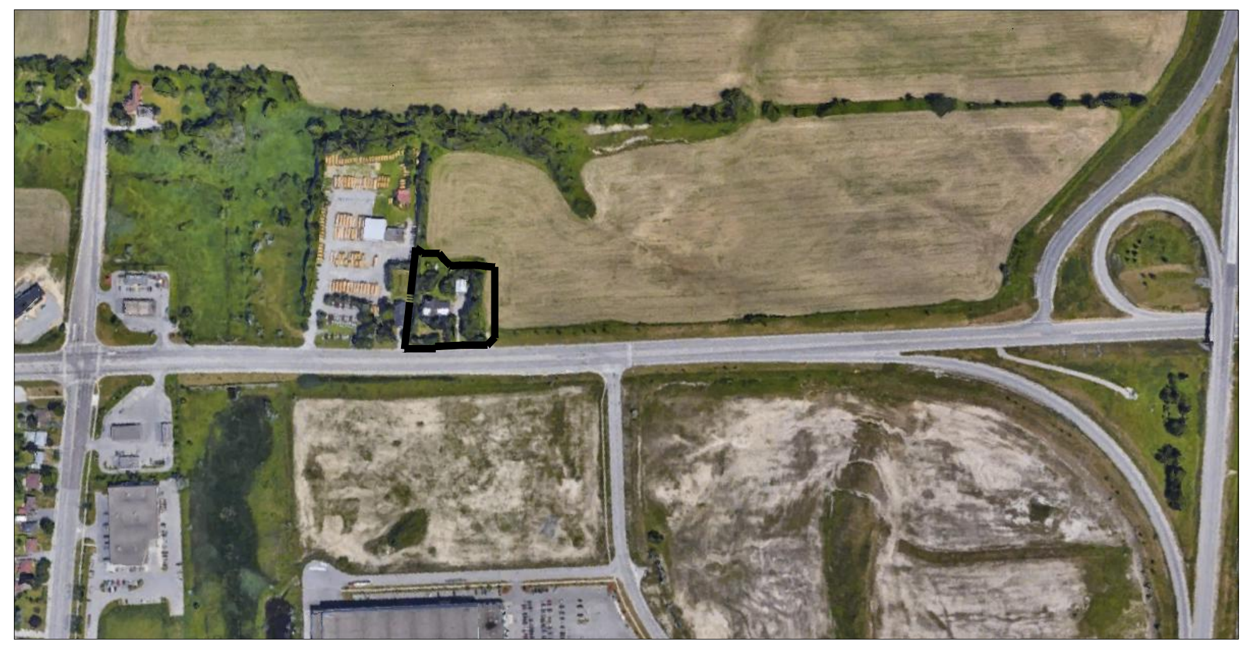
SITE PLAN NOTES

1	PROPERTY LINE
2	2700x5800 PARKING STALL, PAINTED PARKING STRIPPING PER THE TOWN OF AURORA STANDARDS.
3	LANDSCAPING (SEE LANDSCAPING DWG.)
4	YELLOW PAINTED LINES FOR PEDESTRIAN ACCESS
5	150mm WIDE CURB
6	MIN. 1500mm WIDE CONCRETE SIDEWALK TYPICAL U.N.O
7	HEATED CONCRETE PAD WITH PAINTED LINE TO INDICATE DOOR ACTIVATION
8	FIRE DEPARTMENT/SIAMESE CONNECTION
9	MUNICIPAL SIDEWALK & CURB ACROSS PROPOSED ACCESS TO BE HEAVY DUTY
10	DETECTIBLE TACTILE WARNING SURFACE, CONFORMING TO 2012 O.B.C.
11	FIRE ACCESS ROUTE. MIN 12.0M TURNING RADIUS
12	HATCHED AREA DENOTES HEAVY DUTY ASPHALT. TYPICAL FOR ALL AREAS REQUIRING TRACTOR TRUCK ACCESS.
13	TYPICAL SHARED ACCESSIBLE PARKING STALLS, PAINTED PARKING STRIPING PER MUNICIPAL STANDARDS. EACH PAIR OF SHARED STALLS TO PROVIDE A MINIMUM OF (1) TYPE A (3400 MIN WIDTH) & (1) TYPE B (2400 MIN WIDTH) STALL C/W A 1.5M PAINTED AISLE – REFER TO THE TOWN OF NEWMARKET ACCESSIBLE PARKING STANDARDS
14	PROPOSED LOCATION OF TRANSFORMER C/W CONCRETE PAD
15	ALL DRIVEWAYS TO BE DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH TOWN OF NEWMARKET STANDARD
16	PRINCIPLE ENTRY WITH POWER OPERATED AUTOMATIC DOOR OPENER AND FLUSH THRESHOLD. PROVIDE FROST SLAB BY STRUCTURAL.
17	PROPOSED BICYCLE PARKING SPACE
18	ACCESSIBLE PARKING SIGN INSTALLED PER MUNICIPAL STANDARDS
19	LIMIT OF LANDSCAPE BUFFER
20	SNOW STORAGE
21	EV CAR CHARGING STATION
22	PHASE 2 BUILDING OUTLINE SHOWN ON SITE FOR REFERENCE
23	FIRE HYDRANT. SEE CIVIL DRAWINGS.
24	FIRE ROUTE ACCESS SIGN SPACED MAX 22.86m
25	PROPOSED 220 V EV CHARGER ON 24" DIAMETER CONCRETE PIER WITH 100mm DIAMETER BOLLARDS
26	TOYOTA PYLON SIGNAGE
27	TOYOTA DIRECTIONAL SIGN
28	DEPRESSED CURB WITH TACTICLE INDICATOR

SITE LEGEND

▨	NEW HEAVY DUTY PAVEMENT (HATCHED)
▨	PAINTED DIAGONAL LINES WHERE INDICATED
▨	NEW LANDSCAPING AREA (HATCHED)
— - —	FIRE ACCESS ROUTE MIN. 12.0M TURNING RADIUS
—‖—	PROPERTY LINE
(#)	PARKING STALL COUNT TOTAL.
▲	MAIN ENTRANCE DOOR
▲	EXIT DOOR
○	DRIVE IN DOOR
♿	BARRIER–FREE PARKING SPACE WITH SIGNAGE AT SIDEWALK
D.C.	DEPRESSED CURB FOR BARRIER–FREE ACCESS
F.C.	FLUSH CURB
●	PROPOSED FIRE HYDRANT
○	PROPOSED SANITARY MANHOLE
●	PROPOSED STORM WATER MANHOLE
—<	FIRE DEPARTMENT CONNECTION
FAR	FIRE ACCESS ROUTE SIGN

VICINITY MAP



VICINITY MAP

SCALE: N.T.S.

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P 905.760.1221

ARCHITECTURE
PLANNING
INTERIORS
CIVIL ENGINEERING
BRANDING
BUILDING MEASUREMENT

NewRoads Automotive Group™

TOYOTA

TOYOTA - NEWMARKET
1171 DAVIS DR, NEWMARKET,
ONTARIO L3Y 8R1, CANADA

SITE PLAN

	DATE	REMARKS
1	08/27/2024	ISSUED FOR REVIEW
2	08/29/2024	ISSUED FOR REVIEW
3	09/12/2024	ISSUED FOR REVIEW
4	09/19/2024	ISSUED FOR CONSULTANTS
5	09/27/2024	ISSUED FOR SPA

PA/PM:	J. COX
DRAWN BY.:	A.S.
JOB NO.:	TOR24-0080-00

SHEET

A100

09/27/2024 - ISSUED FOR SPA

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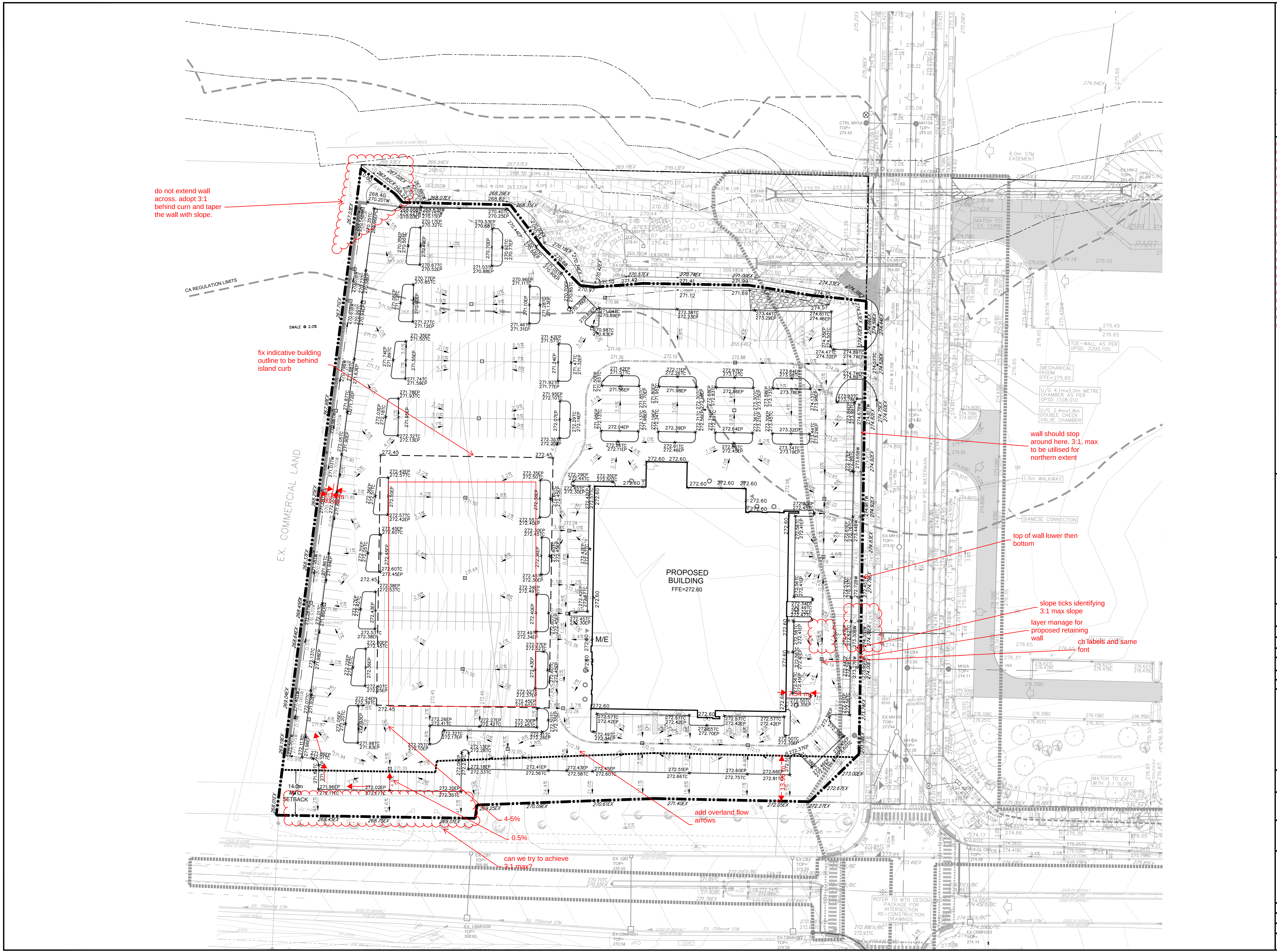
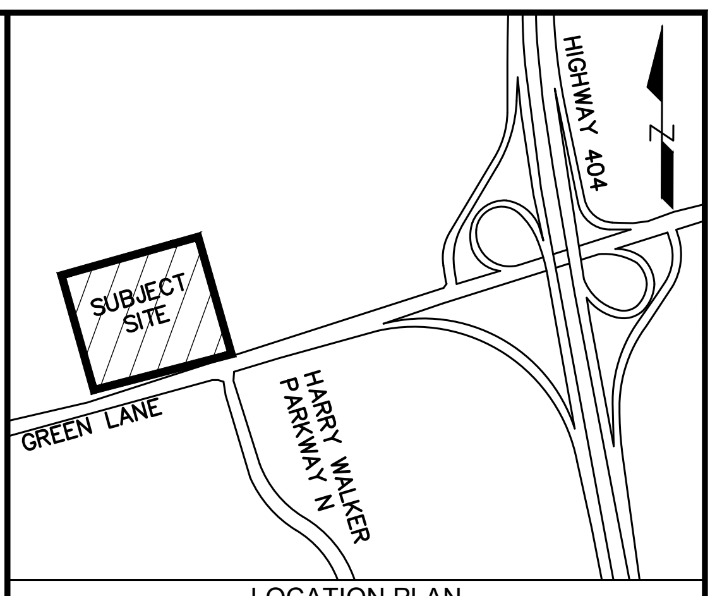




LOCATION PLAN
N.T.S.

LEGEND

LIST OF DRAWINGS
- SG-01 - SITE GRADING PLAN
- SS-01 - SITE SERVICING PLAN
- EC-01 - EROSION AND SEDIMENT CONTROL PLAN
- CMP-01 - CONSTRUCTION MANAGEMENT PLAN
- XS-01 - CROSS SECTIONS
- DD-01 - DETAIL DRAWING
- DD-02 - DETAIL DRAWING
- DD-03 - DETAIL DRAWING
- DAP-01 - PRE-DEVELOPMENT DRAINAGE AREA PLAN
- DAP-02 - POST-DEVELOPMENT AREA PLAN

SITE PLAN INFORMATION

TUNER FLEISCHER ARCHITECTS INC.
67 LESMILL ROAD,
TORONTO, ON, M3B 2T8
PHONE: (416) 425-222
EMAIL: toronto@turnerfleischer.com

SURVEYOR INFORMATION

E.R. GARDEN LIMITED
ONTARIO LAND SURVEYOR
1260 JOURNEY'S END CIRCLE, UNIT 1,
NEWMARKET, ON, L3Y 8Z7
PHONE: (905) 895-5600
FAX: (905) 895-7127
WEBSITE: www.ergardenlimited.ca

BENCHMARK INFORMATION:
ELEVATIONS ARE GEODETIC AND ARE DERIVED FROM TOWN OF NEWMARKET BENCHMARK 1095 HAVING AN ELEVATION 273.91 METRES A.S.L.

5			
4			
3			
2			
1	12/2/2024	ISSUED FOR 1st SPA SUBMISSION	TVL
No.	DATE	ISSUE/REVISION	INTIAL

NEW ROAD - TOYOTA
NEWROADS AUTOMOTIVE GROUP
1656 GREEN LANE EAST
TOWN OF EAST GWILLIMBURY, ONTARIO

SITE GRADING PLAN

GEI Consultants

DESIGNED BY: LV	DATE: AUGUST , 2024	CHECKED BY: TVL
DRAWN BY: LV	PROJECT No. 2406541	DRAWING No. SG-01
SCALE: 1:500		

5.0m 0 5.0m 10.0m 15.0m 20.0m 25.0m 30.0m

APPENDIX B

Borehole Logs

Project No. 2177-24-GL

Log of Borehole 24BH-1 (MW)

Dwg No. 2

Project: Geotechnical Investigation

Sheet No. 1 of 1

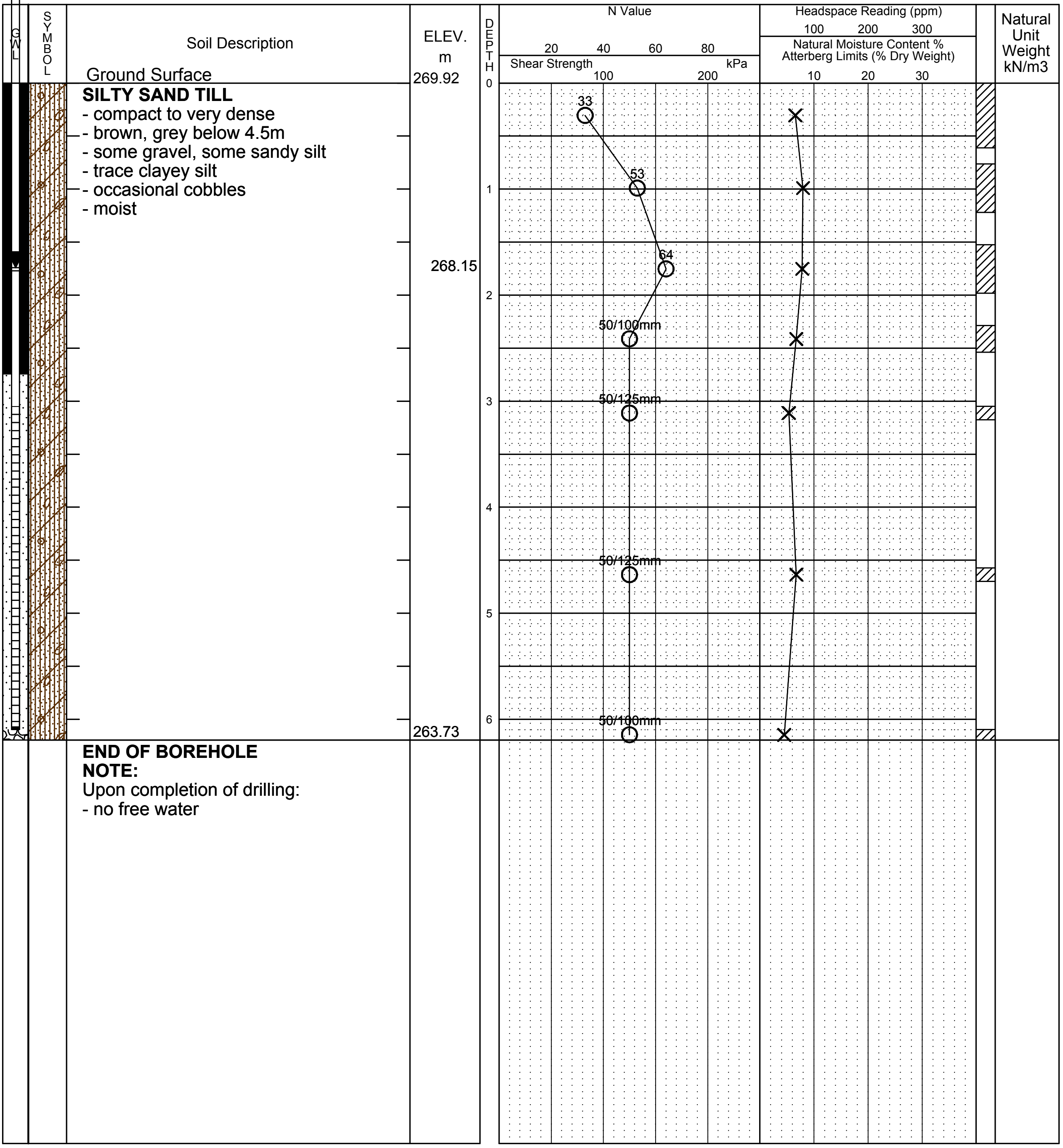
Location: 1656 Green Lane East, East Gwillimbury, Ontario

Date Drilled: 7/29/24

Drill Type: Track Mounted Drill Rig

Datum: Geodetic

Auger Sample	☒	Headspace Reading (ppm)	●
SPT (N) Value	○ ▨	Natural Moisture	✕
Dynamic Cone Test	—	Plastic and Liquid Limit	├─┤
Shelby Tube	■	Unconfined Compression % Strain at Failure	⊗
Field Vane Test	✚ S	Penetrometer	▲



SILTY SAND TILL
- compact to very dense
- brown, grey below 4.5m
- some gravel, some sandy silt
- trace clayey silt
- occasional cobbles
- moist

END OF BOREHOLE
NOTE:
Upon completion of drilling:
- no free water

LGBE3 2177-24-GL.GPJ 10/4/24

NOTE: THE BOREHOLE DATA NEEDS INTERPRETATION ASSISTANCE BY TORONTO INSPECTION LTD. BEFORE USE BY OTHERS

Toronto Inspection Ltd.

Time	Water Level (m)	Depth to Cave (m)
Sept. 25, 2024	1.77m	

Project No. 2177-24-GL

Log of Borehole 24BH-2

Dwg No. 3

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: 1656 Green Lane East, East Gwillimbury, Ontario

Date Drilled: 7/29/24

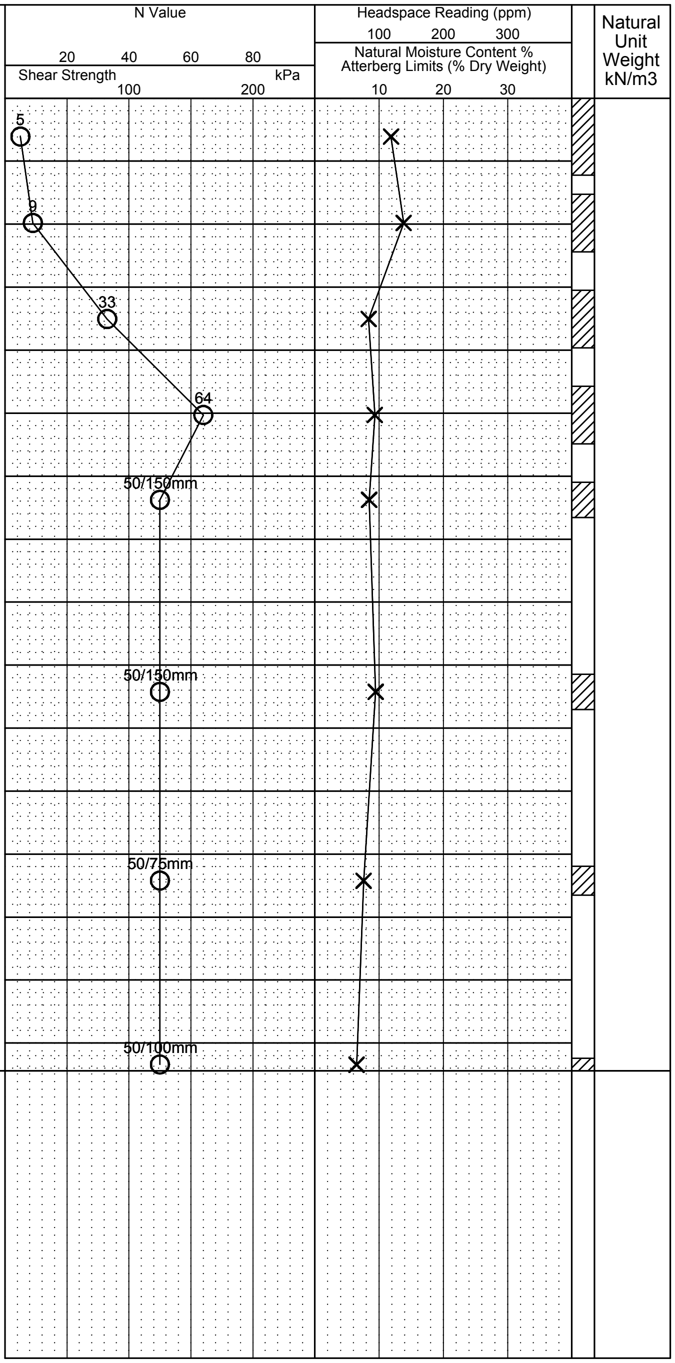
Drill Type: Track Mounted Drill Rig

Datum: Geodetic

Auger Sample	☒
SPT (N) Value	○ ▨
Dynamic Cone Test	—
Shelby Tube	■
Field Vane Test	✚ S

Headspace Reading (ppm)	●
Natural Moisture	×
Plastic and Liquid Limit	├─┤
Unconfined Compression % Strain at Failure	⊗
Penetrometer	▲

GWL	SYMBOL	Soil Description	ELEV. m	DEPTH
		Ground Surface	269.70	0
		FILL (DISTURBED MATERIAL) - brown silty sand - some gravel, some sandy silt - thin layer of clayey silt - very moist to wet		1
▼		**SILTY SAND TILL** - dense to very dense - brown, grey below 2.3m - some gravel, some sandy silt - trace clayey silt - thin layers of sand below 4.5m - occasional cobbles- occasional cobbles - moist to very moist, wet pockets/ layers- moist to very moist, wet pockets/layers	268.48 268.18	2 3 4 5 6 7
		END OF BOREHOLE **NOTE:** Upon completion of drilling: - water level at 1.52m - cave-in at 2.44m	261.98	



NOTE: THE BOREHOLE DATA NEEDS INTERPRETATION ASSISTANCE BY TORONTO INSPECTION LTD. BEFORE USE BY OTHERS

Toronto Inspection Ltd.

Time	Water Level (m)	Depth to Cave (m)

Project No. 2177-24-GL

Log of Borehole 24BH-3

Dwg No. 4

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: 1656 Green Lane East, East Gwillimbury, Ontario

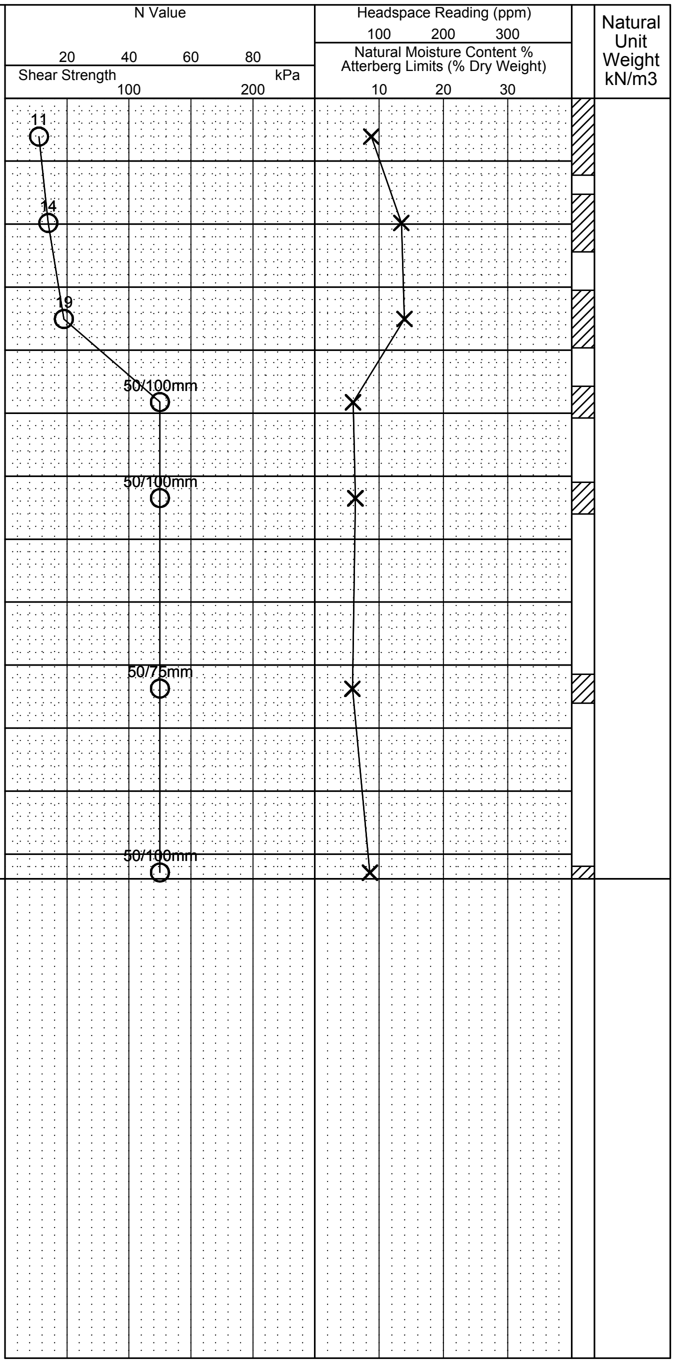
Date Drilled: 7/29/24

Drill Type: Track Mounted Drill Rig

Datum: Geodetic

Auger Sample	☒
SPT (N) Value	○ ▨
Dynamic Cone Test	—
Shelby Tube	■
Field Vane Test	✚ S
Headspace Reading (ppm)	●
Natural Moisture	×
Plastic and Liquid Limit	├─┤
Unconfined Compression % Strain at Failure	⊗
Penetrometer	▲

GWL	SYMBOL	Soil Description	ELEV. m	DEPTH
		Ground Surface	271.53	0
		FILL (DISTURBED MATERIAL) - brown sandy silt, some silty sand - moist	271.07	
▼		**SANDY SILT** - some silty sand, trace gravel - moist to very moist	269.70 269.40	1 2
		SILTY SAND TILL - very dense - gray - some gravel, some sandy silt - occasional cobbles - moist	265.33	3 4 5 6



END OF BOREHOLE

NOTE:

Upon completion of drilling:

- water level at 1.83m

NOTE: THE BOREHOLE DATA NEEDS INTERPRETATION ASSISTANCE BY TORONTO INSPECTION LTD. BEFORE USE BY OTHERS

Toronto Inspection Ltd.

Time	Water Level (m)	Depth to Cave (m)

Project No. 2177-24-GL

Log of Borehole 24BH-4 (MW)

Dwg No. 5

Project: Geotechnical Investigation

Sheet No. 1 of 1

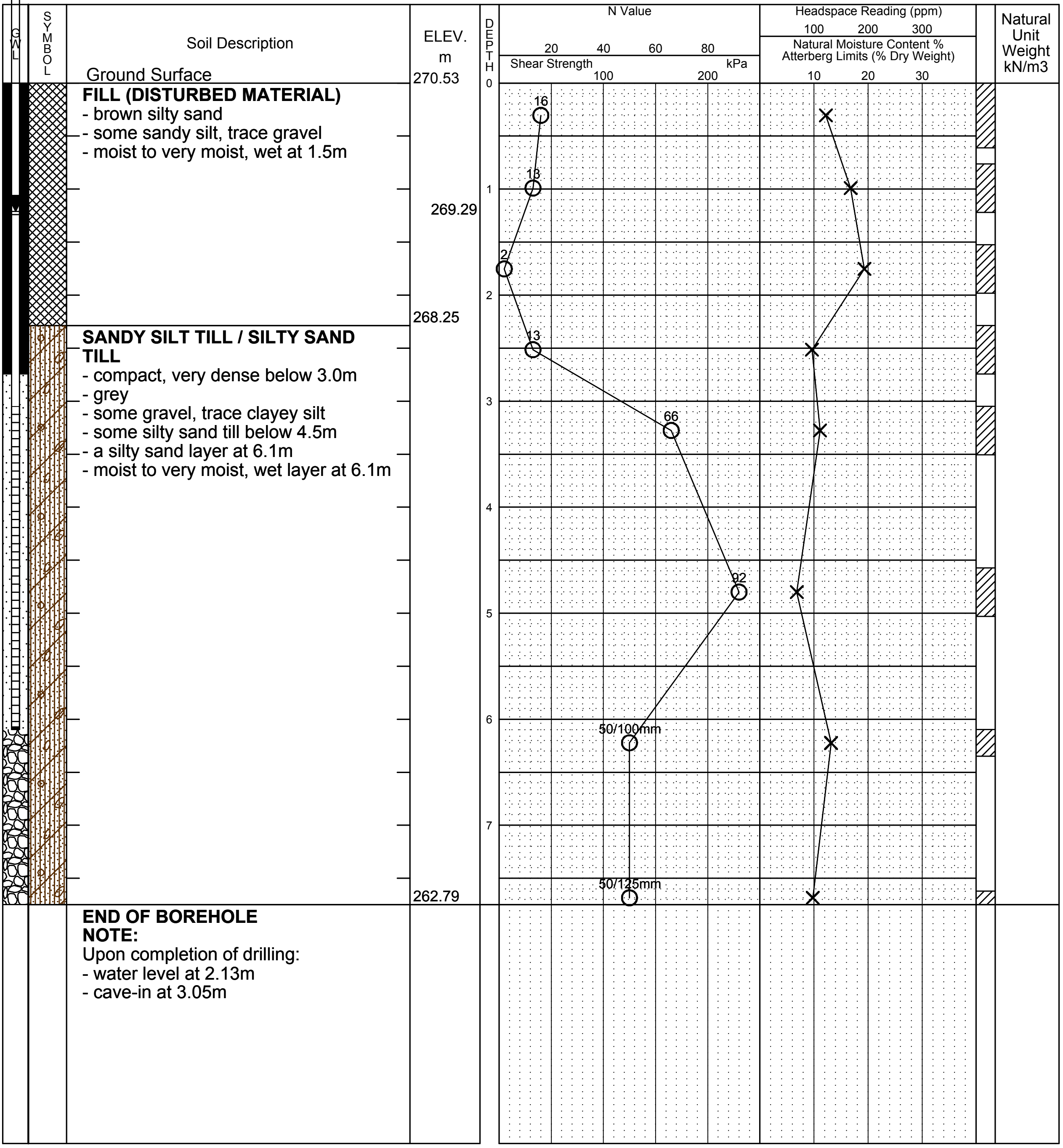
Location: 1656 Green Lane East, East Gwillimbury, Ontario

Date Drilled: 9/11/24

Drill Type: Track Mounted Drill Rig

Datum: Geodetic

Auger Sample	☒	Headspace Reading (ppm)	●
SPT (N) Value	○ ▨	Natural Moisture	×
Dynamic Cone Test	—	Plastic and Liquid Limit	├─┤
Shelby Tube	■	Unconfined Compression % Strain at Failure	⊗
Field Vane Test	✚ S	Penetrometer	▲



FILL (DISTURBED MATERIAL)
- brown silty sand
- some sandy silt, trace gravel
- moist to very moist, wet at 1.5m

SANDY SILT TILL / SILTY SAND TILL
- compact, very dense below 3.0m
- grey
- some gravel, trace clayey silt
- some silty sand till below 4.5m
- a silty sand layer at 6.1m
- moist to very moist, wet layer at 6.1m

END OF BOREHOLE

NOTE:

Upon completion of drilling:
- water level at 2.13m
- cave-in at 3.05m

NOTE: THE BOREHOLE DATA NEEDS INTERPRETATION ASSISTANCE BY TORONTO INSPECTION LTD. BEFORE USE BY OTHERS

Toronto Inspection Ltd.

Time	Water Level (m)	Depth to Cave (m)
Sept. 25, 2024	1.24m	

Project No. 2177-24-GL

Log of Borehole 24BH-5 (MW)

Dwg No. 6

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: 1656 Green Lane East, East Gwillimbury, Ontario

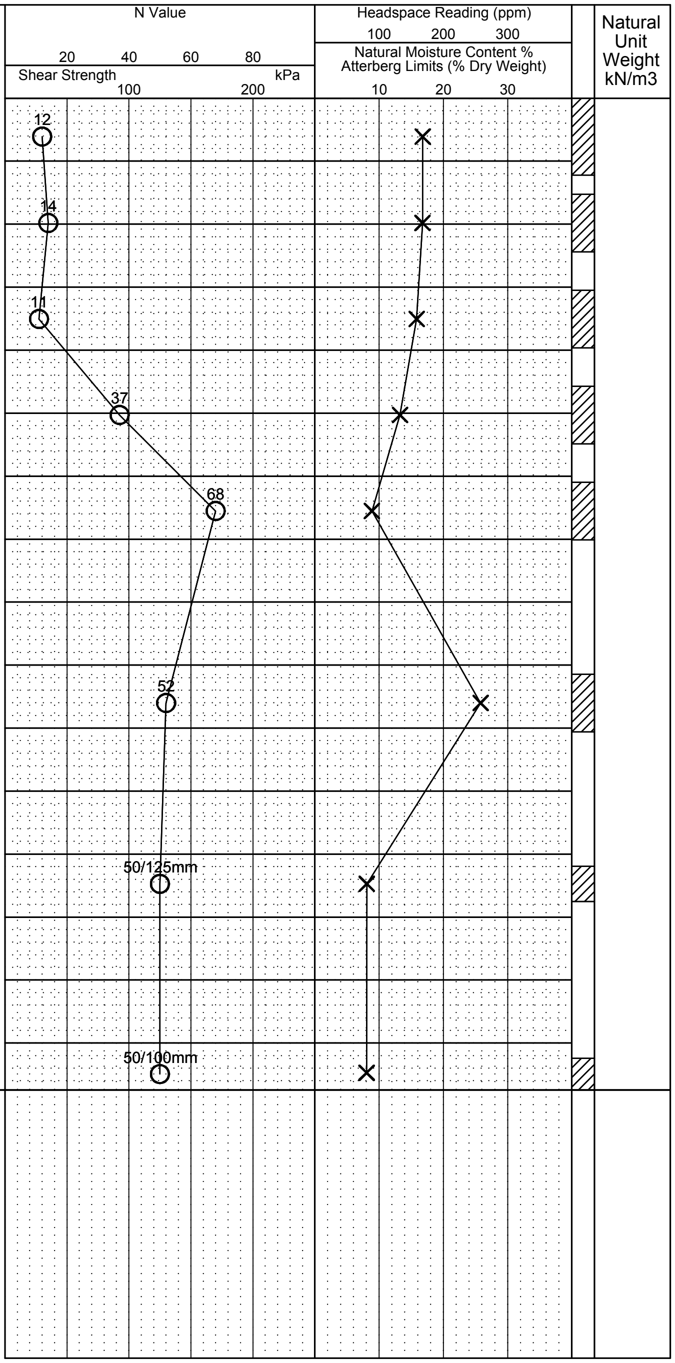
Date Drilled: 7/29/24

Drill Type: Track Mounted Drill Rig

Datum: Geodetic

Auger Sample	☒	Headspace Reading (ppm)	●
SPT (N) Value	○ ▨	Natural Moisture	×
Dynamic Cone Test	───	Plastic and Liquid Limit	├──┤
Shelby Tube	■	Unconfined Compression % Strain at Failure	⊗
Field Vane Test	✚ S	Penetrometer	▲

Soil Description	ELEV. m
Ground Surface	272.16
FILL (DISTURBED MATERIAL) - brown sandy silt - some silty sand, trace clayey silt - moist to very moist	271.55
SANDY SILT TILL - compact to very dense - brown, grey below 4.5m - some silty sand, some gravel - trace clayey silt - layer of silty sand / till - occasional cobbles - moist to very moist, wet pockets	270.10
	264.28
END OF BOREHOLE **NOTE:** Upon completion of drilling: - water level at 1.83m	



LGBE3 2177-24-GL.GPJ 10/4/24

NOTE: THE BOREHOLE DATA NEEDS INTERPRETATION ASSISTANCE BY TORONTO INSPECTION LTD. BEFORE USE BY OTHERS

Toronto Inspection Ltd.

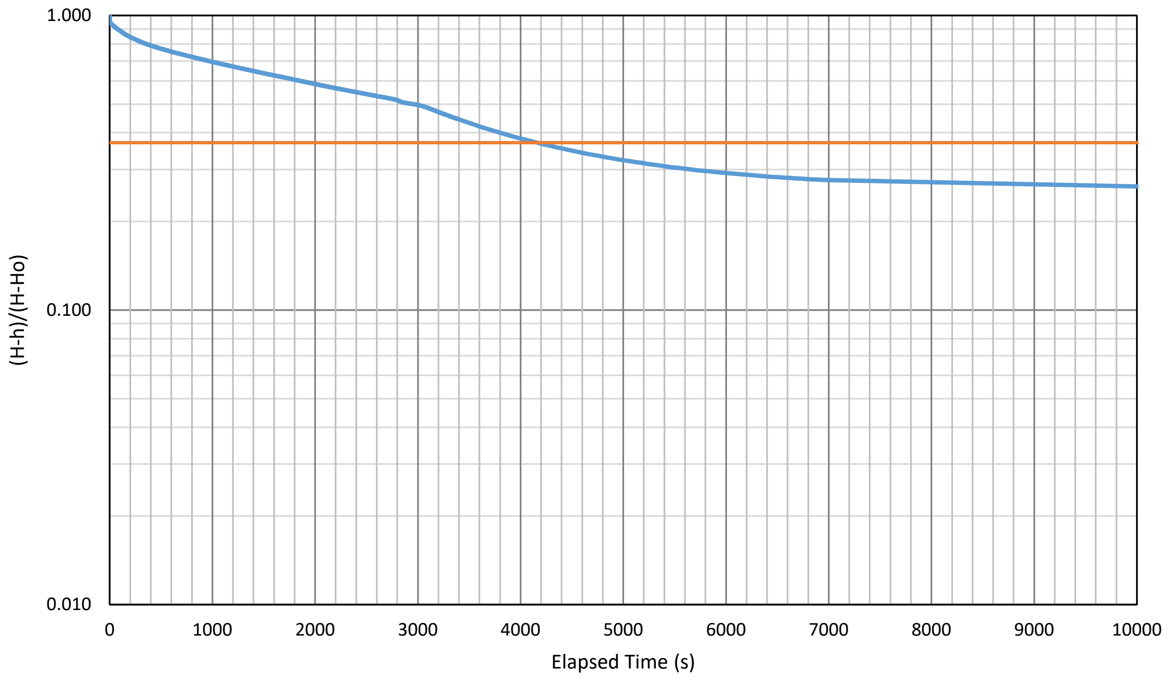
Time	Water Level (m)	Depth to Cave (m)
Sept. 25, 2024	2.06m	

APPENDIX C

Hydraulic Conductivity Analysis

In-Situ Hydraulic Conductivity Analyses: 24BH-1 (MW)

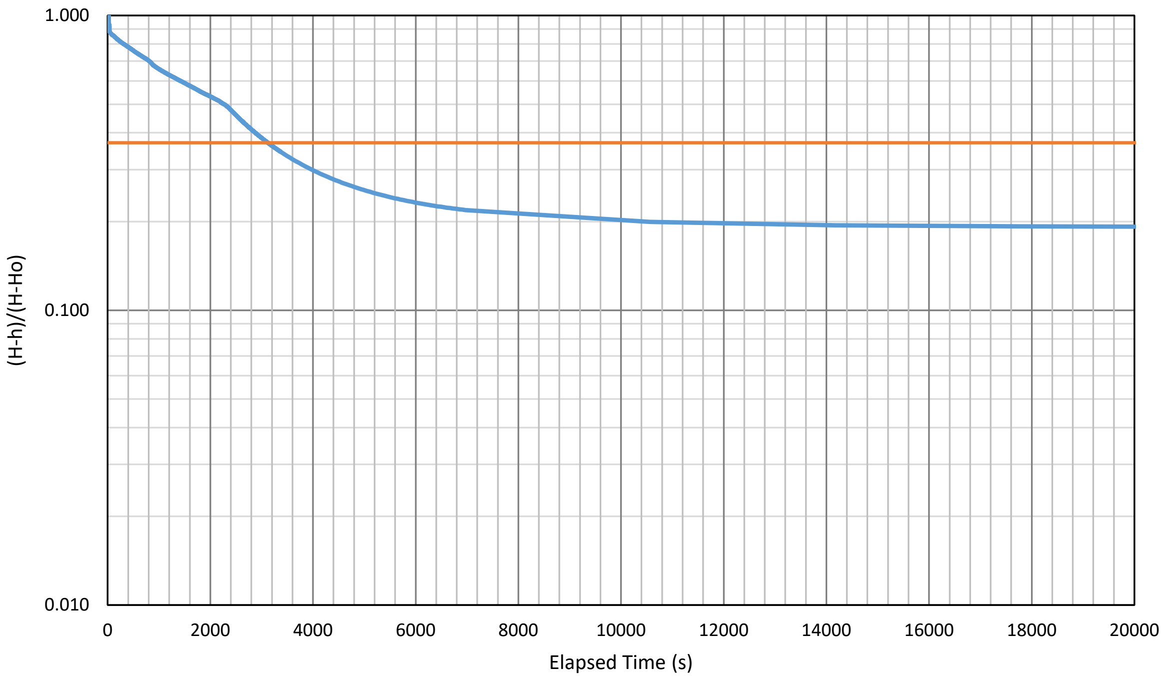
Company:	TIL
Client:	NewRoads Automotive Group
Project:	2177-24-HM
Location:	1656 Green Lane E, East Gwillimbury
Test Well:	24BH-1 (MW)
Test Date:	September 18, 2024
Test Conducted By:	CP
Test Analyzed By:	KN



Effective Well Depth (mbgs):	6.10	**Screened Unit:**	Silty Sand Till
Initial Water Level (mbgs) (H):	1.77	**Screen Length (m) (L_e):**	3.048
Available Drawdown (m):	4.33	**Head at Time = 0 (m) (H_o):**	4.41
Borehole Radius (m) (R_b):	0.0762	**Monitoring Well Radius (m) (R_c):**	0.026
Solution Method:	Hvorslev (1951) ▼	**Recovery (%):**	100%
Early K (m/s)	NA	**Early To (s):**	NA
Mid K (m/s)	8.9E-08	**Mid To (s):**	4400
Late K (m/s)	NA	**Late To (s):**	NA

In-Situ Hydraulic Conductivity Analyses: **24BH-4 (MW)**

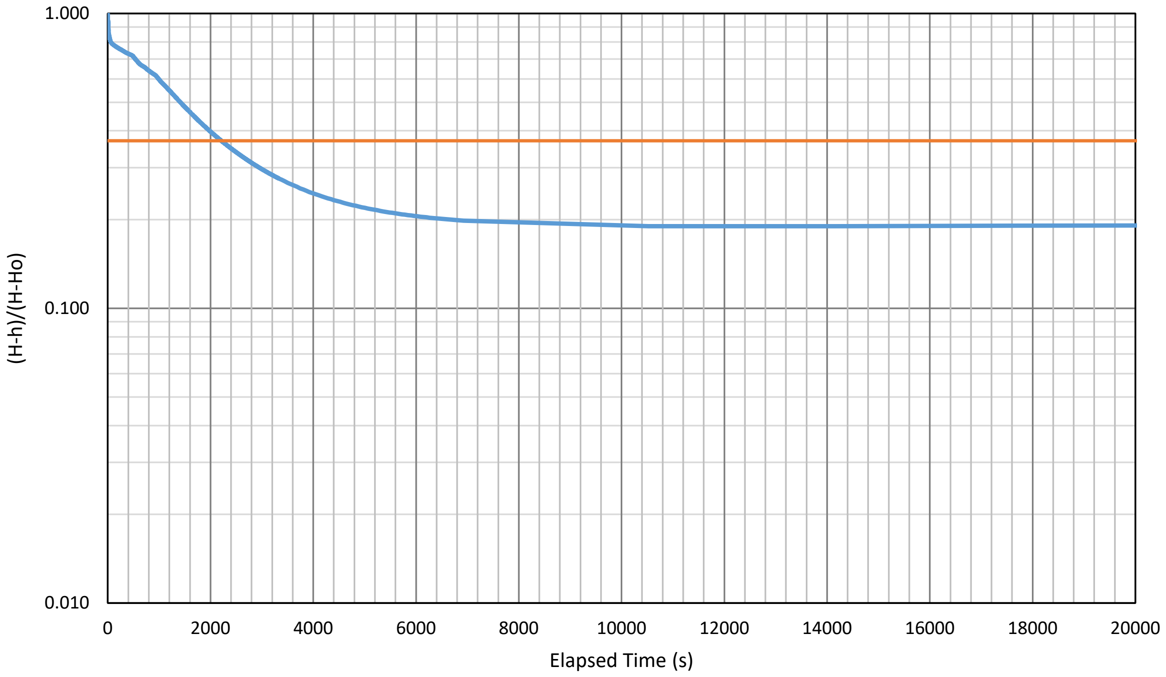
Company:	TIL
Client:	NewRoads Automotive Group
Project:	2177-24-HM
Location:	1656 Green Lane E, East Gwillimbury
Test Well:	24BH-4 (MW)
Test Date:	September 18, 2024
Test Conducted By:	CP
Test Analyzed By:	KN



Effective Well Depth (mbgs):	6.10	**Screened Unit:**	Sandy Silt Till / Silty Sand Till
Initial Water Level (mbgs) (H):	1.24	**Screen Length (m) (L_e):**	3.048
Available Drawdown (m):	4.86	**Head at Time = 0 (m) (H_o):**	5.09
Borehole Radius (m) (R_b):	0.0762	**Monitoring Well Radius (m) (R_c):**	0.026
Solution Method:	Hvorslev (1951) ▼	**Recovery (%):**	100%
Early K (m/s)	NA	**Early To (s):**	NA
Mid K (m/s)	1.1E-07	**Mid To (s):**	3600
Late K (m/s)	NA	**Late To (s):**	NA

In-Situ Hydraulic Conductivity Analyses: 24BH-5 (MW)

Company:	TIL
Client:	NewRoads Automotive Group
Project:	2177-24-HM
Location:	1656 Green Lane E, East Gwilimbury
Test Well:	24BH-5 (MW)
Test Date:	September 18, 2024
Test Conducted By:	CP
Test Analyzed By:	KN



Effective Well Depth (mbgs):	7.62	**Screened Unit:**	Sandy Silt Till
Initial Water Level (mbgs) (H):	2.06	**Screen Length (m) (L_e):**	3.048
Available Drawdown (m):	5.56	**Head at Time = 0 (m) (H_o):**	5.74
Borehole Radius (m) (R_b):	0.0762	**Monitoring Well Radius (m) (R_c):**	0.026
Solution Method:	Hvorslev (1951) ▼	**Recovery (%):**	100%
Early K (m/s)	NA	**Early To (s):**	NA
Mid K (m/s)	1.2E-07	**Mid To (s):**	3200
Late K (m/s)	NA	**Late To (s):**	NA

APPENDIX D

Groundwater Quality Certificate of Analysis

FINAL REPORT

CA40148-SEP24 R1

PN2177

Prepared for

Toronto Inspection Ltd.

FINAL REPORT

First Page

CLIENT DETAILS

Client	Toronto Inspection Ltd.
Address	110 Konrad Crescent, Unit 16 Markham, ON L3R 9X2. Canada
Contact	Yourong Li
Telephone	905-940-8509
Facsimile	905 940 8192
Email	lab@torontoinspection.com
Project	PN2177
Order Number	
Samples	Ground Water (1)

LABORATORY DETAILS

Project Specialist	Brad Moore Hon. B.Sc
Laboratory	SGS Canada Inc.
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SGS Reference	CA40148-SEP24
Received	09/19/2024
Approved	09/26/2024
Report Number	CA40148-SEP24 R1
Date Reported	09/26/2024

COMMENTS

RL - SGS Reporting Limit

Nonylphenol Ethoxylates is the sum of nonylphenol monoethoxylate and nonylphenol diethoxylate.

Temperature of Sample upon Receipt: 6 degrees C
Cooling Agent Present: yes
Custody Seal Present: yes

Chain of Custody Number: 034604

SIGNATORIES

Brad Moore Hon. B.Sc

TABLE OF CONTENTS

FINAL REPORT

CA40148-SEP24 R1

Client: Toronto Inspection Ltd.

Project: PN2177

Project Manager: Yourong Li

Samplers: ,

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 24BH-4(MW)

Sample Matrix Ground Water

Sample Date 18/09/2024

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	24
Total Kjeldahl Nitrogen	as N mg/L	0.5	100	1	< 0.5
Metals and Inorganics					
Sulphate	mg/L	2	1500		42
Cyanide (total)	mg/L	0.01	2	0.02	< 0.01
Fluoride	mg/L	0.06	10		0.14
Aluminum (total)	mg/L	0.001	50		0.367
Antimony (total)	mg/L	0.0009	5		< 0.0009
Arsenic (total)	mg/L	0.0002	1	0.02	0.0017
Cadmium (total)	mg/L	0.000003	0.7	0.008	0.000004
Chromium (total)	mg/L	0.00008	2	0.08	0.00061
Cobalt (total)	mg/L	0.000004	5		0.000334
Copper (total)	mg/L	0.001	3	0.05	< 0.001
Lead (total)	mg/L	0.00009	1	0.12	0.00032
Manganese (total)	mg/L	0.00001	5	0.15	0.0403
Molybdenum (total)	mg/L	0.0004	5		0.0015
Nickel (total)	mg/L	0.0001	2	0.08	0.0008
Phosphorus (total)	mg/L	0.003	10	0.4	0.026
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		0.00013

MATRIX: WATER

Sample Number 8

Sample Name 24BH-4(MW)

Sample Matrix Ground Water

Sample Date 18/09/2024

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		0.0178
Zinc (total)	mg/L	0.002	2	0.04	0.016
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	7.53
Mercury (total)	mg/L	0.00001	0.01	0.0004	< 0.00001

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 24BH-4(MW)
Sample Matrix Ground Water
Sample Date 18/09/2024

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

FINAL REPORT

Client: Toronto Inspection Ltd.

Project: PN2177

Project Manager: Yourong Li

Samplers: ,

MATRIX: WATER

Sample Number 8

Sample Name 24BH-4(MW)

Sample Matrix Ground Water

Sample Date 18/09/2024

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	0.0007
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
24BH-4(MW)					
Total Suspended Solids	SM 2540D	mg/L	24		15

QC SUMMARY

Anions by discrete analyzer

Method: US EPA 375.4 | Internal ref.: ME-CA-[ENV]EWL-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	DIO5015-SEP24	mg/L	2	<2	ND	20	101	80	120	99	75	125

Biochemical Oxygen Demand

Method: SM 5210 | Internal ref.: ME-CA-[ENV]EWL-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)	BOD0037-SEP24	mg/L	2	< 2	12	30	110	70	130	111	70	130

Cyanide by SFA

Method: SM 4500 | Internal ref.: ME-CA-[ENV]SFA-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)	SKA0205-SEP24	mg/L	0.01	<0.01	ND	10	93	90	110	101	75	125

QC SUMMARY

Fluoride by Specific Ion Electrode

Method: SM 4500 | 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	EWL0437-SEP24	mg/L	0.06	<0.06	0	10	99	90	110	98	75	125

Mercury by CVAAS

Method: EPA 7471A/SM 3112B | 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)	EHG0038-SEP24	mg/L	0.00001	< 0.00001	ND	20	112	80	120	80	70	130

QC SUMMARY

Metals in aqueous samples - ICP-MS

Method: SM 3030/EPA 200.8 | Internal ref.: ME-CA-[ENV]SPE-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)	EMS0221-SEP24	mg/L	0.00005	<0.00005	ND	20	95	90	110	104	70	130
Aluminum (total)	EMS0221-SEP24	mg/L	0.001	<0.001	19	20	107	90	110	120	70	130
Arsenic (total)	EMS0221-SEP24	mg/L	0.0002	<0.0002	3	20	97	90	110	107	70	130
Cadmium (total)	EMS0221-SEP24	mg/L	0.000003	<0.000003	ND	20	96	90	110	108	70	130
Cobalt (total)	EMS0221-SEP24	mg/L	0.000004	<0.000004	0	20	93	90	110	100	70	130
Chromium (total)	EMS0221-SEP24	mg/L	0.00008	<0.00008	11	20	100	90	110	110	70	130
Copper (total)	EMS0221-SEP24	mg/L	0.001	<0.001	ND	20	95	90	110	108	70	130
Manganese (total)	EMS0221-SEP24	mg/L	0.00001	<0.00001	5	20	97	90	110	100	70	130
Molybdenum (total)	EMS0221-SEP24	mg/L	0.0004	<0.0004	3	20	98	90	110	103	70	130
Nickel (total)	EMS0221-SEP24	mg/L	0.0001	<0.0001	4	20	98	90	110	96	70	130
Lead (total)	EMS0221-SEP24	mg/L	0.00009	<0.00009	10	20	98	90	110	94	70	130
Phosphorus (total)	EMS0221-SEP24	mg/L	0.003	<0.003	4	20	106	90	110	NV	70	130
Antimony (total)	EMS0221-SEP24	mg/L	0.0009	<0.0009	ND	20	102	90	110	104	70	130
Selenium (total)	EMS0221-SEP24	mg/L	0.00004	<0.00004	ND	20	99	90	110	99	70	130
Tin (total)	EMS0221-SEP24	mg/L	0.00006	<0.00006	ND	20	98	90	110	NV	70	130
Titanium (total)	EMS0221-SEP24	mg/L	0.0001	<0.0001	4	20	97	90	110	NV	70	130
Zinc (total)	EMS0221-SEP24	mg/L	0.002	<0.002	13	20	91	90	110	102	70	130

QC SUMMARY

Nonylphenol and Ethoxylates

Method: ASTM D7065-06 | Internal ref.: ME-CA-[ENV]GC-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	GCM0318-SEP24	mg/L	0.01	<0.01			93	55	120			
Nonylphenol monoethoxylate	GCM0318-SEP24	mg/L	0.01	<0.01			86	55	120			
Nonylphenol	GCM0318-SEP24	mg/L	0.001	<0.001			74	55	120			

Oil & Grease

Method: MOE E3401 | 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 (total)	GCM0334-SEP24	mg/L	2	<2	NSS	20	105	75	125			

FINAL REPORT

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)	GCM0334-SEP24	mg/L	4	< 4	NSS	20	NA	70	130			
Oil & Grease (mineral/synthetic)	GCM0334-SEP24	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	EWL0448-SEP24	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	SKA0196-SEP24	mg/L	0.002	<0.002	ND	10	100	80	120	95	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	GCM0307-SEP24	mg/L	0.0001	<0.0001	NSS	30	88	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	GCM0347-SEP24	mg/L	0.002	< 0.002	NSS	30	104	50	140	NSS	50	140
di-n-Butyl Phthalate	GCM0347-SEP24	mg/L	0.002	< 0.002	NSS	30	105	50	140	NSS	50	140

FINAL REPORT

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	EWL0451-SEP24	mg/L	2	< 2	9	10	97	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	SKA0202-SEP24	as N mg/L	0.5	<0.5	2	10	100	90	110	107	75	125

QC SUMMARY

Volatile Organics

Method: EPA 5030B/8260C | Internal ref.: ME-CA-[ENV]GC-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	GCM0312-SEP24	mg/L	0.0005	<0.0005	ND	30	104	60	130	106	50	140
1,2-Dichlorobenzene	GCM0312-SEP24	mg/L	0.0005	<0.0005	ND	30	103	60	130	103	50	140
1,4-Dichlorobenzene	GCM0312-SEP24	mg/L	0.0005	<0.0005	ND	30	104	60	130	101	50	140
Benzene	GCM0312-SEP24	mg/L	0.0005	<0.0005	ND	30	102	60	130	101	50	140
Chloroform	GCM0312-SEP24	mg/L	0.0005	<0.0005	ND	30	102	60	130	98	50	140
cis-1,2-Dichloroethylene	GCM0312-SEP24	mg/L	0.0005	<0.0005	ND	30	103	60	130	98	50	140
Ethylbenzene	GCM0312-SEP24	mg/L	0.0005	<0.0005	ND	30	104	60	130	103	50	140
m-p-xylene	GCM0312-SEP24	mg/L	0.0005	<0.0005	ND	30	104	60	130	102	50	140
Methyl ethyl ketone	GCM0312-SEP24	mg/L	0.02	<0.02	ND	30	104	50	140	98	50	140
Methylene Chloride	GCM0312-SEP24	mg/L	0.0005	<0.0005	ND	30	99	60	130	96	50	140
o-xylene	GCM0312-SEP24	mg/L	0.0005	<0.0005	ND	30	106	60	130	101	50	140
Styrene	GCM0312-SEP24	mg/L	0.0005	<0.0005	ND	30	105	60	130	102	50	140
Tetrachloroethylene (perchloroethylene)	GCM0312-SEP24	mg/L	0.0005	<0.0005	ND	30	106	60	130	102	50	140
Toluene	GCM0312-SEP24	mg/L	0.0005	<0.0005	ND	30	101	60	130	100	50	140
trans-1,3-Dichloropropene	GCM0312-SEP24	mg/L	0.0005	<0.0005	ND	30	109	60	130	94	50	140
Trichloroethylene	GCM0312-SEP24	mg/L	0.0005	<0.0005	ND	30	103	60	130	99	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.

This report supersedes all previous versions.

-- End of Analytical Report --

APPENDIX E

Dewatering Analysis

Details of Excavation

GS = Ground Surface (masl)
WL = Assumed Depth of Groundwater (m/masl)
a = Length of excavation (m)
b = Width of excavation (m)
D = Depth of Excavation (m/masl)

Parameter	Value	Units
GS	272.60	**masl**
WL	1.50	**m**
	271.10	**masl**
a	71	**m**
b	62	**m**
D	1.00	**m**
	271.60	**masl**

Project Details

Location: 1636 Green Lane E, East Gwilimbury, ON
Project No.: 2177-24-HM
Date: September 26, 2024
Prepared By: KN
Checked By: CH

Radius of Influence Formula (Cashman, P. and Preene, M., 2013):

$$R_{01} = 2.45\sqrt{\frac{HK}{S_y}t}$$

Where:
R01 = Radius of Influence beyond which there is negligible drawdown (m)
H = Distance from initial static water level to bottom of saturated aquifer (m)
K = Hydraulic conductivity (m/s)
S_y = Specific yield of the aquifer formation [-]
t = Time (s) required to draw the static groundwater level to the desired level (assumed to be equivalent to 14 days)

Parameter	Value	Units	
R01	7	**m**	
H	10	**m**	
K	1.1E-07	**m/s**	
S_y	0.20	**[-]**	(Morris and Johnson, 1967)
t	1,209,600	**s**	

Dewatering Rate Formula for Radial Flow to an Excavation in Unconfined Aquifer (Powers et al., 2007):

$$Q = \frac{\pi K(H^2 - h^2)}{\ln(R_{02}/r_e)}$$

Where:

Q = Anticipated unfactored pumping rate (m^3/day)
K = Hydraulic Conductivity (m/day)
H = Distance from initial static water level to bottom of the saturated aquifer (m)
h = Depth of water in the well while pumping (m)
R02 = Radius of Influence beyond which there is negligible drawdown (m)
a = Length (m)
b = Width (m)

Parameter	Value	Units
Q	1.77	**m^3/day**
	0.020	**L/s**
K	9.2E-03	**m/day**
H	10	**m**
h	9	**m**
R02	50	**m**
a	71	**m**
b	62	**m**

Incident Precipitation		
Design Event =	27	mm in 24-hours
Area =	4,402	m^2
Volume =	118.900	m^3/day
	118,900	L/day

* 27 mm/24-hr =99% Percentile Accumulation

Summary

Summary	**Short-Term Pumping Rate Q**		
	m^3/day	**L/day**	**L/s**
Groundwater	3.500	3,500	0.04
Precipitation	118.900	118,900	1.38
Total	122.400	122,400	1.42

Notes:
1. Considering a groundwater factor of safety of: **2**
2. Long-term pumping rate approximately 1/3rd short-term groundwater rate.
Does not include infiltration from rain.
3. Rates rounded to the nearest 100L

APPENDIX F

Water Well Records

MECP WATER WELL RECORDS WITHIN 500M OF SITE

Notes:

UTM: UTM in Zone, Easting, Northing and Datum is NAD83; L: UTM estimated from Centroid of Lot; W: UTM not from Lot Centroid
DATE CNTR: Date Work Completed and Well Contractor Licence Number
CASING DIA: .Casing diameter in inches
WATER: Unit of Depth in Feet. See Table 4 for Meaning of Code
PUMP TEST: Static Water Level in Feet / Water Level After Pumping in Feet / Pump Test Rate in GPM / Pump Test Duration in Hour : Minutes
WELL USE: See Table 3 for Meaning of Code
SCREEN: Screen Depth and Length in feet
WELL: WEL (AUDIT #) Well Tag. A : Abandonment; P: Partial Data Entry Only
FORMATION: See Table 1 and 2 for Meaning of Code

Table 1. Core Material and Descr

Code	Description
BLDR	BOULDERS
BSLT	BASALT
CGRD	COARSE-GRAINED
CGVL	COARSE GRAVEL
CHRT	CHERT
CLAY	CLAY
CLN	CLEAN
CLYY	CLAYEY
CMTD	CEMENTED
CONG	CONGLOMERATE
CRYS	CRYSTALLINE
CSND	COARSE SAND
DKCL	DARK-COLOURED
DLMT	DOLOMITE
DNSE	DENSE
DRTY	DIRTY
DRY	DRY
FCRD	FRACTURED
FGRD	FINE-GRAINED
FGVL	FINE GRAVEL
FILL	FILL
FLDS	FELDSPAR
FLNT	FLINT
FOSS	FOSILIFEROUS
GNIS	GNEISS
GRNT	GRANITE
GRSN	GREENSTONE
GRVL	GRAVEL
GRWK	GREYWACKE
GVLY	GRAVELLY
GYPS	GYPSUM
HARD	HARD
HPAN	HARDPAN
IRFM	IRON FORMATION
LIMY	LIMY
LMSN	LIMESTONE
LOAM	TOPSOIL
LOOS	LOOSE
LTCL	LIGHT-COLOURED
LYRD	LAYERED
MARL	MARL
MGRD	MEDIUM-GRAINED
MGVL	MEDIUM GRAVEL
MRBL	MARBLE
MSND	MEDIUM SAND
MUCK	MUCK
OBDN	OVERBURDEN
PCKD	PACKED
PEAT	PEAT
PGVL	PEA GRAVEL
PORS	POROUS
PRDG	PREVIOUSLY DUG
PRDR	PREV. DRILLED
QRTZ	QUARTZITE
QTZ	QUARTZ
ROCK	ROCK
SAND	SAND
SHLE	SHALE
SHLY	SHALY
SHRP	SHARP
SHST	SCHIST
SILT	SILT
SLTE	SLATE
SLTY	SILTY
SNDS	SANDSTONE
SNDY	SANDYSOAPSTONE
SOFT	SOFT
SPST	SOAPSTONE
STKY	STICKY
STNS	STONES
STNY	STONEY
THIK	THICK
THIN	THIN
TILL	TILL
UNKN	UNKNOWN
VERY	VERY
WBRG	WATER-BEARING
WDFR	WOOD
WTHD	WEATHERED

Notes (Cont'd):

Table 2. Core Colour

Code	**Description**
WHIT	WHITE
GREY	GREY
BLUE	BLUE
GREN	GREEN
YLLW	YELLOW
BRWN	BROWN
RED	RED
BLCK	BLACK
BLGY	BLUE-GREY

Table 3. Well Use

Code	**Description**
DO	Domestic
ST	Livestock
IR	Irrigation
IN	Industrial
CO	Commercial
MN	Municipal
PS	Public
AC	Cooling and A/C
NU	Not Used
OT	Other
TH	Test Hole
DE	Dewatering
MO	Monitoring
MT	Monitoring TestHole

Table 4. Water Detail

Code	Description
FR	Fresh
SA	Salty
SU	Sulphur
MN	Mineral
Uk	Unknown
GS	Gas
IR	Iron

TOWNSHIP CON LOT	UTM	DATE CNTR	CASING	WATER	PUMP TEST	WELL USE	SCREEN	WELL	FORMATION
EAST GWILLIMBURY TOW 02 102	17 625036 4882540 W	2007-05 4102						7045978 (Z56399) A	
EAST GWILLIMBURY TOW CON 02 005	17 625195 4882241 W	1961-12 2310	4	FR 0088	35/40/4/3:0	DO	0088 4	6900075 ()	LOAM 0002 BLUE CLAY 0088 MSND STNS 0092
EAST GWILLIMBURY TOW CON 02 005	17 625201 4882131 W	1961-04 2310	2	FR 0157	30//7/2:0	DO	0159 4	6900076 ()	PRDG 0030 CLAY 0050 MSND CLAY 0090 CLAY 0157 MSND GRVL 0163
EAST GWILLIMBURY TOW CON 02 005	17 625170 4882276 W	1961-12 2310	4	FR 0114	35/100/2/2:0	DO	0114 4	6900077 ()	LOAM 0002 BLUE CLAY 0090 BLUE CLAY STNS 0114 MSND STNS 0118
EAST GWILLIMBURY TOW CON 02 005	17 625190 4882236 W	1962-01 1413	5	FR 0088	23/80/3/:	NU		6900078 () A	BRWN CLAY STNS 0020 BLUE CLAY SILT 0084 CLAY GRVL 0088
EAST GWILLIMBURY TOW CON 02 005	17 625195 4882236 W	1962-03 2310	4	FR 0100	20/95/4/5:0	DO		6900079 ()	LOAM 0002 GREY CLAY 0010 BLUE CLAY 0083 CLAY MSND 0099 MSND GRVL 0101
EAST GWILLIMBURY TOW CON 02 006	17 625002 4882577 W	1950-02 2310	2	FR 0108	20//5/5:0	ST	0108 8	6900080 ()	LOAM 0010 BLUE CLAY 0085 CLAY STNS 0108 FSND 0116
EAST GWILLIMBURY TOW CON 03 005	17 625240 4882348 W	1964-04 3109	30	FR 0036	12//1/:	DO		6900206 ()	LOAM 0001 BLUE CLAY 0040
EAST GWILLIMBURY TOW CON 03 006	17 625190 4882513 W	1965-09 3109	30	FR 0025	8//2/:	DO		6900209 ()	LOAM 0002 CLAY 0023 MSND 0025 CLAY 0027
EAST GWILLIMBURY TOW CON 02 005	17 625165 4882183 W	1968-08 3109	30	FR 0042	14//1/:	DO		6908964 ()	LOAM 0002 BRWN CLAY 0024 BLUE CLAY 0046
EAST GWILLIMBURY TOW CON 02 005	17 625175 4882123 W	1971-10 4231	30	FR 0030	58///:	DO		6910578 ()	BRWN CLAY 0030 BLUE CLAY SILT 0055 BLUE CLAY 0062
EAST GWILLIMBURY TOW CON 02 005	17 625145 4882223 W	1971-07 3109	30	FR 0045	27///:	DO		6910629 ()	LOAM 0002 BRWN CLAY 0018 BLUE CLAY SILT 0050
EAST GWILLIMBURY TOW CON 02 005	17 625190 4882123 W	1972-01 2407	5	UK 0155	65/120/10/5:20	DO	0155 3	6911053 ()	PRDG 0040 BLUE CLAY SAND 0134 BLUE CLAY 0155 BLCK CSND 0168
EAST GWILLIMBURY TOW CON 03 006	17 625165 4882673 W	1972-12 2310	5	FR 0203	35/170/7/2:0	DO	0204 4	6911255 ()	GREY CLAY 0015 BLUE CLAY 0107 BLUE CLAY SAND 0142 BLUE CLAY GRVL 0172 BLUE CLAY 0203 GREY FSND 0208
EAST GWILLIMBURY TOW CON 02 005	17 625041 4882316 W	1973-04 4102	30 30 24	FR 0038	22///:	DO		6911689 ()	LOAM 0002 BRWN CLAY 0012 BLUE CLAY 0040 BLUE CLAY STNS 0080
EAST GWILLIMBURY TOW CON 02 004	17 625165 4882123 W	1978-11 1350	6	FR 0140	42/97/5/72:0	DO		6914826 ()	GREY CLAY 0040 GREY SILT CLAY 0112 GREY CLAY STNS 0135 GREY CLAY 0139 GREY GRVL SAND 0142
EAST GWILLIMBURY TOW CON 02 005	17 625115 4882223 W	1984-07 3108	6	UK 0175 UK 0235		DO		6917186 ()	BRWN CLAY 0020 BLUE CLAY 0047 BLUE CLAY SNDY 0085 BRWN SAND GRVL CLAY 0094 BLUE GRVL CLAY SNDY 0155 FGVL 0157 GREN CLAY SNDY 0165 BRWN FSND 0171 BLUE CLAY 0174 BRWN
EAST GWILLIMBURY TOW CON 02 005	17 625060 4882303 W	1987-11 3108	6	FR 0091	11/90/3/3:0	DO	0091 3	6919140 (13879)	FILL 0012 BLUE CLAY SNDY 0051 SAND GRVL 0052 BLUE CLAY SNDY 0091 SAND GRVL 0097 BLUE CLAY 0100 FSND 0104 BLUE CLAY 0120
EAST GWILLIMBURY TOW 03 006	17 625507 4882578 W	1988-06 1350	6	FR 0068	16/65/4/2:0	DO	0068 4	6919711 (13531)	GREY CLAY 0030 GREY CLAY GRVL 0068 BRWN SAND GRVL 0072
EAST GWILLIMBURY TOW CON 02 008	17 625134 4882586 W	1990-04 5459				DO		6920935 (58492) A	LOAM 0002 BRWN CLAY SNDY 0015 GREY CLAY SAND STNS 0190
EAST GWILLIMBURY TOW CON 02 008	17 625134 4882586 W	1990-04 5459		UK				6920936 (58490)	BRWN CLAY 0016 GREY CLAY 0102 GREY CLAY STNS 0152 GREY CLAY 0320 GRVL CMTD 0329 FSND CMTD 0336 GREY CLAY 0340 BLCK SHLE 0345
EAST GWILLIMBURY TOW CON 03 007	17 625151 4883076 W	1996-11 1413	6	FR 0139	58/300/6/12:0	DO		6923755 (166643)	BRWN CLAY DNSE 0030 GREY CLAY HARD 0129 GREY GRVL CGRD 0130 GREY CLAY HARD 0217 GREY SILT SOFT 0280 GREY CLAY HARD 0335 GREY SHLE LOOS 0339 BLCK SHLE HARD 0356
EAST GWILLIMBURY TOW	17 625381 4882641 W	2006-03 7215	2			NU	0005 5	6930000 (Z43657) A031358	
EAST GWILLIMBURY TOW 02 102	17 625055 4882667 W	2007-04 4102						7043518 (Z56396) A	
EAST GWILLIMBURY TOW CON 02 005	17 625169 4882220 W	2011-11 1413	36		4///:			7174269 (Z140781) A	
EAST GWILLIMBURY TOW	17 625151 4882539 W	2013-11 7201	2					7212751 (Z181968) A	
NEWMARKET TOWN (EAST	17 625293 4882062 W	2014-07 7421				MO		7223345 (Z163539) _NO_TAG	

EAST GWILLIMBURY TOW CON 02 006	17 625049 4882309 W	2014-10 4102						7232538 (Z154861) A	
EAST GWILLIMBURY TOW	17 625409 4882271 W	6946						7323282 (C39191) A233585 P	
EAST GWILLIMBURY TOW	17 625453 4882771 W	2020-04 7472						7363958 (Z338468) A285567 P	
EAST GWILLIMBURY TOW	17 625466 4882734 W	2020-04 7472						7363959 (Z338467) A285566 P	
EAST GWILLIMBURY TOW	17 625471 4882758 W	2020-04 7472						7363960 (Z338466) A285565 P	
EAST GWILLIMBURY TOW	17 625819 4883141 W	2021-03 7230						7389047 (Z349987) A316516 P	
EAST GWILLIMBURY TOW	17 625562 4883082 W	2021-03 7230						7389049 (Z349985) A316515 P	
EAST GWILLIMBURY TOW	17 625125 4882972 W	2021-03 7230						7389050 (Z349984) A316514 P	
EAST GWILLIMBURY TOW	17 625540 4882254 W	2021-07 7644						7395476 (Z367799)	
EAST GWILLIMBURY TOW CON 03 006	17 625895 4882822 W	2021-06 7744						7397423 (Z330104)	
EAST GWILLIMBURY TOW CON 03 006	17 626009 4882829 W	2021-06 7744						7397424 (Z330105)	
EAST GWILLIMBURY TOW CON 03 006	17 625634 4882732 W	2021-06 7744						7397425 (Z330102) A321160 P	
EAST GWILLIMBURY TOW CON 03 006	17 625796 4882679 W	2021-06 7744						7397426 (Z330103)	
EAST GWILLIMBURY TOW CON 03 006	17 625961 4882719 W	2021-06 7744						7397427 (Z330107)	
EAST GWILLIMBURY TOW CON 03 006	17 625567 4882563 W	2021-06 7744						7397428 (Z330101)	
EAST GWILLIMBURY TOW	17 625681 4882150 W	2021-10 7241						7404752 (Z348246) A335987 P	
EAST GWILLIMBURY TOW CON 03 005	17 625717 4882572 W	2021-11 7744	2	UT 0012	///:	MT	0010 5	7405140 (6ME2TCO5)	BLCK 0001 BRWN SAND GRVL FILL 0005 BRWN CLAY SILT DNSE 0010 GREY SILT CLYY HARD 0015
EAST GWILLIMBURY TOW	17 625858 4882711 W	2022-01 1413						7414235 (Z378520)	

1P.

3103d.

UTM 17 Z 625140 E
5 R 4882024 N

Elev. 5 R 0875

Basin 22

The Ontario Water Resources Commission Act

WATER WELL RECORD

GROUND WATER BRANCH
69 № 75
JAN 25 1962
ONTARIO WATER
RESOURCES COMMISSION

County or District YORK
Township, Village, Town or City E. G. T. ~~EAST GWILLIMBURY~~
Con. 2 Lot PART 5
Date completed 7 (day) DEC. (month) 1961 (year)

[redacted]

dress NEWMARKET

Casing and Screen Record

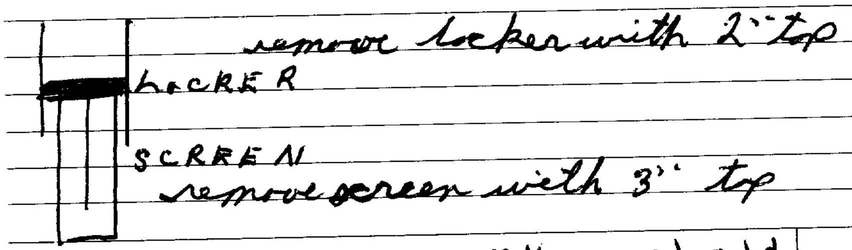
Inside diameter of casing 4''
Total length of casing 88'
Type of screen Cook
Length of screen 4' + 3' neck
Depth to top of screen 85'
Diameter of finished hole 4''

Pumping Test

Static level 35'
Test-pumping rate 4 G.P.M.
Pumping level
Duration of test pumping 3 HR.
Water clear or cloudy at end of test CLEAR
Recommended pumping rate 4 G.P.M.
with pump setting of 84' feet below ground surface

Well Log

Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	Kind of water (fresh, salty, sulphur)
Top Soil	0	2	88'	Fresh
Blue Clay	2	88		
Sand & Stones	88	92		



For what purpose(s) is the water to be used? Household

Is well on upland, in valley, or on hillside? Upland
Drilling or Boring Firm W. F. Gartshore

Address Sharon Ontario

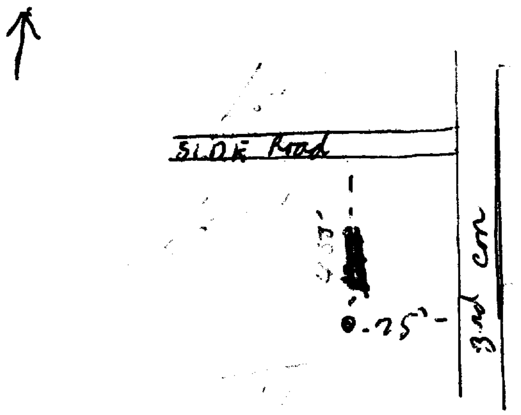
Licence Number 78
Name of Driller or Borer F. Dieman
Address Sharon Ontario
Date Dec/7/61
W. F. Gartshore
(Signature of Licensed Drilling or Boring Contractor)

Form 7 15M Sets 60-5930

WRC COPY

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.



CSS.S8

?

3103d

69 № 76

UTM 17 Z 625143 E

5 R 4881904 N

Elev. 65 R 058 75

The Ontario Water Resources Commission Act

WATER WELL RECORD

Basin 2 W

County or District YORK

Township, Village, Town or City E. GWILL TWP

Date completed 12 (day) APRIL month 1961 year)

[redacted]

dress NEW MARKET

Casing and Screen Record

Inside diameter of casing 2"

Total length of casing 157'

Type of screen CLAYTON MARK

Length of screen 4'

Depth to top of screen 155

Diameter of finished hole 2"

Pumping Test

Static level 30'

Test-pumping rate 7 G.P.M.

Pumping level not known

Duration of test pumping 2 HR

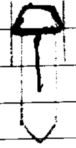
Water clear or cloudy at end of test CLEAR

Recommended pumping rate 7 G.P.M.

with pump setting of 140 feet below ground surface

Well Log

Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	Kind of water (fresh, salty, sulphur)
DUG WELL	0	30	157	fresh
SOFT CLAY	30	50		
SAND + CLAY	50	90		
CLAY	90	157		
[illegible]	157	163		



For what purpose(s) is the water to be used? HOUSEHOLD

Is well on upland, in valley, or on hillside? UPLAND

Drilling or Boring Firm W F Gartshore

Address Sharon

Licence Number 78

Name of Driller or Borer J Diceman

Address Sharon

Date April 12 / 61

W F Gartshore

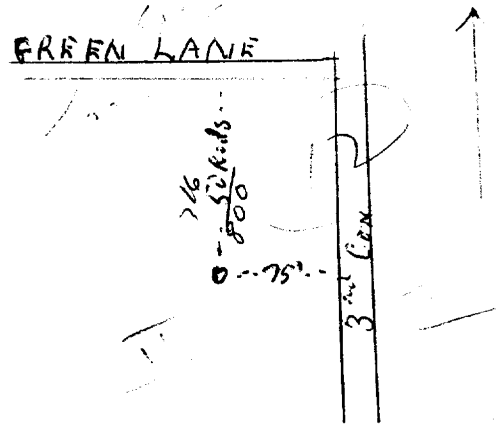
(Signature of Licensed Drilling or Boring Contractor)

Form 7 15M Sets 60-5930

OWRC COPY

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.



CSS.S8

7/4.

3103d

GROUND WATER BRANCH
69 2 No. 9552 77
ONTARIO WATER RESOURCES COMMISSION

UTM 1 7 Z 6 2 5 1 1 1 3 E
15 R 4 8 8 2 0 7 0 N

Elev. 15 R 0 8 7 5

Basin 22

The Ontario Water Resources Commission Act

WATER WELL RECORD

County or District YORK

Township, Village, Town or City ~~EGT~~ EAST GWILLIMBURY

Con. 2 REAR Lot PART 5

Date completed 18 (day) DEC month 1961 year)

[redacted]dress NEWMARKET

Casing and Screen Record

Inside diameter of casing 4"

Total length of casing 114

Type of screen COOK

Length of screen 4' PLUS 3' NECK

Depth to top of screen 109

Diameter of finished hole 4"

Pumping Test

Static level 35'

Test-pumping rate ~~2 HR~~ 2 ½ G.P.M.

Pumping level [illegible]

Duration of test pumping 2 HR

Water clear or cloudy at end of test clear

Recommended pumping rate 2 ½ G.P.M.

with pump setting of 105 feet below ground surface

Well Log

Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	Kind of water (fresh, salty, sulphur)
top soil	0	2	114	fresh
blue clay	2	90		
blue clay an stones	90	114		
sand an stones	114	118		
 remove locker with 2" tap				
remove screen with 3" tap				

For what purpose(s) is the water to be used?
household

Is well on upland, in valley, or on hillside? upland

Drilling or Boring Firm
W. F. Gartshore

Address Sharon

Licence Number 78

Name of Driller or Borer

Address James Diceman

Date Sharon Dec 18/61

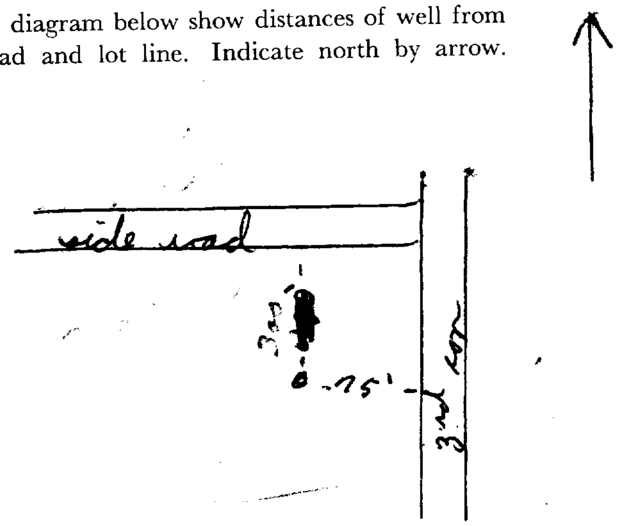
W. F. Gartshore
(Signature of Licensed Drilling or Boring Contractor)

Form 7 15M Sets 60-5930

OWRC COPY

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.



CSS.S8

3103d

GROUND WATER BRANCH
69 No.
JUL 3 1962
ONTARIO WATER
RESOURCES COMMISSION

79

UTM 17 Z 625140 E
5 R ~~1~~ 4882 0114 N
Elev. +5 R 0875

The Ontario Water Resources Commission Act

WATER WELL RECORD

Basin 24 County or District YORK Township, Village, Town or City EGT East Gwillimbury
Con. 2 ~~PLAN 374~~ Lot ~~7~~ 5 Date completed 2 (day) MARCH (month) 1962 (year)
[redacted]dress NEWMARKET

Casing and Screen Record

Inside diameter of casing 4"
Total length of casing 100'
Type of screen NONE
Length of screen
Depth to top of screen
Diameter of finished hole 4"

Pumping Test

Static level 20'
Test-pumping rate 4 G.P.M.
Pumping level 95'
Duration of test pumping 5 HR
Water clear or cloudy at end of test CLEAR
Recommended pumping rate 3½ G.P.M.
with pump setting of 90 feet below ground surface

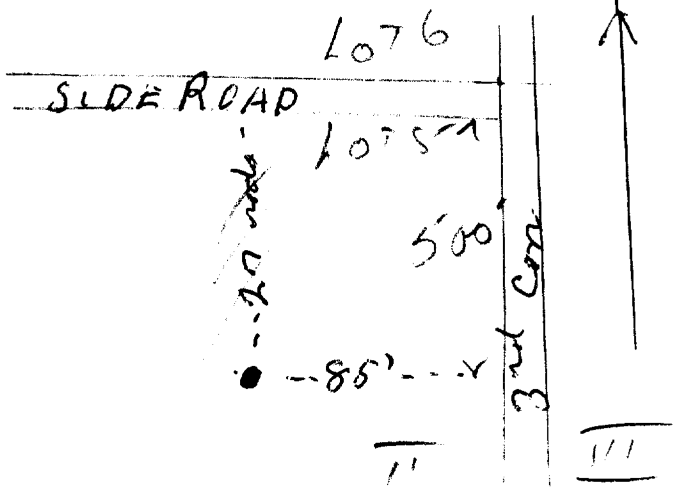
Well Log

Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	Kind of water (fresh, salty, sulphur)
TOP SOIL	0	2		
grey clay	2	10		
blue clay	10	83		
sandy clay	83	99		
sand or gravel	99	101	100'	FRESH

For what purpose(s) is the water to be used? household
Is well on upland, in valley, or on hillside? upland
Drilling or Boring Firm W F Gartshore
Address Sharon
Licence Number 525
Name of Driller or Borer J Dieeman
Address Sharon
Date April 2 1962
W. F. Gartshore
(Signature of Licensed Drilling or Boring Contractor)

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.



Form 7 15M Sets 60-5930

CSS.S8

OWRC COPY

3103d.

23

69 № 80

Received
Apr. 15/50

UTM 17 Z 6249942 E
9 R 4882372 N
Elev. 9 R 08715
Basin 22

ONTARIO

The Well Drillers Act

Department of Mines, Province of Ontario

Water Well Record

[redacted] Con. 2 Lot 6 Pt. Lot
Acres 120

Date Completed Feb 11/50 Cost of Well (not including pump)

Pipe and Casing Record

Casing diameter(s) 2"
Length(s) of casing(s) 20'
Length of screen 2 4' screens
Type of screen Johnson
Type of pump Beatty Pressure
Capacity of pump 3 gal per.
Depth of pump setting 100'

Pumping Test

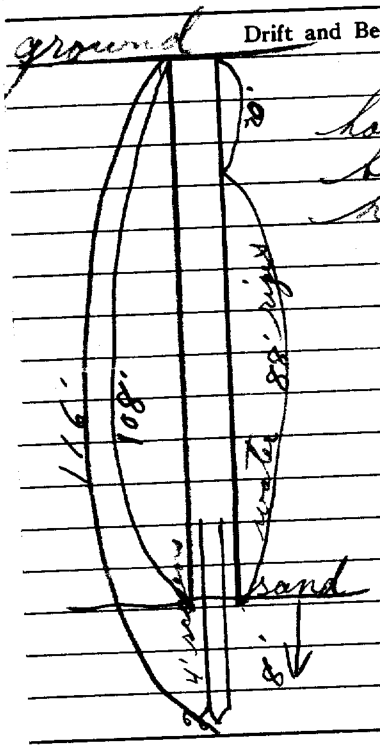
Date Feb. 11
Developed Capacity 5 gal per.
Duration of Test 5 hrs
Pumping Rate 5 gal.
Drawdown not known
Static level of completed well 20'
Is well a gravel-wall type?

Water Record

Kind (fresh or mineral) fresh.
Quality (hard, soft, contains iron, sulphur etc.) soft.
Appearance (clear, cloudy, coloured) clear
For what purpose(s) is the water to be used? stock
How far is well from possible source of contamination? safe
What is source of contamination? none!
Enclose a copy of any mineral analysis that has been made of water

Depth(s) to Water Horizon(s)	Kind of Water	No. of Feet Water Rises
		88

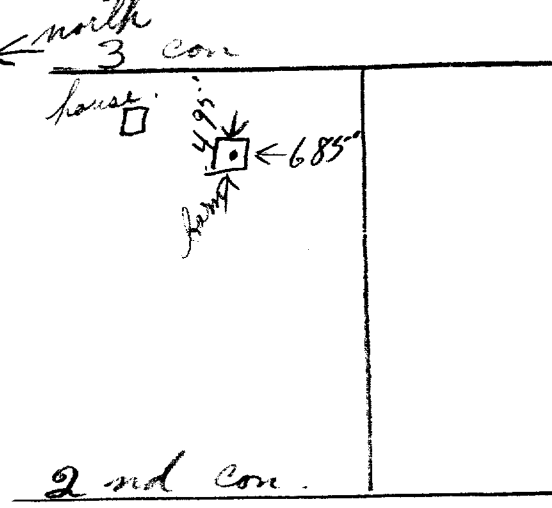
Well Log



Drift and Bedrock Record	From 0 ft.	To ...ft.
hard dark soil		10'
blue clay	10	85'
hard clay & small stones	85	108
fine sand	108	116

Location of Well

In diagram below show distances of well from road and lot line



Situation: Is well on upland, in valley, or on hillside? upland
Drilling Firm W. F. Gartshore
Address Sharon Ont.
Recorded by W. F. Gartshore
Address Sharon Ont.
Date April 3
Licence Number 351

CSS.S8

78

NOT PLOTTED

31D3d.

WATER RESOURCES DIVISION
JUL 14 1964
ONTARIO WATER RESOURCES CO

69 № ~~206~~

UTM | | |Z| | | | | | | |E

Cd 9 R 111 N

Elev. 19 R

Basin 22

The Ontario Water Resources Commission Act

WATER WELL RECORD

County or District York North Township, Village, Town or City East Gwill.

Con. 3 Lot Pt 5. Date completed 24 (day) April (month) 1964 (year)

Owner [redacted] Address R. R. #1, Newmarket

Casing and Screen Record

Inside diameter of casing 30 inches

Total length of casing 40 ft.

Type of screen

Length of screen

Depth to top of screen

Diameter of finished hole 30 inches

Pumping Test

Static level 12

Test-pumping rate 1 G.P.M.

Pumping level

Duration of test pumping

Water clear or cloudy at end of test clear

Recommended pumping rate 1 G.P.M.

with pump setting of 30' feet below ground surface

Well Log

Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	Kind of water (fresh, salty, sulphur)
Top soil	0	1	36 ft.	fresh.
clay	1	12		
Blue clay	12	40		

For what purpose(s) is the water to be used? house

Is well on upland, in valley, or on hillside? upland

~~Drilling~~ or Boring Firm J. G. Kitching & Son Ltd.

Address Holland Landing

Licence Number 57

Name of ~~Driller~~ or Borer Grant Kitching

Address Sharon Ont.

Date May 30, 1964

Grant Kitching

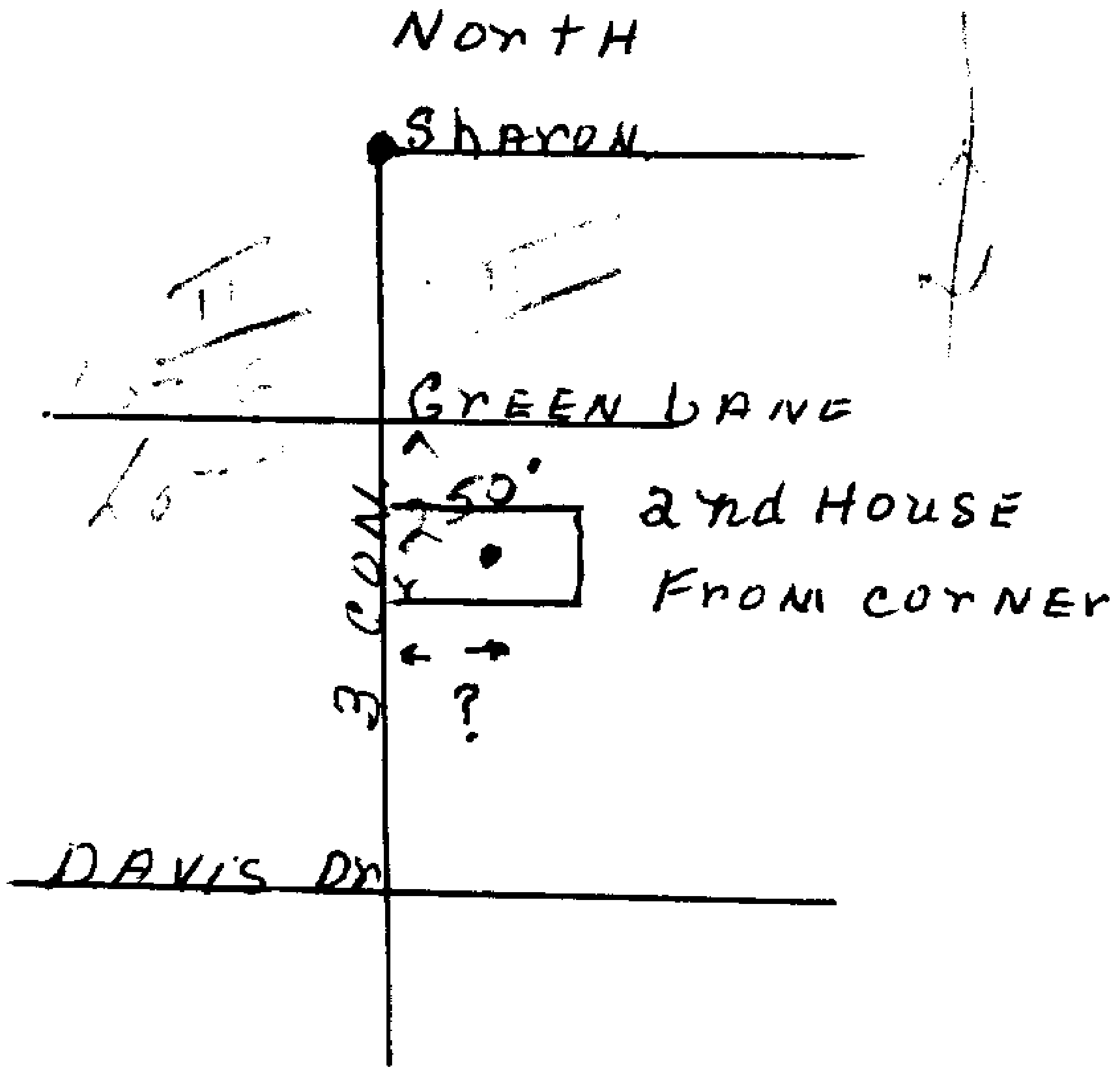
(Signature of Licensed Drilling or Boring Contractor)

Form 7 15M-60-4138

OWRC COPY

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.



CSS.S8

181 31D3d

B

WATER RESOURCES DIVISION
69 No. 209
FEB 24 1966
ONTARIO WATER RESOURCES COMMISSION

UTM 17 Z 625476 E

C 5 R 4882327 N

Elev. 5 R 0880

Basin 22

The Ontario Water Resources Commission Act

WATER WELL RECORD

County or District York

Township, Village, Town or City East Gwillimbury

Con. ~~4~~ III

Lot 6

Date completed 21 (day) Sept. (month) 1965 (year)

[redacted]ess R. R. # 3 Newmarket

Casing and Screen Record		Pumping Test	
Inside diameter of casing	30 inches	Static level	8 ft
Total length of casing	27 ft.	Test-pumping rate	2 G.P.M.
Type of screen		Pumping level	
Length of screen		Duration of test pumping	
Depth to top of screen		Water clear or cloudy at end of test	clear
Diameter of finished hole	30 inches	Recommended pumping rate	2 G.P.M.
		with pump setting of	25 feet below ground surface

Well Log			Water Record	
Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	Kind of water (fresh, salty, sulphur)
Top soil	0	2	25	fresh
Clay	2	23		
Sand	23	25		
Clay.	25	27		

For what purpose(s) is the water to be used? house

Is well on upland, in valley, or on hillside? upland.

Drilling or Boring Firm J F Kitching & Son Ltd.

Address Holland Landing Box 20. Ont.

Licence Number 77

Name of Driller or Borer Dave Draper

Address Keswick. Ont.

Date Oct 1. 1965

Fran Kitchg

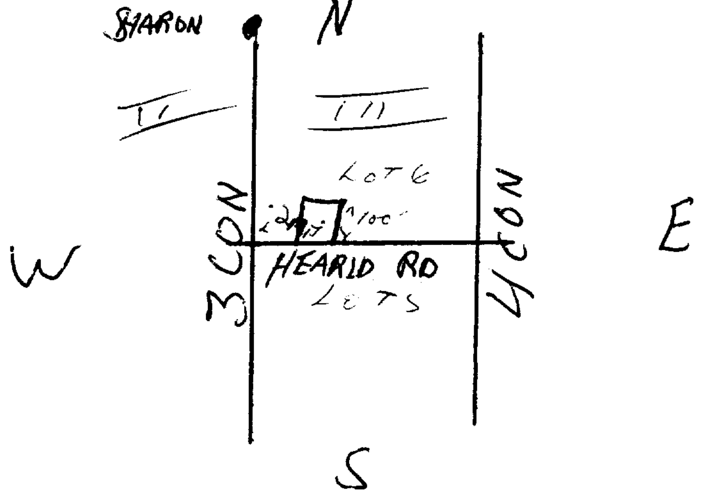
(Signature of Licensed Drilling or Boring Contractor)

Form 7 15M-60-4138

OWRC COPY

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.



CSS.S8

J.B.

6908964
3 9

iM 17 2 625150

4 R4 4881960

lev. 6 R 0925

sin 22 SB

Con II
Lot 5

CODED

31D3d

DIVISION OF
WATER RESOURCES
FEB 3 1969
ONTARIO WATER
RESOURCES COMMISSION

The Ontario Water Resources Commission Act

WATER WELL RECORD

County or ~~District~~ York Township, ~~Village, Town or City~~ imbury

Con 2 Lot ~~17~~ 5 Date completed 21 (day) Aug. (month) 1968 (year)

[redacted] ress R. R. # 3, Newmarket, Ont.

Casing and Screen Record

Inside diameter of casing 30 inches

Total length of casing 46 ft.

Type of screen —

Length of screen —

Depth to top of screen —

Diameter of finished hole 30 inches

Pumping Test

Static level 14 ft.

Test-pumping rate 1 G.P.M.

Pumping level —

Duration of test pumping —

Water clear or cloudy at end of test clear

Recommended pumping rate 1 G.P.M.

with pump setting of 44 feet below ground surface

Well Log

Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	Kind of water (fresh, salty, sulphur)
top soil	0	2	42	fresh
brown clay	2	24		
blue clay	24	46		

For what purpose(s) is the water to be used? house

Is well on upland, in valley, or on hillside? upland

~~Drilling~~ or Boring Firm J. F. Kitching & Son Ltd.,

Address Holland Landing, Ont.

Licence Number 140

Name of ~~Driller~~ or Borer Dave Draper,

Address Keswick, Ont.

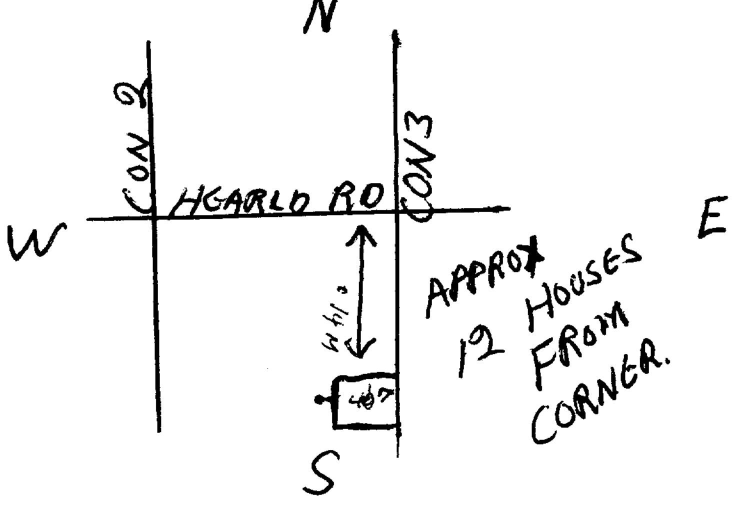
Date Sept. 30, 1968

(Signature of Licensed Drilling or Boring Contractor)

Form 7
OWRC COPY

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.



APPROX 12 HOUSES FROM CORNER.

CSS.S8

3/0/34XD

The Ontario Water Resources Commission Act

WATER WELL RECORD

Water management in Ontario

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11 (1 2) | 6910578 | MUNICIP. 69003 (10 14) | CON. CON 02 (15 22 23 24)

COUNTY OR ~~DISTRICT~~	TOWNSHIP, ~~BOROUGH, CITY, TOWN, VILLAGE~~ (3 9)	CON., BLOCK, ~~TRACT, SURVEY,~~ ETC.	LOT (25-27)
York	East-Gwillimbury	~~3~~ II	~~Pt.5~~ 005

[redacted] RR3 NEWMARKET · Ontario

DATE COMPLETED (48-53) DAY 20 MO. 10 YR. 71

…ING 881900 (24) | RC. 4 (25) | ELEVATION 0875 (26) | RC. 5 (30) | BASIN CODE 22 (31) | II | III | IV | (47)

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH – FEET FROM	DEPTH – FEET TO
Brown		CLAY		0	25
Brown		Gumbo CLAY		25	30
BLUE		SILTY CLAY		30	55
HARD	BLUE	CLAY		55	62½

31 | 0030605 | 005530506 | 0062305

32 (1 2, 10, 14 15, 21, 32, 43, 54, 65, 75, 80)

41 WATER RECORD

WATER FOUND AT – FEET	KIND OF WATER
0030 ~~30-55~~ (10-13)	1 ☒ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL (14)
(15-18)	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL (19)
(20-23)	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL (24)
(25-28)	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL (29)
(30-33)	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL (34 80)

51 CASING & OPEN HOLE RECORD

INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH – FEET FROM	DEPTH – FEET TO
30" (10-11)	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☒ CONCRETE 4 ☐ OPEN HOLE (12)	3"	0	~~62½~~ 0062 (13-16)
(17-18)	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE (19)			(20-23)
(24-25)	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE (26)			(27-30)

OVER A

SCREEN

SIZE(S) OF OPENING (SLOT NO.) (31-33)	DIAMETER (34-38) INCHES	LENGTH (39-40) FEET
MATERIAL AND TYPE	DEPTH TO TOP OF SCREEN (41-44) FEET	80

61 PLUGGING & SEALING RECORD

DEPTH SET AT – FEET FROM	DEPTH SET AT – FEET TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)
(10-13)	(14-17)	
(18-21)	(22-25)	
(26-29)	(30-33)	80

71 PUMPING TEST

PUMPING TEST METHOD (10) 1 ☐ PUMP 2 ☐ BAILER

PUMPING RATE (11-14) GPM.

DURATION OF PUMPING (15-16) HOURS (17-18) MINS.

STATIC LEVEL 058 ~~58~~ FT (19-21) FEET

WATER LEVEL END OF PUMPING (22-24) FEET

WATER LEVELS DURING (25) 1 ☐ PUMPING 2 ☒ ~~RECOVERY~~

15 MINUTES (26-28) FEET | 30 MINUTES (29-31) FEET | 45 MINUTES (32-34) FEET | 60 MINUTES (35-37) FEET — ~~Overnight~~

IF FLOWING, GIVE RATE (38-41) GPM.

PUMP INTAKE SET AT FEET

WATER AT END OF TEST (42) 1 ☒ CLEAR 2 ☐ CLOUDY

RECOMMENDED PUMP TYPE ☐ SHALLOW ☒ DEEP

RECOMMENDED PUMP SETTING (43-45) ~~N.A.~~ FEET

RECOMMENDED PUMPING RATE (46-49) ~~N.A.~~ GPM.

(50-53) ___.___ GPM./FT. SPECIFIC CAPACITY

FINAL STATUS OF WELL (54)

- 1 ☒ WATER SUPPLY
- 2 ☐ OBSERVATION WELL
- 3 ☐ TEST HOLE
- 4 ☐ RECHARGE WELL
- 5 ☐ ABANDONED, INSUFFICIENT SUPPLY
- 6 ☐ ABANDONED, POOR QUALITY
- 7 ☐ UNFINISHED

WATER USE (55-56) 01

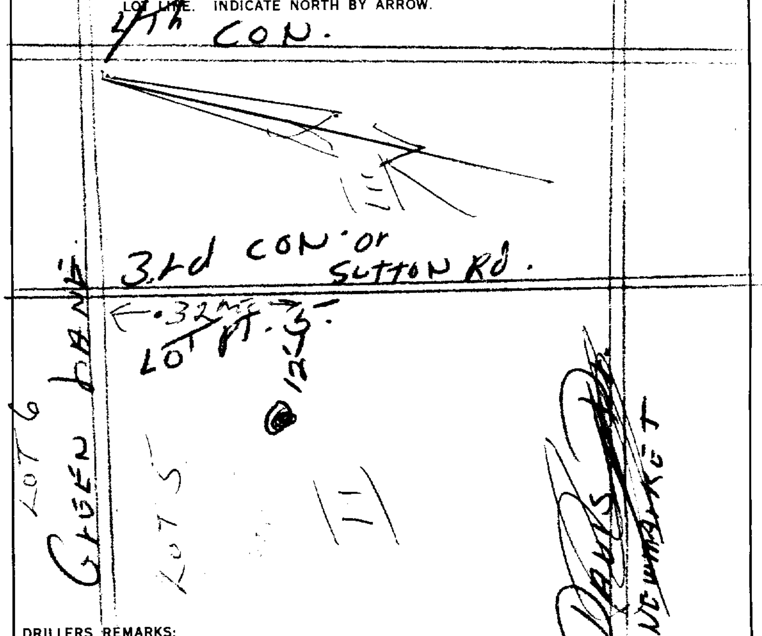
- 1 ☒ DOMESTIC
- 2 ☐ STOCK
- 3 ☐ IRRIGATION
- 4 ☐ INDUSTRIAL
- ☐ OTHER
- 5 ☐ COMMERCIAL
- 6 ☐ MUNICIPAL
- 7 ☐ PUBLIC SUPPLY
- 8 ☐ COOLING OR AIR CONDITIONING
- 9 ☐ NOT USED

METHOD OF DRILLING (57)

- 1 ☐ CABLE TOOL
- 2 ☐ ROTARY (CONVENTIONAL)
- 3 ☐ ROTARY (REVERSE)
- 4 ☐ ROTARY (AIR)
- 5 ☐ AIR PERCUSSION
- 6 ☒ BORING
- 7 ☐ DIAMOND
- 8 ☐ JETTING
- 9 ☐ DRIVING

LOCATION OF WELL

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW.



DRILLERS REMARKS:

CONTRACTOR

NAME OF WELL CONTRACTOR: PIKE'S WELL Digging | LICENCE NUMBER: 4231

ADDRESS: 10 Howard Rd. NWKT.

NAME OF DRILLER OR BORER: G. PIKE | LICENCE NUMBER:

SIGNATURE OF CONTRACTOR:

SUBMISSION DATE DAY 17 MO. 11 YR. 71

OFFICE USE ONLY

DATA SOURCE (58) 1 | CONTRACTOR (59-62) 4231 | DATE RECEIVED (63-68) 171171 | 80

DATE OF INSPECTION: MAR-27/72 | INSPECTOR: J-B.

REMARKS: CSS.S8

P/ J.B.

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OWRC COPY

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The Ontario Water Resources Commission Act

WATER WELL RECORD

656

Water management in Ontario

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11 (1 2)

6910629

MUNICIP. 69003 (10 14)

CON. C0N 02 (15 22 23 24)

COUNTY OR ~~DISTRICT~~	TOWNSHIP, ~~BOROUGH, CITY, TOWN, VILLAGE~~ 3 9	CON., ~~BLOCK, TRACT, SURVEY, ETC.~~	LOT 25-27
YORK	EAST GWILLIMBURY	2 E.pt	~~5~~ 005

[redacted]SS 61 Christie St. Apt. 104, TORONTO

DATE COMPLETED 48-53: DAY 07 MO. ~~July~~ 07 YR. ~~71~~ 71

THING 882000 (24) RC. 4 (25) ELEVATION 0875 (26) RC. 5 (30) BASIN CODE 22 (31) II III IV (47)

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH – FEET FROM	DEPTH – FEET TO
	top soil			0	2
	brown clay			2	18
	blue silty clay			18	50

31 | 0002 02 | 0018605 | 005030506

32

1 2 10 14 15 21 32 43 54 65 75 80

41 WATER RECORD

WATER FOUND AT – FEET	KIND OF WATER
10-13 0045	☒ 1 FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL 14
15-18	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL 19
20-23	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL 24
25-28	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL 29
30-33	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL 34 80

51 CASING & OPEN HOLE RECORD

INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH – FEET FROM	DEPTH – FEET TO
10-11 30	1 ☐ STEEL 12 2 ☐ GALVANIZED ☒ 3 CONCRETE 4 ☐ OPEN HOLE	3	0	13-16 0050
17-18	1 ☐ STEEL 19 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			20-23
24-25	1 ☐ STEEL 26 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			27-30

SCREEN

SIZE(S) OF OPENING (SLOT NO.) 31-33	DIAMETER 34-38 INCHES	LENGTH 39-40 FEET
MATERIAL AND TYPE	DEPTH TO TOP OF SCREEN 41-44 FEET	80

61 PLUGGING & SEALING RECORD

DEPTH SET AT – FEET FROM	DEPTH SET AT – FEET TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)
10-13	14-17	
18-21	22-25	
26-29	30-33	80

71 PUMPING TEST

PUMPING TEST METHOD 10	PUMPING RATE 11-14	DURATION OF PUMPING
1 ☐ PUMP 2 ☐ BAILER	GPM.	15-16 HOURS 17-18 MINS.

STATIC LEVEL	WATER LEVEL END OF PUMPING	25 WATER LEVELS DURING 1 ☐ PUMPING 2 ☒ ~~RECOVERY~~			
19-21	22-24	15 MINUTES 26-28	30 MINUTES 29-31	45 MINUTES 32-34	60 MINUTES 35-37
027 FEET	FEET	~~6 ft. – 24 hrs.~~ FEET	FEET	FEET	FEET

IF FLOWING, GIVE RATE 38-41	PUMP INTAKE SET AT	WATER AT END OF TEST 42
GPM.	FEET	☒ 1 CLEAR 2 ☐ CLOUDY

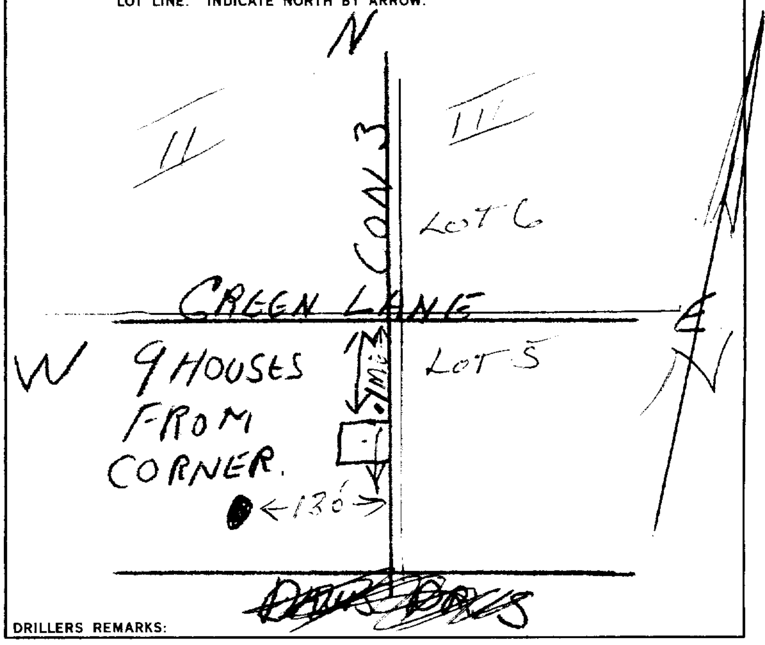
RECOMMENDED PUMP TYPE	RECOMMENDED PUMP SETTING 43-45	RECOMMENDED PUMPING RATE 46-49
☐ SHALLOW ☒ DEEP	048 FEET	0001 GPM.

50-53 ____________ GPM./FT. SPECIFIC CAPACITY

FINAL STATUS OF WELL 54	☒ 1 WATER SUPPLY 2 ☐ OBSERVATION WELL 3 ☐ TEST HOLE 4 ☐ RECHARGE WELL 5 ☐ ABANDONED, INSUFFICIENT SUPPLY 6 ☐ ABANDONED, POOR QUALITY 7 ☐ UNFINISHED
WATER USE 01 55-56	☒ 1 DOMESTIC 2 ☐ STOCK 3 ☐ IRRIGATION 4 ☐ INDUSTRIAL ☐ OTHER 5 ☐ COMMERCIAL 6 ☐ MUNICIPAL 7 ☐ PUBLIC SUPPLY 8 ☐ COOLING OR AIR CONDITIONING 9 ☐ NOT USED
METHOD OF DRILLING 57	1 ☐ CABLE TOOL 2 ☐ ROTARY (CONVENTIONAL) 3 ☐ ROTARY (REVERSE) 4 ☐ ROTARY (AIR) 5 ☐ AIR PERCUSSION ☒ 6 BORING 7 ☐ DIAMOND 8 ☐ JETTING 9 ☐ DRIVING

LOCATION OF WELL

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW.



DRILLERS REMARKS:

CONTRACTOR

NAME OF WELL CONTRACTOR	LICENCE NUMBER
J. F. KITCHING & SON LTD.,	3109
ADDRESS BOX 20, HOLLAND LANDING, ONT.	
NAME OF DRILLER OR BORER D. DRAPER,	LICENCE NUMBER
SIGNATURE OF CONTRACTOR	SUBMISSION DATE DAY 23 MO. July YR. 71

OFFICE USE ONLY

DATA SOURCE 58	CONTRACTOR 59-62	DATE RECEIVED 63-68	80
1	3109	13 12 71 ~~1312~~	
DATE OF INSPECTION MAR. 27/92	INSPECTOR J.B.		
REMARKS: CSS.S8 P/E B			

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ONTARIO

MINISTRY OF THE ENVIRONMENT
The Ontario Water Resources Act

WATER WELL RECORD

31D/3W

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11 | 6911255 | MUNICIP. 69003 | CON. CON 03

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON., ~~BLOCK, TRACT, SURVEY, ETC.~~	LOT 25-27
YORK	EAST GWILLIMBURY	~~E~~ III	006

[redacted] NEWMARKET R.R.3. ONTARIO

DATE COMPLETED 48-53: DAY 11 MO. 12 YR. 72

82450 | RC 4 | ELEVATION 0860 | RC 5 | BASIN CODE 22

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	TO
grey	clay			0	15
blue	clay			15	107
blue	clay	sand		107	142
blue	clay	gravel		142	172
blue	clay			172	203
grey	sand		fine	203	208

31 | 0015205 | 0107305 | 014230528 | 017230511 | 0203305 | 0208208

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
0203	1 ☒ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL

51 CASING & OPEN HOLE RECORD

INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	TO
05	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE	.244	0	~~204~~ 0204
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			

SCREEN

SIZE(S) OF OPENING (SLOT NO.)	DIAMETER	LENGTH
006	05000 INCHES	04 FEET

MATERIAL AND TYPE: ~~stainless steel~~
DEPTH TO TOP OF SCREEN: ~~204~~ 0204 FEET

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)

71 PUMPING TEST

PUMPING TEST METHOD: 1 ☐ PUMP 2 ☒ BAILER
PUMPING RATE: 0007 GPM.
DURATION OF PUMPING: 02 HOURS 00 MINS.

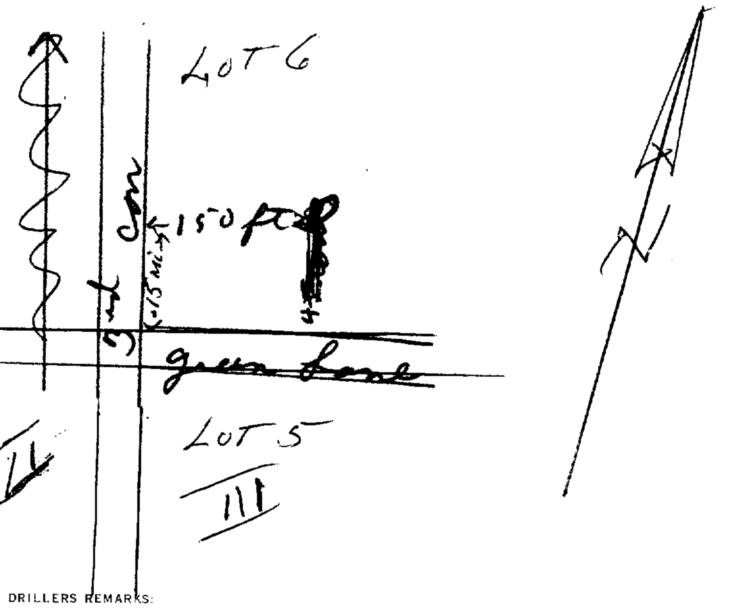
STATIC LEVEL	WATER LEVEL END OF PUMPING	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
035 FEET	170 FEET	035 FEET	035 FEET	035 FEET	035 FEET

WATER LEVELS DURING: 1 ☐ PUMPING 2 ☒ RECOVERY

IF FLOWING GIVE RATE: GPM.
PUMP INTAKE SET AT: FEET
WATER AT END OF TEST: 1 ☒ CLEAR 2 ☐ CLOUDY
RECOMMENDED PUMP TYPE: ☐ SHALLOW ☒ DEEP
RECOMMENDED PUMP SETTING: 204 FEET
RECOMMENDED PUMPING RATE: 0007 GPM.
000.1 GPM./FT. SPECIFIC CAPACITY

LOCATION OF WELL

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW.



DRILLERS REMARKS:

FINAL STATUS OF WELL
1 ☒ WATER SUPPLY
2 ☐ OBSERVATION WELL
3 ☐ TEST HOLE
4 ☐ RECHARGE WELL
5 ☐ ABANDONED, INSUFFICIENT SUPPLY
6 ☐ ABANDONED, POOR QUALITY
7 ☐ UNFINISHED

WATER USE 01
1 ☒ DOMESTIC
2 ☐ STOCK
3 ☐ IRRIGATION
4 ☐ INDUSTRIAL
☐ OTHER
5 ☐ COMMERCIAL
6 ☐ MUNICIPAL
7 ☐ PUBLIC SUPPLY
8 ☐ COOLING OR AIR CONDITIONING
9 ☐ NOT USED

METHOD OF DRILLING
1 ☒ CABLE TOOL
2 ☐ ROTARY (CONVENTIONAL)
3 ☐ ROTARY (REVERSE)
4 ☐ ROTARY (AIR)
5 ☐ AIR PERCUSSION
6 ☐ BORING
7 ☐ DIAMOND
8 ☐ JETTING
9 ☐ DRIVING

CONTRACTOR
NAME OF WELL CONTRACTOR: W.F. Gartshore
LICENCE NUMBER:
ADDRESS: Sharon
NAME OF DRILLER OR BORER: J. Dickman
LICENCE NUMBER: 1711
SIGNATURE OF CONTRACTOR: Fred Gartshore
SUBMISSION DATE: DAY 04 MO. 01 YR. 73

OFFICE USE ONLY
DATA SOURCE: 1
CONTRACTOR: 2310
DATE RECEIVED: 150173
DATE OF INSPECTION: Feb.14/73
INSPECTOR: J.B.
REMARKS: CSS.S8
P/J.B.
WI/J.B.

MINISTRY OF THE ENVIRONMENT COPY

FORM 7 07-091

Ontario ·b

MINISTRY OF THE ENVIRONMENT

The Ontario Water Resources Act

WATER WELL RECORD

31D/3W

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11   6911689   P

MUNICIP. 69003   CON. CØN 02

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON., BLOCK, TRACT, SURVEY, ETC.	LOT
YORK	EAST GWILLIMBURY	~~III~~ II	005

[redacted] #3 NEWMARKET, ONT.

DATE COMPLETED DAY 10 MO. 04 YR. 73

ING   RC.   ELEVATION   RC.   BASIN CODE   II   III   IV

4882093   4   875   5   22   JUN 18, 1976   181

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
	TOP SOIL			0	2
BROWN	CLAY		LOOSE	2	12
BLUE	CLAY		LOOSE	12	40
BLUE	CLAY	SOME STONES	DENSE	40	80

OWRC P.7

OWRC V-3

31   0002 02   0012605   0040305   0080205 12

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
0038 ~~38~~	1 ☑ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL

51 CASING & OPEN HOLE RECORD

INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
30	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☑ CONCRETE 4 ☐ OPEN HOLE	3	0	0010 ~~10~~
30	1 ☐ STEEL 2 ☑ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE		10	0040 ~~40~~
24	1 ☐ STEEL 2 ☑ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE		40	0080 ~~80~~

SCREEN

SIZE(S) OF OPENING (SLOT NO.)	DIAMETER INCHES	LENGTH FEET

MATERIAL AND TYPE	DEPTH TO TOP OF SCREEN FEET

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	DEPTH SET AT - FEET TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)

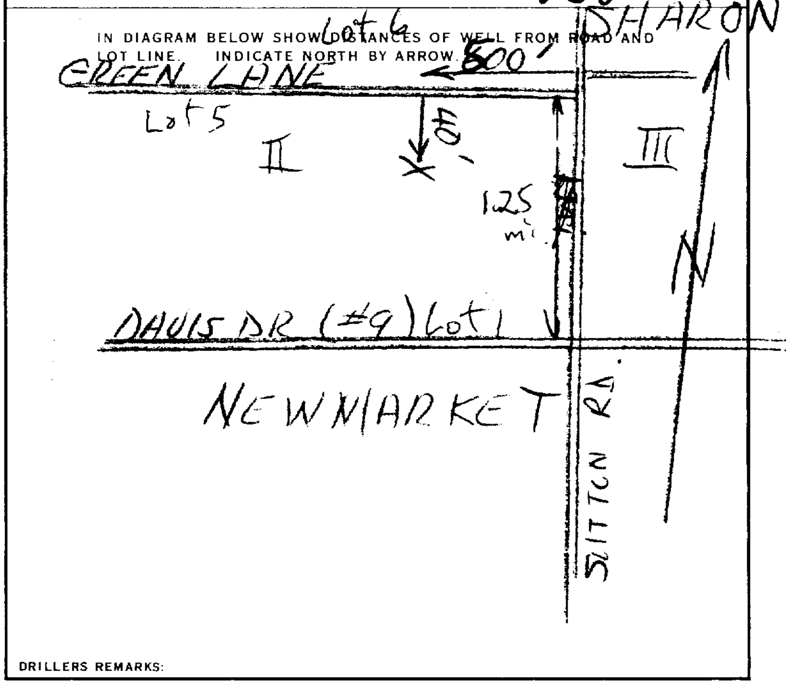
71 PUMPING TEST

PUMPING TEST METHOD 1 ☐ PUMP 2 ☐ BAILER	PUMPING RATE GPM	DURATION OF PUMPING HOURS MINS
STATIC LEVEL 022 ~~22~~ FEET	WATER LEVEL END OF PUMPING FEET	WATER LEVELS DURING 1 ☐ PUMPING 2 [redacted] 15 MINUTES 30 MINUTES 45 MINUTES 60 MINUTES [redacted]
IF FLOWING, GIVE RATE GPM	PUMP INTAKE SET AT FEET	WATER AT END OF TEST 1 ☐ CLEAR 2 ☐ CLOUDY
RECOMMENDED PUMP TYPE ☐ SHALLOW ☑ DEEP	RECOMMENDED PUMP SETTING 073 FEET	RECOMMENDED PUMPING RATE 0004 GPM

FINAL STATUS OF WELL 1	1 ☑ WATER SUPPLY 2 ☐ OBSERVATION WELL 3 ☐ TEST HOLE 4 ☐ RECHARGE WELL	5 ☐ ABANDONED, INSUFFICIENT SUPPLY 6 ☐ ABANDONED, POOR QUALITY 7 ☐ UNFINISHED
WATER USE 01	1 ☑ DOMESTIC 2 ☐ STOCK 3 ☐ IRRIGATION 4 ☐ INDUSTRIAL ☐ OTHER	5 ☐ COMMERCIAL 6 ☐ MUNICIPAL 7 ☐ PUBLIC SUPPLY 8 ☐ COOLING OR AIR CONDITIONING 9 ☐ NOT USED
METHOD OF DRILLING 6	1 ☐ CABLE TOOL 2 ☐ ROTARY (CONVENTIONAL) 3 ☐ ROTARY (REVERSE) 4 ☐ ROTARY (AIR) 5 ☐ AIR PERCUSSION	6 ☑ BORING 7 ☐ DIAMOND 8 ☐ JETTING 9 ☐ DRIVING

LOCATION OF WELL 2582

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW.



DRILLERS REMARKS:

CONTRACTOR

NAME OF WELL CONTRACTOR: ONTARIO WELL DRILLING Co.   LICENCE NUMBER: 4102

ADDRESS: 637 GORHAM St. NEWMARKET

NAME OF DRILLER OR BORER: DAVE MOORE   LICENCE NUMBER: 4102

SIGNATURE OF CONTRACTOR: Dave Moore   SUBMISSION DATE DAY 11 MO. 5 YR. 73

OFFICE USE ONLY

DATA SOURCE	CONTRACTOR	DATE RECEIVED
1	4102	240573

DATE OF INSPECTION: Oc28/75   INSPECTOR: J.B.

REMARKS: P/JD

CSS.S8

MINISTRY OF THE ENVIRONMENT COPY

FORM 7   07-091

Ontario (https://www.ontario.ca/page/government-ontario)

Map: Well records

This map allows you to search and view well record information from reported wells in Ontario.

Full dataset is available in the Open Data catalogue (https://data.ontario.ca/dataset/well-records) .

Go Back to Map

Well ID

Well ID Number: 6914826
Well Audit Number:
Well Tag Number:
This table contains information from the original well record and any subsequent updates.

Well Location

Address of Well Location	
Township	EAST GWILLIMBURY TOWNSHIP
Lot	004

Concession	CON 02
County/District/Municipality	YORK
City/Town/Village	
Province	ON
Postal Code	n/a
UTM Coordinates	NAD83 — Zone 17 Easting: 625164.60 Northing: 4882123.00
Municipal Plan and Sublot Number	
Other	

Overburden and Bedrock Materials Interval

General Colour	Most Common Material	Other Materials	General Description	Depth From	Depth To
GREY	CLAY			0 ft	40 ft

GREY	SILT	CLAY		40 ft	112 ft
GREY	CLAY	STNS		112 ft	135 ft
GREY	CLAY			135 ft	139 ft
GREY	GRVL	SAND		139 ft	142 ft

Annular Space/Abandonment Sealing Record

Depth From	Depth To	Type of Sealant Used (Material and Type)	Volume Placed

Method of Construction & Well Use

Method of Construction	Well Use
Cable Tool	
	Domestic

Status of Well

Water Supply

Construction Record - Casing

Inside Diameter	**Open Hole or material**	**Depth From**	**Depth To**
6 inch	STEEL		142 ft

Construction Record - Screen

Outside Diameter	Material	Depth From	Depth To

Well Contractor and Well Technician Information

Well Contractor's Licence Number: 1350

Results of Well Yield Testing

After test of well yield, water was	CLEAR

If pumping discontinued, give reason	
Pump intake set at	
Pumping Rate	5 GPM
Duration of Pumping	72 h:0 m
Final water level	97 ft
If flowing give rate	
Recommended pump depth	
Recommended pump rate	
Well Production	PUMP
Disinfected?	

Draw Down & Recovery

Draw Down Time(min)	Draw Down Water level	Recovery Time(min)	Recovery Water level
SWL	42 ft		
1		1	

2		2	
3		3	
4		4	
5		5	
10		10	
15		15	
20		20	
25		25	
30		30	
40		40	
45		45	
50		50	
60		60	

Water Details

Water Found at Depth	Kind
140 ft	Fresh

Hole Diameter

Depth From	Depth To	Diameter

Audit Number:

Date Well Completed: November 06, 1978

Date Well Record Received by MOE: January 05, 1979

Related

How to use a Ministry of the Environment map (https://www.ontario.ca/page/how-use-ministry-environment-map#wells)

Technical documentation: Metadata record (https://data.ontario.ca/dataset/well-records/resource/3031344e-e3f2-48d5-888c-c1deadfd2f77)

Updated: January 10, 2024
Published: March 20, 2014

Consulting
Engineers and
Scientists

Hydrogeological Study

Proposed Commercial / Industrial Development

1656 Green Lane East, East Gwillimbury, Ontario

Submitted to:
GL West Preferred Limited Partnership
c/o Rice Commercial Group
75 Tiverton Court
Markham, Ontario, L3R 4M8

Submitted by:
GEI Consultants, Inc.
647 Welham Road, Unit 14
Barrie, Ontario, L4N 0B7
705-719-7994

August 2. 2022 (Rev. 1)
Project No. 2101711

Table of Contents

Table of Contents (cont'd)

Figures

Table

Appendices

1. Introduction

GEI Consultants (GEI) was retained by GL West Preferred Limited Partnership c/o Rice Commercial Group to complete a subsurface investigation and hydrogeological study for the proposed commercial and/or industrial development to be located at 1656 Green Lane East, in East Gwillimbury, Ontario. A site location plan is enclosed as Figure 1.

This revision to the report (Revision 1, dated August 2, 2022) is being provided to address comments received as part of a regulatory body review process. This includes revision to the water balance calculations to only include Site 2 within the water balance calculations and inclusion of monthly groundwater levels in determination of the seasonally high groundwater elevation to be used for design purposes.

The existing property of 1656 Green Lane East ranges between 560 to 690 metres long (east to west) and 190 metres wide (north to south). The property is currently agricultural farm field, with a small portion within the northwest corner containing two watercourse tributaries and a small wetland. The property is bounded by Green Lane East to the south, an off-ramp associated with Highway 404 to the east, agricultural lands to the north and residential/commercial property to the west. An aerial image of the site is provided as Figure 2A.

GEI was provided with the preliminary drawing, *“1656 Green Lane Avenue East, East Gwillimbury, ON, 20.283, Concept Site Plan,”* Drawing No. A1-4, dated January 25, 2021, by Turner Fleischer Architects. It is proposed to construct the following:

- Site 1: Two 17,000 sq. ft buildings in the southwestern portion of the site (Buildings ‘A’ and ‘B’).
- Site 2: One 344,100 sq. ft building in the centre and eastern portions of the site (Building ‘C’), consisting of warehouse space and 2 storeys of office space.
- Extension to Harry Walker Parkway extending to the north end of the site (running north to south).
- Parking and driving lanes surrounding the buildings.

Draft site servicing and grading plans by GEI’s municipal group were also reviewed for Site 2 (Building C). The drawings show preliminary locations for proposed water services, storm, and sanitary sewers. Inverts of the pipes were not available.

The purpose of GEI’s subsurface investigation was to obtain subsurface information by advancing seven (7) boreholes instrumented with monitoring wells spread across the site and carrying out groundwater level measurements, rising head tests, and sampling for groundwater chemical analysis. This report summarizes the existing site conditions, provides hydrogeological engineering recommendations, conducts an impact assessment for groundwater quality and quantity, and provides measures for mitigating the impacts. This report has been prepared following typical Conservation Authority guidelines for hydrogeological report submissions.

It is noted that a supplemental groundwater monitoring program was carried out between June 2021 and May 2022. The results are summarized in GEI's *"Monthly Groundwater Monitoring Assessment, Proposed Commercial/Industrial Development, 1656 Green Lane East, East Gwillimbury, Ontario",* dated August 2, 2022.

2. Site Setting

2.1 Physiography, Surficial and Bedrock Geology

The site is located within the physiographic region denoted as the Schomberg Clay Plains (Chapman & Putnam, 1984). The portion of Schomberg Clay Plain covering Newmarket and East Gwillimbury is located on the north slope of the Oak Ridges Moraine and typically consists primarily of deposits of stratified clay and silt. A drumlinized till plain typically underlies the varved clay and silt deposits.

Surficial and bedrock geology mapping of the site by the Ontario Geological Survey indicates that the site consists of fine-textured glaciolacustrine deposits of silt and clay, which can be massive to well laminated. At depth, shale and limestone bedrock of the Lindsay Formation is present.

As discussed in Section 4, the site is predominantly underlain by cohesionless glacial till with some surficial sand and silt deposits. The physiographic and surficial geology mapping contain higher-level information and variations for local sites is expected.

2.2 Topography and Drainage

A topographic sketch of the site was provided to GEI and reviewed: *"Sketch Showing Elevations, Town of East Gwillimbury, Regional Municipality of York,"* File No. 05-4218, elevations measured on November 28, 2005, by E.R. Garden Limited. The sketch shows spot elevations and contours, and the site generally slopes from near Elev. 283 in the east down to Elev. 267 metres in the west, for about 16 metres of topographic relief across the site. The overall site appears to drain west into the creek and drainage feature located in the northwestern quadrant of the site.

Based on the geodetic survey results of the boreholes advanced at the site by GEI, the site grades range from near Elev. 270 metres in the west and Elev. 283 metres in the east, similar to the topographic sketch.

A small creek flows westward through the northwestern quadrant of the site. The creek originates to the northeast of the site and is a tributary of Holland River East Branch, which eventually flows north and converges with the main Holland River before outletting into Lake Simcoe. There is a drainage swale and outletting tile drain in the northwestern quadrant of the site that also flows into the tributary creek. MNRF mapping shows that an unevaluated wetland is located about 100 metres west of the site. There may also be a small unevaluated wetland feature in the northwestern corner of the site along the creek based on visual observations, aerial images, and the topographic sketch.

The Ontario Flow Assessment Tool (OFAT) by the MNRF was reviewed to confirm the drainage patterns at the site. OFAT shows that the site drains westward into the tributary creek.

2.3 MECP Well Records

Ministry of Environment, Conservation and Parks (MECP) water well records were obtained within 500 metres of the site area to assess the general nature of the groundwater resource in near vicinity of the site, and historical/current uses of wells in the area. 41 well records were found, and a summary of the data obtained from this review is presented below. The approximate MECP well locations are shown on Figure 4 and a well record summary table is included in Appendix E.

The wells were installed for the following uses:

- 22 for domestic water supply.
- 1 for livestock.
- 1 for monitoring, testing and other purposes.
- 16 not used, abandoned or for unknown use.
- 1 for public water supply.

The stratigraphic descriptions within the MECP monitoring well records are typically inaccurate due to the methodology in which they are determined (observations of cuttings and no consistency between descriptions of soil between different drillers). Though this is the case, an overall sense of the deep stratigraphy can be determined by looking at commonalities between most stratigraphic descriptions and if / where the wells terminated in an aquifer.

In the area surrounding the site, the well records generally indicate that the soil consists of “clay” and some sand zones were encountered at depths of about 7 metres below grade. Where information was available, the domestic wells were screened deeper than 21 metres below grade and water was noted at depths of 8 metres or deeper. Shale bedrock was encountered in two wells at approximately 103 metres below grade.

2.4 Active PTTWs

Online mapping from the MECP was reviewed for the site and surrounding area for active Permits to Take Water (PTTW). Three PTTWs are listed at a golf course approximately 1.2 km northeast of the site. The permits indicate approximately 500,000 to 1,600,000 L/day of groundwater is taken for golf course irrigation (commercial use). The next closest PTTW is for active construction dewatering about 2.3 km southwest of the site, where up to approximately 1,400,000 L/day of groundwater is taken by The Regional Municipality of York.

2.5 Visual Inspection of Site

A visual site inspection was carried out on June 29, 2021 by senior GEI staff to assess site drainage, topography and presence of surface water features. The property is currently agricultural farm field, with a small portion within the northwest corner containing two watercourse tributaries and a small wetland. The property is bounded by Green Lane East to the south, an off-ramp associated with Highway 404 to the east, agricultural lands to the north and residential/commercial property to the west. A residential dwelling appears to have formerly existed in the southwestern corner of the property but was previously demolished. Some trees are still in that area.

The site slopes from east to west and appears to generally drain west into the creek and drainage feature located in the northwestern quadrant of the site. Based on the preliminary visual estimates, it appears that the entire existing site consists of permeable land.

2.6 Regulatory Requirements

2.6.1 Source Water Protection

The site is in the East Holland River Watershed, within the jurisdiction of the Lake Simcoe Region Conservation Authority (LSRCA). The following documents should be used in determination of the regulatory requirements when it comes to maintaining hydrogeological function at this site:

- "*Lake Simcoe Protection Plan*", dated July 2009, by MOECC, MNR & LSRCA.
- "*Approved South Georgian Bay Lake Simcoe Source Protection Plan*", dated January 26, 2015, by LSRCA.
- *"Lake Simcoe Protection Plan Water Budget Policy for LSPP 4.8-DP and 6.40-DP,"* dated November 2018, by LSRCA.

Based on online MECP and York Region source water protection mapping, the following is noted:

- Wellhead Protection Area (WHPA): The entire site is within a WHPA Q2 (Figure 5A).
- Highly Vulnerable Aquifer (HVA): The site is not within an HVA (Figure 5B).
- Significant Groundwater Recharge Area (SGRA): The site is not within an SGRA (Figure 5C).
- The site is not within the Oak Ridges Moraine or Niagara Escarpment.

"Lake Simcoe Protection Plan Water Budget Policy for LSPP 4.8-DP and 6.40-DP," (by LSRCA, dated November 2018) Section 6.0 describes the policy hierarchy for water balance

required for Lake Simcoe Watershed. The policies from most to least stringent are described below:

- Source Protection Plan Land Use Policy (SPP LUP) 12: *"Planning Approval Authorities shall only permit new major development (excluding single detached residential, barns and non-commercial structures that are accessory to an agricultural operation) in a WHPA-Q2 where the activity would be a significant drinking water threat, where it can be demonstrated through the submission of a hydrogeological study that the existing water balance can be maintained through the use of best management practices such as low impact development. Where necessary, implementation and maximization of off-site recharge enhancement within the same WHPA-Q2 to compensate for any predicted loss of recharge from the development."*
- Designated Policy (DP) 6.40: *"Outside of the Oak Ridges Moraine area, an application for major development within a significant groundwater recharge area (SGRA) shall be accompanied by an environmental impact study that demonstrates that the quality and quantity of groundwater in these areas and the function of the recharge areas will be protected, improved or restored."*
- Designated Policy (DP) 4.8 d): *"An application for major development shall be accompanied by a stormwater management plan that demonstrates: through an evaluation of anticipated changes in the water balance between pre-development and post-development, how such changes shall be minimized."*

The site is within a WHPA Q2, therefore SPP LUP 12 applies to the site. A major development is proposed therefore DP 4.8 also applies. A water balance and recommended mitigation measures are discussed in Section 5. Based on Table 2 in *"Lake Simcoe Protection Plan Water Budget Policy for LSPP 4.8-DP and 6.40-DP,"* infiltration-based practices are likely not permitted for impervious areas of the commercial/industrial development (e.g. the parking lots) which are considered pollution "hot spots." Infiltration of runoff from vegetated areas and rooftops is always permitted.

The following policy will also apply at the site:

- *"Phosphorous Offsetting Policy",* dated September 2017, by LSRCA.

Section 4.4 Phosphorous Offsetting Policies in the above document discusses the applicable policies, including that the application for a major development *"... shall be accompanied by a Preliminary Phosphorous Budget as part of an overall Functional Servicing Report or Preliminary Stormwater Management Report."* Phosphorous offsetting must be carried out as part of the stormwater management report to be completed for the site by others. Some additional details are provided in Section 5 of this report.

2.6.2 Groundwater Dewatering

The volume of water entering the excavation will be based on both ground water infiltration and precipitation events. Based on O.Reg. 63/16, the following dewatering limits and requirements are as follows:

- Construction Dewatering less than 50,000 L/day: The takings of both groundwater and stormwater do not require a hydrogeological report and does not require a Permit to Take Water (PTTW) from the Ministry of Environment, Conservation and Parks (MECP).
- Construction Dewatering greater than 50,000 L/day and less than 400,000 L/day: The taking of groundwater and/or stormwater requires a hydrogeological report and registration on the Environmental Activity and Sector Registry (EASR) but does not require a PTTW from the MECP.
- Construction Dewatering greater than 400,000 L/day: The taking of groundwater and/or stormwater requires a hydrogeological report and a PTTW from the MECP.

For permanent dewatering, based on Section 34 of O.Reg. 387/04, the dewatering limits and requirements are as follows:

- Water Taking less than 50,000 L/day: A PTTW is not required from the MECP.
- Water Taking greater than 50,000 L/day: A PTTW is required from the MECP.

3. Procedures and Methodology

Prior to the commencement of drilling activities, the locations of underground utilities including natural gas, electrical, telephone, water, etc. were marked out by public and private utility locating companies. The fieldwork for the drilling program was carried out on June 21, 2021. A total of seven boreholes (Boreholes 1 to 7) were advanced on site using a track-mounted drill rig. To advance the boreholes, continuous flight solid stem augers and standard soil sampling equipment was utilized. All samples were collected as per ASTM D1586 to assess the strength characteristics of the substrate.

The boreholes were advanced to depths of 7.6 to 8.1 metres below grade. The horizontal locations were laid out in the field by GEI prior to the drilling operations and the locations are shown on Figures 2A (aerial image) and 2B (proposed site plan). Ground surface elevations of the boreholes were measured using survey equipment in reference to a geodetic benchmark at the site (catch basin on the westbound lane of Green Lane East) with a geodetic elevation of 272.27 metres. The GPS coordinates of the borehole locations were measured with a handheld GPS unit and were referenced to the NAD 83 geodetic datum.

The field staff examined and classified characteristics of the soils encountered in the boreholes, including the presence of earth fill, made groundwater observations during and upon completion of the drilling, recorded observations of borehole construction, and processed the recovered samples. Soil sampling was conducted at regular intervals for the full depth of the borehole. The boreholes were backfilled upon completion. All recovered soil samples were logged in the field, carefully packaged and transported to the laboratory for more detailed examination and classification. In the laboratory, the samples were classified as to their visual and textural characteristics and geotechnical laboratory testing was carried out with the results included in Appendix B. Monitoring wells were installed in each borehole to facilitate long-term groundwater monitoring and sampling. Monitoring well construction is shown on the borehole logs in Appendix A.

4. Subsurface Conditions

4.1 General Overview

The detailed soil profiles encountered in the boreholes are indicated on the attached borehole logs in Appendix A and the subsurface profile on Figure 3. The geotechnical laboratory results are included in Appendix B and the borehole locations are shown on Figures 2A and 2B.

It should be noted that the conditions indicated on the borehole logs are for specific locations only and can vary beyond and between the borehole locations. It should be noted that the soil boundaries indicated on the borehole logs and cross-section are inferred from non-continuous sampling and observations during drilling. These boundaries are intended to reflect approximate transition zones and should not be interpreted as exact planes of geological change.

In addition, the descriptions provided in the borehole logs are inferred from a variety of factors, including visual observations of the soil samples retrieved, laboratory testing, measurements prior to and after drilling, and the drilling process itself (speed of drilling, shaking/grinding of the augers, etc.). The passage of time also may result in changes in conditions interpreted to exist at locations where sampling was conducted.

4.2 Stratigraphy

Borehole 2 encountered a topsoil layer at the ground surface that was 200 mm thick. Underlying the topsoil in Borehole 2 and at the ground surface in the remaining boreholes, cohesionless deposits were encountered that consisted of sand with some silt, to silty sand, to sand and silt. The upper 0.8 metres of sand typically contained trace amounts of organics. The cohesionless deposits were typically brown and moist to wet, and extended to depths of 0.8 to 2.3 metres below grade (Elev. 280.9 to 267.1 metres). The Standard Penetration Test (SPT) results (“N” Values) measured in these upper deposits ranged from 5 to 19 blows per 300 mm of penetration, indicating a loose to compact relative density.

Borehole 2 encountered a cohesionless deposit of sand with some silt and trace gravel underlying the upper silty sand to sandy silt. The brown and wet sand was encountered at a depth of 1.5 metres below grade (Elev. 267.1 metres) and extended to 4.6 metres below grade (Elev. 264.0 metres). The SPT “N” Values measured in the sand ranged from 33 to 50 blows per 300 mm of penetration, indicating a dense relative density. Borehole 2 was advanced in the northwestern corner of the site near the creek.

Underlying the sands and silts, the boreholes encountered deposits of glacial till with a cohesionless matrix consisting of sandy silt with some clay and trace gravel. The glacial till graded to a silty sand or sand and silt with depth in some boreholes. The glacial till was encountered at depths of 0.8 to 4.6 metres below grade (Elev. 280.9 to 264.0 metres), extended to a depth of 3.1 metres below grade (Elev. 267.8 metres) in Borehole 1, and extended beyond the vertical depth of investigation in Boreholes 2 to 7 at depths of 7.6 to 8.1 metres (Elev. 275.5 to 260.9 metres). The glacial till was typically brown and moist, turning grey around 4.5 to 7 metres below grade. The measured SPT "N" Values ranged from 7 to greater than 100 blows per 300 mm of penetration, indicating a loose to very dense (but generally dense to very dense) relative density. Some wet sand seams were noted within the glacial till as well as embedded cobbles or boulders based on auger grinding.

The glacial till deposit in Borehole 5 was interbedded with a cohesive deposit of silt, with some clay to clayey, and trace sand. The silt extended from 2.3 metres below grade (Elev. 276.5 metres) to a depth of 4.6 metres (Elev. 274.2 metres). The silt was brown and moist, and the SPT "N" Values ranged from 46 to 100 blows per 300 mm of penetration, indicating a hard consistency.

Lastly, the glacial till in Borehole 1 was underlain by greyish brown and wet gravel and sand with some silt. The gravel and sand was encountered at a depth of 3.1 metres below grade (Elev. 267.8 metres) and extended beyond the depth of investigation at 7.7 metres below grade (Elev. 263.2 metres). The SPT "N" Values were greater than 100 blows, indicating a very dense relative density.

Figure 2-15 in the document, *"East Holland River Subwatershed Plan"* (LSRCA, 2010) shows a geological cross-section north to south along Yonge Street through the watershed (Yonge Street is about 4 km west of the site). The geological cross-section is included in Appendix I and the site is generally located between Holland Landing and Aurora Road. It shows that the site is likely underlain by Halton Till (part of the Halton Aquitard) near the ground surface, which may be underlain by the Oak Ridges Aquifer Complex. The glacial till deposit encountered at the site is assumed to be Halton Till, and the sand and gravel deposit below the glacial till in Borehole 1 may be part of the Oak Ridges Aquifer Complex or a locally discontinuous zone.

4.3 Groundwater

4.3.1 Groundwater Levels

Unstabilized groundwater level measurements and cave measurements were taken upon completion of drilling of each borehole as shown on the borehole logs in Appendix A. These measurements provide a rough estimate of the possible excavation and temporary groundwater control constructability considerations that may arise. The boreholes remained open and unstabilized groundwater was measured at depths of 2.7 to 7.6 metres below grade upon completion.

Monitoring wells were installed in each borehole to facilitate the measurements of long-term, stabilized groundwater levels. The 50 mm diameter PVC wells had 3-metre-long screens. A summary of the groundwater level measurements are present in Table 1, appended, and the highest groundwater level measurements are summarized below.

Monitoring Well	Screened Location		Strata Screened	Highest Groundwater Level Depth / Elev. (m) of
	Depth (m)	Elev. (m)		
1	4.6 to 7.6	266.2 to 263.2	Gravel & Sand	0.1 / 270.7
2	4.5 to 7.5	264.1 to 261.1	Sand & Silt Glacial Till	0.8 / 267.8
3	4.6 to 7.6	267.44 to 264.44	Silty Sand Glacial Till	0.8 / 271.2
4	4.5 to 7.5	272.4 to 269.4		0.9 / 276.0
5	4.5 to 7.5	274.3 to 271.3	Sandy Silt Glacial Till	1.3 / 277.4
6	4.5 to 7.5	278.7 to 275.7		0.8 / 282.4
7	4.5 to 7.5	277.7 to 274.7		0.4 / 281.8

Based on the groundwater level measurements to date, the highest groundwater table beneath the site is approximately 0.1 to 1.3 metres below grade. Groundwater contours are shown on Figures 6A and 6B and the groundwater generally flows to the west / northwest across the site, toward the creek.

Based on the existing site grades and measured water levels, it is expected that some groundwater will emerge as baseflow into the creek and wetland in the northwestern corner of the site. Lower baseflow is expected from the glacial till deposits but higher baseflow is expected from the sands encountered in Borehole 2 near the creek (although the lateral extent of the deeper sand deposit is unknown).

As previously discussed, the glacial till deposit encountered at the site is assumed to be part of the Halton Till Aquitard, and the sand and gravel deposit below the glacial till in Borehole 1 may be part of the Oak Ridges Aquifer Complex or a locally discontinuous zone.

4.3.2 In-Situ Permeability

Rising head tests were completed in the monitoring wells installed in Boreholes 1 to 7 on June 29, 2021. Water was manually purged from the monitoring wells using LDPE piping and a foot valve. The static water level was measured prior to the start of testing, and the change in water level was monitored using an electronic level logger. The tests were completed to estimate the horizontal hydraulic conductivity (K) of the soils at the well screen depths.

A horizontal hydraulic conductivity value was calculated from the rising head data using Hvorslev's solution (1951). The semi-log plot for drawdown versus time for the tests are provided in Appendix D and are summarized in the table below.

Monitoring Well	Screened Location		Strata Screened	Hydraulic Conductivity (m/s)
	Depth (m)	Local Elev. (m)		
1	4.6 to 7.6	266.2 to 263.2	Gravel & Sand	*3 x 10^{-7}
2	4.5 to 7.5	264.1 to 261.1	Sand & Silt Glacial Till	3 x 10^{-8}
3	4.6 to 7.6	267.44 to 264.44	Silty Sand Glacial Till	1 x 10^{-6}
4	4.5 to 7.5	272.4 to 269.4	Silty Sand Glacial Till	4 x 10^{-7}
5	4.5 to 7.5	274.3 to 271.3	Sandy Silt Glacial Till	1 x 10^{-7}
6	4.5 to 7.5	278.7 to 275.7	Sandy Silt Glacial Till	2 x 10^{-7}
7	4.5 to 7.5	277.7 to 274.7	Sandy Silt Glacial Till	3 x 10^{-7}

*Initial recharge was fast but reduced over time.

In addition to the above-noted permeability data, the hydraulic conductivity of the soils encountered on site was estimated from grain size distribution curves (as provided in Appendix B). According to Freeze and Cherry (1979), the typical hydraulic conductivity of the strata investigated are:

- Glacial Till: 10^{-6} m/s to 10^{-10} m/s
- Silty Sand: 10^{-3} m/s to 10^{-7} m/s
- Sand: 10^{-2} m/s to 10^{-5} m/s
- Gravel: 10^{-2} m/s to 10^{-5} m/s

The document, *"East Holland River Subwatershed Plan"* (LSRCA, 2010) discusses that the Halton Till Aquitard consists of sandy silt to clayey silt glacial till and has a low permeability. Table 5-2 in the LSRCA document indicates that Halton Till typically has a horizontal K of $5x10^{-7}$ m/s and anisotropy of 0.3, indicating horizontal groundwater flow is greater than vertical flow through the deposit. Table 5-2 indicates that the horizontal K of the Oak Ridges Moraine typically ranges from $5x10^{-7}$ to $2.4x10^{-4}$ m/s. The K values measured in the glacial till at the site are within the expected range listed in Table 5-2 of the LSRCA subwatershed plan. The initial recharge in the very dense gravel and sand deposit was faster but reduced over time, and it is therefore expected that the gravel and sand deposit is either locally discontinuous or is locally at a higher elevation, and most of the recharge into the well was governed by the surrounding glacial till.

Glacial till (Halton Till Aquitard) was predominantly encountered beneath the site. For preliminary design purposes, it is recommended to use a hydraulic conductivity of 5 x 10^{-7} m/s during water taking calculations until final grading and site servicing plans are available.

The existing site plan shows that development is not currently proposed near Borehole 2, which encountered a wet sand extending to 4.6 metres below grade (Elev. 264.0 metres) above the glacial till. Rising head tests were not completed within this sand, but the hydraulic conductivity is estimated to be on the order of $1x10^{-5}$ m/s to $1x10^{-6}$ m/s. Final grading and servicing plans should be reviewed to check if development will occur near Borehole 2 (near the existing creek).

The very dense gravel and sand deposit was only encountered in Borehole 1 at a depth of 3.1 metres below grade (Elev. 267.8 metres). Final site servicing and grading plans should be reviewed to check if excavations will extend into the gravel and sand, and a test dig with test pits may be warranted along service alignments to verify the expected flows into open excavations.

4.3.3 Infiltration

Determination of percolation rates are based on the "*Ministry of Municipal Affairs and Housing (MMAH) Supplementary Guidelines SB-6, Percolation Time and Soil Descriptions, September 14, 2012*". Most boreholes encountered a surficial sand with some silt to silty sand that was about 0.8 metres thick which is classified as SM under the Unified Soil Classification System (USCS). Infiltration is expected to be governed by the sand and silt to sandy silt glacial till deposits underlying the upper sand to silty sand across the site, which are also classified as SM under the USCS. Based on document SB-6, the soil type, and the results of the hydraulic conductivity testing, the unfactored percolation rate (T-Time) for design is 20 mins/cm and the equivalent unfactored infiltration rate is 30 mm/hr.

Appendix C of *"Low Impact Development Stormwater Management and Planning Design Guide"* (Version 1.0, 2010, by CVC and TRCA) suggests safety factors to be applied to infiltration rates. A similar soil horizon exists below grade and a safety factor of 2.5 is expected, indicating a factored infiltration rate of 12 mm/hr.

This infiltration rate is not applicable below the groundwater table, which was encountered approximately 0.8 to 2.5 metres below grade across the site. If LID infiltration measures will be designed and constructed on site, GEI can further refine the infiltration rates by excavating test pits and conducting Guelph Permeameter tests in the exact footprints and elevations of the LID measures.

4.3.4 Baseline Groundwater Chemistry Testing

To establish baseline conditions and assess the suitability for discharge of pumped groundwater to the land surface or into the York Region sewers during potential dewatering activities, the following groundwater samples were collected and tested at the site:

- Unfiltered groundwater samples were collected from the wells in Boreholes 1 and 6 and tested for metals, inorganics, volatile organic compounds (VOC), petroleum hydrocarbons (PHC), and total suspended solids (TSS) relative to Provincial Water Quality Objectives (PWQO).
- Filtered groundwater samples were collected from the wells in Boreholes 1 and 6 and tested for metals and TSS relative to PWQO.
- An unfiltered groundwater sample was collected from the well in Borehole 3 and tested relative to the Regional Municipality of York Bylaw No. 2011-56, *Discharge of Sewage, Storm Water and Land Drainage Bylaw*.

The samples were collected and placed into 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 field filtered samples were run through a 75 µm filter. The samples were submitted to CALA- accredited Caduceon Environmental Laboratories for analysis. The results of the groundwater chemistry are presented in the laboratory Certificates of Analysis provided in Appendix C.

A summary of the results is presented in the table below for samples relative to Provincial Water Quality Objectives (PWQO).

Well Sample Location	Parameters Tested	Groundwater Exceedances to Tested PWQO Parameters (Measured Value > PWQO Limit, µg/L)
BH 1 (Unfiltered)	Metals, Inorganics, VOCs, PHCs, TSS	Toluene (5.5 > 0.8)
BH 1 (Filtered)	Metals, TSS	Zinc (27 > 20)
BH 6 (Unfiltered)	Metals, Inorganics, VOCs, PHCs, TSS	Cobalt (3.6 < 0.9) Zinc (21 > 20) Toluene (2.5 > 0.8) Thallium, Silver, Cadmium*
BH 6 (Filtered)	Metals, TSS	Cobalt (3.5 < 0.9) Zinc (23 > 20) Thallium, Silver, Cadmium*

*Assumed to be false positives.

High concentrations of chloride and sodium in the groundwater in BH6 interfered with the inductively coupled plasma mass spectrometry (ICPMS) used by the laboratory to test the groundwater relative to PWQO. As such, the samples had to be diluted and the lowest detection limits for some metals parameters in BH6 are higher than normal. The exceedances reported for thallium, silver and cadmium are a result of the lowest detection limit exceeding the PWQO guideline standard but are assumed to actually meet PWQO similar to BH1 (i.e. they are false positives).

Field filtering the groundwater samples reduced TSS concentrations from 22 to 51 mg/L in the unfiltered samples to less than 0.3 mg/L. Despite the TSS reduction, exceedances persisted for metals parameters zinc in Borehole 1 and zinc and cobalt in Borehole 6, indicating that these metals may be dissolved in the groundwater instead of binding to the sediment.

Exceedances for toluene were also detected in the groundwater samples. The toluene concentrations exceeded PWQO standards by 1.7 to 4.7 µg/L. The other BTEX parameters (benzene, ethylbenzene, and xylene) did not exceed PWQO but the concentrations were just above the detection limits. Additional groundwater sampling and testing should be completed prior to construction to confirm if the toluene exceedance is a false positive or if it persists. Groundwater disposal recommendations are discussed in Section 5.6.

A summary of the results is presented in the table below for the sample relative to York Region sewer use Bylaw 2011-56.

Well Sample Location	Parameters Tested (Bylaw 2011-56)	Groundwater Exceedances to Storm / Sanitary Sewer Discharge Bylaw
BH 3	York Region Sanitary Sewer Discharge	No Exceedances Detected
	York Region Storm Sewer Discharge	TSS (202 > 15 mg/L) Toluene (2.8 > 2.0 µg/L)

The groundwater sample from the well in Borehole 3 met York Region sanitary sewer discharge guidelines but exceeded storm sewer guidelines for TSS and toluene. It is expected that filtration techniques will reduce the TSS to within the storm sewer guidelines based on the results of the PWQO testing, which reduced TSS to less than 0.3 mg/L. Similar to the PWQO samples, benzene and xylene met the sewer use Bylaw standards but their concentrations were just above the detection limits. Additional groundwater sampling and testing should be completed prior to construction to confirm if the toluene exceedance is a false positive or if it persists. Groundwater disposal recommendations are discussed in Section 5.6.

5. Discussion and Analysis

5.1 Proposed Development Plan

GEI was provided with the preliminary drawing, *"1656 Green Lane Avenue East, East Gwillimbury, ON, 20.283, Concept Site Plan,"* Drawing No. A1-4, dated January 25, 2021, by Turner Fleischer Architects. It is proposed to construct the following:

- Site 1: Two 17,000 sq. ft buildings in the southwestern portion of the site (Buildings 'A' and 'B').
- Site 2: One 344,100 sq. ft building in the centre and eastern portions of the site (Building 'C'), consisting of warehouse space and 2 storeys of office space.
- Extension to Harry Walker Parkway extending to the north end of the site (running north to south).
- Parking and driving lanes surrounding the buildings.

Draft site servicing and grading plans by GEI's municipal group were also reviewed for Site 2 (Building C). The drawings show preliminary locations for proposed water services, storm, and sanitary sewers. Inverts of the pipes were not available.

5.2 Preliminary Groundwater Control Methodology

5.2.1 Temporary Construction Groundwater Control

Based on the groundwater level measurements and moisture contents of the recovered soil samples, the prevailing groundwater table beneath the site is approximately 0.8 to 2.5 metres below grade. Groundwater contours are shown on Figures 6A and 6B and the groundwater generally flows to the west / northwest across the site, toward the creek. Glacial till (Halton Till Aquitard) was predominantly encountered beneath the site. For preliminary design purposes, it is recommended to use a hydraulic conductivity of 5×10^{-7} m/s during water taking calculations until final grading and site servicing plans are available. The final plans must be reviewed to confirm if the gravel and sand in Borehole 1 below Elev. 267.8 metres or the upper wet sand in Borehole 2 will be penetrated, and the calculations updated as needed. A test dig with test pits may be warranted by the contractor along service alignments to verify the expected flows into open excavations to confirm the dewatering approach.

Excavations for site servicing or foundation construction may extend below the groundwater table, but excavations are expected to extend primarily into the glacial till deposits. The expected seepage rate is low such that groundwater control can likely be accomplished using a series of conventional sump pumps. Wet sand seams are likely present within the glacial till, but the seams are expected to be horizontally discontinuous and can be drained and then pumped out of the excavation where encountered. A positive dewatering system is not expected to be required on a preliminary basis, but this must be confirmed when final site servicing and grading plans are available.

A preliminary construction dewatering assessment was carried out with the following assumptions:

- Trenches will extend 3 metres below grade for installation of new services. The sides will be sloped at 1 horizontal to 1 vertical and the base of the trench will be 2 metres wide (8 metres wide at the top of the trench).
- The groundwater table was set at 0.8 metres below grade and the dewatering target was set at 0.5 metres below the base of the excavation. Total drawdown will be 2.7 metres.
- 50 metres of trench will be excavated at a time.

The preliminary calculations are summarized below and must be updated once final site grading and servicing plans are available.

Radius of Influence

Typically, the radius of influence for the construction dewatering is calculated based on the empirical Sichardt equation. The Sichardt was specifically developed for coarse sands and gravels. This equation is used to predict the distance at which the drawdown resulting from pumping is negligible. This equation is empirical and was developed to provide representative flow rates using the steady state flow dewatering equations, as discussed below.

It is noted that in steady state conditions, the radius of influence of pumping will extend until boundary flow conditions are reached and provide sufficient water inputs to the aquifer, such as recharge and surface water bodies. The radius of influence (R_o) of pumping based on the Sichardt formula is described as follows:

$$\mathrm{R_o} = 3000 \times (H - h) \times \sqrt{K}$$

Where: H = Water level above the base of the aquifer prior to dewatering
h = water level at the equivalent radius of the excavation
K = Hydraulic Conductivity in m/sec

The radius of influence for the assumed utility trench and subsurface conditions was calculated to be on the order of 5.7 metres. The radius of influence is relatively small due to the low permeability glacial till predominantly encountered beneath the site.

Preliminary Construction Dewatering Calculations

Preliminary construction dewatering estimates for the assumed utility trench were carried out using the Dupuit equation and equivalent well radius method to calculate steady-state flow to a linear excavation from both sides of a trench and at both ends of the trench. The equation which was used to obtain a flow rate estimate while dewatering is expressed as follows:

$$Q_w = \left(\frac{\pi K (H^2 - h^2)}{\ln {}^{R_O}\!/_{r_s}} \right) + 2 \left(\frac{x K (H^2 - h^2)}{2 R_O} \right)$$

Where:
Q_w = Rate of pumping (m^3/sec)
x = Length of excavation (m)
K = Hydraulic conductivity (m/sec)
H = Head beyond the influence of pumping (static groundwater elevation) (m)
h = Head above base of aquifer at the excavation (m)
R_o = Radius or zone of influence (m)
r_s = Equivalent well radius (m)

For the assumed 50 metre length of trench, 2.7 metre drawdown, safety factor of 1.5, and a 25 mm rainfall event, the empirical equivalent well method estimates a steady-state water taking rate on the order of approximately 44,500 L/day (factored). The results are included in Appendix F.

The estimated water taking rate is less than 50,000 L/day, and therefore neither registration on the Environmental Activity and Sector Registry (EASR) nor a Permit to Take Water (PTTW) from the MECP are expected to be required for water taking to support the majority of the project. This estimate must be confirmed once final grading and site servicing plans are available. Higher water taking rates may be required depending on the final depth of utilities and if they will penetrate into the gravel and sand encountered in Borehole 1 or the sand in Borehole 2. The need for an EASR or PTTW must be re-evaluated once final site servicing and grading plans are available. Additional details may also be revealed if the contractor carries out a test dig along servicing alignments.

5.2.2 Permanent Building Drainage

The buildings are assumed to be slab-on-grade structures with no basement levels. As such, basement drainage will not be required and a PTTW for permanent dewatering will not be required.

5.3 Impact Assessment for Groundwater Dewatering

For the assumed maximum groundwater drawdown of 2.7 metres for construction dewatering, settlement of the soil within the zone of influence must be calculated based on the increase in effective stress (10 kPa per metre of drawdown) from reducing the pore water pressures. The maximum settlement is estimated to be less than 2 mm and will occur adjacent to the dewatering system where the maximum drawdown occurs. Settlement has the potential to damage buried utilities, building foundations, or cause subsidence in adjacent lands. The amount of settlement will decrease exponentially to zero towards the radius of influence limit. The radius of influence is only 5.7 metres and the maximum amount of settlement is small, so there will be no settlement related impacts.

Another cause of significant dewatering related settlement is due to pumping of fines through the system. It is imperative that any dewatering systems (e.g. sump pumps) shall be installed adequately to ensure no soil is conveyed through the system. Sufficient filtering techniques are incorporated at the entry point to avoid migration fines in the pumping/dewatering system. The turbidity of pumped water should be monitored daily to ensure that only minimal fines are being conveyed through the system.

Where well screen data is available, the MECP Well Records show that the domestic wells within 500 metres of the site are screened at depths of 21 metres below grade or deeper. Dewatering will likely only occur within the upper 3 to 3.5 metres of the site, within the surficial glacial till aquitard. The existing domestic wells or other wells in the area are outside of the 5.7 metre radius of influence, are screened deep below grade, and will not be impacted by temporary dewatering activities.

Private well surveys were not completed for the nearby domestic wells but are not considered necessary due to the small radius of influence (only 5.7 metres) and the depth of the well screens (typically 21 metres or deeper per the MECP well records) relative to the assumed dewatering depth of 3 to 3.5 metres within the surficial aquitard. If requested by the Regional Municipality of York, private well surveys for nearby properties can be completed prior to construction, to provide the most accurate and relevant baseline conditions and confirm there will be no impacts.

Minimal to negligible impacts are expected to groundwater levels or flow directions, baseflow into the creek / wetland, or other impacts to environmental features for the following reasons:

- Construction dewatering is a temporary, short-term condition only.
- Dewatering is expected to be limited to the upper glacial till deposits (Halton Till Aquitard).
- Limited drawdown is expected, and the radius of influence is small at 5.7 metres.
- The areas to be temporarily dewatered are small relative to the overall size of the site.

5.4 Preliminary Water Balance

5.4.1 Water Balance Components

A water balance is an accounting of the water resources within a given area. The water balance equates the precipitation (P) over a given area to the summation of the change in groundwater storage (S), evapotranspiration/evaporation (ET), surface water runoff (R) and infiltration (I) using the following equation:

$$\mathrm{P} = S + I + ET + R$$

The components of the water balance vary in space and time and depend on climatic conditions as well as the soil and land cover conditions (i.e., rainfall intensity, land slope, soil hydraulic conductivity and vegetation). For example, runoff occurs at a higher percentage during periods of snowmelt when the ground is frozen or during intense rainfall events.

Precise measurement of the water balance components is difficult, and as such, approximations and simplifications are made to characterize the water balance of a property. Field observations of the drainage conditions, land cover and soil types, groundwater levels and local climatic records are important inputs to the water balance calculations.

- Precipitation (P): For the purposes of approximating the annual precipitation at this site, the monthly rainfall between 1981 and 2010 was used based on Environment Canada historical weather data from the “Bradford Muck Research” weather station (Climate ID 6150863, Latitude 44.02 N, Longitude -79.36 W, Elevation 221 metres), located about 14 km west of the site.
- Storage (S): Although there are groundwater storage gains and losses on a short-term basis, the net change in groundwater storage on a long-term basis is assumed to be zero.
- Evapotranspiration/Evaporation (PET): The evapotranspiration and evaporation components vary based on the characteristics of the land surface cover (i.e., type of vegetation, soil moisture conditions, perviousness of surfaces, etc.). Potential evapotranspiration refers to the water loss from a vegetated surface to the atmosphere under conditions of an unlimited water supply. Evaporation occurs from a hard surface (such as flat rooftops, asphalt, gravel parking areas, etc.).
- Water Surplus (R + I): The difference between the mean precipitation and evapotranspiration is referred to as the water surplus. The water surplus is divided into two parts: as surface or overland runoff (R) and the infiltration into the surficial soil (I). The infiltration is comprised of two end member components: one component that moves vertically downward to underlying aquifers (referred to as percolation, deep infiltration or net recharge) and a second component that moves laterally through the near surface soil profile or shallow soils as interflow that re-

emerges locally to surface (i.e., as runoff) at some short distance and time following precipitation.

5.4.2 Approach and Methodology

The analytical approach to calculate the water balance involves monthly soil-moisture balance calculations to determine the pre-development infiltration volumes. The preliminary water balance calculation is provided in Appendix G, which is summarized in this and subsequent sections of the report. The following assumptions were used as part of the soil-moisture balance calculations:

- A soil moisture balance approach assumes that soils do not release water as potential recharge while a soil moisture deficit exists.
- During wetter periods, any excess of precipitation over evapotranspiration first goes to restore soil moisture. Considering the nature of the near surface soils and shallow crops, a soil moisture storage capacity of 125 mm was used for the site. It is assumed that post-construction permeable areas will be shallow urban vegetation and the same storage capacity was used post-development for the permeable areas.
- Once the soil moisture deficit is overcome, any further excess water can then pass through the soil as infiltration and either become interflow (indirect runoff) or recharge (deep infiltration).

Monthly potential evapotranspiration calculations accounting for latitude, climate and the actual evapotranspiration and water surplus components of the water balance based on the monthly precipitation and soil moisture conditions was calculated. The *MOECC SWM Planning and Design Manual* (2003) methodology for calculating total infiltration based on topography, soil type and land cover was used, and a corresponding infiltration factor was calculated for pre and post-development conditions. The water surplus was multiplied by the infiltration factor to determine both the pre-existing and post-condition annual volumes for runoff and infiltration for the property.

The post-development water balance scenario was estimated based on the preliminary drawing, *"1656 Green Lane Avenue East, East Gwillimbury, ON, 20.283, Concept Site Plan,"* Drawing No. A1-4, dated January 25, 2021, by Turner Fleischer Architects. At this stage of planning only Site 2 was evaluated. Site 2 has a total site area of 7.75 hectares, about 6.51 hectares (84%) is estimated to be covered with impermeable surfaces including parking lots and buildings. This preliminary calculation must be updated once final site plans are available.

It is noted that the infiltration and runoff values presented in Appendix G are estimates only. Single values are used for the water balance calculations, but it is important to understand that infiltration rates are dependent upon the hydraulic conductivity of the surficial soils which may vary over several orders of magnitude. As such, the margins of error for the calculated infiltration and runoff component values are potentially quite large. These margins of error are recognized, but for the purposes of this assessment, the numbers used in the water balance calculations are considered reasonable estimates based on the site-specific conditions and useful for comparison of pre- to post-development conditions.

5.4.3 Pre and Post Development Water Balance

The detailed water balance calculations are included in Appendix G. The pre and post development calculations are summarized in this section are preliminary only and must be updated once site plans are finalized. The table below summarizes the pre and post construction water balance for the proposed site.

Condition	Permeable Areas	Impermeable Areas	Average Annual Runoff Volume (m^3/year)	Average Annual Infiltration Volume (m^3/year)
Pre-Development Land Use	100%	0%	7,044	10,567
Post-Development Land Use	16%	84%	46,297	1,691

These calculations suggest that, without mitigation such as low impact development (LID) measures, the proposed development will decrease average infiltration by about 8,876 m^3/year (84% decrease). The proposed development will increase runoff by about 39,253 m^3/year (517% increase). This means about 8,876 m^3/year of infiltration is required to maintain the water balance. The potential impacts of these changes and recommended mitigation measures are discussed below.

5.5 Recommended Mitigation Measures

The three broad categories which typically need to be mitigated and accounted for are:

- Reducing the volume and speed in which additional surface water runoff occurs;
- Increasing the amount of infiltration to match pre-development conditions; and
- Ensuring that the quality of existing surface water features and groundwater will not be adversely impacted.

5.5.1 Runoff Quantity

Urban development of an area affects the natural water balance. The most significant difference is the addition of impervious surfaces as a type of surface cover (e.g. roads, parking lots, rooftops). Impervious surfaces prevent infiltration of water into the underlying soils and the removal of the vegetation reduces the evapotranspiration component of the natural water balance. The evaporation component from impervious surfaces is relatively minor (estimated to be 15% of precipitation) compared to the evapotranspiration component that occurs with vegetation in this area (up to two thirds of precipitation). So, the net effect of the urbanization of the site is that most of the precipitation that falls onto impervious surfaces increases the surplus water resulting in more direct runoff from developed areas and reduced natural infiltration.

In conjunction with increased runoff, there is a reduction in infiltration to the shallow groundwater system. A reduction in infiltration can potentially lead to a lowering of the local water table and reduce the potential for this seasonal water table intersection and discharge.

Methods which do not necessarily increase infiltration rate, but decrease the volume and concentration of surface water runoff can be considered at this site include (but are not limited to):

- Increasing the topsoil thickness by about two times the normal thickness (up to 30 cm) to retain more water in storage; and
- Implementation of rainwater harvesting which intercepts, diverts and stores roof runoff (i.e. cisterns) for future use.

5.5.2 Mitigation Measures for Maintaining Infiltration

The increases in surface water runoff that will occur with urban development and mitigation of the potential impacts to the local water table due to reduction of infiltration may be minimized by using appropriate stormwater management and using low impact development (LID) measures to promote infiltration. These measures can possibly be implemented on-site.

The basic premise for low impact development is to try to minimize changes to runoff and infiltration. As outlined in the *MOECC SWMP Design Manual* (2003) and *Low Impact Development Stormwater Management Planning and Design Guide* published by the CVC and TRCA (2010), there are a suite of techniques that may be considered to promote infiltration and reduce runoff.

In order to maintain ground water function at the site the following typical LID measures can be considered as part of typical site developments (can depend on land use):

- Collection of runoff from the building rooftops and redirection to grass areas and overland flow. If feasible, it is recommended that there be a minimum 5 metre flow path over pervious areas to allow this mitigation method to be fully effective;
- Provision of gentle slopes in open areas or along grass swales in order to allow time for water infiltration;
- Construction of engineered infiltration measures such as soakaway pits, infiltration galleries or bioswales. Subsurface infiltration methods can only be considered in areas where there is sufficient soil permeability and depth to water table to accommodate the systems within the unsaturated zone (typically the infiltration

elevation must be kept 1 metre or more above the seasonal high groundwater level). Infiltration may be challenging for this site due to the higher groundwater table and lower soil permeability; and

- Construction of grass channels or filter strips which allow infiltration, discharge at a lower rate and direct roof runoff to overland flow.

Implementation of LID measures will not only allow for infiltration of the surface water into the near-surface groundwater regime but will also allow for increase in natural filtration of surficial runoff, prevent sedimentation transport and potential erosion, and help reduce flooding by increasing the transit time for water on the site. These types of LID techniques promote natural infiltration by providing additional water volumes in the pervious areas. This is particularly effective in the summer months when natural infiltration would not generally occur because the additional water overcomes the natural soil moisture deficit.

Details and designs for LID measures will be provided in a stormwater management report for the site (by others). This includes demonstrating through plans and sections (including all dimensions, materials used and including the seasonal high groundwater level) how this infiltration deficit will be mitigated.

If the pre and post water balance is maintained, no appreciable change in the groundwater table elevation should occur over the long-term condition, and there will be no impacts to water supply wells, groundwater levels or baseflow into the creek system. The site is within a WHPA Q2 and the water balance should be maintained at the site if possible, but it is noted that infiltration rates through the upper Halton Till Aquitard are likely low and the groundwater table is relatively high, which may create a challenge for implementing LID measures. Offsite or cash compensation methods for the WHPA Q2 may also be permitted by LSRCA.

If the water balance cannot be maintained due to the low infiltration rates and higher groundwater table, it is noted that stormwater runoff will ultimately be directed back into the creek system. It is understood that underground Stormtech chambers may be used for runoff storage prior to discharge. This will offset any potential effects of reduced baseflow to the creek and wetland area if infiltration is reduced at the site. The nearby domestic wells appear to be screened at 21 metres below grade or deeper, and reduced infiltration at the ground surface from the site will not impact yields for water supply as very little infiltration is expected to recharge the deep sands through the low permeability Halton Till Aquitard.

5.5.3 Groundwater Quality

Depending on land use, runoff from urban developments may contain a variety of dilute contaminants such as suspended solids, chloride from road salt, oil and grease, metals, pesticide residues, phosphorous, bacteria and viruses. For groundwater, generally except for the dissolved constituents such as nitrogen and salt, most contaminants are attenuated by filtration during groundwater flow through the soils.

LID measures or end treatments such as oil/grit separators or wet ponds also help to remove suspended solids and other contaminants in runoff prior to infiltration or conveying the flows off the site, especially when a treatment train approach is taken for stormwater management. The stormwater management facilities must be designed such that the water quality is maintained or improved prior to discharging water from the site or infiltrating water into the ground.

Phosphorous can be removed from the site through implementation of measures such as LID or end treatments. This would be addressed in the stormwater management report prepared for the site by others. *"LSRCA Technical Guidelines for Stormwater Management Submissions"* (dated September 1, 2016, by LSRCA) states that 80% removal of annual Total Phosphorous is required for major developments and provides a list of typical phosphorous removal rates for various stormwater management best management practices.

Pollution "hotspots" such as commercial/industrial parking lots typically should not be infiltrated unless approved by the local authorities and pre-treatment is completed to remove contaminants, but runoff from rooftops and landscaped areas is "clean" and can be collected and infiltrated.

Since only clean or pre-treated runoff will be infiltrated, the groundwater quality will not be degraded and will not impact nearby water supply wells, the creek or small wetland feature. The surficial aquitard present across the site also limits the amount of water infiltrating deeper below grade as recharge.

5.6 Groundwater Disposal Recommendations

Baseline groundwater chemical testing was carried out at the site. The results are summarized in Section 4.3.4 and the Certificates of Analysis are included as Appendix C. If groundwater taken during construction will be discharged to the land surface, it must typically meet PWQO guidelines. Groundwater to be pumped into York Region sewers must meet the sewer use Bylaw.

High concentrations of chloride and sodium in the groundwater in BH6 interfered with the inductively coupled plasma mass spectrometry (ICPMS) used by the laboratory to test the groundwater relative to PWQO. As such, the lowest detection limits for some metals parameters in BH6 are higher than normal. The exceedances reported for thallium, silver and cadmium are a result of the lowest detection limit exceeding the PWQO guideline standard but are assumed to actually meet PWQO similar to BH1 (i.e. false positives).

Field filtering the groundwater samples reduced TSS concentrations from 22 to 51 mg/L in the unfiltered samples to less than 0.3 mg/L. Despite the TSS reduction, exceedances persisted for the metals parameters zinc in Borehole 1 and zinc and cobalt in Borehole 6, indicating that these metals may be dissolved in the groundwater instead of binding to the sediment.

Exceedances for toluene were also detected in the groundwater samples. The toluene concentrations exceeded PWQO standards by 1.7 to 4.7 μg/L. The other BTEX parameters (benzene, ethylbenzene, and xylene) did not exceed PWQO but the concentrations were just above the detection limits.

The groundwater sample from the well in Borehole 3 met York Region sanitary sewer discharge guidelines but exceeded storm sewer guidelines for TSS and toluene. It is expected that filtration techniques will reduce the TSS to within the storm sewer guidelines based on the results of the PWQO testing, which reduced TSS to less than 0.3 mg/L. Similar to the PWQO samples, benzene and xylene met the sewer use Bylaw standards but their concentrations were just above the detection limits.

The contractor is responsible for ensuring that discharged groundwater is meets the guidelines during construction. It is recommended to collect and test additional unfiltered and filtered groundwater samples prior to construction to confirm the exceedances to PWQO and/or York Region sanitary and storm sewer discharge guidelines, and to confirm if the detected exceedances are false positives and to confirm the proposed treatment system. A surface water sample collected and tested from the creek just downstream of the site is also recommended to be tested relative to PWQO to establish baseline conditions. If the groundwater will be discharged into or within 30 metres of the watercourse, the turbidity cannot exceed 8 NTU above the background levels of the watercourse. Additional testing and monitoring would be required during construction in this case.

6. Limitations and Conclusions

6.1 Limitations

The recommendations and comments provided are necessarily on-going as new information of underground conditions becomes available. More specific information with respect to the conditions between samples, or the lateral and vertical extent of materials may become apparent during excavation operations. The interpretation of the borehole information must, therefore, be validated during excavation operations. Consequently, conditions not observed during this investigation may become apparent. Should this occur, GEI should be contacted to assess the situation and additional testing and reporting may be required.

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

The comments given in this report are intended only for the guidance of the design engineers. The number of boreholes required to determine the localized underground conditions between boreholes affecting construction costs, techniques, sequencing, equipment, scheduling, etc. could be greater than has been carried out for design purposes. Contractors bidding on or undertaking the works should, in this light, decide on their own investigations, as well as their own interpretations of the factual borehole results, so that they may draw their own conclusions as to how the subsurface conditions may affect them.

This report was prepared by GEI for the account of GL West Preferred Limited Partnership c/o Rice Commercial Group. 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. GEI accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this project.

6.2 Conclusion

It is recognized that municipal/regional governing bodies, in their capacity as the planning and building authority under Provincial statues, will make use of and rely upon this report, cognizant of the limitations thereof, both as are expressed and implied.

We trust this report is complete within our terms of reference, and the information presented is sufficient for your present purposes. If you have any questions, or when we may be of further assistance, please do not hesitate to contact our office.

Yours Truly,

GEI Consultants

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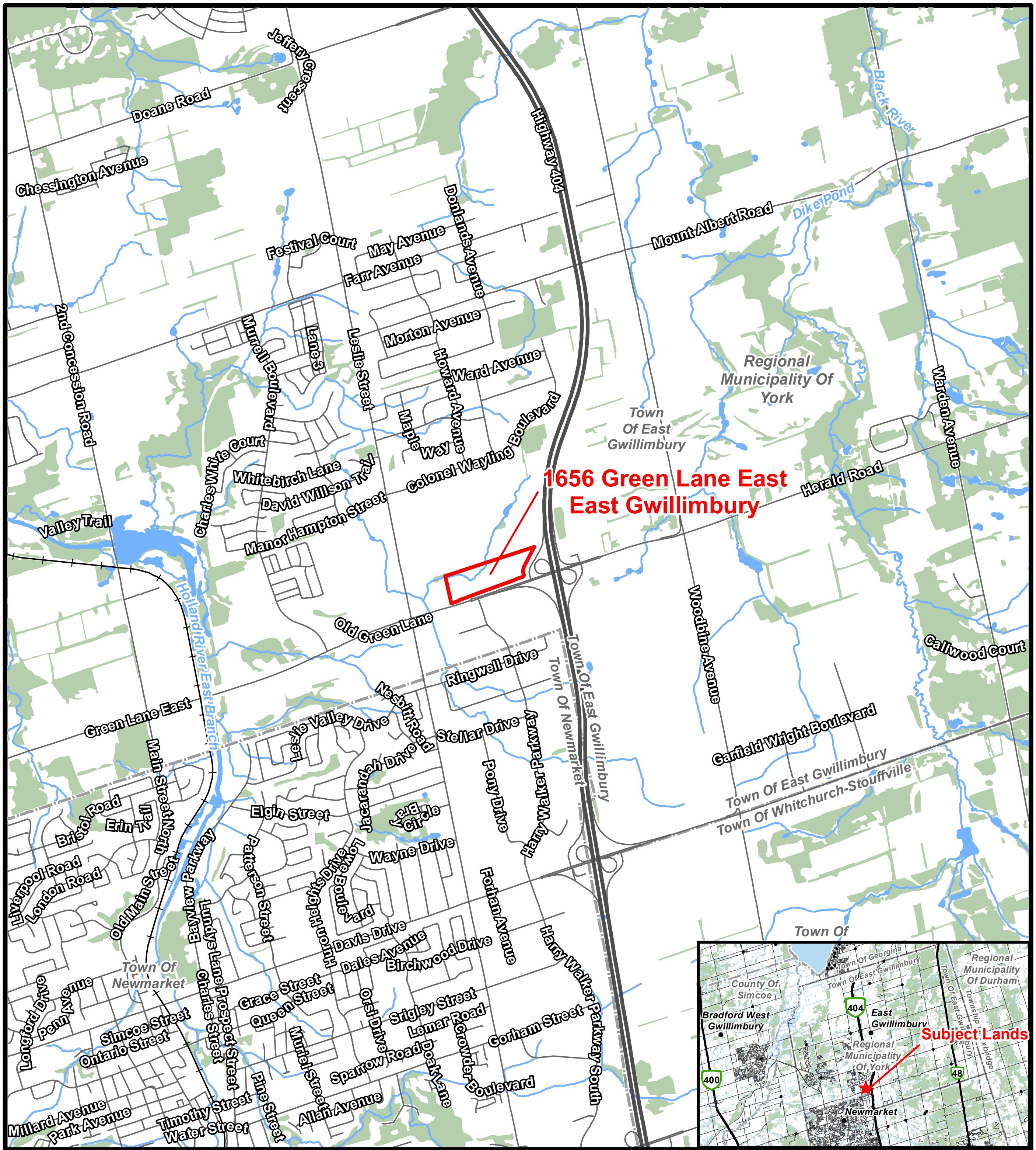
Senior Geotechnical Engineer

Reviewed By:

LICENSED PROFESSIONAL ENGINEER
A.WINKELMANN
100150146
Aug. 2 ,2022
PROVINCE OF ONTARIO

Alexander Winkelmann, P.Eng.
Geotechnical and Earth Sciences Manager

Figures



NOTES:
1. Coordinate System: NAD 1983 UTM Zone 17N.
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2021.

Legend

- 🟥 Subject Lands
- ▭ Municipal Boundary, Lower/Single Tier
- ▭ Municipal Boundary, Upper Tier
- — Highway
- — Road
- — Watercourse
- 🟦 Waterbody
- 🟩 Wooded Area

N

0 500 1,000 m

1:40,000

1656 Green Lane East, East Gwillimbury
Hydrogeological Study

GL West Preferred Limited Partnership

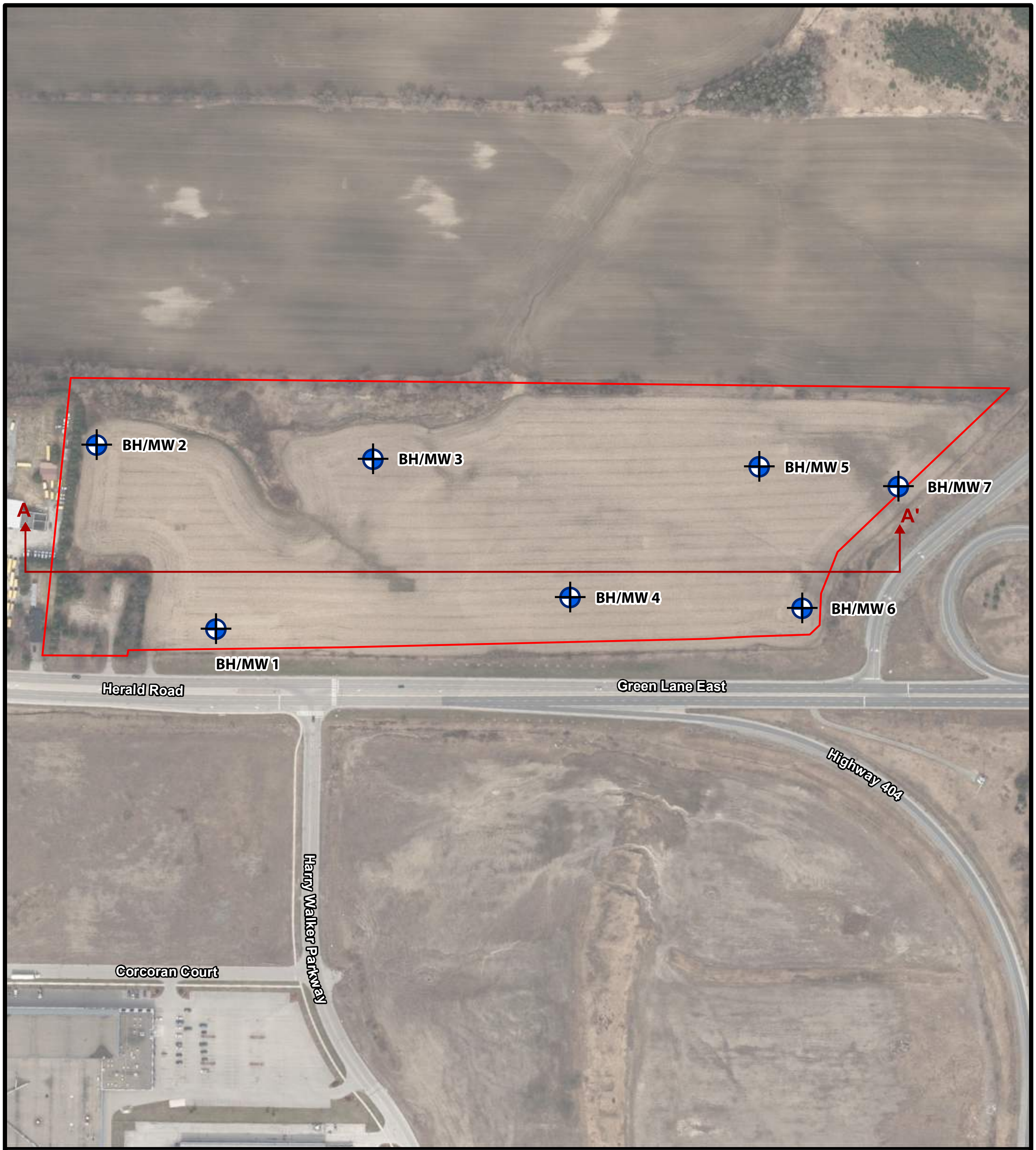
GEI Consultants

Project 2101711

SITE LOCATION PLAN

July 2021

Fig. 1



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1. Coordinate System: NAD 1983 UTM Zone 17N.
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Legend

☐ Subject Lands

⊕ Approximate Borehole and Monitoring Well Location

— Cross Section

N

0 40 80 m

1:4,000

1656 Green Lane East, East Gwillimbury
Hydrogeological Study

GL West Preferred Limited Partnership

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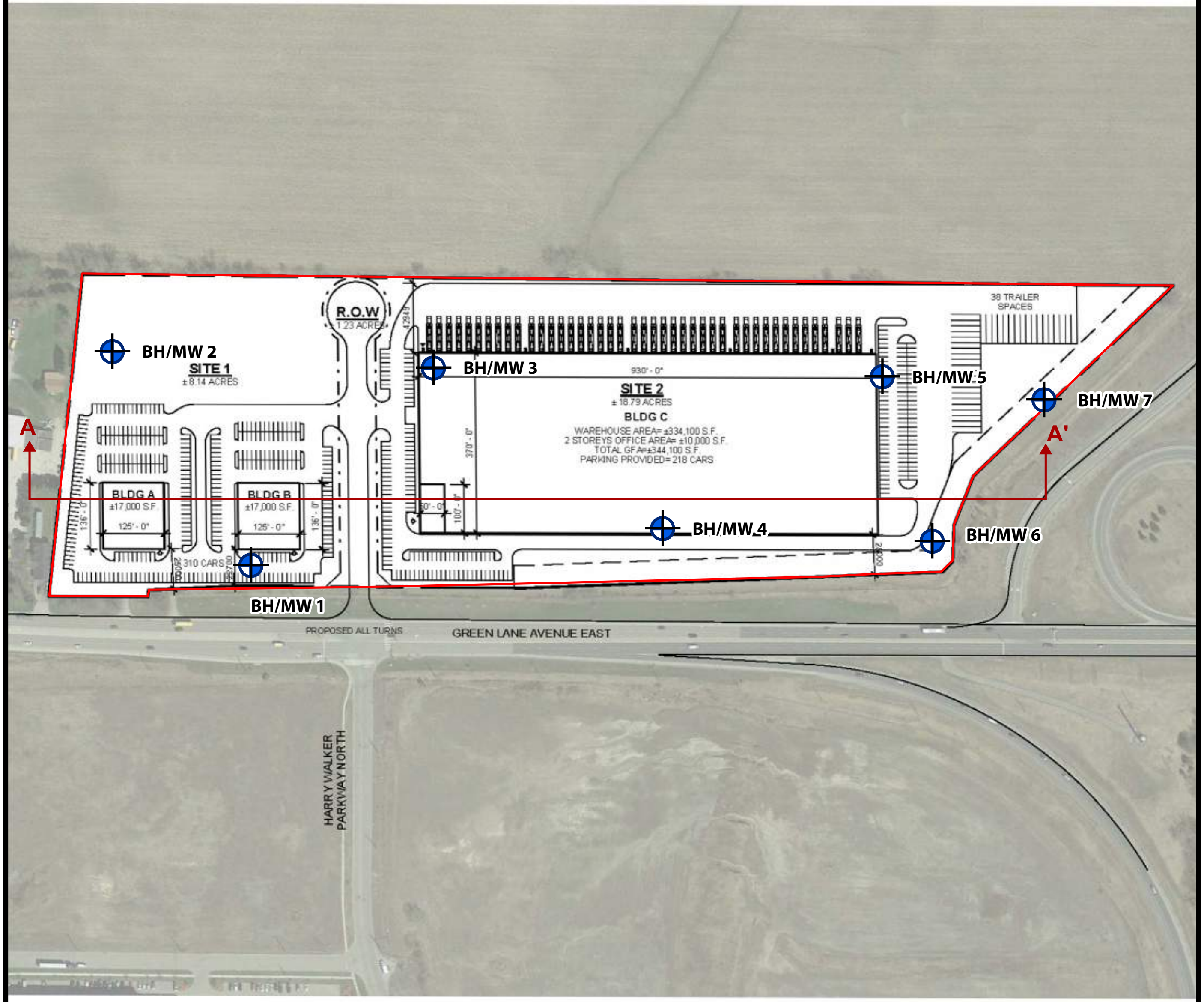
BOREHOLE LOCATION PLAN (AERIAL)

September 2021

Fig. 2A



NOTES:
1. Coordinate System: NAD 1983 UTM Zone 17N.
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2021.
3. "1656 Green Lane Avenue East," Preliminary Drawing No. A1-4, dated 2021-01-25, by Rice Commercial Group.

Legend

🟥 Subject Lands

⊕ Approximate Borehole and Monitoring Well Location

— Cross Section

N

0 50 100 m

1:4,000

1656 Green Lane East, East Gwillimbury
Hydrogeological Study

GL West Preferred Limited Partnership

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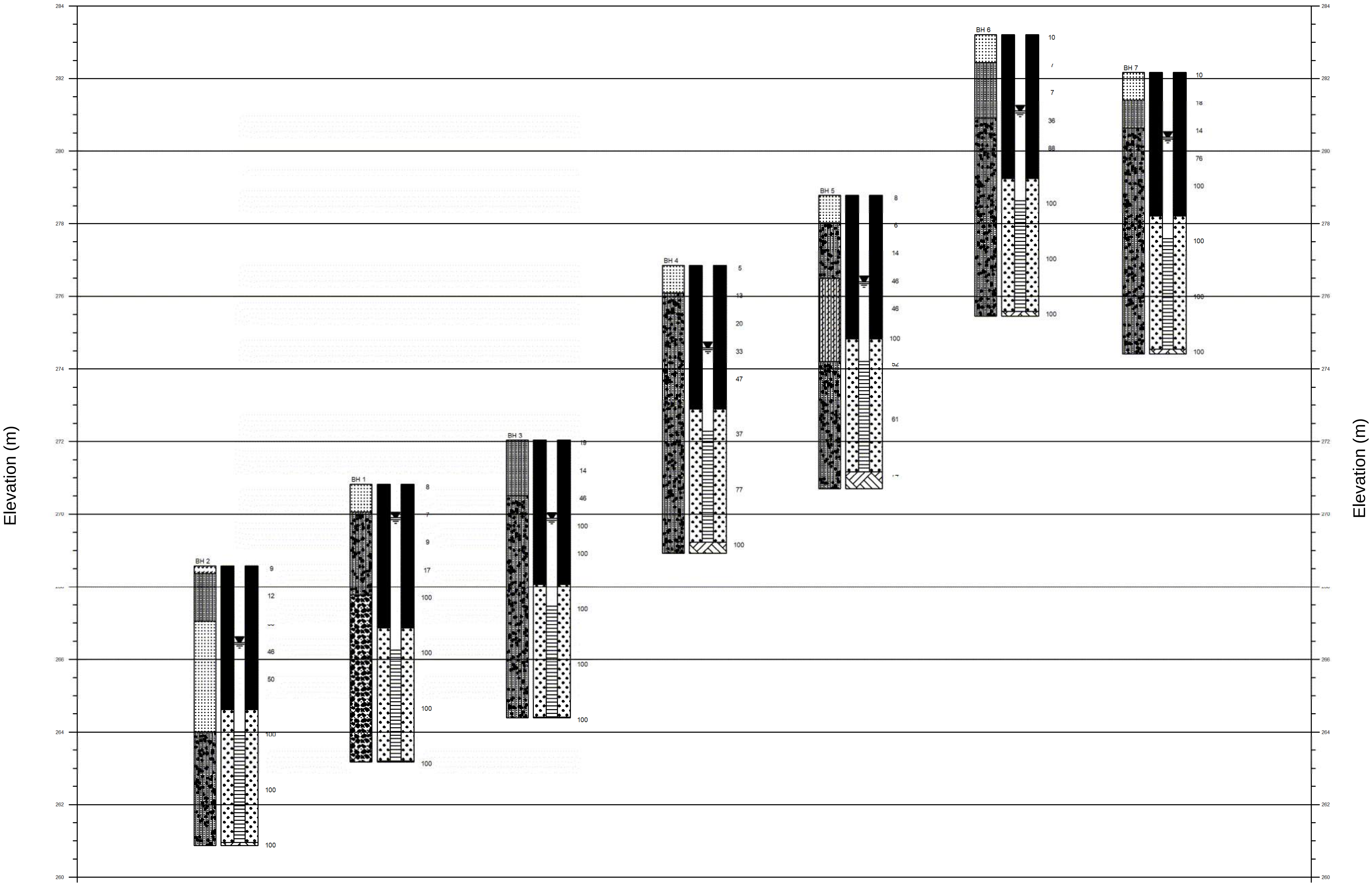
BOREHOLE LOCATION PLAN
(PROPOSED SITE PLAN)

September 2021

Fig. 2B



1. Numbers shown next to boreholes are SPT "N" Values.
2. Subsurface conditions known only at borehole locations.
3. Horizontal distance between boreholes is not to scale.
4. Water levels measured on June 29, 2021

Legend

≡ Water Level In Monitoring Well

Strata symbols

▨ Sand

▨ Silty Sand to Sandy Silt Glacial Till

▨ Silt, Some Clay to Clayey

▨ Silty Sand to Sand & Silt

▨ Gravel & Sand

1656 Green Lane East, East Gwillimbury
Hydrogeological Study

GL West Preferred Limited Partnership

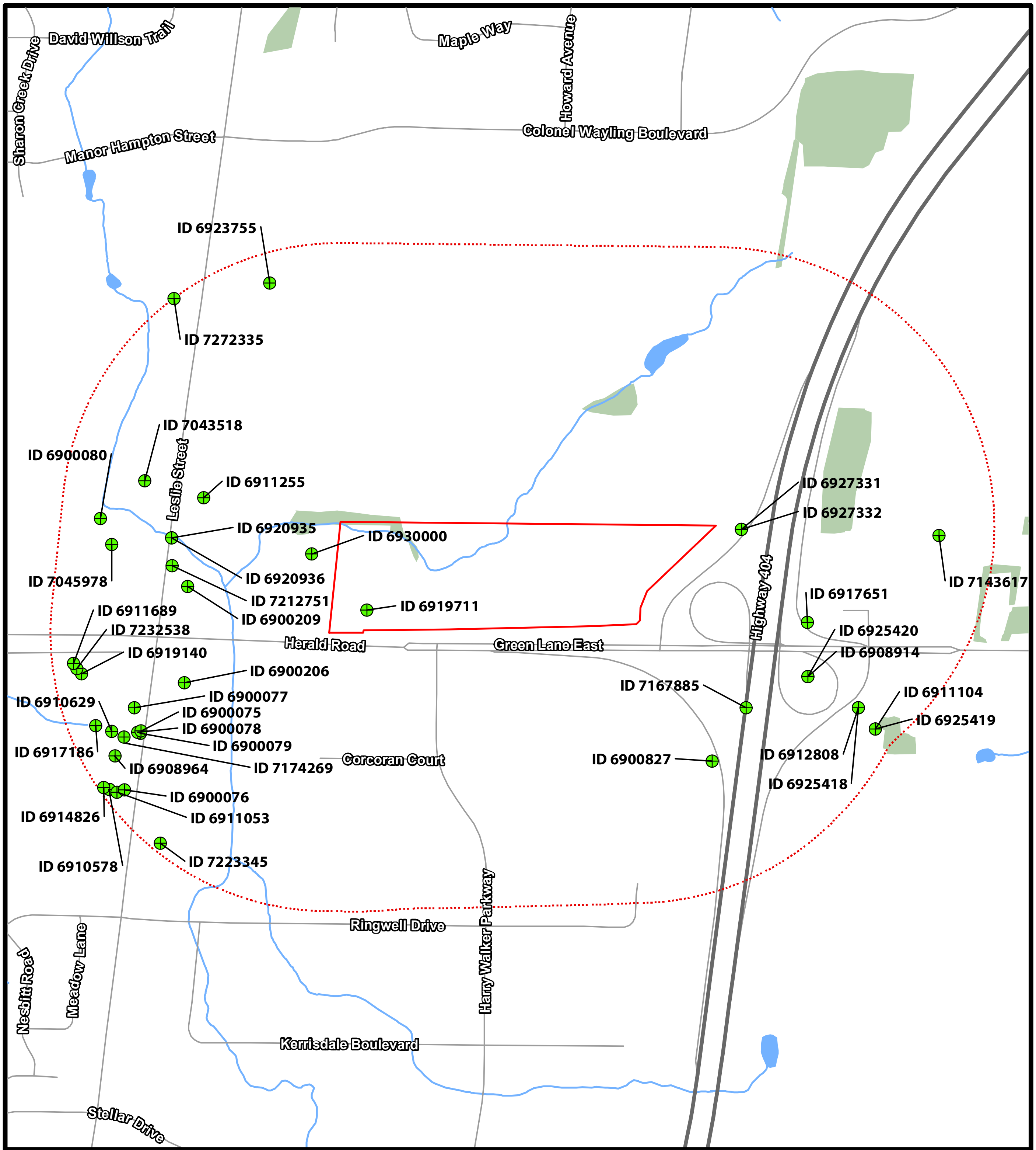
GEI Consultants

Project 2101711

GEOLOGICAL CROSS SECTION A-A’

September 2021

Fig. 3



NOTES:
1. Coordinate System: NAD 1983 UTM Zone 17N.
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Legend

🟥 Subject Lands	Watercourse
⬚ Subject Lands +500 m	🟦 Waterbody
⊕ MECP Well Record (WWIS 2021)	🟩 Wooded Area

N

0 125 250 m
1:10,000

1656 Green Lane East, East Gwillimbury
Hydrogeological Study

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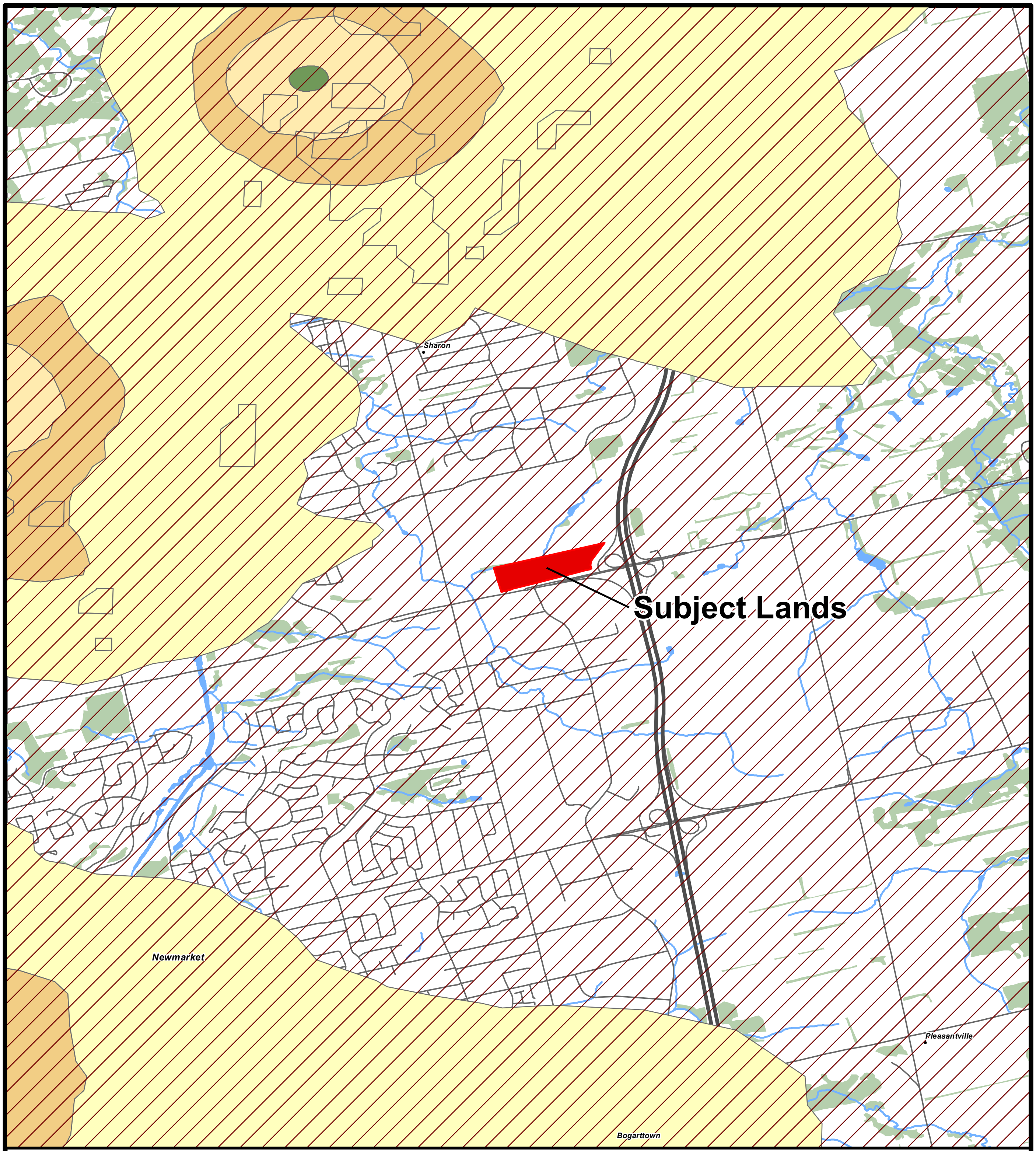
MECP WELL RECORD LOCATIONS

Project 2101711

July 2021

Fig. 4



NOTES:

1. Coordinate System: GCS North American 1927.
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3. Source Water Protection Mapping: LAKE SIMCOE REGION CONSERVATION AUTHORITY, (2021). All Rights Reserved
4. Site is within a Wellhead Protection Area Q2.

Legend

- 🟥 Subject Lands
- ─ Watercourse
- 🟦 Waterbody
- 🟩 Wooded Area

Wellhead Protection Area (LSRCA 2021)

Zone

- 🟩 A
- 🟨 B
- 🟧 C
- 🟨 D
- ▨ Q1/Q2

N

0 540 1,080 m

1:45,000

1656 Green Lane East, East Gwillimbury Hydrogeological Study

GL West Preferred Limited Partnership

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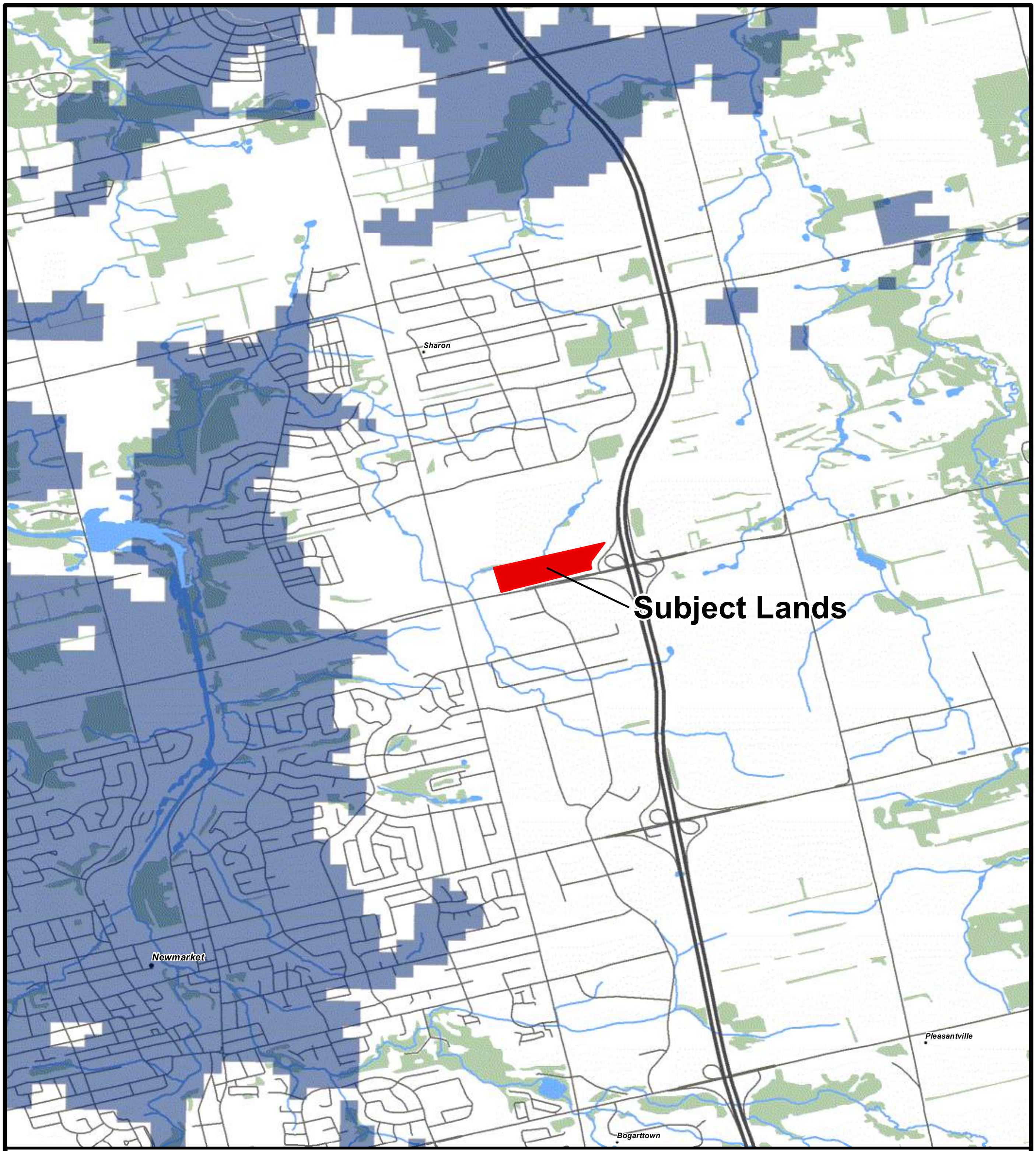
WELLHEAD PROTECTION AREAS

Project 2101711

July 2021

Fig. 5A



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3. Source Water Protection Mapping: LAKE SIMCOE REGION CONSERVATION AUTHORITY, (2021). All Rights Reserved
4. Site is not within a Highly Vulnerable Aquifer.

Legend

🟥 Subject Lands
─ Watercourse
🟦 Waterbody
🟩 Wooded Area
■ Highly Vulnerable Aquifer (LSRCA 2021)

N

0 540 1,080 m

1:45,000

1656 Green Lane East, East Gwillimbury
Hydrogeological Study

GL West Preferred Limited Partnership

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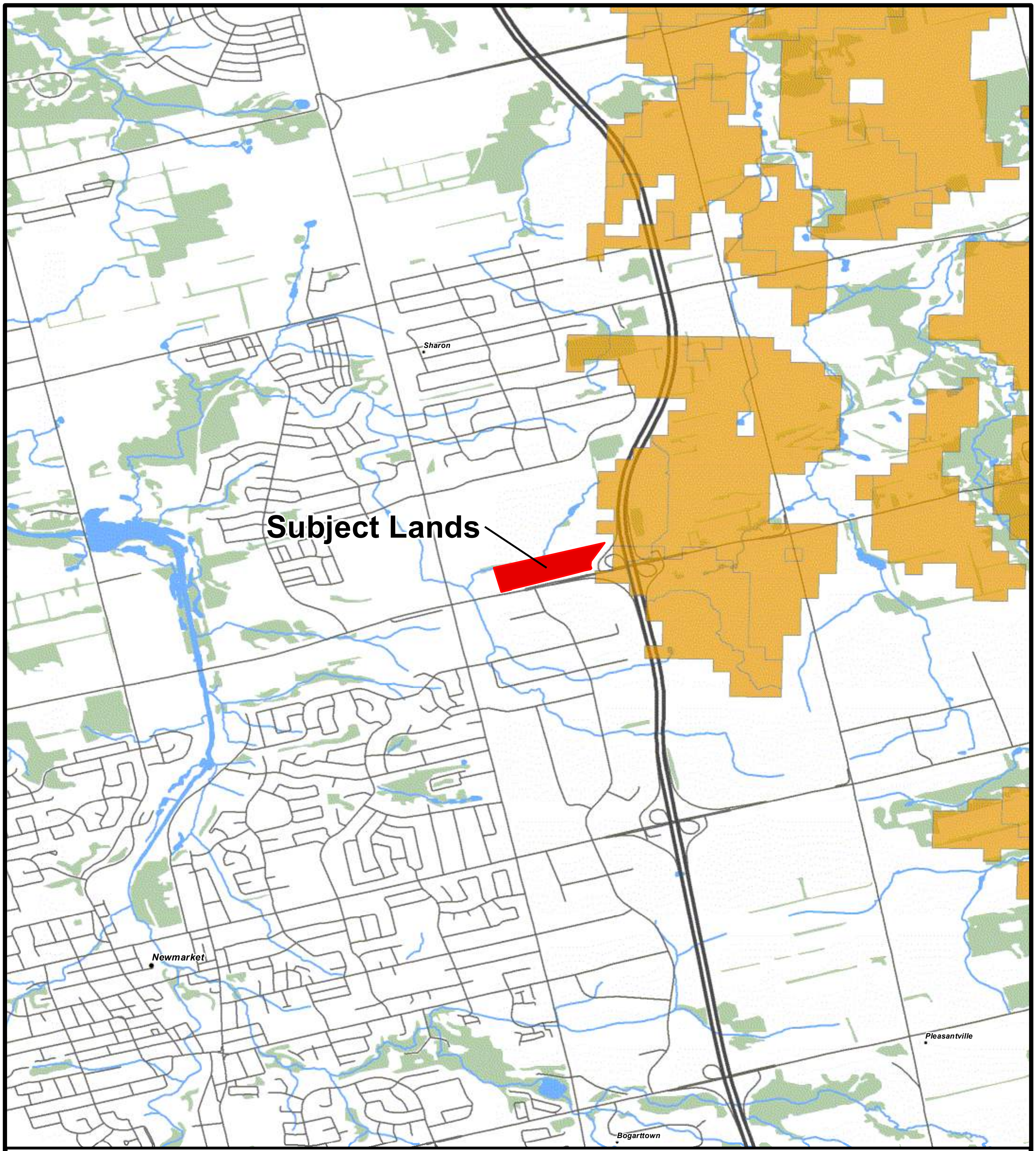
HIGHLY VULNERABLE AQUIFERS

Project 2101711

July 2021

Fig. 5B



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1. Coordinate System: GCS North American 1927.
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2021.
3. Source Water Protection Mapping: LAKE SIMCOE REGION CONSERVATION AUTHORITY, (2021). All Rights Reserved
4. Site is not within a Significant Groundwater

Legend

🟥	Subject Lands
—	Watercourse
🟦	Waterbody
🟩	Wooded Area
🟧	Significant Groundwater Recharge Areas (LSRCA 2021)

N

0 540 1,080
m
1:45,000

1656 Green Lane East, East Gwillimbury
Hydrogeological Study

GL West Preferred Limited Partnership

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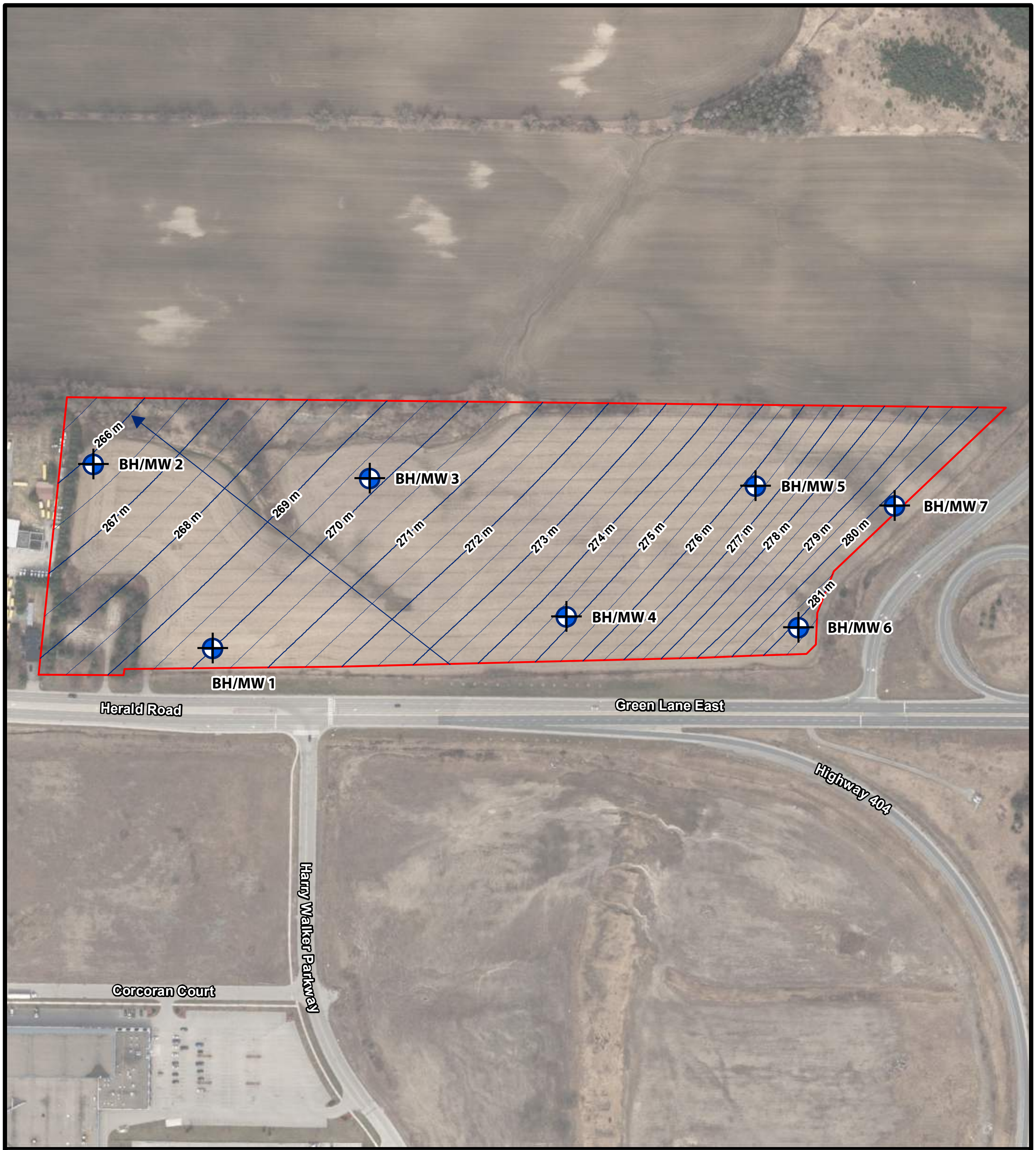
Project 2101711

SIGNIFICANT GROUNDWATER RECHARGE AREAS

July 2021

Fig. 5C



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3. Orthoimagery © First Base Solutions, 2021. Imagery taken in 2020.
4. Water Levels Measured on June 29, 2021.
5. All Elevations Shown Reference a Local Benchmark

Legend

☐ Subject Lands

⊕ Approximate Monitoring Well Location

— Local Elevation of Groundwater

N

0 40 80 m

1:4,000

1656 Green Lane East, East Gwillimbury
Hydrogeological Study

GL West Preferred Limited Partnership

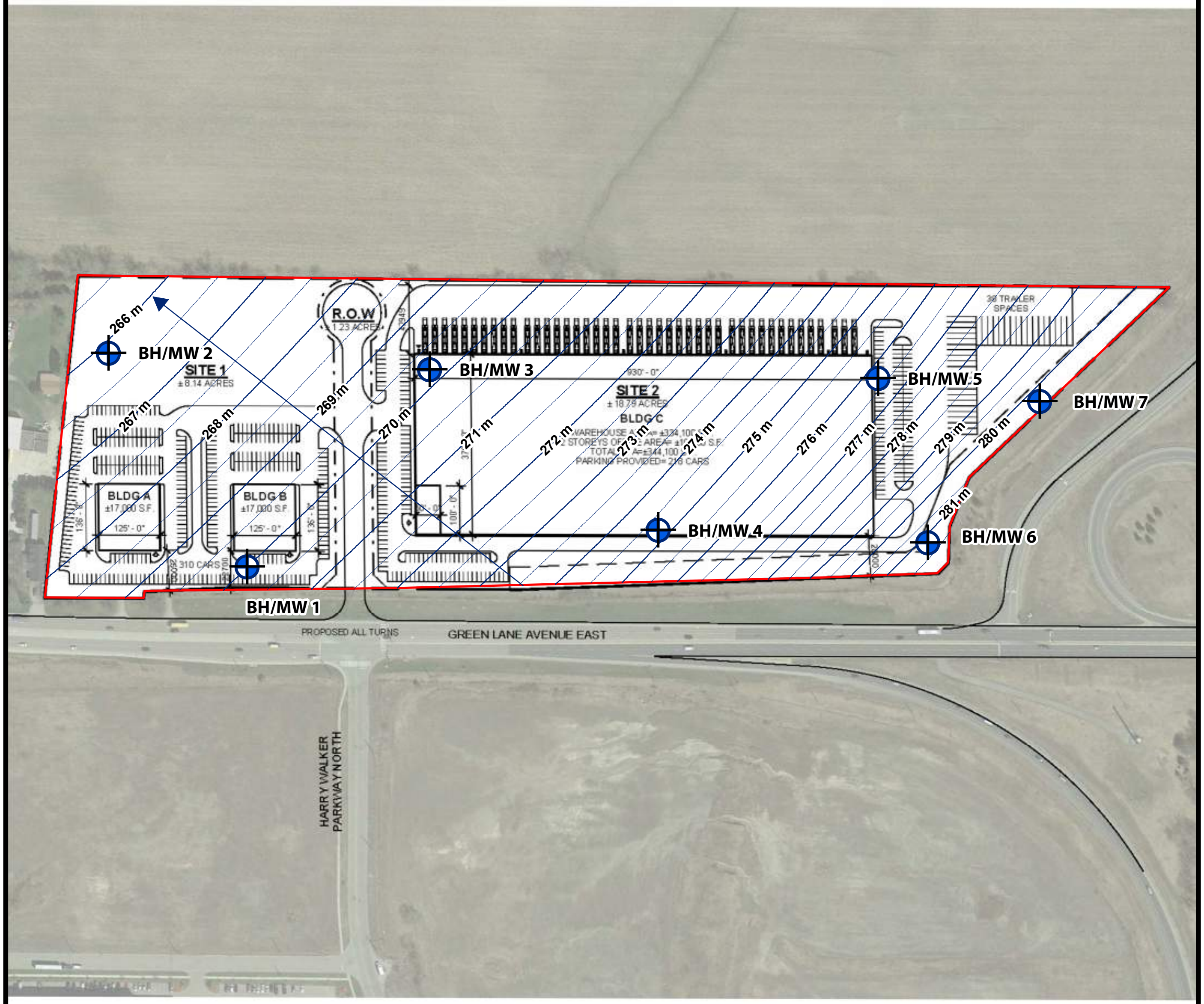
GEI Consultants

Project 2101711

GROUNDWATER CONTOURS (AERIAL)

September 2021

Fig. 6A



NOTES:
1. Coordinate System: NAD 1983 UTM Zone 17N.
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2021.
3. "1656 Green Lane Avenue East," Preliminary Drawing No. A1-4, dated 2021-01-25, by Rice Commercial Group.
4. Water Levels Measured on June 29, 2021.
5. All Elevations Shown Reference a Local Benchmark

Legend

☐ Subject Lands

⊕ Approximate Monitoring Well Location

— Local Elevation of Groundwater

N

0 40 80
m
1:4,000

1656 Green Lane East, East Gwillimbury
Hydrogeological Study

GL West Preferred Limited Partnership

GEI Consultants

Project 2101711

GROUNDWATER CONTOURS (PROPOSED SITE)

September 2021

Fig. 6B

Table

TABLE 1:
Groundwater Level Measurements

Date of Groundwater Level Reading	Depth (m) / Geodetic Elevation (m) of Groundwater Table													
	BH1				BH1				BH1				BH1	
29-Jun-21	0.8	270.0	2.5	266.1	2.3	269.8	2.1	274.8	2.4	276.3	1.9	281.3	1.7	280.5
5-Aug-21	0.9	269.9	2.1	266.5	2.2	269.9	2.3	274.6	2.4	276.4	2.1	281.1	1.8	280.4
3-Sep-21	1.3	269.6	2.8	265.7	2.7	269.3	2.7	274.1	3.2	275.6	2.5	280.7	2.1	280.1
1-Oct-21	0.8	270.1	1.4	267.2	2.0	270.0	1.9	274.9	1.8	277.0	1.9	281.3	1.3	280.9
1-Nov-21	0.3	270.5	0.9	267.7	1.4	270.7	1.1	275.8	1.3	277.4	1.4	281.8	0.4	281.8
1-Dec-21	0.2	270.7	1.0	267.6	1.0	271.1	1.1	275.8	1.5	277.3	1.3	281.9	0.4	281.7
6-Jan-22	0.2	270.7	1.0	267.6	0.8	271.2	1.3	275.6	1.5	277.3	1.1	282.1	0.6	281.5
1-Feb-22	0.7	270.1	1.4	267.2	1.3	270.8	2.1	274.8	1.8	277.0	1.5	281.7	0.9	281.3
1-Mar-22	0.4	270.5	0.8	267.8	1.1	271.0	1.9	274.9	2.7	276.1	1.3	281.9	0.9	281.3
5-Apr-22	0.1	270.7	0.8	267.8	0.8	271.2	0.9	276.0	1.7	277.1	0.8	282.4	0.5	281.7
3-May-22	0.2	270.6	0.9	267.7	0.9	271.1	1.2	275.6	1.7	277.1	1.0	282.2	0.6	281.6
Highest	**0.1**	**270.8**	**0.8**	**268.6**	**0.8**	**272.0**	**0.9**	**276.9**	**1.3**	**278.8**	**0.8**	**283.2**	**0.4**	**282.2**

Appendix A

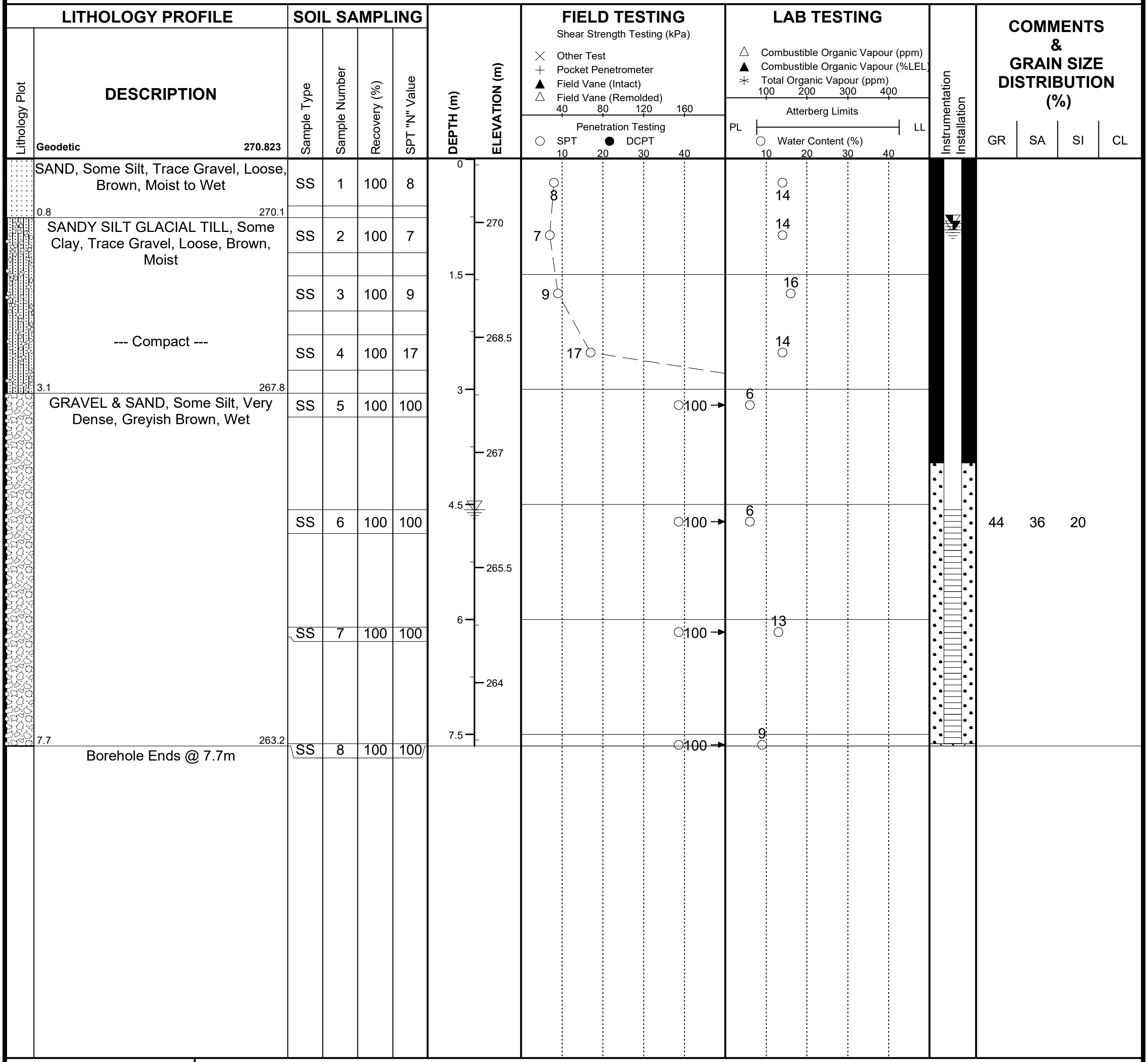
Borehole Logs

RECORD OF BOREHOLE No. 1

Project Number: **2101711**
Project Client: **GL West Preferred Limited Partnership**
Project Name: **1656 Green Lane Ave East**
Project Location: **East Gwillimbury, Ontario**
Drilling Location: **South Side of Proposed Building B**

Drilling Method: **Solid Stem Augers**
Drilling Machine: **Track Mount**
Logged By: **BH**
Reviewed By: **AW**
Northing: **4882576**
Easting: **625568**
Date Started: **2021-06-21**
Date Completed: **2021-06-21**

LITHOLOGY PROFILE	SOIL SAMPLING					LAB TESTING	COMMENTS & GRAIN SIZE DISTRIBUTION (%)			
DESCRIPTION Geodetic 270.823	Sample Type	Sample Number	Recovery (%)	SPT "N" Value	DEPTH (m)	Water Content (%)	GR	SA	SI	CL
SAND, Some Silt, Trace Gravel, Loose, Brown, Moist to Wet	SS	1	100	8	0	14				
0.8 270.1										
SANDY SILT GLACIAL TILL, Some Clay, Trace Gravel, Loose, Brown, Moist	SS	2	100	7		14				
	SS	3	100	9	1.5	16				
--- Compact ---	SS	4	100	17		14				
3.1 267.8					3					
GRAVEL & SAND, Some Silt, Very Dense, Greyish Brown, Wet	SS	5	100	100		6				
	SS	6	100	100	4.5	6	44	36	20	
	SS	7	100	100	6	13				
7.7 263.2	SS	8	100	100	7.5	9				
Borehole Ends @ 7.7m										



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Groundwater depth encountered on completion of drilling: **4.57m**

Cave depth after auger removal: **Open**

Groundwater depth observed on **June 29/21** at a depth of: **0.84m**

Observed on **Aug. 5/21** at a depth of: **0.92m**

Borehole details presented do not constitute a thorough understanding of all potential conditions present and require interpretative assistance from a qualified geotechnical engineer. Also, borehole information should be read in conjunction with the geotechnical report for which it was commissioned and the accompanying 'Explanation of Boring Log'.

Scale: **1 :75**

RECORD OF BOREHOLE No. 2

Project Number: **2101711**
Project Client: **GL West Preferred Limited Partnership**
Project Name: **1656 Green Lane Ave East**
Project Location: **East Gwillimbury, Ontario**
Drilling Location: **Northwest Corner of Property**

Drilling Method: **Solid Stem Augers**
Drilling Machine: **Track Mount**
Logged By: **BH**
Reviewed By: **AW**
Northing: **4882673**
Easting: **625444**
Date Started: **2021-06-21**
Date Completed: **2021-06-21**

LITHOLOGY PROFILE

Geodetic **268.575**

Depth (m)	DESCRIPTION	Elevation (m)
0.2	Topsoil = 200mm	268.4
0.8	SILTY SAND, Trace Gravel, Loose, Brown, Moist	267.8
1.5	SANDY SILT, Trace Gravel, Compact, Brown, Moist	267.1
4.6	SAND, Some Silt, Trace Gravel, Dense, Brown, Wet	264.0
7.7	SAND & SILT GLACIAL TILL, Some Clay, Trace Gravel, Very Dense, Grey, Moist to Wet	260.9
	Borehole Ends @ 7.7m	

SOIL SAMPLING

Sample Type	Sample Number	Recovery (%)	SPT "N" Value	Water Content (%)	GR	SA	SI	CL
SS	1	100	9	15				
SS	2	78	12	18				
SS	3	100	33	15				
SS	4	100	46	9				
SS	5	100	50	10	7	77	16	
SS	6	100	100	10				
SS	7	100	100	5				
SS	8	100	100	10				

DEPTH (m): 0, 1.5, 3, 4.5, 6, 7.5
ELEVATION (m): 268.5, 267, 265.5, 264, 262.5, 261

FIELD TESTING

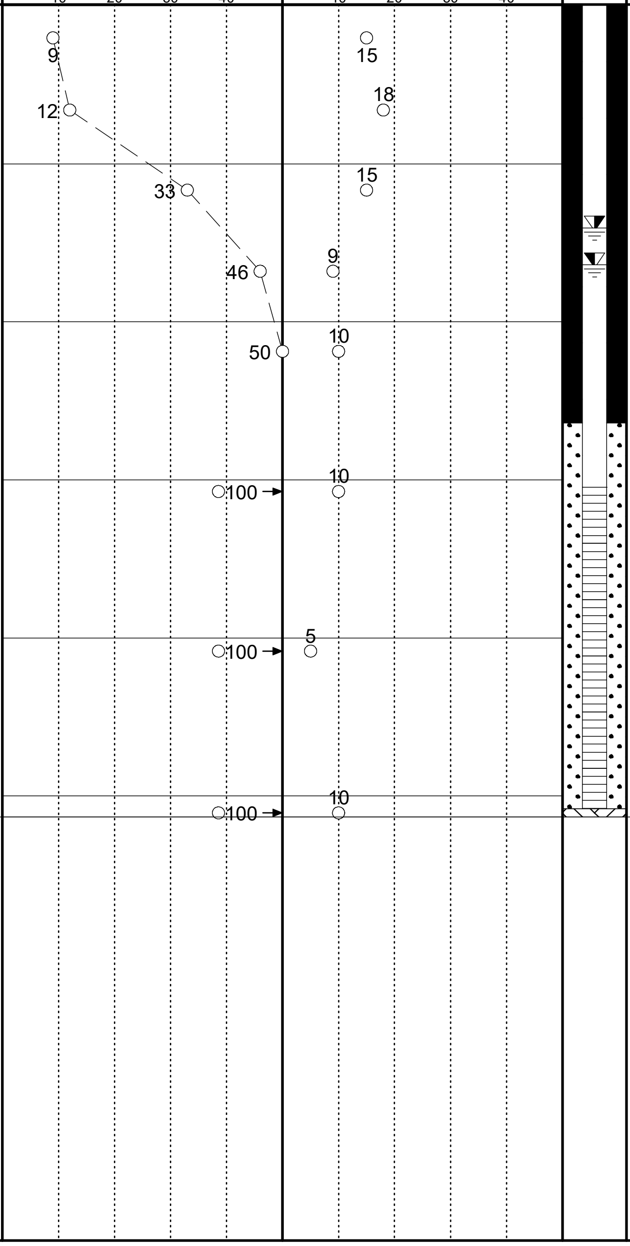
Shear Strength Testing (kPa)
× Other Test
+ Pocket Penetrometer
▲ Field Vane (Intact)
△ Field Vane (Remolded)
40 80 120 160
Penetration Testing
○ SPT ● DCPT
10 20 30 40

LAB TESTING

△ Combustible Organic Vapour (ppm)
▲ Combustible Organic Vapour (%LEL)
✳ Total Organic Vapour (ppm)
100 200 300 400
Atterberg Limits
PL LL
○ Water Content (%)
10 20 30 40

Instrumentation Installation

COMMENTS & GRAIN SIZE DISTRIBUTION (%)



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Groundwater depth encountered on completion of drilling: **2.74m**

Cave depth after auger removal: **Open**

Groundwater depth observed on **June 29/21** at a depth of: **2.46m**

Observed on **Aug. 5/21** at a depth of: **2.11m**

Borehole details presented do not constitute a thorough understanding of all potential conditions present and require interpretative assistance from a qualified geotechnical engineer. Also, borehole information should be read in conjunction with the geotechnical report for which it was commissioned and the accompanying 'Explanation of Boring Log'.

Scale: **1 :75**

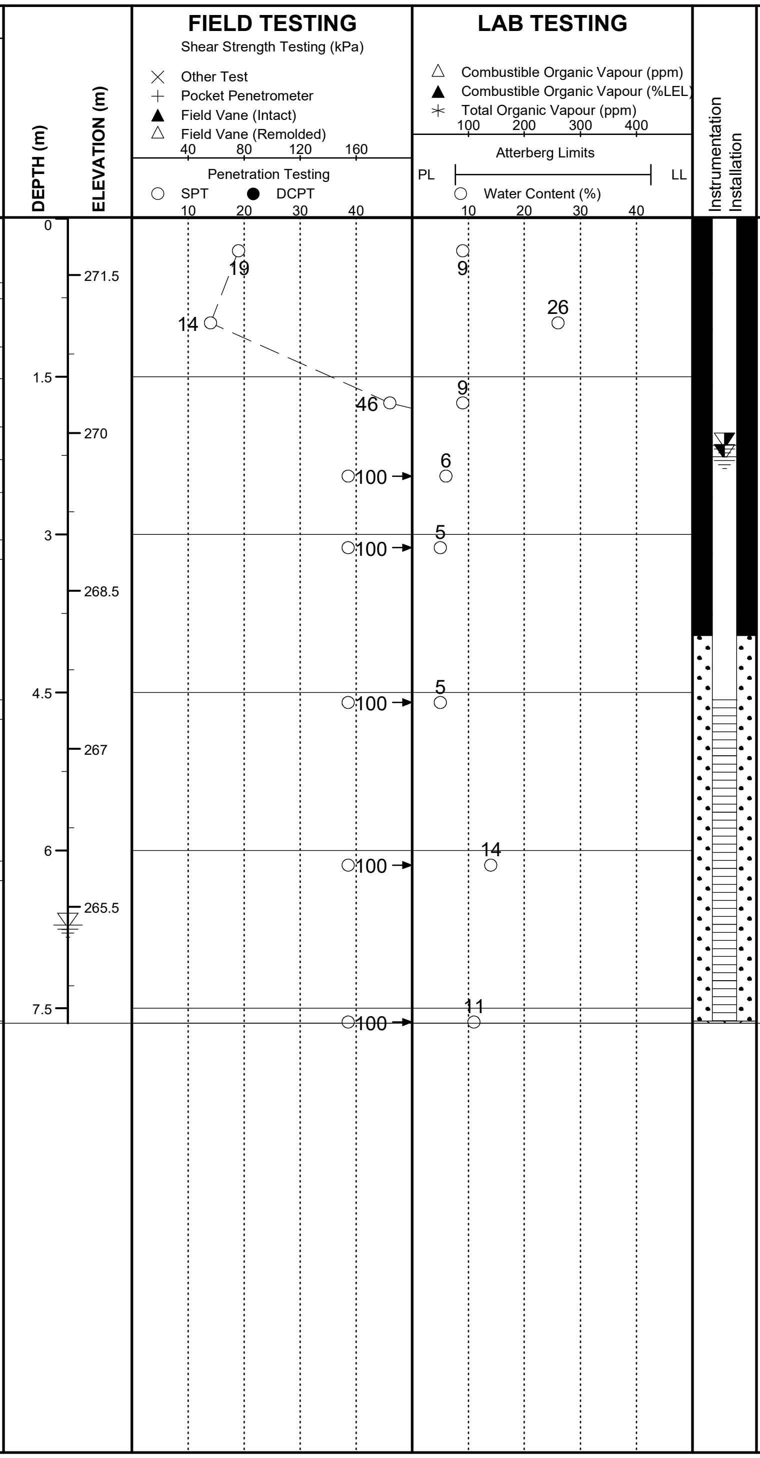
Page: **1 of 1**

RECORD OF BOREHOLE No. 3

Project Number: **2101711**
Project Client: **GL West Preferred Limited Partnership**
Project Name: **1656 Green Lane Ave East**
Project Location: **East Gwillimbury, Ontario**
Drilling Location: **Northwest Corner of Proposed Building C**

Drilling Method: **Solid Stem Augers**
Drilling Machine: **Track Mount**
Logged By: **BH**
Northing: **4882728**
Date Started: **2021-06-21**
Reviewed By: **AW**
Easting: **625635**
Date Completed: **2021-06-21**

LITHOLOGY PROFILE		SOIL SAMPLING					
DESCRIPTION	Geodetic 272.035	Sample Type	Sample Number	Recovery (%)	SPT "N" Value	Water Content (%)	COMMENTS & GRAIN SIZE DISTRIBUTION (%)
SILTY SAND, Trace Organics, Trace Gravel, Trace Clay, Compact, Brown, Moist --- Some Organics, Dark Brown ---		SS	1	100	19	9	
		SS	2	100	14	26	
1.5	270.5						
SILTY SAND GLACIAL TILL, Some Clay, Trace Gravel, Dense to Very Dense, Brown, Moist		SS	3	100	46	9	
		SS	4	100	100	6	
		SS	5	100	100	5	
		SS	6	100	100	5	
		SS	7	100	100	14	Between 6.7m and 7.6m, Auger Grinding on Boulders / Cobbles
7.6	264.4						
Borehole Ends @ 7.6m		SS	8	100	100	11	



GR SA SI CL

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Groundwater depth encountered on completion of drilling: **6.71m**

Cave depth after auger removal: **Open**

Groundwater depth observed on **June 29/21** at a depth of: **2.26m**

Observed on **Aug. 5/21** at a depth of: **2.15m**

Borehole details presented do not constitute a thorough understanding of all potential conditions present and require interpretative assistance from a qualified geotechnical engineer. Also, borehole information should be read in conjunction with the geotechnical report for which it was commissioned and the accompanying 'Explanation of Boring Log'.

Scale: **1 :75**

RECORD OF BOREHOLE No. 4

Project Number: **2101711**
Project Client: **GL West Preferred Limited Partnership**
Project Name: **1656 Green Lane Ave East**
Project Location: **East Gwillimbury, Ontario**
Drilling Location: **Soouth Side and Centre of Proposed**

Drilling Method: **Solid Stem Augers**
Drilling Machine: **Track Mount**
Logged By: **BH**
Reviewed By: **AW**
Northing: **4882680**
Easting: **625801**
Date Started: **2021-06-21**
Date Completed: **2021-06-21**

LITHOLOGY PROFILE · SOIL SAMPLING · FIELD TESTING · LAB TESTING · COMMENTS & GRAIN SIZE DISTRIBUTION (%)

Geodetic 276.848

FIELD TESTING: Shear Strength Testing (kPa): Other Test, Pocket Penetrometer, Field Vane (Intact), Field Vane (Remolded); 40 80 120 160. Penetration Testing: ○ SPT ● DCPT; 10 20 30 40

LAB TESTING: △ Combustible Organic Vapour (ppm); ▲ Combustible Organic Vapour (%LEL); ✳ Total Organic Vapour (ppm); 100 200 300 400. Atterberg Limits PL — LL; ○ Water Content (%) 10 20 30 40

DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT "N" Value	Water Content (%)	GR	SA	SI	CL
SAND, Some Silt, Trace Organics, Loose, Brown, Wet	SS	1	100	5	16				
0.8 — 276.1 SANDY SILT GLACIAL TILL, Some Clay, Trace Gravel, Compact, Brown, Moist to Wet	SS	2	100	13	12				
	SS	3	100	20	14				
2.3 — 274.6 SILTY SAND GLACIAL TILL, Some Clay, Trace Gravel, Dense, Brown, Moist	SS	4	100	33	10				
	SS	5	100	47	11				
	SS	6	100	37	10				
--- Very Dense ---	SS	7	100	77 →	11				
--- Grey --- 7.9 — 268.9	SS	8	100	100 →	8	5	49	28	18
Borehole Ends @ 7.9m									

DEPTH (m): 0, 1.5, 3, 4.5, 6, 7.5
ELEVATION (m): 276, 274.5, 273, 271.5, 270

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Groundwater depth encountered on completion of drilling: **7.32m**

Cave depth after auger removal: **Open**

Groundwater depth observed on **June 29/21** at a depth of: **2.09m**

Observed on **Aug. 5/21** at a depth of: **2.26m**

Borehole details presented do not constitute a thorough understanding of all potential conditions present and require interpretative assistance from a qualified geotechnical engineer. Also, borehole information should be read in conjunction with the geotechnical report for which it was commissioned and the accompanying 'Explanation of Boring Log'.

Scale: **1 :75**

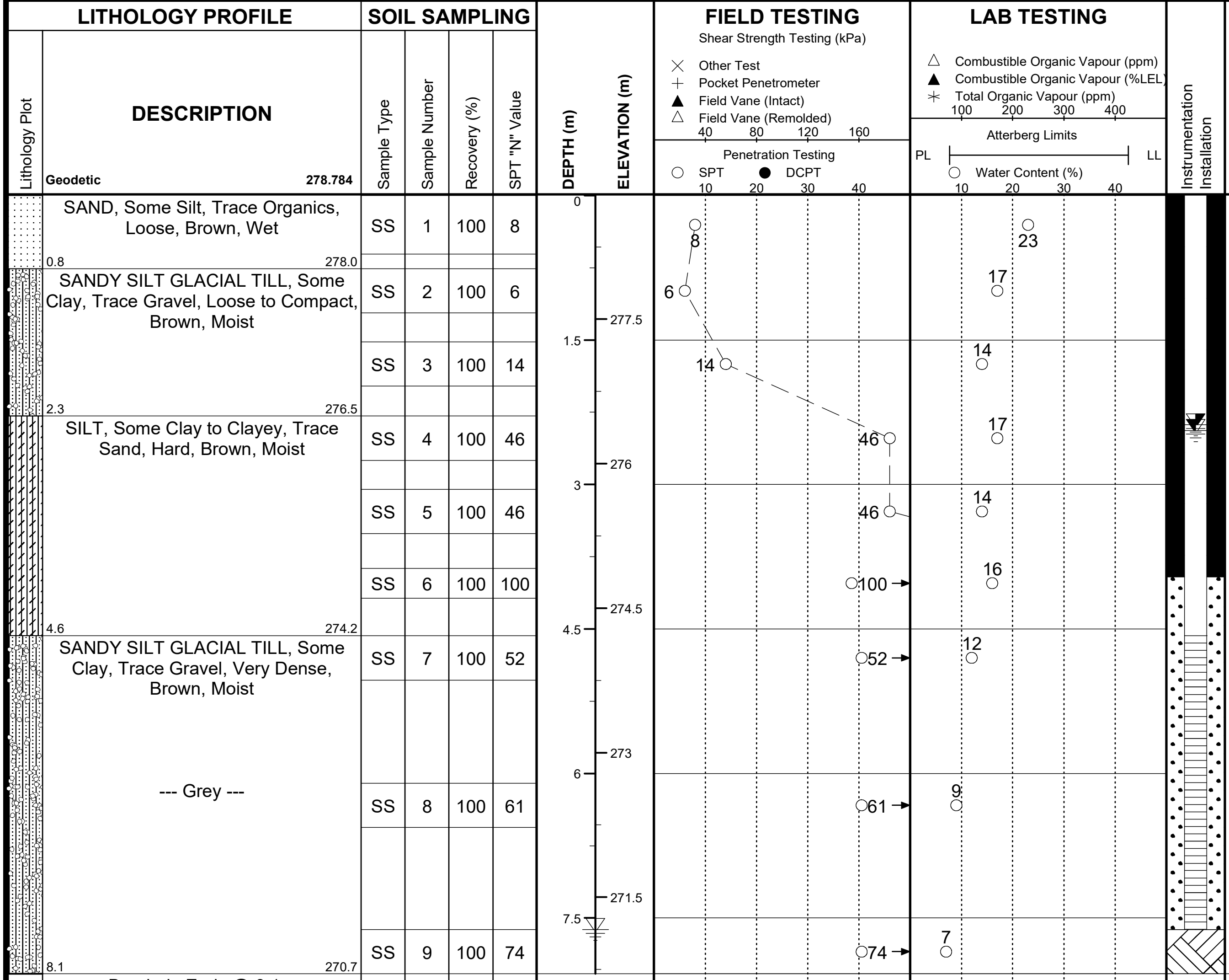
Page: **1 of 1**

RECORD OF BOREHOLE No. 5

Project Number: **2101711**
Project Client: **GL West Preferred Limited Partnership**
Project Name: **1656 Green Lane Ave East**
Project Location: **East Gwillimbury, Ontario**
Drilling Location: **Northeast Corner of Proposed Building C**

Drilling Method: **Solid Stem Augers**
Drilling Machine: **Track Mount**
Logged By: **BH**
Reviewed By: **AW**
Northing: **4882813**
Easting: **625899**
Date Started: **2021-06-21**
Date Completed: **2021-06-21**

LITHOLOGY PROFILE		SOIL SAMPLING						COMMENTS & GRAIN SIZE DISTRIBUTION (%)			
Depth / Elevation	DESCRIPTION (Geodetic 278.784)	Sample Type	Sample Number	Recovery (%)	SPT "N" Value	Water Content (%)	Comments	GR	SA	SI	CL
	SAND, Some Silt, Trace Organics, Loose, Brown, Wet	SS	1	100	8	23					
0.8 / 278.0	SANDY SILT GLACIAL TILL, Some Clay, Trace Gravel, Loose to Compact, Brown, Moist	SS	2	100	6	17					
		SS	3	100	14	14					
2.3 / 276.5	SILT, Some Clay to Clayey, Trace Sand, Hard, Brown, Moist	SS	4	100	46	17					
		SS	5	100	46	14					
		SS	6	100	100	16		0	1	78	21
4.6 / 274.2	SANDY SILT GLACIAL TILL, Some Clay, Trace Gravel, Very Dense, Brown, Moist	SS	7	100	52	12					
	--- Grey ---	SS	8	100	61	9	Wet Sand Seam at 6.1m				
8.1 / 270.7		SS	9	100	74	7					
	Borehole Ends @ 8.1m										



GEI CONSULTANTS

647 Welham Road, Unit 14
Barrie, Ontario L4N 0B8
T : (705) 719-7994
www.geiconsultants.com

Groundwater depth encountered on completion of drilling: **7.62m**

Cave depth after auger removal: **Open**

Groundwater depth observed on **June 29/21** at a depth of: **2.44m**

Observed on **Aug. 5/21** at a depth of: **2.38m**

Borehole details presented do not constitute a thorough understanding of all potential conditions present and require interpretative assistance from a qualified geotechnical engineer. Also, borehole information should be read in conjunction with the geotechnical report for which it was commissioned and the accompanying 'Explanation of Boring Log'.

Scale: **1 :75**

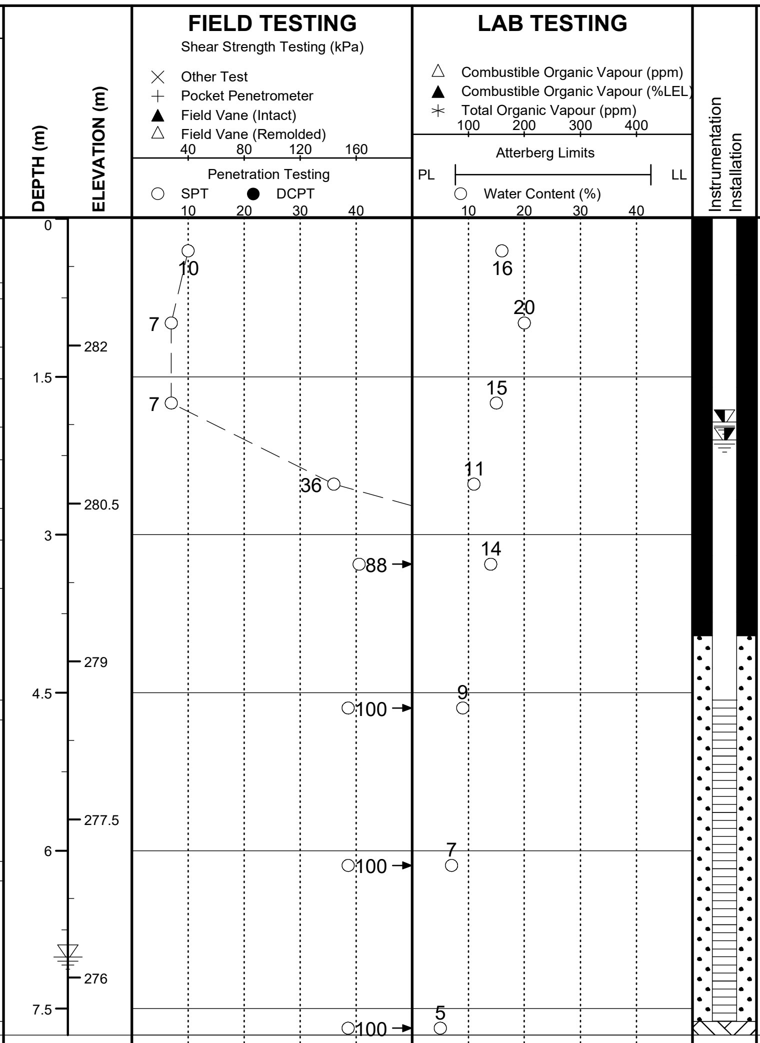
RECORD OF BOREHOLE No. 6

GEI Consultants

Project Number: **2101711**
Project Client: **GL West Preferred Limited Partnership**
Project Name: **1656 Green Lane Ave East**
Project Location: **East Gwillimbury, Ontario**
Drilling Location: **Southeast Corner of Property**

Drilling Method: **Solid Stem Augers**
Drilling Machine: **Track Mount**
Logged By: **BH**
Reviewed By: **AW**
Northing: **4882727**
Easting: **625961**
Date Started: **2021-06-21**
Date Completed: **2021-06-21**

LITHOLOGY PROFILE DESCRIPTION	Depth / Elev. (m)	SOIL SAMPLING Sample Type	Sample Number	Recovery (%)	SPT "N" Value	Water Content (%)	COMMENTS & GRAIN SIZE DISTRIBUTION (%)
Geodetic	283.204						
SAND, Some Silt, Trace Organics, Loose, Brown, Moist		SS	1	100	10	16	
	0.8 / 282.4						
SAND & SILT, Trace Clay, Loose, Brown, Wet		SS	2	100	7	20	
		SS	3	100	7	15	
	2.3 / 280.9						
SANDY SILT GLACIAL TILL, Some Clay, Trace Gravel, Dense to Very Dense, Brown, Moist		SS	4	100	36	11	
		SS	5	100	88	14	
		SS	6	100	100	9	Wet Sand Seam Between 5.2m and 6.1m
--- Grey ---		SS	7	100	100	7	
	7.8 / 275.5	SS	8	100	100	5	
Borehole Ends @ 7.8m							



GEI CONSULTANTS

647 Welham Road, Unit 14
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Groundwater depth encountered on completion of drilling: **7.01m**

Cave depth after auger removal: **Open**

Groundwater depth observed on **June 29/21** at a depth of: **1.93m**

Observed on **Aug. 5/21** at a depth of: **2.10m**

Borehole details presented do not constitute a thorough understanding of all potential conditions present and require interpretative assistance from a qualified geotechnical engineer. Also, borehole information should be read in conjunction with the geotechnical report for which it was commissioned and the accompanying 'Explanation of Boring Log'.

Scale: **1 :75**

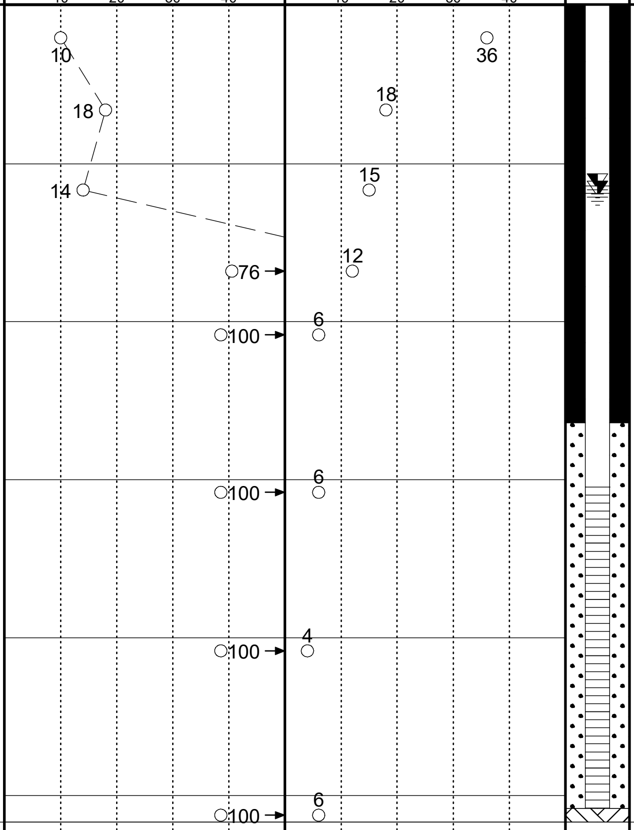
Page: **1 of 1**

RECORD OF BOREHOLE No. 7

Project Number: **2101711**
Project Client: **GL West Preferred Limited Partnership**
Project Name: **1656 Green Lane Ave East**
Project Location: **East Gwillimbury, Ontario**
Drilling Location: **Eastern Edge of Property**

Drilling Method: **Solid Stem Augers**
Drilling Machine: **Track Mount**
Logged By: **BH**
Reviewed By: **AW**
Northing: **4882832**
Easting: **625998**
Date Started: **2021-06-21**
Date Completed: **2021-06-21**

LITHOLOGY PROFILE		SOIL SAMPLING						FIELD TESTING	LAB TESTING		COMMENTS & GRAIN SIZE DISTRIBUTION (%)			
DESCRIPTION Geodetic 282.163	Depth / Elevation	Sample Type	Sample Number	Recovery (%)	SPT "N" Value	DEPTH (m)	ELEVATION (m)	SPT	Water Content (%)	Instrumentation Installation	GR	SA	SI	CL
SAND, Some Silt, Trace Organics, Loose, Brown, Wet	0.8 / 281.4	SS	1	83	10	0	282	10	36					
SAND & SILT, Trace Clay, Compact, Brown, Wet	1.5 / 280.6	SS	2	100	18			18	18					
SILT GLACIAL TILL, Some Sand to Sandy, Some Clay, Trace Gravel, Compact, Brown, Moist		SS	3	100	14	1.5	280.5	14	15		3	19	60	18
--- Very Dense ---		SS	4	100	76			76	12					
		SS	5	100	100	3	279	100	6					
--- Grey ---		SS	6	100	100	4.5	277.5	100	6					
		SS	7	100	100	6	276	100	4					
	7.8 / 274.4	SS	8	100	100	7.5	274.5	100	6					
Borehole Ends @ 7.8m														



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Groundwater depth encountered on completion of drilling: **7.32m**

Cave depth after auger removal: **Open**

Groundwater depth observed on **June 29/21** at a depth of: **1.71m**

Observed on **Aug. 5/21** at a depth of: **1.78m**

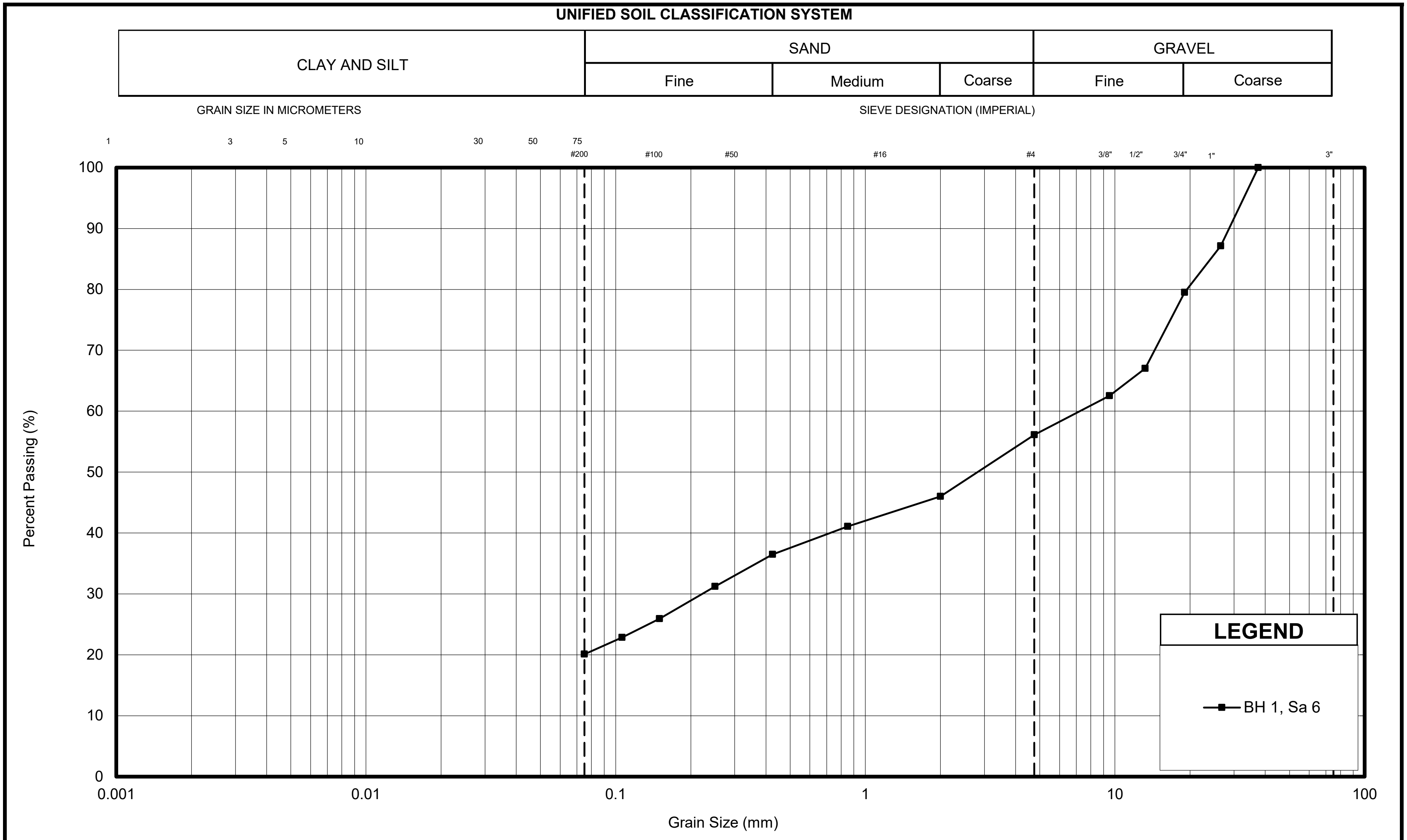
Borehole details presented do not constitute a thorough understanding of all potential conditions present and require interpretative assistance from a qualified geotechnical engineer. Also, borehole information should be read in conjunction with the geotechnical report for which it was commissioned and the accompanying 'Explanation of Boring Log'.

Scale: **1 :75**

Page: **1 of 1**

Appendix B

Geotechnical Laboratory Data



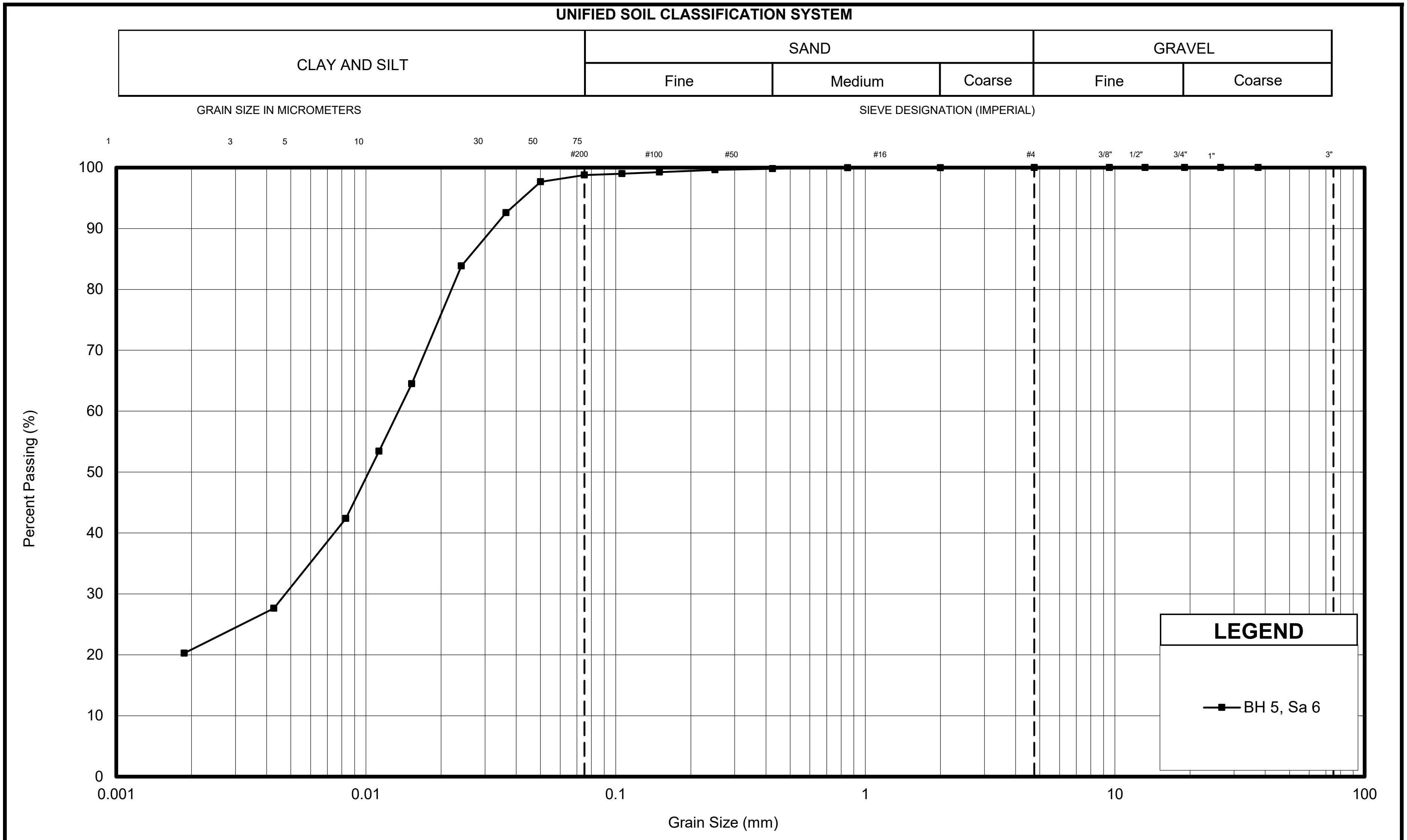
Sample	Description	Gr.	Sa.	Si.	Cl.	D_{10}	D_{30}	D_{60}	C_u	C_c
BH 1, Sa 6	GRAVEL & SAND, Some Fines	44	36	20		-	0.22	7.21	-	-

GEI Consultants

GRAIN SIZE DISTRIBUTION - 1656 Green Lane East

GRAVEL & SAND

APP. No	B
REF. No.	2101711
DATE	September 2021



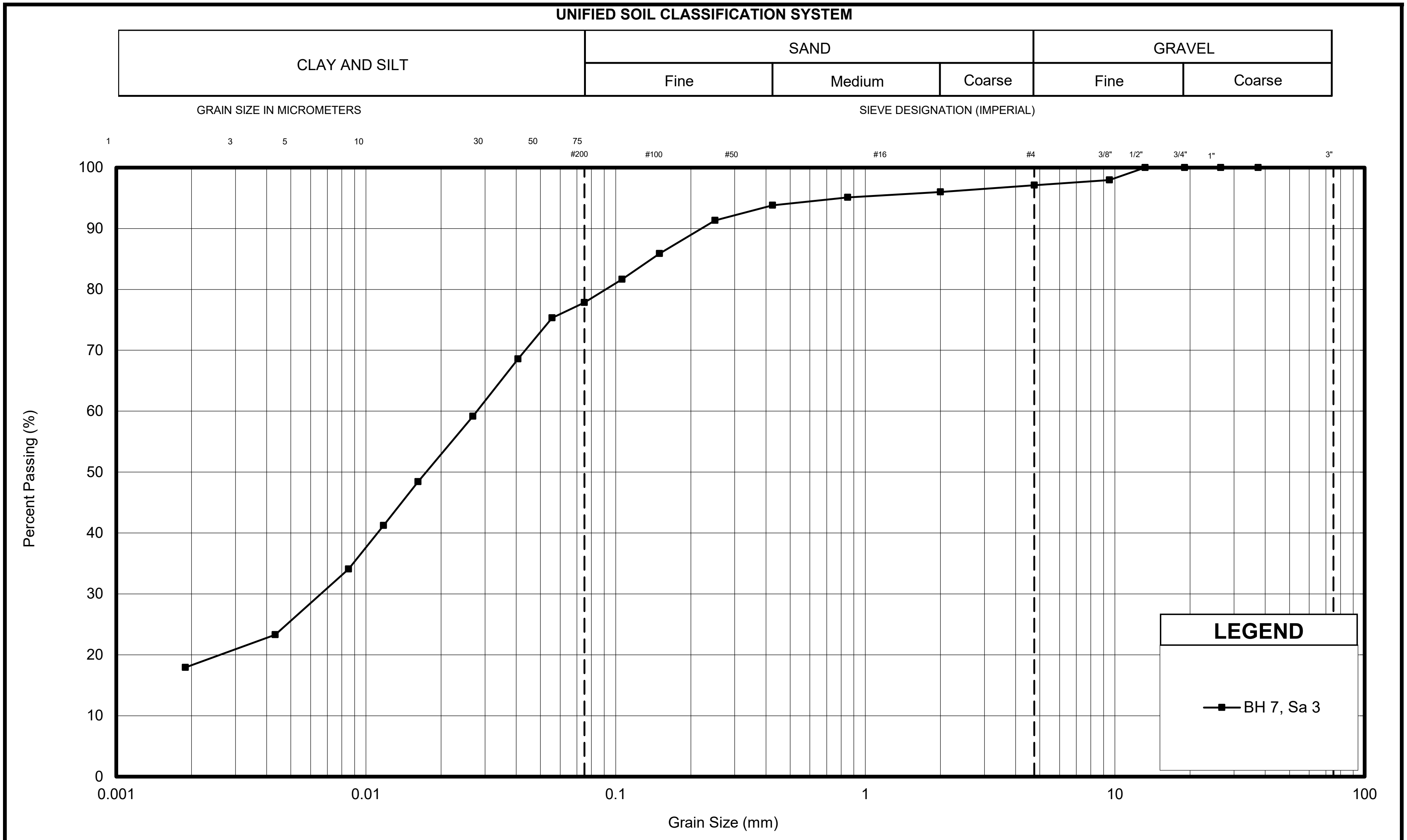
Sample	Description	Gr.	Sa.	Si.	Cl.	D_{10}	D_{30}	D_{60}	C_u	C_c
BH 5, Sa 6	CLAYEY SILT, Trace Sand	0	1	78	21	-	0.005	0.013	-	-

GEI Consultants

GRAIN SIZE DISTRIBUTION - 1656 Green Lane East

CLAYEY SILT

APP. No B
REF. No. 2101711
DATE September 2021



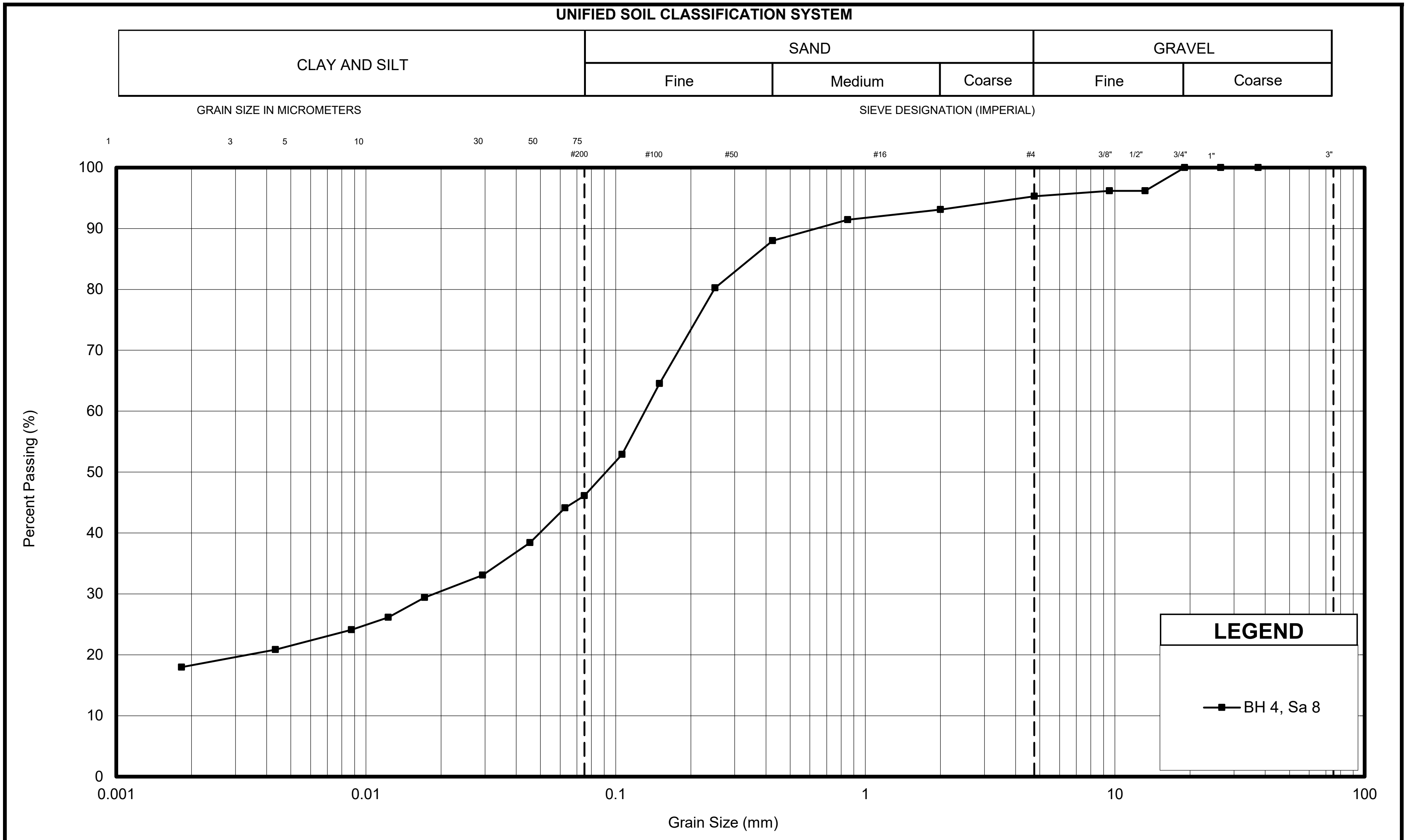
Sample	Description	Gr.	Sa.	Si.	Cl.	D_{10}	D_{30}	D_{60}	C_u	C_c
BH 7, Sa 3	SILT GLACIAL TILL, Some Sand, Some Clay, Trace Gravel	3	19	60	18	-	0.007	0.028	-	-

GEI Consultants

GRAIN SIZE DISTRIBUTION - 1656 Green Lane East

SILT GLACIAL TILL

APP. No	B
REF. No.	2101711
DATE	September 2021



Sample	Description	Gr.	Sa.	Si.	Cl.	D_{10}	D_{30}	D_{60}	C_u	C_c
BH 4, Sa 8	SILTY SAND GLACIAL TILL, Some Clay, Trace Gravel	5	49	28	18	-	0.019	0.13	-	-

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GRAIN SIZE DISTRIBUTION - 1656 Green Lane East

SILTY SAND GLACIAL TILL

APP. No	B
REF. No.	2101711
DATE	September 2021

Sample	Description	Gr.	Sa.	Si.	Cl.	D_{10}	D_{30}	D_{60}	C_u	C_c
BH 2, Sa 5	SAND, Some Fines, Trace Gravel	7	77	16		-	0.15	0.28	-	-

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GRAIN SIZE DISTRIBUTION - 1656 Green Lane East

SAND

APP. No	B
REF. No.	2101711
DATE	September 2021

Appendix C

Groundwater Chemistry Certificates of Analysis

CADUCEON
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CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: --- **REPORT No. B21-20333 (i)**

Report To:
GEI Consultants
647 Welham Rd, Unit 14,
Barrie ON L4N 0B7 Canada
Attention: Alex Winkelmann

Caduceon Environmental Laboratories
112 Commerce Park Drive
Barrie ON L4N 8W8
Tel: 705-252-5743
Fax: 705-252-5746

DATE RECEIVED: 02-Jul-21
DATE REPORTED: 07-Jul-21
SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.: 1656 Green Lane
P.O. NUMBER: 2101711
WATERWORKS NO.

Parameter	Qty	Site Analyzed	Analyst Initials	Date Analyzed	Lab Method	Reference Method
Cyanide	2	Kingston	US	07-Jul-21	A-CN-001 (k)	SM 4500CN
Conductivity	2	Holly Lane	SYL	05-Jul-21	A-COND-02 (o)	SM 2510B
Anions	2	Holly Lane	VK	06-Jul-21	A-IC-01 (o)	SM4110C
pH	2	Holly Lane	SYL	05-Jul-21	A-PH-01 (o)	SM 4500H
Total Suspended Solids	4	Kingston	bbr	06-Jul-21	A-TSS-001 (k)	SM2540D
Chromium (VI)	4	Holly Lane	LMG	07-Jul-21	D-CRVI-01 (o)	MOE E3056
Mercury	4	Holly Lane	PBK	07-Jul-21	D-HG-02 (o)	SM 3112 B
Metals - ICP-OES	2	Holly Lane	hmc	07-Jul-21	D-ICP-01 (o)	SM 3120
Metals - ICP-MS	4	Holly Lane	TPR	07-Jul-21	D-ICPMS-01 (o)	EPA 200.8

PWQO - Provincial Water Quality Objectives
Interim PWQO - Interim PWQO
PWQO - Provincial Water Quality Objectives

Steve Garrett
Director of Laboratory Services

R.L. = Reporting Limit
Test methods may be modified from specified reference method unless indicated by an *
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

CERTIFICATE OF ANALYSIS

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Barrie ON L4N 8W8
Tel: 705-252-5743
Fax: 705-252-5746

DATE RECEIVED: 02-Jul-21
DATE REPORTED: 07-Jul-21
SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.: 1656 Green Lane
P.O. NUMBER: 2101711
WATERWORKS NO.

	Client I.D.		BH 1	BH 1 (F)	BH 6	BH 6 (F)	**PWQO**	
	Sample I.D.		B21-20333-1	B21-20333-2	B21-20333-3	B21-20333-4	**Interim PWQO**	**PWQO**
	Date Collected		30-Jun-21	30-Jun-21	30-Jun-21	30-Jun-21		
Parameter	**Units**	**R.L.**						
pH @25°C	pH Units		8.25		7.66			8.5
Conductivity @25°C	mS/cm	0.001	0.337		5.62			
Total Suspended Solids	mg/L	3	22	< 3	51	< 3		
Chloride	µg/L	500	16000		1820000			
Cyanide (Free)	µg/L	5	< 5		< 5			5
Antimony	µg/L	0.1	0.2	< 0.1	< 1	< 1	20	
Arsenic	µg/L	0.1	0.6	0.6	< 1	< 1	5	5
Barium	µg/L	1	83	79	813	708		
Beryllium	µg/L	0.1	< 0.1	< 0.1	< 1	< 1		11
Boron	µg/L	5	53	53	41	36	200	
Cadmium	µg/L	0.015	0.025	< 0.015	**< 0.14**	**< 0.14**	0.1	0.2
Chromium	µg/L	1	< 1	< 1	< 2	< 2		
Chromium (VI)	µg/L	1	< 1 [1]	< 1 [1]	< 1 [1]	< 1 [1]		1
Cobalt	µg/L	0.1	0.2	0.1	**3.6**	**3.5**	0.9	
Copper	µg/L	2	< 2	< 2	< 2	< 2	5	
Lead	µg/L	0.02	0.09	< 0.02	0.23	< 0.2	1	5
Mercury	µg/L	0.02	< 0.02	< 0.02	< 0.02	< 0.02		0.2
Molybdenum	µg/L	0.1	12.8	11.2	11.5	5.8	40	
Nickel	µg/L	0.2	2.1	1.6	12.5	11.2		25
Selenium	µg/L	1	< 1	< 1	< 10	< 10		100
Silver	µg/L	0.1	< 0.1	< 0.1	**< 0.2**	**< 0.2**		0.1
Sodium	µg/L	200	14100		543000			
Thallium	µg/L	0.05	< 0.05	< 0.05	**< 0.5**	**< 0.5**	0.3	0.3
Uranium	µg/L	0.05	0.06	< 0.05	1.78	1.62	5	
Vanadium	µg/L	0.1	0.5	0.2	< 1	< 1	6	
Zinc	µg/L	5	< 5	**27**	**21**	**23**	20	30

PWQO - Provincial Water Quality Objectives
Interim PWQO - Interim PWQO
PWQO - Provincial Water Quality Objectives

R.L. = Reporting Limit
Test methods may be modified from specified reference method unless indicated by an *
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

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Director of Laboratory Services

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112 Commerce Park Drive
Barrie ON L4N 8W8
Tel: 705-252-5743
Fax: 705-252-5746

DATE RECEIVED: 02-Jul-21
DATE REPORTED: 07-Jul-21
SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.: 1656 Green Lane
P.O. NUMBER: 2101711
WATERWORKS NO.

	Client I.D. **Sample I.D.** **Date Collected**		BH 1 B21-20333-1 30-Jun-21	BH 1 (F) B21-20333-2 30-Jun-21	BH 6 B21-20333-3 30-Jun-21	BH 6 (F) B21-20333-4 30-Jun-21	**PWQO** **Interim PWQO**	 **PWQO**
Parameter	**Units**	**R.L.**						

1 . Chromium (VI) result is based on total chromium
2 . Elevated RL due to sample matrix interference

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Interim PWQO - Interim PWQO
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DATE RECEIVED: 02-Jul-21
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SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.: 1656 Green Lane
P.O. NUMBER: 2101711
WATERWORKS NO.

Summary of Exceedances

Interim PWQO

BH 1 (F)	Found Value	Limit
Zinc (µg/L)	27	20

BH 6	Found Value	Limit
Zinc (µg/L)	21	20
Thallium (µg/L)	< 0.5	0.3
Cobalt (µg/L)	3.6	0.9
Cadmium (µg/L)	< 0.14	0.1

BH 6 (F)	Found Value	Limit
Zinc (µg/L)	23	20
Thallium (µg/L)	< 0.5	0.3
Cobalt (µg/L)	3.5	0.9
Cadmium (µg/L)	< 0.14	0.1

Provincial Water Quality Objectives

BH 6	Found Value	Limit
Thallium (µg/L)	< 0.5	0.3
Silver (µg/L)	< 0.2	0.1

BH 6 (F)	Found Value	Limit
Thallium (µg/L)	< 0.5	0.3
Silver (µg/L)	< 0.2	0.1

PWQO - Provincial Water Quality Objectives
Interim PWQO - Interim PWQO
PWQO - Provincial Water Quality Objectives

R.L. = Reporting Limit
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Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

Steve Garrett
Director of Laboratory Services

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: --- **REPORT No. B21-20333 (ii)**

Report To:

GEI Consultants
647 Welham Rd, Unit 14,
Barrie ON L4N 0B7 Canada
Attention: Alex Winkelmann

Caduceon Environmental Laboratories
112 Commerce Park Drive
Barrie ON L4N 8W8
Tel: 705-252-5743
Fax: 705-252-5746

DATE RECEIVED: 02-Jul-21
DATE REPORTED: 07-Jul-21
SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.: 1656 Green Lane
P.O. NUMBER: 2101711
WATERWORKS NO.

Parameter	Qty	Site Analyzed	Analyst Initials	Date Analyzed	Lab Method	Reference Method
PHC(F2-F4)	2	Kingston	KPR	05-Jul-21	C-PHC-W-001 (k)	MOE E3421
VOC's	2	Richmond Hill	JE	05-Jul-21	C-VOC-02 (rh)	EPA 8260
PHC(F1)	2	Richmond Hill	JE	05-Jul-21	C-VPHW-01 (rh)	MOE E3421

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Interim PWQO - Interim PWQO
PWQO - Provincial Water Quality Objectives

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Steve Garrett
Director of Laboratory Services

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112 Commerce Park Drive
Barrie ON L4N 8W8
Tel: 705-252-5743
Fax: 705-252-5746

DATE RECEIVED: 02-Jul-21
DATE REPORTED: 07-Jul-21
SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.: 1656 Green Lane
P.O. NUMBER: 2101711
WATERWORKS NO.

	Client I.D.		BH 1	BH 6			**PWQO**	
	Sample I.D.		B21-20333-1	B21-20333-3			**Interim PWQO**	**PWQO**
	Date Collected		30-Jun-21	30-Jun-21				
Parameter	**Units**	**R.L.**						
Acetone	µg/L	30	< 30	< 30				
Benzene	µg/L	0.5	1.1	0.5			100	
Bromodichloromethane	µg/L	2	< 2	< 2			200	
Bromoform	µg/L	5	< 5	< 5			60	
Bromomethane	µg/L	0.5	< 0.5	< 0.5			0.9	
Carbon Tetrachloride	µg/L	0.2	< 0.2	< 0.2				
Monochlorobenzene (Chlorobenzene)	µg/L	0.5	< 0.5	< 0.5				15
Chloroform	µg/L	1	< 1	< 1				
Dibromochloromethane	µg/L	2	< 2	< 2				
Dichlorobenzene,1,2-	µg/L	0.5	< 0.5	< 0.5				2.5
Dichlorobenzene,1,3-	µg/L	0.5	< 0.5	< 0.5				2.5
Dichlorobenzene,1,4-	µg/L	0.5	< 0.5	< 0.5				4
Dichlorodifluoromethane	µg/L	2	< 2	< 2				
Dichloroethane,1,1-	µg/L	0.5	< 0.5	< 0.5			200	
Dichloroethane,1,2-	µg/L	0.5	< 0.5	< 0.5			100	
Dichloroethylene,1,1-	µg/L	0.5	< 0.5	< 0.5			40	
Dichloroethene, cis-1,2-	µg/L	0.5	< 0.5	< 0.5			200	
Dichloroethene, trans-1,2-	µg/L	0.5	< 0.5	< 0.5			200	
Dichloropropane,1,2-	µg/L	0.5	< 0.5	< 0.5			0.7	
Dichloropropene, cis-1,3-	µg/L	0.5	< 0.5	< 0.5				
Dichloropropene, trans-1,3-	µg/L	0.5	< 0.5	< 0.5			7	
Dichloropropene 1,3-cis+trans	µg/L	0.5	< 0.5	< 0.5				
Ethylbenzene	µg/L	0.5	0.7	< 0.5			8	

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Interim PWQO - Interim PWQO
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Steve Garrett
Director of Laboratory Services

CERTIFICATE OF ANALYSIS

Final Report

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Attention: Alex Winkelmann

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112 Commerce Park Drive
Barrie ON L4N 8W8
Tel: 705-252-5743
Fax: 705-252-5746

DATE RECEIVED: 02-Jul-21
DATE REPORTED: 07-Jul-21
SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.: 1656 Green Lane
P.O. NUMBER: 2101711
WATERWORKS NO.

	Client I.D.		BH 1	BH 6			**PWQO**	
	Sample I.D.		B21-20333-1	B21-20333-3			**Interim PWQO**	**PWQO**
	Date Collected		30-Jun-21	30-Jun-21				
Parameter	**Units**	**R.L.**						
Dibromoethane,1,2- (Ethylene Dibromide)	µg/L	0.2	< 0.2	< 0.2			5	5
Hexane	µg/L	5	< 5	< 5				
Methyl Ethyl Ketone	µg/L	20	< 20	< 20			400	
Methyl Isobutyl Ketone	µg/L	20	< 20	< 20				
Methyl-t-butyl Ether	µg/L	2	< 2	< 2			200	
Dichloromethane (Methylene Chloride)	µg/L	5	< 5	< 5			100	
Styrene	µg/L	0.5	< 0.5	< 0.5			4	
Tetrachloroethane,1,1,1,2-	µg/L	0.5	< 0.5	< 0.5			20	
Tetrachloroethane,1,1,2,2-	µg/L	0.5	< 0.5	< 0.5			70	
Tetrachloroethylene	µg/L	0.5	< 0.5	< 0.5			50	
Toluene	µg/L	0.5	**5.5**	**2.5**			0.8	0.8
Trichloroethane,1,1,1-	µg/L	0.5	< 0.5	< 0.5			10	
Trichloroethane,1,1,2-	µg/L	0.5	< 0.5	< 0.5			800	
Trichloroethylene	µg/L	0.5	< 0.5	< 0.5			20	
Trichlorofluoromethane	µg/L	5	< 5	< 5				
Vinyl Chloride	µg/L	0.2	< 0.2	< 0.2			600	
Xylene, m,p-	µg/L	1.0	2.4	1.2				
Xylene, o-	µg/L	0.5	0.8	< 0.5			40	
Xylene, m,p,o-	µg/L	1.1	3.2	1.2				
PHC F1 (C6-C10)	µg/L	25	28	< 25				
PHC F2 (>C10-C16)	µg/L	50	< 50	< 50				
PHC F3 (>C16-C34)	µg/L	400	< 400	< 400				
PHC F4 (>C34-C50)	µg/L	400	< 400	< 400				

PWQO - Provincial Water Quality Objectives
Interim PWQO - Interim PWQO
PWQO - Provincial Water Quality Objectives

Steve Garrett
Director of Laboratory Services

R.L. = Reporting Limit
Test methods may be modified from specified reference method unless indicated by an *
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: --- **REPORT No. B21-20333 (ii)**

Report To:

GEI Consultants
647 Welham Rd, Unit 14,
Barrie ON L4N 0B7 Canada
Attention: Alex Winkelmann

Caduceon Environmental Laboratories
112 Commerce Park Drive
Barrie ON L4N 8W8
Tel: 705-252-5743
Fax: 705-252-5746

DATE RECEIVED: 02-Jul-21
DATE REPORTED: 07-Jul-21
SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.: 1656 Green Lane
P.O. NUMBER: 2101711
WATERWORKS NO.

	Client I.D. **Sample I.D.** **Date Collected**		BH 1 B21-20333-1 30-Jun-21	BH 6 B21-20333-3 30-Jun-21			**PWQO** **Interim PWQO**	**PWQO**
Parameter	**Units**	**R.L.**						

PWQO - Provincial Water Quality Objectives
Interim PWQO - Interim PWQO
PWQO - Provincial Water Quality Objectives

R.L. = Reporting Limit
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Steve Garrett
Director of Laboratory Services

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DATE RECEIVED: 02-Jul-21
DATE REPORTED: 07-Jul-21
SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.: 1656 Green Lane
P.O. NUMBER: 2101711
WATERWORKS NO.

Summary of Exceedances

Interim PWQO

BH 1	Found Value	Limit
Toluene (µg/L)	5.5	0.8
BH 6	Found Value	Limit
Toluene (µg/L)	2.5	0.8

Provincial Water Quality Objectives

BH 1	Found Value	Limit
Toluene (µg/L)	5.5	0.8
BH 6	Found Value	Limit
Toluene (µg/L)	2.5	0.8

PWQO - Provincial Water Quality Objectives
Interim PWQO - Interim PWQO
PWQO - Provincial Water Quality Objectives

R.L. = Reporting Limit
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Steve Garrett
Director of Laboratory Services

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TESTING REQUIREMENTS

☐ O.Reg 153 Table ______ ☐ Medium/Fine ☐ Coarse
☐ RPI ☐ ICC ☐ Agricultural (O.Reg 153)
☐ Yes ☐ No Record of Site Condition (O.Reg 153)
☒ Provincial Water Quality Objectives
☐ Sewer Use By-Law: ______
☐ MISA Guidelines
☐ O.Reg 558 Leachate Analysis
Disposal Site: ______
☐ Landfill Monitoring
☐ Other: ______

REPORT NUMBER (Lab Use) B21-20333

Are any samples to be submitted intended for Human Consumption under any Drinking Water Regulations? ☐ Yes ☒ No (If yes, submit all Drinking Water Samples on a Drinking Water Chain of Custody)

Indicate Laboratory Samples are submitted to: ☐ Kingston ☐ Ottawa ☐ Richmond Hill ☐ Windsor ☒ Barrie ☐ London

Organization: GEI Consultants
Contact: Alex Winkelmann
Tel: (705) 229-4298
Fax: -
Email: awinkelmann@centralearth.ca

Address and Invoicing Address (if different)
647 Welham Road, Unit 14
Barrie, Ontario
L4N 0B7

Quote No.: 2020_EPD
P.O. No.: -
Project Name: 1656 Green Lane
Additional Info: 2101711

ANALYSES REQUESTED (Print Test in Boxes)

TURNAROUND SERVICE REQUESTED (see back page)
☐ Platinum 200% Surcharge
☐ Gold 100% Surcharge
☐ Silver 50% Surcharge
☐ Bronze 25% Surcharge
☒ Standard 5-7 days
☐ Specific Date: ______

* Sample Matrix Legend: WW=Waste Water, SW=Surface Water, GW=Groundwater, LS=Liquid Sludge, SS=Solid Sludge, S=Soil, Sed=Sediment, PC=Paint Chips, F=Filter, Oil = Oil

Indicate Test For Each Sample By Using A Check Mark In The Box Provided

Lab No:	Sample Identification	S.P.L.	Sample Matrix *	Date Collected (yy-mm-dd)	Time Collected	Metals Suite #2	Inorganics Suite #3	PHC + BTEX, VOC	TSS									Suspected Highly Contaminated ✓	Field pH	Field Temp.	# Bottles/ Sample	Field Filtered(Y/N)
1	BH 1	-	GW	21-06-30	PM	✓	✓	✓	✓												9	N
2	BH 1 (F)	-	GW	21-06-30	PM	✓			✓												4	Y
3	BH 6		GW	21-06-30	PM	✓	✓	✓	✓												9	N
4	BH 6 (F)		GW	21-06-30	PM	✓			✓												4	Y
	Gen Chem → K																					
	#1, #3 Gen Chem, ~~CR~~ PM → O																					
	#1, #3 CN, 500mL amber → K																					
	[illegible] Dim																					
	metals, hg, Cr (VI) → O																					
	#1, #3 VOC → RH																					

SAMPLE SUBMISSION INFORMATION

	Sampled by:	Submitted by:
Print:	Bo Hwang	Bo Hwang
Sign:		
Date (yy-mm-dd)/Time:	21-06-30	21-07-02

SHIPPING INFORMATION

Client's Courier ☐
Caduceon's Courier ☐
Drop Off ☒
Caduceon (Pick-up) ☐
Invoice ☐
# of Pieces 8

REPORTING / INVOICING

Report by Fax ☐
Report by Email ☒
Invoice by Email ☒
Invoice by Mail ☐

SAMPLE RECEIVING INFORMATION (LABORATORY USE ONLY)

Received By (print): Ashley m Signature:
Date Received (yy-mm-dd): 21-07-02 Time Received: 9:22
Laboratory Prepared Bottles: ☒ Yes ☐ No
Sample Temperature °C: 8.7
Labeled by: ES
Page 1 of 1
G

Comments:

White: Lab Copy / Yellow: Invoicing Copy / Pink: Client Copy

CofC, May 2019, Revision No: 22

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CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: --- **REPORT No. B21-20330**

Report To:

GEI Consultants
647 Welham Rd, Unit 14,
Barrie ON L4N 0B7 Canada
Attention: Alex Winkelmann

Caduceon Environmental Laboratories
112 Commerce Park Drive
Barrie ON L4N 8W8
Tel: 705-252-5743
Fax: 705-252-5746

DATE RECEIVED: 02-Jul-21
DATE REPORTED: 12-Jul-21
SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.: 1656 Green Lane
P.O. NUMBER: 2101711
WATERWORKS NO.

Parameter	Qty	Site Analyzed	Analyst Initials	Date Analyzed	Lab Method	Reference Method
Cyanide	1	Kingston	US	05-Jul-21	A-CN-001 (k)	SM 4500CN
Anions	1	Holly Lane	VK	06-Jul-21	A-IC-01 (o)	SM4110C
pH	1	Holly Lane	SYL	05-Jul-21	A-PH-01 (o)	SM 4500H
A - Wet Chem	1	Kingston	aro	06-Jul-21	A-TPTKN-001 (N)(k)	E3199A.1
A - Wet Chem	1	Kingston	aro	06-Jul-21	A-TPTKN-001 (P)(k)	E3199A.1
Total Suspended Solids	1	Kingston	bbr	06-Jul-21	A-TSS-001 (k)	SM2540D
Comment	1	Default Site	CS	06-Jul-21	C-Arochlor Comment	-
BOD	1	Kingston	JWF	03-Jul-21	C-BOD-001 (k)	SM 5210B
SVOC	1	Kingston	sge	06-Jul-21	C-NAB-W-001 (k)	EPA 8270
Oil & Grease	1	Kingston	MTY	05-Jul-21	C-O&G-001 (k)	SM 5520
PCB's	1	Kingston	CS	06-Jul-21	C-PCB-03 K	EPA 8082
Phenolics (4-aap)	1	Kingston	kwe	06-Jul-21	C-PHEN-01 (k)	MOEE 3179
VOC's	1	Richmond Hill	JE	05-Jul-21	C-VOC-02 (rh)	EPA 8260
Mercury	1	Holly Lane	PBK	06-Jul-21	D-HG-02 (o)	SM 3112 B
Metals - ICP-OES	1	Holly Lane	AHM	06-Jul-21	D-ICP-01 (o)	SM 3120
Metals - ICP-MS	1	Holly Lane	TPR	06-Jul-21	D-ICPMS-01 (o)	EPA 200.8
Subcontracted	1	Default Site	TES	12-Jul-21	S-Nonylphenols	Subcontract

York Sanitary/Storm Sewer - York Region - Sanitary/Storm Sewer Discharge
York Region - Sani. Dis. - York Region - Tbl. 1 - Sanitary Sewer Discharge
York Region - Storm Dis. - York Region - Tbl. 2 - Storm Sewer Discharge

CBurke

Christine Burke
Lab Manager

R.L. = Reporting Limit
Test methods may be modified from specified reference method unless indicated by an *
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

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ENVIRONMENTAL LABORATORIES
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CERTIFICATE OF ANALYSIS

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REPORT No. B21-20330

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GEI Consultants
647 Welham Rd, Unit 14,
Barrie ON L4N 0B7 Canada
Attention: Alex Winkelmann

Caduceon Environmental Laboratories
112 Commerce Park Drive
Barrie ON L4N 8W8
Tel: 705-252-5743
Fax: 705-252-5746

DATE RECEIVED: 02-Jul-21
DATE REPORTED: 12-Jul-21
SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.: 1656 Green Lane
P.O. NUMBER: 2101711
WATERWORKS NO.

	Client I.D.		BH 3				**ork Sanitary/Storm Sewe**	
	Sample I.D.		B21-20330-1				**York Region - Sani. Dis.**	**York Region - Storm Dis.**
	Date Collected		30-Jun-21					
Parameter	**Units**	**R.L.**						
pH @25°C	pH Units		8.04				10.5	9.0
BOD(5 day)	mg/L	3	< 3				300	15
Total Kjeldahl Nitrogen	mg/L	0.1	0.3				100	1
Oil and Grease-Mineral	mg/L	1.0	< 1.0				15	
Oil and Grease-Anim/Veg.	mg/L	1.0	< 1.0				150	
Oil & Grease-Total	mg/L	1.0	< 1.0					
Phenolics	mg/L	0.002	< 0.002				1	0.008
Phosphorus-Total	mg/L	0.01	0.17				10	0.400
Total Suspended Solids	mg/L	3	**202**				350	15
Cyanide (Total)	mg/L	0.005	< 0.005				2	0.020
Fluoride	mg/L	0.1	< 0.1				10	
Sulphate	mg/L	1	27				1500	
Aluminum (total)	mg/L	0.01	0.55				50	
Antimony	mg/L	0.0001	0.0005				5	
Arsenic	mg/L	0.0001	0.0005				1	0.020
Cadmium	mg/L	0.005	< 0.005				0.7	0.008
Chromium	mg/L	0.002	0.003				2	0.080
Cobalt	mg/L	0.005	< 0.005				5	
Copper	mg/L	0.002	0.003				3	0.050
Lead	mg/L	0.02	< 0.02				1	0.120
Manganese (Total)	mg/L	0.001	0.140				5	0.150
Mercury	mg/L	0.00002	< 0.00002				0.01	0.0004
Molybdenum	mg/L	0.01	< 0.01				5	
Nickel	mg/L	0.01	< 0.01				2	0.080

York Sanitary/Storm Sewer - York Region - Sanitary/Storm Sewer Discharge
York Region - Sani. Dis. - York Region - Tbl. 1 - Sanitary Sewer Discharge
York Region - Storm Dis. - York Region - Tbl. 2 - Storm Sewer Discharge

CBurke

Christine Burke
Lab Manager

R.L. = Reporting Limit
Test methods may be modified from specified reference method unless indicated by an *
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

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REPORT No. B21-20330

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GEI Consultants
647 Welham Rd, Unit 14,
Barrie ON L4N 0B7 Canada
Attention: Alex Winkelmann

Caduceon Environmental Laboratories
112 Commerce Park Drive
Barrie ON L4N 8W8
Tel: 705-252-5743
Fax: 705-252-5746

DATE RECEIVED: 02-Jul-21

DATE REPORTED: 12-Jul-21

SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.: 1656 Green Lane

P.O. NUMBER: 2101711

WATERWORKS NO.

	Client I.D.		BH 3				**ork Sanitary/Storm Sewe**	
	Sample I.D.		B21-20330-1				**York Region - Sani. Dis.**	**York Region - Storm Dis.**
	Date Collected		30-Jun-21					
Parameter	**Units**	**R.L.**						
Selenium	mg/L	0.001	< 0.001				1	0.020
Silver	mg/L	0.005	< 0.005				5	0.120
Tin	mg/L	0.05	< 0.05				5	
Titanium	mg/L	0.005	0.034				5	
Zinc	mg/L	0.005	0.031				2	0.040
Benzene	µg/L	0.5	0.6				10	2.0
Chloroform	µg/L	1	< 1				40	2.0
Dichlorobenzene,1,2-	µg/L	0.5	< 0.5				50	5.6
Dichlorobenzene,1,4-	µg/L	0.5	< 0.5				80	6.8
Dichloroethene, cis-1,2-	µg/L	0.5	< 0.5				4000	5.6
Dichloropropene, trans-1,3-	µg/L	0.5	< 0.5				140	5.6
Ethylbenzene	µg/L	0.5	< 0.5				160	2.0
Dichloromethane (Methylene Chloride)	µg/L	5	< 5				2000	5.2
Tetrachloroethane,1,1,2,2-	µg/L	0.5	< 0.5				1400	17.0
Tetrachloroethylene	µg/L	0.5	< 0.5				1000	4.4
Toluene	µg/L	0.5	**2.8**				270	2.0
Trichloroethylene	µg/L	0.5	< 0.5				400	8.0
Xylene, m,p,o-	µg/L	1.1	1.4				1400	4.4
Xylene, m,p-	µg/L	1.0	1.4					
Xylene, o-	µg/L	0.5	< 0.5					
Di-n-butyl Phthalate	µg/L	1	< 1				80	15.0

York Sanitary/Storm Sewer - York Region - Sanitary/Storm Sewer Discharge
York Region - Sani. Dis. - York Region - Tbl. 1 - Sanitary Sewer Discharge
York Region - Storm Dis. - York Region - Tbl. 2 - Storm Sewer Discharge

R.L. = Reporting Limit
Test methods may be modified from specified reference method unless indicated by an *
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

Christine Burke
Lab Manager

CERTIFICATE OF ANALYSIS

Final Report

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Tel: 705-252-5743
Fax: 705-252-5746

DATE RECEIVED: 02-Jul-21
DATE REPORTED: 12-Jul-21
SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.: 1656 Green Lane
P.O. NUMBER: 2101711
WATERWORKS NO.

	Client I.D.		BH 3				ork Sanitary/Storm Sewe	
	Sample I.D.		B21-20330-1				York Region - Sani. Dis.	York Region - Storm Dis.
	Date Collected		30-Jun-21					
Parameter	**Units**	**R.L.**						
Bis(2-ethylhexyl) Phthalate	µg/L	5	< 5				12	8.8
Poly-Chlorinated Biphenyls (PCB's)	µg/L	0.05	< 0.05				1	0.4
Aroclor	-		-					
Methyl Ethyl Ketone	µg/L	20	< 20				8000	
Styrene	µg/L	0.5	< 0.5				200	
Nonylphenols	µg/L	1	< 1 [1]				20	
Nonylphenol Ethoxylates	µg/L	10	< 10 [1]				200	
Nonylphenol Monoethoxylate	µg/L	10	< 10 [1]					
Nonylphenol Diethoxylate	µg/L	10	< 10 [1]					

[1] Subcontracted to SGS Lakefield

York Sanitary/Storm Sewer - York Region - Sanitary/Storm Sewer Discharge
York Region - Sani. Dis. - York Region - Tbl. 1 - Sanitary Sewer Discharge
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CBurke

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Christine Burke
Lab Manager

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DATE RECEIVED: 02-Jul-21
DATE REPORTED: 12-Jul-21
SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.: 1656 Green Lane
P.O. NUMBER: 2101711
WATERWORKS NO.

Summary of Exceedances

York Region - Tbl. 2 - Storm Sewer Discharge

BH 3	Found Value	Limit
Total Suspended Solids (mg/L)	202	15
Toluene (µg/L)	2.8	2.0

York Sanitary/Storm Sewer - York Region - Sanitary/Storm Sewer Discharge
York Region - Sani. Dis. - York Region - Tbl. 1 - Sanitary Sewer Discharge
York Region - Storm Dis. - York Region - Tbl. 2 - Storm Sewer Discharge

R.L. = Reporting Limit
Test methods may be modified from specified reference method unless indicated by an *
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

Christine Burke
Lab Manager

CADUCEON
ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

TESTING REQUIREMENTS

☐ O.Reg 153 Table ______ ☐ Medium/Fine ☐ Coarse
☐ RPI ☐ ICC ☐ Agricultural (O.Reg 153)
☐ Yes ☐ No Record of Site Condition (O.Reg 153)
☐ Provincial Water Quality Objectives
☒ Sewer Use By-Law: York Region
☐ MISA Guidelines
☐ O.Reg 558 Leachate Analysis
Disposal Site: ______
☐ Landfill Monitoring
☐ Other: ______

REPORT NUMBER (Lab Use)
B21-20330

Are any samples to be submitted intended for Human Consumption under any Drinking Water Regulations? ☐ Yes ☒ No (If yes, submit all Drinking Water Samples on a Drinking Water Chain of Custody)

Indicate Laboratory Samples are submitted to: ☐ Kingston ☐ Ottawa ☐ Richmond Hill ☐ Windsor ☒ Barrie ☐ London

Organization: GEI Consultants
Contact: Alex Winkelmann
Tel: (705) 229-4298
Fax: -
Email: awinkelmann@centralearth.ca

Address and Invoicing Address (if different)
647 Welham Road, Unit 14
Barrie, Ontario
L4N 0B7

Quote No.: 2020_EPD
P.O. No.: -
Project Name: 1656 Green Lane
Additional Info: 2101711

ANALYSES REQUESTED (Print Test in Boxes): York Region Sanitary

TURNAROUND SERVICE REQUESTED (see back page)
☐ Platinum 200% Surcharge
☐ Gold 100% Surcharge
☐ Silver 50% Surcharge
☐ Bronze 25% Surcharge
☒ Standard 5-7 days
☐ Specific Date: ______

* Sample Matrix Legend: WW=Waste Water, SW=Surface Water, GW=Groundwater, LS=Liquid Sludge, SS=Solid Sludge, S=Soil, Sed=Sediment, PC=Paint Chips, F=Filter, Oil = Oil

Lab No:	Sample Identification	S.P.L.	Sample Matrix *	Date Collected (yy-mm-dd)	Time Collected					York Region Sanitary								Suspected Highly Contaminated ✓	Field pH	Field Temp.	# Bottles/ Sample	Field Filtered(Y/N)
	BH 3	-	GW	21-06-30	PM					✓											9/3	N
		-																				
	(x3)																					
	~~(l)~~ 1L ambers →																					
	VOC → RH																					
	Gen Chem, metals, hg → O																					
	Gen chem, nut, CN, phenol → K																					
	1L amber → SGS																					

SAMPLE SUBMISSION INFORMATION

	Sampled by:	Submitted by:
Print:	Bo Hwang	Bo Hwang
Sign:	Bo H	Bo H
Date (yy-mm-dd)/Time:	21-06-30	21-07-02

SHIPPING INFORMATION
Client's Courier ☐
Caduceon's Courier ☐
Drop Off ☒
Caduceon (Pick-up) ☐
Invoice ☐
# of Pieces 8

REPORTING / INVOICING
Report by Fax ☐
Report by Email ☒
Invoice by Email ☒
Invoice by Mail ☐

SAMPLE RECEIVING INFORMATION (LABORATORY USE ONLY)
Received By (print): Ashley M Signature:
Date Received (yy-mm-dd): 21-07-02 Time Received: 9:22
Laboratory Prepared Bottles: ☒ Yes ☐ No
Sample Temperature °C: 8.7
Labeled by: EB
Page 1 of 1
G

Comments:

White: Lab Copy / Yellow: Invoicing Copy / Pink: Client Copy

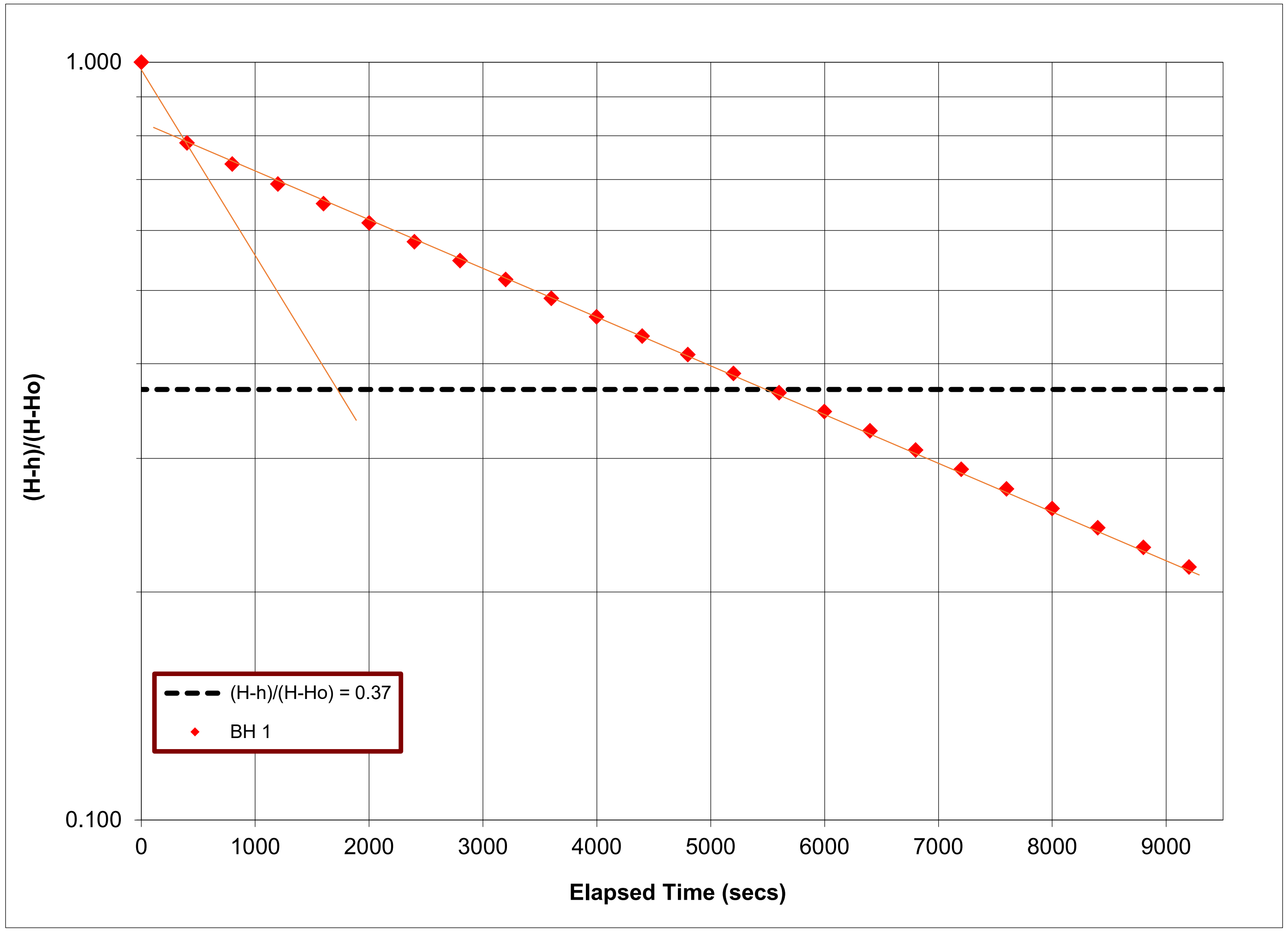
CofC, May 2019, Revision No: 22

Appendix D

Rising Head Test Results

Recovery Testing - Hvorslev Method (1951)

		BH 1			
Time	Elapsed Time (mins)	Elapsed Time (sec)	Water Level (m)	H-h	(H-h)/(H-Ho)
			1.690		
9:20:54 AM	0.00	0	7.015	5.325	1.000
9:27:34 AM	6.67	400	5.857	4.167	0.783
9:34:14 AM	13.33	800	5.599	3.909	0.734
9:40:54 AM	20.00	1200	5.367	3.677	0.691
9:47:34 AM	26.67	1600	5.155	3.465	0.651
9:54:14 AM	33.33	2000	4.959	3.269	0.614
10:00:54 AM	40.00	2400	4.776	3.086	0.580
10:07:34 AM	46.67	2800	4.603	2.913	0.547
10:14:14 AM	53.33	3200	4.441	2.751	0.517
10:20:54 AM	60.00	3600	4.288	2.598	0.488
10:27:34 AM	66.67	4000	4.146	2.456	0.461
10:34:14 AM	73.33	4400	4.008	2.318	0.435
10:40:54 AM	80.00	4800	3.88	2.190	0.411
10:47:34 AM	86.67	5200	3.759	2.069	0.389
10:54:14 AM	93.33	5600	3.642	1.952	0.367
11:00:54 AM	100.00	6000	3.532	1.842	0.346
11:07:34 AM	106.67	6400	3.427	1.737	0.326
11:14:14 AM	113.33	6800	3.33	1.640	0.308
11:20:54 AM	120.00	7200	3.237	1.547	0.291
11:27:34 AM	126.67	7600	3.147	1.457	0.274
11:34:14 AM	133.33	8000	3.063	1.373	0.258
11:40:54 AM	140.00	8400	2.985	1.295	0.243
11:47:34 AM	146.67	8800	2.91	1.220	0.229
11:54:14 AM	153.33	9200	2.839	1.149	0.216



K = Hydraulic Conductivity
r = radius of well casing
R = Radius of well screen or filter pack
L = Length of the well screen (in Slug Test) or the length of submerged portion of the well screen (in Rising Head)
T_0 = time for water level to rise or fall to 37% of the initial change

Notes:
1 - All water levels are in metres from ground surface
2 - R is radius of sand pack
3 - T_o is determined from plots where (H-h)/(H-Ho) = 0.37
4 - Analysis based off of Horslev (1951)

r (m) = 0.025
L (m) = 3
R (m) = 0.05
T_o (sec) = 1,700

K (m/s) = 3E-07

GEI Consultants

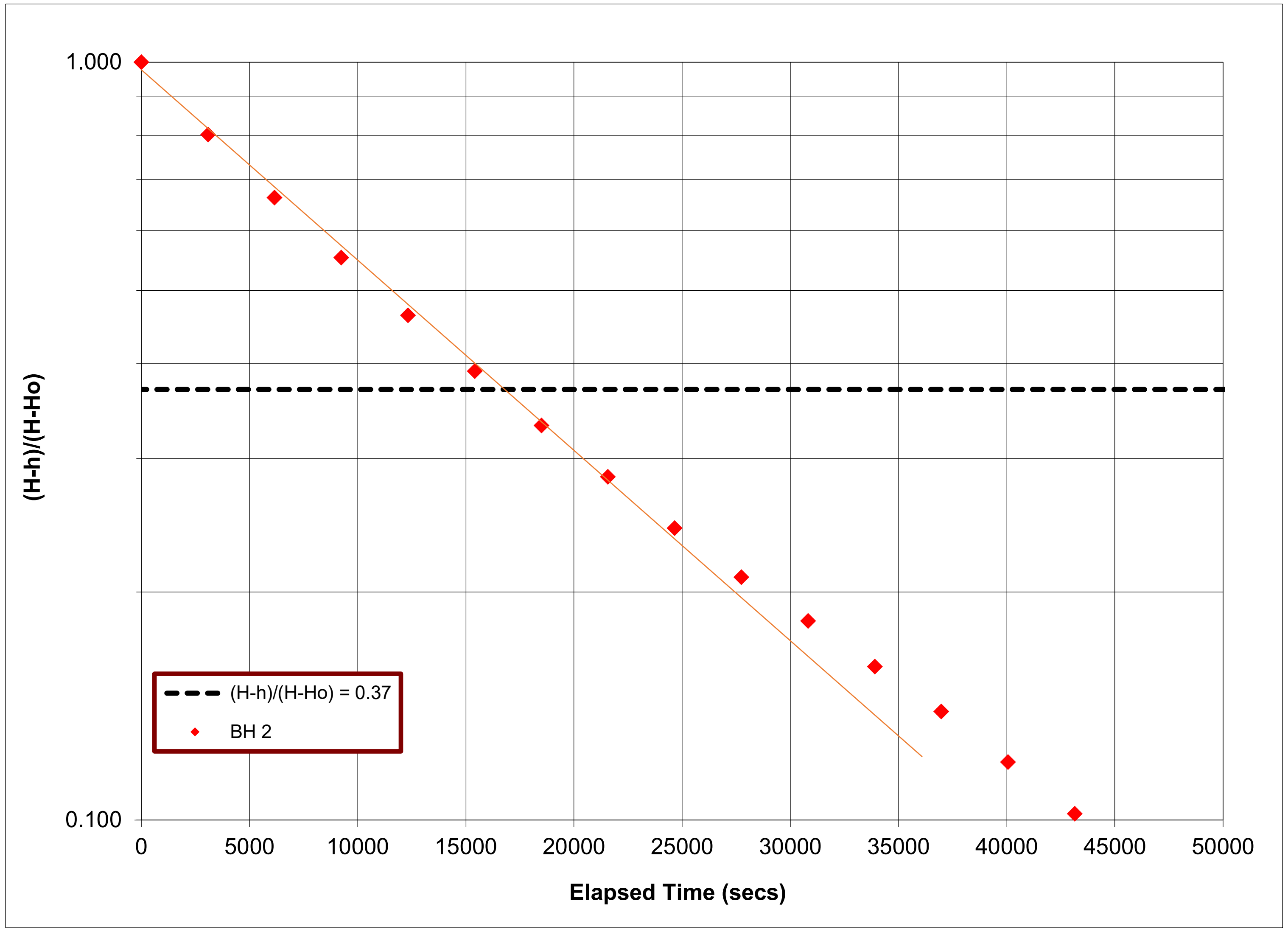
RISING HEAD TEST - Borehole 1

APPENDIX:	D
REF. No.:	2101711
DATE:	September 2021

Recovery Testing - Hvorslev Method (1951)

BH 2

Time	Elapsed Time (mins)	Elapsed Time (sec)	Water Level (m)	H-h	(H-h)/(H-Ho)
			3.110		
9:34:52 AM	0.00	0	6.179	3.069	1.000
10:26:14 AM	51.37	3082	5.573	2.463	0.803
11:17:36 AM	102.73	6164	5.145	2.035	0.663
12:08:58 PM	154.10	9246	4.805	1.695	0.552
1:00:20 PM	205.47	12328	4.533	1.423	0.464
1:51:42 PM	256.83	15410	4.31	1.200	0.391
2:43:04 PM	308.20	18492	4.128	1.018	0.332
3:34:26 PM	359.57	21574	3.981	0.871	0.284
4:25:48 PM	410.93	24656	3.855	0.745	0.243
5:17:10 PM	462.30	27738	3.752	0.642	0.209
6:08:32 PM	513.67	30820	3.672	0.562	0.183
6:59:54 PM	565.03	33902	3.599	0.489	0.159
7:51:16 PM	616.40	36984	3.537	0.427	0.139
8:42:38 PM	667.77	40066	3.476	0.366	0.119
9:34:00 PM	719.13	43148	3.423	0.313	0.102
10:25:22 PM	770.50	46230	3.381	0.271	0.088
11:16:44 PM	821.87	49312	3.344	0.234	0.076
12:08:06 AM	873.23	52394	3.311	0.201	0.065
12:59:28 AM	924.60	55476	3.284	0.174	0.057
1:50:50 AM	975.97	58558	3.261	0.151	0.049
2:42:12 AM	1027.33	61640	3.242	0.132	0.043
3:33:34 AM	1078.70	64722	3.222	0.112	0.036
4:24:56 AM	1130.07	67804	3.206	0.096	0.031
5:16:18 AM	1181.43	70886	3.189	0.079	0.026
6:07:40 AM	1232.80	73968	3.173	0.063	0.021
6:59:02 AM	1284.17	77050	3.159	0.049	0.016
7:50:24 AM	1335.53	80132	3.147	0.037	0.012
8:41:46 AM	1386.90	83214	3.137	0.027	0.009
9:33:08 AM	1438.27	86296	3.126	0.016	0.005
10:24:30 AM	1489.63	89378	3.119	0.009	0.003



K = Hydraulic Conductivity
r = radius of well casing
R = Radius of well screen or filter pack
L = Length of the well screen (in Slug Test) or the length of submerged portion of the well screen (in Rising Head)
T_0 = time for water level to rise or fall to 37% of the initial change

r (m) = 0.025
L (m) = 3
R (m) = 0.05
T_o (sec) = 17,000

K (m/s) = 3E-08

Notes:
1 - All water levels are in metres from ground surface
2 - R is radius of sand pack
3 - T_o is determined from plots where (H-h)/(H-Ho) = 0.37
4 - Analysis based off of Horslev (1951)

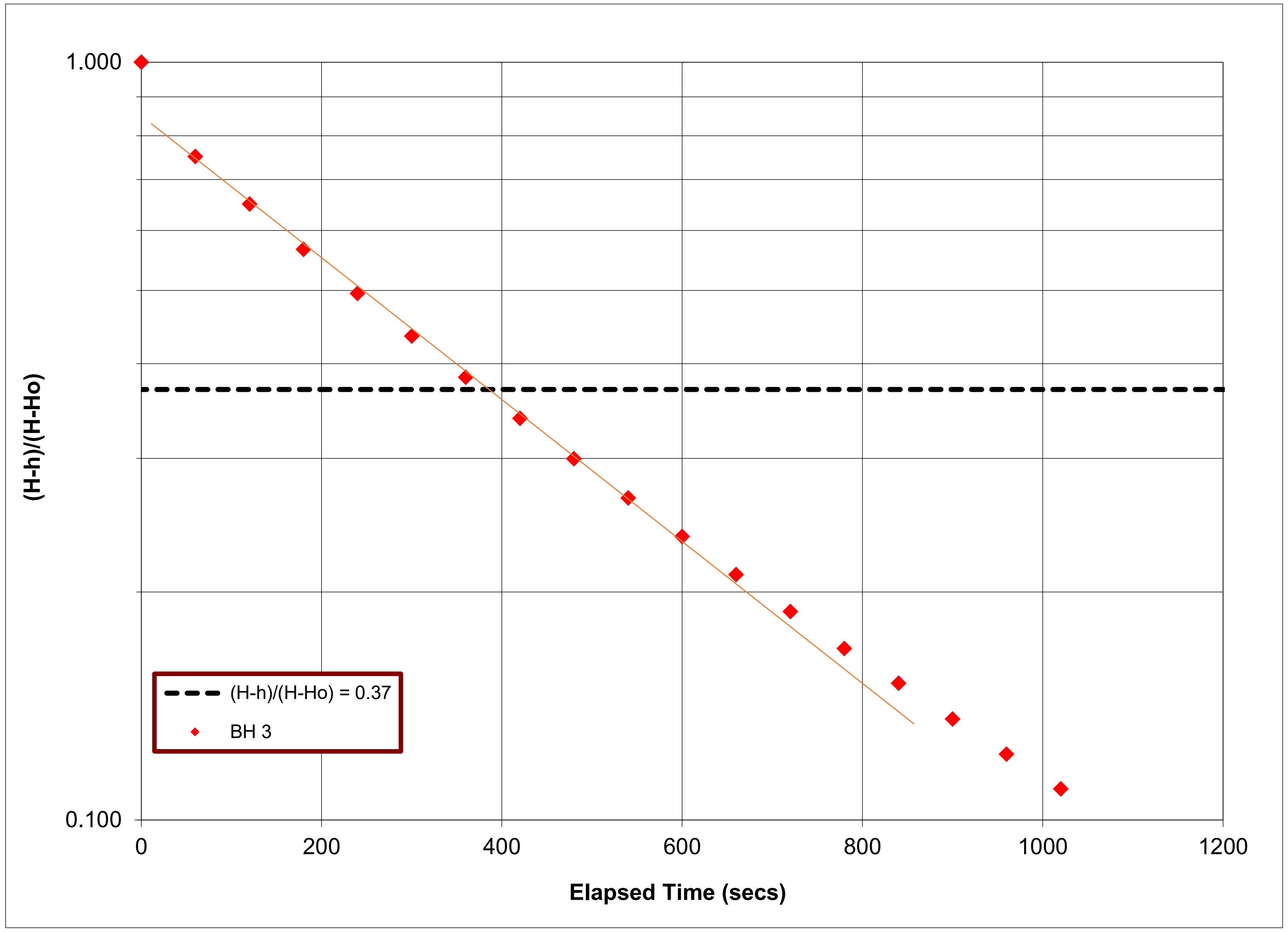
GEI Consultants

RISING HEAD TEST - Borehole 2

APPENDIX: D
REF. No.: 2101711
DATE: September 2021

Recovery Testing - Hvorslev Method (1951)

		BH 3			
Time	Elapsed Time (mins)	Elapsed Time (sec)	Water Level (m)	H-h	(H-h)/(H-Ho)
			3.040		
9:45:44 AM	0.00	0	5.895	2.855	1.000
9:46:44 AM	1.00	60	5.183	2.143	0.751
9:47:44 AM	2.00	120	4.896	1.856	0.650
9:48:44 AM	3.00	180	4.658	1.618	0.567
9:49:44 AM	4.00	240	4.455	1.415	0.496
9:50:44 AM	5.00	300	4.283	1.243	0.435
9:51:44 AM	6.00	360	4.136	1.096	0.384
9:52:44 AM	7.00	420	4.008	0.968	0.339
9:53:44 AM	8.00	480	3.896	0.856	0.300
9:54:44 AM	9.00	540	3.8	0.760	0.266
9:55:44 AM	10.00	600	3.716	0.676	0.237
9:56:44 AM	11.00	660	3.642	0.602	0.211
9:57:44 AM	12.00	720	3.578	0.538	0.188
9:58:44 AM	13.00	780	3.521	0.481	0.168
9:59:44 AM	14.00	840	3.473	0.433	0.152
10:00:44 AM	15.00	900	3.428	0.388	0.136
10:01:44 AM	16.00	960	3.389	0.349	0.122
10:02:44 AM	17.00	1020	3.354	0.314	0.110
10:03:44 AM	18.00	1080	3.324	0.284	0.099
10:04:44 AM	19.00	1140	3.297	0.257	0.090
10:05:44 AM	20.00	1200	3.273	0.233	0.082
10:06:44 AM	21.00	1260	3.252	0.212	0.074
10:07:44 AM	22.00	1320	3.233	0.193	0.068
10:08:44 AM	23.00	1380	3.215	0.175	0.061
10:09:44 AM	24.00	1440	3.2	0.160	0.056



K = Hydraulic Conductivity
r = radius of well casing
R = Radius of well screen or filter pack
L = Length of the well screen (in Slug Test) or the length of submerged portion of the well screen (in Rising Head)
T_0 = time for water level to rise or fall to 37% of the initial change

Notes:
1 - All water levels are in metres from ground surface
2 - R is radius of sand pack
3 - T_o is determined from plots where (H-h)/(H-Ho) = 0.37
4 - Analysis based off of Horslev (1951)

r (m) = 0.025
L (m) = 3
R (m) = 0.05
T_o (sec) = 390

K (m/s) = 1E-06

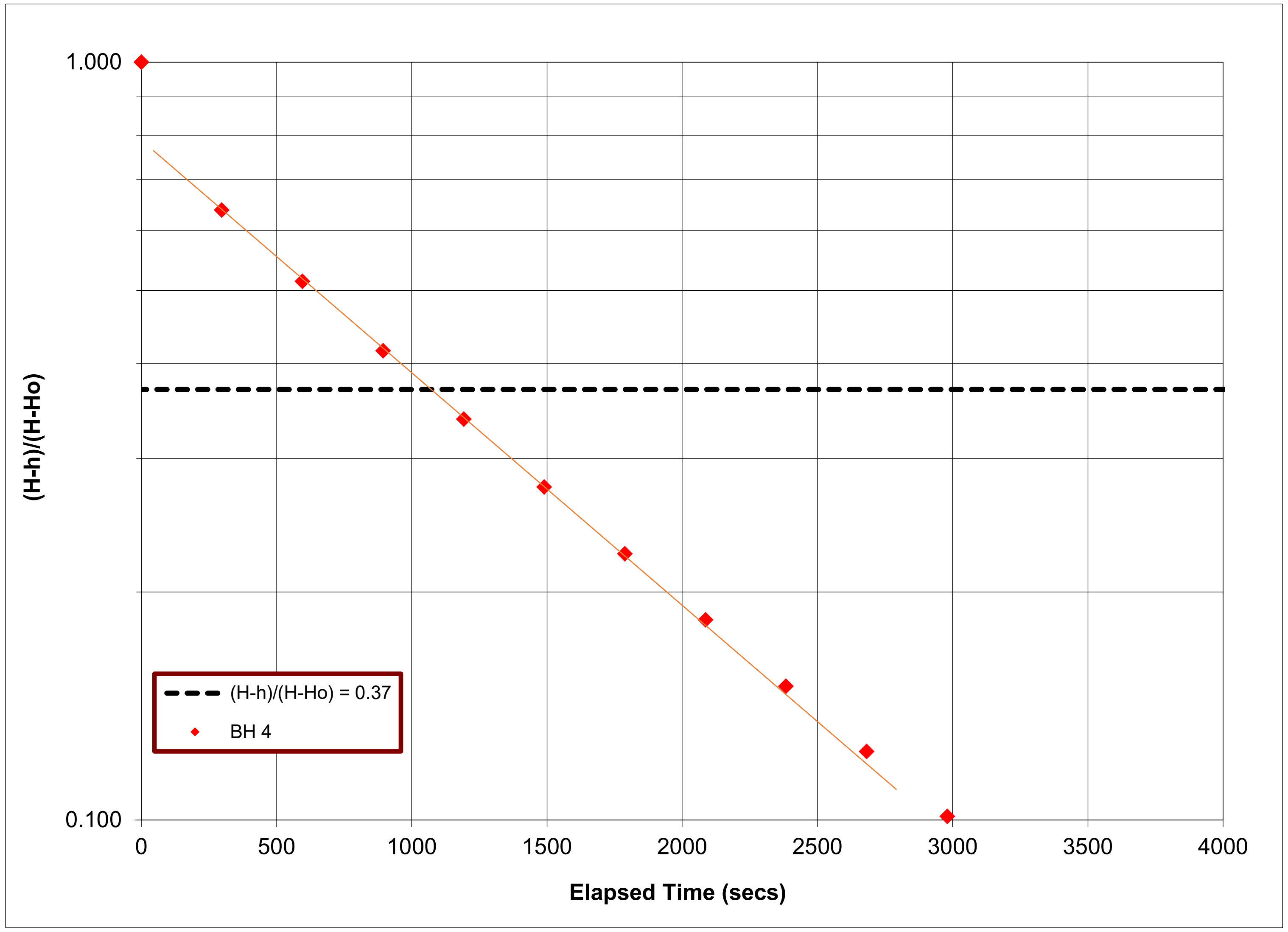
GEI Consultants

RISING HEAD TEST - Borehole 3

APPENDIX:	D
REF. No.:	2101711
DATE:	September 2021

Recovery Testing - Hvorslev Method (1951)

		BH 4			
Time	Elapsed Time (mins)	Elapsed Time (sec)	Water Level (m)	H-h	(H-h)/(H-Ho)
			2.940		
9:55:36 AM	0.00	0	6.064	3.124	1.000
10:00:34 AM	4.97	298	4.933	1.993	0.638
10:05:32 AM	9.93	596	4.546	1.606	0.514
10:10:30 AM	14.90	894	4.24	1.300	0.416
10:15:28 AM	19.87	1192	3.997	1.057	0.338
10:20:26 AM	24.83	1490	3.799	0.859	0.275
10:25:24 AM	29.80	1788	3.642	0.702	0.225
10:30:22 AM	34.77	2086	3.514	0.574	0.184
10:35:20 AM	39.73	2384	3.409	0.469	0.150
10:40:18 AM	44.70	2682	3.325	0.385	0.123
10:45:16 AM	49.67	2980	3.256	0.316	0.101
10:50:14 AM	54.63	3278	3.199	0.259	0.083
10:55:12 AM	59.60	3576	3.153	0.213	0.068
11:00:10 AM	64.57	3874	3.115	0.175	0.056
11:05:08 AM	69.53	4172	3.084	0.144	0.046
11:10:06 AM	74.50	4470	3.058	0.118	0.038
11:15:04 AM	79.47	4768	3.037	0.097	0.031
11:20:02 AM	84.43	5066	3.019	0.079	0.025
11:25:00 AM	89.40	5364	3.004	0.064	0.020
11:29:58 AM	94.37	5662	2.991	0.051	0.016
11:34:56 AM	99.33	5960	2.982	0.042	0.013
11:39:54 AM	104.30	6258	2.974	0.034	0.011
11:44:52 AM	109.27	6556	2.968	0.028	0.009
11:49:50 AM	114.23	6854	2.962	0.022	0.007
11:54:48 AM	119.20	7152	2.959	0.019	0.006
11:59:46 AM	124.17	7450	2.955	0.015	0.005
12:04:44 PM	129.13	7748	2.952	0.012	0.004
12:09:42 PM	134.10	8046	2.947	0.007	0.002
12:14:40 PM	139.07	8344	2.946	0.006	0.002
12:19:38 PM	144.03	8642	2.943	0.003	0.001



K = Hydraulic Conductivity
r = radius of well casing
R = Radius of well screen or filter pack
L = Length of the well screen (in Slug Test) or the length of submerged portion of the well screen (in Rising Head)
T_0 = time for water level to rise or fall to 37% of the initial change

Notes:
1 - All water levels are in metres from ground surface
2 - R is radius of sand pack
3 - T_o is determined from plots where (H-h)/(H-Ho) = 0.37
4 - Analysis based off of Horslev (1951)

r (m) = 0.025
L (m) = 3
R (m) = 0.05
T_o (sec) = 1,200

K (m/s) = 4E-07

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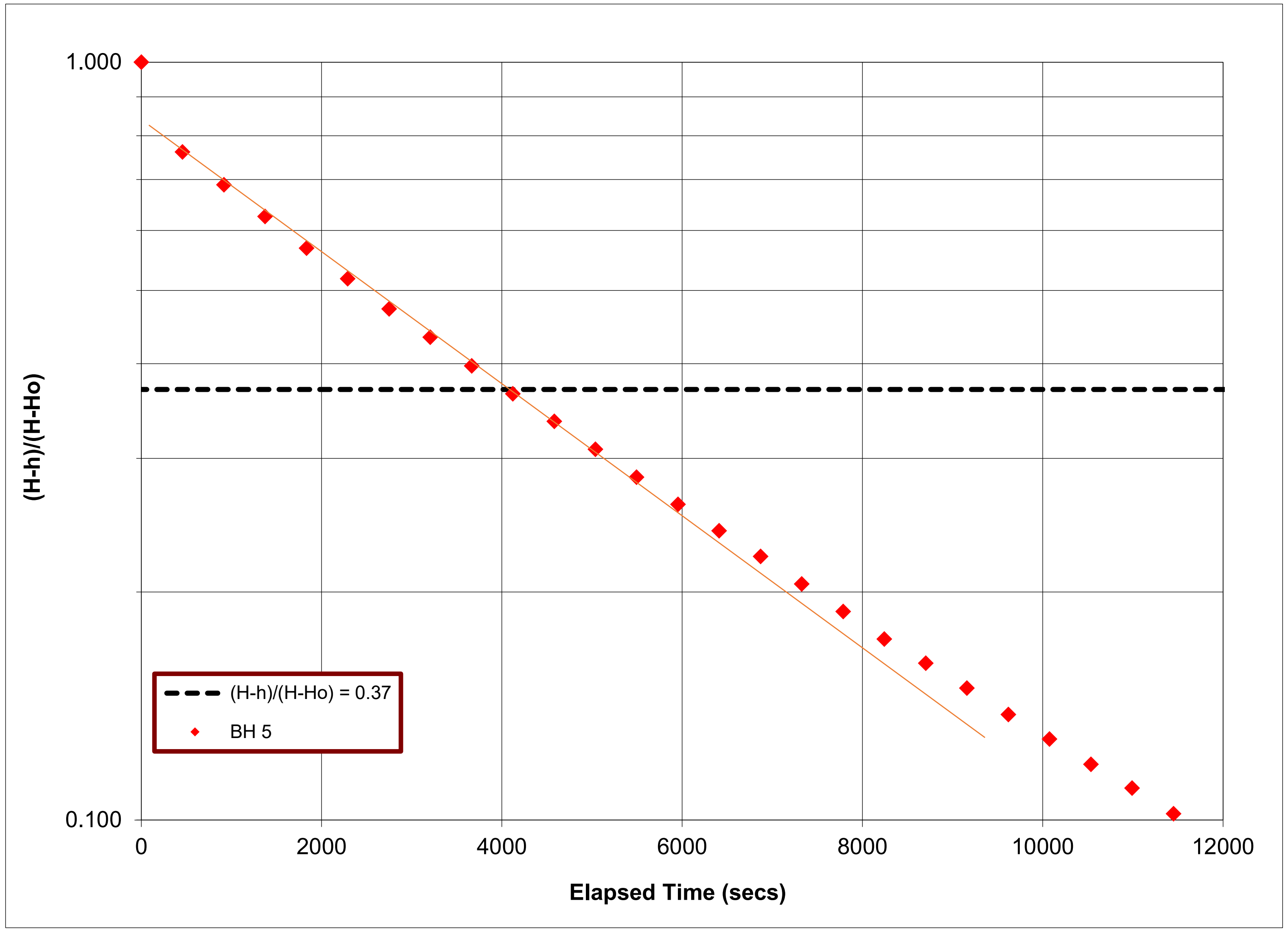
RISING HEAD TEST - Borehole 4

APPENDIX:	D
REF. No.:	2101711
DATE:	September 2021

Recovery Testing - Hvorslev Method (1951)

BH 5

Time	Elapsed Time (mins)	Elapsed Time (sec)	Water Level (m)	H-h	(H-h)/(H-Ho)
			3.240		
10:06:14 AM	0.00	0	5.772	2.532	1.000
10:13:52 AM	7.63	458	5.167	1.927	0.761
10:21:30 AM	15.27	916	4.984	1.744	0.689
10:29:08 AM	22.90	1374	4.825	1.585	0.626
10:36:46 AM	30.53	1832	4.68	1.440	0.569
10:44:24 AM	38.17	2290	4.552	1.312	0.518
10:52:02 AM	45.80	2748	4.437	1.197	0.473
10:59:40 AM	53.43	3206	4.338	1.098	0.434
11:07:18 AM	61.07	3664	4.246	1.006	0.397
11:14:56 AM	68.70	4122	4.165	0.925	0.365
11:22:34 AM	76.33	4580	4.09	0.850	0.336
11:30:12 AM	83.97	5038	4.021	0.781	0.308
11:37:50 AM	91.60	5496	3.958	0.718	0.284
11:45:28 AM	99.23	5954	3.901	0.661	0.261
11:53:06 AM	106.87	6412	3.85	0.610	0.241
12:00:44 PM	114.50	6870	3.804	0.564	0.223
12:08:22 PM	122.13	7328	3.759	0.519	0.205
12:16:00 PM	129.77	7786	3.717	0.477	0.188
12:23:38 PM	137.40	8244	3.679	0.439	0.173
12:31:16 PM	145.03	8702	3.648	0.408	0.161
12:38:54 PM	152.67	9160	3.618	0.378	0.149
12:46:32 PM	160.30	9618	3.589	0.349	0.138
12:54:10 PM	167.93	10076	3.564	0.324	0.128
1:01:48 PM	175.57	10534	3.54	0.300	0.118
1:09:26 PM	183.20	10992	3.519	0.279	0.110
1:17:04 PM	190.83	11450	3.498	0.258	0.102
1:24:42 PM	198.47	11908	3.48	0.240	0.095
1:32:20 PM	206.10	12366	3.465	0.225	0.089
1:39:58 PM	213.73	12824	3.45	0.210	0.083
1:47:36 PM	221.37	13282	3.436	0.196	0.077
1:55:14 PM	229.00	13740	3.421	0.181	0.071



K = Hydraulic Conductivity
r = radius of well casing
R = Radius of well screen or filter pack
L = Length of the well screen (in Slug Test) or the length of submerged portion of the well screen (in Rising Head)
T_0 = time for water level to rise or fall to 37% of the initial change

r (m) =	0.025
L (m) =	3
R (m) =	0.05
T_o (sec) =	4,200
K (m/s) =	**1E-07**

Notes:
1 - All water levels are in metres from ground surface
2 - R is radius of sand pack
3 - T_o is determined from plots where (H-h)/(H-Ho) = 0.37
4 - Analysis based off of Horslev (1951)

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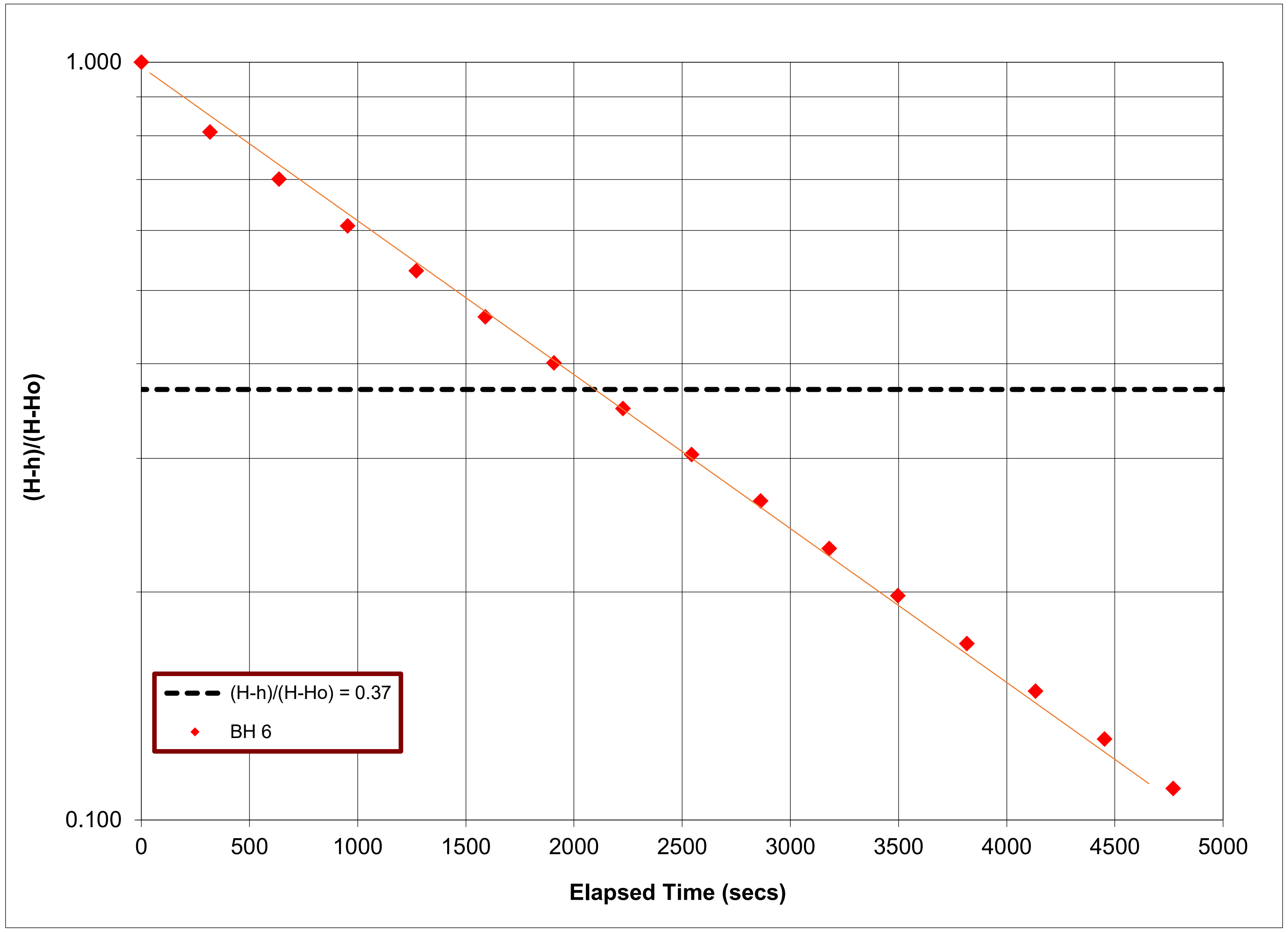
RISING HEAD TEST - Borehole 5

APPENDIX:	D
REF. No.:	2101711
DATE:	September 2021

Recovery Testing - Hvorslev Method (1951)

		BH 6			
Time	Elapsed Time (mins)	Elapsed Time (sec)	Water Level (m)	H-h	(H-h)/(H-Ho)
			2.860		
10:26:30 AM	0.00	0	5.713	2.853	1.000
10:31:48 AM	5.30	318	5.167	2.307	0.809
10:37:06 AM	10.60	636	4.86	2.000	0.701
10:42:24 AM	15.90	954	4.596	1.736	0.608
10:47:42 AM	21.20	1272	4.374	1.514	0.531
10:53:00 AM	26.50	1590	4.176	1.316	0.461
10:58:18 AM	31.80	1908	4.005	1.145	0.401
11:03:36 AM	37.10	2226	3.856	0.996	0.349
11:08:54 AM	42.40	2544	3.726	0.866	0.304
11:14:12 AM	47.70	2862	3.612	0.752	0.264
11:19:30 AM	53.00	3180	3.511	0.651	0.228
11:24:48 AM	58.30	3498	3.424	0.564	0.198
11:30:06 AM	63.60	3816	3.348	0.488	0.171
11:35:24 AM	68.90	4134	3.282	0.422	0.148
11:40:42 AM	74.20	4452	3.225	0.365	0.128
11:46:00 AM	79.50	4770	3.174	0.314	0.110
11:51:18 AM	84.80	5088	3.129	0.269	0.094
11:56:36 AM	90.10	5406	3.091	0.231	0.081
12:01:54 PM	95.40	5724	3.058	0.198	0.069
12:07:12 PM	100.70	6042	3.027	0.167	0.059
12:12:30 PM	106.00	6360	3	0.140	0.049
12:17:48 PM	111.30	6678	2.979	0.119	0.042
12:23:06 PM	116.60	6996	2.958	0.098	0.034
12:28:24 PM	121.90	7314	2.94	0.080	0.028



K = Hydraulic Conductivity
r = radius of well casing
R = Radius of well screen or filter pack
L = Length of the well screen (in Slug Test) or the length of submerged portion of the well screen (in Rising Head)
T_0 = time for water level to rise or fall to 37% of the initial change

r (m) = 0.025
L (m) = 3
R (m) = 0.05
T_o (sec) = 2,100

K (m/s) = 2E-07

Notes:
1 - All water levels are in metres from ground surface
2 - R is radius of sand pack
3 - T_o is determined from plots where (H-h)/(H-Ho) = 0.37
4 - Analysis based off of Horslev (1951)

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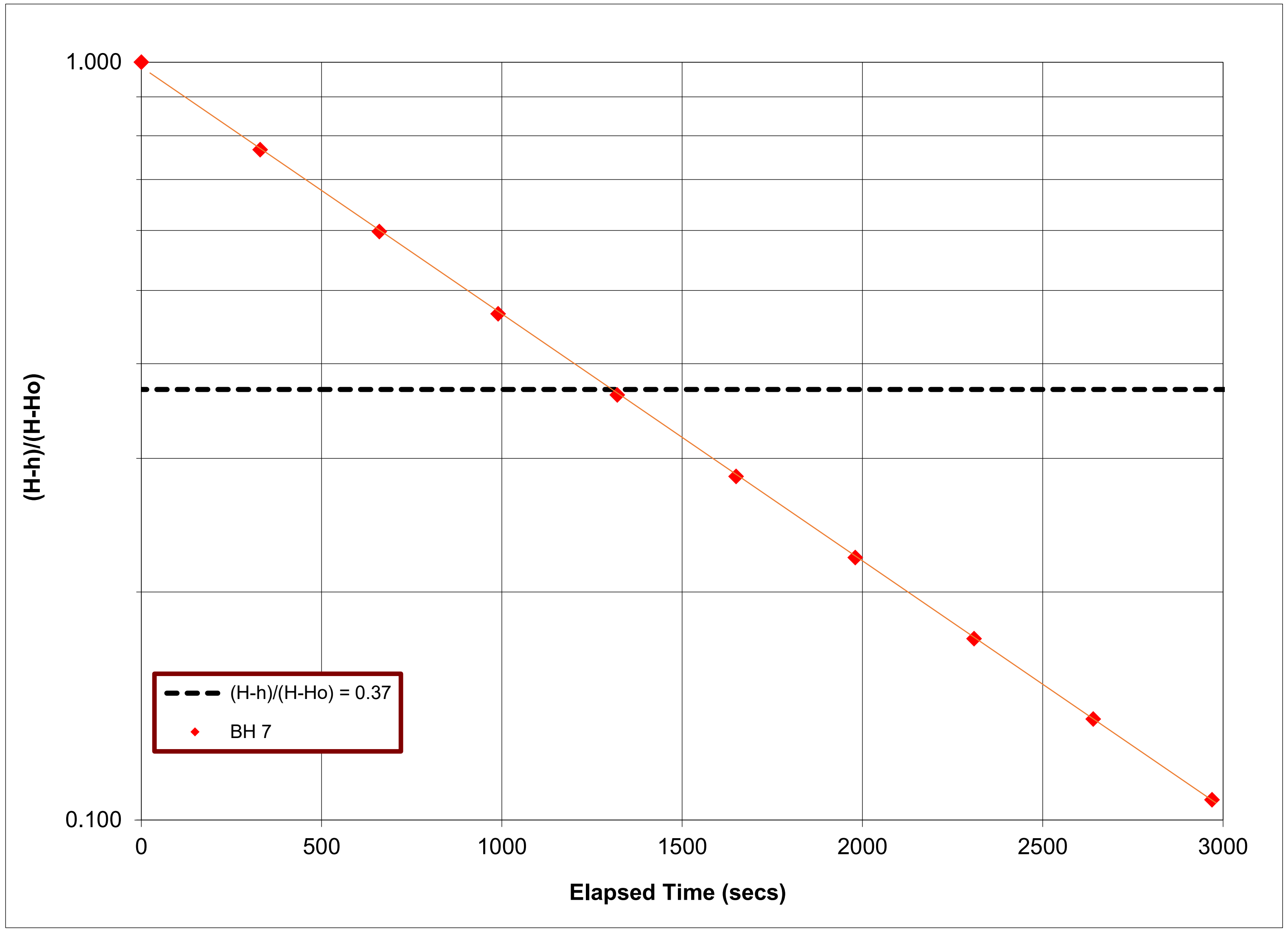
RISING HEAD TEST - Borehole 6

APPENDIX:	D
REF. No.:	2101711
DATE:	September 2021

Recovery Testing - Hvorslev Method (1951)

BH 7

Time	Elapsed Time (mins)	Elapsed Time (sec)	Water Level (m)	H-h	(H-h)/(H-Ho)
			2.560		
10:16:00 AM	0.00	0	5.362	2.802	1.000
10:21:30 AM	5.50	330	4.709	2.149	0.767
10:27:00 AM	11.00	660	4.235	1.675	0.598
10:32:30 AM	16.50	990	3.865	1.305	0.466
10:38:00 AM	22.00	1320	3.58	1.020	0.364
10:43:30 AM	27.50	1650	3.356	0.796	0.284
10:49:00 AM	33.00	1980	3.182	0.622	0.222
10:54:30 AM	38.50	2310	3.046	0.486	0.173
11:00:00 AM	44.00	2640	2.941	0.381	0.136
11:05:30 AM	49.50	2970	2.858	0.298	0.106
11:11:00 AM	55.00	3300	2.792	0.232	0.083
11:16:30 AM	60.50	3630	2.741	0.181	0.065
11:22:00 AM	66.00	3960	2.702	0.142	0.051
11:27:30 AM	71.50	4290	2.671	0.111	0.040
11:33:00 AM	77.00	4620	2.647	0.087	0.031
11:38:30 AM	82.50	4950	2.627	0.067	0.024
11:44:00 AM	88.00	5280	2.614	0.054	0.019
11:49:30 AM	93.50	5610	2.602	0.042	0.015
11:55:00 AM	99.00	5940	2.593	0.033	0.012
12:00:30 PM	104.50	6270	2.585	0.025	0.009
12:06:00 PM	110.00	6600	2.579	0.019	0.007
12:11:30 PM	115.50	6930	2.573	0.013	0.005
12:17:00 PM	121.00	7260	2.57	0.010	0.004
12:22:30 PM	126.50	7590	2.567	0.007	0.002



K = Hydraulic Conductivity
r = radius of well casing
R = Radius of well screen or filter pack
L = Length of the well screen (in Slug Test) or the length of submerged portion of the well screen (in Rising Head)
T_0 = time for water level to rise or fall to 37% of the initial change

r (m) = 0.025
L (m) = 3
R (m) = 0.05
T_o (sec) = 1,300

K (m/s) = 3E-07

Notes:
1 - All water levels are in metres from ground surface
2 - R is radius of sand pack
3 - T_o is determined from plots where (H-h)/(H-Ho) = 0.37
4 - Analysis based off of Horslev (1951)

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RISING HEAD TEST - Borehole 7

APPENDIX:	D
REF. No.:	2101711
DATE:	September 2021

Appendix E

MECP Well Records Summary Table

TOWNSHIP CON LOT	UTM	DATE CNTR	CASING	WATER	PUMP TEST	WELL USE	SCREEN	WELL	FORMATION
EAST GWILLIMBURY TOW CON 02 005	17 625195 4882241 W	1961/12 2310	4	FR 0088	35/40/4/3:0	DO	0088 4	6900075 ()	LOAM 0002 BLUE CLAY 0088 MSND STNS 0092
EAST GWILLIMBURY TOW CON 02 005	17 625201 4882131 W	1961/04 2310	2	FR 0157	30//7/2:0	DO	0159 4	6900076 ()	PRDG 0030 CLAY 0050 MSND CLAY 0090 CLAY 0157 MSND GRVL 0163
EAST GWILLIMBURY TOW CON 02 005	17 625170 4882276 W	1961/12 2310	4	FR 0114	35/100/2/2:0	DO	0114 4	6900077 ()	LOAM 0002 BLUE CLAY 0090 BLUE CLAY STNS 0114 MSND STNS 0118
EAST GWILLIMBURY TOW CON 02 005	17 625190 4882236 W	1962/01 1413	5	FR 0088	23/80/3/:	NU		6900078 () A	BRWN CLAY STNS 0020 BLUE CLAY SILT 0084 CLAY GRVL 0088
EAST GWILLIMBURY TOW CON 02 005	17 625195 4882236 W	1962/03 2310	4	FR 0100	20/95/4/5:0	DO		6900079 ()	LOAM 0002 GREY CLAY 0010 BLUE CLAY 0083 CLAY MSND 0099 MSND GRVL 0101
EAST GWILLIMBURY TOW CON 02 006	17 625002 4882577 W	1950/02 2310	2	FR 0108	20//5/5:0	ST	0108 8	6900080 ()	LOAM 0010 BLUE CLAY 0085 CLAY STNS 0108 FSND 0116
NEWMARKET TOWN (EAST CON 03 004	17 625312 4882031 W	1965/09 2310	4	FR 0054	35/40/5/2:0	DO		6900205 ()	PRDG 0024 BLUE CLAY 0054 GRVL CLAY 0058
EAST GWILLIMBURY TOW CON 03 005	17 625240 4882348 W	1964/04 3109	30	FR 0036	12//1/:	DO		6900206 ()	LOAM 0001 BLUE CLAY 0040
EAST GWILLIMBURY TOW CON 03 006	17 625190 4882513 W	1965/09 3109	30	FR 0025	8//2/:	DO		6900209 ()	LOAM 0002 CLAY 0023 MSND 0025 CLAY 0027
EAST GWILLIMBURY TOW CON 03 007	17 625088 4883120 W	1960/12 4102	30	FR 0030	15//2/:	DO		6900211 ()	BLUE CLAY 0020 CLAY MSND 0045
EAST GWILLIMBURY TOW CON 02 005	17 625165 4882183 W	1968/08 3109	30	FR 0042	14//1/:	DO		6908964 ()	LOAM 0002 BRWN CLAY 0024 BLUE CLAY 0046
EAST GWILLIMBURY TOW CON 02 005	17 625175 4882123 W	1971/10 4231	30	FR 0030	58///:	DO		6910578 ()	BRWN CLAY 0030 BLUE CLAY SILT 0055 BLUE CLAY 0062
EAST GWILLIMBURY TOW CON 02 005	17 625145 4882223 W	1971/07 3109	30	FR 0045	27///:	DO		6910629 ()	LOAM 0002 BRWN CLAY 0018 BLUE CLAY SILT 0050
EAST GWILLIMBURY TOW CON 02 005	17 625190 4882123 W	1972/01 2407	5	UK 0155	65/120/10/5:20	DO	0155 3	6911053 ()	PRDG 0040 BLUE CLAY SAND 0134 BLUE CLAY 0155 BLCK CSND 0168
EAST GWILLIMBURY TOW CON 03 006	17 625165 4882673 W	1972/12 2310	5	FR 0203	35/170/7/2:0	DO	0204 4	6911255 ()	GREY CLAY 0015 BLUE CLAY 0107 BLUE CLAY SAND 0142 BLUE CLAY GRVL 0172 BLUE CLAY 0203 GREY FSND 0208
EAST GWILLIMBURY TOW CON 02 005	17 624990 4882298 W	1972/09 3109	30	FR 0066	30///:	DO		6911286 ()	LOAM 0002 BRWN CLAY STNS 0032 BLUE CLAY STNS 0066 CSND 0067 BLUE CLAY STNS 0075
EAST GWILLIMBURY TOW CON 02 005	17 625041 4882316 W	1973/04 4102	30 30 24	FR 0038	22///:	DO		6911689 ()	LOAM 0002 BRWN CLAY 0012 BLUE CLAY 0040 BLUE CLAY STNS 0080
EAST GWILLIMBURY TOW CON 02 007	17 625015 4883123 W	1978/06 3109	30	FR 0018	10///24:0	DO		6914740 ()	LOAM 0002 BRWN CLAY SLTY 0016 BLUE CLAY SLTY 0035
EAST GWILLIMBURY TOW CON 02 004	17 625165 4882123 W	1978/11 1350	6	FR 0140	42/97/5/72:0	DO		6914826 ()	GREY CLAY 0040 GREY SILT CLAY 0112 GREY CLAY STNS 0135 GREY CLAY 0139 GREY GRVL SAND 0142
EAST GWILLIMBURY TOW CON 02 005	17 625115 4882223 W	1984/07 3108	6	UK 0175 UK 0235		DO		6917186 ()	BRWN CLAY 0020 BLUE CLAY 0047 BLUE CLAY SNDY 0085 BRWN SAND GRVL CLAY 0094 BLUE GRVL CLAY SNDY 0155 FGVL 0157 GREN CLAY SNDY 0165 BRWN FSND 0171 BLUE CLAY 0174 BRWN SAND 0180 BLUE CLAY 0216 BLUE SILT 0230 BLUE FSND 0245
EAST GWILLIMBURY TOW 02 008	17 624998 4883138 W	1987/04 1413	6	FR 0190	30/170/8/6:0	PS	0187 3	6918702 (08720)	BRWN SAND CLAY SOFT 0020 GREY CLAY SOFT 0080 GREY SILT GRVL LOOS 0085 GREY HPAN BLDR HARD 0112 GREY GRVL SILT LOOS 0115 GREY CLAY SILT HARD 0130 GREY CLAY DNSE 0140 GREY GRVL SILT LOOS 0142 GREY SAND SILT 0150 GREY CLAY SILT 0183 GREY GRVL SILT HARD 0190
EAST GWILLIMBURY TOW CON 02 005	17 625060 4882303 W	1987/11 3108	6	FR 0091	11/90/3/3:0	DO	0091 3	6919140 (13879)	FILL 0012 BLUE CLAY SNDY 0051 SAND GRVL 0052 BLUE CLAY SNDY 0091 SAND GRVL 0097 BLUE CLAY 0100 FSND 0104 BLUE CLAY 0120
EAST GWILLIMBURY TOW 03 006	17 625507 4882578 W	1988/06 1350	6	FR 0068	16/65/4/2:0	DO	0068 4	6919711 (13531)	GREY CLAY 0030 GREY CLAY GRVL 0068 BRWN SAND GRVL 0072
EAST GWILLIMBURY TOW CON 02 008	17 625134 4882586 W	1990/04 5459				DO		6920935 (58492) A	LOAM 0002 BRWN CLAY SNDY 0015 GREY CLAY SAND STNS 0190
EAST GWILLIMBURY TOW CON 02 008	17 625134 4882586 W	1990/04 5459		UK				6920936 (58490)	BRWN CLAY 0016 GREY CLAY 0102 GREY CLAY STNS 0152 GREY CLAY 0320 GRVL CMTD 0329 FSND CMTD 0336 GREY CLAY 0340 BLCK SHLE 0345
EAST GWILLIMBURY TOW CON 03 007	17 625151 4883076 W	1996/11 1413	6	FR 0139	58/300/6/12:0	DO		6923755 (166643)	BRWN CLAY DNSE 0030 GREY CLAY HARD 0129 GREY GRVL CGRD 0130 GREY CLAY HARD 0217 GREY SILT SOFT 0280 GREY CLAY HARD 0335 GREY SHLE LOOS 0339 BLCK SHLE HARD 0356
EAST GWILLIMBURY TOW CON 03 006	17 626096 4882934 L	2003/07 5459				NU		6927331 (264098) A	

TOWNSHIP CON LOT	UTM	DATE CNTR	CASING	WATER	PUMP TEST	WELL USE	SCREEN	WELL	FORMATION
EAST GWILLIMBURY TOW CON 03 006	17 626096 4882934 L	2003/08 5459				NU		6927332 (264119) A	
EAST GWILLIMBURY TOW	17 625381 4882641 W	2006/03 7215	2			NU	0005 5	6930000 (Z43657) A031358	
EAST GWILLIMBURY TOW 02 102	17 625055 4882667 W	2007/04 4102						7043518 (Z56396) A	
EAST GWILLIMBURY TOW 02 102	17 625036 4882540 W	2007/05 4102						7045978 (Z56399) A	
EAST GWILLIMBURY TOW CON 02 005	17 625169 4882220 W	2011/11 1413	36		4///:			7174269 (Z140781) A	
EAST GWILLIMBURY TOW	17 625151 4882539 W	2013/11 7201	2					7212751 (Z181968) A	
NEWMARKET TOWN (EAST	17 625293 4882062 W	2014/07 7421				MO		7223345 (Z163539) _NO_TAG	
EAST GWILLIMBURY TOW CON 02 006	17 625049 4882309 W	2014/10 4102						7232538 (Z154861) A	
EAST GWILLIMBURY TOW CON 02 007	17 624998 4882993 W	7147						7272335 (C34021) P	
EAST GWILLIMBURY TOW	17 625409 4882271 W	6946						7323282 (C39191) A233585 P	
EAST GWILLIMBURY TOW CON 03 004	17 625938 4882150 W	2019/03 7215						7330114 (C441111) A266468 P	
EAST GWILLIMBURY TOW	17 625453 4882771 W	2020/04 7472						7363958 (Z338468) A285567 P	
EAST GWILLIMBURY TOW	17 625466 4882734 W	2020/04 7472						7363959 (Z338467) A285566 P	
EAST GWILLIMBURY TOW	17 625471 4882758 W	2020/04 7472						7363960 (Z338466) A285565 P	

Water Well Records

TOWNSHIP CON LOT	UTM	DATE CNTR	CASING DIA	WATER	PUMP TEST	WELL USE	SCREEN	WELL	FORMATION

Notes:
UTM: UTM in Zone, Easting, Northing and Datum is NAD83; L: UTM estimated from Centroid of Lot; W: UTM not from Lot Centroid
DATE CNTR: Date Work Completedand Well Contractor Licence Number
CASING DIA: .Casing diameter in inches
WATER: Unit of Depth in Fee. See Table 4 for Meaning of Code

PUMP TEST: Static Water Level in Feet / Water Level After Pumping in Feet / Pump Test Rate in GPM / Pump Test Duration in Hour : Minutes
WELL USE: See Table 3 for Meaning of Code
SCREEN: Screen Depth and Length in feet
WELL: WEL (AUDIT #) Well Tag . A: Abandonment; P: Partial Data Entry Only
FORMATION: See Table 1 and 2 for Meaning of Code

1. Core Material and Descriptive terms

Code	Description	Code	Description	Code	Description	Code	Description	Code	Description
BLDR	BOULDERS	FCRD	FRACTURED	IRFM	IRON FORMATION	PORS	POROUS	SOFT	SOFT
BSLT	BASALT	FGRD	FINE-GRAINED	LIMY	LIMY	PRDG	PREVIOUSLY DUG	SPST	SOAPSTONE
CGRD	COARSE-GRAINED	FGVL	FINE GRAVEL	LMSN	LIMESTONE	PRDR	PREV. DRILLED	STKY	STICKY
CGVL	COARSE GRAVEL	FILL	FILL	LOAM	TOPSOIL	QRTZ	QUARTZITE	STNS	STONES
CHRT	CHERT	FLDS	FELDSPAR	LOOS	LOOSE	QSND	QUICKSAND	STNY	STONEY
CLAY	CLAY	FLNT	FLINT	LTCL	LIGHT-COLOURED	QTZ	QUARTZ	THIK	THICK
CLN	CLEAN	FOSS	FOSILIFEROUS	LYRD	LAYERED	ROCK	ROCK	THIN	THIN
CLYY	CLAYEY	FSND	FINE SAND	MARL	MARL	SAND	SAND	TILL	TILL
CMTD	CEMENTED	GNIS	GNEISS	MGRD	MEDIUM-GRAINED	SHLE	SHALE	UNKN	UNKNOWN TYPE
CONG	CONGLOMERATE	GRNT	GRANITE	MGVL	MEDIUM GRAVEL	SHLY	SHALY	VERY	VERY
CRYS	CRYSTALLINE	GRSN	GREENSTONE	MRBL	MARBLE	SHRP	SHARP	WBRG	WATER-BEARING
CSND	COARSE SAND	GRVL	GRAVEL	MSND	MEDIUM SAND	SHST	SCHIST	WDFR	WOOD FRAGMENTS
DKCL	DARK-COLOURED	GRWK	GREYWACKE	MUCK	MUCK	SILT	SILT	WTHD	WEATHERED
DLMT	DOLOMITE	GVLY	GRAVELLY	OBDN	OVERBURDEN	SLTE	SLATE		
DNSE	DENSE	GYPS	GYPSUM	PCKD	PACKED	SLTY	SILTY		
DRTY	DIRTY	HARD	HARD	PEAT	PEAT	SNDS	SANDSTONE		
DRY	DRY	HPAN	HARDPAN	PGVL	PEA GRAVEL	SNDY	SANDYOAPSTONE		

2. Core Color

Code	Description
WHIT	WHITE
GREY	GREY
BLUE	BLUE
GREN	GREEN
YLLW	YELLOW
BRWN	BROWN
RED	RED
BLCK	BLACK
BLGY	BLUE-GREY

3. Well Use

Code	Description	Code	Description
DO	Domestic	OT	Other
ST	Livestock	TH	Test Hole
IR	Irrigation	DE	Dewatering
IN	Industrial	MO	Monitoring
CO	Commercial	MT	Monitoring TestHole
MN	Municipal		
PS	Public		
AC	Cooling And A/C		
NU	Not Used		

4. Water Detail

Code	Description	Code	Description
FR	Fresh	GS	Gas
SA	Salty	IR	Iron
SU	Sulphur		
MN	Mineral		
UK	Unknown		

Appendix F

Preliminary Dewatering Calculations

Equivalent Well Radius Method

Inputs

Rs (m)	Ro (m)	H (m)	h (m)	k (m/s)	Trench Length, x (m)	Trench Width, b (m)
4.5	5.7	9.2	6.5	5.00E-07	50	8

Elevations (m)

Ground Surface	275
Highest Water Level	274.2
Base of Excavation	272
Drawdown Target	271.5
Aquifer Bottom	265

Groundwater Flows

Flow Rate, Q=	0.0003	m3/s
Q=	23,008	L/day
Safety Factor	1.5	
Q factored =	**34,512**	L/day

Precipitation

Rainfall Event	25	mm
Excavation Area	400	m2
Rainfall Q =	**10,000**	L/day

TOTAL Factored Q =	**44,512**	**L/day**

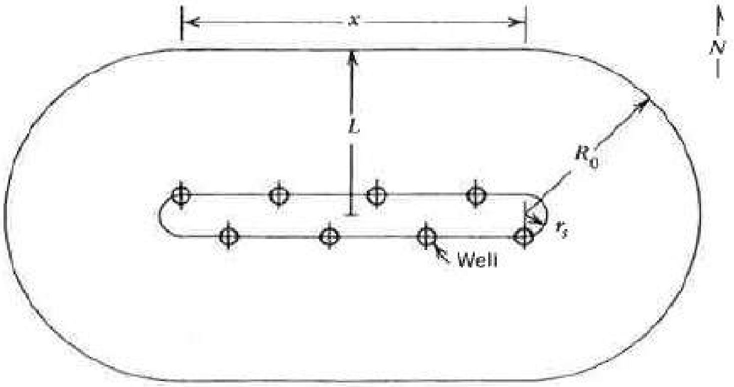


Figure 6.8 Approximate analysis of long, narrow systems.

of the actual system is finite, the end effects must be considered. This can be done by assuming that at each end of the system there is a flow equal to one half the flow to a circular well of radius r_s. The total flow to the system may be approximated by adding Eqs. 6.1 and 6.6 for a confined aquifer, or Eqs. 6.3 and 6.7 for a water table aquifer:

$$Q = \frac{2\pi KB(H - h)}{\ln R_0/r_s} + 2\left[\frac{xKB(H - h)}{L}\right] \qquad (6.10a)$$

$$Q = \frac{\pi K(H^2 - h^2)}{\ln R_0/r_s} + 2\left[\frac{xK(H^2 - h^2)}{2L}\right] \qquad (6.10b)$$

Appendix G

Preliminary Water Balance

File No. 2101711

Water Balance - 1656 Green Lane East

MONTHLY AND YEARLY WATER BALANCE COMPONENTS														
		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
Potential Evapotranspiration Calculation	Average Temperature: T (^{o}C)	-6.9	-5.9	-1.2	6.3	12.4	17.6	20.2	19.0	14.7	8.6	2.4	-3.7	7.0
	Heat Index: i=(T/5)$^{1.514}$	0.00	0.00	0.00	1.42	3.96	6.72	8.28	7.55	5.12	2.27	0.33	0.00	35.6
	Unadjusted Daily Potential Evapotranspiration: U (mm)	0.0	0.0	0.0	29.3	60.3	87.5	101.3	94.9	72.2	40.8	10.5	0.0	496.8
	Adjusting Factor for U (Latitude 44^{o})	0.81	0.81	1.02	1.13	1.27	1.28	1.30	1.20	1.04	0.94	0.80	0.76	-
	Adjusted Potential Evapotranspiration - PET (mm)	0.0	0.0	0.0	33.1	76.5	112.0	131.7	113.9	75.1	38.4	8.4	0.0	589.1
Pervious Components	Precipitation: P (mm)	52.9	47.9	52.3	59.9	72.8	79.8	85.1	89.7	81.7	69.7	72.4	52.1	816.3
	Adjusted Potential Evapotranspiration: PET (mm)	0.0	0.0	0.0	33.1	76.5	112.0	131.7	113.9	75.1	38.4	8.4	0.0	589.1
	P - PET	52.9	47.9	52.3	26.8	-3.7	-32.2	-46.6	-24.2	6.6	31.3	64.0	52.1	227.2
	Change in Soil Moisture Storage (mm)	0.0	0.0	0.0	0.0	-3.7	-32.2	-46.6	-24.2	6.6	31.3	64.0	0.0	-
	Water Holding Capacity (max. 125 mm)	125.0	125.0	125.0	125.0	121.3	89.1	42.5	18.4	25.0	56.3	120.3	125.0	-
	Water Surplus Available for Infiltration or Runoff	52.9	47.9	52.3	26.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	47.4	227.2
	Potential Infiltration based on MOECC Infiltration Factor (mm)	31.7	28.7	31.4	16.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	28.4	136.3
	Potential Surface Water Runoff (mm)	21.2	19.2	20.9	10.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	19.0	90.9
Impervious Components	Precipitation: P (mm)	-												816.3
	Potential Evaporation: PE (mm), Assume 15%	-												122.4
	Potential Surface Water Runoff: P - PE (mm)	-												693.9

PRE- AND POST-DEVELOPMENT WATER BALANCE (NO LOW IMPACT DEVELOPMENT MEASURES IN PLACE)							
		Total Land Area (m^{2})	Est. Fraction of Land	Est. Land Area (m^{2})	Runoff (m^{3}/annum)	Infiltration (m^{3}/annum)	**Runoff Increase Pre to Post**
Existing Land Use (Pre-Development)	Pervious Area (Site 2 only)	77500.0	100%	77500.0	7044.4	10566.6	557%
	Impervious Area		0%	0.0	0.0	0.0	**Infiltration Decrease Pre to Post**
	TOTAL	-	100%	77500.0	7044.4	10566.6	-84%
Proposed Land Use (Post-Development)	Pervious Area	77500.0	16%	12400.0	1127.1	1690.7	**Infiltration Required to Meet Pre-Development Conditions (m^{3})**
	Impervious Area (Estimated from preliminary site plan - Site 2 only)		84%	65100.0	45170.0	0.0	
	TOTAL	-	100%	77500.0	46297.1	1690.7	8876

Notes

1. Both potential infiltration and surface water runoff are independent of temperature
2. Assumption is in January maximum soil moisture storage value is present (125mm)
3. Water Holding Capacity & Infiltration Factors taken from Table 3.1 of MOE SWMPDM, 2003
4. Average Temp. and Precip. taken from Environment Canada station "Bradford Muck Research" between 1981 and 2010
5. Adjusting Factor for U based on Lorente, 1961

Infiltration Criteria	Site Description	Infiltration Factor
Topography	Hilly Land - Average Slope 28 to 47 m/km	0.1
Soils	Open Sandy Loam	0.4
Cover	Cultivated Land	0.1
	Sum of Infiltration Factors	**0.6**

Appendix H

Geological Cross Section – East Holland River Watershed

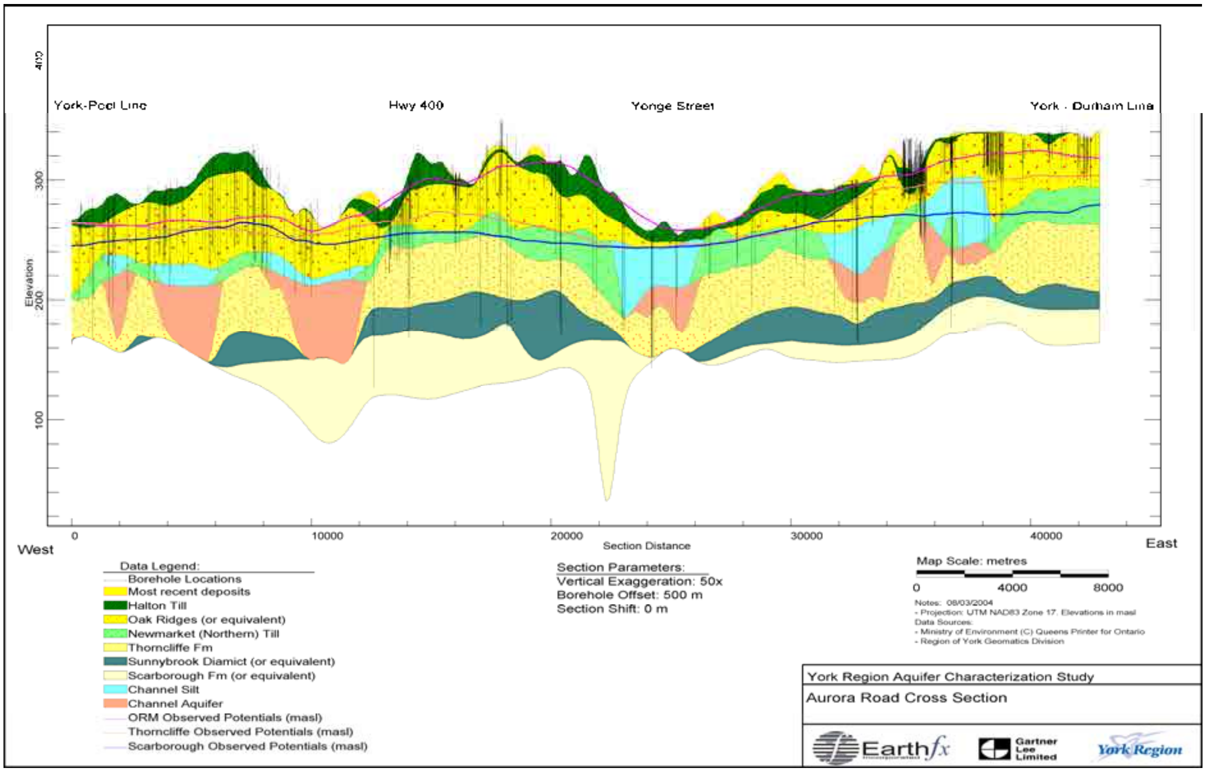


Figure 2-14 West-east cross section along Aurora Road (figure from Earthfx, 2006)

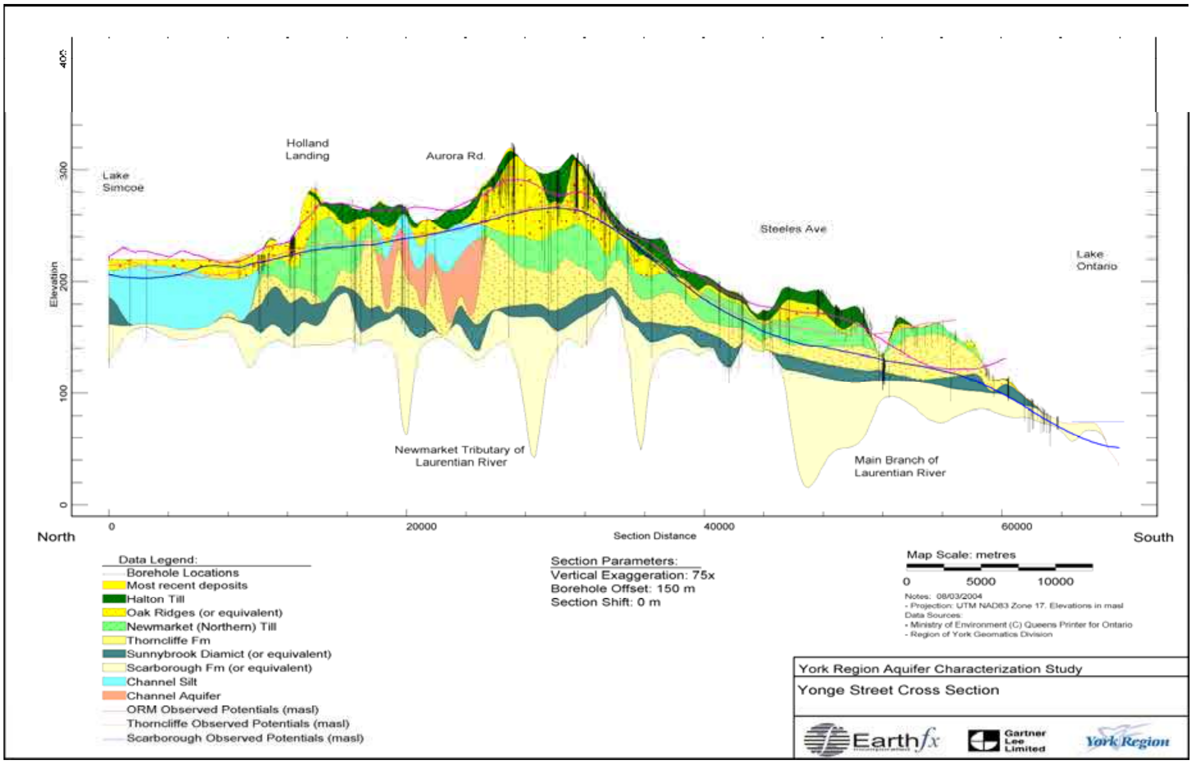
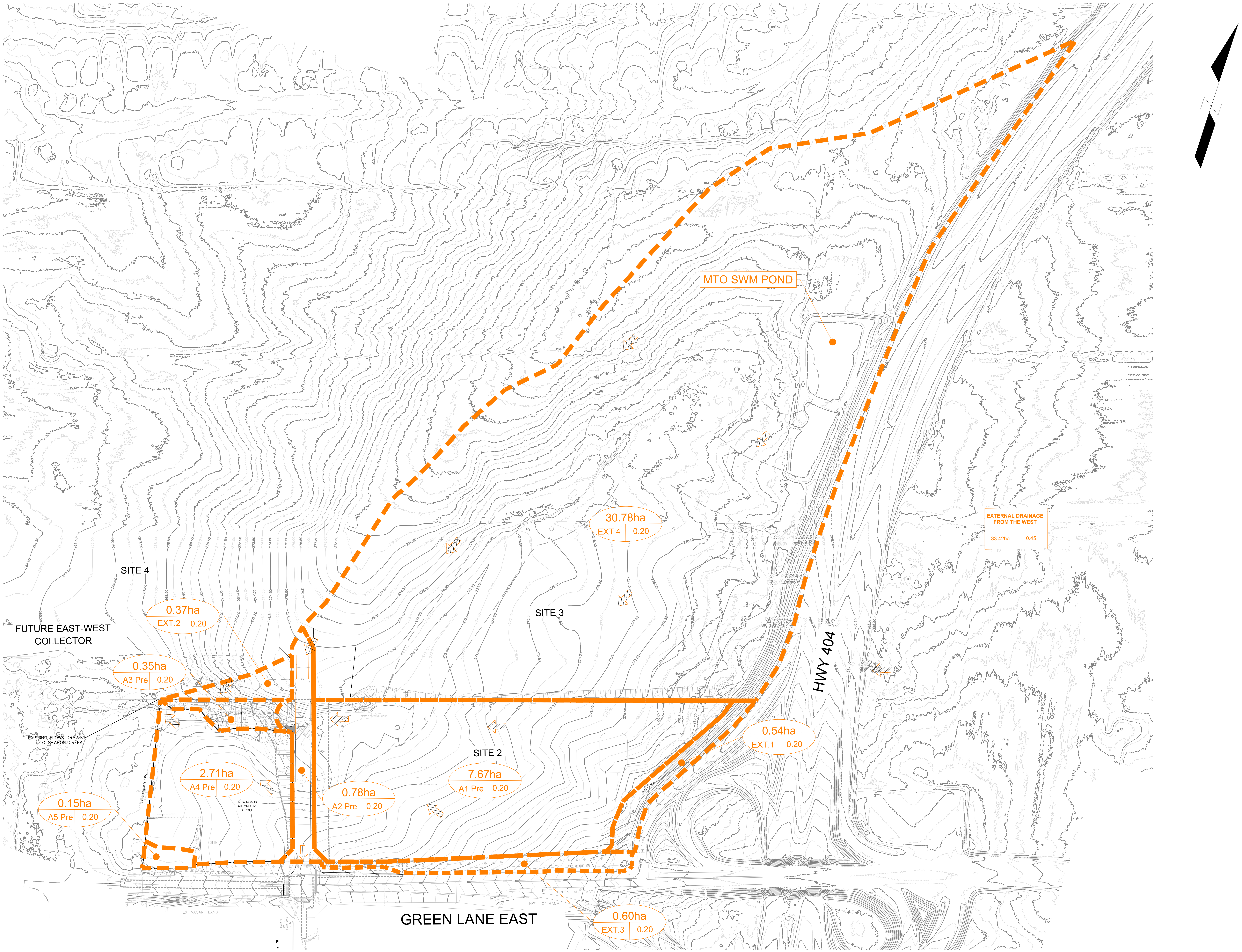
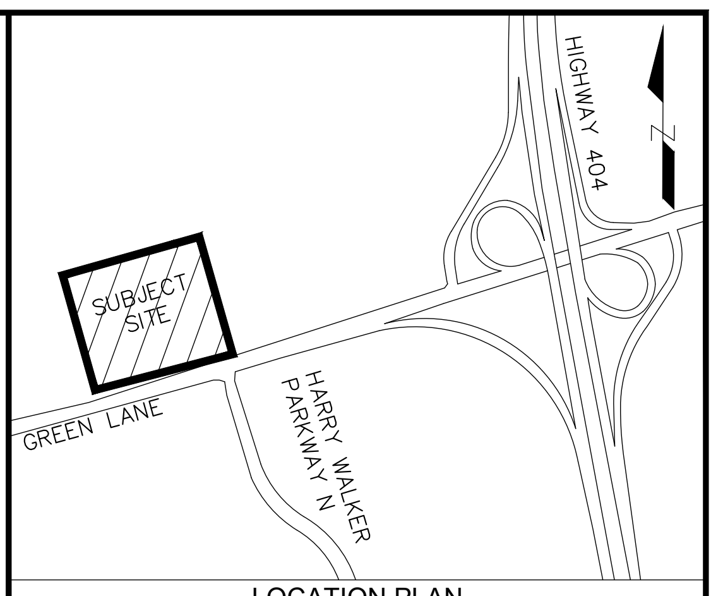


Figure 2-15 North-south cross section along Yonge Street (figure from Earthfx, 2006)

Appendix B

Stormwater Management Analysis





LOCATION PLAN
N.T.S.

LEGEND

PROPERTY LINE	▬
PRE-DEVELOPMENT DRAINAGE AREA BOUNDARY	‒ ‒ ‒
EXISTING OVERLAND FLOW ROUTE	⇦
PRE-DEVELOPMENT DRAINAGE AREA ID	AREA HA: 30.58ha; ID#: EXT.2; COEFFICIENT: 0.20

LIST OF DRAWINGS

SG-01 - SITE GRADING PLAN
SS-01 - SITE SERVICING PLAN
EC-01 - EROSION AND SEDIMENT CONTROL PLAN
CMP-01 - CONSTRUCTION MANAGEMENT PLAN
XS-01 - CROSS SECTIONS
DD-01 - DETAIL DRAWING
DD-02 - DETAIL DRAWING
DD-03 - DETAIL DRAWING
DAP-01 - PRE-DEVELOPMENT DRAINAGE AREA PLAN
DAP-02 - POST-DEVELOPMENT AREA PLAN

SITE PLAN INFORMATION

TUNER FLEISCHER ARCHITECTS INC.
67 LESMILL ROAD,
TORONTO, ON, M3B 2T8
PHONE: (416) 425-222
EMAIL: toronto@turnerfleischer.com

SURVEYOR INFORMATION

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ONTARIO LAND SURVEYOR
1260 JOURNEY'S END CIRCLE, UNIT 1,
NEWMARKET, ON, L3Y 8Z7
PHONE: (905) 895-5600
FAX: (905) 895-7127
WEBSITE: www.ergardenlimited.ca

BENCHMARK INFORMATION:
ELEVATIONS ARE GEODETIC AND ARE DERIVED FROM TOWN OF NEWMARKET BENCHMARK 1095 HAVING AN ELEVATION 273.91 METRES A.S.L.

No.	DATE	ISSUE/REVISION	INTIAL
5			
4			
3			
2			
1	12/2/2024	ISSUED FOR 1st SPA SUBMISSION	TVL

TOWN OF EAST GWILLIMBURY
YORK REGION

NEW ROAD - TOYOTA
NEWROADS AUTOMOTIVE GROUP
1656 GREEN LANE EAST
TOWN OF EAST GWILLIMBURY, ONTARIO

PRE-DEVELOPMENT DRAINAGE AREA PLAN

GEI Consultants

DESIGNED BY: LV	DATE: AUGUST , 2024	CHECKED BY: TVL
DRAWN BY: LV	PROJECT No. 2406541	DRAWING No. DAP-01
SCALE: 1:2500		

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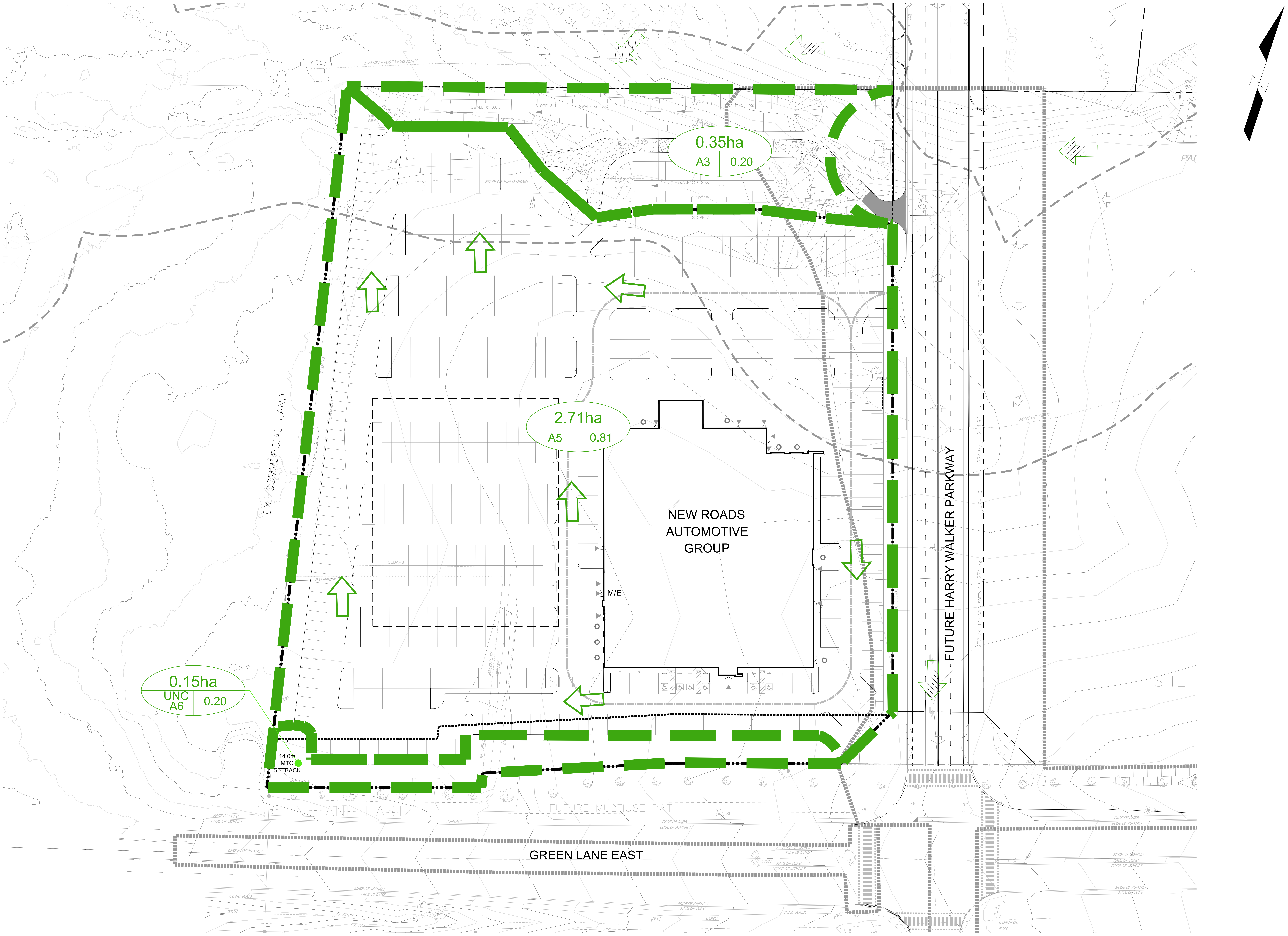

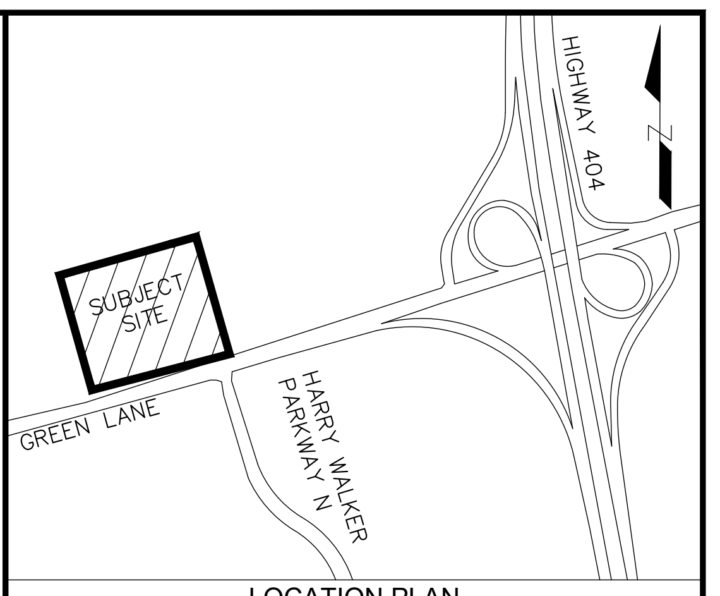

LOCATION PLAN
N.T.S.

LEGEND

PROPERTY LINE	───
POST DEVELOPMENT DRAINAGE AREA BOUNDARY	▬ ▬ ▬
PROPOSED OVERLAND FLOW ROUTE	⇦
EXISTING OVERLAND FLOW ROUTE	⇦
POST-DEVELOPMENT DRAINAGE AREA ID	AREA HA 30.58ha ID# EXT.2 COEFFICIENT 0.20

LIST OF DRAWINGS

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SS-01 - SITE SERVICING PLAN
EC-01 - EROSION AND SEDIMENT CONTROL PLAN
CMP-01 - CONSTRUCTION MANAGEMENT PLAN
XS-01 - CROSS SECTIONS
DD-01 - DETAIL DRAWING
DD-02 - DETAIL DRAWING
DD-03 - DETAIL DRAWING
DAP-01 - PRE-DEVELOPMENT DRAINAGE AREA PLAN
DAP-02 - POST-DEVELOPMENT AREA PLAN

SITE PLAN INFORMATION

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BENCHMARK INFORMATION:
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No.	DATE	ISSUE/REVISION	INTIAL
5			
4			
3			
2			
1	12/2/2024	ISSUED FOR 1st SPA SUBMISSION	TVL

TOWN OF EAST GWILLIMBURY
YORK REGION

NEW ROAD - TOYOTA
NEWROADS AUTOMOTIVE GROUP
1656 GREEN LANE EAST
TOWN OF EAST GWILLIMBURY, ONTARIO

POST DEVELOPMENT DRAINAGE AREA PLAN

GEI Consultants

DESIGNED BY: LV	DATE: AUGUST , 2024	CHECKED BY: TVL
DRAWN BY: LV	PROJECT No. 2406541	DRAWING No. DAP-02
SCALE: 1:500		

Pre Development
Composite Runoff Coefficient

1656 Green Lane East Site 1
Project #: 2406541
October 2024

A3 Pre

	(ha)		
Total Area:	0.35		
Impervious:	0.00	**Coefficient:**	0.9
Landscaping:	0.35	**Coefficient:**	0.2
Composite C:	**0.20**		
Percent Impervious	**0.00%**		

A4 Pre

	(ha)		
Total Area:	2.71		
Impervious:	0.00	**Coefficient:**	0.9
Landscaping:	2.71	**Coefficient:**	0.2
Composite C:	**0.20**		
Percent Impervious	**0.00%**		

A5 Pre

	(ha)		
Total Area:	0.15		
Impervious:	0.00	**Coefficient:**	0.9
Landscaping:	0.15	**Coefficient:**	0.2
Composite C:	**0.20**		
Percent Impervious	**0.00%**		

GEI Consultants

Rational Method
Pre-Development Flow Calculation

1656 Green Lane East Site 1
Project #: 2406541
October 2024

Input Parameters

Area Number	**Area (ha)**	**C, 5-Year**	**C, 25-Year**	**C, 100-Year**	**Tc (min.)**
A3 Pre	0.35	0.20	0.30	0.40	7
A4 Pre	2.71	0.20	0.30	0.40	7
A5 Pre	0.15	0.20	0.30	0.40	7

Formula: = a(T+b)^c

a,b,c	Constants
T	Time of concentration
I	Rainfall intensity

Rational Method Calculations

IDF Data Set: Town of East Gwillimbury
Event 2-Year
a = 648.00
b = 4.00
c = -0.7840

Area Number	**A (ha)**	**C**	**AC**	**Tc (min.)**	**I (mm/h)**	**Q (m^3/s)**	**Q (L/s)**
A3 Pre	0.35	0.20	0.07	7	98.9	0.019	19.2
A4 Pre	2.71	0.20	0.54	7	98.9	0.149	148.9
A5 Pre	0.15	0.20	0.03	7	98.9	0.008	8.2
Total							176.3

IDF Data Set: Town of East Gwillimbury
Event 5-Year
a = 930.00
b = 4.00
c = -0.7980

Area Number	**A (ha)**	**C**	**AC**	**Tc (min.)**	**I (mm/h)**	**Q (m^3/s)**	**Q (L/s)**
A3 Pre	0.35	0.20	0.07	7	137.2	0.027	26.7
A4 Pre	2.71	0.20	0.54	7	137.2	0.207	206.6
A5 Pre	0.15	0.20	0.03	7	137.2	0.011	11.4
Total							244.7

IDF Data Set: Town of East Gwillimbury
Event 10-Year
a = 1021.00
b = 3.00
c = -0.7870

Area Number	**A (ha)**	**C**	**AC**	**Tc (min.)**	**I (mm/h)**	**Q (m^3/s)**	**Q (L/s)**
A3 Pre	0.35	0.20	0.07	7	166.7	0.032	32.4
A4 Pre	2.71	0.20	0.54	7	166.7	0.251	251.0
A5 Pre	0.15	0.20	0.03	7	166.7	0.014	13.9
Total							297.3

IDF Data Set: Town of East Gwillimbury
Event 25-Year
a = 1100.00
b = 2.00
c = -0.7760

Area Number	**A (ha)**	**C**	**AC**	**Tc (min.)**	**I (mm/h)**	**Q (m^3/s)**	**Q (L/s)**
A3 Pre	0.35	0.30	0.11	7	199.9	0.058	58.3
A4 Pre	2.71	0.30	0.81	7	199.9	0.452	451.5
A5 Pre	0.15	0.30	0.05	7	199.9	0.025	25.0
Total							534.8

IDF Data Set: Town of East Gwillimbury
Event 50-Year
a = 1488.00
b = 3.00
c = -0.8030

Area Number	**A (ha)**	**C**	**AC**	**Tc (min.)**	**I (mm/h)**	**Q (m^3/s)**	**Q (L/s)**
A3 Pre	0.35	0.30	0.11	7	234.2	0.068	68.3
A4 Pre	2.71	0.30	0.81	7	234.2	0.529	528.9
A5 Pre	0.15	0.30	0.05	7	234.2	0.029	29.3
Total							626.5

IDF Data Set: Town of East Gwillimbury
Event 100-Year
a = 1770.00
b = 4.00
c = -0.8200

Area Number	**A (ha)**	**C**	**AC**	**Tc (min.)**	**I (mm/h)**	**Q (m^3/s)**	**Q (L/s)**
A3 Pre	0.35	0.40	0.14	7	247.8	0.096	96.4
A4 Pre	2.71	0.40	1.08	7	247.8	0.746	746.0
A5 Pre	0.15	0.40	0.06	7	247.8	0.041	41.3
Total							883.7

GEI Consultants

Post Development
Composite Runoff Coefficient

1656 Green Lane East Site 1
Project #: 2406541
October 2024

Overall Site

		Runoff C		
Drainage Area ID	**Area (ha)**	**5-year**	**25-year**	**100-year**
A3 Post	0.35	0.20	0.30	0.40
A5 Post	2.71	0.81	0.87	0.92
A6 Post	0.15	0.20	0.30	0.40
Total	3.21	0.72	0.02	0.04

A3 Post

	(ha)				
Total Area:	0.35		5-year	25-year	100-year
Impervious:	0.00	**Coefficient:**	0.90	0.95	1.00
Landscaping:	0.35	**Coefficient:**	0.20	0.30	0.40
Imperviousness:	0%				
Runoff Coefficient	0.20				

A5 Post

	(ha)				
Total Area:	2.71		5-year	25-year	100-year
Impervious:	2.37	**Coefficient:**	0.90	0.95	1.00
Landscaping:	0.34	**Coefficient:**	0.20	0.30	0.40
Imperviousness:	87%				
Runoff Coefficient	0.81				

A6 Post

	(ha)				
Total Area:	0.15		5-year	25-year	100-year
Impervious:	0.00	**Coefficient:**	0.90	0.95	1.00
Landscaping:	0.15	**Coefficient:**	0.20	0.30	0.40
Imperviousness:	0%				
Runoff Coefficient	0.20				

Modified Rational Method - 2-Year Storm
Site Flow and Storage Summary

1656 Green Lane East Site 1
Project #: 2406541
October 2024

Underground Tanks

Drainage Area: A5 Post
Area = 2.71 ha
"C" = 0.81
AC2 = 2.20
Tc = 7.0 min
Time Increment = 5.0 min

Target release rate = 148.9 L/s
Controlled Release Rate via Orifice (R) = 145.5 L/s

Max. Required Storage Volume = 223.0 m^3
Provided Storage Volume = 225.2 m^3

2-Year Design Storm

A = 648.00
B = 4.00
C = 0.784
I = I = A/(T+B)^C

(1)	(2)	(3)	(4)	(5)	(6)
Time (min)	**Rainfall Intensity (mm/hr)**	**Storm Runoff (m^3/s)**	**Storm Volume (m^3)**	**Allowable Release Volume to STM (m^3)**	**Storage Volume (m^3)**
		(3) = AC2*(2) / 360	**(4) = 60*(1)*(3)**	**(5) = 60*(1)*(R)/1000**	**(6) = (4) - (5)**
7.0	98.9	0.605	253.9	61.1	192.8
12.0	73.7	0.451	324.5	104.8	219.7
17.0	59.6	0.364	371.4	148.4	223.0
22.0	50.4	0.308	406.6	192.1	214.5
27.0	43.9	0.268	434.7	235.8	198.9
32.0	39.0	0.239	458.2	279.4	178.8
37.0	35.2	0.216	478.4	323.1	155.4
42.0	32.2	0.197	496.2	366.7	129.5
47.0	29.7	0.182	512.2	410.4	101.8
52.0	27.6	0.169	526.6	454.1	72.5
57.0	25.8	0.158	539.8	497.7	42.1
62.0	24.3	0.148	552.0	541.4	10.6
67.0	22.9	0.140	563.3	585.0	0.0
72.0	21.7	0.133	573.9	628.7	0.0
77.0	20.7	0.126	583.8	672.3	0.0
82.0	19.7	0.121	593.2	716.0	0.0
87.0	18.9	0.115	602.1	759.7	0.0
92.0	18.1	0.111	610.6	803.3	0.0
97.0	17.4	0.106	618.6	847.0	0.0
102.0	16.7	0.102	626.3	890.6	0.0
107.0	16.1	0.099	633.7	934.3	0.0
112.0	15.6	0.095	640.8	978.0	0.0
117.0	15.1	0.092	647.6	1021.6	0.0
122.0	14.6	0.089	654.2	1065.3	0.0
127.0	14.2	0.087	660.6	1108.9	0.0
132.0	13.8	0.084	666.7	1152.6	0.0
137.0	13.4	0.082	672.6	1196.3	0.0
142.0	13.0	0.080	678.4	1239.9	0.0
147.0	12.7	0.078	684.0	1283.6	0.0
152.0	12.4	0.076	689.4	1327.2	0.0
157.0	12.1	0.074	694.7	1370.9	0.0
162.0	11.8	0.072	699.8	1414.6	0.0

Modified Rational Method - 5-Year Storm
Site Flow and Storage Summary

1656 Green Lane East Site 1
Project #: 2406541
October 2024

Underground Tanks

Drainage Area: A5 Post
Area = 2.71 ha
"C" = 0.81
AC2 = 2.20
Tc = 7.0 min
Time Increment = 5.0 min

Target release rate = 206.6 L/s
Controlled Release Rate via Orifice (R) = 189.0 L/s

Max. Required Storage Volume = 318.1 m^3
Provided Storage Volume = 318.2 m^3

5-Year Design Storm

A = 930.00
B = 4.00
C = 0.798
I = I = A/(T+B)^C

(1)	(2)	(3)	(4)	(5)	(6)
Time (min)	**Rainfall Intensity (mm/hr)**	**Storm Runoff (m^3/s)**	**Storm Volume (m^3)**	**Allowable Release Volume to STM (m^3)**	**Storage Volume (m^3)**
		(3) = AC2*(2) / 360	**(4) = 60*(1)*(3)**	**(5) = 60*(1)*(R)/1000**	**(6) = (4) - (5)**
7.0	137.2	0.839	352.4	79.4	273.0
12.0	101.8	0.622	448.0	136.1	311.9
17.0	81.9	0.501	510.8	192.8	318.1
22.0	69.1	0.422	557.5	249.5	308.0
27.0	60.0	0.367	594.6	306.2	288.4
32.0	53.3	0.326	625.4	362.9	262.6
37.0	48.0	0.294	651.9	419.5	232.3
42.0	43.8	0.268	675.0	476.2	198.8
47.0	40.3	0.247	695.7	532.9	162.7
52.0	37.4	0.229	714.3	589.6	124.7
57.0	35.0	0.214	731.4	646.3	85.0
62.0	32.8	0.201	747.0	703.0	44.0
67.0	31.0	0.189	761.6	759.7	1.9
72.0	29.3	0.179	775.2	816.4	0.0
77.0	27.9	0.171	787.9	873.1	0.0
82.0	26.6	0.163	799.9	929.8	0.0
87.0	25.4	0.155	811.3	986.5	0.0
92.0	24.4	0.149	822.0	1043.2	0.0
97.0	23.4	0.143	832.3	1099.9	0.0
102.0	22.5	0.138	842.1	1156.6	0.0
107.0	21.7	0.133	851.5	1213.3	0.0
112.0	20.9	0.128	860.5	1270.0	0.0
117.0	20.2	0.124	869.1	1326.7	0.0
122.0	19.6	0.120	877.4	1383.4	0.0
127.0	19.0	0.116	885.5	1440.1	0.0
132.0	18.4	0.113	893.2	1496.8	0.0
137.0	17.9	0.110	900.7	1553.5	0.0
142.0	17.4	0.107	908.0	1610.2	0.0
147.0	17.0	0.104	915.1	1666.9	0.0
152.0	16.5	0.101	921.9	1723.5	0.0
157.0	16.1	0.099	928.5	1780.2	0.0
162.0	15.7	0.096	935.0	1836.9	0.0

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Modified Rational Method - 10-Year Storm
Site Flow and Storage Summary

1656 Green Lane East Site 1
Project #: 2406541
October 2024

Underground Tanks

Drainage Area:	A5 Post	
Area =	2.71	ha
"C" =	0.81	
AC2 =	2.20	
Tc =	7.0	min
Time Increment =	5.0	min
Target release rate =	251.0	L/s
Controlled Release Rate via Orifice (R) =	244.2	L/s
Max. Required Storage Volume =	357.7	m^3
Provided Storage Volume =	362.2	m^3

10-Year Design Storm

A =	1021.00
B =	3.00
C =	0.787
I =	I = A/(T+B)^C

(1) **Time** **(min)**	(2) **Rainfall Intensity** **(mm/hr)**	(3) **Storm Runoff** **(m^3/s)**	(4) **Storm Volume** **(m^3)**	(5) **Allowable Release Volume to STM** **(m^3)**	(6) **Storage Volume** **(m^3)**
		(3) = AC2*(2) / 360	**(4) = 60*(1)*(3)**	**(5) = 60*(1)*(R)/1000**	**(6) = (4) - (5)**
7.0	166.7	1.019	428.1	102.5	325.6
12.0	121.2	0.741	533.4	175.8	357.7
17.0	96.6	0.591	602.6	249.0	353.6
22.0	81.1	0.496	654.2	322.3	332.0
27.0	70.2	0.429	695.6	395.5	300.1
32.0	62.2	0.380	730.2	468.8	261.5
37.0	56.0	0.342	760.1	542.0	218.1
42.0	51.0	0.312	786.4	615.3	171.2
47.0	47.0	0.287	810.0	688.5	121.5
52.0	43.6	0.266	831.4	761.8	69.7
57.0	40.7	0.249	851.1	835.0	16.1
62.0	38.2	0.234	869.2	908.2	0.0
67.0	36.1	0.220	886.1	981.5	0.0
72.0	34.1	0.209	901.9	1054.7	0.0
77.0	32.5	0.198	916.8	1128.0	0.0
82.0	30.9	0.189	930.8	1201.2	0.0
87.0	29.6	0.181	944.1	1274.5	0.0
92.0	28.4	0.173	956.8	1347.7	0.0
97.0	27.2	0.166	968.9	1421.0	0.0
102.0	26.2	0.160	980.4	1494.2	0.0
107.0	25.3	0.154	991.5	1567.5	0.0
112.0	24.4	0.149	1002.2	1640.7	0.0
117.0	23.6	0.144	1012.4	1713.9	0.0
122.0	22.8	0.140	1022.3	1787.2	0.0
127.0	22.1	0.135	1031.9	1860.4	0.0
132.0	21.5	0.131	1041.1	1933.7	0.0
137.0	20.9	0.128	1050.1	2006.9	0.0
142.0	20.3	0.124	1058.7	2080.2	0.0
147.0	19.8	0.121	1067.2	2153.4	0.0
152.0	19.3	0.118	1075.3	2226.7	0.0
157.0	18.8	0.115	1083.3	2299.9	0.0
162.0	18.4	0.112	1091.1	2373.2	0.0

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Modified Rational Method - 25-Year Storm
Site Flow and Storage Summary

1656 Green Lane East Site 1
Project #: 2406541
October 2024

Underground Tanks

Drainage Area:	A5 Post	
Area =	2.71	ha
"C" =	0.87	
AC2 =	2.35	
Tc =	7.0	min
Time Increment =	5.0	min
Target release rate =	451.5	L/s
Controlled Release Rate via Orifice (R) =	357.3	L/s
Max. Required Storage Volume =	410.7	m^3
Provided Storage Volume =	425.9	m^3

25-Year Design Storm

A =	1100.00
B =	2.00
C =	0.776
I =	I = A/(T+B)^C

(1)	(2)	(3)	(4)	(5)	(6)
Time (min)	**Rainfall Intensity (mm/hr)**	**Storm Runoff (m^3/s)**	**Storm Volume (m^3)**	**Allowable Release Volume to STM (m^3)**	**Storage Volume (m^3)**
		(3) = AC2*(2) / 360	**(4) = 60*(1)*(3)**	**(5) = 60*(1)*(R)/1000**	**(6) = (4) - (5)**
7.0	199.9	1.307	549.0	150.1	398.9
12.0	141.9	0.928	667.9	257.2	410.7
17.0	112.0	0.732	746.6	364.4	382.2
22.0	93.4	0.611	806.0	471.6	334.4
27.0	80.6	0.527	854.1	578.8	275.3
32.0	71.3	0.466	894.7	686.0	208.7
37.0	64.1	0.419	930.0	793.1	136.9
42.0	58.4	0.381	961.4	900.3	61.0
47.0	53.7	0.351	989.6	1007.5	0.0
52.0	49.8	0.325	1015.4	1114.7	0.0
57.0	46.5	0.304	1039.1	1221.9	0.0
62.0	43.6	0.285	1061.1	1329.1	0.0
67.0	41.2	0.269	1081.6	1436.2	0.0
72.0	39.0	0.255	1100.9	1543.4	0.0
77.0	37.1	0.242	1119.1	1650.6	0.0
82.0	35.3	0.231	1136.4	1757.8	0.0
87.0	33.8	0.221	1152.8	1865.0	0.0
92.0	32.4	0.212	1168.4	1972.2	0.0
97.0	31.1	0.203	1183.4	2079.3	0.0
102.0	29.9	0.196	1197.7	2186.5	0.0
107.0	28.9	0.189	1211.4	2293.7	0.0
112.0	27.9	0.182	1224.7	2400.9	0.0
117.0	27.0	0.176	1237.4	2508.1	0.0
122.0	26.1	0.171	1249.7	2615.2	0.0
127.0	25.3	0.166	1261.7	2722.4	0.0
132.0	24.6	0.161	1273.2	2829.6	0.0
137.0	23.9	0.156	1284.4	2936.8	0.0
142.0	23.3	0.152	1295.3	3044.0	0.0
147.0	22.6	0.148	1305.8	3151.2	0.0
152.0	22.1	0.144	1316.1	3258.3	0.0
157.0	21.5	0.141	1326.1	3365.5	0.0
162.0	21.0	0.137	1335.8	3472.7	0.0

Modified Rational Method - 50-Year Storm
Site Flow and Storage Summary

1656 Green Lane East Site 1
Project #: 2406541
October 2024

Underground Tanks

Drainage Area:	A5 Post	
Area =	2.71	ha
"C" =	0.87	
AC =	2.35	
Tc =	7.0	min
Time Increment =	5.0	min
Target release rate =	528.9	L/s
Controlled Release Rate via Orifice (R) =	486.2	L/s
Max. Required Storage Volume =	446.0	m^3
Provided Storage Volume =	455.2	m^3

50-Year Design Storm

A =	1488.00
B =	3.00
C =	0.803
I =	I = A/(T+B)^C

(1)	(2)	(3)	(4)	(5)	(6)
Time (min)	**Rainfall Intensity (mm/hr)**	**Storm Runoff (m^3/s)**	**Storm Volume (m^3)**	**Allowable Release Volume to STM (m^3)**	**Storage Volume (m^3)**
		(3) = AC2*(2) / 360	**(4) = 60*(1)*(3)**	**(5) = 60*(1)*(R)/1000**	**(6) = (4) - (5)**
7.0	234.2	1.531	643.1	204.2	438.9
12.0	169.1	1.106	796.1	350.0	446.0
17.0	134.2	0.878	895.1	495.9	399.2
22.0	112.2	0.734	968.4	641.8	326.6
27.0	96.9	0.634	1026.6	787.6	239.0
32.0	85.6	0.560	1075.1	933.5	141.6
37.0	76.9	0.503	1116.6	1079.3	37.3
42.0	70.0	0.458	1153.1	1225.2	0.0
47.0	64.3	0.420	1185.7	1371.0	0.0
52.0	59.6	0.389	1215.2	1516.9	0.0
57.0	55.6	0.363	1242.2	1662.7	0.0
62.0	52.1	0.341	1267.0	1808.6	0.0
67.0	49.1	0.321	1290.1	1954.4	0.0
72.0	46.4	0.304	1311.7	2100.3	0.0
77.0	44.1	0.288	1331.9	2246.1	0.0
82.0	42.0	0.275	1351.0	2392.0	0.0
87.0	40.1	0.262	1369.1	2537.8	0.0
92.0	38.4	0.251	1386.3	2683.7	0.0
97.0	36.9	0.241	1402.6	2829.5	0.0
102.0	35.4	0.232	1418.2	2975.4	0.0
107.0	34.1	0.223	1433.2	3121.2	0.0
112.0	33.0	0.215	1447.6	3267.1	0.0
117.0	31.8	0.208	1461.4	3412.9	0.0
122.0	30.8	0.201	1474.7	3558.8	0.0
127.0	29.9	0.195	1487.6	3704.7	0.0
132.0	29.0	0.189	1500.0	3850.5	0.0
137.0	28.1	0.184	1512.0	3996.4	0.0
142.0	27.4	0.179	1523.6	4142.2	0.0
147.0	26.6	0.174	1534.9	4288.1	0.0
152.0	25.9	0.170	1545.9	4433.9	0.0
157.0	25.3	0.165	1556.5	4579.8	0.0
162.0	24.7	0.161	1566.9	4725.6	0.0

Modified Rational Method - 100-Year Storm
Site Flow and Storage Summary

1656 Green Lane East Site 1
Project #: 2406541
October 2024

Underground Tanks

Drainage Area:	A5 Post	
Area =	2.71	ha
"C" =	0.92	
AC2 =	2.51	
Tc =	7.0	min
Time Increment =	5.0	min
Target release rate =	746.0	L/s
Controlled Release Rate via Orifice (R) =	600.1	L/s
Max. Required Storage Volume =	481.2	m^3
Provided Storage Volume =	484.6	m^3

100-Year Design Storm

A =	1770.00
B =	4.00
C =	0.82
I =	I = A/(T+B)^C

(1)	(2)	(3)	(4)	(5)	(6)
Time (min)	**Rainfall Intensity (mm/hr)**	**Storm Runoff (m^3/s)**	**Storm Volume (m^3)**	**Allowable Release Volume to STM (m^3)**	**Storage Volume (m^3)**
		(3) = AC2*(2) / 360	**(4) = 60*(1)*(3)**	**(5) = 60*(1)*(R)/1000**	**(6) = (4) - (5)**
7.0	247.8	1.725	724.4	252.1	472.3
12.0	182.2	1.268	913.3	432.1	481.2
17.0	145.8	1.015	1035.2	612.1	423.1
22.0	122.4	0.852	1124.5	792.2	332.3
27.0	105.9	0.737	1194.7	972.2	222.5
32.0	93.7	0.652	1252.5	1152.2	100.3
37.0	84.2	0.586	1301.7	1332.3	0.0
42.0	76.6	0.534	1344.6	1512.3	0.0
47.0	70.4	0.490	1382.6	1692.4	0.0
52.0	65.2	0.454	1416.7	1872.4	0.0
57.0	60.8	0.423	1447.8	2052.4	0.0
62.0	57.0	0.397	1476.3	2232.5	0.0
67.0	53.7	0.374	1502.6	2412.5	0.0
72.0	50.8	0.353	1527.1	2592.6	0.0
77.0	48.2	0.336	1550.0	2772.6	0.0
82.0	45.9	0.319	1571.6	2952.6	0.0
87.0	43.8	0.305	1591.9	3132.7	0.0
92.0	41.9	0.292	1611.1	3312.7	0.0
97.0	40.2	0.280	1629.4	3492.8	0.0
102.0	38.7	0.269	1646.8	3672.8	0.0
107.0	37.2	0.259	1663.5	3852.8	0.0
112.0	35.9	0.250	1679.4	4032.9	0.0
117.0	34.7	0.241	1694.7	4212.9	0.0
122.0	33.5	0.234	1709.5	4392.9	0.0
127.0	32.5	0.226	1723.6	4573.0	0.0
132.0	31.5	0.219	1737.3	4753.0	0.0
137.0	30.6	0.213	1750.5	4933.1	0.0
142.0	29.7	0.207	1763.3	5113.1	0.0
147.0	28.9	0.201	1775.7	5293.1	0.0
152.0	28.2	0.196	1787.7	5473.2	0.0
157.0	27.4	0.191	1799.3	5653.2	0.0
162.0	26.8	0.186	1810.6	5833.3	0.0

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Orifice Control
Harry Walker Extension

1656 Green Lane East Site 1
Project #: 2406541
October 2024

Description	Orifice #1	Twin Orifices #2 & #3	Weir
Invert (m)	268.01	268.65	268.84
Diameter/Width (mm)	360	400	800
Control Elevation (m)	268.19	268.85	
Obvert (m)	268.37	269.05	
Area (m^2)	0.102	0.126	

Orifice Plate Coefficient	0.61
Weir Coefficient	1.75

Orifice Equation

$$Q = C \times W \times H^{3/2}$$

Weir Equation

$$Q = C \times A \times \sqrt{2 \times g \times h}$$

Storm Event	Headwater Elevation	Orifice #1 Head	Orifice #1 Release Rate	Orifice #2 & #3 Head	Orifice #2 & #3 Flow Width	Orifice #2 & #3 Release Rate (Each)	Weir Release Rate	Total Release Rate	Target Release Rate	Provided Storage	Required storage
	(m)	(m)	(L/s)	(m)	(m)	(L/s)	(L/s)	(L/s)	(L/s)	(m^3)	(m^3)
2-Year	268.47	0.28	145.5	0.00		0.00	0.00	145.53	148.9	225.2	223.0
5-Year	268.66	0.47	188.5	0.00	0.12	0.22	0.00	188.99	206.6	318.2	318.1
10-Year	268.75	0.56	205.8	0.00	0.35	19.17	0.00	244.15	251.0	362.2	357.7
25-Year	268.88	0.69	228.5	0.03	0.40	58.81	11.20	357.27	451.5	425.9	410.7
50-Year	268.94	0.75	238.2	0.09	0.36	101.86	44.27	486.17	528.9	455.2	446.0
100-Year	269.00	0.81	247.5	0.15	0.26	131.50	89.60	600.13	746.0	484.6	481.2

GEI Consultants

Greenstorm Tanks Stage Storage

1656 Green Lane East Site 1
Project #: 2406541
October 2024

For Greenstorm Chambers:

No. of Cells/Layer	800	
No. of Layers	1.5	
Bottom of Tank	268.01	m
Top of Tank	269.02	m
Half Cell Volume	0.212	m^3
Full Cell Volume	0.406	m^3
Half Cell Height	0.35	m
Full Cell Height	0.66	m
Total Provided Storage Volume	494.40	m^3

Stage (m)		Water Head (m)	Cumulative Storage Volume (m^3)
Storm Tank Invert	268.01	0.00	0.00
	268.05	0.04	19.58
	268.10	0.09	44.06
	268.15	0.14	68.53
	268.20	0.19	93.01
	268.25	0.24	117.48
	268.30	0.29	141.96
	268.35	0.34	166.43
	268.40	0.39	190.91
	268.45	0.44	215.38
	268.50	0.49	239.86
	268.55	0.54	264.33
	268.60	0.59	288.81
	268.65	0.64	313.28
	268.70	0.69	337.76
	268.75	0.74	362.23
	268.80	0.79	386.71
	268.85	0.84	411.18
	268.90	0.89	435.66
	268.95	0.94	460.13
	269.00	0.99	484.61
Top of Tanks	269.02	1.01	494.40

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Hydraulic Conductivity & Infiltration Rates

1656 Green Lane East Site 1
Project #: 2406541
October 2024

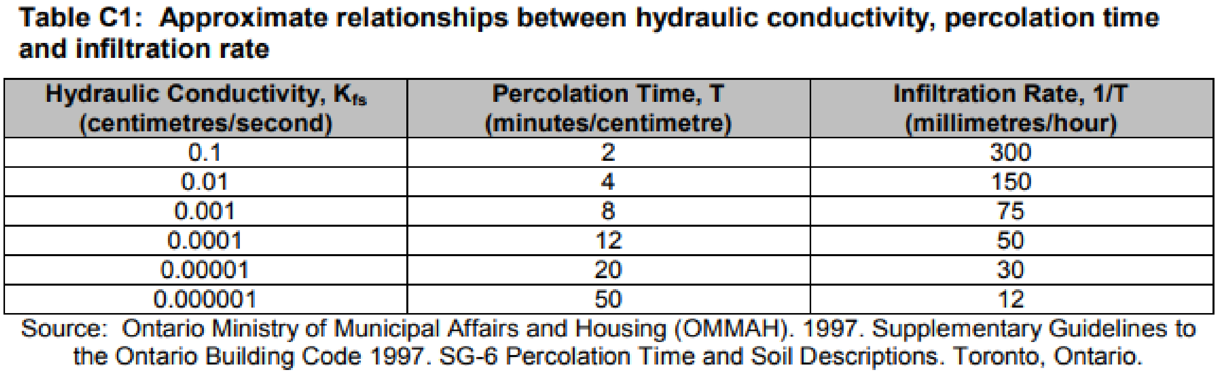
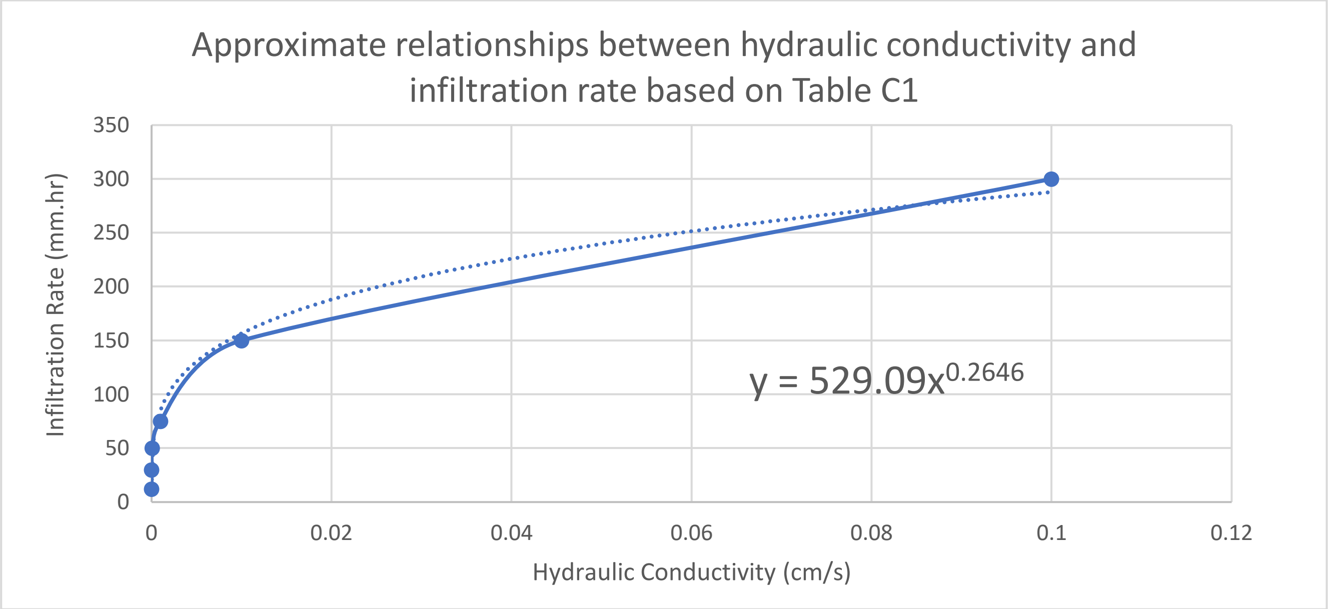


Table C1: Approximate relationships between hydraulic conductivity, percolation time and infiltration rate

Hydraulic Conductivity, K_{fs} (centimetres/second)	Percolation Time, T (minutes/centimetre)	Infiltration Rate, 1/T (millimetres/hour)
0.1	2	300
0.01	4	150
0.001	8	75
0.0001	12	50
0.00001	20	30
0.000001	50	12

Source: Ontario Ministry of Municipal Affairs and Housing (OMMAH). 1997. Supplementary Guidelines to the Ontario Building Code 1997. SG-6 Percolation Time and Soil Descriptions. Toronto, Ontario.

From LID SWM Planning and Design Guide by TRCA and CVC (2010)



BH/MW 2

Hydraulic Conductivity (k)[1]	3.00E-06	cm/s
Infiltration Rate	18.29	mm/hr
Safety Factor	2.5	
Design Infiltration Rate	7.32	mm/hr

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[1] Hydraulic Conductivity for BH/MW 2 from Hydrogeological Study by GEI (Aug 2022)

GEI Consultants

Infiltration Deficit Calculations

1656 Green Lane East Site 1
Project #: 2406541
October 2024

Water Balance Formula

$$\boxed{P = ET + R + I}$$

$$\boxed{P = ET + \Delta S}$$

$$\boxed{\Delta S = R + I}$$

P: Precipitation
ET: Evapotranspiration
ΔS: Surplus
I: Infiltration
R: Runoff

Pre-Development Infiltration Factors (MOE Table 3.1)

Factor	Condition	Value
Topography/Slope (m/km)	27	0.10
Soils[1]	Sandy Loam (HSG = B)	0.30
Cover	Cultivated Land	0.10
Total Factor (Sum)		0.50

Pre-Development Water Balance

	Pervious Area	Impervious Area	Total
Development Area (ha)	3.21	0.00	3.21
Precipitation[2] (mm/yr)	735	735	
ET[2] (mm/yr)	597	74	
Surplus (mm/yr) = P - ET	138	662	
Infiltration (mm/yr) = ΔS x Factor	69	0	
Runoff (mm/yr) = ΔS - I	69	662	
ET (m^3/yr)	19175	0	19175
Infiltration (m^3/yr)	2209	0	2209
Runoff (m^3/yr)	2209	0	2209

Post-Development Infiltration Factors

Factor	Condition	Value
Topography/Slope (m/km)	15	0.15
Soils[1]	Sandy Loam (HSG = B)	0.30
Cover	Urban Lawn	0.10
Total Factor (Sum)		0.55

Post-Development Water Balance (No Mitigation)

	Pervious Area	Impervious Area	Total
Development Area (ha)*	0.84	2.37	3.21
Precipitation[2] (mm/yr)	735	735	
ET[2] (mm/yr)	597	74	
Surplus (mm/yr) = P - ET	138	662	
Infiltration (mm/yr) = ΔS x Factor	76	0	
Runoff (mm/yr) = ΔS - I	62	662	
ET (m^3/yr)	5018	1742	6760
Infiltration (m^3/yr)	636	0	636
Runoff (m^3/yr)	520	15678	16198

Annual Infiltration Volume Deficit = 1573 m^3/year

Summary

	Pre	Post (without Mitigation)	Difference
ET (m^3/yr)	19175	6760	-65%
Infiltration (m^3/yr)	2209	636	-71%
Runoff (m^3/yr)	2209	16198	633%

[1] Ontario GeoHub Soil Survey Complex

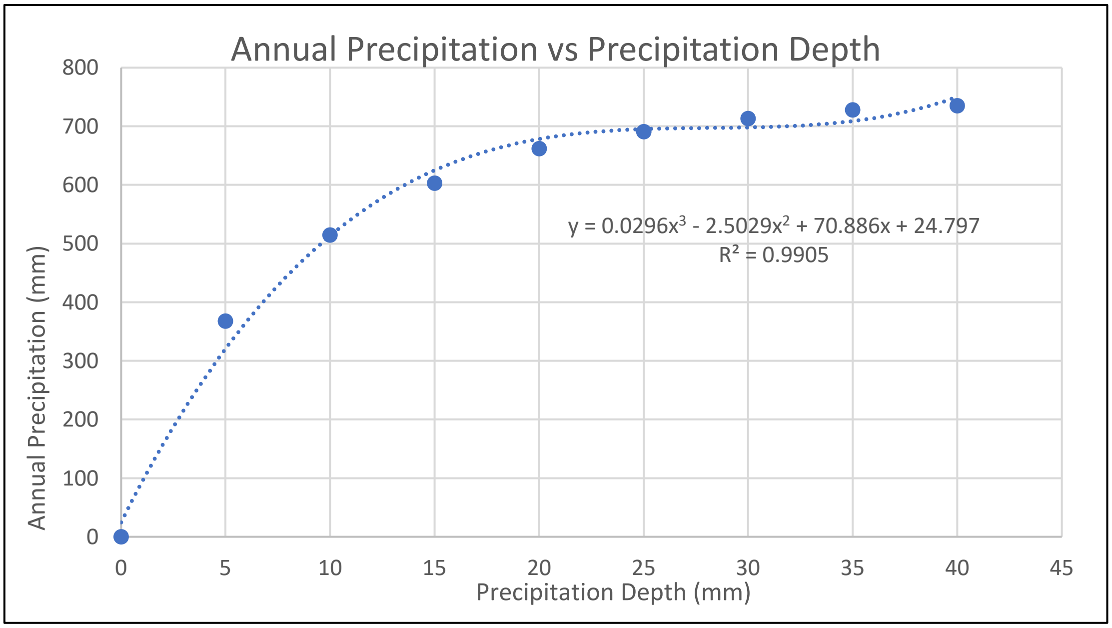
[2] Canadian Climate Normals Station King Smoke Tree

Annual Precipitation vs Precipitation Depth

1656 Green Lane East Site 1
Project #: 2406541
October 2024

Precipitation[1]	735	mm

Precipitation Depth (mm)	% Total Average Annual Rainfall[2]	Annual Precipitation (mm)
0	0%	0
5	50%	368
10	70%	515
15	82%	603
20	90%	662
25	94%	691
30	97%	713
35	99%	728
40	100%	735



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[1] Canadian Climate Normals Station King Smoke Tree

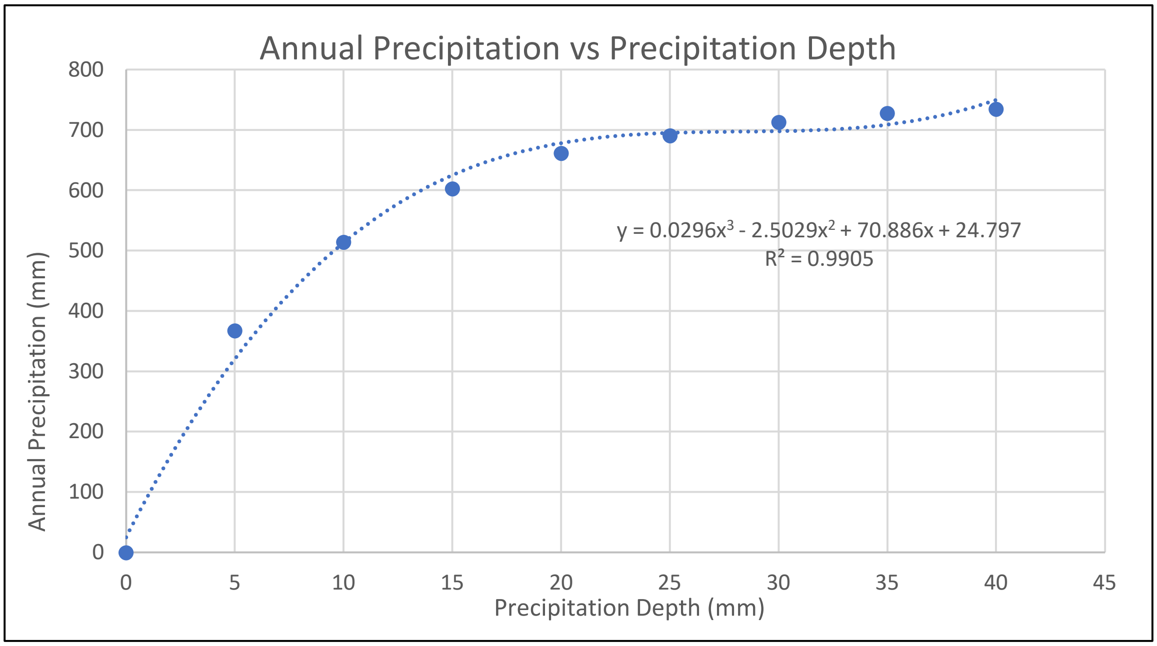
[2] City of Toronto Wet Weather Flow Management Guidelines November 2006 Figure 1a

Water Balance Mitigation Calculations

1656 Green Lane East Site 1
Project #: 2406541
October 2024

Based on fitted curve shown below:

Precipitation events of depth ≤ …	1	mm
…will produce an annual precipitation of:	93	mm/yr



Annual Infiltration Deficit	1573.42	m^3/year	

Greenstorm Infiltration Trench Design

Half Cell Total Volume	0.224	m^3	
Half Cell Storage Capacity	0.212	m^3	
Half Cell Height	0.35	m	
Storage Media Porosity	0.95		storage capacity/total volume
Contributing Area (A5 Post)	2.71	ha	
Annual Infiltration Provided	2525.98	m^3/year	Acontributing x 93 mm/yr
Required Trench Storage Volume	27.1	m^3	Acontributing x 1 mm
No. of Tank Layers	0.5		
Depth of the Infiltration Trench	0.35	m	
Required Trench Area	82	m^2	volume ÷ depth ÷ porosity
No. of Cells/Layer	140		
Provided Trench Area	89.6	m^2	
Design Infiltration rate	7.32	mm/hr	Based on HydroG (GEI Aug 2022)
Estimated drawdown time	48	hrs	depth ÷ infiltration rate

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Volume Control Calculations

1656 Green Lane East Site 1
Project #: 2406541
October 2024

Criteria: Capture and retain/treat direct runoff from new/fully reconstructed impervious surfaces.

Impervious Area = 23,700 m^2

Flexible Treatment Alternatives	Event (mm)	Volume Required (m^3)
Normal Criteria	25.00	593
Alternative #1	12.50	296
Alternative #2	5.00	119
Alternative #3	Post-to-Pre	27.1

Allowable Depth (MOE SWMP Manual Eq. 4.2)

$$\boxed{d = \frac{PT}{1000}}$$

d = maximum allowable depth of soakaway pit/infiltration trench (mm)
P = percolation rate (mm/h)
T = drawdown time (h)

P	7.3	mm/h
T	48	h
d	**0.35**	**m**

Infiltration Trench with Clear Stone

Trench Foot-print	200	m^2
Depth of Infiltration Trench	0.35	m
Alternative #3 Required Volume	119	m^3
Total Tank Infiltration Volume	**27.1**	**m^3**
Design Infiltration Rate	7.32	mm/hr
DrawdownTime	47.8	hr

Phosphorous Balance Analysis
Harry Walker Extension
1656 Green Lane East Site 1
Project #: 2406541
October 2024

Drainage Area ID	Pre-development Land Use	Area (ha)	P coeff. (kg/ha/yr)	P Load (kg/yr)
A3 Pre + A4 Pre + A5 Pre	Low Intensity - Sod Farm/Golf Course	3.21	0.24	0.77
			Total	**0.77**

Treatment Train Efficiency

Treatment Method	% Removal	% Remaining
OGS (EFO12)	20%	80%
Underground Storage + Isolated Row	25%	75%

Total:
%remaining = ∏(1-%eff) 60%
total %eff = 100% - %remaining = **40%**

Drainage Area ID	Post-development Land Use	Area (ha)	P coeff. (kg/ha/yr)	P Load (kg/yr)	Best Management Practice applied with P Removal Efficiency			P Load with BMP (kg/yr)
A3 Post	Low Intensity - Sod Farm/Golf Course	0.35	0.24	0.08	N/A	0%		0.08
A5 Post	High Intensity - Commercial	2.71	1.82	4.93	OGS (20%) + Underground Storage (25%)	40%		2.96
A6 Post	Low Intensity - Sod Farm/Golf Course	0.15	0.24	0.04	N/A	0%		0.04
			Total	**5.05**	29 CB Shields	-0.021	kg/yr	-0.61
							Total	**2.47**

	P Load (kg/yr)
Pre-development:	0.77
Post-development:	5.05
Post-development (with BMPs):	2.47

51% reduction in net load

Phosphorous Offsetting (LSCRA Phosphorous Offsetting Policy)

Offset Ratio = 2.5:1
Offset Value = $35,770/kg/yr
+ 15% Administration Fee

Total Offset Cost = $254,044.62

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Rational Method Post-Development Flow
Storm Sewer Capture Calculations - Harry Walker Extension

1656 Green Lane East Site 1
Project #: 2406541
October 2024

Input Parameters

Area Number	Area	C, 5-Year	C, 25-Year	C, 100-Year	Tc
	(ha)				(min.)
Swale Drainage Area	0.92	0.90	0.95	1.00	7

Formula: I = a(T+b)^c

a,b,c	Constants
T	Time of concentration
I	Rainfall intensity

Rational Method Calculations

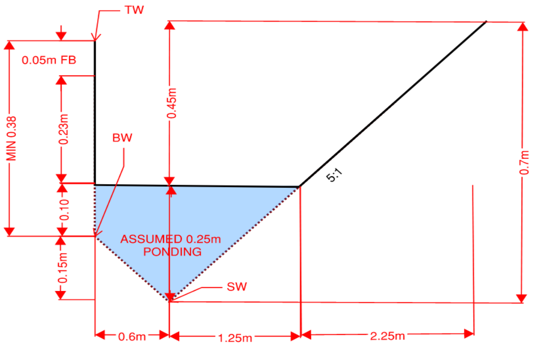
IDF Data Set: Town of East Gwillimbury
Event 5-Year
a = 930.00
b = 4.00
c = -0.7980

Area Number	A (ha)	C	AC	Tc (min.)	I (mm/h)	Q (m^3/s)	Q (L/s)
Swale Drainage Area	0.92	0.90	0.83	7	137.2	0.316	315.6

IDF Data Set: Town of East Gwillimbury
Event 100-Year
a = 1770.00
b = 4.00
c = -0.8200

Area Number	A (ha)	C	AC	Tc (min.)	I (mm/h)	Q (m^3/s)	Q (L/s)
Swale Drainage Area	0.92	1.00	0.92	7	247.8	0.633	633.2

Design Flow Q_{100}-Q_5	317.5	L/s
Starting Bottom Elevation	270.56	m
Spill Elevation	270.27	m
Length of Swale to Spill	123.00	m
Slope	0.2%	



Swale Sizing

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.002 m/m
Discharge	317.53 L/s

Section Definitions

Station (m)	Elevation (m)
0+00.00	0.28
0+00.00	0.00
0+01.85	0.00
0+04.10	0.45

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.28)	(0+04.10, 0.45)	0.025

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	234.0 mm
Roughness Coefficient	0.025
Elevation	0.23 m
Elevation Range	0.00 to 0.45 m
Flow Area	0.6 m²
Wetted Perimeter	3.28 m
Hydraulic Radius	173.9 mm
Top Width	3.02 m
Normal Depth	234.0 mm
Critical Depth	135.3 mm
Critical Slope	0.014 m/m
Velocity	0.56 m/s
Velocity Head	0.02 m
Specific Energy	0.25 m
Froude Number	0.410
Flow Type	Subcritical

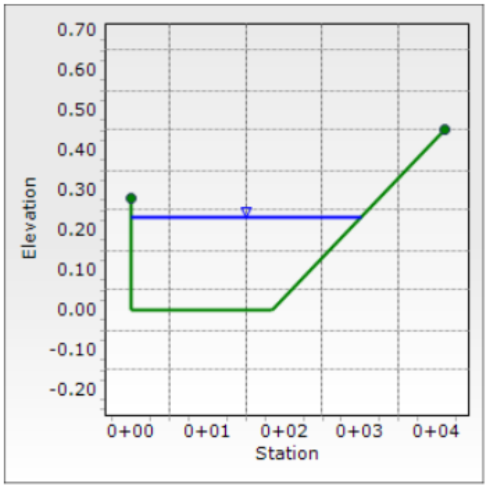
Swale Sizing

GVF Input Data

Downstream Depth	0.0 mm
Length	0.00 m
Number Of Steps	0

GVF Output Data

Upstream Depth	0.0 mm
Profile Description	N/A
Profile Headloss	0.00 m
Downstream Velocity	0.00 m/s
Upstream Velocity	0.00 m/s
Normal Depth	234.0 mm
Critical Depth	135.3 mm
Channel Slope	0.002 m/m
Critical Slope	0.014 m/m



Stormceptor® EF Sizing Report

Imbrium® Systems
ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

10/08/2024

Province:	Ontario
City:	East Gwillimbury
Nearest Rainfall Station:	TORONTO INTL AP
Climate Station Id:	6158731
Years of Rainfall Data:	20
Site Name:	1
Drainage Area (ha):	2.71
Runoff Coefficient 'c':	0.81
Particle Size Distribution:	CA ETV
Target TSS Removal (%):	70.0
Required Water Quality Runoff Volume Capture (%):	90.00
Estimated Water Quality Flow Rate (L/s):	68.26
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	No
Peak Conveyance (maximum) Flow Rate (L/s):	1725.00
Influent TSS Concentration (mg/L):	200
Estimated Average Annual Sediment Load (kg/yr):	0
Estimated Average Annual Sediment Volume (L/yr):	0

Project Name:	Green Lane Site 1
Project Number:	2406541
Designer Name:	Emeline Wang
Designer Company:	GEI Consultants
Designer Email:	ewang@geiconsultants.com
Designer Phone:	647-740-5285
EOR Name:	
EOR Company:	
EOR Email:	
EOR Phone:	

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EFO4	37
EFO6	47
EFO8	54
EFO10	58
EFO12	61

Recommended Stormceptor EF Model: **Parallel Models**

Estimated Net Annual Sediment (TSS) Load Reduction (%): **Parallel Models**

Water Quality Runoff Volume Capture (%): **> 90**

THIRD-PARTY TESTING AND VERIFICATION

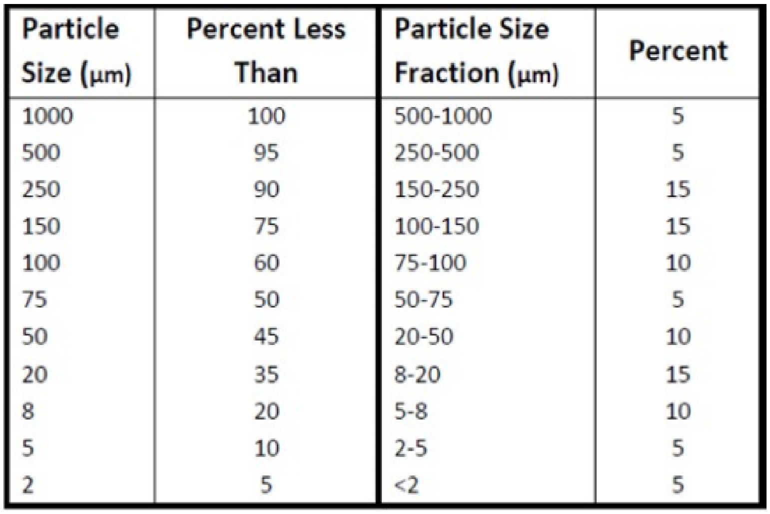
►**Stormceptor® EF and Stormceptor® EFO** are the latest evolutions in the Stormceptor® oil-grit separator (OGS) technology series, and are designed to remove a wide variety of pollutants from stormwater and snowmelt runoff. These technologies have been third-party tested in accordance with the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators** and performance has been third-party verified in accordance with the **ISO 14034 Environmental Technology Verification (ETV)** protocol.

PERFORMANCE

►**Stormceptor® EF and EFO** remove stormwater pollutants through gravity separation and floatation, and feature a patent-pending design that generates positive removal of total suspended solids (TSS) throughout each storm event, including high-intensity storms. Captured pollutants include sediment, free oils, and sediment-bound pollutants such as nutrients, heavy metals, and petroleum hydrocarbons. Stormceptor is sized to remove a high level of TSS from the frequent rainfall events that contribute the vast majority of annual runoff volume and pollutant load. The technology incorporates an internal bypass to convey excessive stormwater flows from high-intensity storms through the device without resuspension and washout (scour) of previously captured pollutants. Proper routine maintenance ensures high pollutant removal performance and protection of downstream waterways.

PARTICLE SIZE DISTRIBUTION (PSD)

►The **Canadian ETV PSD** shown in the table below was used, or in part, for this sizing. This is the identical PSD that is referenced in the Canadian ETV ***Procedure for Laboratory Testing of Oil-Grit Separators*** for both sediment removal testing and scour testing. The Canadian ETV PSD contains a wide range of particle sizes in the sand and silt fractions, and is considered reasonably representative of the particle size fractions found in typical urban stormwater runoff.

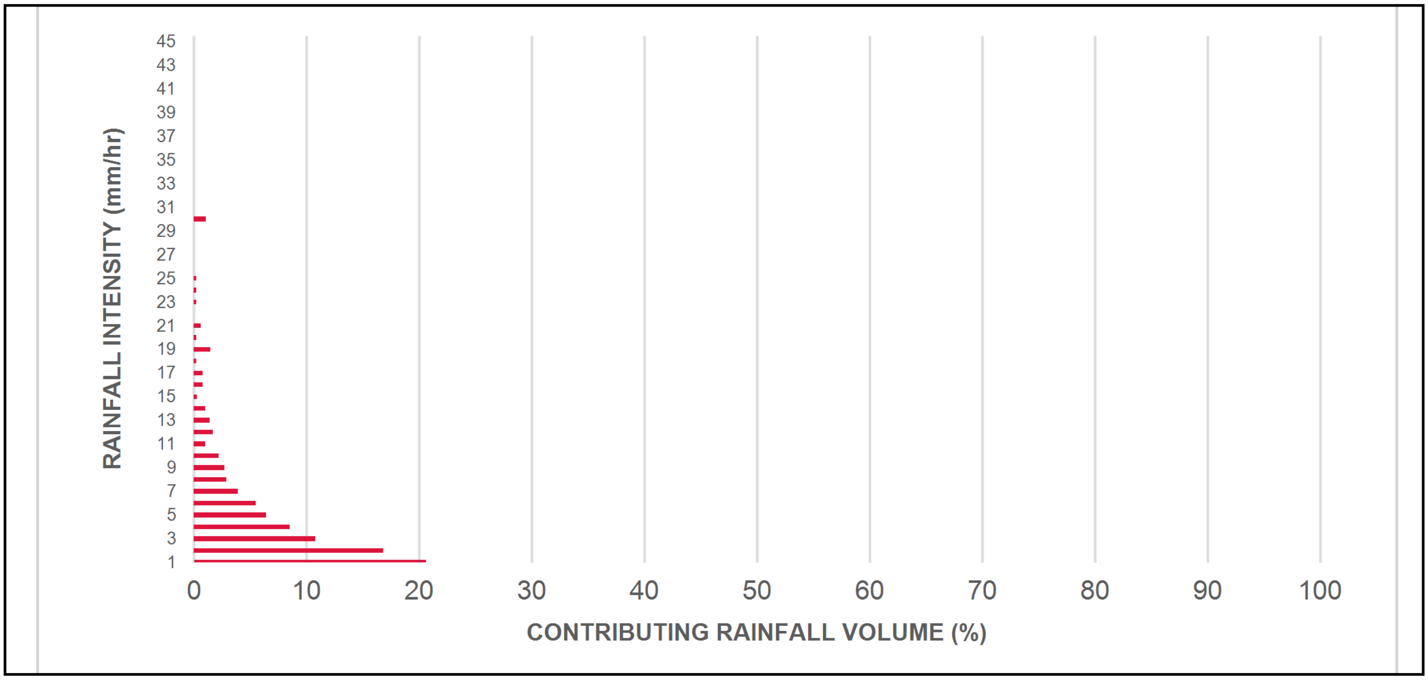


Particle Size (μm)	Percent Less Than	Particle Size Fraction (μm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

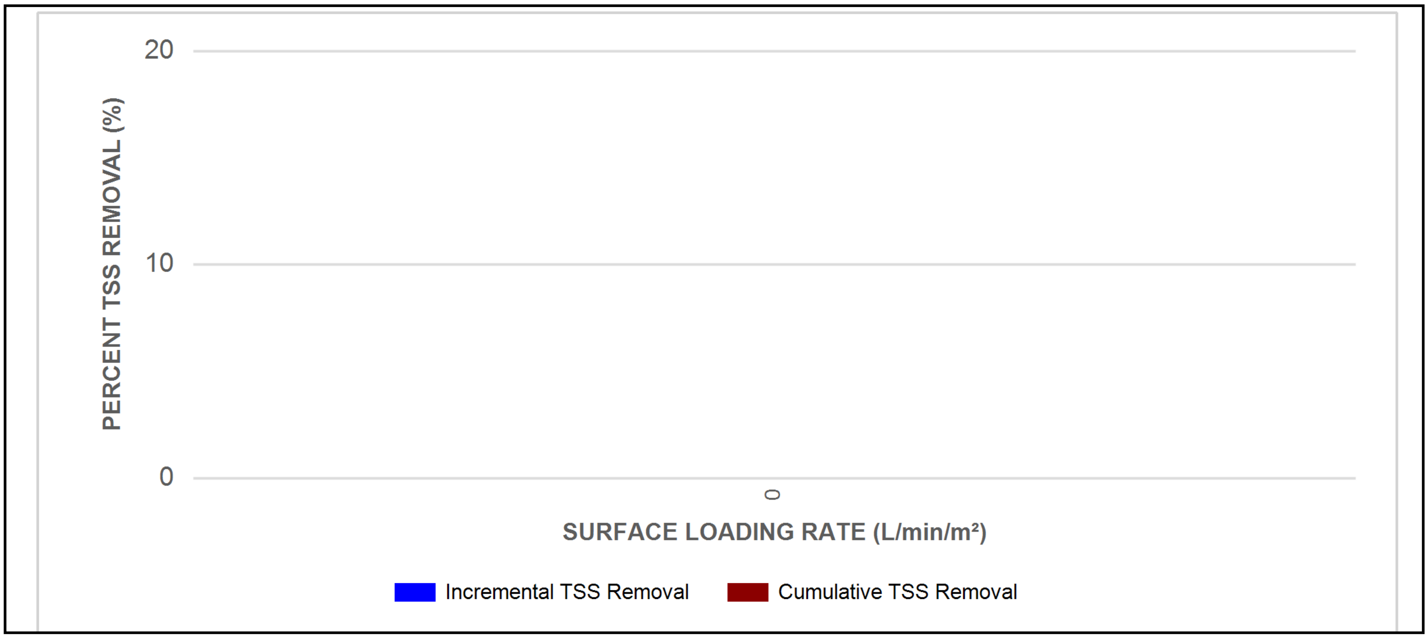
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
0.50	8.5	8.5	3.05	183.0	N/A	N/A	N/A	N/A
1.00	20.6	29.1	6.10	366.0	N/A	N/A	N/A	N/A
2.00	16.8	45.9	12.20	732.0	N/A	N/A	N/A	N/A
3.00	10.8	56.7	18.31	1098.0	N/A	N/A	N/A	N/A
4.00	8.5	65.2	24.41	1465.0	N/A	N/A	N/A	N/A
5.00	6.4	71.6	30.51	1831.0	N/A	N/A	N/A	N/A
6.00	5.5	77.0	36.61	2197.0	N/A	N/A	N/A	N/A
7.00	3.9	81.0	42.72	2563.0	N/A	N/A	N/A	N/A
8.00	2.9	83.9	48.82	2929.0	N/A	N/A	N/A	N/A
9.00	2.7	86.5	54.92	3295.0	N/A	N/A	N/A	N/A
10.00	2.2	88.7	61.02	3661.0	N/A	N/A	N/A	N/A
11.00	1.0	89.7	67.13	4028.0	N/A	N/A	N/A	N/A
12.00	1.7	91.3	73.23	4394.0	N/A	N/A	N/A	N/A
13.00	1.4	92.8	79.33	4760.0	N/A	N/A	N/A	N/A
14.00	1.0	93.7	85.43	5126.0	N/A	N/A	N/A	N/A
15.00	0.3	94.0	91.54	5492.0	N/A	N/A	N/A	N/A
16.00	0.8	94.8	97.64	5858.0	N/A	N/A	N/A	N/A
17.00	0.8	95.7	103.74	6224.0	N/A	N/A	N/A	N/A
18.00	0.2	95.8	109.84	6591.0	N/A	N/A	N/A	N/A
19.00	1.5	97.3	115.95	6957.0	N/A	N/A	N/A	N/A
20.00	0.2	97.5	122.05	7323.0	N/A	N/A	N/A	N/A
21.00	0.6	98.2	128.15	7689.0	N/A	N/A	N/A	N/A
22.00	0.0	98.2	134.25	8055.0	N/A	N/A	N/A	N/A
23.00	0.2	98.4	140.35	8421.0	N/A	N/A	N/A	N/A
24.00	0.2	98.6	146.46	8787.0	N/A	N/A	N/A	N/A
25.00	0.2	98.9	152.56	9154.0	N/A	N/A	N/A	N/A
30.00	1.1	100.0	183.07	10984.0	N/A	N/A	N/A	N/A
35.00	0.0	100.0	213.58	12815.0	N/A	N/A	N/A	N/A
40.00	0.0	100.0	244.10	14646.0	N/A	N/A	N/A	N/A
45.00	0.0	100.0	274.61	16476.0	N/A	N/A	N/A	N/A
Estimated Net Annual Sediment (TSS) Load Reduction =								**0 %**

Climate Station ID: 6158731 *Years of Rainfall Data*: 20

RAINFALL DATA FROM TORONTO INTL AP RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



Maximum Pipe Diameter / Peak Conveyance

Stormceptor EF / EFO	Model Diameter		Min Angle Inlet / Outlet Pipes	Max Inlet Pipe Diameter		Max Outlet Pipe Diameter		Peak Conveyance Flow Rate	
	(m)	(ft)		(mm)	(in)	(mm)	(in)	(L/s)	(cfs)
EF4 / EFO4	1.2	4	90	609	24	609	24	425	15
EF6 / EFO6	1.8	6	90	914	36	914	36	990	35
EF8 / EFO8	2.4	8	90	1219	48	1219	48	1700	60
EF10 / EFO10	3.0	10	90	1828	72	1828	72	2830	100
EF12 / EFO12	3.6	12	90	1828	72	1828	72	2830	100

SCOUR PREVENTION AND ONLINE CONFIGURATION

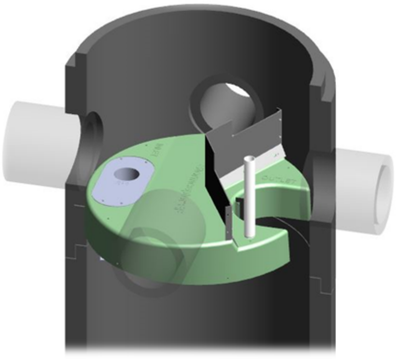
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test performance has been third-party verified in accordance with the ISO 14034 ETV protocol. As a result, Stormceptor EF and EFO are approved for online installation, eliminating the need for costly additional bypass structures, piping, and installation expense.

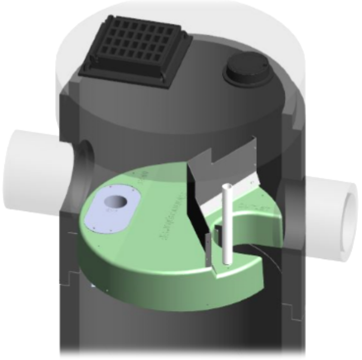
DESIGN FLEXIBILITY

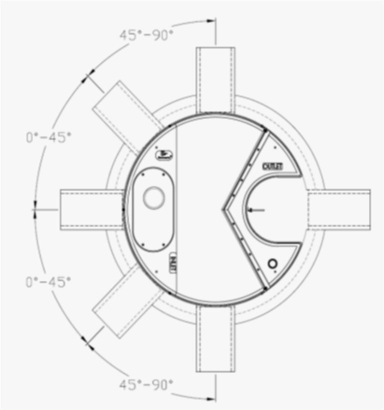
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend angle, and can be modified to ensure performance in submerged conditions.

OIL CAPTURE AND RETENTION

►While Stormceptor® EF will capture and retain oil from dry weather spills and low intensity runoff, **Stormceptor® EFO** has demonstrated superior oil capture and greater than 99% oil retention in third-party testing according to the light liquid re-entrainment testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**. Stormceptor EFO is recommended for sites where oil capture and retention is a requirement.







INLET-TO-OUTLET DROP

Elevation differential between inlet and outlet pipe inverts is dictated by the angle at which the inlet pipe(s) enters the unit.

0° - 45° : The inlet pipe is 1-inch (25mm) higher than the outlet pipe.

45° - 90° : The inlet pipe is 2-inches (50mm) higher than the outlet pipe.

HEAD LOSS

The head loss through Stormceptor EF is similar to that of a 60-degree bend structure. The applicable K value for calculating minor losses through the unit is 1.1. For submerged conditions the applicable K value is 3.0.

Pollutant Capacity

Stormceptor EF / EFO	Model Diameter		Depth (Outlet Pipe Invert to Sump Floor)		Oil Volume		Recommended Sediment Maintenance Depth *		Maximum Sediment Volume *		Maximum Sediment Mass **	
	(m)	(ft)	(m)	(ft)	(L)	(Gal)	(mm)	(in)	(L)	(ft³)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	265	70	203	8	1190	42	1904	5250
EF6 / EFO6	1.8	6	1.93	6.3	610	160	305	12	3470	123	5552	15375
EF8 / EFO8	2.4	8	2.59	8.5	1070	280	610	24	8780	310	14048	38750
EF10 / EFO10	3.0	10	3.25	10.7	1670	440	610	24	17790	628	28464	78500
EF12 / EFO12	3.6	12	3.89	12.8	2475	655	610	24	31220	1103	49952	137875

*Increased sump depth may be added to increase sediment storage capacity

** Average density of wet packed sediment in sump = 1.6 kg/L (100 lb/ft³)

Feature	Benefit	Feature Appeals To
Patent-pending enhanced flow treatment and scour prevention technology	Superior, verified third-party performance	Regulator, Specifying & Design Engineer
Third-party verified light liquid capture and retention for EFO version	Proven performance for fuel/oil hotspot locations	Regulator, Specifying & Design Engineer, Site Owner
Functions as bend, junction or inlet structure	Design flexibility	Specifying & Design Engineer
Minimal drop between inlet and outlet	Site installation ease	Contractor
Large diameter outlet riser for inspection and maintenance	Easy maintenance access from grade	Maintenance Contractor & Site Owner

STANDARD STORMCEPTOR EF/EFO DRAWINGS

For standard details, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

For specifications, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

Table of TSS Removal vs Surface Loading Rate Based on Third-Party Test Results
Stormceptor® EF

SLR (L/min/m²)	TSS % REMOVAL	SLR (L/min/m²)	TSS % REMOVAL	SLR (L/min/m²)	TSS % REMOVAL	SLR (L/min/m²)	TSS % REMOVAL
1	70	660	42	1320	35	1980	24
30	70	690	42	1350	35	2010	24
60	67	720	41	1380	34	2040	23
90	63	750	41	1410	34	2070	23
120	61	780	41	1440	33	2100	23
150	58	810	41	1470	32	2130	22
180	56	840	41	1500	32	2160	22
210	54	870	41	1530	31	2190	22
240	53	900	41	1560	31	2220	21
270	52	930	40	1590	30	2250	21
300	51	960	40	1620	29	2280	21
330	50	990	40	1650	29	2310	21
360	49	1020	40	1680	28	2340	20
390	48	1050	39	1710	28	2370	20
420	47	1080	39	1740	27	2400	20
450	47	1110	38	1770	27	2430	20
480	46	1140	38	1800	26	2460	19
510	45	1170	37	1830	26	2490	19
540	44	1200	37	1860	26	2520	19
570	43	1230	37	1890	25	2550	19
600	42	1260	36	1920	25	2580	18
630	42	1290	36	1950	24	2600	26

STANDARD PERFORMANCE SPECIFICATION FOR “OIL GRIT SEPARATOR” (OGS) STORMWATER QUALITY TREATMENT DEVICE

PART 1 – GENERAL

1.1 WORK INCLUDED

This section specifies requirements for selecting, sizing, and designing an underground Oil Grit Separator (OGS) device for stormwater quality treatment, with third-party testing results and a Statement of Verification in accordance with ISO 14034 Environmental Management – Environmental Technology Verification (ETV).

1.2 REFERENCE STANDARDS & PROCEDURES

ISO 14034:2016 Environmental management – Environmental technology verification (ETV)

Canadian Environmental Technology Verification (ETV) Program’s **Procedure for Laboratory Testing of Oil-Grit Separators**

1.3 SUBMITTALS

1.3.1 All submittals, including sizing reports & shop drawings, shall be submitted upon request with each order to the contractor then forwarded to the Engineer of Record for review and acceptance. Shop drawings shall detail all OGS components, elevations, and sequence of construction.

1.3.2 Alternative devices shall have features identical to or greater than the specified device, including: treatment chamber diameter, treatment chamber wet volume, sediment storage volume, and oil storage volume.

1.3.3 Unless directed otherwise by the Engineer of Record, OGS stormwater quality treatment product substitutions or alternatives submitted within ten days prior to project bid shall not be accepted. All alternatives or substitutions submitted shall be signed and sealed by a local registered Professional Engineer, based on the exact same criteria detailed in Section 3, in entirety, subject to review and approval by the Engineer of Record.

PART 2 – PRODUCTS

2.1 OGS POLLUTANT STORAGE

The OGS device shall include a sump for sediment storage, and a protected volume for the capture and storage of petroleum hydrocarbons and buoyant gross pollutants. The minimum sediment & petroleum hydrocarbon storage capacity shall be as follows:

2.1.1 4 ft (1219 mm) Diameter OGS Units: 1.19 m^3 sediment / 265 L oil
6 ft (1829 mm) Diameter OGS Units: 3.48 m^3 sediment / 609 L oil
8 ft (2438 mm) Diameter OGS Units: 8.78 m^3 sediment / 1,071 L oil
10 ft (3048 mm) Diameter OGS Units: 17.78 m^3 sediment / 1,673 L oil
12 ft (3657 mm) Diameter OGS Units: 31.23 m^3 sediment / 2,476 L oil

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

The OGS stormwater quality treatment device shall be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV). The OGS stormwater quality treatment device shall remove oil, sediment and gross pollutants from stormwater runoff during frequent wet weather events, and retain these pollutants during less frequent high flow wet weather events below the insert within the OGS for later removal during maintenance. The Manufacturer shall have at least ten (10) years of local experience, history and success in engineering design, manufacturing and production and supply of OGS stormwater quality treatment device systems, acceptable to the Engineer of Record.

3.2 SIZING METHODOLOGY

The OGS device shall be engineered, designed and sized to provide stormwater quality treatment based on treating a minimum of 90 percent of the average annual runoff volume and a minimum removal of an annual average 60% of the sediment (TSS) load based on the Particle Size Distribution (PSD) specified in the sizing report for the specified device. Sizing of the OGS shall be determined by use of a minimum ten (10) years of local historical rainfall data provided by Environment Canada. Sizing shall also be determined by use of the sediment removal performance data derived from the ISO 14034 ETV third-party verified laboratory testing data from testing conducted in accordance with the Canadian ETV protocol Procedure for Laboratory Testing of Oil-Grit Separators, as follows:

3.2.1 Sediment removal efficiency for a given surface loading rate and its associated flow rate shall be based on sediment removal efficiency demonstrated at the seven (7) tested surface loading rates specified in the protocol, ranging 40 L/min/m^2 to 1400 L/min/m^2, and as stated in the ISO 14034 ETV Verification Statement for the OGS device.

3.2.2 Sediment removal efficiency for surface loading rates between 40 L/min/m^2 and 1400 L/min/m^2 shall be based on linear interpolation of data between consecutive tested surface loading rates.

3.2.3 Sediment removal efficiency for surface loading rates less than the lowest tested surface loading rate of 40 L/min/m^2 shall be assumed to be identical to the sediment removal efficiency at 40 L/min/m^2. No extrapolation shall be allowed that results in a sediment removal efficiency that is greater than that demonstrated at 40 L/min/m^2.

3.2.4 Sediment removal efficiency for surface loading rates greater than the highest tested surface loading rate of 1400 L/min/m^2 shall assume zero sediment removal for the portion of flow that exceeds 1400 L/min/m^2, and shall be calculated using a simple proportioning formula, with 1400 L/min/m^2 in the numerator and the higher surface loading rate in the denominator, and multiplying the resulting fraction times the sediment removal efficiency at 1400 L/min/m^2.

The OGS device shall also have sufficient annual sediment storage capacity as specified and calculated in Section 2.1.

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of third-party scour testing conducted in accordance with the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.**

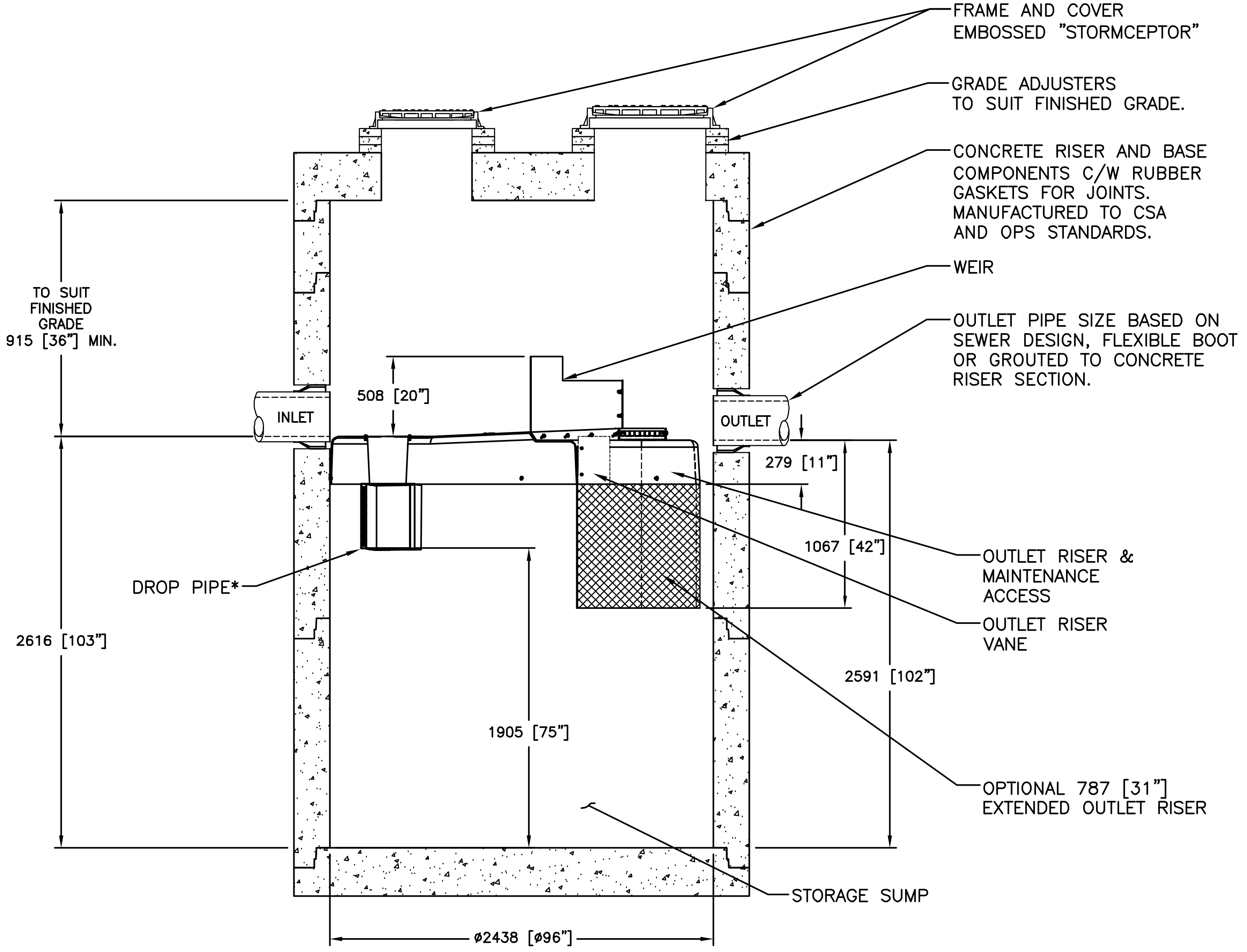
3.3.1 To be acceptable for on-line installation, the OGS device must demonstrate an average scour test effluent concentration less than 10 mg/L at each surface loading rate tested, up to and including 2600 L/min/m^2.

3.4 LIGHT LIQUID RE-ENTRAINMENT SIMULATION TESTING

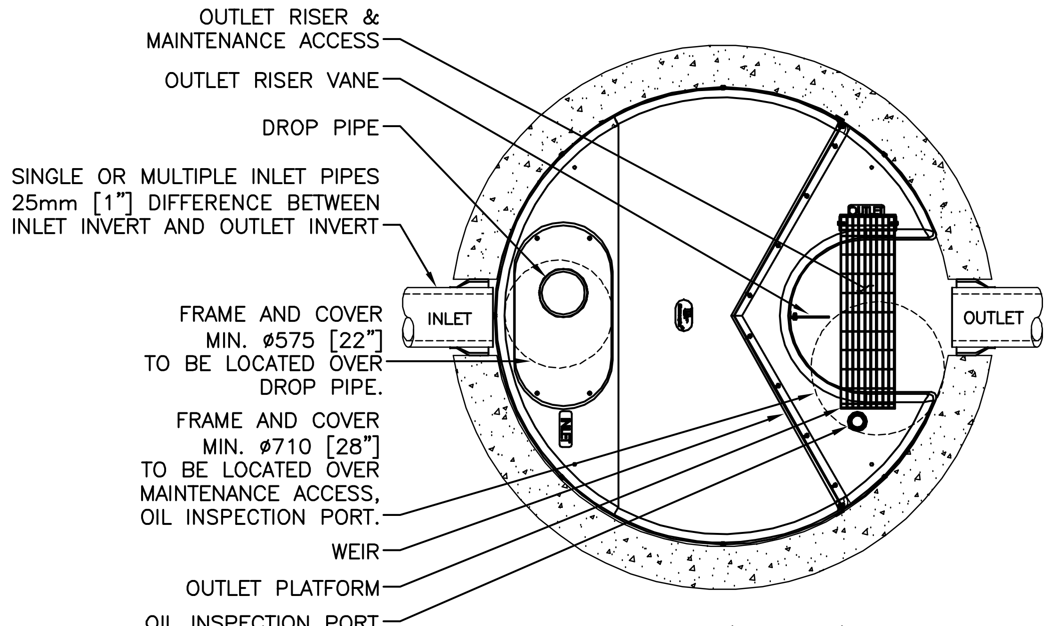
The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of completed third-party Light Liquid Re-entrainment Simulation Testing in accordance with the Canadian ETV **Program's Procedure for Laboratory Testing of Oil-Grit Separators,** with results reported within the Canadian ETV or ISO 14034 ETV verification. This re-entrainment testing is conducted with the device pre-loaded with low density polyethylene (LDPE) plastic beads as a surrogate for light liquids such as oil and fuel. Testing is conducted on the same OGS unit tested for sediment removal to assess whether light liquids captured after a spill are effectively retained at high flow rates.

3.4.1 For an OGS device to be an acceptable stormwater treatment device on a site where vehicular traffic occurs and the potential for an oil or fuel spill exists, the OGS device must have reported verified performance results of greater than 99% cumulative retention of LDPE plastic beads for the five specified surface loading rates (ranging 200 L/min/m^2 to 2600 L/min/m^2) in accordance with the Light Liquid Re-entrainment Simulation Testing within the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.** However, an OGS device shall not be allowed if the Light Liquid Re-entrainment Simulation Testing was performed with screening components within the OGS device that are effective at retaining the LDPE plastic beads, but would not be expected to retain light liquids such as oil and fuel.

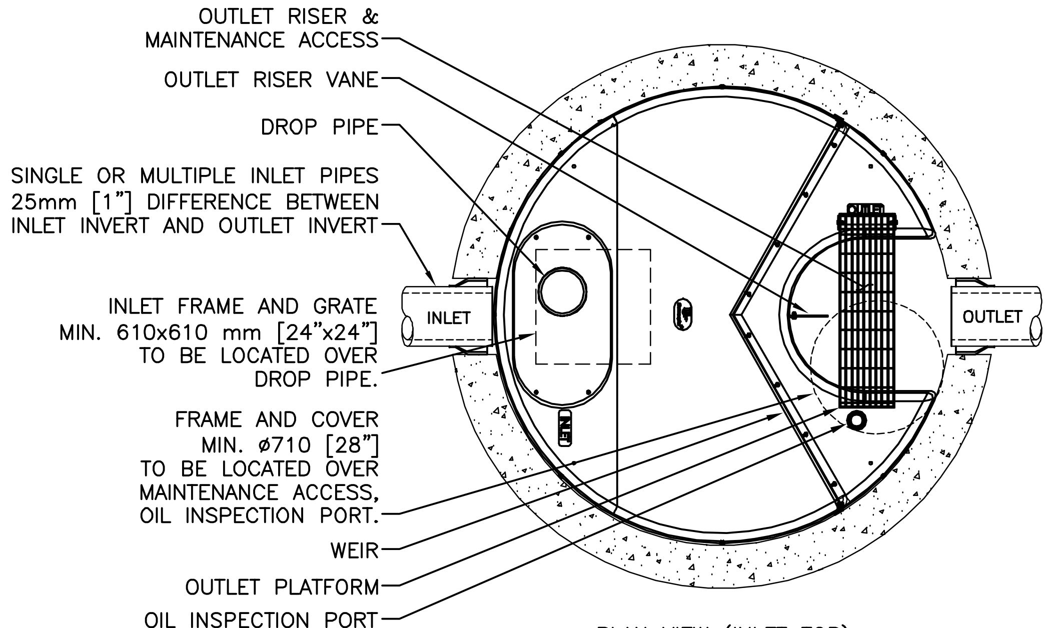
DRAWING NOT TO BE USED FOR CONSTRUCTION



SECTION VIEW



PLAN VIEW (STANDARD)



PLAN VIEW (INLET TOP)

GENERAL NOTES:

* MAXIMUM SURFACE LOADING RATE (SLR) INTO LOWER CHAMBER THROUGH DROP PIPE IS 1135 $L/min/m^2$ (27.9 gpm/ft^2) FOR STORMCEPTOR EF8 AND 535 $L/min/m^2$ (13.1 gpm/ft^2) FOR STORMCEPTOR EFO8 (OIL CAPTURE CONFIGURATION).

1. ALL DIMENSIONS INDICATED ARE IN MILLIMETERS (INCHES) UNLESS OTHERWISE SPECIFIED.
2. STORMCEPTOR STRUCTURE INLET AND OUTLET PIPE SIZE AND ORIENTATION SHOWN FOR INFORMATIONAL PURPOSES ONLY.
3. UNLESS OTHERWISE NOTED, BYPASS INFRASTRUCTURE, SUCH AS ALL UPSTREAM DIVERSION STRUCTURES, CONNECTING STRUCTURES, OR PIPE CONDUITS CONNECTING TO COMPLETE THE STORMCEPTOR SYSTEM SHALL BE PROVIDED AND ADDRESSED SEPARATELY.
4. DRAWING FOR INFORMATION PURPOSES ONLY. REFER TO ENGINEER'S SITE/UTILITY PLAN FOR STRUCTURE ORIENTATION.
5. NO PRODUCT SUBSTITUTIONS SHALL BE ACCEPTED UNLESS SUBMITTED 10 DAYS PRIOR TO PROJECT BID DATE, OR AS DIRECTED BY THE ENGINEER OF RECORD.

FOR SITE SPECIFIC DRAWINGS PLEASE CONTACT YOUR LOCAL STORMCEPTOR REPRESENTATIVE. SITE SPECIFIC DRAWINGS ARE BASED ON THE BEST AVAILABLE INFORMATION AT THE TIME. SOME FIELD REVISIONS TO THE SYSTEM LOCATION OR CONNECTION PIPING MAY BE NECESSARY BASED ON AVAILABLE SPACE OR SITE CONFIGURATION REVISIONS. ELEVATIONS SHOULD BE MAINTAINED EXCEPT WHERE NOTED ON BYPASS STRUCTURE (IF REQUIRED).

INSTALLATION NOTES

A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STRUCTURE (LIFTING CLUTCHES PROVIDED)
C. CONTRACTOR WILL INSTALL AND LEVEL THE STRUCTURE, SEALING THE JOINTS, LINE ENTRY AND EXIT POINTS (NON-SHRINK GROUT WITH APPROVED WATERSTOP OR FLEXIBLE BOOT)
D. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT THE DEVICE FROM CONSTRUCTION-RELATED EROSION RUNOFF.
E. DEVICE ACTIVATION, BY CONTRACTOR, SHALL OCCUR ONLY AFTER SITE HAS BEEN STABILIZED AND THE STORMCEPTOR UNIT IS CLEAN AND FREE OF DEBRIS.

STANDARD DETAIL
NOT FOR CONSTRUCTION

SITE SPECIFIC DATA REQUIREMENTS

STORMCEPTOR MODEL	EFO8				
STRUCTURE ID					*
HYDROCARBON STORAGE REQ'D (L)					*
WATER QUALITY FLOW RATE (L/s)					*
PEAK FLOW RATE (L/s)					*
RETURN PERIOD OF PEAK FLOW (yrs)					*
DRAINAGE AREA (HA)					*
DRAINAGE AREA IMPERVIOUSNESS (%)					*
PIPE DATA:	I.E.	MAT'L	DIA	SLOPE %	HGL
INLET #1	*	*	*	*	*
INLET #2	*	*	*	*	*
OUTLET	*	*	*	*	*

* PER ENGINEER OF RECORD

The design and information shown on this drawing is provided as a service to the project owner, engineer and contractor by Imbrium Systems ("Imbrium"). Neither this drawing, nor any part thereof, may be used, reproduced or modified in any manner without the prior written consent of Imbrium. Failure to comply is done at the user's own risk and Imbrium expressly disclaims any liability or responsibility for such use.

If discrepancies between the supplied information upon which the drawing is based and actual field conditions are encountered as site work progresses, these discrepancies must be reported to Imbrium immediately for re-evaluation of the design. Imbrium accepts no liability for designs based on missing, incomplete or inaccurate information supplied by others.

MARK	DATE	REVISION DESCRIPTION	BY
####	####		####
####	####		####
####	####		####
1	6/8/18	OUTLET PLATFORM	JSK
0	5/26/17	INITIAL RELEASE	JSK

Stormceptor® EF

SCALE = NTS

imbrium®
407 FAIRVIEW DRIVE, WHITBY, ON L1N 3A9
TF 800-565-4801 CA 416-960-9900 INTL +1-416-960-9900

THE STORMCEPTOR SYSTEM IS PROTECTED BY ONE OR MORE OF THE FOLLOWING PATENTS
Australia Patent No. 693,164 • 707,133 • 729,096 • 779401 | Austrian Patent No. 289,647 | Canadian Patent No. 2,009,280 • 2,137,942 • 2,175,277 • 2,180,305 • 2,180,383 • 2,206,338 • 2,327,768 | China Patent No. 1,168,439 | Denmark DK 711,879 | German DE 69,634,021 | Indonesian Patent No 16,688 | Japan Patent No. 9-11476 (Pending) | Korea Patent No. 10-2000-0026101 (Pending) | Malaysia Patent No. PI9701737 (Pending) | New Zealand Patent No. 314646 | United States Patent No. 4,985,148 • 5,498,331 • 5,725,760; 5,753,115 • 5,849,181 • 6,068,765 • 6,371,690

DATE: 10/13/2017	
DESIGNED: JSK	DRAWN: JSK
CHECKED: BSF	APPROVED: *
PROJECT No.: EFO8	SEQUENCE No.: *
SHEET: 1 OF 1	

I:\IMBRIUM\PRODUCTS\STORMCEPTOR EF\40 DRAWINGS & DETAILS\STANDARD DETAILS\EFO STANDARD DETAILS\EFO8-DETAIL.DWG 4/12/2019 11:07 AM

◆ Verification Statement ◆ Verification Statement ◆ Verification Statement ◆

VERIFICATION STATEMENT

GLOBE Performance Solutions

Verifies the performance of

Stormceptor® EF4 and EFO4 Oil-Grit Separators

Developed by Imbrium Systems, Inc.,
Whitby, Ontario, Canada

In accordance with

ISO 14034:2016

Environmental management — Environmental technology verification (ETV)

John D. Wiebe, PhD
Executive Chairman
GLOBE Performance Solutions

November 10, 2017
Vancouver, BC, Canada

GLOBE
PERFORMANCE
SOLUTIONS

Verification Body
GLOBE Performance Solutions
404 – 999 Canada Place | Vancouver, B.C | Canada |V6C 3E2

Technology description and application

The Stormceptor® EF4 and EFO4 are treatment devices designed to remove oil, sediment, trash, debris, and pollutants attached to particulates from Stormwater and snowmelt runoff. The device takes the place of a conventional manhole within a storm drain system and offers design flexibility that works with various site constraints. The EFO4 is designed with a shorter bypass weir height, which accepts lower surface loading rate into the sump, thereby reducing re-entrainment of captured free floating light liquids.

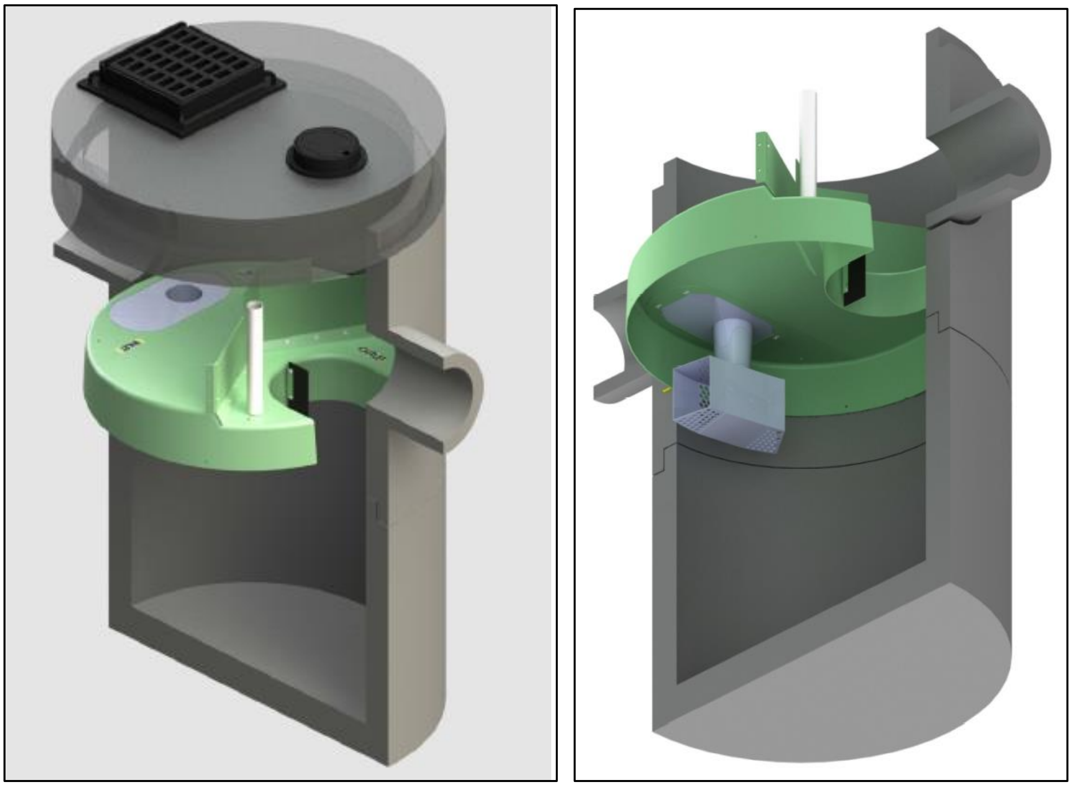


Figure 1. Graphic of typical inline Stormceptor® unit and core components.

Stormwater and snowmelt runoff enters the Stormceptor® EF/EFO's upper chamber through the inlet pipe(s) or a surface inlet grate. An insert divides the unit into lower and upper chambers and incorporates a weir to reduce influent velocity and separate influent (untreated) from effluent (treated) flows. Influent water ponds upstream of the insert's weir providing driving head for the water flowing downwards into the drop pipe where a vortex pulls the water into the lower chamber. The water diffuses at lower velocities in multiple directions through the drop pipe outlet openings. Oil and other floatables rise up and are trapped beneath the insert, while sediments undergo gravitational settling to the sump's bottom. Water from the sump can exit by flowing upward to the outlet riser onto the top side of the insert and downstream of the weir, where it discharges through the outlet pipe.

Maximum flow rate into the lower chamber is a function of weir height and drop pipe orifice diameter. The Stormceptor® EF and EFO are designed to allow a surface loading rate of 1135 L/min/m^2 (27.9 gal/min/ft^2) and 535 L/min/m^2 (13.1 gal/min/ft^2) into the lower chamber, respectively. When prescribed surface loading rates are exceeded, ponding water can overtop the weir height and bypass the lower treatment chamber, exiting directly through the outlet pipe. Hydraulic testing and scour testing demonstrate that the internal bypass effectively prevents scour at all bypass flow rates. Increasing the bypass flow rate does not increase the orifice-controlled flow rate into the lower treatment chamber where sediment is stored. This internal bypass feature allows for in-line installation, avoiding the cost of additional bypass structures. During bypass, treatment continues in the lower chamber at the maximum flow rate. The Stormceptor® EFO's lower design surface loading rate is favorable for minimizing re-entrainment and washout of captured light liquids. Inspection of Stormceptor® EF and EFO devices is performed from grade by inserting a sediment probe through the outlet riser and an oil dipstick through the oil inspection pipe. The unit can be maintained by using a vacuum hose through the outlet riser.

Performance conditions

The data and results published in this Technology Fact Sheet were obtained from the testing program conducted on the Imbrium Systems Inc.'s Stormceptor® OGS device, in accordance with the Procedure for Laboratory Testing of Oil-Grit Separators (Version 3.0, June 2014). The Procedure was prepared by the Toronto and Region Conservation Authority (TRCA) for Environment Canada's Environmental Technology Verification (ETV) Program. A copy of the Procedure may be accessed on the Canadian ETV website at www.etvcanada.ca.

Performance claim(s)

Capture test [a]:

During the capture test, the Stormceptor® EF OGS device, with a false floor set to 50% of the manufacturer's recommended maximum sediment storage depth and a constant influent test sediment concentration of 200 mg/L, removes 70, 64, 54, 48, 46, 44, and 49 percent of influent sediment by mass at surface loading rates of 40, 80, 200, 400, 600, 1000, and 1400 L/min/m^2, respectively.

Stormceptor® EFO, with a false floor set to 50% of the manufacturer's recommended maximum sediment storage depth and a constant influent test sediment concentration of 200 mg/L, removes 70, 64, 54, 48, 42, 40, and 34 percent of influent sediment by mass at surface loading rates of 40, 80, 200, 400, 600, 1000, and 1400 L/min/m^2, respectively.

Scour test [a]:

During the scour test, the Stormceptor® EF and Stormceptor® EFO OGS devices, with 10.2 cm (4 inches) of test sediment pre-loaded onto a false floor reaching 50% of the manufacturer's recommended maximum sediment storage depth, generate corrected effluent concentrations of 4.6, 0.7, 0, 0.2, and 0.4 mg/L at 5-minute duration surface loading rates of 200, 800, 1400, 2000, and 2600 L/min/m^2, respectively.

Light liquid re-entrainment test[a]:

During the light liquid re-entrainment test, the Stormceptor® EFO OGS device with surrogate low-density polyethylene beads preloaded within the lower chamber oil collection zone, representing a floating light liquid volume equal to a depth of 50.8 mm over the sedimentation area, retained 100, 99.5, 99.8, 99.8, and 99.9 percent of loaded beads by mass during the 5-minute duration surface loading rates of 200, 800, 1400, 2000, and 2600 L/min/m^2.

---

[a] The claim can be applied to other units smaller or larger than the tested unit as long as the untested units meet the scaling rule specified in the Procedure for Laboratory of Testing of Oil Grit Separators (Version 3.0, June 2014)

Performance results

The test sediment consisted of ground silica (1 – 1000 micron) with a specific gravity of 2.65, uniformly mixed to meet the particle size distribution specified in the testing procedure. The *Procedure for Laboratory Testing of Oil Grit Separators* requires that the three sample average of the test sediment particle size distribution (PSD) meet the specified PSD percent less than values within a boundary threshold of 6%. The comparison of the average test sediment PSD to the CETV specified PSD in Figure 2 indicates that the test sediment used for the capture and scour tests met this condition.

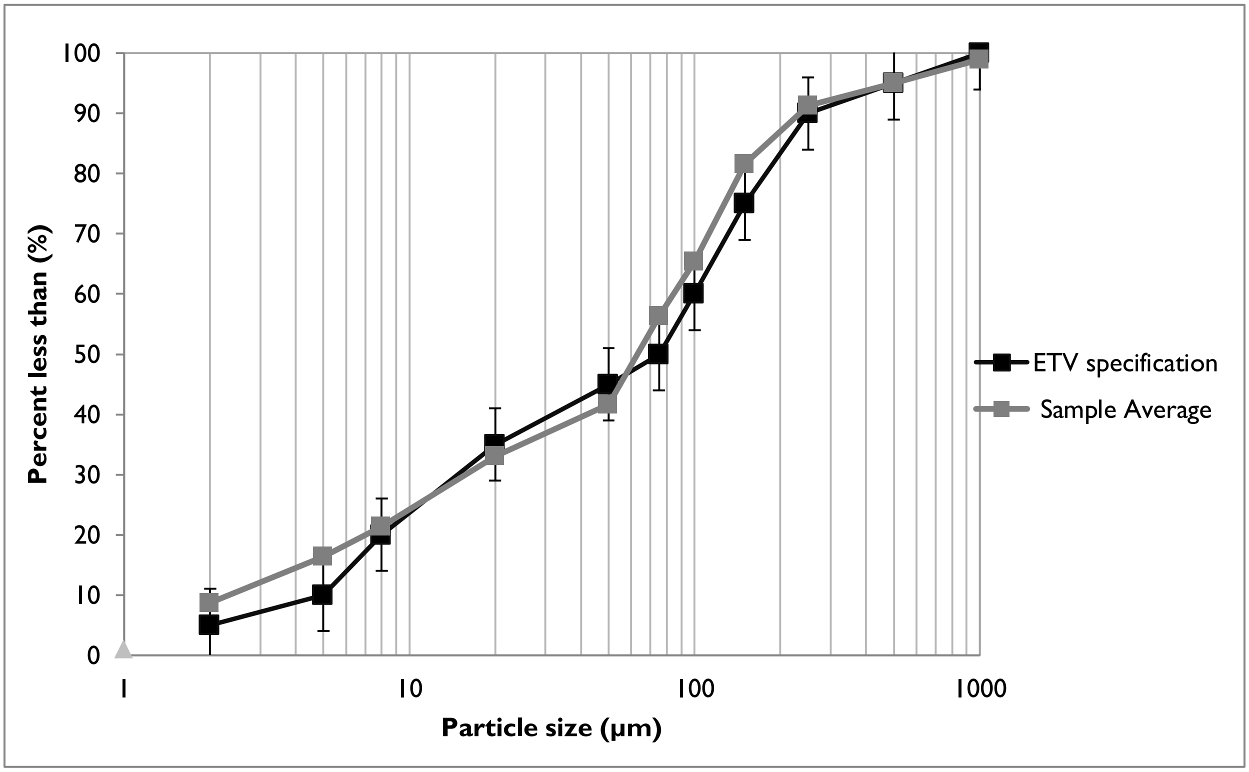


Figure 2. The three sample average particle size distribution (PSD) of the test sediment used for the capture and scour test compared to the specified PSD.

The capacity of the device to retain sediment was determined at seven surface loading rates using the modified mass balance method. This method involved measuring the mass and particle size distribution of the injected and retained sediment for each test run. Performance was evaluated with a false floor simulating the technology filled to 50% of the manufacturer's recommended maximum sediment storage depth. The test was carried out with clean water that maintained a sediment concentration below 20 mg/L. Based on these conditions, removal efficiencies for individual particle size classes and for the test sediment as a whole were determined for each of the tested surface loading rates (Table 1). Since the EF and EFO models are identical except for the weir height, which bypasses flows from the EFO model at a surface loading rate of 535 L/min/m^2 (13.1 gpm/ft^2), sediment capture tests at surface loading rates from 40 to 400 L/min/m^2 were only performed on the EF unit. Surface loading rates of 600, 1000, and 1400 L/min/m^2 were tested on both units separately. Results for the EFO model at these higher flow rates are presented in Table 2.

In some instances, the removal efficiencies were above 100% for certain particle size fractions. These discrepancies are not unique to any one test laboratory and may be attributed to errors relating to the blending of sediment, collection of representative samples for laboratory submission, and laboratory analysis of PSD. Due to these errors, caution should be exercised in applying the removal efficiencies by particle size fraction for the purposes of sizing the tested device (see Bulletin # CETV 2016-11-0001). The results for "all particle sizes by mass balance" (see Table 1 and 2) are based on measurements of the total injected and retained sediment mass, and are therefore not subject to blending, sampling or PSD analysis errors.

Table 1. Removal efficiencies (%) of the EF4 at specified surface loading rates

Particle size fraction (µm)	**Surface loading rate (L/min/m²)**						
	40	80	200	400	600	1000	1400
>500	90	58	58	100*	86	72	100*
250 - 500	100*	100*	100	100*	100*	100*	100*
150 - 250	90	82	26	100*	100*	67	90
105 - 150	100*	100*	100*	100*	100*	100*	100
75 - 105	100*	92	74	82	77	68	76
53 - 75	Undefined [a]	56	100*	72	69	50	80
20 - 53	54	100*	54	33	36	40	31
8 - 20	67	52	25	21	17	20	20
5 – 8	33	29	11	12	9	7	19
<5	13	0	0	0	0	0	4
All particle sizes by mass balance	**70.4**	**63.8**	**53.9**	**47.5**	**46.0**	**43.7**	**49.0**

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[a] An outlier in the feed sample sieve data resulted in a negative removal efficiency for this size fraction.

* Removal efficiencies were calculated to be above 100%. Calculated values ranged between 101 and 171% (average 128%). See text and Bulletin # CETV 2016-11-0001 for more information.

Table 2. Removal efficiencies (%) of the EFO4 at surface loading rates above the bypass rate of 535 L/min/m²

Particle size fraction (µm)	**Surface loading rate (L/min/m²)**		
	600	1000	1400
>500	89	83	100*
250 - 500	90	100*	92
150 - 250	90	67	100*
105 - 150	85	92	77
75 - 105	80	71	65
53 - 75	60	31	36
20 - 53	33	43	23
8 - 20	17	23	15
5 – 8	10	3	3
<5	0	0	0
All particle sizes by mass balance	**41.7**	**39.7**	**34.2**

* Removal efficiencies were calculated to be above 100%. Calculated values ranged between 103 and 111% (average 107%). See text and Bulletin # CETV 2016-11-0001 for more information.

Figure 3 compares the particle size distribution (PSD) of the three sample average of the test sediment to the PSD of the sediment retained by the EF4 at each of the tested surface loading rates. Figure 4 shows the same graph for the EFO4 unit at surface loading rates above the bypass rate of 535 L/min/m².

As expected, the capture efficiency for fine particles in both units was generally found to decrease as surface loading rates increased.

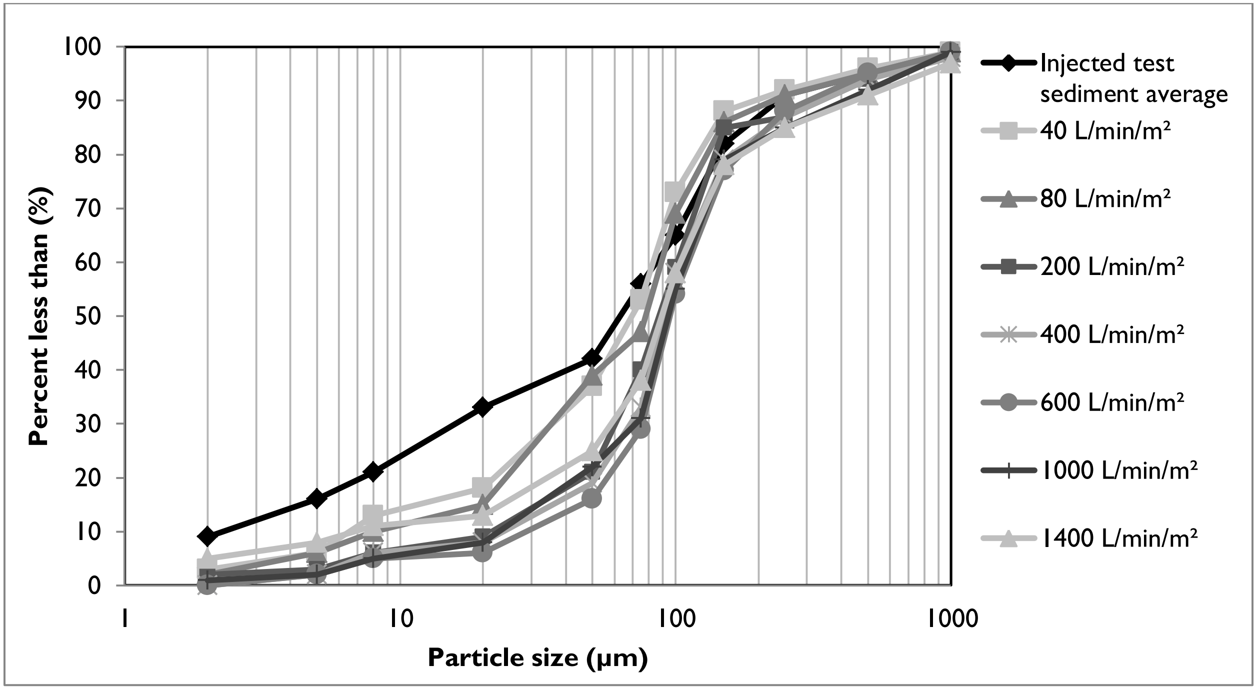

Figure 3. Particle size distribution of sediment retained in the EF4 in relation to the injected test sediment average.

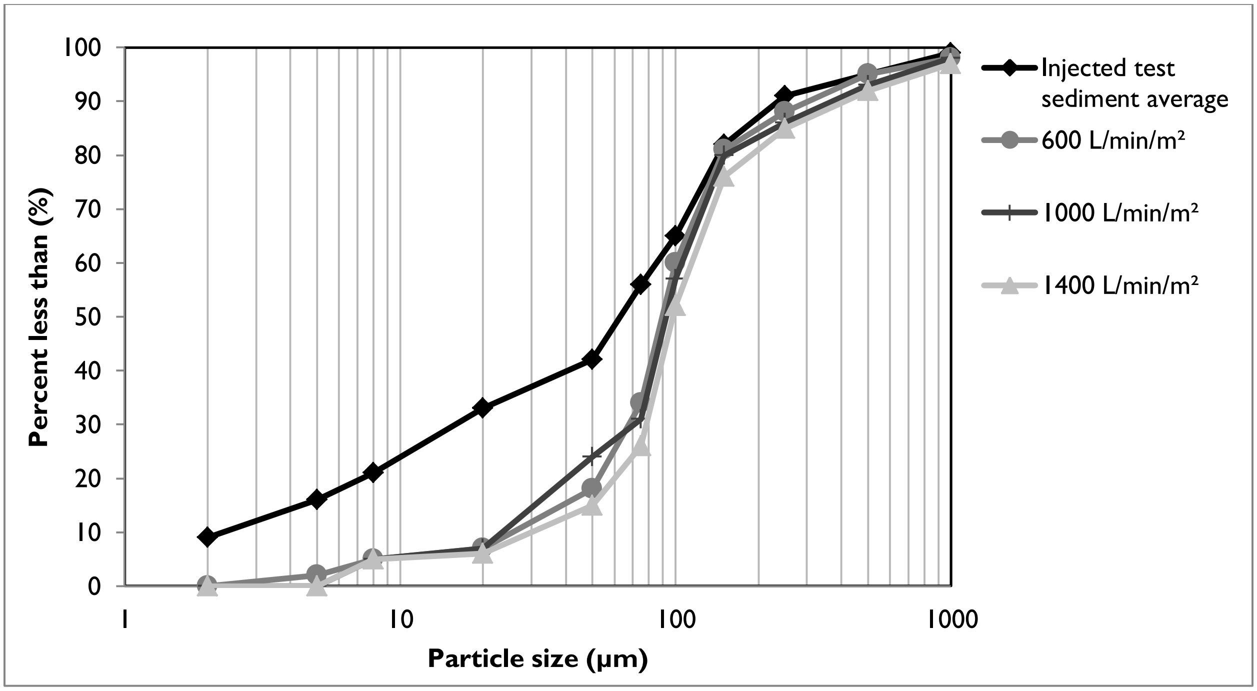

Figure 4. Particle size distribution of sediment retained in the EFO4 in relation to the injected test sediment average at surface loading rates above the bypass rate of 535 L/min/m²

Table 4 shows the results of the sediment scour and re-suspension test for the EF4 unit. The EFO4 was not tested as it was reasonably assumed that scour rates would be lower given that flow bypass occurs at a lower surface loading rate. The scour test involved preloading 10.2 cm of fresh test sediment into the sedimentation sump of the device. The sediment was placed on a false floor to mimic a device filled to 50% of the maximum recommended sediment storage depth. Clean water was run through the device at five surface loading rates over a 30 minute period. Each flow rate was maintained for 5 minutes with a one minute transition time between flow rates. Effluent samples were collected at one minute sampling intervals and analyzed for Suspended Sediment Concentration (SSC) and PSD by recognized methods. The effluent samples were subsequently adjusted based on the background concentration of the influent water. Typically, the smallest 5% of particles captured during the 40 L/min/m² sediment capture test is also used to adjust the concentration, as per the method described in Bulletin # CETV 2016-09-0001. However, since the composites of effluent concentrations were below the Reporting Detection Limit of the Laser Diffraction PSD methodology, this adjustment was not made. Results showed average adjusted effluent sediment concentrations below 5 mg/L at all tested surface loading rates.

It should be noted that the EF4 starts to internally bypass water at 1135 L/min/m², potentially resulting in the dilution of effluent concentrations, which would not normally occur under typical field conditions because the field influent concentration would contain a much higher sediment concentration than during the lab test. Recalculation of effluent concentrations to account for dilution at surface loading rates above the bypass rate showed sediment effluent concentrations to be below 1.6 mg/L.

Table 4. Scour test adjusted effluent sediment concentration.

Run	Surface loading rate (L/min/m²)	Run time (min)	Background sample concentration (mg/L)	Adjusted effluent suspended sediment concentration (mg/L) [a]	Average (mg/L)
1	200	1:00	<RDL	11.9	4.6
		2:00		7.0	
		3:00		4.4	
		4:00		2.2	
		5:00		1.0	
		6:00		1.2	
2	800	7:00	<RDL	1.1	0.7
		8:00		0.9	
		9:00		0.6	
		10:00		1.4	
		11:00		0.1	
		12:00		0	
3	1400	13:00	<RDL	0	0
		14:00		0.1	
		15:00		0	
		16:00		0	
		17:00		0	
		18:00		0	
4	2000	19:00	1.2	0.2	0.2
		20:00		0	
		21:00		0	
		22:00		0.7	
		23:00		0	

		24:00		0.4	
5	2600	25:00	1.6	0.3	0.4
		26:00		0.4	
		27:00		0.7	
		28:00		0.4	
		29:00		0.2	
		30:00		0.4	

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[a] The adjusted effluent suspended sediment concentration represents the actual measured effluent concentration minus the background concentration. For more information see Bulletin # CETV 2016-09-0001.

The results of the light liquid re-entrainment test used to evaluate the unit's capacity to prevent re-entrainment of light liquids are reported in Table 5. The test involved preloading 58.3 L (corresponding to a 5 cm depth over the collection sump area of 1.17m^2) of surrogate low-density polyethylene beads within the oil collection skirt and running clean water through the device continuously at five surface loading rates (200, 800, 1400, 2000, and 2600 L/min/m^2). Each flow rate was maintained for 5 minutes with approximately 1 minute transition time between flow rates. The effluent flow was screened to capture all re-entrained pellets throughout the test.

Table 5. Light liquid re-entrainment test results for the EFO4.

Surface Loading Rate (L/min/m2)	Time Stamp	Amount of Beads Re-entrained			
		Mass (g)	Volume (L)[a]	% of Pre-loaded Mass Re-entrained	% of Pre-loaded Mass Retained
200	62	0	0	0.00	100
800	247	168.45	0.3	0.52	99.48
1400	432	51.88	0.09	0.16	99.83
2000	617	55.54	0.1	0.17	99.84
2600	802	19.73	0.035	0.06	99.94
Total Re-entrained		295.60	0.525	0.91	--
Total Retained		32403	57.78	--	99.09
Total Loaded		32699	58.3	--	--

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[a] Determined from bead bulk density of 0.56074 g/cm^3

Variances from testing Procedure

The following minor deviations from the *Procedure for Laboratory Testing of Oil-Grit Separators* (Version 3.0, June 2014) have been noted:

1. During the capture test, the 40 L/min/m^2 and 80 L/min/m^2 surface loading rates were evaluated over 3 and 2 days respectively due to the long duration needed to feed the required minimum of 11.3 kg of test sediment into the unit at these lower flow rates. Pumps were shut down at the end of each intermediate day, and turned on again the following morning. The target flow rate was re-established within 30 seconds of switching on the pump. This procedure may have allowed sediments to be captured that otherwise may have exited the unit if the test was

continuous. On the basis of practical considerations, this variance was approved by the verifier prior to testing.

2. During the scour test, the coefficient of variation (COV) for the lowest flow rate tested (200 L/min/m^2) was 0.07, which exceeded the specified limit of 0.04 target specified in the OGS Procedure. A pump capable of attaining the highest flow rate of 3036 L/min had difficulty maintaining the lowest flow of 234 L/min but still remained within +/- 10% of the target flow and is viewed as having very little impact on the observed results. Similarly, for the light liquid re-entrainment test the COV for the flow rate of the 200 L/min/m^2 run was 0.049, exceeding the limit of 0.04, but is believed to introduce negligible bias.

3. Due to pressure build up in the filters, the runs at 1000 L/min/m^2 for the Stormceptor® EF4 and 1000 and 1400 L/min/m^2 for the Stormceptor® EFO4 were slightly shorter than the target. The run times were 54, 59 and 43 minutes respectively, versus targets of 60 and 50 minutes. The final feed samples were timed to coincide with the end of the run. Since >25 lbs of sediment was fed, the shortened time did not invalidate the runs.

Verification

The verification was completed by the Verification Expert, Toronto and Region Conservation Authority, contracted by GLOBE Performance Solutions, using the International Standard ***ISO 14034:2016 Environmental management -- Environmental technology verification (ETV)***. Data and information provided by Imbrium Systems Inc. to support the performance claim included the following: Performance test report prepared by Good Harbour Laboratories, and dated September 8, 2017; the report is based on testing completed in accordance with the Procedure for Laboratory Testing of Oil-Grit Separators (Version 3.0, June 2014).

What is ISO14034:2016 Environmental management – Environmental technology verification (ETV)?

ISO 14034:2016 specifies principles, procedures and requirements for environmental technology verification (ETV), and was developed and published by the *International Organization for Standardization (ISO)*. The objective of ETV is to provide credible, reliable and independent verification of the performance of environmental technologies. An environmental technology is a technology that either results in an environmental added value or measures parameters that indicate an environmental impact. Such technologies have an increasingly important role in addressing environmental challenges and achieving sustainable development.

For more information on the Stormceptor® EF4 and EFO4 please contact:

Imbrium Systems, Inc.
407 Fairview Drive
Whitby, ON
L1N 3A9, Canada
Tel: 416-960-9900
info@imbriumsystems.com

For more information on ISO 14034:2016 / ETV please contact:

GLOBE Performance Solutions
World Trade Centre
404 – 999 Canada Place
Vancouver, BC
V6C 3E2 Canada
Tel: 604-695-5018 / Toll Free: 1-855-695-5018
etv@globeperformance.com

Limitation of verification

GLOBE Performance Solutions and the Verification Expert provide the verification services solely on the basis of the information supplied by the applicant or vendor and assume no liability thereafter. The responsibility for the information supplied remains solely with the applicant or vendor and the liability for the purchase, installation, and operation (whether consequential or otherwise) is not transferred to any other party as a result of the verification.

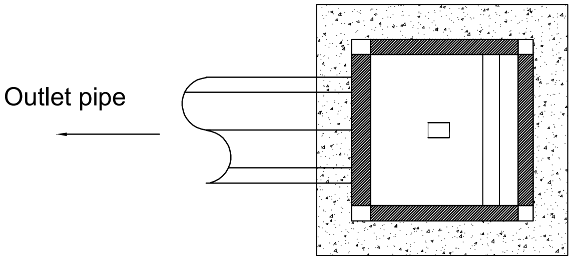
Notes

1. CB Shield can be installed at any time. In a non frozen condition.

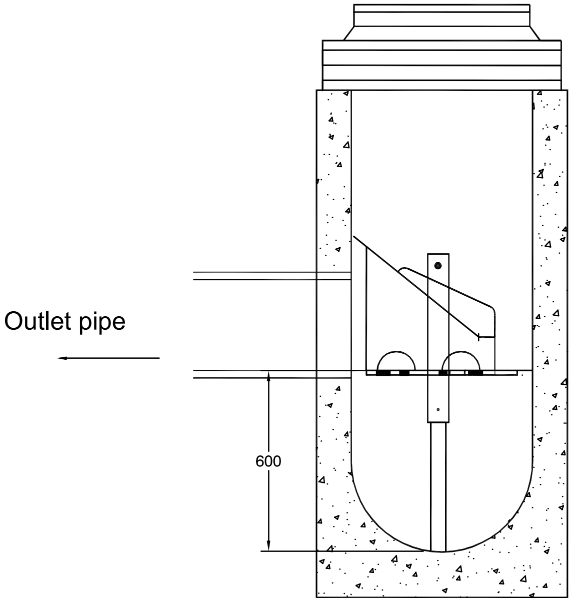
2. The **frame and cover MUST BE well aligned** with the catchbasin for proper installation.

3. The catchbasin sump must be clean before installation

4. The grate should be at the same level as the standing water in the sump.

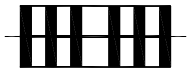


Top view

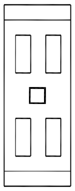


Profile view

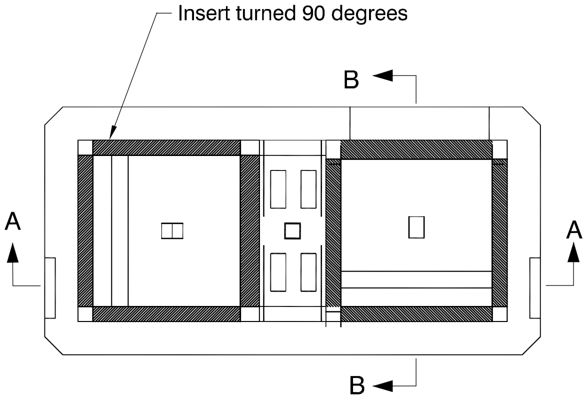
CB Shield (600mm Sump)



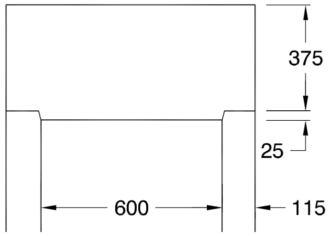
Side View-center spacer



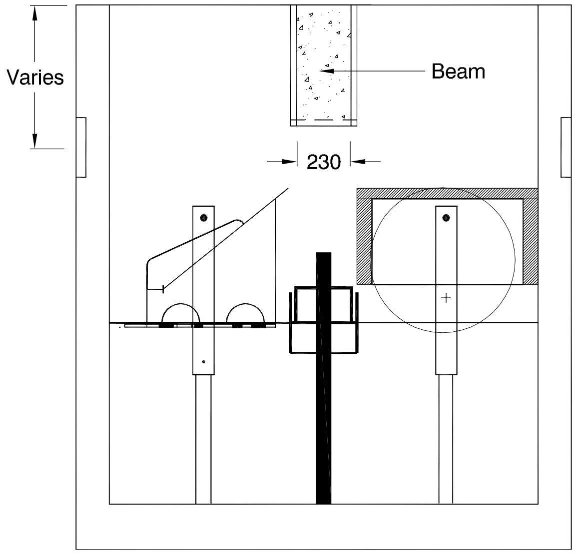
Top View center spacer



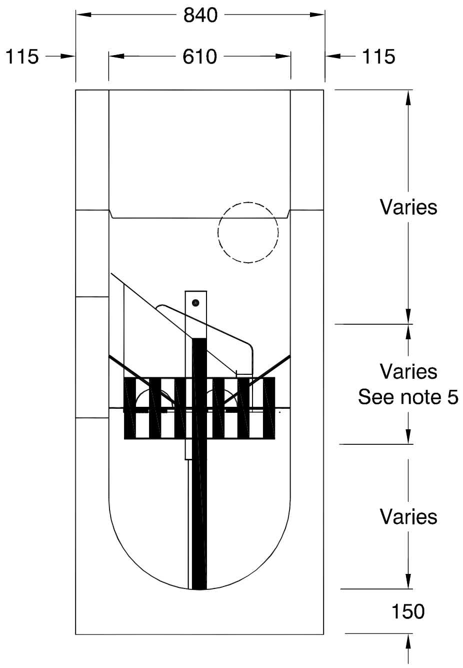
PLAN



BEAM DETAIL



SECTION A - A



SECTION B - B

600 X 1450 mm Twin Inlet C/W CB Shield

Canadian ETV Verification Report

Performance Testing
of
Catch Basin Shield Technology

<u>FINAL – STRICTLY CONFIDENTIAL</u>

Date: 17 October 2016

Prepared For:
GLOBE Performance Solutions
World Trade Centre
404 – 999 Canada Place
Vancouver, British Columbia
V6C 3E2
Canada

Prepared By:
Toronto and Region Conservation Authority
101 Exchange Ave
Concord, Ontario
L4K 5R6
Canada

Toronto and Region Conservation for The Living City

Authentication

Dated: 17 October 2016
Approved by:

Tim Van Seters

Name: Tim Van Seters
Title/Position: Senior Manager
Department: Sustainable Technologies,
Organization: Toronto and Region Conservation Authority

Verification Report Outline for CB Shield Inc.

Catch Basin Shield Technology

Contents

Disclaimer

The Toronto and Region Conservation Authority ("TRCA") including its employees and Directors, (the "Verifier") has participated in the Canadian Environmental Technology Verification (ETV) Program verification of the CB Shield (the "Vendor") Catch Basin Shield Technology.

Any reference to the "Technology" refers to the Vendor's Catch Basin Shield Technology.

The Verifier is in no way affiliated with the Vendor.

The Vendor shall not edit or modify the report in any way or make any attempt to misrepresent data to the benefit of the Vendor. Selectively using sections of the report in order to change or misrepresent its overall meaning is also prohibited.

Claim verification by the Verifier does not represent any guarantee of the performance or safety of the Technology.

The Verifier shall not be liable in any way in the event that the Technology fails to perform as advertised by the Vendor and/or CB Shield Technology does not meet government-mandated health and safety standards.

To the extent permitted by law, the Verifier denies all liability to the Vendor or to any other person or entity for any loss, damage, costs, expenses and/or other compensation, arising directly or indirectly from the use of the report (in whole or on part) and/or any information contained therein.

The Vendor is wholly responsible for ensuring that the Technology complies with all applicable legislation, regulations, and other authorities.

Executive Summary

The CB Shield Technology was subjected to verification in accordance with the Canadian ETV Program General Verification Protocol, and taking into account the current draft of the proposed FDIS ISO 14034.

The verification process was mutually agreed upon by GLOBE Performance Solutions, the Verification Body, and Toronto and Region Conservation Authority ("TRCA"), the subcontracted Verification Expert. The purpose of this verification is to provide objective and quality-assured performance data on environmental technologies, so that users, developers, regulators, and consultants can make informed decisions about purchasing and applying these technologies.

This report, prepared by TRCA according to the criteria and guidelines set out in the Canadian ETV Program General Verification Protocol (GVP) of June 2012, is an official audit of the testing report generated through the performance testing of the CB Shield technology. The report is based on the Canadian ETV Program.

In addition, through guidance provided by GPS, the TRCA completed its verification of the CB Shield technology performance taking into account the principles and requirements of FDIS ISO 14034.

Performance testing for this verification took place at Good Harbour Laboratories in Mississauga, Ontario, Canada. Good Harbour Laboratories conducted the testing and followed the test sediment particle size distribution and many of the methods outlined in the *Procedure for Laboratory Testing of Oil-Grit Separators* developed by Toronto and Region Conservation Authority for the Canadian ETV Program.

CB Shield Technology is based on established scientific and technical principles in the field of fluid dynamics, sedimentation/settling, hydrology and sediment transport.

The technology incorporates an insert for catchbasins that aims to deflect and reduce the energy of inflows and thereby increase capture and reduce scour of sediment found in stormwater runoff.

After examination and audit of the test report and based on the test data submitted, the TRCA has concluded that _the CB Shield insert provides an environmental benefit related to capture and scour prevention of suspended sediments in stormwater runoff.

Accordingly, the TRCA recommends that the performance claims be worded as follows:

1. During the sediment capture test, for a catch basin with a false floor set to 50% of the manufacturer's recommended maximum sediment storage depth and a constant influent sediment concentration of 200 mg/L, the catch basin with a CB Shield insert removed 64, 59.9, 52.4, 42.6, 25.2, and 26.7 percent of influent sediment by mass at inflow rates of 0.24, 0.48, 1.20, 2.40, 6.00, and 8.40 L/s, respectively.

2. For a catchbasin filled to three quarters of the manufacturer's recommended maximum sediment storage depth, with the CB Shield™ insert, scouring of test sediment is at most 8% of the control catchbasin during a continuous 30 minute scour test run with 5 minute duration inflows of 1.2, 4.8, 8.4, 12.0, and 15.6 L/s.

1. Introduction

GLOBE Performance Solutions (GPS) which operates the Canadian ETV Program on behalf of Environment Canada has engaged the Toronto and Region Conservation Authority ("TRCA") to verify the performance of CB Shield Technology within the framework of a subcontracted agreement. The CB Shield technology is a technology for capturing sediment from storm water runoff when inserted inside street drains (catchbasins) and retaining sediment by preventing scour and re-suspension.

GLOBE Performance Solutions, in collaboration with the TRCA, has further agreed to prepare a verification report and verification statement that will meet the requirements of the Canadian ETV Program.

This verification report, prepared by the TRCA (the Verifier), in its capacity as a Canadian ETV Program Verification Expert (VE), constitutes a review of the application of the CB Shield technology based on the Canadian ETV Program General Verification Protocol (GVP) and taking into account the principles and requirements of FDIS ISO 14034.

The verification report is a summary record of the audit undertaken by the TRCA to verify the Vendor's technology performance claim.

CB Shield applied for technology verification through GLOBE Performance Solutions. Testing was carried out by the Good Harbour Laboratories in accordance with ISO 17025 requirements. TRCA examined the test report and prepared the verification report.

The CB Shield Technology is based on established scientific and technical principles in the field of _fluid dynamics, sedimentation/settling, hydrology and sediment transport. The technology incorporates an insert for catchbasins that deflects incoming water to the sidewalls dissipating its energy and passing it over a grate where velocity is decreased and residence time is increased allowing sediments to drop out of suspension and be captured. The dissipation of influent water energy also reduces scouring of already captured sediment during subsequent storms.

CB Shield's performance claims as submitted were:

1. For a catch basin containing sediment up to 150mm below the outlet invert, use of a CB Shield™ reduces scour of ETV sediment by a factor of at least 20 for stormwater inflows from 1.2-15.6L/s.
2. In addition use of CB Shield™ increases capture of ETV test sediment in all cases and by at least 370% to 490% respectively for flows of 2.4L/s and 8.4L/s.

Results showed that the initial claim for capture test could not be verified for individual flow rates as independence between samples of different flow rates could not be maintained since the captured sediment was not removed between the tests of different flow rates. A re-test was requested for the capture test. The re-test was done on a catchbasin with CB Shield insert without reference to a control catch basin. Results showed removal efficiencies ranging from 64.0 - 26.7% for inflow rates ranging from 0.24 - 8.40 L/s respectively.

The scour test was evaluated as a continuous test. Comparing the CB Shield to the Control treatment indicated that the CB Shield scoured much less than the control catch basin at 5 minute duration inflow rates of 1.2, 4.8, 8.4, 12.0, and 15.6 L/s.

1.1 Objectives

The objective of this report is to verify the performance claim made by CB Shield for the Catch Basin Shield Technology. This report summarizes the findings of the Canadian ETV Program Verification Expert, the TRCA, based on information and data contained in the Formal Application submitted by CB Shield to GLOBE Performance Solutions.

1.2 Scope

This verification was conducted by the TRCA using the June 2012 Canadian ETV Program General Verification Protocol and the most recent version (June 2015) of the international ETV standard (FDIS ISO 14034).

2. Review of the Application

2.1 Introduction

This section provides a summary of the information provided by the applicant included with the pre-screening application and formal application forms submitted to GLOBE Performance Solutions and reviewed by the TRCA pursuant to the Canadian ETV Program and the new international ETV standard (FDIS ISO 14034).

2.2 Applicant Organization

CB Shield Inc.
233 Cross Avenue, Suite 302
Oakville, ON L6J 2W9

Canada

2.3 Documents Reviewed

The technology and all information provided by the Applicant with the Formal Application, the formal application binder and all subsequent transmittals to the Verification Expert were reviewed. The results of this Application Review are summarized in the Application Review Checklist (Table 1) below.

Table 1: Application Review Checklist – Mandatory Information

Ref.	Criteria		Yes	No	Verifier Comments
1.1	Signed Formal Application.		☑	☐	
1.2	Signed Declaration Regarding Codes & Standards submitted with signed formal application.		☑	☐	
1.3	Technology provides an environmental benefit.		☑	☐	When installed in storm water catch basin, the device reduces souring and re-suspension of retained sediment, thereby reducing discharge of sediment into the environment.
1.4	A copy of "Claim to be Verified" for each performance claim to be verified included with the Formal Application.		☑	☐	"Claim to be Verified" submitted with application.
1.5	Performance Claim composed in a way that satisfies "Criteria for Specifying Claims":		☐	☐	
	1.5.1	Include Technology name (and model number)	☑	☐	CB Shield™
	1.5.2	Include application of the technology	☑	☐	Applied as an insert into catchbasins to improve capture and reduce scour of stormwater runoff sediment.
	1.5.3	Include specific operating conditions during testing	☑	☐	Test sediment: ETV test sediment Capture (Claim 1): Constant influent concentration of 200 mg/L. False floor set to 50% of the manufacturer's recommended maximum sediment storage (300 mm below the outlet invert) Inflow rates of 0.24, 0.48, 1.20, 2.40, 6.00 and 8.40 L/s. Scour (Claim 2): Catchbasin filled to ¾ of the manufacturer's recommended maximum sediment storage depth Claim based on continuous 30 minute test with 5 minute duration inflows of 1.2, 4.8, 8.4, 12.0, and 15.6 L/s.
	1.5.4	Does it meet the minimum requirement for the majority of Canadian Standards / Guidelines?	☑	☐	Signed Declaration Regarding Codes & Standards submitted with signed formal
	1.5.5	Does it specify the performance achievable by the technology?	☑	☐	Capture: Removal efficiencies of 64, 59.9, 52.4, 42.6, 25.2, and 26.7 for inflow rates of 0.24, 0.48, 1.20, 2.40, 6.00, and 8.40 L/s respectively with a constant influent sediment concentration of 200 mg/L. Scour: Scouring is at most 8% of the control catchbasin during a continuous 30 minute scour test run with 5 minute duration inflows of 1.2, 4.8, 8.4, 12.0, and 15.6 L/s.

	1.5.6	Is the performance measurable?	☑	☐	Capture: To measure the capture performance at each flow rate, a modified mass balance calculation is required, which can be done using mass of the sediment added to the sediment feeder, mass of sediment remaining in the feeder, and mass of captured sediment. Scour: To compare scouring potential for the continuous test between the control and CB Shield treatments the total effluent load is calculated for the entire duration of the test based on flow rate, duration, and sediment concentration of individual samples.
1.6	Standard operating practices and a description of operating conditions for each individual performance claim specified.		☑	☐	Tests are done in a lab on a simulated street scape with catchbasins clean of litter/debris. In the field, on average there are 5 catch basins per hectare. Therefore, the results from the maximum flow rate (15.6L/s) during the scour test will be meaningful for runoff flows up to 78 L/s per hectare. The range of flows tested is anticipated to match the range of flows expected at most installations. ETV test sediment: AGSCO 1-1000 micron silica sediment blend. Background samples are taken to account for all sources of sediment input. Capture Test (Claim 1) Background samples taken at least three times per run to account for all sources of sediment input Influent sediment concentration is constant at 200 mg/L (+/- 25mg/L) Tested flows: 0.24, 0.48, 1.2, 2.4, 6, and 8.4 L/s. These flow rates comply with surface loading rates specified in the CETV OGS testing procedures (40, 80, 200, 400, 1000, and 1400 L/min/m^2), based on the effective treatment area (0.36m^2) of the device. The specified loading rate of 600 L/min/m^2 was not tested. Conducted with a false bottom set at 300 mm below the outlet invert. Effluent was not recirculated; single pass through. Sediment injected 16.5 mm away from the inlet Scour Test (Claim 2) Tested flows: 1.2, 4.8, 8.4, 12, and 15.6 L/s. These flow rates comply with surface loading rates specified in the CETV OGS testing procedures (200, 800, 1400, 2000, and 2600 L/min/m^2), based on the effective treatment area (0.36m^2) of the device. Conducted with a false bottom set at 254 mm below the invert and preloaded with sediment up to 152 mm below the outlet invert. Water is filled to the effluent pipe and allowed to settle for 12-24 hours. Initial start time and flow rate transition times shall not exceed 1 minute. Effluent filtered using a 10μm filter before recirculation.

1.7	The proponent has supplied significant references describing or supporting scientific and engineering principles of the technology.	☐	☐	Proponent claimed that scientific principles underlying the CB Shield are based on widely accepted knowledge of fluid dynamics, sedimentation/settling, hydrology and sediment transport. Link to EPA paper was broken.
1.8	Two or more names and contact information of independent experts (with no vested interest in the technology), qualified (backgrounds of experts are needed) to review the scientific and engineering principles on which the technology is based. These experts must be willing to be contacted by the VE.	☑	☐	Greg Williams (Ph.D., P.Eng), Jenn Drake (Ph.D)
1.9	Brief summary of significant human or environmental health and safety issues associated with the technology. (Note: this criterion complements but does not replace the obligation for the applicant to submit a duly signed "Declaration Regarding Codes and Standards")	☑	☐	Brief descriptions given about health and safety issues associated with the working environment during installation, removal, the cleanout of catchbasins (considering they are confined spaces), and sediment disposal. Persons involved with installing, removing, and or maintaining CB Shield inserts need to be trained in accordance with requirements for servicing regular catchbasins.
1.10	Brief summary of training requirements needed for safe, effective operation of technology, and a list of available documents describing these requirements. (Note: this criterion complements but does not replace the obligation for the applicant to submit a duly signed "Declaration Regarding Codes and Standards")	☑	☐	Link to video instructions that guides installation and removal of the CB Shield is provided; a list of general practices is also given.
1.11	Process flow diagram(s), design drawings, photographs, equipment specification sheets (including response parameters and operating conditions), and/or other information identifying the unit processes or specific operating steps in the technology. If feasible, a site visit to inspect the process should be part of the technology assessment.	☑	☐	Photographs of lab setup, flow diagrams of water flow through the simulated streetscape, and links to videos showing test runs and sampling methods were provided.
1.12	Supplemental materials (optional) have been supplied which offer additional insight into the technology application integrity and performance, including one or more of the following:	☐	☑	
	A copy of patent(s) for the technology, patent pending or submitted.	☐	☑	
	User manual(s).	☐	☑	
	Maintenance manuals.	☐	☑	
	Operator manuals.	☐	☑	
	Quality assurance procedures.	☐	☑	
	Sensor/monitor calibration program.	☐	☑	
	Certification for ISO 9001, ISO 14000, or similar.	☐	☑	
	Material Safety Data Sheet (MSDS) information.	☐	☑	
	Workplace Hazardous Materials Information System (WHMIS) information.	☐	☑	
	Health and Safety plan.	☐	☑	
	Emergency response plan.	☐	☑	
	Protective equipment identified.	☐	☑	
	Technical brochures.	☑	☐	Website link provided with technical drawings and information.
1.13	The applicant provided adequate documentation and data. There is sufficient information on the technology and performance claim for the verification. [Note: The Verifier should communicate with the Canadian ETV Program, through GPS, to request copies of the necessary documentation and required data that are available to support the claims.]	☑	☐	Adequate documentation given for reviewing testing protocol. All collected data including laboratory work book were submitted. Methodology for testing was clearly outlined in application. Videos of testing protocol, and installation/removal of CB Shield were also provided.

3. Review of the Technology

3.1 Technology Review Criteria

The results of the Technology Review are summarized in the Technology Review Criteria Checklist (Table 2) below.

Table 2: Technology Review Criteria Checklist

Ref	Criteria	Yes	No	Verifier Comments
2.1	The technology is based on scientific and technical principles. (Note: It will be necessary for the Verifier to read the key articles and citations listed in the Formal Application. It may also be necessary to contact the independent experts listed in the Formal Application to obtain additional information)	☑	☐	The technology is a flow deflection device that dissipates the energy of inflows, preventing scour and increasing capture. The scientific principles underlying the technology are based on well-known areas of fluid dynamics, sedimentation/settling, hydrology and sediment transport.
2.2	The technology is supported by peer review technical literature or references. (Note: Peer review literature and texts must be supplied with the Formal Application as well as relevant regulations and standards that are pertinent to the performance claim)	☐	☐	Currently the link to peer review article is inaccessible.
2.3	The technology is designed, manufactured, and/or operated reliably. (Note: Historical data from the applicant, not conforming to all data criteria, may be useful for the Verifier to review to assess the viability of the technology not for verification, but for insight purposes)	☑	☐	CB Shield is said to be constructed in Canada using quality fiberglass. No details from long term studies to comment on long term reliability.
2.4	The technology is designed to provide an environmental benefit and not create an alternative environmental issue. (e.g., It does not create a more hazardous and/ or unmanaged byproduct and it does not result in the transfer of an environmental problem from one media to another media without appropriate management of the subsequent contaminated media)	☑	☐	The technology provides an environmental benefit of controlling sediment washoff at upstream locations by capturing and retaining sediment from stormwater runoff within the catchbasin. However, long term reliability specifically about the clogging of grate opening by debris which would decrease its hydraulic capacity requires further attention.
2.5	The technology conforms to standards for health and safety of workers and the public. (Note: The vendor must submit a signed "Declaration Regarding Codes & Standards", with the Formal Application. The Verifier should ensure that this signed document is included with the information that is reviewed for the performance claim verification)	☑	☐	Signed Declaration Regarding Codes and Standards was submitted.
Environmental Standards				
2.6	Technology achieves federal, provincial, and/or municipal regulations or guidelines for management of contaminated and/or treated soils, sediments, sludges, or other solid-phase materials.	☑	☐	
2.7	Technology achieves federal, provincial, and/or municipal regulations or guidelines for all (contaminated and or treated) aqueous discharges as determined by the applicant's information.	☑	☐	
2.8	Technology achieves federal, provincial, and/or municipal regulations or guidelines for all (direct or indirect) air emissions. If the environmental technology results in the transfer of contaminants directly or indirectly to the atmosphere, then, where required, all regulations or guidelines (at any level of government) relating to the management of air emissions must be satisfied by the applicant's information.	☑	☐	
Commercial Readiness				
2.9	Technology and all components (apparatus, processes, products) is full-scale, commercially-available, or alternatively see 2.10 or 2.11, and, data supplied to the Verifier is from the use or demonstration of a commercial unit.	☑	☐	Technology and components used for testing are full-scale and commercially available. At the time of this verification, the vendor has the capacity to produce many hundred units per month.

2.10	Technology is a final prototype design prior to manufacture or supply of commercial units, or alternatively see 2.11. (Note: Verification of the performance claim for the technology is valid if based on a prototype unit, if that prototype is the final design and represents a pre- commercial unit. The verification will apply to any subsequent commercial unit that is based on the prototype unit design. The verification will not be valid for any commercial unit that includes any technology design change from the prototype unit used to generate the supporting data for the verification.	☐	☐	NA
2.11	Technology is a pilot scale unit used to provide data which when used with demonstrated scale up factors, proves that the commercial unit satisfies the performance claim.	☐	☐	NA
Operating Conditions				
2.12	All operating conditions affecting technology performance and the performance claim have been identified.	☑	☐	Operating conditions affecting technology performance were identified. Please see Ref. 1.6.
2.13	The relationships among operating conditions and their impacts on technology performance have been identified. (Note: It is the responsibility of the Verifier to understand the relationship between the operating conditions and the performance of the technology, and to ensure that the impacts of the operating conditions and the responses of the technology are compatible)	☑	☐	Background concentration – needs to be < 20 mg/L to allow for accurate assessment of performance in the laboratory Water temperature – needs to be <25 °C; higher water temperatures have reduced viscosity allowing suspended sediments to settle quicker. However, water temperature has a negligible impact on settling velocity. Standardized test sediment - ensures comparability between units and a fair assessment of performance based on range of sediment sizes. Flow rates - lower flow rates should allow higher percentage of capture and retention. False floor (used storage capacity) – higher false floor will lower capture and retention performance as sediment will be held closer to the outlet invert <u>Capture test</u> Influent sediment concentration - held constant at 200 mg/L; studies have shown this to be a reasonable average sediment concentration in stormwater runoff from paved surfaces. Higher or lower influent concentrations may change the removal efficiencies
2.14	Technology designed to respond predictably when operated at normal conditions (i.e. conditions given in 2.12), and/or alternatively see 2.15. (Note: The Verifier must be satisfied that these data do not demonstrate a performance that is different than the performance indicated in the Performance Claim to be validated)	☑	☐	Based on the test results, the technology does respond predictably when operated at normal conditions. The discrepancy with the S5 run result during the control treatment of the scour test showing the second lowest scour rate for the highest flow rate is likely the result of a lack of finer sediments in the sump to scour.
2.15	Effects of variable operating conditions, including start up and shut down, are important to the performance of the technology and have been described completely as a qualifier to the performance claim under assessment.	☑	☐	A range of inflow rates were tested and the samples taken when changing from one flow rate to the next were clearly distinguished.
Throughput Parameters				

2.16	Effects of variable contaminant loading or throughput rate must be assessed and input/output limits established for the technology. Note: If the application of the technology is to a variable waste source or expected (designed) variable operating conditions, then it will be necessary to establish acceptable upper and lower ranges for the operating conditions, applications and/or technology responses. Sufficient, quality data must be supplied to validate the performance of the technology at the upper and lower ranges for the operating conditions, applications and or technology responses detailed in the performance claim.	☑	☐	Scour: The tested flow rates were between 1.2 and 15.6 L/s. The catch basins with and without CB Shield were pre-loaded with test sediment. Influent was clean water. Testing was continuous from one flow rate to the next with 1 minute transition periods. Capture: The tested lower and upper throughput rates are 0.24 and 8.40 L/s. Contaminant loading rates were controlled to have a constant inflow sediment concentration of 200mg/L.
Other Relevant Parameters/Variables/Operating Conditions Note: The Verifier is expected to understand the technology and identify and record all relevant criteria, parameters, variables or operating conditions that potentially can or will affect the performance of the technology under assessment. It is practical to include all of these variables in Table 2 (i.e., from 2.17 to …).		☑	☐	Parameters mentioned from 2.12 to 2.16 will also affect field performance accordingly (e.g., the false floor represents the accumulated amount of sediment). Additionally, in the field, debris may accumulate and affect performance which was not evaluated in the lab setting but can be evaluated in a field case study.
2.17				
2.18				

4. Review of Test Plan, Test Execution and Data

4.1 Review of Test Plan and Execution of Test Plan

The results of the Test Plan Review are summarized in the Test Plan Design Assessment Criteria Checklist (Table 3) below.

Table 3: Test Plan Design Assessment Criteria Checklist

Ref.	Criteria			Verifier Comments
3.1	Was a statistician, or an expert with specialized capabilities in the design of experiments, consulted prior to the completion of the test program, and if so please provide the contact details	☑	☐	Greg Williams 416-624-2007 gwilliams@goodharbourlabs.com
3.2	Is a statistically testable hypothesis or hypotheses provided? (such that an objective, specific test is possible)	☑	☐	The testable hypothesis is that a catchbasin with the CB Shield insert will retain more sediment in stormwater runoff than a catch basin without the insert. The hypothesis can be tested by a capture and comparative scour test as follows: Capture test: The OGS testing protocol requires the total amount of sediment to be accounted for by means of a modified mass balance. As a result, statistics will not be required since the whole "population" is taken into account instead of taking samples. Scour test: The scour test is a continuous test where samples taken within and between flow rates are not independent of each other. Since the assumption of independence fails, a mix model approach is required to compare the means between the control and CB shield catchbasin and confirm a significance difference. A measure of difference can be calculated between the two treatments by finding the quotient of their total effluent loads.
3.3a-c	Does the performance test generate data suitable for testing the hypothesis being postulated? Namely:	☑	☐	

3.3a	Does the test measure the parameters used in the performance claim hypothesis?	☑	☐	Capture test: Total amount of sediment added into the feeder is measured as well as the total amount captured after each flow rate test. A modified mass balance is undertaken to calculate exactly how much sediment was fed through the feeder as influent into the catchbasin and what percentage was retained for both treatments. Scour test: Performance test measures effluent concentrations of control and CB Shield treatments.
3.3b	Does the performance test control for extraneous variability?	☑	☐	The test was conducted under controlled laboratory conditions, following well defined procedures, thereby limiting extraneous variability. More specifically, influent flow was sampled to account for any background concentrations that would add to the controlled influent sediment feed. Inflow concentration was measured for each flow rate to ensure auger feed rates were synced to influent flow rate to achieve target influent concentrations. When concentrations of samples were analyzed, a blank, 20 mg/L standard, and 100 mg/L standard were also tested to account for instrumental or systematic errors. For sediment re-suspension test, pre-loaded sediment is allowed to settle for 12-24 hours before tests are started. Water temperature were monitored to not exceed 25°C as higher temperature can decrease water viscosity and thereby increase sediment settling velocity.
3.3c	Does the performance test include only those effects attributable to the technology being evaluated?	☑	☐	To ensure effects are attributable to the technology evaluated, the catchbasin with a CB shield insert is evaluated against a catchbasin without the insert (control) as part of the scour test.
3.4	Does the performance test generate data suitable for analysis using the SAWs? (Note: It is preferable that tests are designed with the SAWS in mind before test plans are written)	☐	☑	The mixed model approach required to compare control and CB Shield catchbasin scour test results requires a test outside of recommended SAWs (the R statistical program was used)
3.5	Does the performance test generate data suitable for analysis using other generic experimental designs? (Note: Performance testing and verification studies should be designed with the final data analysis in mind to facilitate interpretation and reduce costs)	☑	☐	Capture and scour tests generally followed the experimental design proposed by the OGS testing protocol which do not require statistical analysis. However, scour test claim compares control and CB Shield catchbasin which requires further analysis (mixed model) to prove significance difference between control and CB Shield catchbasin.
3.6	Are the appropriate parameters, specific to the technology and performance claim, measured? (Note: It is essential that the Verifier and the technology developer ensure that all parameters – e.g. temperature, etc - that could affect the performance evaluation are either restricted to pre-specified operating conditions or are measured)	☑	☐	Water temperature, influent flow rate, background concentration Capture test: Influent concentration, total influent mass, total captured mass Scour test: influent flow rate, preloaded sediment mass, effluent concentration
3.7a-d	Are samples representative of process characteristics at specified locations? Namely:	☑	☐	

3.7a	Are samples collected in a manner representative of typical process characteristics at the sampling locations? (e.g., the samples are collected from the source stream fully mixed, etc.)	☑	☐	Capture test: Sampling done according to OGS test Procedure. Upon completion of test, the remaining water from the catchbasin is decanted over a period of less than 30hrs. The total sediment captured is removed, dried and weighed. Mass of sediment remaining in the feeder is weighed and subtracted from total mass of sediment added at the beginning of the test to establish actual amount fed. Scour test: Effluent grab samples are taken at the catch basin outlet which will reflect effluent concentrations. A minimum of 500 ml samples was taken in 1000 mL jars that were attempted to be held under the whole effluent stream or passed under the stream such that the sample collection would be complete with a single pass.
3.7b	Is data representative of the current technology?	☑	☐	The data reflects the effect of a CB shield inserted into a normal catchbasin without any other alterations to the catchbasin. The inserted CB Shield is the unit that is currently commercially available.
3.7c	Have samples been collected after a sufficient period of time for the process to stabilize?	☑	☐	Samples were collected according to OGS testing procedure, which was developed based on scientific principles to ensure, among other things, sampling is conducted in a representative and replicable manner. Capture test: Sediment is only fed once target flows are reached and stabilized. A maximum of 30hrs is given to decant remaining water after a test run before captured sediment is removed, dried and weighed. Scour: Once sediment is pre-loaded, the device is filled up with water to the invert and allowed to sit for 12-24 hours before starting the tests. Changes in flow rates were done within 60s and an effluent sample was taken at approximately 30s to determine if additional scouring was taking place while flow rates were stabilizing.
3.7d	Have samples been collected over a sufficient period of time to ensure that the samples are representative of process performance?	☑	☐	Capture test: Total captured sediment is collected at the end of each flow run. The test duration for tested flow rates of 0.24, 0.48, 1.20, 2.40, 6.00, and 8.40 L/s are 420, 420, 360, 180, 70, and 50 mins respectively. Scour test: Effluent samples were taken every 1 minute for test durations of 5 minutes for flow rates of 1.2, 4.8, 8.4, 12.0, and 15.6 L/s. Transition samples were taken within 30 seconds of switching to a new flow rate. The system was shut down between flow rates of 8.4 and 12.0 L/s and between 12.0 and 15.6 L/s due to standpipe overflow.

3.8	Are samples representative of operating conditions? (Note: A time lag occurs between establishing steady state conditions and stabilization of the observed process performance. This time lag depends in part on the time scale of the process)	☑	☐	Long term operating conditions need to be evaluated. The effect of debris accumulation in an in situ field setting needs to be considered as affecting the performance. <u>Capture test:</u> Flow rates are monitored and influent sediment is only added once each target flow is stabilized in order to match performance to specific flow rates that cover the expected range of catchbasin inflow. Performance is representative of catchbasin that has used up 50% of the manufacture recommended Maximum Sediment Storage Depth and a constant inflow concentration of 200 mg/L. Because the sediment is collected at the end of each run, it accounts for the performance of the unit during start up and shut down as well. <u>Scour test:</u> Samples are representative for a specific operating condition of having the catch basin ¾ full of sediment. Scouring results are from a continuous test where scouring from a previous flow will affect subsequent scouring rates. After pre-loading the sediment time is given for agitated sediments to settle over a period of 12-24 hours. Flow changes are done within 1 minute and a sample is taken at approximately 30s to capture the scouring potential when altering flow rates.
3.9	Are samples representative of known, measured and appropriate operating conditions? (Note: This includes technologies that operate on short cycles and so have start and stop cycles which affects the operation of the technology. If the operating conditions are not vital but are recommended, then the reviewer must evaluate operating conditions)	☑	☐	The device is a passive device working to deflect and reduce the energy of stormwater inflow, which increases capture and reduces scour. The data were collected under controlled laboratory conditions using a test sediment that includes clay, silt and sand sized particles characteristic of stormwater runoff. The effects of debris on performance were not evaluated.
3.10	Were samples and data prepared or provided by a third party? (Note: In some cases, where the expertise rests with the applicant, an independent unbiased third party should witness and audit the collection of information and data about the technology. The witness auditor must not have any vested interest in the technology.)	☑	☐	Data samples were analyzed and prepared by a third party laboratory (Good Harbour Laboratories). Good Harbour Laboratories 2596 Dunwin Drive, Mississauga ON, L5L 1J5 905 696 7276 goodharbourlabs.com
3.11a-c	Performance Test Design is Acceptable - Namely:	☑	☐	
3.11a	The samples have been collected when the technology was operated under controlled and monitored conditions.	☑	☐	<u>Capture test:</u> flow rate, and influent concentrations were monitored and adjusted as required <u>Scour test:</u> flow rates were monitored and adjusted as required
3.11b	The test plan design should have been established prior to testing to ensure that the data were collected using a systematic and rational approach	☑	☐	Test plan design generally satisfied the OGS testing protocol.

3.11c	The test plan design should have defined the acceptable values or ranges of values for key operating conditions, and the data collection and analysis methodology	☑	☐	<u>Operating conditions:</u> Flows tested (operating conditions) are the expected general range of flows through a catchbasin: capture test (0.24-8.4L/s), scour test: (1.2-15.6 L/s). Water temperature needs to be below 25°C. Unit tested having 50% of its maximum storage capacity filled. <u>Data collection and analysis:</u> follows the OGS testing protocol. However, the scour test is run additionally with a control catch basin for comparison.

4.3 Data Validity Checklist

The results of the Data Validity Review are summarized in the Data Validity Checklist (Table 4) below.

Table 4: Data Validity Checklist

Ref.	Criteria	Yes	No	Verifier Comments
4.1	Were appropriate sample collection methods used (e.g. random, judgmental, systematic etc)? For example: simple grab samples are appropriate if the process characteristics at a sampling location remain constant over time. Composites of aliquots instead may be suitable for flows with fluctuating process characteristics at a sampling location. (Note: Sampling methods appropriate for specific processes may sometimes be described in federal, provincial or local monitoring regulations)	☑	☐	<u>Capture test:</u> The mass of sediments fed into the catchbasin and captured is measured in order to carry out a modified mass balance. <u>Scour test:</u> Multiple effluent grab samples are appropriate to evaluate the effluent concentrations and thereby the scouring potential at each flow rate.
4.2	Were apparatus and/or facilities for the test(s) adequate for generation of relevant data? (i.e. testing was performed at a location and under operating conditions and environmental conditions for which the performance claim has been defined)	☑	☐	Facility/apparatus sufficiently simulated a streetscape with a catchbasin with and without a CB Shield insert. Slurry feeder was calibrated and the auger feed rate was monitored. The facility had the capacity to manage the large amounts of water required for testing.
4.3	Were operating conditions during the test monitored and documented and provided?	☑	☐	Monitored/ documented operating conditions: background concentration, water temperature, PSD of test sediment <u>Capture test:</u> False floor height, flow rates, influent sediment concentration, amount of sediment injected <u>Scour test:</u> False floor height, flow rates, time limits, sampling frequency
4.4	Has the information and/or data on operating conditions and measuring equipment measurements and calibrations been supplied to the Verifier?	☑	☐	Measurements of monitored flow, water temperature and concentrations of sediment added were provided. Calibration of flow meter and PSD of sediment used were also provided.

4.5	Were acceptable protocols used for sample collection, preservation and transport? (Note: Acceptable protocols include those developed by a recognized authority in environmental testing such as a provincial regulatory body, ASTM, USEPA, Standard Methods)	☑	☐	
4.6	Were Quality Assurance/Quality Control (QA/QC) (e.g. use of field blanks, standards, replicates, spikes etc) procedures followed during sample collection? A formal QA/QC program, although highly desirable, is not essential, if it has been demonstrated by the vendor's information that quality assurance has been applied to the data generation and collection.	☑	☐	Replicates were taken and kept for 7 days (refrigerated) for each sample. Blank, 20 mg/L standard, and 100 mg/L standard run during sample analysis.
4.7	Were samples analyzed using approved analytical protocols? (e.g. samples analyzed using a protocol recognized by an authority in environmental testing such as Standard Methods, EPA. ASTM etc. Were the chemical analyses at the site in conformance with the SOPs (Standard Operating Procedures)?	☑	☐	The SSC samples were analyzed by GHL as detailed in ASTM D3977-97 (2013), Standard Test Methods for Determining Sediment Concentration in Water Samples.
4.8	Were samples analysed within recommended analysis times (especially for time sensitive analysis such as bacteria)	☑	☐	Recommended storage time is 7 days but samples were analyzed within 2.
4.9 a-e	Were QA/QC procedures followed during sample analysis? Namely:	☐	☐	
4.9a	Maintaining control charts	☑	☐	QA/QC (e.g., flow rates monitored to not vary more than expected COV (<0.04)
4.9b	Establishing minimum detection limits	☑	☐	MDL is 1.26 mg/L.
4.9c	Establishing recovery values	☐	☑	
4.9d	Determining precision for analytical results	☐	☑	
4.9e	Determining accuracy for analytical results	☐	☑	
4.10 a-c	Was a chain-of-custody (full tracing of the sample from collection to analysis) methodology used for sample handling and analysis - Namely:	☐	☐	
4.10a	Are completed and signed chain-of-custody forms used for each sample submitted from the field to the analytical lab provided for inspection by the Verifier?	☑	☐	Chain of custody provided for ETV test sediment analysis. Sampling and analyzing were done by GHL in their laboratory.
4.10b	Are completed and easily readable field logbooks available for the Verifier to inspect?	☑	☐	Field logbook from GHL was made available to the verifier.
4.10c	Are there other chain-of-custody methodology actions and documentation recorded/available (e.g. sample labels, sample seals, sample submission sheet, sample receipt log and assignment for analysis)?	☑	☐	GHL provided certificate of analysis for effluent concentration of the scour test.
4.11	Experimental Data Set is Acceptable (i.e., the quality of the data submitted is established using the best professional judgment of the Verifier)	☑	☐	The Verifier believes that the experimental data quality set is acceptable as overseen by Good Harbour Laboratories.

4.5 Data Analysis Checklist

The intent of the data analysis checklist is to ensure that the appropriate statistical tools can be used in a rigorous, defensible manner (Environment Canada 2012). The checklist also emphasizes that an initial performance claim may be rewritten and updated to better reflect what the data support, using the expertise of the Verifier and other pertinent resources. In this case, the performance claims were modified and restated by the Verifier. The updated performance claims are presented in the conclusion of this report.

Table 5: Data Analysis Checklist

Ref.	Criteria	Yes	No	Verifier Comments

5.1	Does the analysis test the performance claim being postulated? (Note: When conducting performance evaluations, under the Canadian ETV program, the alternative hypothesis of a "significant difference" without stating the direction of the expected difference will usually be unacceptable)	☑	☐	Capture test: analysis not required since modified mass balance will be done. Scour test: mixed model is used to evaluate whether there is a significant difference in effluent concentrations between CB shield and Control treatments. A confidence interval for the quotient of means between the control and CB Shield treatment will be calculated for comparison. The standard error of the distributions that is required to calculate the confidence intervals is calculated using a bootstrap method in R statistical program. This method is less stringent on the assumption of normality which the data set does not fully satisfy.
5.2	Does the analysis fit into a generic verification study design? For example, many other "generic" designs exist that are not explicitly covered by the Canadian ETV Program (e.g. ANOVA, ANCOVA, regression, etc.) that are potentially useful.	☑	☐	Capture test: Since there are no replications, results of the tests are presented as they are. Scour test: Mixed model analysis is carried to determine if there is a significant difference, a type of comparison of means taking into account non-independence. The quotient between the Control and the CB Shield treatments are used to compare the treatments.
5.2 a-c	Are the assumptions of the analysis met? Namely: (Note: A negative response means the Verifier needs to request further information)	☑	☐	Scour test: assumptions for a linear model include: 1. Linearity –dependent variable is the result of a linear combination of independent variable(s) 2. Absence of collinearity – fixed effects should not be collinear to each other 3. Homoskedasticity – variance of your data should be approximately equal across the range of predicted values 4. Normality or residuals (least important) – residuals of the regression need to be normally distributed 5. Absence of influential data points 6. Independence – most important for a linear model. Samples need to be independent. Since this assumption is not satisfied, a mixed model is used in place of a linear model. The mixed model allows for non-independent samples.
5.2.a	Did the data analyst check the assumptions of the statistical test used?	☑	☐	
5.2.b	Are the tests of assumptions presented?	☑	☐	
5.2.c	Do the tests of the assumptions validate the use of the test and hence the validity of the inferences?	☑	☐	
5.3	Data Analysis is Acceptable The data analysis is acceptable if the statistical test employed tests the hypothesis being postulated by the technology developer, the assumptions of the statistical test is met and the test is performed correctly.	☑	☐	Data analysis is acceptable.

4.7 Data Interpretation Checklist

The intent of the data interpretation checklist is to ensure that the data analyses results are reviewed in a manner that emphasizes the applicability to the specific performance claim and the statistical power of the performance test.

Table 6: Data Interpretation Checklist

Ref	Criteria	Yes	No	Verifier Comments

6.1a	Are the results statistically or operationally significant? Did the performance test result in a statistically significant test of hypothesis?	☑	☐	Capture test: Results are operationally significant. Removal efficiencies ranged from 64 to 26.7% for flow rates of 0.24 – 8.40 L/s. Scour test: results reflect comparison between control and CB Shield for a continuous scour test of different flow rates (0.24-8.4L/s) at 5 minute intervals. Under a mixed model analysis that takes into account non-independence between samples (since it is a continuous test, the previous sample will affect subsequent sample) it was shown that the treatment (control vs. CB Shield) had a significant effect on scouring.
6.1b	To be operationally significant, does the technology meet regulatory guidelines and applicable laws?	☑	☐	Declaration regarding codes & standards have been signed.
6.2	Does the performance test have sufficient power to support the claim being made? Note: For performance test designs where acceptance of the null hypothesis results in a performance claim being met, the statistical power of the test must be determined (Note: A statistical power of at least 0.8 is the target. If the power of the verification experiment is less than this value, the Verifier should contact the Canadian ETV Program to discuss an appropriate course of action)	☑	☐	Capture test: No statistical tests were conducted. Instead, a mass balance approach was used, which is regarded as a direct and robust and scientifically valid means of evaluating capture in stormwater sedimentation devices. Scour test: No suitable method of testing the power of a mixed model statistical test was available. However, the differences between the control catch basin and CB shield catch basin were very significant, and the number of effluent samples collected was suitable for the selected statistical method of evaluation.
6.3	Is the interpretation phrased in a defensible manner? Note: The final performance claim should reflect any changes to the claim made during the course of the analyses, variations or restrictions on operating conditions, etc. that changed the scope of the performance claim. The initial performance claim should be viewed as a tentative claim that is subject to modification as the verification progresses. A thoughtful open-minded verification will in the end, prove to be of greatest benefit to the technology developer.	☑	☐	Both claims were revised Capture test: Results for the capture test cannot undergo a statistical test due to a lack of replicates. However, since the analysis was performed in a control laboratory setting, it is assumed that results would be replicable and therefore interpreted as results for a given set of testing conditions. Scour test: Since the scour test was run as a continuous test, comparison between specific flow rates cannot be made, but rather on the entire series. Using mixed models to account for non-independence between samples, a significant difference was found between the two treatments. The interpretation is specific to testing conditions, but can be generalized to state the CB Shield scours much less than the control catchbasin.
6.4	Data Interpretation is Acceptable The data interpretation is acceptable if the data analyses results are reviewed in a manner that emphasizes the applicability to the specific performance claim and the statistical power of the verification experiment.	☑	☐	In general, the data interpretation is acceptable.

5. Statistical Evaluation of Claims

The statistical evaluation of the claims put forward by the Vendor was carried out using the R statistical software based on some of the principles presented in Statistical Analysis Worksheets (SAWs) provided by GPS (as per Environment Canada 2012). The first claim (capture test) does not require a statistical evaluation since the entire "population" is sampled (total mass of influent and captured sediments are accounted for) and n = 1 for each flow rate. The capture test follows the OGS protocol published by CETV and the analysis of which specifies a modified mass balance approach.

The data set resulting from the scour test does not satisfy the assumption of independence. Therefore, the second claim (scour test) cannot be evaluated statistically using the provided standard SAWs that require normality. A mixed model approach is taken to confirm significant difference between results of control catchbasin and one with a CB Shield. A bootstrap simulation method is used in R to calculate the standard deviation from which confidence intervals for their quotient is derived to make estimates of the minimum performance limit.

5.1 Statistical Evaluation of Claim #1: Capture test

A modified mass balance approach is taken to analyze the treatment performance of capturing suspended sediments at various loading rates. Each flow rate is run only once due to feasibility related to testing duration and cost, but the total influent sediment and total captured sediment is weighed and accounted for. Since there are no repeated tests, statistical analysis is not carried out but rather the results of the modified mass balance is given as is.

5.1.1 Raw Data

The raw data provided by the Vendor is presented in Appendix D of the formal application.

5.1.2 Assessing Normality

This procedure is used to determine if the data variable is normally distributed or log-normally distributed. This is important as the assumption of normality is often invoked in subsequent calculations.

– Not applicable

Assumptions:
- Not applicable

5.1.3 Testing if the Mean is Equal to Specified Value

This test is used to determine at a level of 95% confidence that the mean is not equal to some pre-specified value, μ_o. The value μ_o will often be the performance that a technology is claiming to achieve.

$H_0 : \mu_1 = \mu_o$

– Not applicable

Assumptions:
- Not applicable

Inferences:
No statistical inferences are made. Based on the modified mass balance approach, under specified operating conditions of a false floor set to 50% of the manufacturer's recommended maximum sediment storage depth and a constant influent sediment concentration of 200 mg/L, the catch basin with a CB Shield insert removed 64, 59.9, 52.4, 42.6, 25.2, and 26.7 percent of influent sediment by mass at inflow rates of 0.24, 0.48, 1.20, 2.40, 6.00, and 8.40 L/s, respectively.

Table Z1: Summary of Acceptable Data Sets for Verification

Acceptable Data Set(s) Identification	SAWs Used	Supports Claim (Y/N)
Table 9. Removal efficiency based on mass balance (from Performance testing of the CB Shield for the enhancement of catch basin sediment capture – 24 Aug 2016)	Not applicable	Yes

5.2 Statistical Evaluation of Claim #2: Scour Test

5.2.1 Raw Data

The raw data provided by the Vendor is presented in Appendix D of the formal application.

5.2.2 Mixed model analysis: Testing for significant difference between scour test effluent loads of control and CB Shield treatment using

The scour test is run continuously with test sediment of a specified PSD preloaded and having flow rates altered at 5 minute intervals (1.2, 4.8, 8.4, 12.0, and 15.6 L/s). Effluent loads of the two treatments cannot be compared separately at each flow rate since preceding flow rates affect the amount of sediment left to scour during subsequent flow rates. As a result, for each treatment all collected effluent concentrations are treated as part of a single dataset. However, conventional statistics used for comparison of means analysis (i.e., t-test) requires each sample to be independent of each other, put forth as the assumption of independence. Since data from the scour test fails to meet this assumption, a mixed model approach is taken.

A mix model is a linear model that includes a "mix" of fixed and random effects. Effects that are constant for each sample are fixed effects (i.e., the treatment) while effects that are variable for each sample(run/flow rate) are random effects and in part treated as a random error term. A "full" model is created with all fixed and random effects along with a "null" model that excludes the fixed effect that is in question of having a significant effect. The treatment effect (CB Shield vs. control) will be excluded in the null model. An ANOVA is used to compare the two models which if determined to be significantly different from each other identifies the fixed effect in question (i.e., treatment) to be a significant effect.

Assumptions:

- Linearity: The dependent variable has to be a result of a linear combination of the independent variables. A residual plot can be used as an indicator. Residuals should not exhibit a recognizable pattern (e.g., exhibit an increase or decrease or a curved relationship)
- Homoscedasticity: Variance of the data should be approximately equal across the range of predicted values. Residuals on a residual plot should be approximately equal distance from the Y=0 line.
- Absence of collinearity: Fixed effects should not be collinear (very closely related) to each other so that it would not be difficult to distinguish between their effects.
- Normality of residuals: Linear model are relatively robust against violations of normality assumption so this is the least important assumption to satisfy. Normality of residuals can be checked using a q-q plot.
- Absence of influential data points

5.2.3 Calculating the 95% confidence interval for the effluent load mean quotient of the two treatments

To make a claim on the effluent load performance of the CB Shield relative to the control treatment, the quotient of the mean effluent loads is calculated and expressed as a percentage. The 95% confidence interval of the quotient of means is calculated and the lower limit is used in the claim to reference the minimum performance as required by CETV instead of the mean performance.

A bootstrap simulation method is used in R to calculate the standard deviation of the distribution of effluent loads of the two treatments as an effective means of correcting for non-normal distribution. The calculated standard deviation is used with GraphPad's web application (http://www.graphpad.com/quickcalcs/errorProp1/) to estimate the 95% confidence intervals of the quotient. The application assumes normal distributions for the datasets, which although not satisfied, the robust bootstrapping method used to calculate the standard deviations is believed to give very good estimates of the minimum performance without introducing complications of transforming and retransforming variables.

Assumptions:

- Data set is normally distributed: although not satisfied, the robust bootstrapping method used to calculate the standard deviations is believed to give good estimates of the calculated minimum performance without introducing abstractions of transforming and retransforming variables.

Inferences:
Based upon the above inferences, it can be concluded that for a catchbasin filled to three quarters of the manufacturer's recommended maximum sediment storage depth, with the CB Shield™ insert, scouring of test sediment is at most 8% of the control catchbasin during a continuous 30 minute scour test run with 5 minute duration inflows of 1.2, 4.8, 8.4, 12.0, and 15.6 L/s.

Table Z2: Summary of Acceptable Data Sets for Verification

Acceptable Data Set(s) Identification	Analysis Used	Supports Claim (Y/N)
Table 2. Scour test results for CB Shield protected and control catch basins (from Environmental Technology Verification (ETV): Supporting documentation for Canadian ETV program formal application – October 2015)	Mixed model regression is used (R statistical package)	Y
Table 2. Scour test results for CB Shield protected and control catch basins (from Environmental Technology Verification (ETV): Supporting documentation for Canadian ETV program formal application – October 2015)	Bootstrap simulation is run in R to find the standard error for the mean percent change (between scour results of the control and CB Shield treatments)	Y

Table 2. Scour test results for CB Shield protected and control catch basins (from Environmental Technology Verification (ETV): Supporting documentation for Canadian ETV program formal application – October 2015)	GraphPad web application is used to calculate 95% confidence interval of the quotient of mean effluent loads of the two treatments.	Y

6. Audit Trail

The items in Table 8 are useful in determining reasons for data discrepancies.

Table 8: Key documents

Raw data sheets and summary data	Yes
Signature pages	Yes
Signed Formal Application	Yes
Declaration Regarding Codes & Standards	Yes
Patent(s)	NA (Patent Pending)
Sample security: e.g. chain of custody sheets for each sample	Chain of custody for sediment, not for effluent sample since collected and analyzed by same lab.
Operation and maintenance manual	Operation and maintenance videos.
Field notebooks	Provided
Certificate of accreditation of laboratories	GHL not accredited but allowed by the verifier since an internal verification documented in the validation report TR-AA20120409-01.

7. Conclusion

CB Shield’s technology performance claims have been verified as follows:

1. Capture test:

   During the sediment capture test, for a catch basin with a false floor set to 50% of the manufacturer’s recommended maximum sediment storage depth and a constant influent sediment concentration of 200 mg/L, the catch basin with a CB Shield insert removed 64, 59.9, 52.4, 42.6, 25.2, and 26.7 percent of influent sediment by mass at inflow rates of 0.24, 0.48, 1.20, 2.40, 6.00, and 8.40 L/s, respectively.

2. Scour Test:

   For a catchbasin filled to three quarters of the manufacturer's recommended maximum sediment storage depth, with the CB Shield™ insert, scouring of test sediment is lowered by at least 81% compared to a control catchbasin during a continuous 30 minute scour test run with 5 minute duration inflows of 1.2, 4.8, 8.4, 12.0, and 15.6 L/s.

The verified claims concur with the verification report.

8. References

Environment Canada. 2012. Environmental Technology Verification – General Verification Protocol (GVP). Review of Application & Assessment of Technology. [online] http://etvcanada.ca/wp-content/uploads/2013/05/General-Verification-Protocol_Canadian-ETV-Program_June2012-May2013.pdf [accessed June 2016]. Environment Canada, Science and Technology Programs, Science and Technologies Strategies Directorate, Science and Technology Branch, Gatineau, QC.

ISO/FDIS 14034:2015, Environmental management – Environmental technology verification (ETV)

ISO/IEC 17025, General requirements for the competence of testing and calibration laboratories

Appendices

Appendix A. Statistical Analysis

Appendix A contains the detailed worksheets of the statistical analysis undertaken to confirm the CB Shield Technology performance claims.

A.1 Claim 1: Capture Test

No statistical analysis performed. It is not feasible to do repeated tests for the capture test. Instead, a modified mass balance is calculated by weighing the mass of all influent and captured materials to arrive at removal efficiencies.

A.2 Claim 2: Scour Test

A.2.1 Mixed model analysis: Testing for significant difference between scour test effluent loads of control and CB Shield treatment using

A “linear mixed model” approach is taken to compare the effluent loads of the CB Shield and Control treatment.

The scour test is run continuously with test sediment of a specified PSD preloaded and having flow rates altered at 5 minute intervals (1.2, 4.8, 8.4, 12.0, and 15.6 L/s). Effluent loads of the two treatments cannot be compared separately at each flow rate since preceding flow rates affect the amount of sediment left to scour during subsequent flow rates. As a result, for each treatment all collected effluent concentrations are treated as part of a single dataset. However, conventional statics used for comparison of means analysis (i.e., t-test) requires each sample to be independent of each other, put forth as the assumption of independence. Since data from the scour test fails to meet this assumption, a mixed model approach is taken.

A mixed model can represent a “mix” of fixed and random variables. In our study, treatment will be a fixed effect while each run (different flow rate) will be treated as a random effect. More specifically, we account for the interaction of the treatment and run factor as the random effect. The analysis is carried out in “R” statistical software using the “lmer” function of the “lme4” package. To assess if the fixed factor “treatment” (CB Shield, Control) has a significant effect on the model, both a “full” model and a “null” model are created, with and without the fixed effect of “treatment” respectively. An ANOVA is run to compare the “full” and “null” model and a significant difference between the two models indicates that the fixed factor “treatment” is a significant effect. This indicates a significant difference in the responses (effluent loads) of the two treatments.

There are 6 assumptions for linear models:

1. Linearity: The dependent variable has to be a result of a linear combination of the independent variables. A residual plot can be used as an indicator. Residuals should not exhibit a recognizable pattern (e.g., exhibit an increase or decrease or a curved relationship)

2. Homoscedasticity: Variance of the data should be approximately equal across the range of predicted values. Residuals on a residual plot should be approximately equal distance from the Y=0 line.

3. Absence of collinearity: Fixed effects should not be collinear (very closely related) to each other so that it would not be difficult to distinguish between them.

4. Normality of residuals: Linear model are relatively robust against violations of normality assumption so this is the least important assumption to satisfy. Normality of residuals can be check using a q-q plot.

5. Absence of influential data points: Influential data points can change interpretation of results. The “influence” and “dfbetas” function for the “influence.ME” package can be used in R to check for this.

6. Independence: This is the most important assumption for a linear model. If the assumption is not satisfied, and linear “mixed model” is used.

The “full” and “null” models are built using the following codes. Notice that loads is the response variable, treatment is the fixed effect (constant for samples) and the interaction of the treatment and run variables is the random effect (varies for each sample) .

```
Code [
model_full = lmer(loads_g ~ treatment + (treatment|run), data=test.data, REML=FALSE)
model_null = lmer(loads_g ~ (1|run), data=test.data, REML=FALSE)
]
```

<u>Assumptions 1 and 2: Linearity and homoscedasticity</u>
Both assumption 1 and 2 can be checked using a residual plot.

```
Code [
```

```
plot(fitted(model_full), residuals(model_full))
]
```

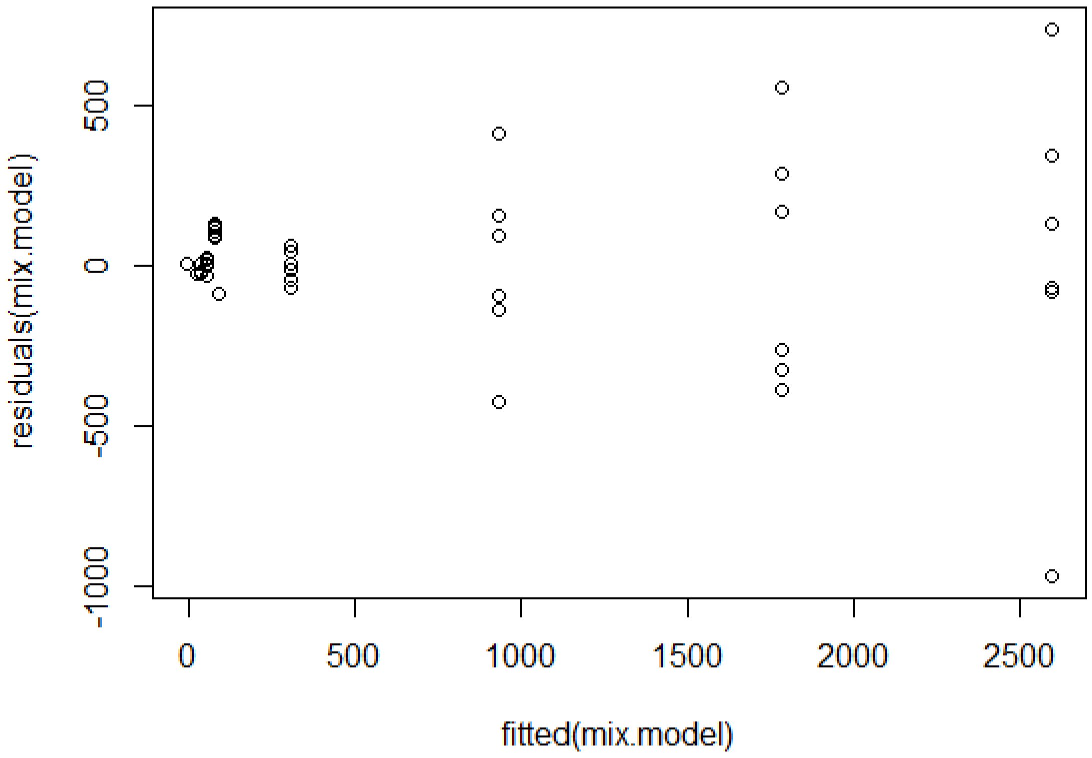


Figure A1. Residual vs. fitted model.

There seems to be a pattern where the residuals of this model are increasingly dispersed. As a result, the response variable (loads) is transformed logarithmically and the assumptions are re-tested.

```
Code [
model_full = lmer(loads_g_log ~ treatment + (treatment|run), data=test.data, REML=FALSE)
model_null = lmer(loads_g_log ~ (1|run), data=test.data, REML=FALSE)

plot(fitted(model_full), residuals(model_full))
]
```

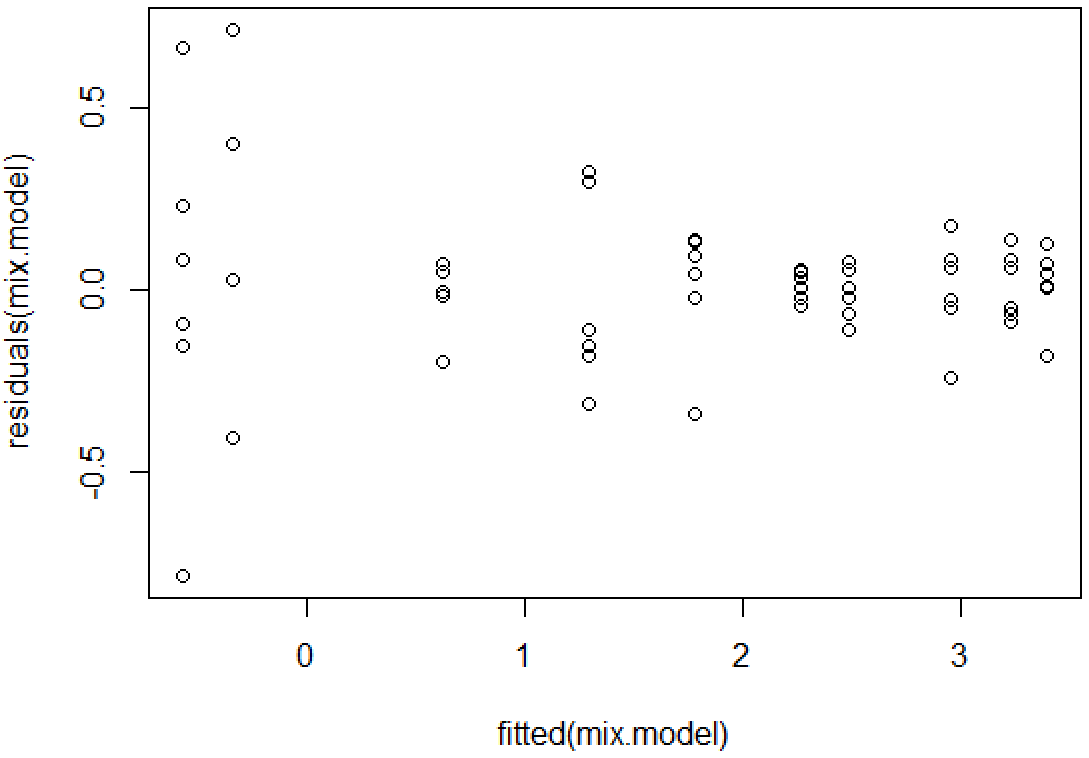


Figure A2. Residual vs. fitted model with log transformed response variable.

This model satisfactorily meets the assumptions 1 and 2. Residuals do not exhibit a clear recognizable pattern and are relatively equidistant from the Y=0 line.

<u>Assumption 3: Absence of collinearity</u>
This assumption is satisfied as the model only identifies one fixed effect with no other closely related variables.

<u>Assumption 4: Normality of residuals</u>

```
Code[
# LOAD LIBRARY
library(fitdistrplus)

# PLOT THE FITTED MODEL AGAINST THE NORMAL DISTRIBUTION
fit.norm <- fitdist(residuals(model_full), "norm")
```

```
plot(fit.norm)
]
```

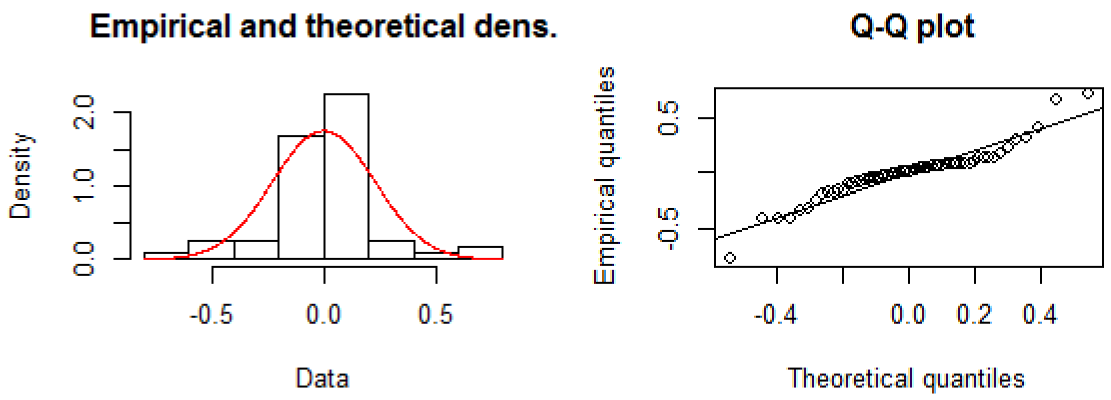


Figure A3. Histogram and Q-Q plot of residuals

Based on figure A3, the model satisfies assumption 4.

Assumption 5: Absence of influential data points

```
Code[
#LOAD LIBRARY
library(influence.ME)

# DFBETA VALUES SHOULD NOT BE MORE THAN 2/sqrt of n;  "n" BEING NUMBER OF VALUES
FOR THE GROUPING FACTOR (THERE ARE 5 RUNS/FLOW RATES)
2/(sqrt(5)) # equals 0.8944272

estex.mix.model <- influence(mix.model, "run")
dfbetas(estex.mix.model, parameter =c(0))
]
```

Table A1. DFBETAS values fixed factor by runs.

Run/flow rates	Intercept	treatmentControl
S1	-0.64651330	-0.02705247
S2	-0.50157391	0.88798512
S3	-0.05102875	0.34856408
S4	0.45949187	-0.29719975
S5	0.81812841	-0.93360428

All DFBETA values are less than 2/sqrt of n (2/(sqrt(5)) = 0.8944272); "n" being number of values for the grouping factor (there are 5 runs/flow rates). Assumption 5 is also satisfied.

ANOVA comparing the full and null model, with and without the fixed factor of treatment respectively

```
Code[
anova(model_full, model_null)
]
```

Table A2. Results for ANOVA comparing the full and null model with and without the fixed factor of treatment, respectively.

Model	Df	AIC	BIC	logLik	Deviance	Chisq	Pr(>Chisq)
Model_null	3	206.187	212.470	-100.094	200.187		
Model_full	6	59.523	72.089	-23.761	47.523	152.66	<2.2e-16

Based on table A2, there is significant difference between the models with and without the fixed factor of treatment. It can be inferred that the treatment has a significant effect, and therefore a significant difference can be claimed between the effluent loads from the CB Shield and Control treatments.

A.2.2 Calculating the 95% confidence interval for the effluent load mean quotient of the two treatments

Table A3. Calculated total/mean loads, bootstrapped standard error, standard deviation, and variance for the scour test results.

	N	Total load (g)	Mean load (g)	Bootstrap standard error[a]	Standard deviation	Variance
CB Shield	30	1564.42	52.11	12.69	69.52	4832.47
Control	30	33957.38	1131.91	176.50	966.75	934597.15

[a] Since datasets are not well suited to satisfy a normal distribution, a bootstrap method was used to calculate standard errors in the R statistical program. The bootstrap method is less stringent on satisfying the normality assumption for calculation of standard errors.

Ratio of mean effluent loads between the control and CB Shield treatments:

Mean of CB Shield/ Mean of Control
= 52.150/1131.910
=0.046
= The mean effluent load of the CB Shield treatment is 5% of the Control treatment.

Confidence Interval:
Using the standard deviation calculated in Table A1, the following GraphPad web application was used to find the confidence interval:
http://www.graphpad.com/quickcalcs/errorProp1/

CI of a sum, difference, quotient or product
Mean of CB Shield **divided by** Mean of Control = 0.046

Table A2. Confidence intervals calculated using bootstrapped standard error at the 90, 95, and 99 percentile (using GraphPad web application)

90% CI:	0.026	to	0.073
95% CI:	**0.023**	**to**	**0.080**
99% CI:	0.016	to	0.096

"These results assume that both variables follow a Gaussian distribution and that the measurements of CB Shield are not paired or matched to measurements of Control. Although the datasets are not entirely normally distributed, the standard error used to calculate the standard deviation was derived using a bootstrap method which is assumed to decrease the stringency on the requirement of normality.

Results computed by the method of EC Fieller, Suppl to J.R.Statist.Soc, 7,1-64 summarized here. "

Based on the calculated confidence interval, the effluent load of the CB Shield during the scour test is at most 8% of that of the Control treatment.

Appendix B. Supplemental Verification Checklist Pursuant to ISO/FDIS 14034:2015

Appendix B provides a supplemental verification checklist pursuant to ISO/FDIS 14034:2015. It may be useful for the verifier to include this completed Appendix in the final Verification Report.

ISO/FDIS 14034:2015 Checklist Principles, procedures and requirements for ETV		
Reference	Requirements (Criteria)	Verifier Comments
1. Applicant Information	1.1 Applicant name(s), address(es) and physical location(s)	Applicant names and addresses provided.
2. Technology Description	2.1 A unique identifier for the technology (e.g., a commercial name, an identification number or applicable version)	The technology is uniquely identified as CB Shield™.
3. Information about the intended application of the technology NOTE: More than one technology purpose, type of material and measurable property can be provided.	3.1 Purpose of the technology	The technology is a flow deflection device that when inserted into catchbasins dissipates the energy of inflows by deflecting flows to the side walls which prevents scour and increases capture of sediments within storm water runoff by increasing its residence time inside the catchbasin.
	3.2 Type of material for which the technology is intended	The technology is intended to catch suspended sediments from stormwater runoff.
	3.3 Measurable property that is affected by the technology and the way in which it is affected	The effluent sediment concentration of stormwater catchbasins is reduced by the technology.
	3.4 Information sufficient to understand the operation and performance of the technology	Applicant has provided sufficient information to understand the operation (i.e., videos and written instructions) and performance of the technology (lab test results).
	3.5 Development status of the	Technology is ready for the market. Production

	technology proposed for verification and its readiness for market (Note: Technology proposed for verification shall be either already available on the market or available at least at a stage where no substantial change affecting its performance will be implemented before market entry)	line is set up to make 100s at a time.
	3.6 Information on relevant alternatives of the technology, including relevant performance and environmental impacts	Current alternatives are in some form of fine mesh either as a guard surrounding the catchbasin inlet or as a pouch directly under the inlet through which all inflow passes through. More similar alternatives to the CB shield include OGS units, but are more expensive to install or retrofit while the CB Shield can be simply inserted into an existing catch basin.
	3.7 Information on significant environmental impacts of the technology proposed for verification and its environmental added value, if applicable.	Yes, the technology will reduce downstream transport of suspended sediment within stormwater runoff received in the catchbasin.
	3.8 Does the technology fulfil the definition of environmental technology?	Definition: "technology that either results in an environmental added value or measures parameters that indicate an environmental impact". The CB Shield inserted into a catchbasin results in an environmental added value of decreased effluent suspended sediment concentration from catchbasins.
4. Operational aspects	4.1 Are the Installation and operating requirements and conditions described?	Yes, installation, operating requirements, and conditions are detailed within the application in addition to links for videos that show installation and lab testing.
	4.2 Are the service and maintenance requirements described?	Yes, service and maintenance would be that required by normal catchbasins in terms of cleanout. The technology is manufactured with strong fiberglass material making it very durable.
	4.3 Is information provided on the expected length of time for which the technology functions under normal operating conditions?	The applicant expects the technology to operate normally given its durability combined with a regular cleanout cycle of less than 2 years; no specific life expectancy is provided.
5. Legal and regulatory context	5.1 Is information provided on the relevant legal requirements and/or standards related to the technology and its use?	Yes.
	5.2 Does the technology adhere to applicable regulatory requirements?	Yes it adheres to requirements for technologies fitted into a catchbasin.
6.Health and Safety	6.1 Are there any applicable health and safety requirements and considerations?	Health and safety requirements follow those set out for cleaning and maintaining regular catchbasins.
7. Performance claim(s) and parameters	7.1 Do the performance claims for the intended application of the technology address the needs of the interested parties?	Yes, the performance claim addresses typical flows that can be expected for a catchbasin and the performance as a result of the CB Shield insert.
	7.2 Is the information on the technology sufficient to review the performance claim(s)?	Yes, the technology is a fairly straight forward flow deflection device and information provided is sufficient to review performance claims.
	7.3 Do the performance claim(s) to be verified include proposed performance parameters and numerical values?	Yes.

	7.4 Are the performance parameters relevant and sufficient for verification of the performance of the environmental technology, and the environmental added value, if applicable?	Yes, the performance parameters indicate the improvement to sediment capture and retention.
	7.5 Can the performance claims be quantitatively verified through testing?	For the claim regarding removal efficiencies determined through the capture test, the results will be simply stated in the form of a claim. For the scour analysis, a significance difference between control and CB shield catchbasin can be verified and the absolute difference stated.
	7.6 Can their numerical values be verified under set operating conditions, using existing verification plans and relevant technical references, including standardized testing methods, preferably based on international standards?	Their numerical values and analysis for the performance claims were attained by 3rd party Good Harbour Laboratory under set operating conditions following for the greater part the OGS testing protocol published by TRCA.
8. Test data	8.1 Are relevant test data and the methods for acquiring these data provided to support the performance claim?	Testing methodology, videos taken during testing, and relevant test data were provided to support the performance claims.
	8.2 Are specifications of the requirements for the test data provided, including quality and quantity and testing conditions?	Specific testing conditions were listed in report regarding flow rates, time for each run, height of the sump (false floor), and amount of sediment added to list a few.
	8.3 Is a description provided of the methods for the assessment of the test data and their quality?	Description of the methods used to assess test data and its quality were provided.
	8.4 Are the data at a quality level generally accepted by the scientific community for the technology and/or the industrial sector concerned?	Yes.
	8.5 Are the data of sufficient quality in terms of reproducibility, repeatability, ranges of confidence, accuracy, and uncertainties?	Yes for the most part. There were a few discrepancies related to the filter of recycled effluent flow not working optimally which increased the background sediment concentration and not having enough sediment left over for scour in the control catchbasin for the final flow rate.
	8.6 Are other relevant technical references included, such as other existing verification plans, applicable legislation, standardized test methods and international standards?	Yes, applicant refrenced OGS testing protocol upon which much of the testing for the CB Shield was based on.
	8.7 Was information provided to explain deviations from the test plan?	Yes deviations from the OGS testing protocol were evident in the testing methodology.
9. Verification	9.1 Were the test data assessed against the performance specified in the verification plan?	Yes.

	9.2 Do the test data confirm the performance of the technology, achieved under the same conditions, constraints and limitations as those specified?	Yes. Few requests made for proof of analysis and for alteration of claim composition were satisfied.
	9.3 Are the performance claims verified as originally stated?	No.
	9.4 If the performance claims are not verified as originally stated, how should they be modified?	Capture test: During the sediment capture test, for a catch basin with a false floor set to 50% of the manufacturer's recommended maximum sediment storage depth and a constant influent sediment concentration of 200 mg/L, the catch basin with a CB Shield insert removed 64, 59.9, 52.4, 42.6, 25.2, and 26.7 percent of influent test sediment by mass at inflow rates of 0.24, 0.48, 1.20, 2.40, 6.00, and 8.40 L/s, respectively. Scour test: For a catchbasin filled to three quarters of the manufacturer's recommended maximum sediment storage depth, with the CB Shield™ insert, scouring of test sediment is at most 8% of the control catchbasin during a continuous 30 minute scour test run with 5 minute duration inflows of 1.2, 4.8, 8.4, 12.0, and 15.6 L/s.

Appendix C. Verification Guidance Pursuant to ISO/FDIS 14034:2015

Appendix C provides guidance on performance testing and verification of technologies pursuant to ISO/FDIS 14034:2015

1. Definition of Roles:

Verifier - Organization that performs environmental technology verification

Test body - Organization that performs testing, test-implementation and reporting on the testing of an environmental technology

Applicant – Organization proposing a technology for which performance will be verified through environmental technology verification

2. Terminology

2.1 Terms related to verification

Verification - Confirmation through the provision of objective evidence

Verification Plan - Detailed planning document for implementation of the environmental technology verification

Verification Report - Document detailing the environmental technology verification and its results

Verification Statement - Document summarizing the results of the environmental technology verification

Test Plan - Detailed planning document specifying the principles, testing methods, conditions and procedures, required to carry out testing and to produce test data

Data Quality - Characteristics of data that relate to their ability to satisfy stated requirements [SOURCE: ISO 14040:2006]

Test Report - Document describing conditions and results of testing

2.2 Terms related to technology

Technology - Application of scientific knowledge, tools, techniques, crafts, or systems in order to solve a problem or achieve an objective, which can result in a product or process

Product - Any goods or service [SOURCE: ISO 14050:2009]

Process - Set of interrelated or interacting activities that transforms inputs into outputs [SOURCE: ISO 14001]

Environmental Technology - Technology that either results in an environmental added value or measures parameters that indicate an environmental impact

Environmental Technology Verification - Verification of the performance of an environmental technology by a verifier

Environmental Impact - Change to the environment, whether adverse or beneficial, wholly or partially resulting from material acquisition, design, production, use, or end-of-use of a technology [SOURCE: adapted from ISO 14001]

Environmental Added Value - More beneficial or less adverse environmental impact of a technology with respect to the relevant alternative

Relevant Alternative - Technology applied currently in similar situation as the environmental technology for which performance will be verified through environmental technology verification

2.3 Terms related to performance

Performance - Measurable result; Performance relates to measurable results supported by numerical quantitative findings. [SOURCE: adapted from ISO 14001]

Performance Claim - Statement of the performance of the environmental technology declared by the applicant

Performance Parameter - Numerical or other measurable factor of the performance of a technology

3. General principles and requirements

3.1 Principles

General - The purpose of environmental technology verification is to provide a credible and impartial account of the performance of environmental technologies. Environmental technology verification is based on a number of principles to ensure that verifications are performed and reported accurately, clearly, unambiguously and objectively.

Factual approach - Verification statements are based on factual and relevant evidence collected through an objective confirmation of the performance of environmental technologies.

Sustainability - Environmental technology verification is a tool in support of sustainability, by providing credible information on the performance of environmental technologies.

Transparency and credibility - Environmental technology verification is based on reliable test results and robust procedures. The process is facilitated such that, to the greatest extent feasible, methods and data are fully disclosed and reports are clear, complete, objective and useful to the interested parties.

Flexibility - Environmental technology verification allows for flexibility in the specification of performance parameters and test methods. This is achieved through dialogue among the applicant, verifier and interested parties to maximize utility of environmental technology verification.

3.2 Requirements

When verifying performance of environmental technologies, the requirements of ISO/FDIS 14034 and the current version of ISO/IEC 17020 Conformity assessment – requirements for the operation of various types of bodies performing inspection - shall be applied and demonstrated.

4. Application review

4.1 Administrative review

Administrative review shall ensure that all information requested for the application has been provided in accordance with the requirements specified.

4.2 Technical review

Technical review shall ensure that:
a) The technology fulfils the definition of environmental technology
b) The performance claim for the intended application of the technology addresses the needs of the interested parties
c) The information on the technology is sufficient to review the performance claim.

4.3 Feedback to Applicant

Any issues related to the acceptance or rejection of the application that may arise from the administrative or the technical review shall be resolved prior to the verification. Acceptance or rejection of the application shall be communicated to the applicant with justification.

5. Pre-verification

5.1 Specification of performance to be verified

Performance to be verified shall be specified in consultation with the applicant prior to the establishment of the verification plan.

Performance parameters shall be specified considering that:
a) They are relevant and sufficient for the verification of the performance of the environmental technology, and the environmental added value, if applicable;
b) They correspond in full to the needs of the interested parties;
c) They can be quantitatively verified through testing;
d) Their numerical values can be verified under set operating conditions, using existing verification plans and relevant technical references, including standardized testing methods, preferably based on international standards.

5.2 Verification plan

The verification plan shall detail the verification procedure specific to the technology and the performance to be verified. The testing conditions specified in the verification plan shall be identical to the operational conditions of the technology defined. The verification plan shall include at a minimum:
a) Identification of the verifier;

b) Identification of the applicant;
c) Unique identification of the verification plan and date of issue;
d) Description of the technology;
e) A list of performance parameters and their assigned numerical values and the description of how they will be verified;
f) Technical and operational details of the planned verification;
g) Specification of the requirements for the test data, including quality and quantity and testing conditions;
h) Description of methods for the assessment of the test data and their quality.

NOTE:
- Requirements on data and data quality should refer to the quality level (e.g. regarding reproducibility, repeatability, ranges of confidence, accuracy, uncertainties,) generally accepted by the scientific community for the technology or (by default) in the industrial sector concerned.
- Other existing verification plans, similar relevant technical references including applicable legislation and standardized test methods, preferably international standards, should be used or referred to wherever available.

6. Verification

The verification of the performance shall be organized as follows: i) acceptance of existing test data; ii) generation of additional test data if needed and iii) confirmation of the performance based on the results of test data assessment.

6.1 Acceptance of existing test data

Test data provided by the applicant which were generated prior to verification may be accepted for the verification if they meet the following requirements:
a) They are relevant for the performance to be verified;
b) They are produced and reported according to the requirements of ISO/IEC 17025;
c) They meet the requirements specified in the verification plan.

If the existing test data do not meet the above requirements then additional test data shall be generated. This shall be communicated to the applicant.

6.2 Generation of additional test data

If any additional test data is required, they shall be produced meeting the requirements specified. This shall be communicated to the applicant.

6.3 Confirmation of performance

Existing test data, that is accepted and additional test data that is generated shall be assessed against the performance specified in the verification plan. The result of the assessment shall be a confirmation of the performance of the technology, achieved under the same conditions, constraints and limitations as those specified for the generation of the test data used for verification.

7. Reporting

7.1 Verification report

A verification report shall be developed. It shall adhere to the verification plan and shall include at a minimum:
a) Identification of the verifier;
b) Identification of the applicant;
c) Unique identification of the report and date of issue;
d) Date of verification;
e) Description of the technology;
f) Test results;
g) Verification results including the verified performance, test conditions, constraints and limitations under which they are met;
h) Description on how the requirements for the verification of the performance and for the test data, as specified in the verification plan, were met, including reporting of any deviations;
i) Signature or other indication of approval by verifier;

If it is necessary to include, information not verified under the environmental technology verification, this shall be clearly stated and explained. The report shall be submitted to the applicant for review and comment. The comments may be incorporated as deemed appropriate.

7.2 Verification statement

A short document summarizing the verification report shall be developed. It shall include at a minimum:

a) Identification of the verifier;
b) Identification of the applicant;
c) Unique identification of the statement and date of issue;
d) A summary description of the technology;
e) A summary description on how the requirements specified in the verification plan were met;
f) Verification results including the verified performance;
g) Description on how the requirements of the verification specified in the verification plan were met including reporting of any deviations
h) A summary of the verification results including the verified performance, test conditions, constraints and limitations under which they are met;
i) A statement that the verification plan has been addressed,
j) Any other information necessary to understand and use the verification statement
k) Signature or other indication of approval by the verifier.

If it is necessary to include, information not verified under the environmental technology verification this shall be clearly stated and explained. The statement shall be submitted to the applicant for review and comment. The comments may be incorporated as deemed appropriate.

8. Post-verification

8.1 Publication

At a minimum, the verification statement should be made available publicly. The publication shall be included in a publicly available directory (e.g. website).

The applicant shall make the statement available to interested parties in full and shall not use parts of the statement for any purpose.

8.2 Validity of the verification report / verification statement

The applicant shall:
a) Ensure that the technology which performance has been verified is conforming to the conditions as per its verification, published verification statement and report, if relevant;
b) Inform the verifier, in writing, of any changes that are made to the technology.

Based on the information provided by the applicant, the verifier shall determine the impact of any changes on the verified performance of the technology to the verification conditions, and therefore the validity of the verification statement and the verification report.

If it is determined that the verification statement and verification report are no longer valid, it shall be communicated to the applicant and made publicly available

8.3 Expiration

An expiration date may be established on the verification statement. After the defined time period, upon demonstration that no changes affecting the verified performance have occurred in the technology, the validity of the verification statement could be extended under the same conditions.

9. References

ISO/IEC 14001, Environmental management systems - Requirements with guidance for use

ISO/IEC 14025, Environmental labels and declarations – Type III environmental declarations – Principles and procedures

ISO/IEC 14040, Environmental management — Life cycle assessment — Principles and framework

ISO/IEC 14050, Environmental management — Vocabulary

ISO/IEC 17020, General criteria for the operation of various types of bodies performing inspection

ISO/IEC 17025, General requirements for the competence of testing and calibration laboratories

ISO Guide 82, Guidelines for addressing sustainability in standards

Appendix D. Raw data

Capture test raw data

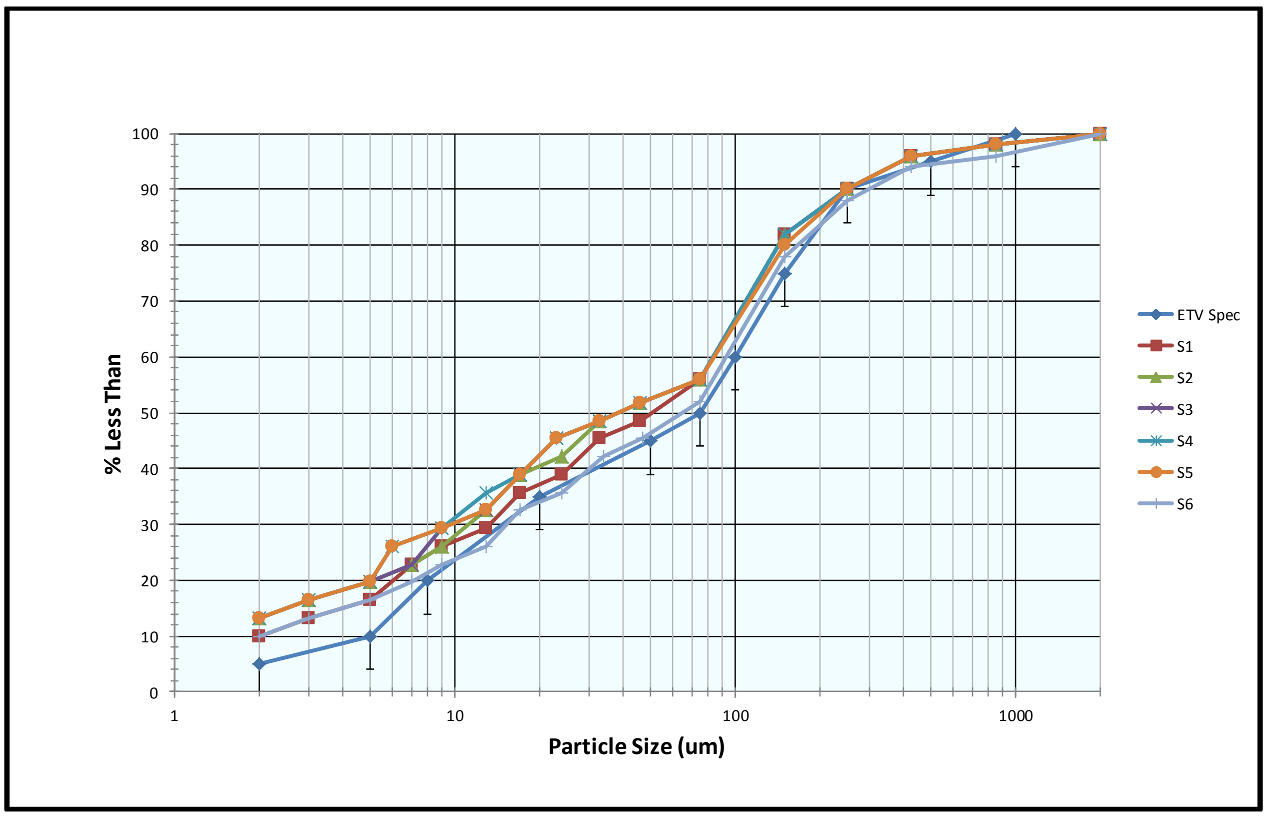
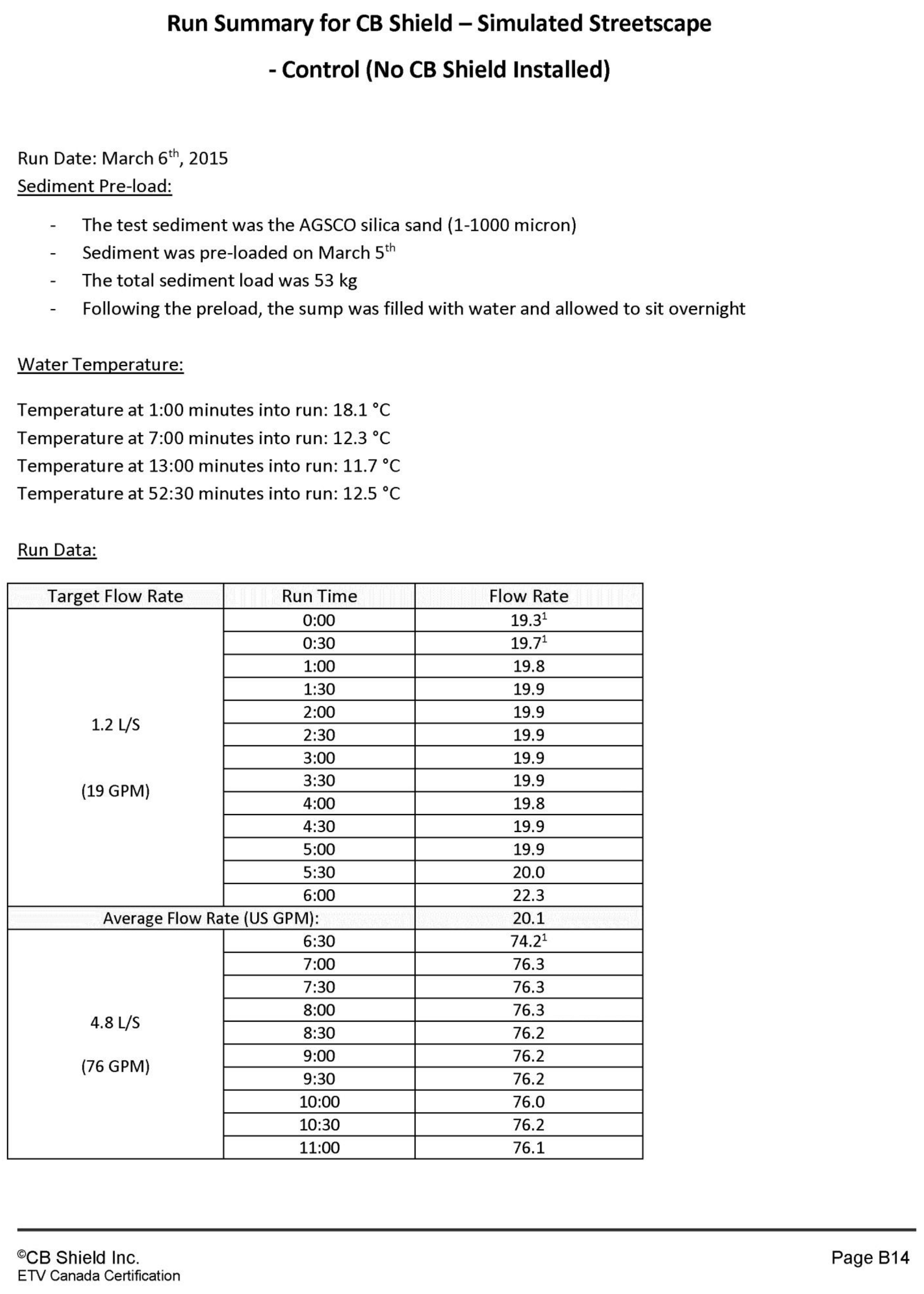


Figure D1. Feed sediment particle size distribution.

Table D1. Removal efficiency based on mass balance.

Run		S1	S2	S3	S4	S5	S6
Target Flow Rate	(L/s)	0.24	0.48	1.2	2.4	6.0	8.4
	(gpm)	3.8	7.7	19.0	38.0	95.1	133
Sediment Mass Added	(kg)	1.217	2.302	5.072	5.150	4.921	4.812
Sediment Captured in Catch Basin	(kg)	0.765	1.368	2.643	2.184	1.238	1.287
Sediment Captured on FCS and Grate	(kg)	0.013	0.010	0.016	0.012	0	0
Total Mass Captured	(kg)	0.778	1.378	2.659	2.196	1.238	1.287
Removal Efficiency	(%)	64.0	59.9	52.4	42.6	25.2	26.7

Scour test raw data



Run Summary for CB Shield – Simulated Streetscape

- Control (No CB Shield Installed)

Run Date: March 6th, 2015

Sediment Pre-load:

- The test sediment was the AGSCO silica sand (1-1000 micron)
- Sediment was pre-loaded on March 5th
- The total sediment load was 53 kg
- Following the preload, the sump was filled with water and allowed to sit overnight

Water Temperature:

Temperature at 1:00 minutes into run: 18.1 °C
Temperature at 7:00 minutes into run: 12.3 °C
Temperature at 13:00 minutes into run: 11.7 °C
Temperature at 52:30 minutes into run: 12.5 °C

Run Data:

Target Flow Rate	Run Time	Flow Rate
1.2 L/S (19 GPM)	0:00	19.3[1]
	0:30	19.7[1]
	1:00	19.8
	1:30	19.9
	2:00	19.9
	2:30	19.9
	3:00	19.9
	3:30	19.9
	4:00	19.8
	4:30	19.9
	5:00	19.9
	5:30	20.0
	6:00	22.3
Average Flow Rate (US GPM):		20.1
4.8 L/S (76 GPM)	6:30	74.2[1]
	7:00	76.3
	7:30	76.3
	8:00	76.3
	8:30	76.2
	9:00	76.2
	9:30	76.2
	10:00	76.0
	10:30	76.2
	11:00	76.1

	11:30	76.0
	12:00	80.7
Average Flow Rate (US GPM):		76.6

[1] Transition flow rate, not included in the average

Target Flow Rate	Run Time	Flow Rate
8.4 L/S (133 GPM)	12:30	134.6[1]
	13:00	132.6
	13:30	132.9
	14:00	132.4
	14:30	132.5
	15:00	132.9
	15:30	132.8
	16:00	132.5
	16:30	132.7
	17:00	132.4
	17:30	132.6
	18:00	132.4
Average Flow Rate (US GPM):		132.6
12.0 L/S [2] (190 GPM)	25:00	185.2[1]
	25:30	188.7
	26:00	189.3
	26:30	189.5
	27:00	191.0
	27:30	191.0
	28:00	190.8
	28:30	190.8
	29:00	190.6
	29:30	191.0
	30:00	190.7
	30:30	191.2
Average Flow Rate (US GPM):		190.4
15.6 L/S [3] (247 GPM)	52:00	245.7[1]
	52:30	249.1
	53:00	248.2
	53:30	248.6
	54:00	248.0
	54:30	247.9
	55:00	247.9
	55:30	247.7
	56:00	248.1
	56:30	247.9
	57:00	247.8
	57:30	247.7
Average Flow Rate (US GPM):		248.1

[1] Transition flow rate, not included in the average

[2] The system was shut down between flow 8.4 L/s and flow 12.0 L/s due to standpipe overflow

[3] The system was shut down between flow 12.0 L/s and flow 15.6 L/s due to standpipe overflow

Effluent Analysis:

Run Time (minutes)	Sample ID	Sample Description	SSC (mg/L)	
			Measured	Corrected[4]
0:00	Background 1-1	Background sample taken at 1.2 L/s	< MDL	-
0:30	Effluent 1-1	1.2 L/s transition sample #1	94.3	94.3
1:00	Effluent 2-1	1st sample taken at 1.2 L/s	129.2	129.2
2:00	Effluent 3-1	2nd sample taken at 1.2 L/s	185.3	185.3
3:00	Effluent 4-1	3rd sample taken at 1.2 L/s	206.0	206.0
4:00	Effluent 5-1	4th sample taken at 1.2 L/s	176.0	176.0
5:00	Effluent 6-1	5th sample taken at 1.2 L/s	523.6	523.6
6:00	Effluent 7-1	6th sample taken at 1.2 L/s	495.7	495.7
7:00	Background 2-1	Background sample taken at 4.8 L/s	< MDL	-
6:30	Effluent 8-1	4.8 L/s transition sample #1	6420	6420
7:00	Effluent 9-1	1st sample taken at 4.8 L/s	7164	7164
8:00	Effluent 10-1	2nd sample taken at 4.8 L/s	8094	8094
9:00	Effluent 11-1	3rd sample taken at 4.8 L/s	6762	6762
10:00	Effluent 12-1	4th sample taken at 4.8 L/s	4842	4842
11:00	Effluent 13-1	5th sample taken at 4.8 L/s	5266	5266
12:00	Effluent 14-1	6th sample taken at 4.8 L/s	4768	4768
13:00	Background 3-1	Background sample taken at 8.4 L/s	1.8	-
12:30	Effluent 15-1	8.4 L/s transition sample #1	6665	6663
13:00	Effluent 16-1	1st sample taken at 8.4 L/s	5431	5429
14:00	Effluent 17-1	2nd sample taken at 8.4 L/s	6649	6648
15:00	Effluent 18-1	3rd sample taken at 8.4 L/s	5027	5025
16:00	Effluent 19-1	4th sample taken at 8.4 L/s	5861	5859
17:00	Effluent 20-1	5th sample taken at 8.4 L/s	5021	5019
18:00	Effluent 21-1	6th sample taken at 8.4 L/s	3251	3249
The system was shut down due to standpipe overflow				
25:30	Background 4-1	Background sample taken at 12.0 L/s	41.2	-
25:00	Effluent 22-1	12.0 L/s transition sample #1	1569	1528
25:30	Effluent 23-1	1st sample taken at 12.0 L/s	1927	1886
26:30	Effluent 24-1	2nd sample taken at 12.0 L/s	1474	1432
27:30	Effluent 25-1	3rd sample taken at 12.0 L/s	1208	1167
28:30	Effluent 26-1	4th sample taken at 12.0 L/s	1550	1508
29:30	Effluent 27-1	5th sample taken at 12.0 L/s	1141	1100
30:30	Effluent 28-1	6th sample taken at 12.0 L/s	749.5	708
The system was shut down due to standpipe overflow				
52:00	Effluent 29-1	15.6 L/s transition sample #1	Not tested	
52:30	Background 5-1	1st Background sample taken at 15.6 L/s	145.6	-
52:30	Effluent 30-1	1st effluent sample taken at 15.6 L/s	532.5	386.9
53:30	Background 6-1	2nd Background sample taken at 15.6 L/s	179.2	-
53:30	Effluent 31-1	2nd effluent sample taken at 15.6 L/s	432.0	252.7
54:30	Background 7-1	3rd Background sample taken at 15.6 L/s	182.4	-
54:30	Effluent 32-1	3rd effluent sample taken at 15.6 L/s	554.9	372.5
55:30	Background 8-1	4th Background sample taken at 15.6 L/s	198.2	-
55:30	Effluent 33-1	4th effluent sample taken at 15.6 L/s	530.6	332.4

56:30	Background 9-1	5th Background sample taken at 15.6 L/s	200.3	-
56:30	Effluent 34-1	5th effluent sample taken at 15.6 L/s	480.1	279.8
57:30	Background 10-1	6th Background sample taken at 15.6 L/s	210.0	-
57:30	Effluent 35-1	6th effluent sample taken at 15.6 L/s	520.2	310.2

MDL – Method detection limit

[4] $SSC_{corrected} = SSC_{measured} - SSC_{background}$

Run Summary for CB Shield Scour Testing

– Simulated Streetscape - With CB Shield Insert

Run Date: March 13th, 2015

Sediment Pre-load:

- The test sediment was the AGSCO silica sand (1-1000 micron)
- Sediment was pre-loaded on March 12th
- The total sediment load was 53 kg
- Following the preload, the sump was filled with water and allowed to sit overnight

Water Temperature:

Temperature at 1:00 minutes into run: 17.1 °C
Temperature at 7:00 minutes into run: 10.6 °C
Temperature at 13:00 minutes into run: 10.0 °C
Temperature at 19:00 minutes into run: 10.4 °C
Temperature at 25:00 minutes into run: 10.7 °C

Run Data:

Target Flow Rate	Run Time	Flow Rate
1.2 L/S (19 GPM)	0:00	17.7[1]
	0:30	18.8[1]
	1:00	18.8
	1:30	18.9
	2:00	18.9
	2:30	19.0
	3:00	18.9
	3:30	19.0
	4:00	18.9
	4:30	18.9
	5:00	18.9
	5:30	18.9
	6:00	18.9
Average Flow Rate (US GPM):		18.9
4.8 L/S (76 GPM)	6:30	50.9[1]
	7:00	76.6
	7:30	76.5
	8:00	76.2
	8:30	76.0
	9:00	75.8
	9:30	76.0
	10:00	76.0
	10:30	75.8

	11:00	75.8
	11:30	76.0
	12:00	75.9
Average Flow Rate (US GPM):		76.1

[1] Transition flow rate, not included in the average

Target Flow Rate	Run Time	Flow Rate
8.4 L/S (133 GPM)	12:30	131.0[1]
	13:00	132.6
	13:30	132.5
	14:00	132.8
	14:30	132.7
	15:00	132.6
	15:30	133.0
	16:00	132.8
	16:30	132.8
	17:00	132.8
	17:30	132.8
	18:00	132.6
Average Flow Rate (US GPM):		132.7
12.0 L/S (190 GPM)	25:00	181.9[1]
	25:30	187.6
	26:00	188.5
	26:30	189.8
	27:00	189.4
	27:30	189.2
	28:00	190.0
	28:30	189.4
	29:00	189.6
	29:30	190.0
	30:00	189.9
	30:30	189.9
Average Flow Rate (US GPM):		189.4
15.6 L/S (247 GPM)	52:00	247.5[1]
	52:30	248.0
	53:00	247.8
	53:30	247.6
	54:00	247.5
	54:30	247.6
	55:00	247.7
	55:30	247.6
	56:00	247.6
	56:30	247.7
	57:00	247.6
	57:30	247.5
Average Flow Rate (US GPM):		247.7

[1] Transition flow rate, not included in the average

Effluent Analysis:

Run Time (minutes)	Sample ID	Sample Description	SSC (mg/L)	
			Measured	Corrected[2]
0:00	Background 1-1	Background sample taken at 1.2 L/s	< MDL	-
0:30	Effluent 1-1	1.2 L/s transition sample #1	31.5	31.5
1:00	Effluent 2-1	1st sample taken at 1.2 L/s	17.7	17.7
2:00	Effluent 3-1	2nd sample taken at 1.2 L/s	6.5	6.5
3:00	Effluent 4-1	3rd sample taken at 1.2 L/s	2.7	2.7
4:00	Effluent 5-1	4th sample taken at 1.2 L/s	3.1	3.1
5:00	Effluent 6-1	5th sample taken at 1.2 L/s	4.6	4.6
6:00	Effluent 7-1	6th sample taken at 1.2 L/s	< MDL	< MDL
7:00	Background 2-1	Background sample taken at 4.8 L/s	< MDL	-
6:30	Effluent 8-1	4.8 L/s transition sample #1	3.0	3.0
7:00	Effluent 9-1	1st sample taken at 4.8 L/s	8.2	8.2
8:00	Effluent 10-1	2nd sample taken at 4.8 L/s	4.0	4.0
9:00	Effluent 11-1	3rd sample taken at 4.8 L/s	< MDL	< MDL
10:00	Effluent 12-1	4th sample taken at 4.8 L/s	< MDL	< MDL
11:00	Effluent 13-1	5th sample taken at 4.8 L/s	1.7	1.7
12:00	Effluent 14-1	6th sample taken at 4.8 L/s	< MDL	< MDL
13:00	Background 3-1	Background sample taken at 8.4 L/s	< MDL	-
12:30	Effluent 15-1	8.4 L/s transition sample #1	2.5	2.5
13:00	Effluent 16-1	1st sample taken at 8.4 L/s	5.4	5.4
14:00	Effluent 17-1	2nd sample taken at 8.4 L/s	10	10
15:00	Effluent 18-1	3rd sample taken at 8.4 L/s	9.5	9.5
16:00	Effluent 19-1	4th sample taken at 8.4 L/s	10	10
17:00	Effluent 20-1	5th sample taken at 8.4 L/s	8.4	8.4
18:00	Effluent 21-1	6th sample taken at 8.4 L/s	8.2	8.2
19:00	Background 4-1	Background sample taken at 12.0 L/s	1.6	-
18:30	Effluent 22-1	12.0 L/s transition sample #1	21.1	19.5
19:00	Effluent 23-1	1st sample taken at 12.0 L/s	40.0	38.4
20:00	Effluent 24-1	2nd sample taken at 12.0 L/s	81.0	79.4
21:00	Effluent 25-1	3rd sample taken at 12.0 L/s	115	113
22:00	Effluent 26-1	4th sample taken at 12.0 L/s	104	103
23:00	Effluent 27-1	5th sample taken at 12.0 L/s	116	114
24:00	Effluent 28-1	6th sample taken at 12.0 L/s	93.9	92.3
25:00	Background 5-1	1st Background sample taken at 15.6 L/s	2.0	-
24:30	Effluent 29-1	15.6 L/s transition sample #1	131.3	128.0
25:00	Effluent 30-1	1st sample taken at 15.6 L/s	180.8	177.4
26:00	Effluent 31-1	2nd sample taken at 15.6 L/s	214.9	211.6
27:00	Effluent 32-1	3rd sample taken at 15.6 L/s	223.7	220.3

28:00	Effluent 33-1	4th sample taken at 15.6 L/s	191.1	187.8
29:00	Effluent 34-1	5th sample taken at 15.6 L/s	227.7	224.4
30:00	Effluent 35-1	6th sample taken at 15.6 L/s	202.5	199.2
30:00	Background 6-1	2nd Background sample taken at 15.6 L/s	4.6	-

MDL – Method detection limit

[2] $SSC_{corrected} = SSC_{measured} - SSC_{background}$

For additional datasets please request for vendor's CETV formal application.

VERIFICATION STATEMENT

GLOBE Performance Solutions

Verifies the performance of

CB Shield® Stormwater Quality Device

Developed by CB Shield Inc.
Oakville, Ontario, Canada

Registration: GPS-ETV_VR2022-10-31

In accordance with

ISO 14034:2016

Environmental Management — Environmental Technology Verification (ETV)

John D. Wiebe, PhD
Executive Chairman
GLOBE Performance Solutions

October 31, 2022
Vancouver, BC, Canada

GLOBE PERFORMANCE SOLUTIONS

Verification Body
GLOBE Performance Solutions
404 – 999 Canada Place | Vancouver, B.C | Canada |V6C 3E2

Technology description and application

The CB Shield® technology provides an environmental benefit of controlling sediment wash off at upstream locations. A standard catch basin has a 1.2 m waterfall inflow that churns up sediment in the sump below causing a very poor rate of sediment retention. The CB Shield is a flow deflection device that is inserted into a standard catch basin. It contains a sloped plate to direct runoff to the back wall of the catch basin, thereby dissipating the energy of stormwater inflows. The dissipation of inflow energy allows time for settling of sediment in stormwater runoff, increasing capture and reducing scour/ re-suspension of previously deposited sediment. Installation involves lowering the unit into a standard sized catch basin, and adjusting the height of the unit to the height of the permanent pool in the sump. The unit is manufactured with durable fiberglass requiring little maintenance and is estimated to be operated on the same cleanout schedule set for the catch basin. Due to high rates of scour in a standard catch basin, they are seldom filled beyond 40% of sump capacity. Clean out routines and expenses are optimized when the CB Shield captures and retains more sediment within the sump.

In an urban setting, there are typically approximately 5 catch basins installed per hectare. Assuming an equal distribution of overland flow, the tested flow rates for the scour and capture tests are meaningful in the context of 78 L/s per hectare and 42 L/s per hectare, respectively. The CB Shield's scour prevention performance has been evaluated in a laboratory setting relative to a standard unshielded catch basin for flows of 1.2 to15.6 L/s. The device's sediment capture performance was evaluated for flows of 0.24 to 8.4 L/s. Hydraulically, the CB Shield has been tested to pass flows up to 60 L/s without any negative impacts (i.e., surcharging).

Performance conditions

Claim 1: Capture test

The capture test is carried out in a laboratory with a constructed simulated street scape (1 % slope along its 2.4 m (96 inch) length, 2 % slope along its 1.2 m (48 inch) width). The catch basin was clean of any litter or debris. Capture performance was tested by comparing the mass of retained sediment with the influent sediment mass for each of six inflow rates: 0.24, 0.48, 1.20, 2.40, 6.00, and 8.40 L/s. The test sediment consisted of ground silica (1 – 1000 micron) with a specific gravity of 2.65, uniformly mixed to meet the particle size distribution specified in the *Procedure for Laboratory Testing of Oil Grit Separators (TRCA, 2014)*. Sediment was injected onto the street scape at a point just upstream of the catch basin to allow mixing prior to discharge while avoiding excessive buildup of sediment on the street scape. The sediment feed rate was adjusted for each flow rate to keep the influent concentrations consistent at 200 mg/L. The tests were conducted with a false floor set at 300 mm below the outlet invert simulating a catch basin that is filled to 50% of the manufacturer's recommended maximum sediment storage.

Claim 2: Scour test

The scour test was carried out in a laboratory on catch basins with and without the CB Shield® insert with a constructed simulated street scape (1 % slope along its 2.4 m (96 inch) length, 2 % slope along its 1.2 m (48 inch) width) and the catch basins clean of any litter or debris. A false floor was set in the catch basins at 254 mm below the outlet invert and preloaded with the test sediment (1- 1000 micron silica blend) test up to 150 mm below the outlet invert simulating a catch basin that is ¾ full of sediment. Water was filled to the effluent pipe and sediments were allowed to settle for 12-24 hours. Flows of 1.2, 4.8, 8.4, 12, and 15.6 L/s were tested on a continuous run with flow rates maintained at 5 minutes and a one minute transition time between flow rates. A minimum effluent grab sample of 500 mL was collected in 1000 mL jars by holding it under the entire effluent stream. A sample was taken at 30 seconds during the flow transitions to account for scour during the transition. Background samples were also taken at least once every flow rate and effluent concentrations were corrected accordingly. Effluent flow was filtered using a 10µm filter and was recycled during the continuous 30 min test.

Performance claim(s)

Claim 1: Capture test

During the sediment capture test, for a catch basin with a false floor set to 50% of the manufacturer's recommended maximum sediment storage depth and a constant influent sediment concentration of 200 mg/L, the catch basin with a CB Shield® insert removed 64, 59.9, 52.4, 42.6, 25.2, and 26.7 percent of influent test sediment by mass at inflow rates of 0.24, 0.48, 1.20, 2.40, 6.00, and 8.40 L/s, respectively.

Claim 2: Scour test

For a catch basin filled to three quarters of the manufacturer's recommended maximum sediment storage depth, with the CB Shield® insert, scouring of test sediment is at most 8% of the control catch basin during a continuous 30 minute scour test run with 5 minute duration inflows of 1.2, 4.8, 8.4, 12.0, and 15.6 L/s.

Performance results

The test sediment used to evaluate the CB Shield® technology was the same as that required by CETV for the evaluation of Oil Grit Separators. The comparison of the average test sediment PSD to the CETV specified PSD in Figure 1 indicates that the test sediment was finer than the specified PSD, with a median particle size of approximately 50 microns.

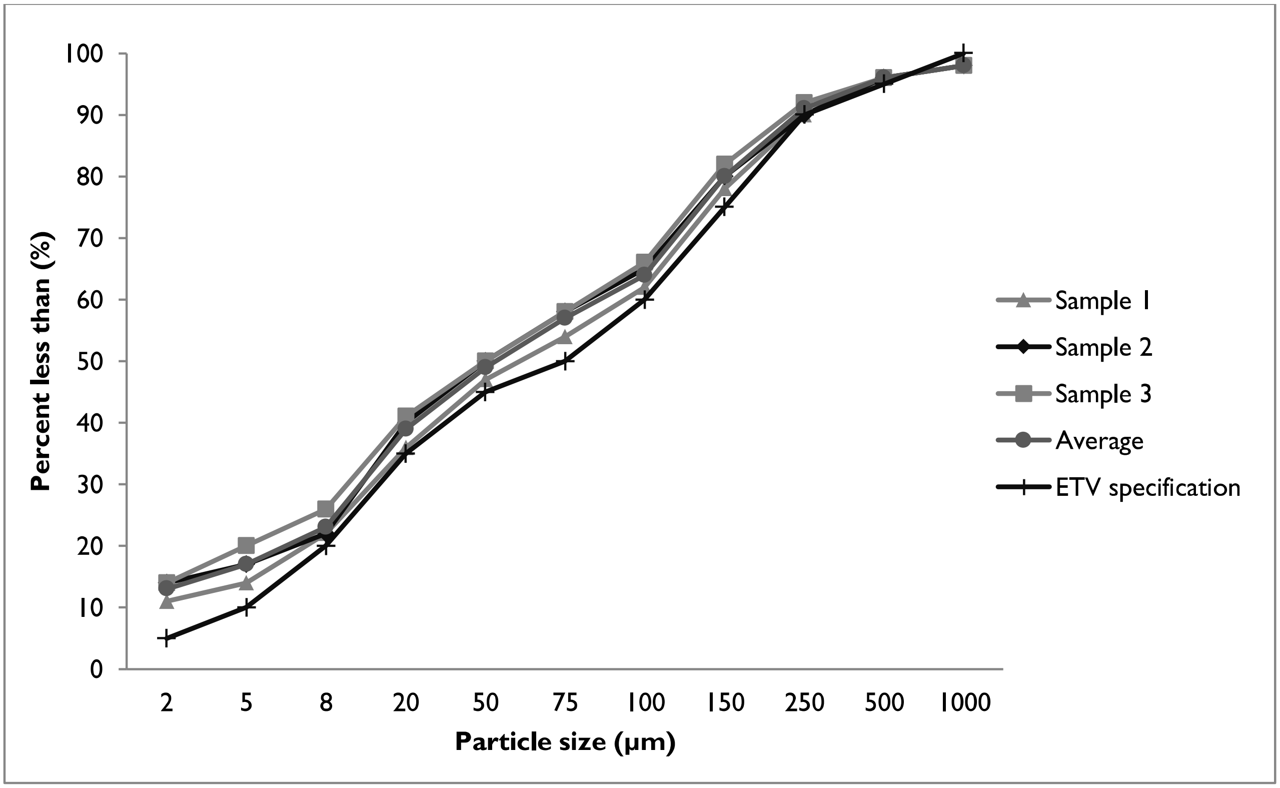


Figure 1. Test sediment particle size distribution (PSD) in relation to specified PSD.

The capacity of the device to retain sediment was determined at six surface loading rates using the modified mass balance method (see TRCA, 2014). During each of the tested flow rates, a known quantity of sediment was injected at a constant rate onto a simulated street scape just upstream of the catch basin containing the CB Shield® technology. Based on these results, removal efficiencies were determined for each of the tested surface loading rates (Table 1).

Table 1. Removal efficiencies (%) based on modified mass balance results at specified surface loading rates.

Flow rate	**(L/s)**	0.24	0.48	1.20	2.40	6.00	8.40
Surface loading rate	**(L/min/m²)**	40	80	200	400	1000	1400
Total mass added	**(kg)**	1.217	2.302	5.072	5.150	4.921	4.812
Total mass captured	**(kg)**	0.778	1.378	2.659	2.196	1.238	1.287
Removal efficiency	**(%)**	64.0	59.9	52.4	42.6	25.2	26.7

Table 2 shows the results of the sediment scour and re-suspension test. This test involved preloading fresh test sediment into the sedimentation area of two catch basins with and without the CB Shield technology, as described in Performance Conditions section above. Effluent samples were collected at one-minute sampling intervals and analyzed for Suspended Sediment Concentration (SSC). The mean sediment scour load of the catch basin with the CB shield insert was shown to be only 5% that of the control catch basin.

Table 2. Scour test effluent sediment concentration and loads.

			CB Shield®			**Control**		
Run	**Flow rates (L/sec)**	**Surface loading rate ($L/min/m^2$)**	**Run time (min)**	**Effluent suspended sediment concentration (mg/L)**	**Sediment load (g)**	**Run time (min)**	**Effluent suspended sediment concentration (mg/L)**	**Sediment load (g)**
1	1.2	200	1:00	17.7	1.3	1:00	129.2	9.7
			2:00	6.5	0.47	2:00	185.3	13.9
			3:00	2.7	0.19	3:00	206.0	15.5
			4:00	3.1	0.22	4:00	176.0	13.2
			5:00	4.6	0.33	5:00	523.6	39.4
			6:00	0.6	0.04	6:00	495.7	41.8
			Sum		**2.6**	**Sum**		**133.5**
2	4.8	800	7:00	8.2	2.4	7:00	7164.0	2069.0
			8:00	4	1.2	8:00	8094.0	2338.0
			9:00	0.6	0.2	9:00	6762.0	1950.0
			10:00	0.6	0.2	10:00	4842.0	1393.0
			11:00	1.7	0.5	11:00	5266.0	1517.0
			12:00	0.6	0.2	12:00	4768.0	1457.0
			Sum		**4.7**	**Sum**		**10724.0**
3	8.4	1400	13:00	5.4	2.7	13:00	5429.0	2725.0
			14:00	10.0	5.0	14:00	6648.0	3332.0
			15:00	9.5	4.8	15:00	5025.0	2528.0
			16:00	10.0	5.0	16:00	5859.0	2939.0
			17:00	8.4	4.2	17:00	5019.0	2515.0
			18:00	8.2	4.1	18:00	3249.0	1628.0
			Sum		**25.8**	**Sum**		**15667.0**
4	12	2000	19:00	38.4	27.6	25:30	1886.0	1347.0
			20:00	79.4	57.2	26:30	1432.0	1027.0
			21:00	113.0	81.3	27:30	1167.0	844.0
			22:00	103.0	74.2	28:30	1508.0	1089.0
			23:00	114.0	82.1	29:30	1100.0	795.0
			24:00	92.3	66.5	30:30	708.0	512.0
			Sum		**388.9**	**Sum**		**5614.0**
5	15.6	2600	25:00	117.4	166.0	52:30	386.9	364.8
			26:00	211.6	198.1	53:30	252.7	237.8
			27:00	220.3	206.2	54:30	372.5	349.6
			28:00	187.8	175.8	55:30	332.4	311.7
			29:00	224.4	210.0	56:30	279.8	262.6
			30:00	199.2	186.5	57:30	310.2	290.9
			Sum		**1142.6**	**Sum**		**1817.4**
Total load					**1564.6**			**33956.0**

Potential sources of error

1. Background concentrations during the scour test were measured to be generally under 5 mg/L for both CB Shield® and Control treatments. However, background concentrations for the Control treatment at flow rates of 12.0 L/s and 15.6 L/s were substantially higher than the expected threshold of 20 mg/L as a result of inefficient recycling of water in the laboratory. Effluent samples were corrected based on the measured background concentrations since it was assumed that background sediments consisted of fine particles that were not captured in the device and flowed through as effluent concentration. If instead, some of the background sediments settled, the correction for all background sediments would bias against the relative performance of the CB Shield and therefore result in a more conservative evaluation of the CB Shield technology performance.

2. The reduction in scour at higher flow rates for the Control treatment suggested that the amount of preloaded sediment (10.2 cm depth) may have been insufficient to provide a continuous supply of fine particles for scour throughout the test. A similar decrease in scour at high flow rates was not observed for the CB Shield® treatment. This interpretation of the data implies that preloading both catch basins with additional sediment would likely have shown increased relative scour for the Control treatment, particularly at high flow rates. Although further testing would be required to verify this interpretation, it is reasonable to suggest that the test as conducted may have produced a smaller relative difference, resulting in a more conservative claim for the CB Shield technology.

Verification

This verification was first completed in October, 2016 and is considered valid for subsequent renewal periods every three (3) years thereafter. Data and information provided by CB Shield Inc. to support the performance claim included the following: Performance test report prepared by Good Harbour Laboratories of Mississauga, Ontario, dated 24 August 2016; the report was based on testing completed in accordance with the Procedure for Laboratory Testing of Oil-Grit Separators (Version 3.0, June 2014).

The original verification was completed by the Toronto and Region Conservation Authority, contracted by GLOBE Performance Solutions, using the Canadian ETV Program's General Verification Protocol (June 2012) and taking into account ISO/FDIS 14034:2015(E). This ETV renewal is considered to meet the equivalency of an ETV verification completed using the International Standard ***ISO 14034:2016 Environmental management -- Environmental technology verification (ETV)***.

What is ISO14034:2016 Environmental management – Environmental technology verification (ETV)?

ISO 14034:2016 specifies principles, procedures and requirements for environmental technology verification (ETV) and was developed and published by the *International Organization for Standardization (ISO)*. The objective of ETV is to provide credible, reliable and independent verification of the performance of environmental technologies. An environmental technology is a technology that either results in an environmental added value or measures parameters that indicate an environmental impact. Such technologies have an increasingly important role in addressing environmental challenges and achieving sustainable development.

For more information on the CB Shield® Stormwater Quality Device please contact:

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39 Uplands Drive
Brantford, ON
N3R 6H5 Canada
Tel: 519-212-9161
info@cbshield.com
www.cbshield.com

For more information on ISO 14034:2016 / ETV please contact:

GLOBE Performance Solutions
404 – 999 Canada Place
Vancouver, BC
V6C 3E2 Canada
Tel: 604-695-5018 / Toll Free: 1-855-695-5018
etv@globeperformance.com
www.globeperformance.com

Limitation of verification - Registration: GPS-ETV_VR2022-10-31
GLOBE Performance Solutions and the Verification Expert provide the verification services solely on the basis of the information supplied by the applicant or vendor and assume no liability thereafter. The responsibility for the information supplied remains solely with the applicant or vendor and the liability for the purchase, installation, and operation (whether consequential or otherwise) is not transferred to any other party as a result of the verification.

NEWROADS AUTOMOTIVE GROUP
1656 GREEN LANE EAST
TOWN OF EAST GWILLIMBURY

DRAWING INDEX

TITLE	SHEET NO
COVER SHEET	1 OF 9
SYSTEM LAYOUT & SYSTEM CALCULATION SHEET	2-7 OF 9
SYSTEM OVERLAY SHEET	8 OF 9
DETAIL SHEET	7 OF 9

	PROJECT INFORMATION		
SITE CONTACT	PHIL ALLEN	416-286-5990	PHILALLEN@STORMCON.CA
ENGINEER / TECHNICAL SPECIALIST	ERIC CUMISKEY	289-380-3742	ECUMISKEY@STORMCON.CA
SALES REP:	GREG DZIEWIECKI	437-231-6080	GREGD@STORMCON.CA
PROJECT NO:	2024-135		

	REVISION	DATE	COMMENT	BY
COMMENTS:				

GENERAL NOTES

1. COORDINATE WITH MANUFACTURER'S REPRESENTATIVE/DISTRIBUTOR FOR PRE-CONSTRUCTION MEETING AND SITE INSPECTION DURING INSTALLATION.
2. ENGINEERING DRAWINGS SUPERSEDE ALL PROVIDED DOCUMENTATION. REFER TO SITE ENGINEERS FOR ADDITIONAL INSTRUCTIONS.
3. COORDINATE GREENSTORM INSTALLATION ACTIVITIES WITH OTHER SITE ACTIVITIES.
4. ALL DIMENSIONS ARE IN METERS UNLESS NOTED OTHERWISE.
5. THE SUB-GRADE AND SIDE BACKFILL TO BE COMPACTED TO 95% SPD OR AS DIRECTED BY THE QUALIFIED ENGINEER.
6. PRESENCE OF GROUND WATER ABOVE THE BASE OF THE SYSTEM MUST BE IDENTIFIED TO STORMCON. ALL PUBLISHED MAXIMUM AND MINIMUM INSTALLATION DEPTHS ASSUME THE GROUND WATER IS AT OR BELOW THE BASE OF THE SYSTEM UNLESS OTHERWISE NOTED.
7. CONFIRM GEOTECHNICAL SOIL EVALUATION BY A QUALIFIED ENGINEER TO DETERMINE SUITABILITY OF STRUCTURAL INSTALLATION.
8. CONFIRM FOR BURIED UNDERGROUND UTILITIES INCLUDING GAS, ELECTRICAL, PIPELINES OR CONDUITS.
9. ROOTS FROM SURROUNDING TREES MAY DAMAGE THE SYSTEM. PROJECT ENGINEER OF RECORD TO ENSURE ADEQUATE SEPARATION FROM ALL TREES.
10. WHEN INSTALLED IN CONFORMANCE TO THE INSTALLATION GUIDELINES, GREENSTORM-ST CAN HANDLE STANDARD CL-625 TRUCK LOADING AFTER 0.80m COVER. FOR NON-STANDARD LOADS AND INSTALLATION WITHIN GROUNDWATER, CONTACT MANUFACTURER'S REPRESENTATIVE/DISTRIBUTOR.
11. PROTECT THE INSTALLATION AGAINST DAMAGE WITH CONSTRUCTION TAPE, FENCING OR OTHER MEANS TILL THE CONSTRUCTION IS COMPLETE.
12. ENSURE THAT CONSTRUCTION FOLLOWS APPLICABLE FEDERAL, PROVINCIAL, LOCAL, MUNICIPAL AND LOCAL LAWS, ORDINANCES, REGULATIONS AND SAFETY REQUIREMENTS.
13. VEHICULAR LOADING IS PROHIBITED UNTIL BACKFILLED AS PER MANUFACTURER'S INSTALLATION GUIDELINES. THE USE OF EQUIPMENT OVER GREENSTORM CHAMBERS IS LIMITED:
    - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
    - NO RUBBER TIRED LOADER, DUMP TRUCK, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE CONSTRUCTION GUIDE.
    - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE CONSTRUCTION GUIDE.

CHECK - REQUIRED MATERIALS AND EQUIPMENT

13. ALL GREENSTORM CHAMBERS AND ACCESSORIES AS SPECIFIED IN THE ENGINEER'S PLANS INCLUDING NON-WOVEN GEOTEXTILE, CONNECTORS, QUADS, SIDEWALLS ADAPTER, RISER AND LINER WHERE APPLICABLE.
14. RECIPROCATING SAW OR ROUTER.
15. TRANSIT OR LASER LEVEL MEASURING DEVICE.
16. COMPACTION EQUIPMENT WITH MAXIMUM GROSS VEHICLE WEIGHT OF 12,000 LBS (5,440 KGS).
17. ACCEPTABLE FILL MATERIAL AS SHOWN IN INSTALLATION INSTRUCTIONS.
18. QUANTITIES FOR GEOSYNTHETIC ARE APPROXIMATE AND MAY VARY BASED ON OVERLAP, WASTAGE.
19. CHECK GREENSTORM CHAMBERS FOR DAMAGE PRIOR TO INSTALLATION. DO NOT USE DAMAGED CHAMBERS, CONTACT YOUR SUPPLIER IMMEDIATELY TO REPORT DAMAGE OR PACKING-LIST DISCREPANCIES.

NOTES FOR BIDDING AND INSTALLATIONS

1. CONTRACTORS ARE EXPECTED TO COMPREHEND AND USE THE MOST CURRENT INSTALLATION INSTRUCTIONS PRIOR TO BEGINNING A SYSTEM INSTALLATION. FOR THE MOST CURRENT INSTRUCTIONS, CONTACT STORMCON AT (289) 380-3742 OR VISIT WWW.STORMCON.CA.
2. CONTACT STORMCON AT LEAST TWO WEEKS PRIOR TO SYSTEM INSTALLATION TO ARRANGE FOR A PRE-CONSTRUCTION MEETING.
3. USE GREENSTORM INSTALLATION INSTRUCTIONS AS A GUIDELINE ONLY FOR MINIMUM/MAXIMUM REQUIREMENTS. ACTUAL DESIGN MAY VARY. REFER TO APPROVED CONSTRUCTION DRAWINGS FOR JOB-SPECIFIC DETAILS. ENGINEERING DRAWINGS SUPERSEDE ALL PROVIDED DOCUMENTATION.
4. THE FOUNDATION STONE SHALL BE LEVEL AND COMPACTED PRIOR TO CHAMBER INSTALLATION.
5. ANY DISCREPANCIES WITH THE SYSTEM SUB-GRADE SOIL'S BEARING CAPACITY MUST BE REPORTED TO THE GEOTECHNICAL ENGINEER.
6. CONTRACTOR TO REFER TO GREENSTORM INSTALLATION INSTRUCTIONS CONCERNING VEHICULAR TRAFFIC. RESPONSIBILITY FOR PREVENTING VEHICLES THAT EXCEED REQUIREMENTS SPECIFIED FROM TRAVELING ACROSS OR PARKING OVER THE CHAMBER SYSTEM LIES SOLELY WITH THE CONTRACTOR THROUGHOUT THE ENTIRE SITE CONSTRUCTION PROCESS. THE PLACEMENT OF WARNING TAPE, TEMPORARY FENCING, AND/OR APPROPRIATELY LOCATED SIGNS IS HIGHLY RECOMMENDED.
7. TRAFFIC OF INSTALLATION EQUIPMENT OR OTHER VEHICULAR TRAFFIC OVER TOP OF THE GREENSTORM STORMWATER SYSTEM IS STRICTLY RESTRICTED AND PROHIBITED UNTIL SATISFACTORY COVER AND COMPACTION IS ACHIEVED ACCORDING TO MANUFACTURER'S INSTALLATION INSTRUCTIONS.
8. EROSION AND SEDIMENT-CONTROL MEASURES MUST MEET LOCAL CODES AND THE DESIGN ENGINEER'S SPECIFICATIONS THROUGHOUT THE ENTIRE SITE CONSTRUCTION PROCESS.
9. GREENSTORM SYSTEMS MUST BE DESIGNED AND INSTALLED IN ACCORDANCE WITH STORMCON'S MINIMUM REQUIREMENTS. FAILURE TO DO SO WILL VOID THE LIMITED WARRANTY.

STORMCON

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NOTE: THESE SHOP DRAWINGS MAY CONTAIN COMPONENTS INCLUDING BUT NOT LIMITED TO MANHOLES, CATCH BASINS, STORM PIPES AND FITTINGS, MANIFOLDS, CASTINGS AND OTHER NECESSARY APPURTENANCES THAT MAY NOT BE SUPPLIED BY STORMCON. IT IS THE RESPONSIBILITY OF THE CONTRACTOR AND/OR SUPPLIER TO CONFIRM THE MATERIALS PROVIDED.

THIS DRAWING WAS PREPARED TO SUPPORT THE PROJECT ENGINEER OF RECORD FOR THE PROPOSED SYSTEM. IT IS THE ULTIMATE RESPONSIBILITY OF THE PROJECT ENGINEER OF RECORD TO ENSURE THAT THE SYSTEM IS DESIGN IN FULL COMPLIANCE WITH ALL APPLICABLE LAWS AND REGULATIONS. IT IS THE CONTRACTOR OF RECORD'S RESPONSIBILITY TO ENSURE THAT THE STORMCON PRODUCTS ARE INSTALLED IN ACCORDANCE WITH STORMCON'S MINIMUM REQUIREMENTS. STORMCON DOES NOT APPROVE PLANS, SIZING, OR SYSTEM DESIGNS.

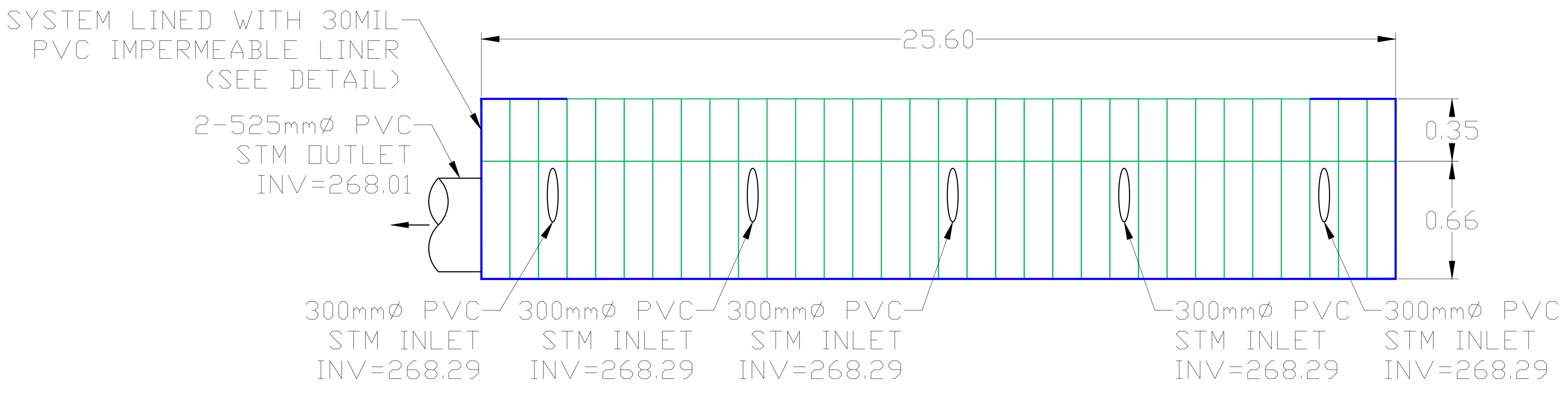
PROPOSED MAIN TANK SYSTEM ELEVATIONS

(TO BE APPROVED BY ENGINEER)
***ENGINEER TO CONFIRM MINIMUM AND MAXIMUM BURIAL REQUIREMENTS ARE MET**

272.98	MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED)
269.78	MINIMUM ALLOWABLE GRADE
268.98	GREENSTORM STORAGE TOP ELEVATION LEVEL 1.5
268.63	GREENSTORM STORAGE TOP ELEVATION LEVEL 1
267.97	GREENSTORM BASE ELEVATION
267.82	BOTTOM OF EXCAVATION
<267.80	SEASONAL HIGH GROUNDWATER ELEVATION

GREENSTORM STORMWATER MANAGEMENT SYSTEM

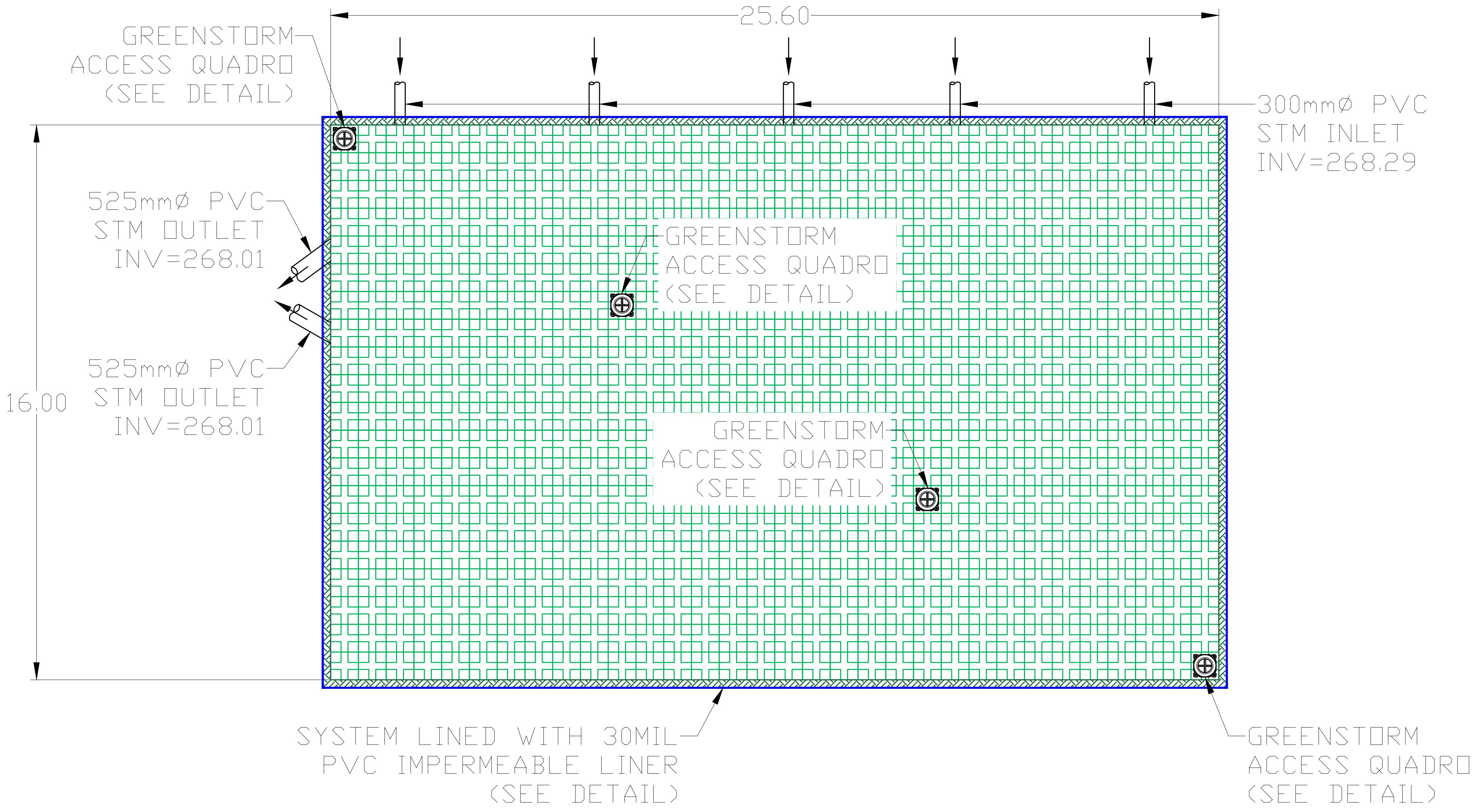
TOTAL STORAGE PROVIDED: 397.15 m^3
STORAGE VOID RATIO: 0.96
SYSTEM AREA: 409.60 m^2
DEPTH OF EMBEDMENT STONE: 0.00 m
DEPTH OF BEDDING STONE: 0.00 m
STONE PERIMETER: 0.00 m



② 1.5 LAYER MAIN TANK SYSTEM LAYOUT PROFILE
NTS

GREENSTORM LEGEND

⊞	GREENSTORM ST BLOCK
▨	GREENSTORM SIDEWALL GRID WITH 8 OZ NON-WOVEN GEOTEXTILE
⊕	GREENSTORM ACCESS QUADRO
—	30MIL PVC IMPERMEABLE LINER



① MAIN TANK SYSTEM LAYOUT PLAN
NTS

NOTE:*ALL EXTERNAL SYSTEM STRUCTURES, INLET/OUTLET PIPES, AND PROPOSED ELEVATIONS MUST BE DESIGNED AND APPROVED BY PROJECT ENGINEER OF RECORD. PROJECT ENGINEER OF RECORD MUST ENSURE CHAMBER BURIAL REQUIREMENTS ARE MET.

MATERIALS LIST SUPPLIED BY STORMCON (SYSTEM MATERIALS LIST - SEE COVER SHEET FOR COMBINED PROJECT MATERIALS LIST)		
GREENSTORM-ST	1912	PIECES
SINGLE LAYER CONNECTOR	1300	PIECES
MULTI LAYER CONNECTOR	1300	PIECES
SIDEWALL GRID	104	PIECES
HALF BLOCK SIDEWALL GRID	104	PIECES
HALF BLOCK COVER PLATE	636	PIECES
HALF BLOCK COVER PLATE QUADRO CONTROL	4	PIECES
QUADRO CONTROL	8	PIECES
QUADRO ADAPTERS	4	PIECES
EXTENSION PIPE	12	METER
CAST IRON COVER	4	PIECES
NO. OF 525mmØ PIPE ADAPTER	0	PIECES
NO. OF 450mmØ PIPE ADAPTER	0	PIECES
MIDDLE GRID	0	PIECES
MIDDLE GRID QUADRO CONTROL	0	PIECES
8 OZ NON-WOVEN GEOTEXTILE	1960	SQ. METER
30MIL PVC IMPERMEABLE LINER	700	SQ. METER
LINER TAPE	370	METER
GREENSTORM FULL TREATMENT ROW	0	PIECES
GREENSTORM HALF TREATMENT ROW	0	PIECES
100MM SUBDRAIN	0	METER

NOTE:*

1)USE OF VEHICLES WHEN APPLYING THE FIRST COVER LAYER :

THE FIRST COVER LAYER CAN BE APPLIED FOR EXAMPLE USING A WHEEL LOADER OR A FRONT-TYPE MOBILE EXCAVATOR. FOR A WHEEL LOADER OR MOBILE EXCAVATOR WITH A MAXIMUM TOTAL WEIGHT Of 15TONS(CHAIN,WHEELS,TWIN-TYRES), A COMPACTED COVER OF AT LEAST 30CM MUST BE PLACED OVER THE STORAGE/INFILTRATION SYSTEM. POSSIBLE FORMATION OF RUTS MUST BE TAKEN INTO ACCOUNT! AVOID STEERING MANOEUVRES AT THIS CONSTRUCTION STAGE

2) USE OF CONSTRUCTION VEHICLES:

DRIVING OVER THE COVER WITH HEAVY CONSTRUCTION VEHICLES WITH A WHEEL LOAD OF UP TO 50KN (E.G. HGV 30) IS POSSIBLE IF THE THICKNESS OF THE COMPACTED COVER IS NOT LESS THAN 60CM. POSSIBLE FORMATION OF RUTS MUST BE TAKEN INTO ACCOUNT! WHEN DUMPING THE EARTHQUAKE MATERIAL, THE WHEEL LOAD OF 140KN MUST NOT BE EXCEEDED;IF NECESSARY,LOAD DISTRIBUTION PLATES MUST BE USED.

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NEWROADS AUTOMOTIVE GROUP
1656 GREEN LANE EAST
TOWN OF EAST GWILLIMBURY
MAIN TANK SYSTEM LAYOUT SHEET

GREENSTORM STORMWATER CHAMBER

PROJECT NO:	2024-135	DATE:	10/18/2024
DESIGNED BY:	JD	CHECKED BY:	EC
SCALE:	N.T.S.	SHEET NO:	2 OF 9

STORMCON

GREENSTORM Stage Storage Calculations

Project Details

Project Name	Newroads Automotive Group
Address	1656 Green Lane East
City	Town of Gwillimbury, ON
Country	Canada
Date	October 18, 2024

System Details

Chamber Model	**GreenStorm-ST**	
Number of Layers	**1.5**	
Height of Chambers	1.01	m
Chamber Length	25.60	m
Chamber Width	16.00	m
Storage Void Ratio	96%	
System Perimeter	83.20	m
GreenStorm Area	409.60	m^2
System Area	409.60	m^2
GreenStorm Base Elevation	**267.97**	m

Top Stone	**0.00**	m
Bottom Stone	**0.00**	m
Perimeter Stone	**0.00**	m
Stone Qty.	0.00	m^3
Stone Void Ratio	40%	
Impermeable Liner	**Yes**	
Middle Grids	**No**	
Highest Finished Grade	**271.14**	m
Lowest Finished Grade	**270.11**	m

Stage Storage

Height of System	GreenStorm Volume	Top Stone Volume	Bottom Stone Volume	Perimeter Stone Volume	Cumulative Storage Volume	Elevation
mm	m^3	m^3	m^3	m^3	m^3	m
1010	13.76	0.00	0.00	0.00	397.15	268.980
975	9.83	0.00	0.00	0.00	383.39	268.945
950	9.83	0.00	0.00	0.00	373.56	268.920
925	9.83	0.00	0.00	0.00	363.72	268.895
900	9.83	0.00	0.00	0.00	353.89	268.870
875	9.83	0.00	0.00	0.00	344.06	268.845
850	9.83	0.00	0.00	0.00	334.23	268.820
825	9.83	0.00	0.00	0.00	324.40	268.795
800	9.83	0.00	0.00	0.00	314.57	268.770
775	9.83	0.00	0.00	0.00	304.74	268.745
750	9.83	0.00	0.00	0.00	294.91	268.720
725	9.83	0.00	0.00	0.00	285.08	268.695
700	9.83	0.00	0.00	0.00	275.25	268.670
675	9.83	0.00	0.00	0.00	265.42	268.645
650	9.83	0.00	0.00	0.00	255.59	268.620
625	9.83	0.00	0.00	0.00	245.76	268.595
600	9.83	0.00	0.00	0.00	235.93	268.570
575	9.83	0.00	0.00	0.00	226.10	268.545
550	9.83	0.00	0.00	0.00	216.27	268.520
525	9.83	0.00	0.00	0.00	206.44	268.495
500	9.83	0.00	0.00	0.00	196.61	268.470
475	9.83	0.00	0.00	0.00	186.78	268.445
450	9.83	0.00	0.00	0.00	176.95	268.420
425	9.83	0.00	0.00	0.00	167.12	268.395
400	9.83	0.00	0.00	0.00	157.29	268.370
375	9.83	0.00	0.00	0.00	147.46	268.345
350	9.83	0.00	0.00	0.00	137.63	268.320
325	9.83	0.00	0.00	0.00	127.80	268.295
300	9.83	0.00	0.00	0.00	117.96	268.270
275	9.83	0.00	0.00	0.00	108.13	268.245
250	9.83	0.00	0.00	0.00	98.30	268.220
225	9.83	0.00	0.00	0.00	88.47	268.195
200	9.83	0.00	0.00	0.00	78.64	268.170
175	9.83	0.00	0.00	0.00	68.81	268.145
150	9.83	0.00	0.00	0.00	58.98	268.120
125	9.83	0.00	0.00	0.00	49.15	268.095
100	9.83	0.00	0.00	0.00	39.32	268.070
75	9.83	0.00	0.00	0.00	29.49	268.045
50	9.83	0.00	0.00	0.00	19.66	268.020
25	9.83	0.00	0.00	0.00	9.83	267.995
0	0.00	0.00	0.00	0.00	0.00	267.970

1.5-LAYER GREENSTORM CALCULATION SHEET (SYSTEM STAGE-STORAGE TABLE)

STORMCON
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NEWROADS AUTOMOTIVE GROUP
1656 GREEN LANE EAST
TOWN OF EAST GWILLIMBURY
MAIN TANK SYSTEM CALCULATION SHEET

GREENSTORM STORMWATER CHAMBER

PROJECT NO:	2024-135	DATE:	10/18/2024
DESIGNED BY:	JD	CHECKED BY:	EC
SCALE:	N.T.S.	SHEET NO:	3 OF 9

PROPOSED ISOLATED ROW SYSTEM ELEVATIONS

(TO BE APPROVED BY ENGINEER)

*ENGINEER TO CONFIRM MINIMUM AND MAXIMUM BURIAL REQUIREMENTS ARE MET

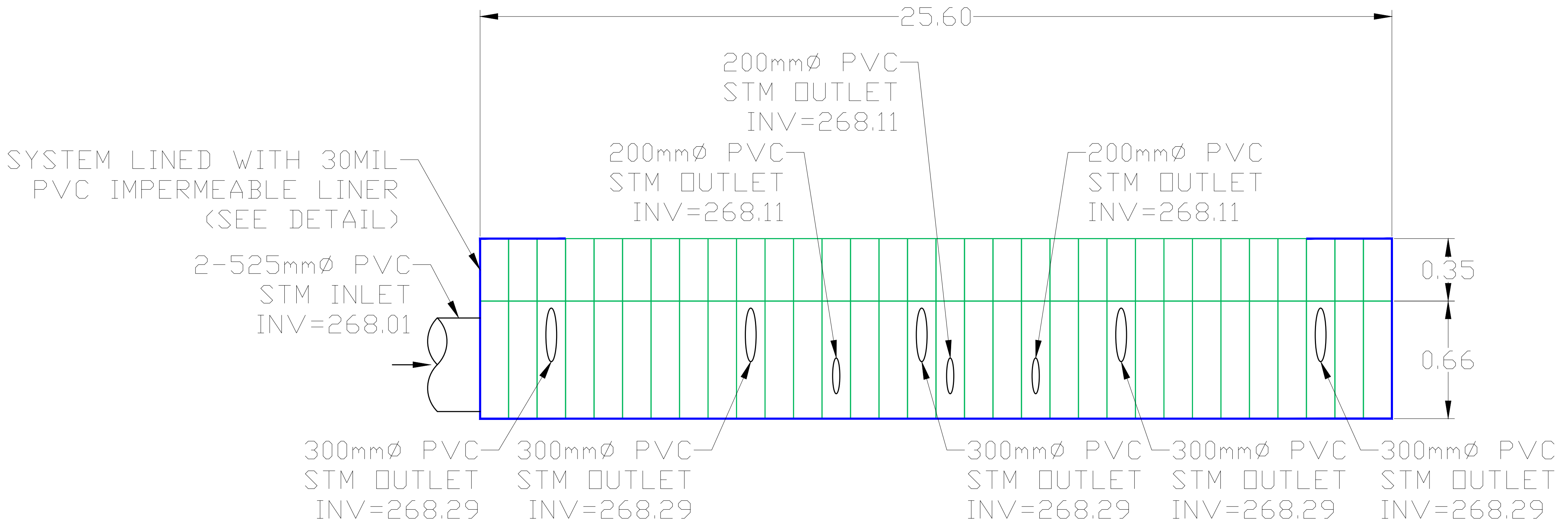
272.98	MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED)
269.78	MINIMUM ALLOWABLE GRADE
268.98	GREENSTORM STORAGE TOP ELEVATION LEVEL 1.5
268.63	GREENSTORM STORAGE TOP ELEVATION LEVEL 1
267.97	GREENSTORM BASE ELEVATION
267.82	BOTTOM OF EXCAVATION
<267.80	SEASONAL HIGH GROUNDWATER ELEVATION

GREENSTORM STORMWATER MANAGEMENT SYSTEM

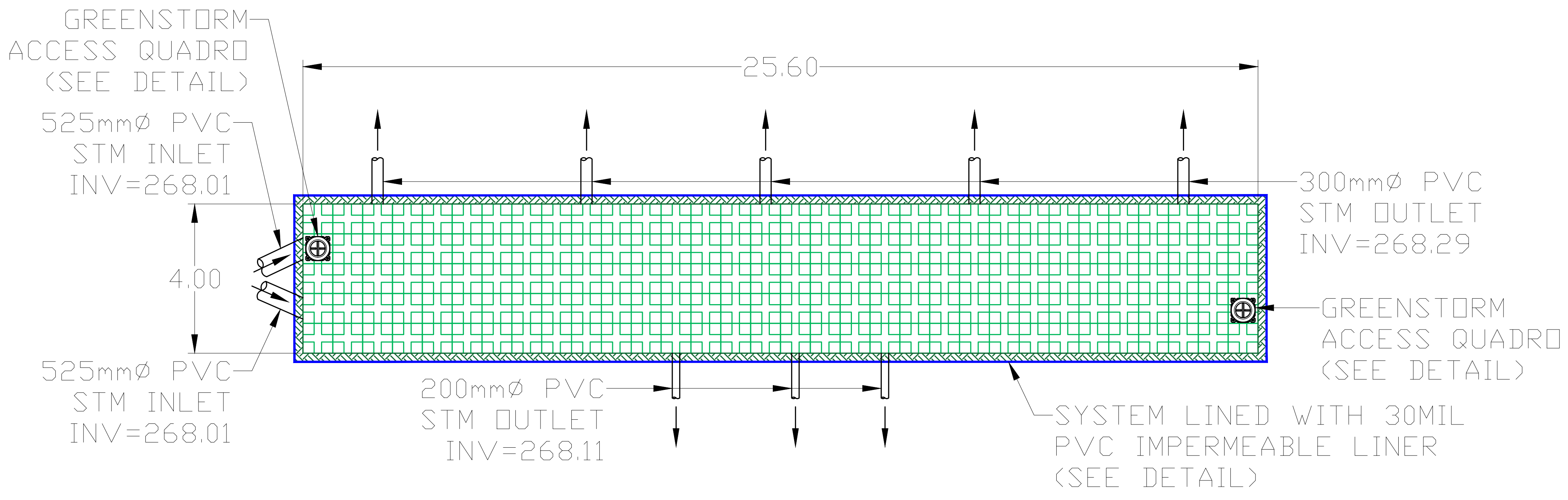
TOTAL STORAGE PROVIDED: 99.29 m^3
STORAGE VOID RATIO: 0.96
SYSTEM AREA: 102.40 m^2
DEPTH OF EMBEDMENT STONE: 0.00 m
DEPTH OF BEDDING STONE: 0.00 m
STONE PERIMETER: 0.00 m

GREENSTORM LEGEND

⊞	GREENSTORM ST BLOCK
▨	GREENSTORM SIDEWALL GRID WITH 8 OZ NON-WOVEN GEOTEXTILE
⊕	GREENSTORM ACCESS QUADRO
—	30MIL PVC IMPERMEABLE LINER



② 1.5 LAYER ISOLATED ROW SYSTEM LAYOUT PROFILE
NTS



① ISOLATED ROW SYSTEM LAYOUT PLAN
NTS

NOTE:*ALL EXTERNAL SYSTEM STRUCTURES, INLET/OUTLET PIPES, AND PROPOSED ELEVATIONS MUST BE DESIGNED AND APPROVED BY PROJECT ENGINEER OF RECORD. PROJECT ENGINEER OF RECORD MUST ENSURE CHAMBER BURIAL REQUIREMENTS ARE MET.

MATERIALS LIST SUPPLIED BY STORMCON (SYSTEM MATERIALS LIST - SEE COVER SHEET FOR COMBINED PROJECT MATERIALS LIST)		
GREENSTORM-ST	476	PIECES
SINGLE LAYER CONNECTOR	300	PIECES
MULTI LAYER CONNECTOR	300	PIECES
SIDEWALL GRID	74	PIECES
HALF BLOCK SIDEWALL GRID	74	PIECES
HALF BLOCK COVER PLATE	158	PIECES
HALF BLOCK COVER PLATE QUADRO CONTROL	2	PIECES
QUADRO CONTROL	4	PIECES
QUADRO ADAPTERS	2	PIECES
EXTENSION PIPE	4	METER
CAST IRON COVER	2	PIECES
NO. OF 525mmØ PIPE ADAPTER	0	PIECES
NO. OF 450mmØ PIPE ADAPTER	0	PIECES
MIDDLE GRID	0	PIECES
MIDDLE GRID QUADRO CONTROL	0	PIECES
8 OZ NON-WOVEN GEOTEXTILE	600	SQ. METER
30MIL PVC IMPERMEABLE LINER	230	SQ. METER
LINER TAPE	120	METER
GREENSTORM FULL TREATMENT ROW	0	PIECES
GREENSTORM HALF TREATMENT ROW	0	PIECES
100MM SUBDRAIN	0	METER

NOTE:*

1)USE OF VEHICLES WHEN APPLYING THE FIRST COVER LAYER :

THE FIRST COVER LAYER CAN BE APPLIED FOR EXAMPLE USING A WHEEL LOADER OR A FRONT-TYPE MOBILE EXCAVATOR. FOR A WHEEL LOADER OR MOBILE EXCAVATOR WITH A MAXIMUM TOTAL WEIGHT Of 15TONS(CHAIN,WHEELS,TWIN-TYRES), A COMPACTED COVER OF AT LEAST 30CM MUST BE PLACED OVER THE STORAGE/INFILTRATION SYSTEM. POSSIBLE FORMATION OF RUTS MUST BE TAKEN INTO ACCOUNT! AVOID STEERING MANOEUVRES AT THIS CONSTRUCTION STAGE

2) USE OF CONSTRUCTION VEHICLES:

DRIVING OVER THE COVER WITH HEAVY CONSTRUCTION VEHICLES WITH A WHEEL LOAD OF UP TO 50KN (E.G. HGV 30) IS POSSIBLE IF THE THICKNESS OF THE COMPACTED COVER IS NOT LESS THAN 60CM. POSSIBLE FORMATION OF RUTS MUST BE TAKEN INTO ACCOUNT! WHEN DUMPING THE EARTHQUAKE MATERIAL, THE WHEEL LOAD OF 140KN MUST NOT BE EXCEEDED;IF NECESSARY,LOAD DISTRIBUTION PLATES MUST BE USED.

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NEWROADS AUTOMOTIVE GROUP
1656 GREEN LANE EAST
TOWN OF EAST GWILLIMBURY
ISOLATED ROW SYSTEM LAYOUT SHEET

GREENSTORM STORMWATER CHAMBER

PROJECT NO:	2024-135	DATE:	10/18/2024
DESIGNED BY:	JD	CHECKED BY:	EC
SCALE:	N.T.S.	SHEET NO:	4 OF 9

GREENSTORM Stage Storage Calculations

Project Details

Project Name	Newroads Automotive Group
Address	1656 Green Lane East
City	Town of Gwillimbury, ON
Country	Canada
Date	October 18, 2024

System Details

Chamber Model	**GreenStorm-ST**	
Number of Layers	**1.5**	
Height of Chambers	1.01	m
Chamber Length	25.60	m
Chamber Width	4.00	m
Storage Void Ratio	96%	
System Perimeter	59.20	m
GreenStorm Area	102.40	m^2
System Area	102.40	m^2
GreenStorm Base Elevation	**267.97**	m

Top Stone	**0.00**	m
Bottom Stone	**0.00**	m
Perimeter Stone	**0.00**	m
Stone Qty.	0.00	m^3
Stone Void Ratio	40%	
Impermeable Liner	**Yes**	
Middle Grids	**No**	
Highest Finished Grade	**270.86**	m
Lowest Finished Grade	**270.30**	m

Stage Storage

Height of System	GreenStorm Volume	Top Stone Volume	Bottom Stone Volume	Perimeter Stone Volume	Cumulative Storage Volume	Elevation
mm	m^3	m^3	m^3	m^3	m^3	m
1010	3.44	0.00	0.00	0.00	99.29	268.980
975	2.46	0.00	0.00	0.00	95.85	268.945
950	2.46	0.00	0.00	0.00	93.39	268.920
925	2.46	0.00	0.00	0.00	90.93	268.895
900	2.46	0.00	0.00	0.00	88.47	268.870
875	2.46	0.00	0.00	0.00	86.02	268.845
850	2.46	0.00	0.00	0.00	83.56	268.820
825	2.46	0.00	0.00	0.00	81.10	268.795
800	2.46	0.00	0.00	0.00	78.64	268.770
775	2.46	0.00	0.00	0.00	76.19	268.745
750	2.46	0.00	0.00	0.00	73.73	268.720
725	2.46	0.00	0.00	0.00	71.27	268.695
700	2.46	0.00	0.00	0.00	68.81	268.670
675	2.46	0.00	0.00	0.00	66.36	268.645
650	2.46	0.00	0.00	0.00	63.90	268.620
625	2.46	0.00	0.00	0.00	61.44	268.595
600	2.46	0.00	0.00	0.00	58.98	268.570
575	2.46	0.00	0.00	0.00	56.52	268.545
550	2.46	0.00	0.00	0.00	54.07	268.520
525	2.46	0.00	0.00	0.00	51.61	268.495
500	2.46	0.00	0.00	0.00	49.15	268.470
475	2.46	0.00	0.00	0.00	46.69	268.445
450	2.46	0.00	0.00	0.00	44.24	268.420
425	2.46	0.00	0.00	0.00	41.78	268.395
400	2.46	0.00	0.00	0.00	39.32	268.370
375	2.46	0.00	0.00	0.00	36.86	268.345
350	2.46	0.00	0.00	0.00	34.41	268.320
325	2.46	0.00	0.00	0.00	31.95	268.295
300	2.46	0.00	0.00	0.00	29.49	268.270
275	2.46	0.00	0.00	0.00	27.03	268.245
250	2.46	0.00	0.00	0.00	24.58	268.220
225	2.46	0.00	0.00	0.00	22.12	268.195
200	2.46	0.00	0.00	0.00	19.66	268.170
175	2.46	0.00	0.00	0.00	17.20	268.145
150	2.46	0.00	0.00	0.00	14.75	268.120
125	2.46	0.00	0.00	0.00	12.29	268.095
100	2.46	0.00	0.00	0.00	9.83	268.070
75	2.46	0.00	0.00	0.00	7.37	268.045
50	2.46	0.00	0.00	0.00	4.92	268.020
25	2.46	0.00	0.00	0.00	2.46	267.995
0	0.00	0.00	0.00	0.00	0.00	267.970

1.5-LAYER GREENSTORM CALCULATION SHEET (SYSTEM STAGE-STORAGE TABLE)

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NEWROADS AUTOMOTIVE GROUP
1656 GREEN LANE EAST
TOWN OF EAST GWILLIMBURY
ISOLATED ROW SYSTEM CALCULATION SHEET

GREENSTORM STORMWATER CHAMBER

PROJECT NO:	2024-135	DATE:	10/18/2024
DESIGNED BY:	JD	CHECKED BY:	EC
SCALE:	N.T.S.	SHEET NO:	5 OF 9

PROPOSED INFILTRATION TANK SYSTEM ELEVATIONS

(TO BE APPROVED BY ENGINEER)

*ENGINEER TO CONFIRM MINIMUM AND MAXIMUM BURIAL REQUIREMENTS ARE MET

272.35	MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED)
269.15	MINIMUM ALLOWABLE GRADE
268.35	GREENSTORM STORAGE TOP ELEVATION LEVEL 0.5
268.00	GREENSTORM BASE ELEVATION
267.85	BOTTOM OF EXCAVATION
<267.80	SEASONAL HIGH GROUNDWATER ELEVATION

GREENSTORM STORMWATER MANAGEMENT SYSTEM

TOTAL STORAGE PROVIDED: 30.11 m^3

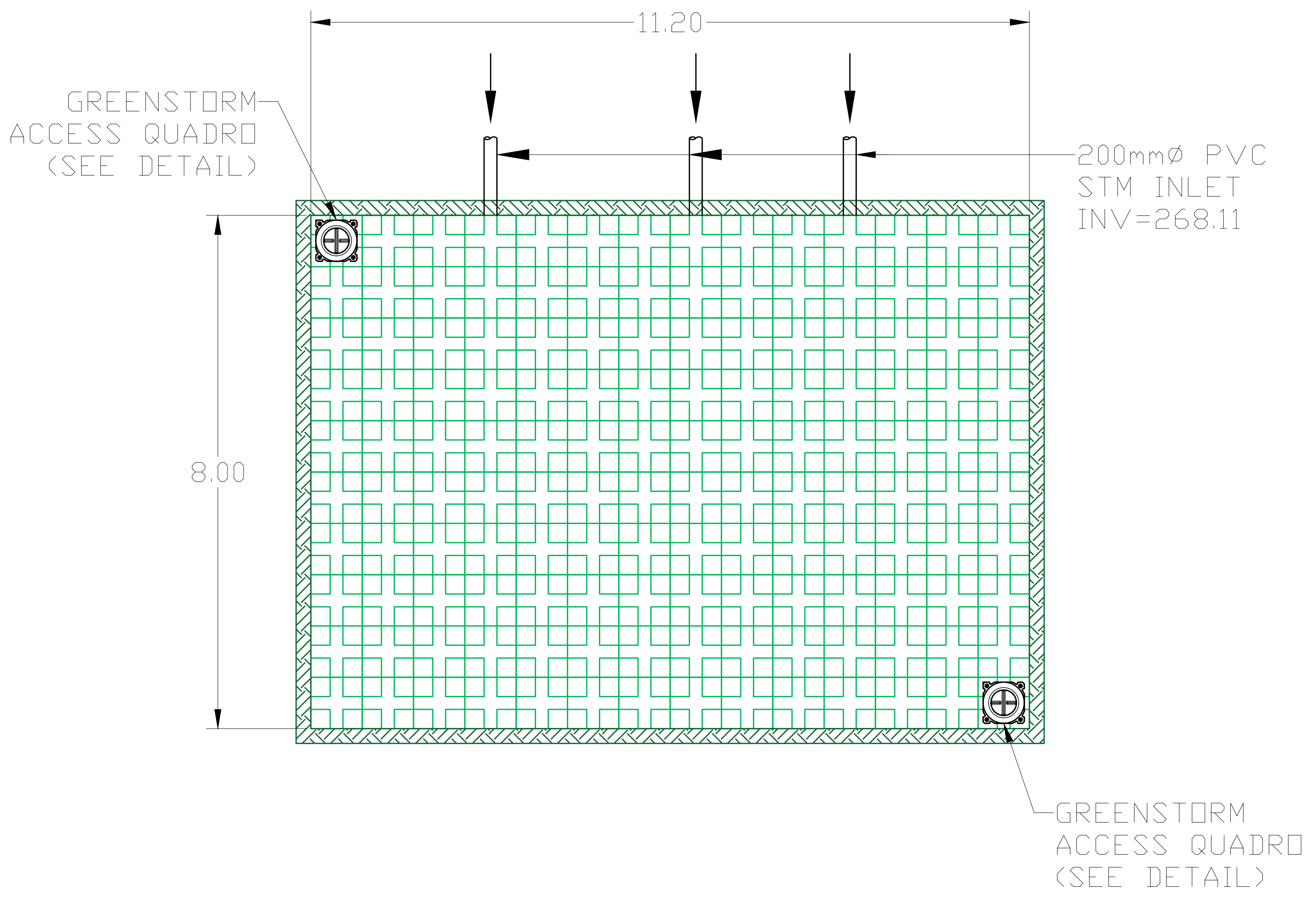
STORAGE VOID RATIO: 0.96

SYSTEM AREA: 89.60 m^2

DEPTH OF EMBEDMENT STONE: 0.00 m

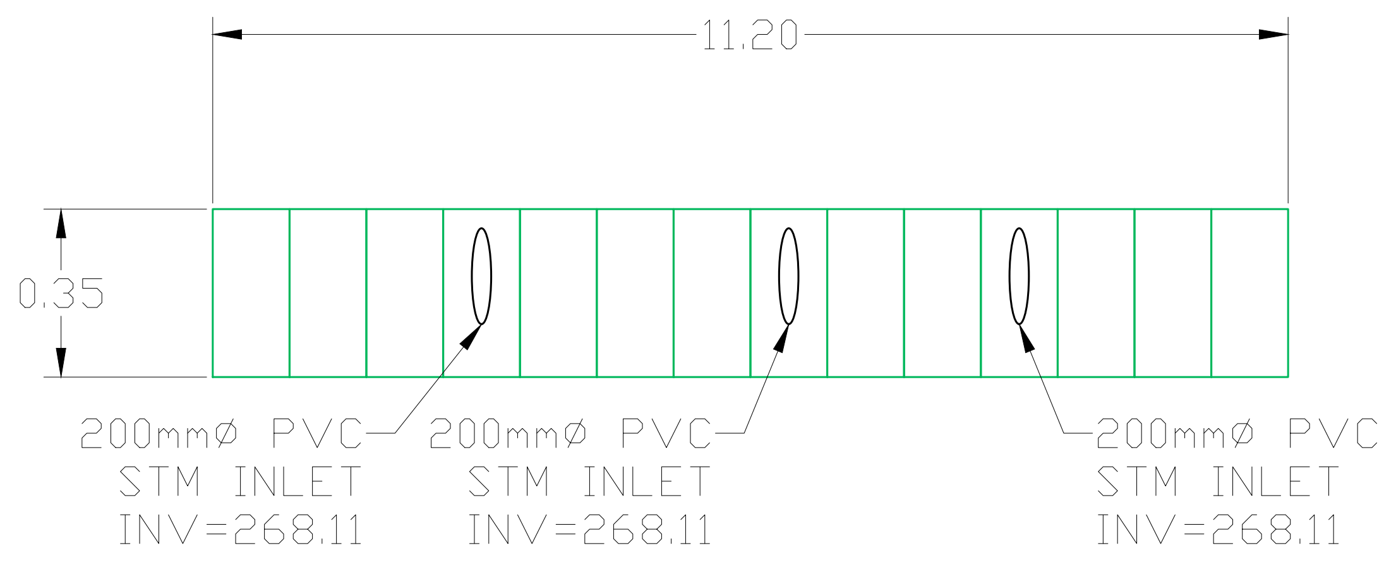
DEPTH OF BEDDING STONE: 0.00 m

STONE PERIMETER: 0.00 m



① INFILTRATION TANK SYSTEM LAYOUT PLAN

NTS



② 0.5 LAYER INFILTRATION TANK SYSTEM LAYOUT PROFILE

NTS

NOTE:*ALL EXTERNAL SYSTEM STRUCTURES, INLET/OUTLET PIPES, AND PROPOSED ELEVATIONS MUST BE DESIGNED AND APPROVED BY PROJECT ENGINEER OF RECORD. PROJECT ENGINEER OF RECORD MUST ENSURE CHAMBER BURIAL REQUIREMENTS ARE MET.

MATERIALS LIST SUPPLIED BY STORMCON

(SYSTEM MATERIALS LIST - SEE COVER SHEET FOR COMBINED PROJECT MATERIALS LIST)

GREENSTORM-ST	140	PIECES
SINGLE LAYER CONNECTOR	300	PIECES
MULTI LAYER CONNECTOR	0	PIECES
SIDEWALL GRID	0	PIECES
HALF BLOCK SIDEWALL GRID	48	PIECES
HALF BLOCK COVER PLATE	138	PIECES
HALF BLOCK COVER PLATE QUADRO CONTROL	2	PIECES
QUADRO CONTROL	0	PIECES
QUADRO ADAPTERS	0	PIECES
EXTENSION PIPE	6	METER
CAST IRON COVER	2	PIECES
NO. OF 525mmØ PIPE ADAPTER	0	PIECES
NO. OF 450mmØ PIPE ADAPTER	0	PIECES
MIDDLE GRID	0	PIECES
MIDDLE GRID QUADRO CONTROL	0	PIECES
8 OZ NON-WOVEN GEOTEXTILE	270	SQ. METER
30MIL PVC IMPERMEABLE LINER	0	SQ. METER
LINER TAPE	0	METER
GREENSTORM FULL TREATMENT ROW	0	PIECES
GREENSTORM HALF TREATMENT ROW	0	PIECES
100MM SUBDRAIN	0	METER

GREENSTORM LEGEND

⊞	GREENSTORM ST BLOCK
▨	GREENSTORM SIDEWALL GRID WITH 8 OZ NON-WOVEN GEOTEXTILE
⊕	GREENSTORM ACCESS QUADRO

NOTE:*

1)<u>USE OF VEHICLES WHEN APPLYING THE FIRST COVER LAYER :</u>

THE FIRST COVER LAYER CAN BE APPLIED FOR EXAMPLE USING A WHEEL LOADER OR A FRONT-TYPE MOBILE EXCAVATOR. FOR A WHEEL LOADER OR MOBILE EXCAVATOR WITH A MAXIMUM TOTAL WEIGHT OF 15TONS(CHAIN,WHEELS,TWIN-TYRES), A COMPACTED COVER OF AT LEAST 30CM MUST BE PLACED OVER THE STORAGE/INFILTRATION SYSTEM. POSSIBLE FORMATION OF RUTS MUST BE TAKEN INTO ACCOUNT! AVOID STEERING MANOEUVRES AT THIS CONSTRUCTION STAGE

2) <u>USE OF CONSTRUCTION VEHICLES:</u>

DRIVING OVER THE COVER WITH HEAVY CONSTRUCTION VEHICLES WITH A WHEEL LOAD OF UP TO 50KN (E.G. HGV 30) IS POSSIBLE IF THE THICKNESS OF THE COMPACTED COVER IS NOT LESS THAN 60CM. POSSIBLE FORMATION OF RUTS MUST BE TAKEN INTO ACCOUNT! WHEN DUMPING THE EARTHQUAKE MATERIAL, THE WHEEL LOAD OF 140KN MUST NOT BE EXCEEDED;IF NECESSARY,LOAD DISTRIBUTION PLATES MUST BE USED.

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NEWROADS AUTOMOTIVE GROUP
1656 GREEN LANE EAST
TOWN OF EAST GWILLIMBURY
IINFILTRATION TANK SYSTEM LAYOUT SHEET

GREENSTORM STORMWATER CHAMBER

PROJECT NO:	2024-135	DATE:	10/18/2024
DESIGNED BY:	JD	CHECKED BY:	EC
SCALE:	N.T.S.	SHEET NO:	6 OF 9

GREENSTORM Stage Storage Calculations

Project Details

Project Name	Newroads Automotive Group
Address	1656 Green Lane East
City	Town of Gwillimbury, ON
Country	Canada
Date	October 18, 2024

System Details

Chamber Model	**GreenStorm-ST**	
Number of Layers	**0.5**	
Height of Chambers	0.35	m
Chamber Length	11.20	m
Chamber Width	8.00	m
Storage Void Ratio	96%	
System Perimeter	38.40	m
GreenStorm Area	89.60	m^2
System Area	89.60	m^2
GreenStorm Base Elevation	**268.00**	m

Top Stone	**0.00**	m
Bottom Stone	**0.00**	m
Perimeter Stone	**0.00**	m
Stone Qty.	0.00	m^3
Stone Void Ratio	40%	
Impermeable Liner	**No**	
Middle Grids	**No**	
Highest Finished Grade	**270.86**	m
Lowest Finished Grade	**270.54**	m

Stage Storage

Height of System	GreenStorm Volume	Top Stone Volume	Bottom Stone Volume	Perimeter Stone Volume	Cumulative Storage Volume	Elevation
mm	m^3	m^3	m^3	m^3	m^3	m
350	2.15	0.00	0.00	0.00	30.11	268.350
325	2.15	0.00	0.00	0.00	27.96	268.325
300	2.15	0.00	0.00	0.00	25.80	268.300
275	2.15	0.00	0.00	0.00	23.65	268.275
250	2.15	0.00	0.00	0.00	21.50	268.250
225	2.15	0.00	0.00	0.00	19.35	268.225
200	2.15	0.00	0.00	0.00	17.20	268.200
175	2.15	0.00	0.00	0.00	15.05	268.175
150	2.15	0.00	0.00	0.00	12.90	268.150
125	2.15	0.00	0.00	0.00	10.75	268.125
100	2.15	0.00	0.00	0.00	8.60	268.100
75	2.15	0.00	0.00	0.00	6.45	268.075
50	2.15	0.00	0.00	0.00	4.30	268.050
25	2.15	0.00	0.00	0.00	2.15	268.025
0	0.00	0.00	0.00	0.00	0.00	268.000

0.5-LAYER GREENSTORM CALCULATION SHEET (SYSTEM STAGE-STORAGE TABLE)

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NEWROADS AUTOMOTIVE GROUP
1656 GREEN LANE EAST
TOWN OF EAST GWILLIMBURY
INFILTRATION TANK SYSTEM CALCULATION SHEET

GREENSTORM STORMWATER CHAMBER

PROJECT NO:	2024-135	DATE:	10/18/2024
DESIGNED BY:	JD	CHECKED BY:	EC
SCALE:	N.T.S.	SHEET NO:	7 OF 9

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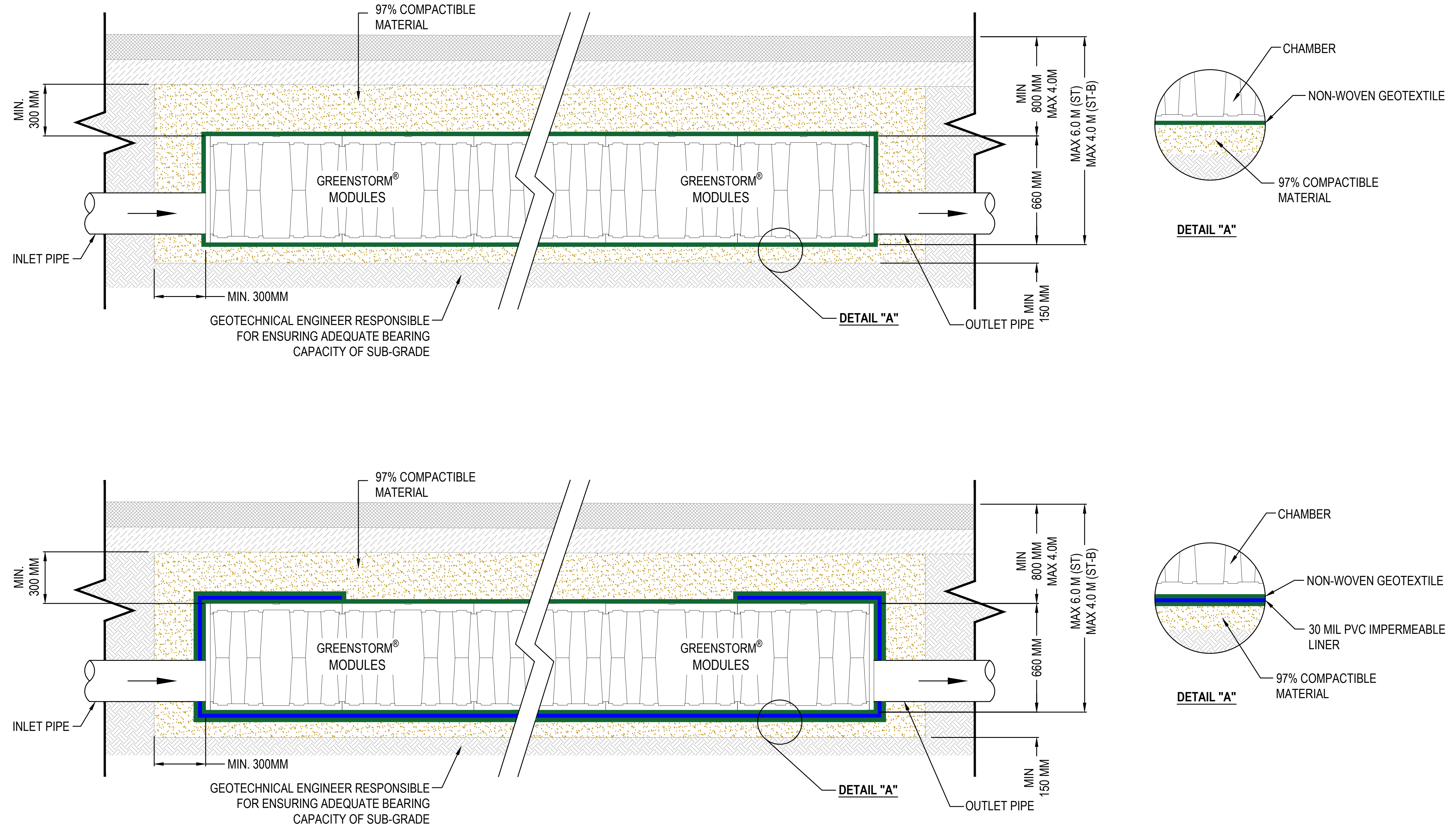
NEWROADS AUTOMOTIVE GROUP
1656 GREEN LANE EAST
TOWN OF EAST GWILLIMBURY
SYSTEM OVERLAY SHEET

GREENSTORM STORMWATER CHAMBER

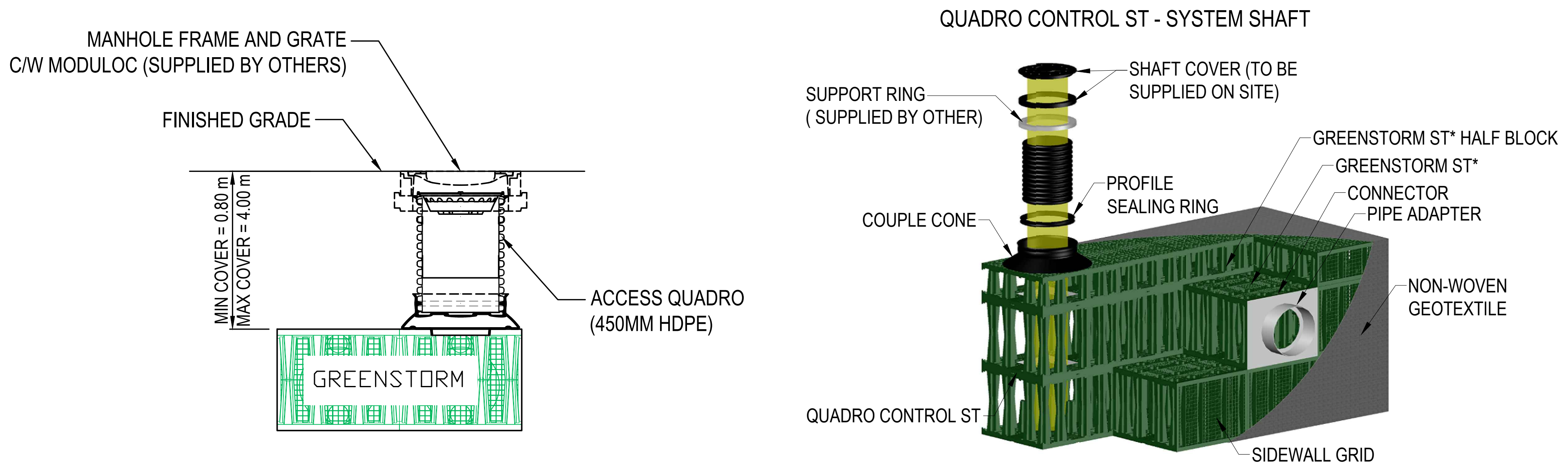
PROJECT NO:	2024-135	DATE:	10/18/2024
DESIGNED BY:	JD	CHECKED BY:	EC
SCALE:	N.T.S.	SHEET NO:	8 OF 9



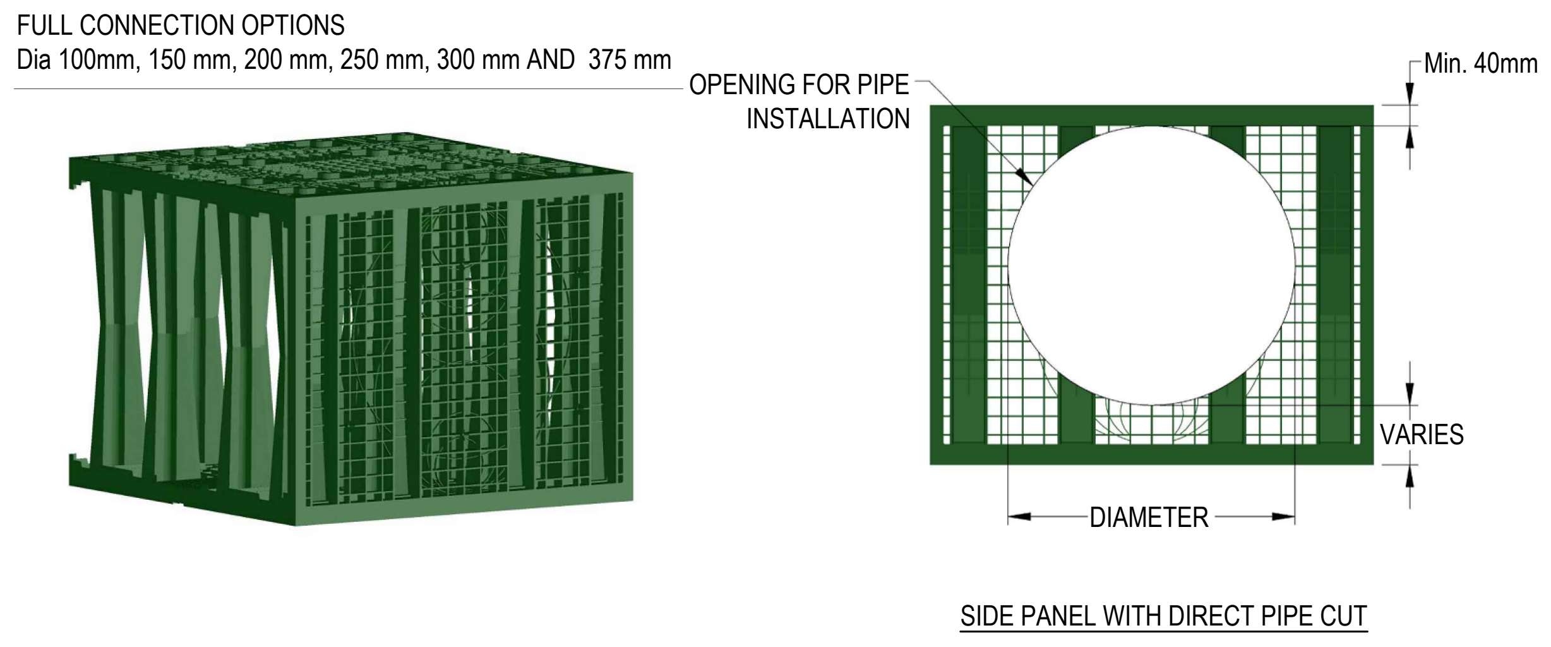
**Recommended bedding materials : HPB

COMPACTIBLE MATERIAL LIST	LEGEND
• GRANULAR A • GRANULAR B • 19mm CLEAR ANGULAR STONE • HIGH PERFORMANCE BEDDING (HPB) • HL6	🟦 30MIL PVC IMPERMEABLE LINER 🟩 8 OZ NON-WOVEN GEOTEXTILE

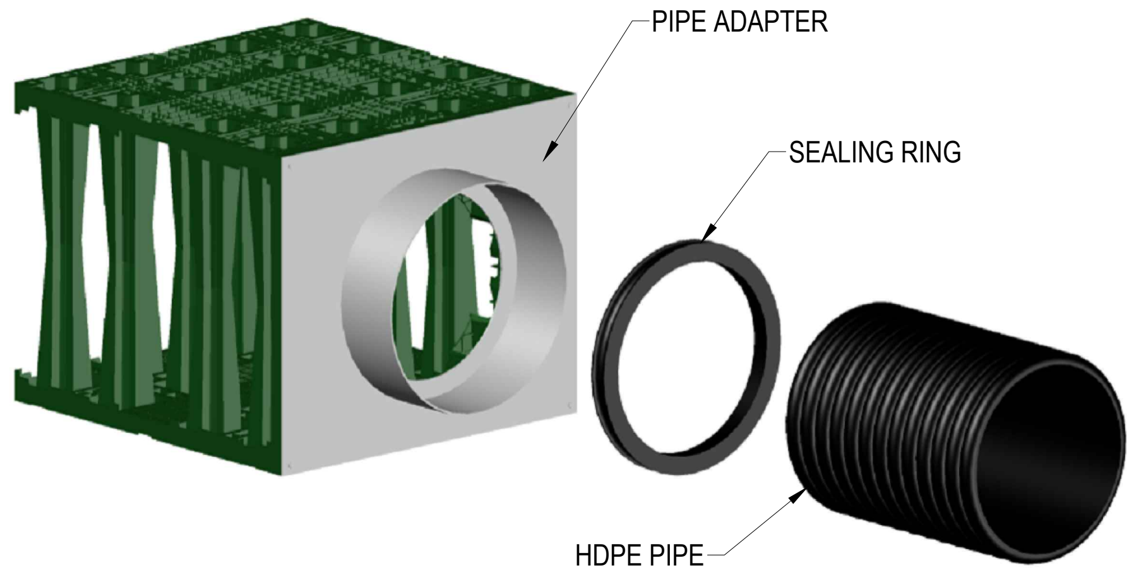
TYPICAL ONE LAYER GREENSTORM CROSS SECTION



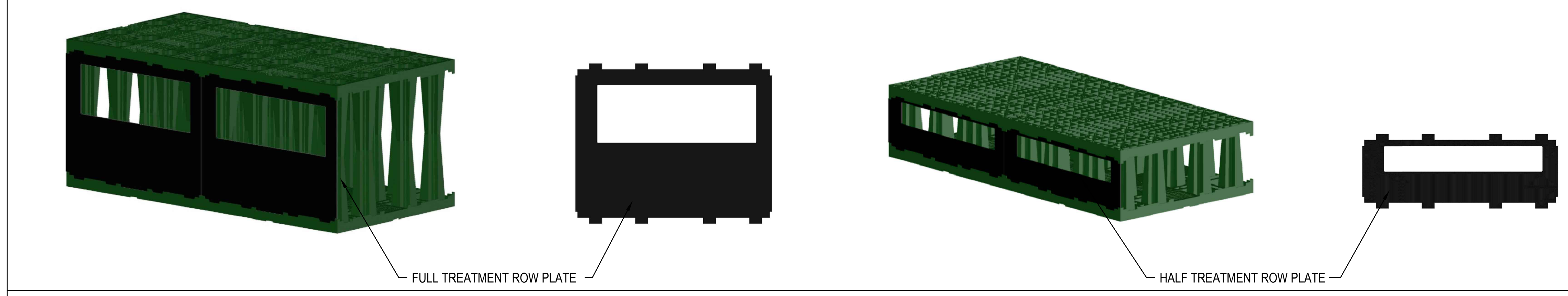
GREENSTORM ACCESS QUADRO DETAIL(WHERE APPLICABLE)



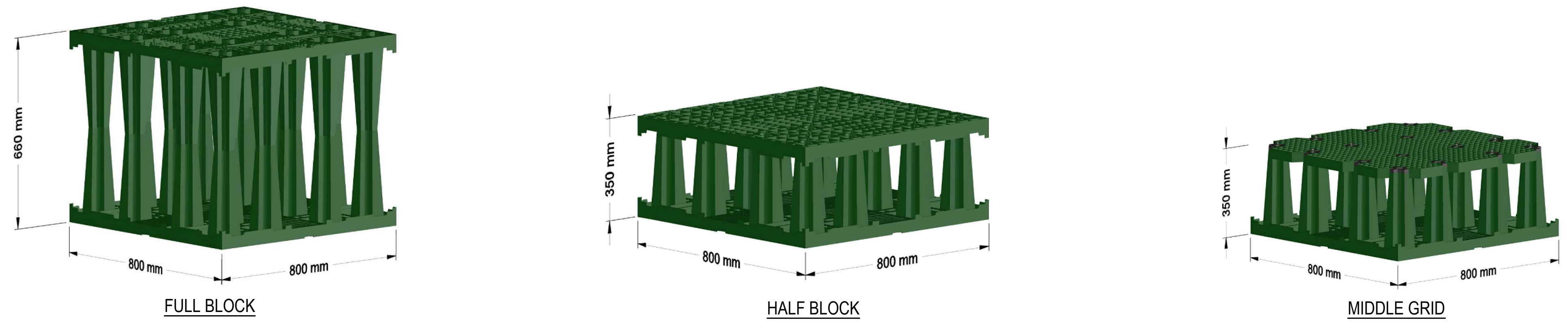
STANDARD SIDE PANEL WITH DIRECT PIPE CUT



STD. ADAPTER PANEL W/ DIA 450&525



STANDARD TREATMENT ROW DETAIL (WHERE APPLICABLE)



STANDARD GREENSTORM BLOCK DETAIL

STORMCON

69 CONNIE CRESCENT
CONCORD, ON
L4K 1L3

SALES@STORMCON.CA
www.STORMCON.CA

THIS DRAWING WAS PREPARED TO SUPPORT THE PROJECT ENGINEER OF RECORD FOR THE PROPOSED SYSTEM. IT IS THE ULTIMATE RESPONSIBILITY OF THE PROJECT ENGINEER OF RECORD TO ENSURE THAT THE SYSTEM IS DESIGN IN FULL COMPLIANCE WITH ALL APPLICABLE LAWS AND REGULATIONS. IT IS THE CONTRACTOR OF RECORD'S RESPONSIBILITY TO ENSURE THAT THE STORMCON PRODUCTS ARE INSTALLED IN ACCORDANCE WITH STORMCONS MINIMUM REQUIREMENTS. STORMCON DOES NOT APPROVE PLANS, SIZING, OR SYSTEM DESIGNS.

NEWROADS AUTOMOTIVE GROUP
1656 GREEN LANE EAST
TOWN OF EAST GWILLIMBURY

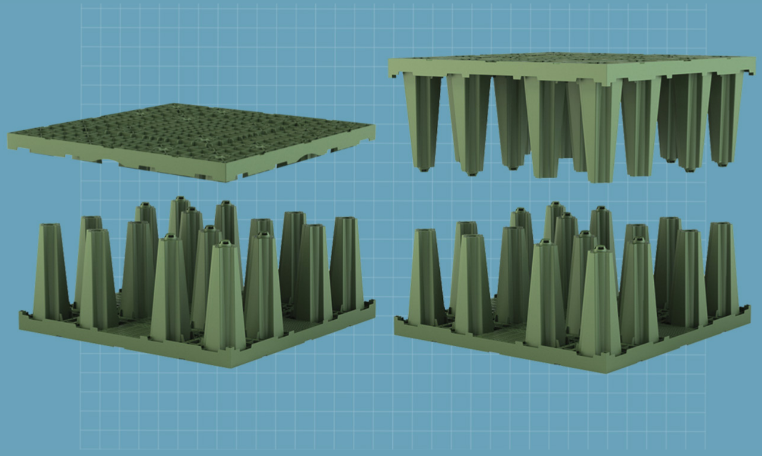
DETAILS SHEET

GREENSTORM STORMWATER CHAMBER

PROJECT NO:	2024-135	DATE:	10/18/2024
DESIGNED BY:	JD	CHECKED BY:	EC
SCALE:	N.T.S.	SHEET NO:	9 OF 9

STORMCON

STORMWATER MANAGEMENT
STORMWATER STORAGE



GREENSTORM ST
GREENSTORM ST-B

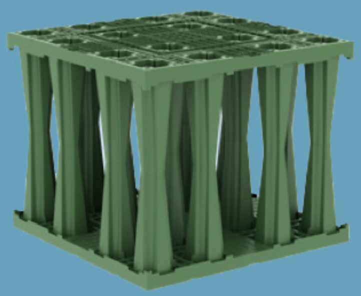
UNDERGROUND STORAGE INFILTRATION MODULES

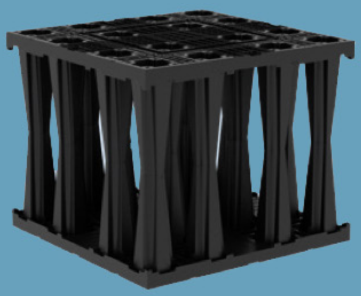
www.stormcon.ca

STORMCON

GREENSTORM ST* SYSTEM

Certifcation CSTB





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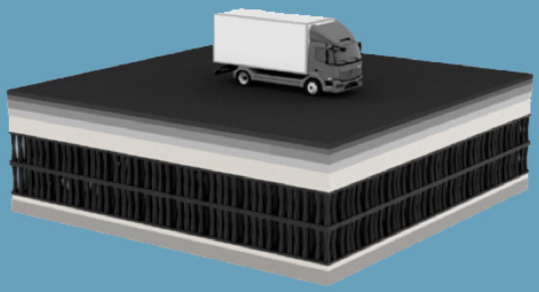


EXTREMELY HIGH VOLUME **VERY EASY TO INSTALL** **100% INSPECTABLE**

NB

In what follows, an illustrative explanation of the GreenStorm system will be given by means of the green module. All properties and advantages also apply to the GreenStorm ST-B system. The systems have been optimised for different installation situations.

In the following, please be sure to pay attention to these signs:

Statements marked with this sign apply to both GreenStorm ST and GreenStorm ST-B.

TABLE OF CONTENTS

STORING STORMWATER WITH STORAGE/ INFILTRATION SYSTEMS

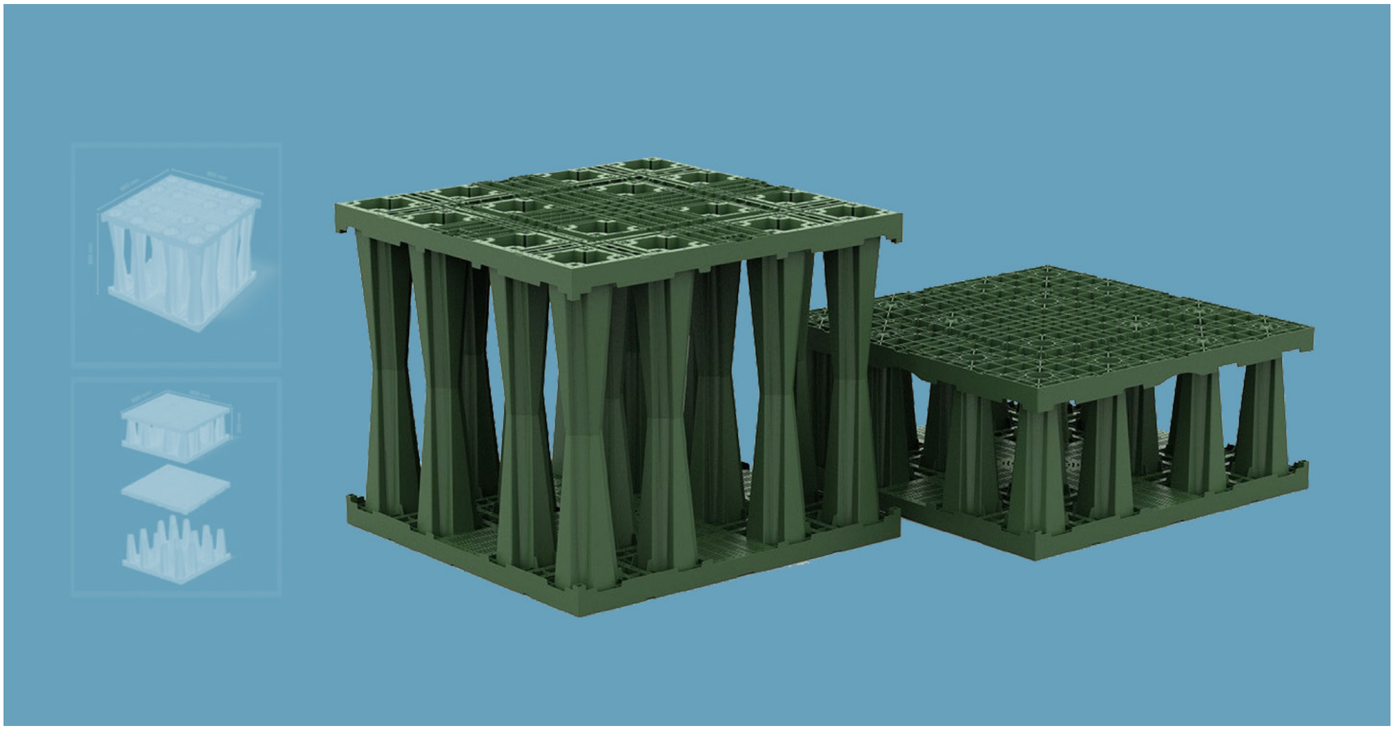
Basic element for underground water storage facilities

GreenStorm ST* are plastic tanks to be installed underground (storage/ infiltration modules) in which water is collected and stored. Storage/infiltration systems temporarily collect stormwater and discharge it later. In addition to infiltration using underdrained swale systems, pipe swales, and gravel swales common in the past, increasingly more storage/infiltration systems are being built today.

The storage space of the storage/ infiltration system consists of numerous GreenStorm ST* modules which can be combined three - dimensionally to form large systems.

The advantage of this method is that the void ratio is up to three times larger in these infiltration systems than in gravel swales which saves space and excavation work.

GreenStorm ST* is a modular system which is characterised by high flexibility, rapid installation and a high level of user-friendliness.



APPLICATION – INFILTRATION

Stormwater infiltration – giving back to nature

Large amounts of stormwater can reduce the performance of wastewater treatment systems. Infiltrating unpolluted stormwater nearby has therefore several advantages.

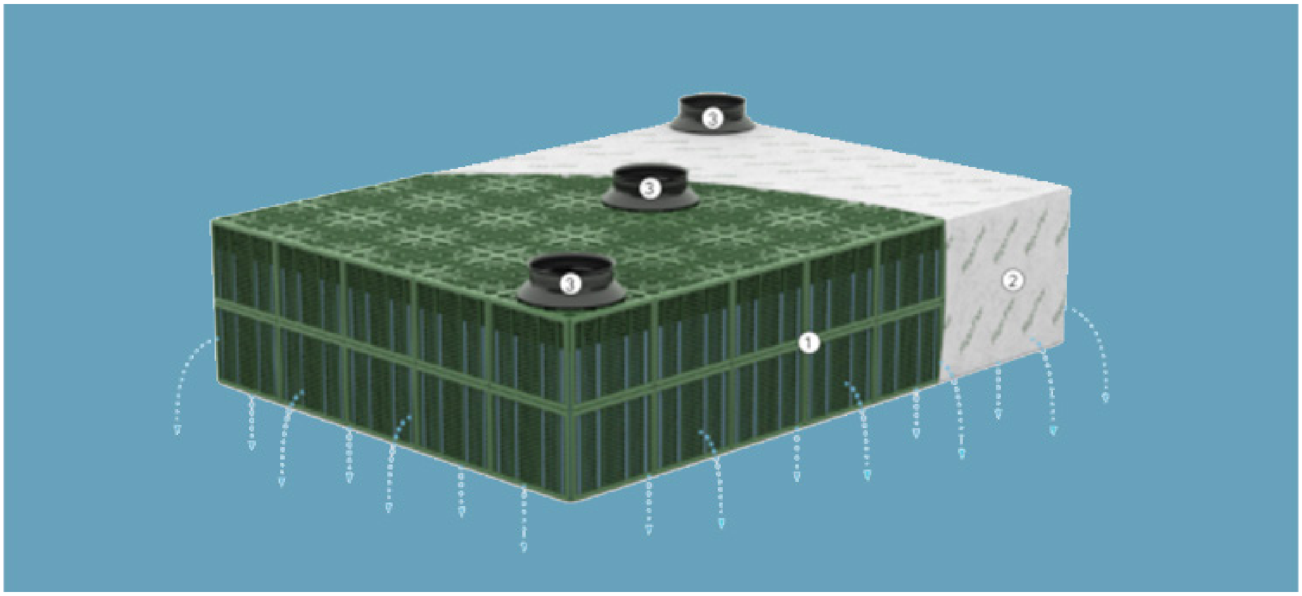
A constant growth in built-up areas and increase in impervious surfaces prevent natural infiltration of stormwater into the soil. Special infiltration systems are used in order to discharge it to the water cycle. In addition to infiltration using pipe swales, increasingly more storage/infiltration systems are being built.

The advantage of this method is that the storage volume of the infiltration system is increased, and space and excavation are saved as compared to gravel swales.

Stormwater is thus returned to the natural water cycle and can contribute to producing new groundwater. Infiltration systems are subject to very high requirements. Consequently, they have become an important component of urban drainage.

Storage/infiltration systems considerably increase the underground storage volume. High-performance storage/infiltration systems can be installed even in confined space.

In particular in urban construction no additional space is required and precious building ground is saved.



① GreenStorm ST* storage/infiltration module ② Geotextile ③ QuadrControl ST system shaft

APPLICATION – RETENTION

Retaining stormwater – instead of flooding

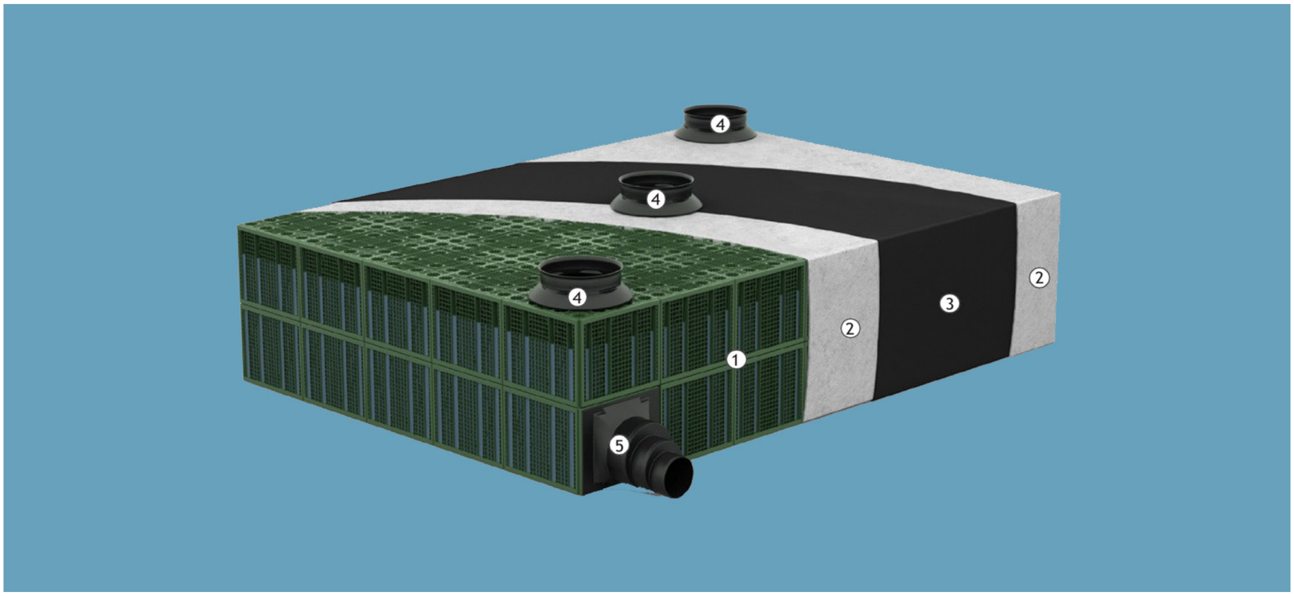
If subsoil conditions are unfavourable to infiltration, the goal is to retain the stormwater and ensure a retarded, timelagged discharge. Exposure to impulsive stress can be eliminated or reduced in sewer networks, wastewater treatment systems and waterbodies.

Stormwater retention systems retard the infiltration of stormwater. They are comprised of a watertight retaining element, an inlet and a vortex outlet.

The stormwater distributes evenly in the system where it can be stored and is then discharged in a controlled manner through throttle shafts. If infiltration must be avoided or to prevent unintended discharge of groundwater or strata water (e.g., in case of contaminated soil), it is necessary to waterproof the retention system.

Stormwater runoff from impervious surfaces that cannot infiltrate naturally leads to peak loads in sewer systems.

Stormwater retention facilities collect stormwater in an underground storage tank and discharge it in a retarded manner but continuously. Their very short construction times make storage/ infiltration systems an inexpensive alternative to conventional retention facilities such as retention channels or underground concrete tanks.



① GreenStorm ST* storage/infiltration module ② Geotextile ③ Impermeable membrane
④ QuadroControl ST system shaft ⑤ Adapter

APPLICATION – HARVESTING / FIRE WATER STORAGE

Retaining stormwater – instead of flooding

Water – particularly drinking water – is a priceless resource which should be treated responsibly and used sparingly. It is therefore wise to collect, store and use stormwater if the water must not necessarily be suitable for drinking purposes, instead of allowing the water to infiltrate into the soil unused or diverting it into the sewer system.

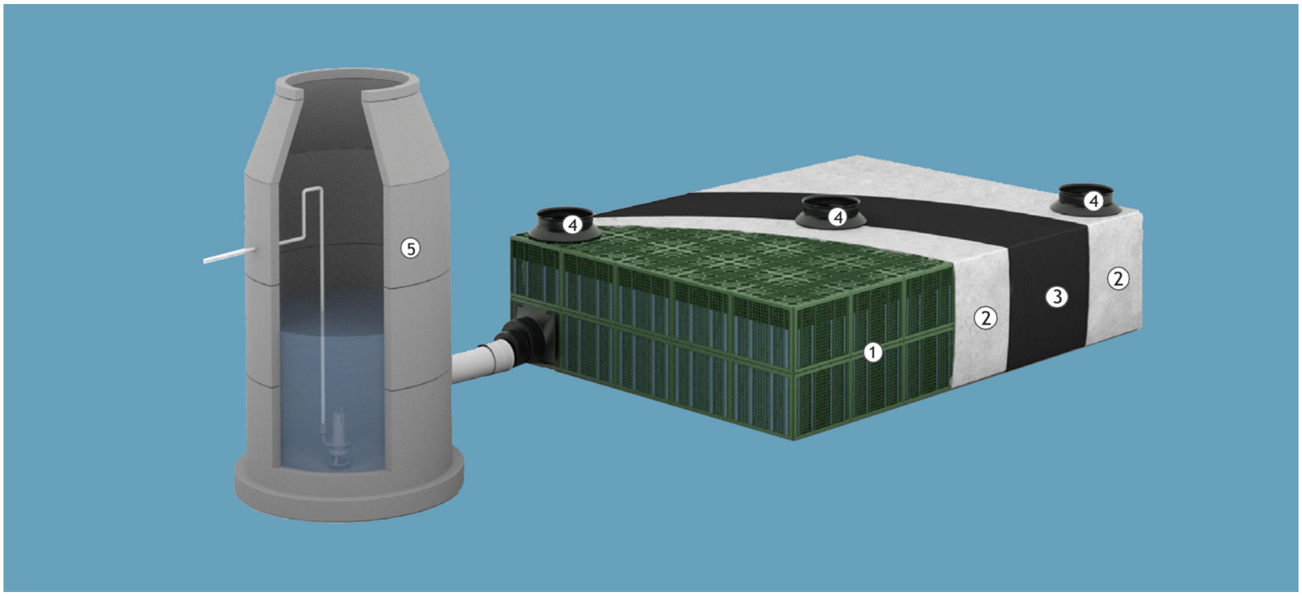
There are many examples: irrigation for greens, car wash, use in toilets, etc.

Water is diverted into a waterproof storage/ infiltration system and can be supplied for use via a pumping system

The use of the GreenStorm inspect system allows for finding solutions that fit project-specific requirements – even under the most difficult conditions such as very tight space, narrow conditions, low cover, high groundwater level, etc.

Stormwater harvesting systems provide waterfor different domestic and industrial water uses. They comprise a watertight retaining element, an inlet with upstream stormwater treatment system, a pump shaft and a system control.

Using GreenStorm ST* for fire water storage also saves water, since system checks can be made in a filled state and water does not have to be pumped out as is the case with conventional concrete tanks.



① GreenStorm ST* storage/infiltration module ② Geotextile ③ Impermeable membrane
④ QuadroControl ST system shaft ⑤ Adapter

APPLICATION – MODULAR DESIGN

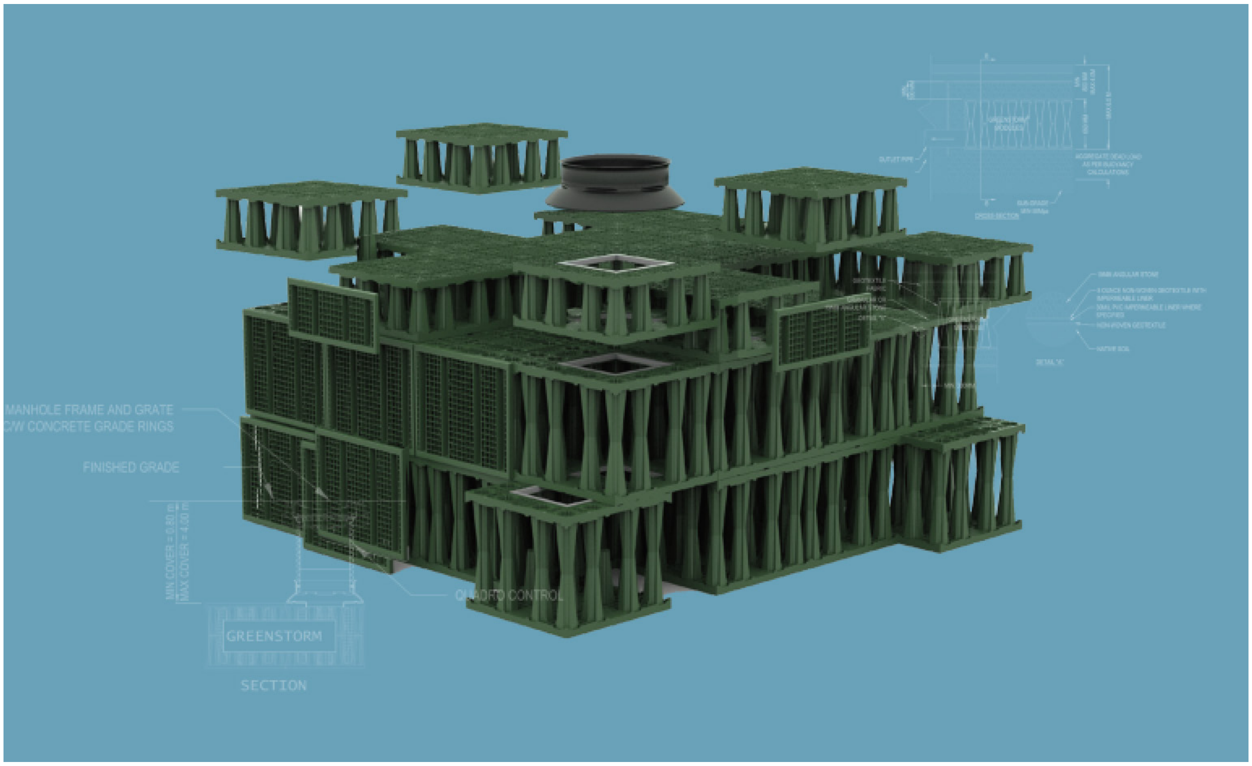
Individual system geometries due to modular design

Sizes (length and width) of GreenStorm Storage/infiltration systems can be freely designed with hardly any limitations. The 31.4961 in cellular block type structure can easily be adapted to fit nearly any layout.

With heights of 25.9843 in (full block) and 350 mm (half block), systems can be built in various sizes to accommodate any single or multi-layer combination. Therefore, the system can very easily be adapted to on-site requirements.

Under high groundwater conditions or low permeability of backfill soil, for example, rather shallow depth systems are to be preferred.

For soils with good permeability, however, high and compact systems are favourable and may be built accordingly. The maximum space available is used.



POSSIBLE SYSTEM GEOMETRIES

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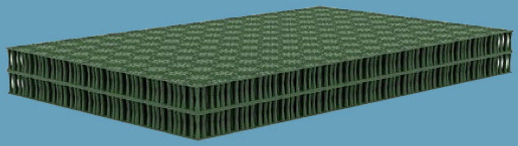

GreenStorm ST*
2 Layer

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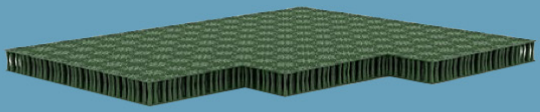

GreenStorm ST*
1 Layer

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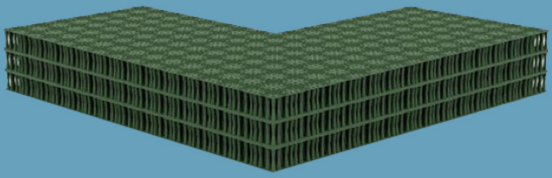

GreenStorm ST*
3 Layer

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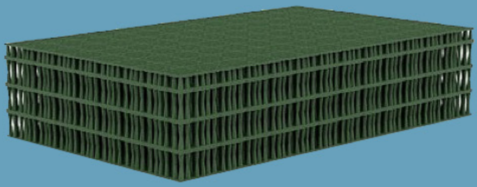


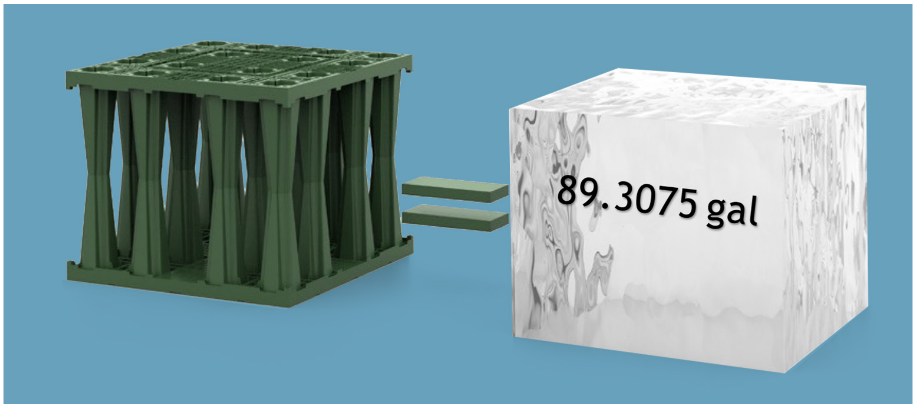
GreenStorm ST*
3 1/2 Layer

STORAGE VOLUME

Extremely high volume

The GreenStorm ST* full block provides a storage volume of 89.3075 gallons with a gross volume of 92.827 gallons. With a storage volume of more than 96 %, it stores three times as much water as gravel swales.

The half block has a height of 13.7795 in and is used if shallow systems are required, e.g, in case of high groundwater levels. With a gross volume of 49.2731 gallons, it offers a storage volume of 46.6335 gallons.



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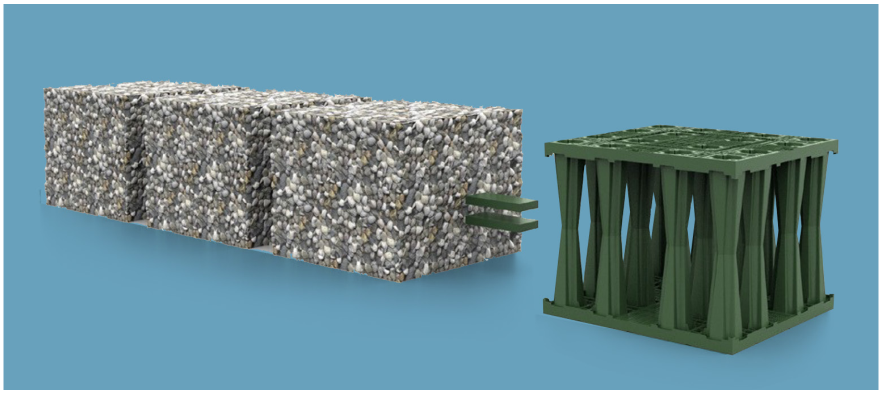
Pipe and gravel swales only use approx. 30 % of their volume to store water. Therefore, three times the required water storage volume must be provided by excavation.

This requires lots of space which is frequently not available in urban areas. GreenStorm ST* storage/infiltration systems save an enormous amount of space and excavation work.

Thus, subsoil storage spaces for stormwater can be built in a very efficient and cost-saving way.

Storage/infiltration systems considerably increase the storage space. High- performance storage/infiltration systems can be installed even in confined space.



INSTALLATION

Easy construction site handling

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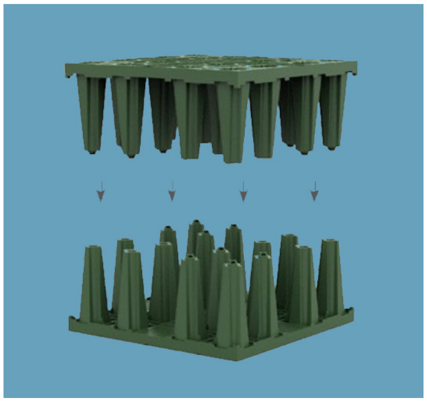
REQUIRES LITTLE SPACE FOR STORAGE.

The storage/infiltration modules are delivered in compact, stacked units with 17 modules per pallet. The easy stackability of the GreenStorm ST* and ST-B modules allows them to be stored even in confined construction space, even outside the excavation pit. This facilitates installation, since no additional storage space must be provided in the excavation pit. Installation is neither impeded nor constrained.

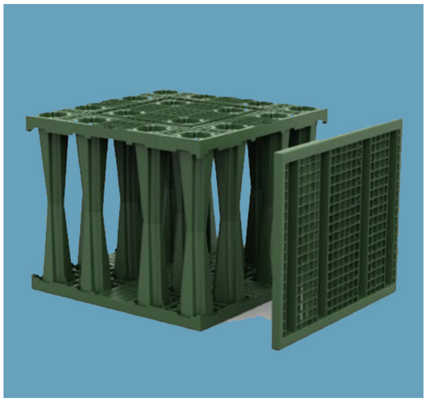
PRE-ASSEMBLY

Depending on the requirements, GreenStorm ST and GreenStorm ST*-B modules can be preassembled in no time at all, both outside and inside the excavation pit with just one easy move. Easy high tensile strength snap connections allow for combining two half elements to create a reliable unit in only a short period of time. This can easily be done by one person alone without requiring any additional tools. The moveable parts of the snap connection are recessed and thus protected from damage.



EASY ASSEMBLY

There is no need to adhere to any complex installation pattern – the pre-assembled modules or half blocks can just as well be connected to create a single unit. The low weight allows this to be done by one person only. Connectors establish firm connections between the individual modules. The surface can be accessed immediately without any risk of accidents, since the hole size of the columns is dimensioned respectively (< 3.93701 in).
Thus, no additional covers of column holes are required.



UP TO **88%**

The storage/infiltration modstorage space saved as compared to unstackable storage/infiltration modules

*GreenStorm ST/STB underground infitration/storage modules *Rigofill ST RigofillST-B

INSPECTION

CCTV inspection even when filled

Storage/infiltration systems are durable structures for urban drainage; they must work reliably for decades. Durability and reliability are essential requirements. The best way to inspect the state of a system using state-of-the-art technology is CCTV inspection. Thus, a storage/infiltration system can be inspected excellently – for final acceptance or later. This provides safety for authorities, engineers, construction companies, customers, and operators.

Cross-shaped inspection tunnel

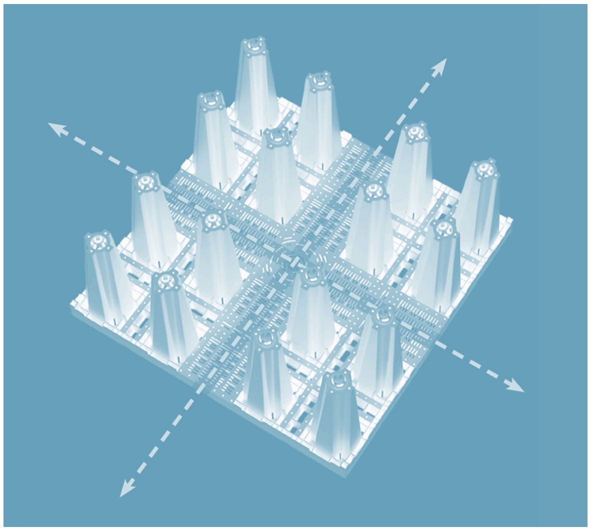
GreenStorm ST* modules have a cross-shaped tunnel which makes the storage/infiltration system camera-accessible and flushable in two axes and thus in four dimensions.The special and open design of the inspection tunnel allows for an unobstructed view of the entire interior and not only the inspection tunnel.

For example, the statically relevant load-bearing elements, the condition of the geotextile and the entire soil area can be viewed. GreenStorm ST* and GreenStorm ST*-B thus provide excellent options to control the “inner life” of a storage/ infiltration system at any time.

The ideal, level and vibration-free running surface and the slim column structure allow for an unobstructed view of the entire module volume. The Quadro Control ST shaft for GreenStorm ST*, which can be integrated, allows for easy access of the automotive dolly for both professional final acceptance inspection and flushing technology.

100%

INSPECTABLE



INSPECTION

Recommended camera equipment

A standard sewer camera is sufficient for camera inspection. A rotatable and height-adjustable camera head allows for an optimal view of the lateral soil area, a controllable carriage ensures a centred positioning, and high- performance optics together with lighting allow for a perfect picture.

Recommended: tender invitation for final acceptance inspection

Final acceptance of sewers using camera inspection has long since become a matter of course in sewer construction.
Also in the construction of storage/ infiltration systems, the final acceptance inspection is important! Planning engineers should absolutely include this in their tender documents.

Certified CCTV accessibility

GreenStorm ST* has been designed for the use of modern CCTV inspection technology. The inspectability of the GreenStorm ST* and QuadroControl ST system unit has been tested and confirmed by leading manufacturers of pipe CCTV inspection technology.

KT kanal-türpe Gochsheim

Notdienst Tag + Nacht

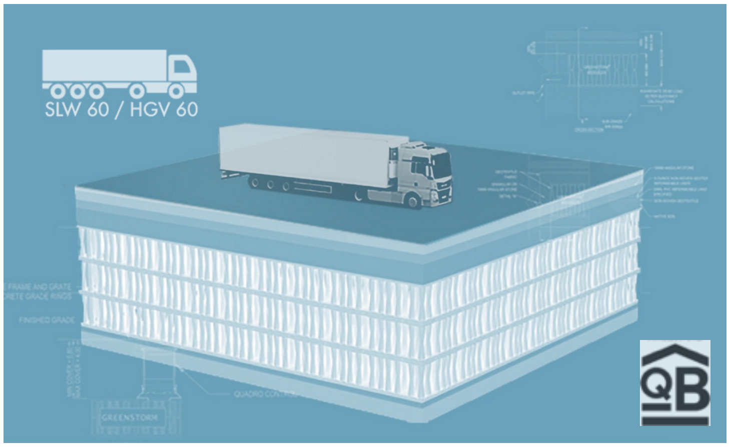
Certificate

LOADING

Heavy traffic

Storage/infiltration systems are subsoil structures and must have sufficient load-carrying capacity against impacting soil and traffic loads.

GreenStorm ST* storage/ infiltration sys- tems are extremely strong and have been designed with various applications in mind: While GreenStorm ST* has been designed in particular for traffic loads of up to 13 tons axle load.



High resistance

When installed under traffic areas, relevant national guidelines must be observed.
To build the planum for the road construction, an upper levelling layer must be provided.

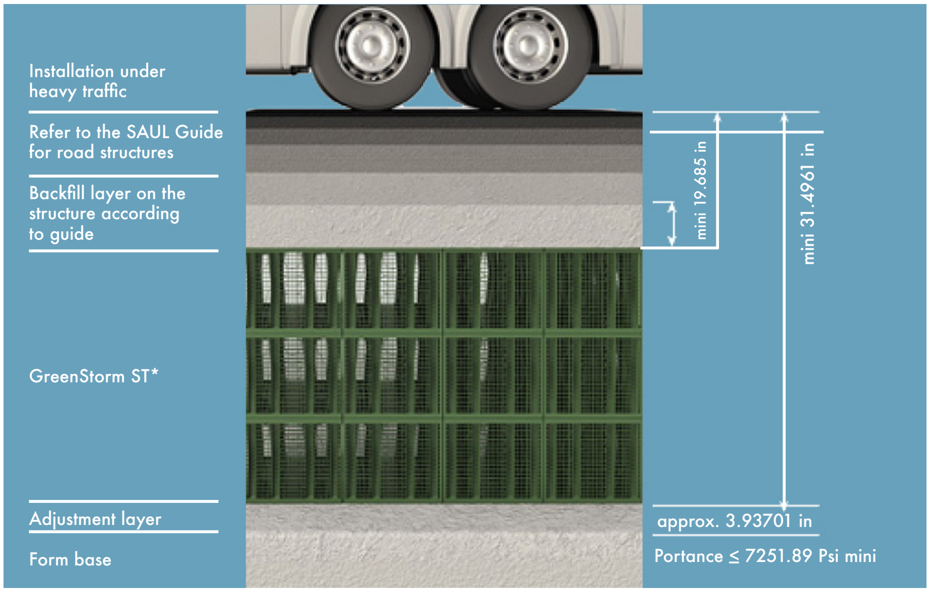
It should preferably be built as a gravel sub-base with a thickness of at least 13.7795 in, other materials usually result in larger covers.

Generally, a uniform modulus of deformation EV2 ≥ 45 MN/m² must be proven on the planum.

Installation under traffic area

The subsoil structures must have sufficient load-carrying capacity against impacting soil and traffic loads to ensure reliable stability.

This is why GreenStorm ST* is suitable for traffic loads of up to 15 tons axle load (20 tons possible, please refer to our technical department).



With conventional installation parameters*, depths of cover of DC 157.48 in and soil depths DSof 236.22 in are possible for infiltration systems. A project-specific stability analysis can be prepared by STORMCON.

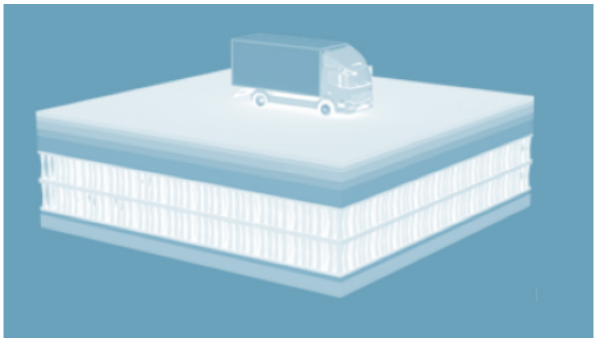
*specific weight of soil 18 kN/m3 Mean soil temperature max. 73.4°F, 236.22 in. soil depth, = 0.3, 4-layer

*GreenStorm ST/STB underground infitration/storage modules *Rigofill ST RigofillST-B

LOADING

Light traffic, green spaces

The special material composition of GreenStorm ST-B* makes it ideal for surfaces with less traffic such as sports fields or green spaces. STORMCON storage/ infiltration systems have been designed for a minimum lifetime of 50 years.



Installation under traffic areas

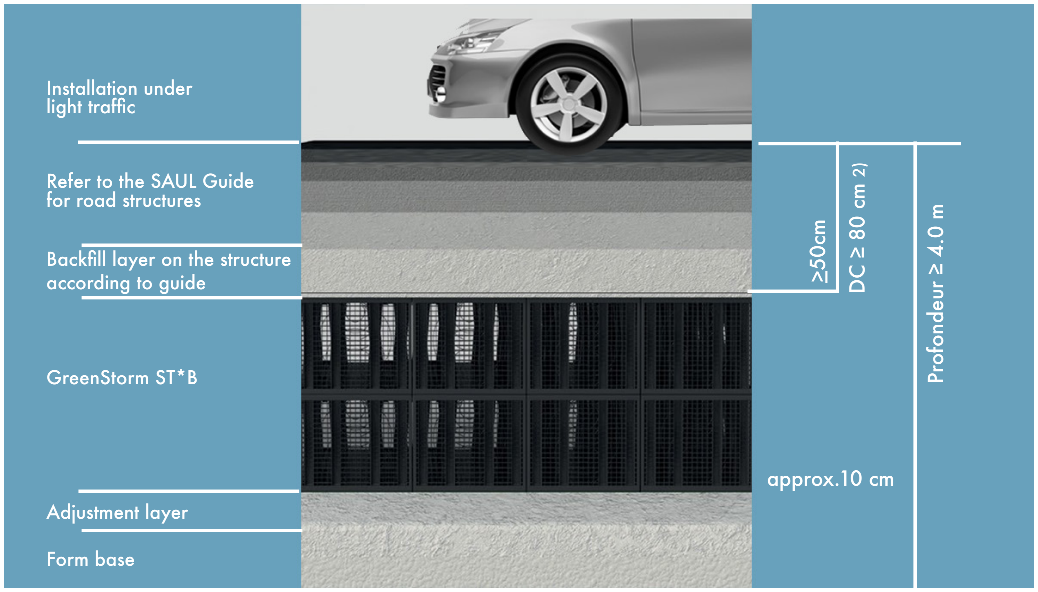
When installed under traffic areas, relevant national guidelines must be observed.
To build the planum for the road construction, an upper levelling layer must be provided.

It should preferably be built as a gravel sub-base with a thickness of at least 13.7795 in, other materials usually result in larger covers.

Generally, a uniform modulus of deformation EV2 ≥ 45 MN/m² must be proven on the planum.

Standard installation under a traffic area

The GreenStorm ST-B* storage/infiltration module is suitable for traffic loads of up to 10 tons axle load and therefore also suitable for the construction of systems under parks, greens and car parks.

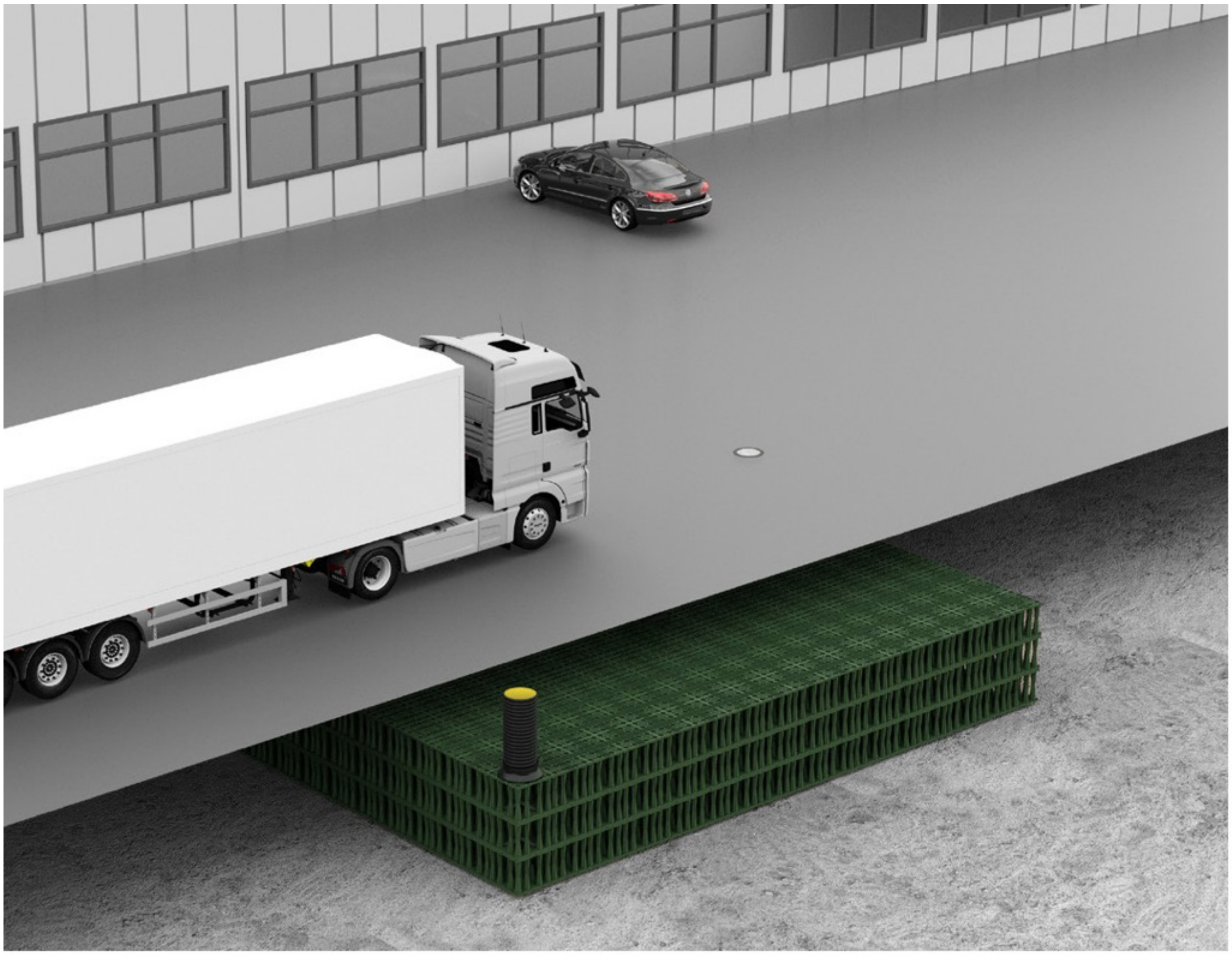


With conventional installation parameters*, depths of cover up to 2.5 m and soil depths up to 4m are possible for infiltration systems. A project-specific stability analysiscan be prepared by STORMCON.

*Light traffic, specific weight of soil 18 kN/m3
Mean soil temperature max. 23 °C, = 0.3

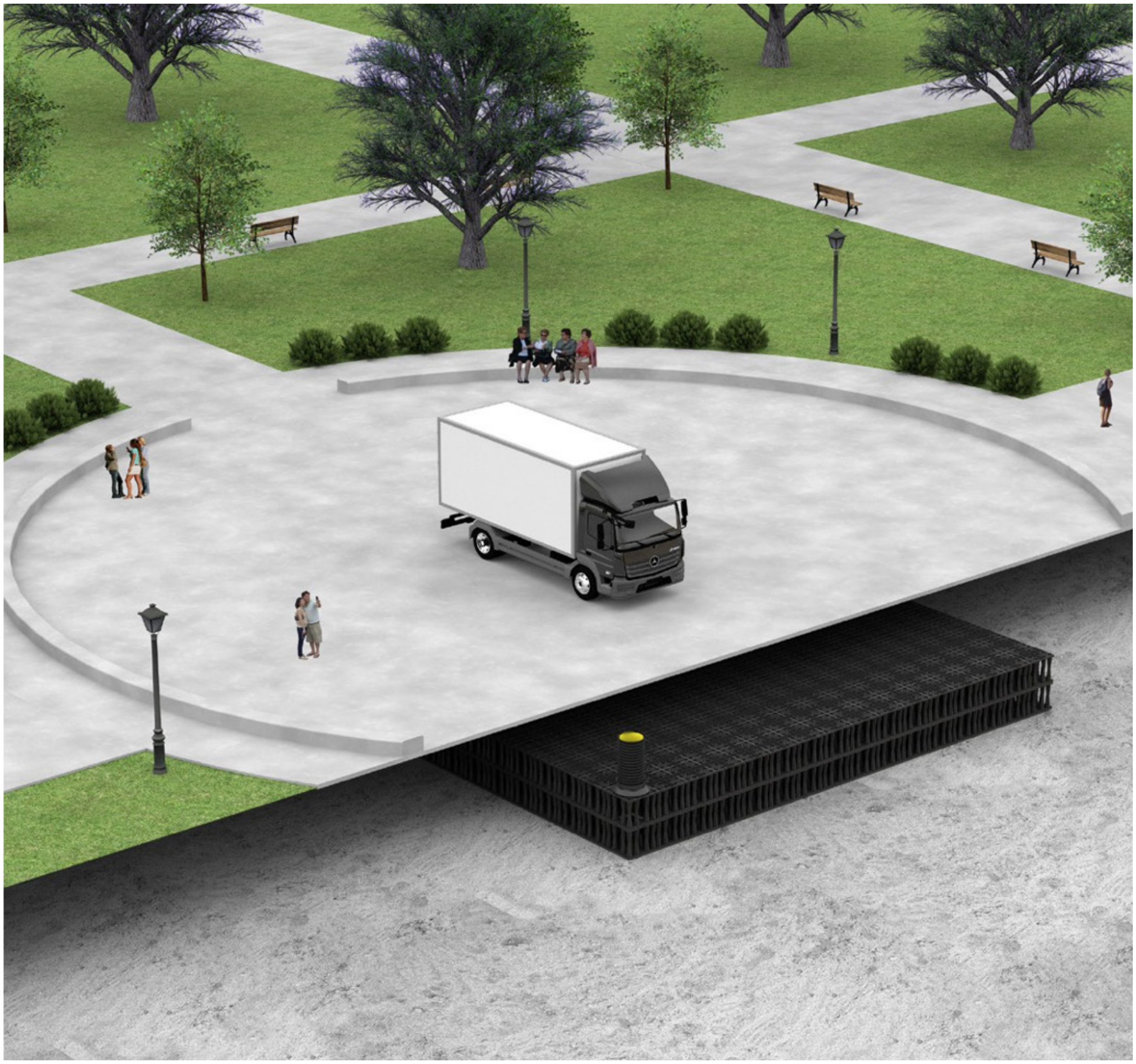
LOADING

Heavy traffic example GreenStorm ST*

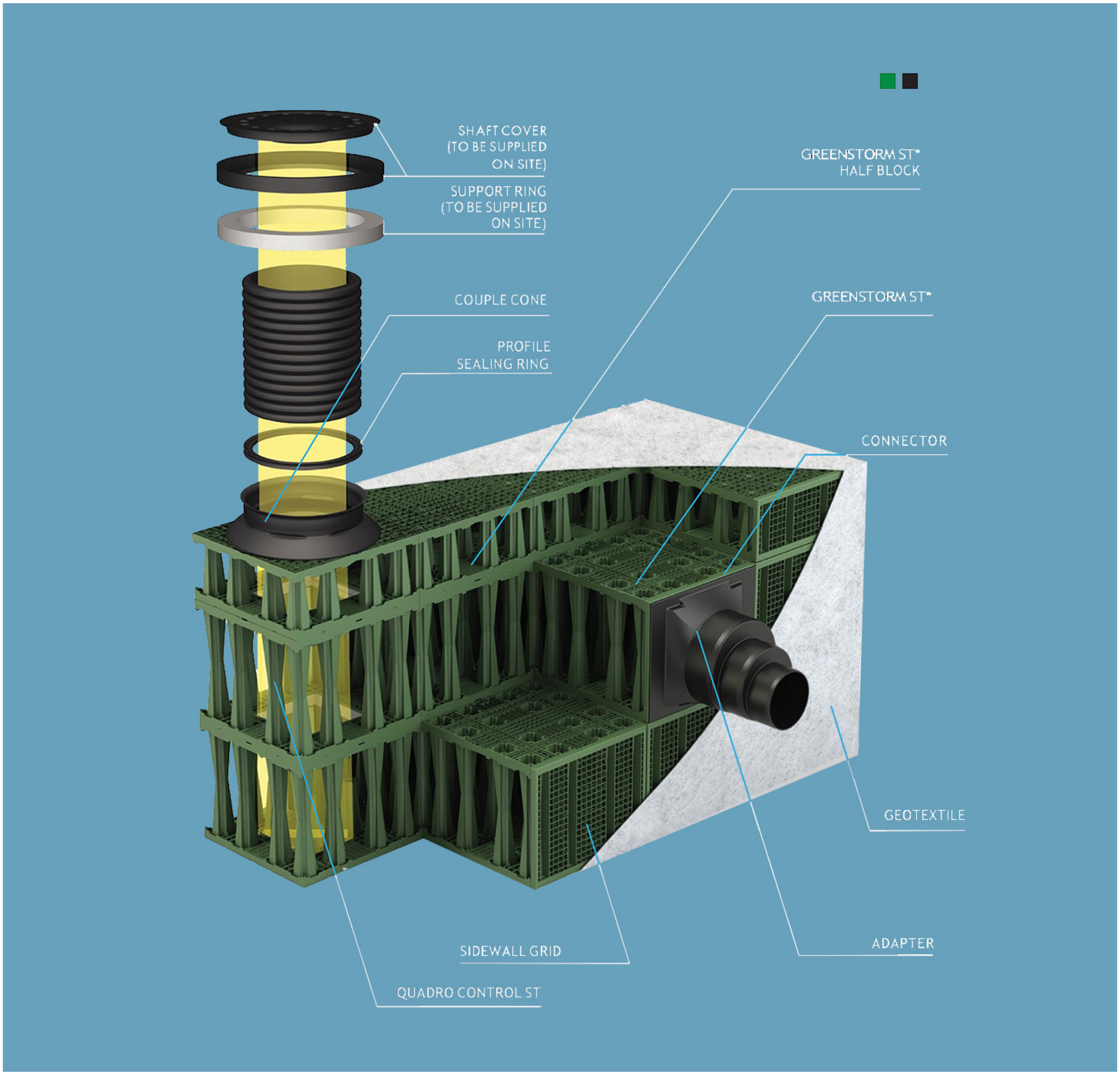


LOADING

Light traffic example GreenStorm ST*



Quadro® Control ST – system shaft



*GreenStorm ST/STB underground infiltration/storage modules *Rigofill ST RigofillST-B

INTEGRATED INSPECTION SHAFTS

Quadro® Control ST is a polypropylene inspection shaft which can be integrated in the storage/infiltration system.

It is square with a base of 800 x 800 mm and can be used in any position of the layout.

Its height results from the number of layers of the connected storage/ infiltration system. The shaft allows for comfortable access to the inspection tunnel from aboveground. High-performance inspection and flushing equipment can easily be inserted into the inspection tunnel. The shaft is integrated in the storage/infiltration system and grows layer by layer as construction progresses. QuadroControl ST is delivered with all required components and will be assembled on site.

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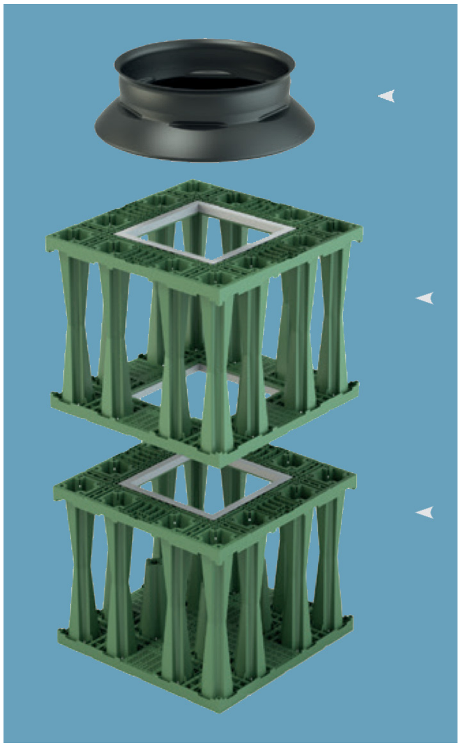
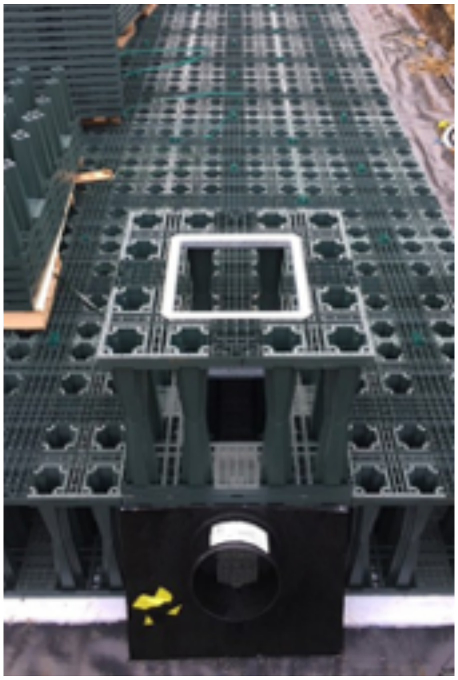
Structure



The shaft cone is the transition to the extension pipe. The length of the extension pipe is chosen depending on the installation depth.

The shaft is integrated in the storage/ infiltration system and grows layer by layer as construction progresses.

The shaft components are stackable and delivery includes the cone with all required components as shaft package.



Arrangement of inspection shafts

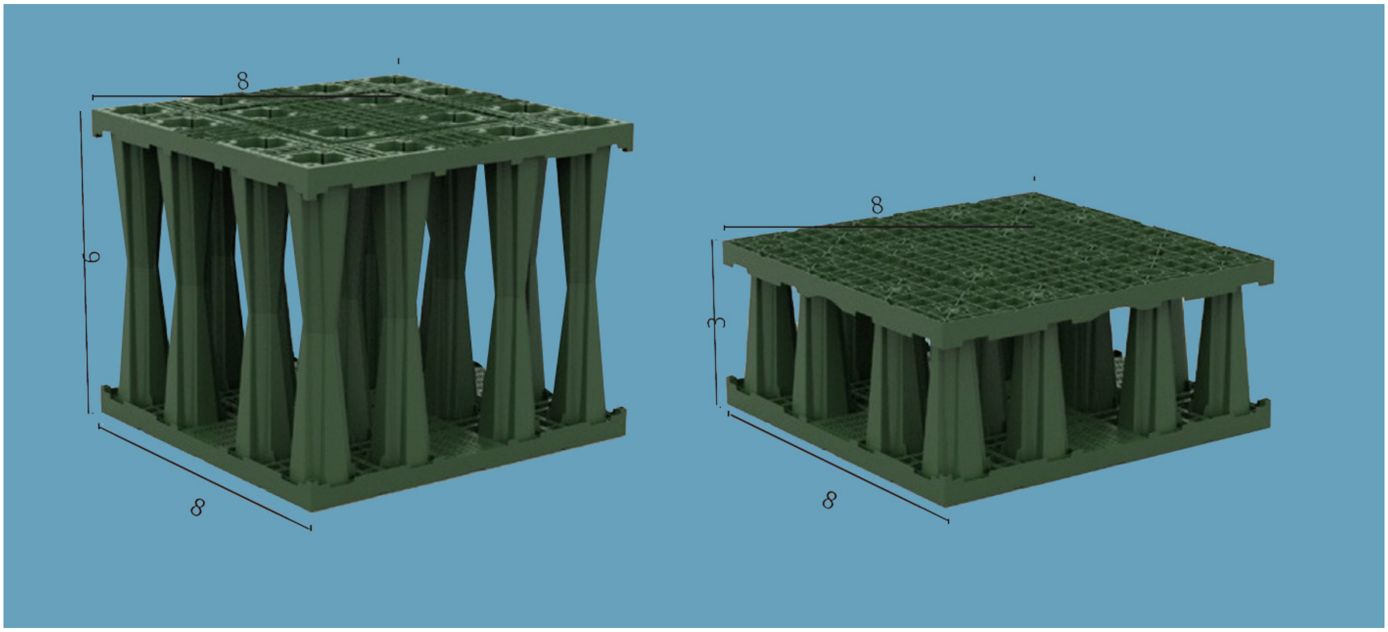
Number of and position in the system are above all determined by the size of the system, access, pipe connections and design of the outdoor facilities.

In order to ensure that flushing of the complete system is possible, each module should comprise at least one inspection shaft. In addition, the shafts should be positioned such that the shaft covers do not interfere with the design of the outdoor facilities, but can easily be accessed by vehicles for maintenance purposes.

Adjacent shafts should be staggered in the layout.

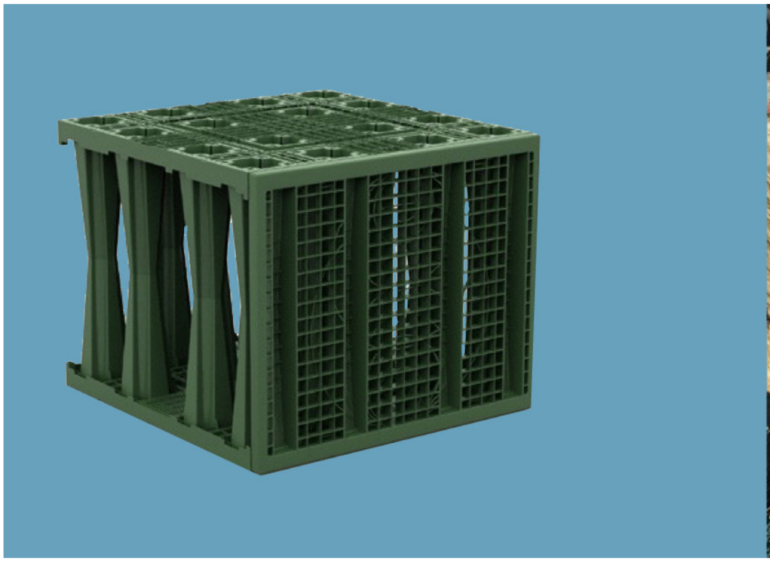
*GreenStorm ST/STB underground infitration/storage modules *Rigofill ST RigofillST-B

DESIGN-RELEVANT DIMENSIONS



Sidewall grid connection options

Full block connection options
Dia 100 mm, 135 mm, 150 mm, 200 mm,
250 mm, 300 mm, 375 mm et 450 mm

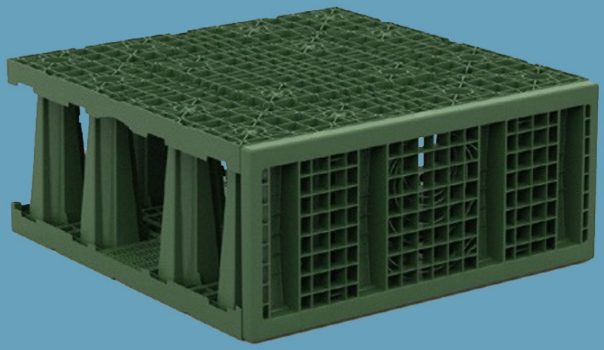


This allows all available nominal diameters to be realised both at the top and the bottom of the module.

SIDEWALL GRID CONNECTION OPTIONS

Sidewall grid connection options

Half block connection options
Dia 100 mm, 135 mm, 150 mm,
200 mm et 250 mm

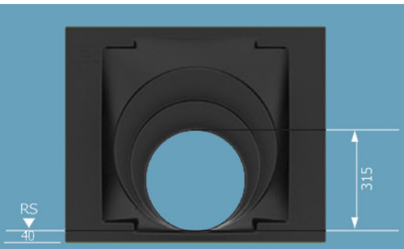


The side plates can be drilled to the height and desired position within the frame.

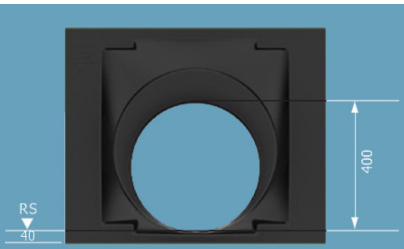
ADAPTER CONNECTION OPTIONS

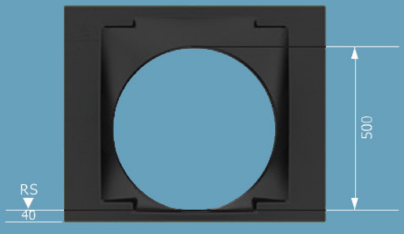
Connections:
Dia 300 mm, 450 mm
et 525 mm

Outside diameter 315 mm for a pipe diameter 300 mm PVC



Outside diameter 400 mm for a pipe diameter 450 mm PVC. A flexible sleeve off center is required.

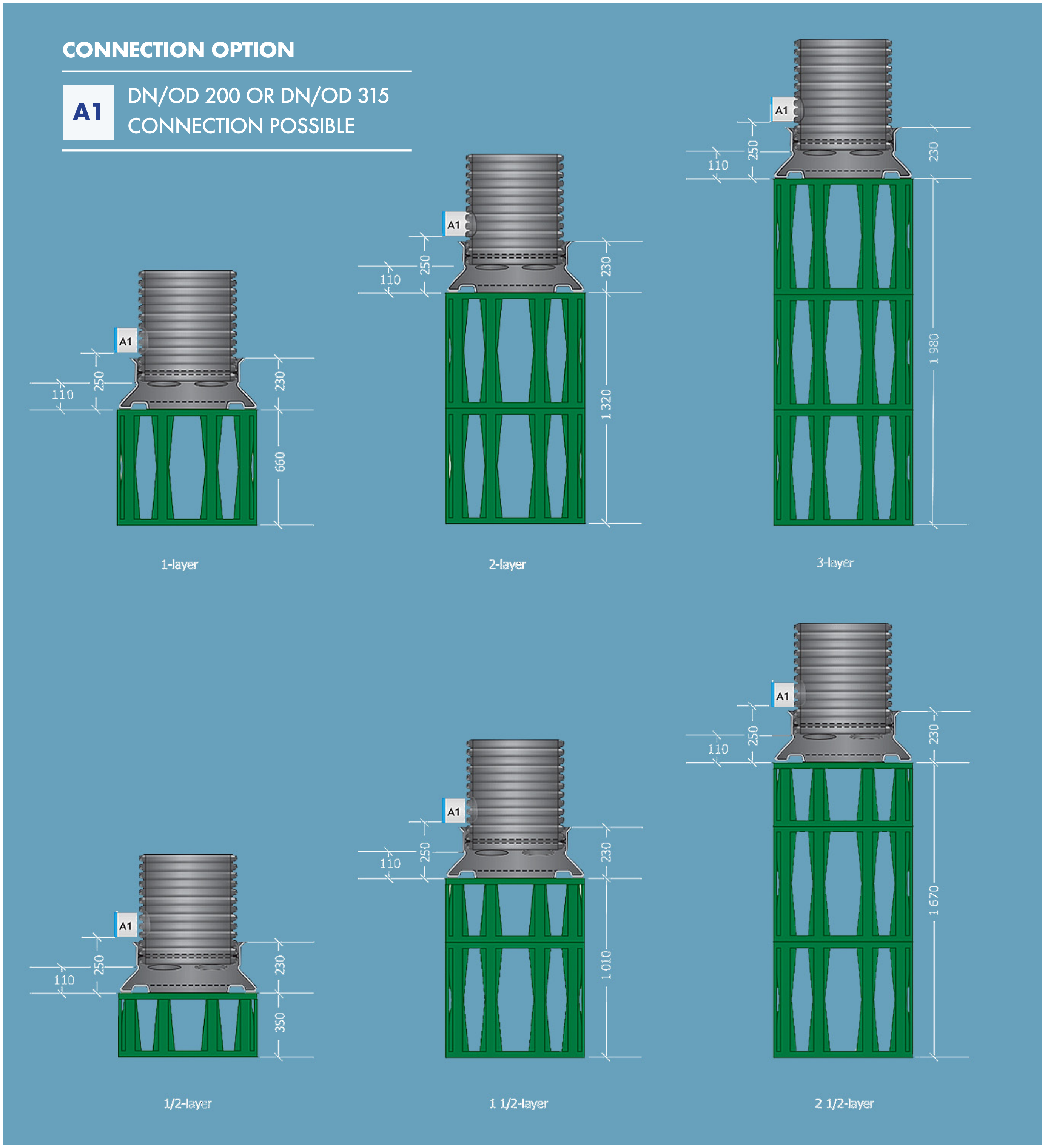




Outside diameter 500 mm for a pipe
of diameter 525 mm.
A flexible sleeve off center is required

*GreenStorm ST/STB underground infitration/storage modules *Rigofill ST RigofillST-B

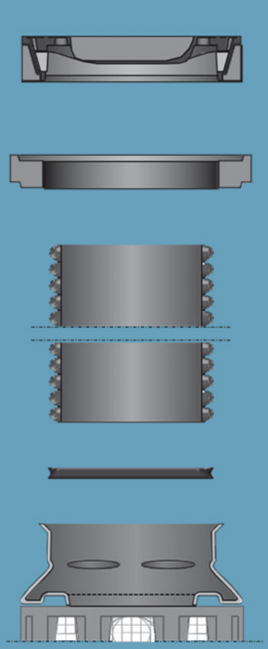
DIMENSIONS OF QUADRO® CONTROL ST



*GreenStorm ST/STB underground infitration/storage modules *Rigofill ST RigofillST-B

SHAFT DESIGN OF QUADRO® CONTROL ST

Structure of inspection shaft

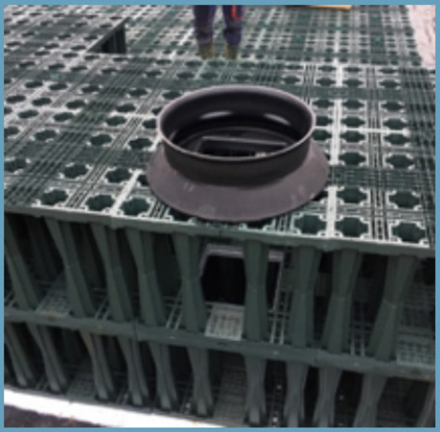


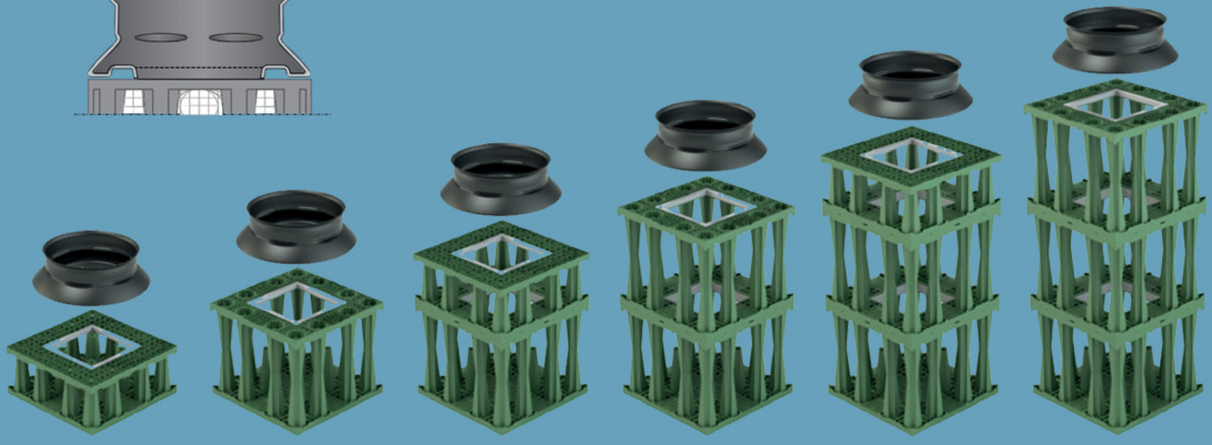
Class B or D
shaft cover acc. to DIN EN 124,
CW 610

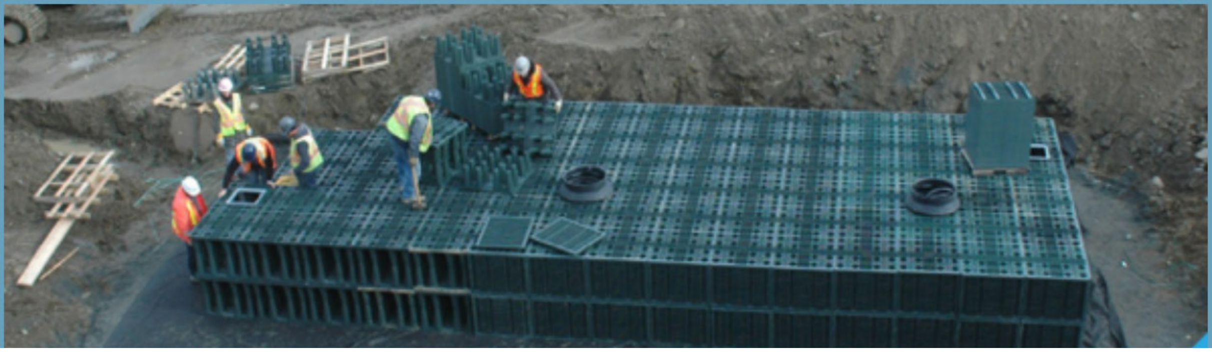
Support ring acc. to DIN 4034,
$D_1 = 625$ mm

Extension pipe
D_o 600

Sealing ring







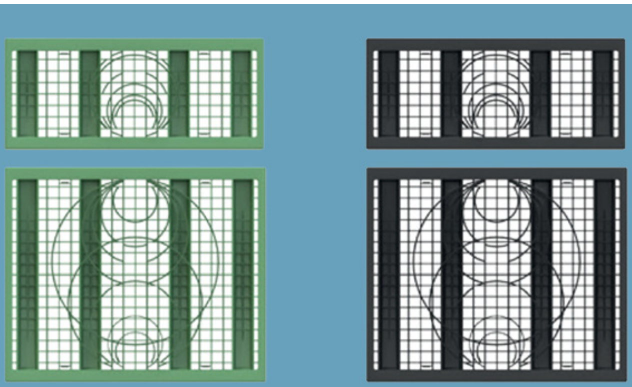
Sidewall grid

The sidewall grids serve as external boundary.

They can be assembled easily using snap connections. The predefined position of the connections at the sidewall grids guarantees that the connections of inlet pipe and outlet pipe and the tunnel are same level. The sidewall grids can be assembled easily also outside the excavation pit.

The sidewall grid for the full block and Quadro® Control ST and Quadro® Control ST-B has a size of W x D x H = 800 x 30 x 660 mm and is suited for connecting lateral solid wall pipes DN 110, 125, 160, 200, 225, 250, 315, 400 and 500.

The sidewall grid for the half block or the half-layer shaft has a size of W x D x H = 800 x 30 x 350 mm and is suited for connecting lateral solid wall pipes DN 110, 125, 160, 200, 225 and 250. In storage/infiltration designs with inside corners, shortened sidewall grids are used at one side.



Different connection heights (regardless of the nominal diameter) are required above the bottom depending on the number of floors:

ST	ST-B	Number of floors	Connection height
○	●	0.5-layer	40 mm
○	●	1-layer	40 mm
○	●	1.5-layer	700 mm
○	●	2-layer	700 mm
○	●	2.5-layer	1 360 mm
○	●	3-layer	1 360 mm

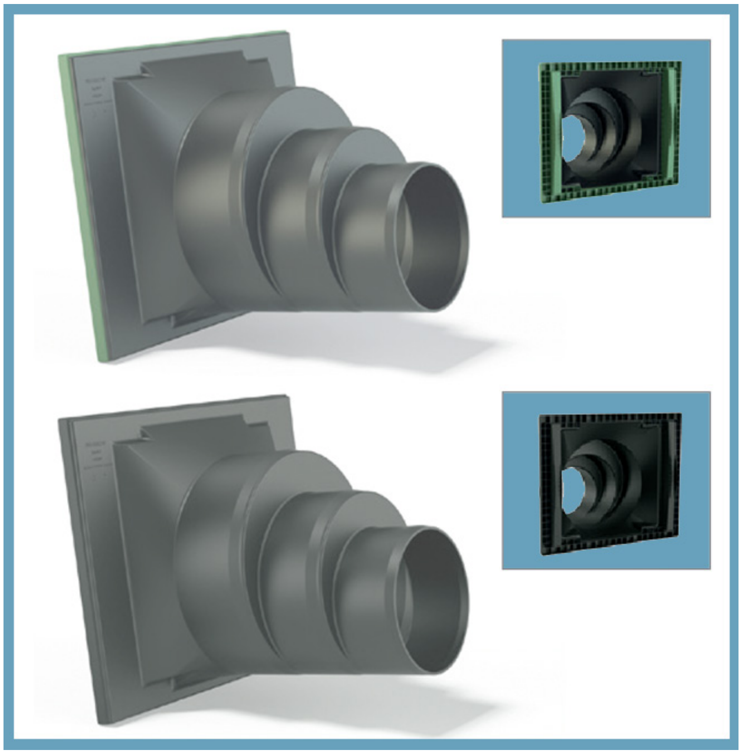
Adapter

The adapter for GreenStorm ST* and GreenStorm ST-B* has a length of 800 mm and a height of 660 mm and serves as an inlet and outlet connection.

It provides an inlet connection with an optimised flow design with diffusor effect for solid wall pipes DN 315, 400 and 500. It can be connected to GreenStorm ST* and GreenStorm ST-B* easily and quickly thanks to the snap connection.

The predefined position of the snap connection at the module guarantees that inlet pipe and outlet pipe and tunnel connect same level.

The adapter ensures a connection with the same crown, as it is installed turned by 180°.

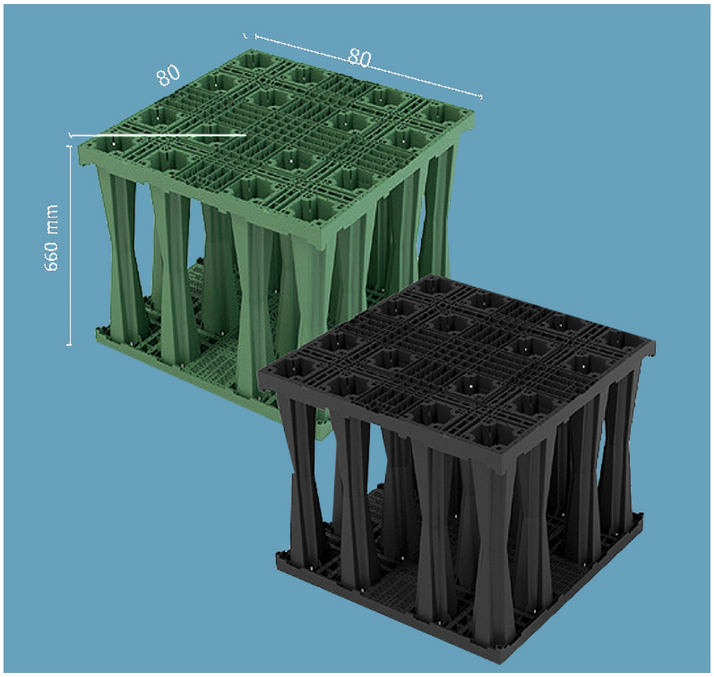


GREENSTORM ST* AND ST-B* – HALF BLOCK

GreenStorm ST* and GreenStorm ST-B* are highly durable and hard-wearing storage/infiltration module with a base of 800 x 800 mm and a height of 660 mm full blocks.

The polypropylene full block consists of two half elements to be installed on site and has a void ratio of more than 96 %. Water can flow through the module three-dimensionally almost without any obstacles. GreenStorm ST* and GreenStorm ST-B* allows for virtually any size and geometry of the systems.

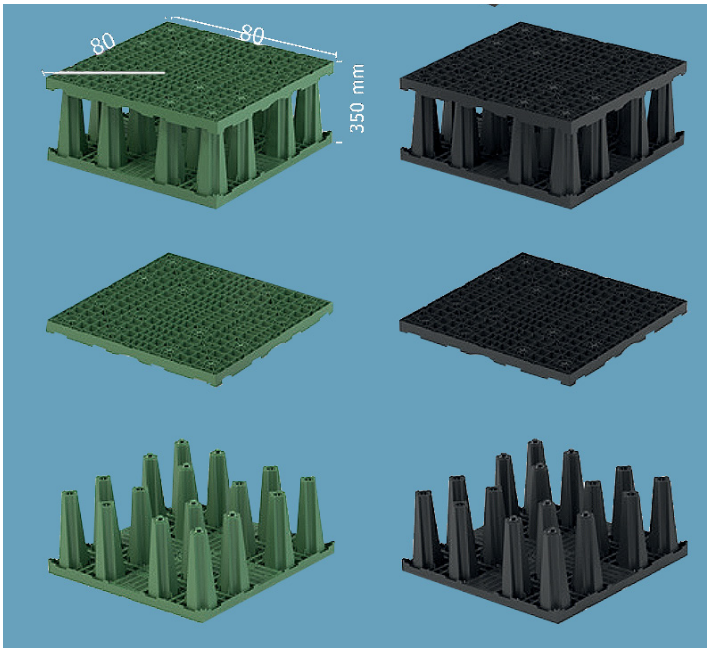
The cross-shaped inspection tunnel in the storage/infiltration modules has been designed for the use of automotive dollies. This allows the effective drainage surface and the entire system volume with all statically relevant bearing-type fixtures to be inspected.



The GreenStorm ST* and GreenStorm ST-B* half block have a base of 800 x 800 mm and a height of 350 mm

It consists of only one half element which must be assembled with a roof slab on site. This roof slab is only required for the half block. The GreenStorm ST* and GreenStorm ST-B* half block are used in particular for systems with shallow installation depths, e.g, in case of high groundwater levels.

Systems in various heights can be realised in 35cm steps and adjusted to almost any layout in combination with the full block.



NOTES

Appendix C

Sanitary Flow Calculations

Green Lane Site 1

OBC Sanitary Flow Calculation

GEI Consultants

This Calculation is to be used to determine allocation only. All Sanitary infrasuture is to be designed for conveyance per Town of East Gwillimbury Engineering standards.

Date:	Oct-24
Project #:	2103285
Designed:	BH
Checked:	TVL

Part 1 - Daily Flow Generation

To be completed in accordance with OBC table 8.2.1.3.A. & 8.2.1.3.B.

Proposed Toyota Building

Description	Quantity Description	Quanity	Volume Discharged (L/Day/ quantity description)	Total Volume Discharged (m^3/Day)	Flow (L/s)
Warehouse	Water Closets	16	950	15.20	0.18
Warehouse	Loading Bays	0	150	0.00	0.00
Office Building	Employees / 8 hour shift	10	75	0.75	0.01
Office Building	Floor area / 9.3 m^2	199	75	14.91	0.17
				0.00	0.00
				0.00	0.00
				0.00	0.00
			Total	**30.11**	**0.35**

Site Area	2.87	ha
Peaking Factor	5.40	
Total Peak Flow	**1.88**	L/s

Future Indicative Building

Description	Quantity Description	Quanity	Volume Discharged (L/Day/ quantity description)	Total Volume Discharged (m^3/Day)	Flow (L/s)	
Warehouse	Water Closets	5	950	4.75	0.05	
Warehouse	Loading Bays	0	150	0.00	0.00	
Office Building	Employees / 8 hour shift	12	75	0.90	0.01	n/a *
Office building	Floor area / 9.3 m^2	174	75	13.05	0.15	
			5	0.00	0.00	
			1230	0.00	0.00	
				0.00	0.00	
			Total	**17.80**	**0.21**	

- 400 m2 / employee was used in determining the # of employees
- *Is not included in total, as value for floor area is greater (per OBC guidelines)

Site Area	2.87	ha
Peaking Factor	5.40	
Total Peak Flow	**1.11**	L/s

Part 2 - Building Water Process Flow Generation

Water Processes described on separate rows below are in addition to flows noted in part 1

Water Process Description	Base Process Flow (L/s)	Process Duration (hr/day)	% Recycled	Total Efluent Disccharged to Sanitary Sewer	
				Flow (L/s)	Volume (m^3/day)
Proposed Building - Washdown Area	0.5	16.0	0%	0.5	1.8
			Total	**0.5**	**2**

Site Area	2.87	ha
Peaking Factor	1.00	
Total Peak Flow	**0.50**	L/s

Assumptions:
Noviclean Self Serve Wash System specifications for water consumption (4 to 8 GPM)
Considers 8GPM for 16 hours 30.2 L/min)
Built-in oil drain

Part 3 - Extraneous Flow Generation

* Per Region of York's Sanitary Sewer Inspection , Testing and Acceptance Guideline

Proposed Building

Infiltration Allowance

Allowable Infiltration rate	0.0375	Litres/millimeter diameter/100 metres of pipe sewer / hour
Design Factor of Safety	2	

Diameter of Sewer Section (mm)	Length of Sewer Section (m)	Sewer Section Infiltration Allowance (L/s)
300	276.5	0.0086
150	125.0	0.0020

Total Site Extraneous Flow	**0.011**	**L/sec**	ha
Total Site Extraneous Design Flow	**0.02**	**L/sec**	(Including factor of safety)
Total Site Extraneous Volume	**1.83**	**m^3/day**	L/s

Future Building

Infiltration Allowance

Allowable Infiltration rate	0.0375	Litres/millimeter diameter/100 metres of pipe sewer / hour
Design Factor of Safety	2	

Diameter of Sewer Section (mm)	Length of Sewer Section (m)	Sewer Section Infiltration Allowance (L/s)
300	276.5	0.0086
150	130.0	0.0020

Total Site Extraneous Flow	**0.011**	**L/sec**	ha
Total Site Extraneous Design Flow	**0.02**	**L/sec**	(Including factor of safety)
Total Site Extraneous Volume	**1.84**	**m^3/day**	L/s

Total Sanitary Flow Generation

Proposed Building Total Estimated Volume	**33.7**	m^3/day
Future Building Total Estimated Volume	**19.6**	m^3/day
Total Estimated Flow	**53.4**	m^3/day
Proposed Building Estimated Base Flow	**0.86**	L/sec
Future Building Estimated Base Flow	**0.21**	L/sec
Total Estimated Base Flow	**1.07**	L/sec
Proposed Building Estimated Peak Flow	**2.40**	L/sec
Future Building Estimated Peak Flow	**1.13**	L/sec
Total Estimated Peak Flow	**3.5**	L/sec

Regional Flow Monitoring Data vs Allocated Flow Comparison

GEI Consultants

Date:	Apr-23
Project #:	2101711
Designed:	TVL
Checked:	AP

Existing Design Flows for Caratuk/Newgwill Development (From existing agreement)

Undeveloped Blocks

Block A (i)	3.16	L/s
Block B	2.02	L/s
Block C	1.99	L/s
Block D	2.23	L/s
Block E	3.82	L/s
Block F	4.25	L/s
Block G	3.70	L/s
Block K	5.94	L/s
Sub-Total	27.12	L/s

Existing Design Flows for Caratuk/Newgwill Development (From existing agreement)

Undeveloped Blocks

Block A (i)	3.16	L/s
Block B	2.02	L/s
Block C	1.99	L/s
Block D	2.23	L/s
Block E	3.82	L/s
Block F	4.25	L/s
Block G	3.70	L/s
Block K	5.94	L/s
Sub-Total	27.12	L/s

Existing Design Flows for Caratuk/Newgwill Development (From existing agreement)

Developed Blocks

Block A (ii)	2.26	L/s
Block H	2.06	L/s
Block I	2.46	L/s
Block J	4.00	L/s
Sub-Total	10.78	L/s
Total	37.90	L/s

Caratuk/Newgwill Development Regional Flow Monitoring Data

Developed Blocks

Block A (ii)		
Block H	See excel file provided with submission	
Block I		
Block J		
Sub-Total	1.616	L/s
Un-used Design Flow	9.17	L/s
Total	37.90	L/s

THE CORPORATION OF THE TOWN OF EAST GWILLIMBURY

BY-LAW NO. 2001- 71

To enter into a an Agreement with the Corporation of the Town of Newmarket regarding a Servicing Extension Agreement with respect to 19T-88073 (NewGwill) and 19T-88023 (Queensville/Caratuck)

WHEREAS it is deemed necessary to enter into an Agreement with the Corporation of the Town of Newmarket regarding a Servicing Extension Agreement with respect to 19T-88073 (NewGwill) and 19T-88023 Queensville/ Caratuck;

THEREFORE BE IT ENACTED by the Municipal Council of the Corporation of the Town of East Gwillimbury as follows

1. The entering into of an Agreement with the Corporation of the Town of Newmarket, a copy of which is attached hereto and forms part of this By-law, be approved.

2. The Mayor and Clerk are hereby authorized to sign the said Agreement on behalf of the Corporation of the Town of East Gwillimbury and affix the Corporate Seal thereto.

ENACTED AND PASSED this 16th day of JULY, 2001.

James Young, Mayor

Stephen McDonald, Clerk

Servicing Extension Agreement
19T-88073 (NewGwill)
19T-88023 (Queensville/Caratuk)

This Agreement made as of the 1st day of March, 2001.

.

BETWEEN:

The Corporation of the Town of East Gwillimbury,

Of the First Part

(hereinafter called "East Gwillimbury")

-and-

Corporation of the Town of Newmarket

Of the Second Part

(hereinafter called "Newmarket")

WHEREAS East Gwillimbury has approved two draft plans of subdivision under file numbers 19T-88023 ("HWP") and 19T-88073 ("Ringwell") collectively referred to as "the Subdivisions" illustrated on Schedule "A" hereto;

AND WHEREAS in order to provide additional access to HWP it is necessary to construct an extension to Harry Walker Parkway in the Town of Newmarket northerly from Ringwell Drive and East Gwillimbury wishes to make arrangements for the construction of the required municipal road ("Harry Walker Parkway extension");

AND WHEREAS in order to provide access to Ringwell it is necessary to make improvements at the northerly limit of Ringwell Drive in Newmarket ("Ringwell Improvements");

AND WHEREAS in order to provide municipal services to HWP East Gwillimbury wishes to construct a sanitary and storm sewer system and install a watermain within HWP and a watermain within the Harry Walker Parkway extension, (hereinafter collectively referred to as the "HWP Services");

AND WHEREAS the sanitary sewer system outlet for HWP requires a connection to an existing sanitary sewer within an easement located within Lot 2, Plan 65M-2730 being Part 5, Plan 65R-13705, Town of Newmarket, Regional Municipality of York (hereinafter referred to as the "Easement");

AND WHEREAS East Gwillimbury has requested permission to construct and to connect the HWP Services to the Town of Newmarket's existing sanitary sewer system and watermain;

AND WHEREAS in order to provide municipal services to Ringwell, East Gwillimbury wishes to install sanitary and water service connections (hereinafter referred to as the “Ringwell Services”) to the existing Ringwell Drive sanitary sewer and watermain in Newmarket (“Newmarket Services for Ringwell”);

AND WHEREAS Newmarket has allowed for the extension of Harry Walker Parkway northerly from Ringwell Drive through East Gwillimbury to Green Lane;

AND WHEREAS Newmarket has agreed to permit the extension of its municipal services and construction of the Harry Walker Parkway Extension and improvements to Ringwell Drive (the "Ringwell Improvements") to serve HWP and Ringwell upon terms and conditions;

AND WHEREAS the provision of municipal services between municipalities is authorized pursuant to provisions of the Municipal Act, R.S.O. 1990 c. M45 the Ontario Water Resources Act, R.S.O. 1990 c. O40 and the Public Utilities Act, R.S.O. 1990 c. P52;

NOW THEREFORE WITNESSETH that in consideration of the mutual covenants herein contained and other good and valuable consideration, the receipt of which is acknowledged by both parties, East Gwillimbury and Newmarket agree with the other as follows:

WORKS AND SERVICES

1. East Gwillimbury shall make provisions for the design and construction, at its expense for the HWP Services, Ringwell Services and the Harry Walker Parkway Extension (collectively referred to as the “Services”) to be located within the Subdivisions and within the Harry Walker Parkway extension in Newmarket in accordance with the plans and drawings prepared by Stantec Consulting Ltd. under file number 60609803, as cleared by the Town Engineer for East Gwillimbury for the Services in East Gwillimbury and as cleared by Newmarket’s Director of Public Works and Environmental Services for the Services in Newmarket. Ownership of the portion of the Services located in the Town of East Gwillimbury shall vest in the Town of East Gwillimbury and ownership of the portion of the Services located in Newmarket shall vest in the Town of Newmarket immediately upon the placement of them in or on the ground.

2. East Gwillimbury shall make provisions for the design, construction and installation, at its expense of the Ringwell Improvements in accordance with the plans and drawings prepared by Stantec Consulting Ltd. Drawing 60609803-1, and the Harry Walker Parkway extension in accordance with the plans and drawings prepared by Stantec Consulting Ltd. Drawing 60609803 - P01 (collectively referred to as the "Road Works") to the satisfaction of Newmarket’s Director of Public Works and Environmental Services for the Road Works in Newmarket and the Town Engineer for East Gwillimbury for the Road Works in East Gwillimbury.

3. Construction of the Services and the Road Works shall be commenced within one year and completed within three years of the date of execution of this agreement failing either of which Newmarket may require the re-negotiation of this agreement.

4. All design drawings and all specifications for the Services and the Road Works shall be submitted to Newmarket's Director of Public Works and Environmental Services before any work is tendered and /or contracted and all drawings shall contain the seal of the professional engineer who is responsible for the engineering design and shall be signed by him/her. The Services and Road Works shall be constructed in accordance with the design drawings and specifications such that all Services and Road Works shall perform the function intended for such Services and Road Works.

5. Construction and installation of the Services and Road Works shall not commence without the consent of Newmarket's Director of Public Works and Environmental Services.

RESTRICTIONS ON CONNECTIONS

6. Upon completion of construction of the HWP Services to the extent required to permit occupancy from time to time as certified by the Town Engineer for East Gwillimbury to the satisfaction of Newmarket, Newmarket agrees to permit East Gwillimbury to connect the HWP Services to the existing Newmarket Services located within Harry Walker Parkway. Similarly, upon completion of the construction of the Ringwell Services and Ringwell Improvements, to the extent required to permit occupancy from time to time as certified by the Town Engineer for East Gwillimbury to the satisfaction of Newmarket, Newmarket agrees to permit East Gwillimbury to connect the Ringwell Services to the Newmarket Services for Ringwell. Newmarket's consent to allow connections as aforesaid is for the sole purpose of Newmarket providing municipal services for the benefit of HWP and Ringwell, respectively and the 4.8 ha. of land immediately west thereof identified as within the service area illustrated on Schedule "A" (herein referred to as the "Additional Serviced Land). In addition, Newmarket hereby agrees to permit East Gwillimbury to connect its sanitary sewer for HWP to an existing sanitary sewer main located within the Easement. Newmarket, subject to compliance with this agreement, agrees to deliver water and provide sanitary sewer services to the Subdivision lands and the Additional Serviced Lands for a term of twenty years which term shall be automatically extended for further twenty year terms on each twenty year anniversary date thereof.

7. Notwithstanding the generality of the provisions of paragraph 6 hereof, East Gwillimbury acknowledges and agrees that the capacity of Newmarket's sanitary sewer system is limited such that the Subdivision lands and the Additional Serviced Lands described in Schedule "A" hereto are limited to the peak sanitary sewage discharge rate provided in Schedule "B" hereto. In order to permit Newmarket to monitor said peak sanitary sewage discharge rate, East Gwillimbury agrees to provide to Newmarket monthly reports in a form consistent with Schedule "B" which will identify any instance in which the allowable peak discharge rate has been exceeded and provide details of action taken to ensure that there shall be no recurrence. In the event the peak sanitary sewage discharge rate is exceeded, East Gwillimbury agrees that it shall not issue further building permits within the Subdivision lands until such time as Newmarket has provided its consent which consent may be given upon such terms and conditions as Newmarket may impose.

East Gwillimbury further acknowledges that the spread sheet contained within Schedule "B" is based upon the assumption that sanitary discharge will not exceed water consumption and further that certain land uses (for example composting plants) may generate sanitary discharge in excess of water consumption. Consequently, East Gwillimbury covenants and agrees to notify Newmarket's Director of Public Works and Environmental Services, in writing, when any site plan application involves a land use for which sanitary discharge may exceed water consumption to the intent that Newmarket may impose such conditions as it, in its sole opinion, may consider necessary in order to insure that the peak allowable sanitary discharge rates set out in Schedule "B" are not exceeded.

8. East Gwillimbury agrees that no further connections to the Services (beyond that which is required to accommodate the development of the Subdivisions and the Additional Serviced Lands) shall be permitted unless and until an amendment to this agreement is prepared to the satisfaction of Newmarket and fully executed by the Parties. It is understood that any such agreement shall include such conditions as Newmarket may impose upon such connection. In the event any unauthorized connection shall occur, East Gwillimbury agrees that Newmarket shall be at liberty to terminate the delivery of water to East Gwillimbury after giving East Gwillimbury 7 days written notice of its intention to do so. East Gwillimbury agrees that it shall indemnify and save harmless Newmarket from and against all loss, cost, charges, damages, expenses, claims, demands and liens whatsoever to which Newmarket may be put by reason of terminating delivery of water to the unauthorized connections.

OPERATION, MAINTENANCE, REPAIR AND REPLACEMENT

9. In order to maintain the integrity of the operation and maintenance of the Newmarket Services for the Harry Walker Parkway Extension, the HWP Services, the Newmarket Services for Ringwell and the Road Works, East Gwillimbury agrees that it shall be responsible in perpetuity for the maintenance, repair and capital replacement of: the HWP Services; the sanitary sewer main located within the Easement; the Harry Walker Parkway Extension (including sidewalk and road snow removal); as necessary, to a standard equal to or better than Newmarket's standards to the satisfaction of Newmarket. Upon completion of the maintenance period for the Ringwell Services and Road Works, Newmarket shall have full responsibility for Ringwell Drive and its improvements.

FEES, RATES AND CHARGES

10. In the event Newmarket retains consultant engineers, inspectors or inspection firms on its behalf to examine, check and criticize the design drawings or to provide field monitoring services, the cost of same shall be paid by East Gwillimbury. In addition, East Gwillimbury shall compensate Newmarket for the costs of its staff together with disbursements related to the review and approval of the design drawings herein, field inspection and monitoring, meetings and discussions with East Gwillimbury and the Subdivision developers and the preparation and administration of this agreement.

11. Inasmuch as the cost of water which will serve the Subdivisions will be charged to Newmarket by the Region of York, East Gwillimbury agrees that commencing six months after first occupancy of any structure within the Subdivisions, it shall remit to Newmarket, monthly, a sum equal to Newmarket's rates, adjusted for full cost recovery, for the provision of water

and sanitary sewer services calculated on the basis of water meter readings of East Gwillimbury customers within the Subdivisions and the Additional Serviced Lands. East Gwillimbury shall pay to Newmarket a sum equal to Newmarket's Water Construction Charge for Commercial/Industrial/Institutional purposes for each structure for water consumption while under construction to be paid upon issuance of any building permit and a further sum equal to Newmarket's rates, adjusted for full cost recovery, based on actual metered consumption.

East Gwillimbury acknowledges that Newmarket's sanitary sewer rate, water rate and water construction charge shall be determined and set by Newmarket Council from time to time and that for year 2000 the charges are $1.90 per 100 cu. ft., $2.14 per 100 cu. ft. and $85 respectively.

12. For the purposes of determining the water and sanitary sewer rates to be paid by East Gwillimbury to Newmarket, Newmarket may employ a user fee bylaw pursuant to the provisions of the Municipal Act, a capital cost rate pursuant to the Municipal Act, a water rate and sanitary sewer rates bylaw pursuant to the Public Utilities Act, or similar or subsequent legislation to provide for the collection of the water rates and capital charges. East Gwillimbury agrees to take any steps within its jurisdiction, upon the request of Newmarket, to facilitate the enactment by Newmarket of any bylaws set out above and to facilitate Newmarket in the collection of the water rates and capital charges.

13. East Gwillimbury shall remit to Newmarket upon the issuance of any building permit within the lands within draft plan 19T-88073 (NewGwill) a sanitary sewer capital charge calculated at the rate of $22,580 per net hectare of the lot or block upon which the structure is to be erected and a water capital charge calculated at the rate of $4,400 per net hectare of the lot or block upon which the structure is to be erected and for the lands within draft plan 19T-88023 (Queensville/Caratuk) a sanitary sewer capital charge calculated at the rate of $22,580 per net hectare of the lot or block upon which the structure is to be erected and a water capital charge calculated at the rate of $2,200 per net hectare of the lot or block upon which the structure is to be erected.

WATER SYSTEM SECURITY AND ANTI-TAMPERING DEVICES

14. East Gwillimbury agrees to ensure that all hydrants and water valves are equipped with anti-tampering devices satisfactory to Newmarket's Director of Public Works and Environmental Services and that such anti-tampering devices are maintained before, during and after construction within the Subdivision lands to the intent that no hydrants are used for any purpose other than fire-fighting or testing of the water distribution systems within the Subdivisions under the supervision of East Gwillimbury failing which Newmarket shall be at liberty to replace such anti-tampering devices at the expense of East Gwillimbury.

15. East Gwillimbury shall take such steps as are reasonably necessary to ensure the proper functioning of water meters within buildings to be constructed within the Subdivision lands and the Additional Serviced Land and to undertake such plumbing inspections as may be necessary to ensure that all water consumed within the buildings is metered.

LANDS TO BE CONVEYED

16. East Gwillimbury agrees to take such steps as may be necessary to obtain the conveyance to Newmarket, at no cost and free from encumbrances, of the additional lands required for the Ringwell Improvements being Part lot 13, Plan 65M-2730 described as Part 1, Plan 65R-17697 and Part of lot 14, Plan 65M-2730 described as Part 6 on a preliminary reference plan prepared by Lloyd & Purcell Ltd. under file number G2-III-5-8-1, all in the Town of Newmarket, Regional Municipality of York.

ROAD DEDICATION AND ASSUMPTION

17. Upon completion of the construction of the Harry Walker Parkway extension over Block 59, Plan 65M-2730 and the conveyance to Newmarket of the additional lands required for the Ringwell Improvements to the satisfaction of Newmarket, Newmarket agrees to enact a bylaw dedicating the said lands as public highways. Thereafter and upon completion of a two year maintenance period as certified by East Gwillimbury's professional engineer, to the satisfaction of Newmarket's Director of Public Works and Environmental Services and subject to the approval of the Town Engineer for East Gwillimbury, Newmarket shall finally accept and assume the said lands as public highways.

INDEMNIFICATION

18. East Gwillimbury shall indemnify and save harmless Newmarket from and against all loss, damage or injury whatsoever, except to the extent that such liability is due to the negligence of Newmarket, which may result from the design, construction, installation, operation , maintenance or disconnection of the Services and the Road Works or any disconnection pursuant to Section 8 and East Gwillimbury shall assume all liability for any loss, damage or injury whatsoever to property or persons which would not have happened but for the installation of the Services and the Road Works. Without limiting the generality of the foregoing, East Gwillimbury acknowledges that the sanitary sewer design within the Subdivision lands includes an inverted siphon and a non-standard boulevard width and slope on the west side of Ringwell Drive cul-de-sac for which Newmarket accepts no responsibility despite any approval given by Newmarket therefor and from which East Gwillimbury shall fully indemnify and save harmless Newmarket as aforesaid.

CONSTRUCTION ACCESS

19. Inasmuch as access to the Subdivisions will be restricted to Ringwell Drive and Harry Walker Parkway until such time as the reconstruction of Green Lane has been completed and Ringwell Drive and Harry Walker Parkway shall be the sole construction access to the Subdivisions, East Gwillimbury agrees that it shall be fully responsible to ensure that Ringwell Drive and Harry Walker Parkway Extension north of Ringwell Drive are kept free and clear of mud, dust and construction debris at all times failing which, upon four (4) hours notice, Newmarket shall be at liberty to perform the work necessary to keep the said streets free and clear at the expense of East Gwillimbury. In the event an emergency situation exists or the health and safety of the public is at risk, as determined by Newmarket's Director of

Public Works and Environmental Services, Newmarket may, without notice, take such action as it considers necessary at the expense of East Gwillimbury.

East Gwillimbury further agrees that it shall ensure that the extension to Harry Walker Parkway to be constructed within East Gwillimbury northerly to Green Lane shall be completed to the intent that it will be open to the public immediately upon the completion of Green Lane and that thereafter all construction traffic shall be directed to the HWP subdivision via Green Lane.

20. East Gwillimbury agrees that it is fully responsible for the protection of all works and services fronting on or in Ringwell Drive and Harry Walker Parkway Extension north of Ringwell Drive during the development of the Subdivisions. East Gwillimbury agrees to properly restore to the satisfaction of Newmarket's Director of Public Works and Environmental Services any damage caused by the development of the Subdivisions and the individual sites therein, as directed by Newmarket's Director of Public Works and Environmental Services, to the said streets or to any works and services on or in the said streets forthwith upon demand therefor, failing which Newmarket may, upon 15 days written notice to East Gwillimbury, undertake such work as is necessary to restore the said streets or works and services at the expense of East Gwillimbury.

RIGHT TO DISCONNECT

21. It is agreed by and between the parties that in the event of any breach or non-performance by East Gwillimbury at any time or times in respect of any covenant or agreement herein contained on the part of East Gwillimbury, Newmarket may, upon seven days written notice to East Gwillimbury, East Gwillimbury agrees that Newmarket may direct the Region of York to disconnect all or any of the Services from Newmarket Services at East Gwillimbury's expense and East Gwillimbury hereby releases and forever discharges and saves harmless Newmarket of and from all manner of actions, causes of action, suits, claims and demands whatsoever against Newmarket which East Gwillimbury can, shall or may have for or by reason of any cause, matter or thing whatsoever arising out of or incidental to any such disconnection of all or any of the Services.

INSTALLATION AND RELOCATION OF UTILITIES WITHIN NEWMARKET

22. East Gwillimbury agrees that it shall be fully responsible, at its sole cost, for making all arrangements with Newmarket Hydro and any other Utility company related to the provision of utilities resulting from development of the Subdivisions and the Additional Serviced Land and which including any relocation, expansion, replacement of existing utility plant located within Newmarket, including but not limited to street lighting.

WATERMAIN COMMISSIONING PROCEDURES

23. East Gwillimbury agrees to cause its Consulting Engineer to certify to Newmarket's Director of Public Works and Environmental Services that Newmarket's watermain commissioning procedures have been successfully completed prior to opening the valve at the intersection of Ringwell Drive and Harry Walker Parkway.

APPROVALS

24. East Gwillimbury agrees to ensure that any approvals required by any other governmental authority having jurisdiction are obtained prior to commencement of any of the works and services contemplated by this agreement.

ENGINEER'S CERTIFICATE AND AS BUILT DRAWINGS

25. East Gwillimbury agrees to cause its Consulting Engineer provide its Certificate confirming the completion of all works and services within Newmarket in accordance with the approved drawings and that such works and services will function as intended and further to file "as-built drawings" of all works addressed by this Agreement with Newmarket forthwith upon completion of all of said works.

ESTOPPEL

26. The parties agree that they have the jurisdiction and the authority to enter into this agreement and that they are forever estopped from challenging the validity of this agreement or any of its provisions before the Courts of Ontario, any administrative tribunal or other authority having jurisdiction to rescind, vary or amend the provisions of this agreement without the concurrence of all parties.

27. In the event there is any dispute arising from the terms of this agreement, the Parties agree that such dispute shall be referred to and settled by a single arbitrator, acceptable to both parties pursuant to the provisions of the Arbitrations Act RSO 1990 c. A24.

SEVERABILITY AND FURTHER ASSURANCES

28. In the event that a court quashes any portion of this agreement or declares any portion of this agreement to be null or unenforceable such provisions(s) shall be severed from the remainder of this agreement which shall continue in full force and effect. The parties agree to execute such further assurances as may be necessary to carry into effect the provisions(s) quashed or declared to be null or unenforceable.

29. This agreement and everything herein contained shall respectively enure to the benefit of and be binding upon the parties, and their successors and assigns, respectively.

IN WITNESS WHEREOF the parties have affixed their respective corporate seals attested by the hands of their respective officers duly authorized in that behalf.

The Corporation of the Town of East Gwillimbury
Per:

James R. Young, Mayor

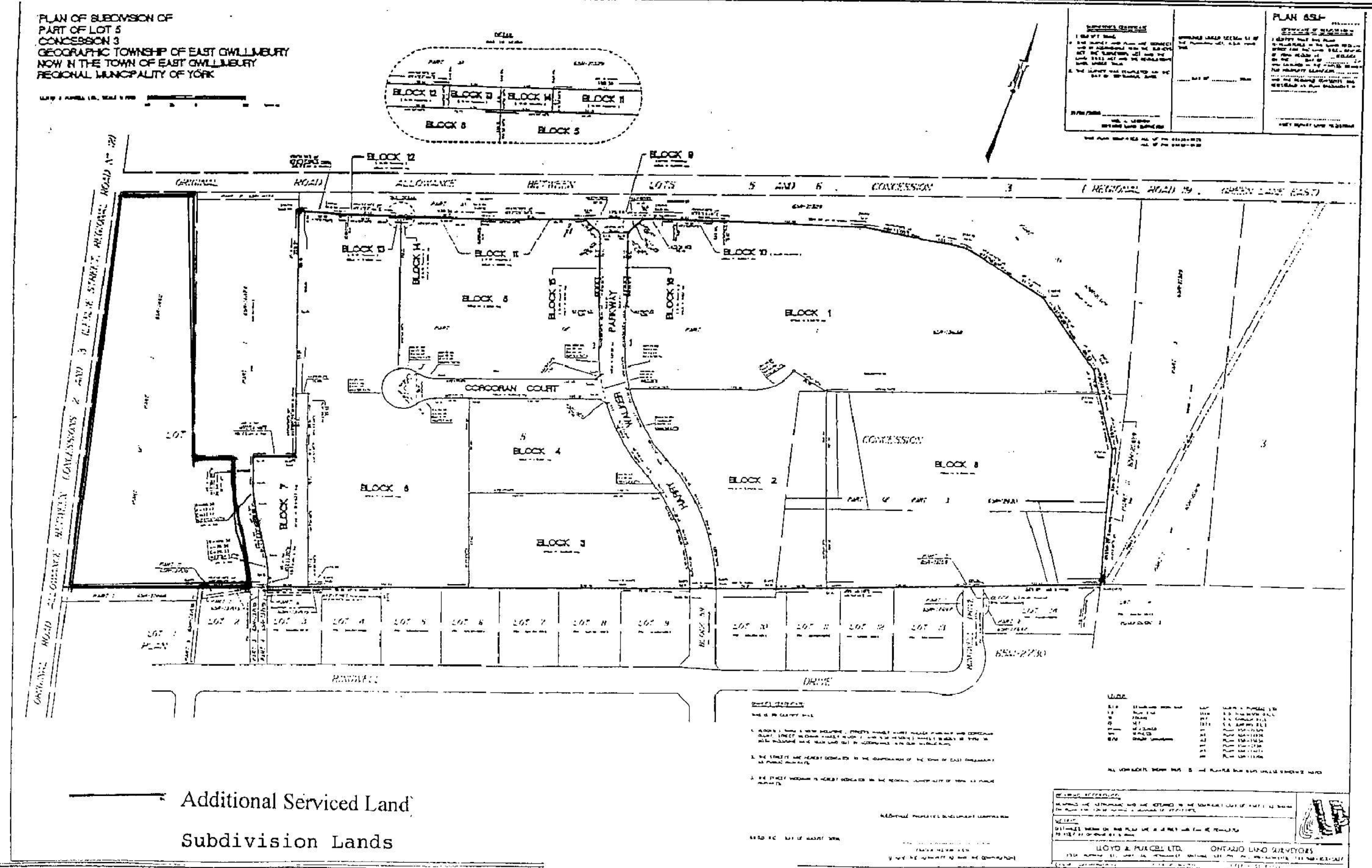
Stephen McDonald, Clerk

Corporation of the Town of Newmarket
Per:

Tom Taylor, Mayor

Nancy Wright-Laking, Clerk
2001-102

Schedule "A"



Additional Serviced Land

Subdivision Lands

SCHEDULE "B"

(PAGE 1 OF 2)

SANITARY FLOW MONITORING SPREADSHEET

Water Consumption Converted to a Peak Sanitary Flow Rate

Town of East Gwillimbury / Town of Newmarket

Shell/Caratuck/Newgwill Industrial Development

May 2000

Address[1]	Occupant/Owner[2]	Site Area (ha)[3]	Allowable Peak Discharge (APD) to the Town of Newmarket Sanitary System (L/s)[4]	Metered Water Consumption (ft^3)[5]	Water Consumption (WC) Converted to (L)[6]	Period (Duration of Metering)[7]	Months[8]	Average Water Consumption (AWC) Rate (L/s) (Based on 14 hours of Operation)[9]	Peak Water Consumption (PWC) Rate (L/s)[10]	Comparison of Allowable Peak Discharge to Peak Water Consumption Rate[11]
NODE 1 - Shell Canada										
Block A	Vacant	**4.800**	**5.424**	0	0	Jan-00	**1**	0.000	**0.000**	***5.424***
NODE 2 - Caratuck Industrial Subdivision										
Block B	Vacant	1.790	2.023	0	0	Jan-00	1	0.000	**0.000**	2.023
Block C	Vacant	1.760	1.989	0	0	Jan-00	1	0.000	**0.000**	1.989
Block D	Vacant	1.974	2.231	0	0	Jan-00	1	0.000	**0.000**	2.231
Block E	Vacant	3.376	3.815	0	0	Jan-00	1	0.000	**0.000**	3.815
Block F	Vacant	3.760	4.249	0	0	Jan-00	1	0.000	**0.000**	4.249
Block G	Vacant	3.278	3.704	0	0	Jan-00	1	0.000	**0.000**	3.704
Block H	Vacant	1.821	2.058	0	0	Jan-00	1	0.000	**0.000**	2.058
Block I	Acushnet Development	2.178	2.461	0	0	Jan-00	1	0.000	**0.000**	2.461
Block J	Vacant	3.543	4.004	0	0	Jan-00	1	0.000	**0.000**	4.004
Total NODE 2 - Caratuck Industrial Subdivision		**23.480**	**26.532**						**0.000**	***26.532***
NODE 3 - Newgwill Industrial Subdivision										
Block K	Vacant	**5.260**	**5.944**	0	0	Jan-00	1	0.000	**0.000**	***5.944***
Totals		***33.540***	***37.900***		0				**0.000**	***37.900***

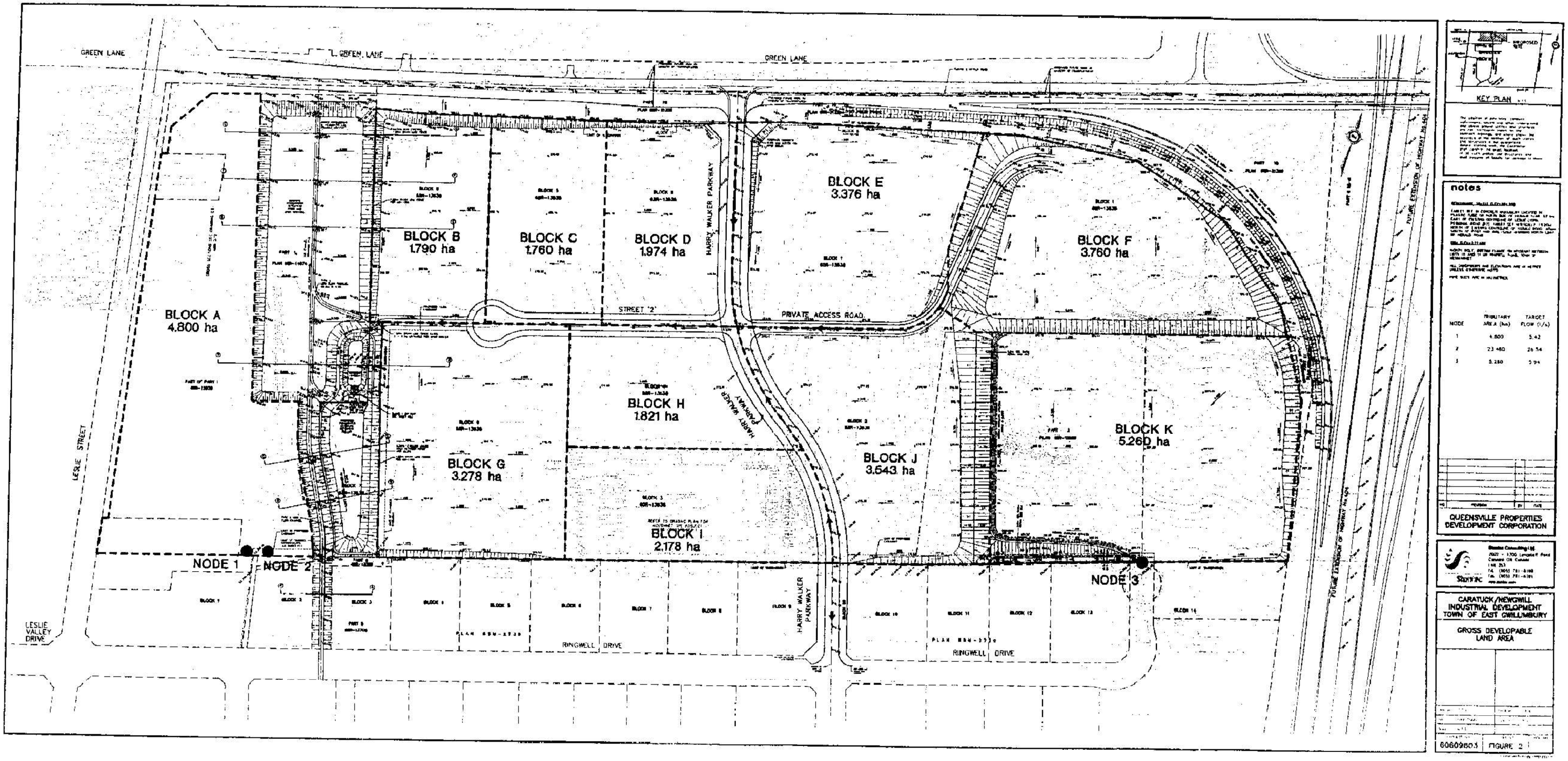
Notes:

1. Refer to Figure 2 - Gross Developable Land Area for Block location. (attached)
2. Owner/Occupant as shown on the water bill.
3. Refer to Figure 2 - Gross Developable Land Area for Area in hectares. (attached)
4. Peak Sanitary Industrial Flow Rate (PSIF) (Town of Newmarket). 1.130 L/s/ha
4. APD = Area x PSIF Rate
5. Variable to be entered - metered water consumption by Town of East Gwillimbury.
6. Water consumption converted to litres by multipling ft^3 x 28.33.
7. Variable to be entered - Period / Duration of water metering shown on the water bill.
8. Variable to be entered - months to correspond with the period or duration entered in column 7.
9. AWC Rate = WC(litres) / Period x 12 / (365 x 14 x 60 x 60)
10. Industrial Sanitary Peaking Factor (MOE) P.F. = 6.097 / $area^{0.20715}$ = 2.945
10. PWC Rate = P.F. x AWC Rate
10. Assume PWC Rate is equal to Peak Sanitary Flow Rate
11. APD Rate - PWC Rate

Stantec Consulting Ltd.

Caratuck Newgwill Water Sanitary Table - Caratuck

SCHEDULE "B" (PAGE 2 o



NODE	TRIBUTARY AREA (ha)	TARGET FLOW (l/s)
1	4.800	5.42
2	23.480	26.54
3	5.280	5.94

This Agreement ("Agreement") made as of the 8 day of JAN, 2020.

BETWEEN:

Corporation of the Town of Newmarket

("**Newmarket**")

-and-

Rice Commercial Group Limited

("**Rice Group**")

WHEREAS:

A. Newmarket has provided and will be continuing to provide water and waster water services to the Corporation of the Town of East Gwillimbury ("**East Gwillimbury**") upon the terms and conditions set out in agreements between Newmarket and East Gwillimbury.

B. The provision by Newmarket of the water and wastewater services has allowed East Gwillimbury to create commercial development lands within East Gwillimbury in the area of Green Lane East and Highway 404.

C. Rice Group has submitted a development application in East Gwillimbury regarding lands owned by Rice Group for the creation of an auto mall to facilitate multiple car dealerships (the "**Rice Development**").

D. Rice Group confirms that it will receive a benefit arising from the provision to East Gwillimbury of water and wastewater services by Newmarket.

E. As compensation for the loss of employment opportunities within the Town of Newmarket and the reduction in revenues to Newmarket that will arise from the relocation of car dealerships currently located in the Town of Newmarket to the Rice Development, Rice Group has agreed to provide a financial contribution to Newmarket as detailed in this Agreement.

NOW THEREFORE, in consideration of other good and valuable consideration as noted in the recitals above and the further sum of TWO DOLLARS ($2.00) of lawful money of Canada now paid by each of the parties hereto to each of the other parties hereto, the receipt whereof is hereby acknowledged, the parties hereto hereby covenant and agree with each other as follows:

1. The parties confirm that the recitals set out above are factually correct and further confirm that the recitals form part of this Agreement.

2. Rice Group covenants and agrees to pay to Newmarket a community benefit in the sum of $ (the "**Community Benefit**") to be applied by Newmarket as follows:

(a) The sum of shall be utilized by Newmarket toward the creation and/or improvement of parks within the Town of Newmarket, and

(b) The sum of shall be utilized by Newmarket toward the creation of an outdoor arena within the Town of Newmarket (the "**Arena**").

3. Payment of the Community Benefit shall be paid by Rice Group to Newmarket immediately upon approval of the zoning of the Rice Development by the Council of East Gwillimbury or applicable planning appeal body (the "**Zoning Approval**"). Rice Group shall provide the Town's Commissioner of Development and Infrastructure Services with notice of the Zoning Approval upon the granting thereof.

4. As security for the payment of the Community Benefit, Rice Group shall provide to Newmarket, thirty (30) days after the execution of this agreement but not later than February 10th,2020 , a certified cheque in the amount of .

5. Rice Group agrees that the Town shall have the unfettered right upon the date of the Zoning Approval to cash the certified cheques in the entire amount of without permission.

6. The cheque shall be returned if the Council of East Gwillimbury or applicable planning appeal body does not provide the Zoning Approval.

7. Without limiting in any way the compensation nature of the Community Benefit to Newmarket, Newmarket will provide a non-exclusive name recognition for Rice Group for the Arena.

8. The parties agree that they have the jurisdiction and the authority to enter into the Agreement and that they are forever estopped from challenging the validity of the Agreement or any of its provisions before the Courts of Ontario, any administrative tribunal or other authority having jurisdiction to rescind, vary or amend the provisions of the Agreement without the concurrence of all parties.

9. In the event there is any dispute arising from the terms of the Agreement, the parties agree that such dispute shall be referred to and settled by a single arbitrator, acceptable to both parties pursuant to the provisions of the Arbitration Act, 1991.

10. Rice Group shall indemnify Newmarket for all costs, losses, liabilities, judgments, damages or expenses which may be paid, sustained or incurred by Newmarket or any of its officers, Council members, partners, agents and/or employees in consequence of any action, claim, demand, loss, suits, or proceedings whatsoever resulting directly from or arising directly out of any breach, violation or non-performance of any provision of the Agreement by Rice Group, its agents, officials and/or employees.

11. All notices, requests, demands or other communications by the terms hereof required, or permitted to be given by one party to another shall be given in writing by personal delivery, or by telefax, email or by registered mail, postage prepaid, addressed to the other party or delivered to such other party as follows:

Appendix D

Water Demand Calculations

DOMESTIC WATER DEMAND

Project Name:	Newmarket Toyota	Project No.	2406541
Prepared by:	Brad Harkins		
Date:	Oct-24		

Note:
Based on the Town of Newmarket Design Criteria

	Site Component	Site 1					
Residential Occupancy Data	Single/Semi Detached						
	People per unit						
	Townhouses						
	People per unit						
	Apartments						
	People per unit						
Commercial Occupancy Data	Commercial	2.87					
	ha	*1.0*					

Unit Quantity by Site Component	**Water Demand**	**Units**	**Equivalent Population (persons)**					
Residential Occupancies								
Not used								-
Not used	-	-	-	-	-	-	-	-
Not used	-	-	-	-	-	-	-	-
Other Occupancies			**Flow Rates (L/d)**					
Industrial	35,000	L/ha/day	100450.0	-	-	-	-	-
Not used	-	-	-	-	-	-	-	-
Not used	-	-	-	-	-	-	-	-

Daily Flow Rate (L/d)								
Residential Occupancies								
Not used								
Not used								
Not used								
Other Occupancies								
Industrial		100,450.00	100,450.00					
Not used		0	0					
Not used		0	0					

	Total Flow						
Average day (L/d)	**100,450**	100,450					
Average day (L/s)	**1.16**	1.16					
Max. day (L/d)	**200,900**	200,900					
Min. hour (L/hr)	**3,516**	3,516					
Peak hour (L/hr)	**11,510**	11,510					
Peak hour (L/s)	**3.20**	3.20					

Peaking Factors			
Land Use	Minimum Hour	Peak Hour	Maximum Day
Residential	0.84	2.75	2.00
Commercial / Retail	0.84	2.75	2.00

B:\Working\NEWROADS AUTOMOTIVE GROUP\2406541 1656 Green Lane East-EG\06_CIV\00_DESIGN\01_Design Docs\01_Calcs\Water\[Toyota Newmarket- Site Plan-Domestic and Fire Demand.xlsx]2. Fire Flow Requirements

FIRE FLOW CALCULATION

Project Name:	Newmarket Toyota	Project No.	2406541
Prepared by:	Brad Harkins		
Date:	Oct-24		

Fire Resistive Construction: **YES**

The following calculations are for the proposed development and area based on the largest floorplan area. The FUS requires that a minmimum water supply source 'F' be provided at 150KPa. The minimum flow 'F' can be calculated as such:

$$F = 220C\sqrt{A}$$

F = Required fire flow L/min

C = Coefficient related to construction

A = Total area in m^2

'Calculations, formulas and factors are as per Fire Underwriter's Survey (FUS) Water Supply for Public Fire Protection

	Site Component:	**Site 1**	**Future Site**				
Total Floor Area	Largest Floor Area (m2)	4622.3	3200				
	Area Above (m2)	0	0				
	Area Below (m2)	0	0				
	Total Floor Area (m2)	4622	3200				
Flow (F)	C (dimensionless)	0.6	0.6				
	A (m2)	4622	3200				
	F (L/min)	9000	7000				
Reduction Factor	F (L/min)	9000	7000				
	f_1 (dimensionless)	1.00	1.00				
	F' = F x f_f (L/min)	9000	7000				
	f_1 = occupancy factor; ie, Residential, f_1 = 0.85; for Retail or Commercial, f_1 = 1.00						
Sprinkler and Exposure Increase or Decrease	f_2 (sprinkler factor)	30%	30%				
	North Side	0%	0%				
	East Side	0%	20%				
	South Side	0%	0%				
	West Side	20%	0%				
	f_3	20%	20%				
	f_3 = Exposure factor not to exceed 75%, determined as per FUS Guide Item 4, page 18)						

F' (L/min)	**9000**	**7000**				
S = F' * *f_2 (L/min)*	**2700**	**2100**				
E = F' * *f_3 (L/min)*	**1800**	**1400**				

F''=F'-S+E (L/min) rounded to nearest 1,000	**8000**	**6000**				
F''(L/s)	**0**	**0**				
F''(USGPM)	**2120**	**1590**				
Max F'' + Dom (USGPM)	**2,160**	**1,630**				

Table 1

Sprinkler Reduction Factor (f_2)		
No Sprkinkler System	Sprinklered	Sprink. + Supervised
0%	30%	50%

Table 2

Construction Type "C" Factor			
Wood Frame	Ordinary Construction	Non-Combustible	Fire Resistive
1.5	1	0.80	0.60

Table 3

Occupancy Factor (f_1)				
Rapid Burning	Free Burning	Combustible	Limited Combustible	Non-Combust.
25%	15%	0%	-15%	-25%

Table 4

Exposure Charge					
0 to 3m	3.1 to 10m	10.1 to 20m	20.1 to 30m	30.1 to 45m	> 45m
25%	20%	15%	10%	5%	0

IQ ENVIRONMENTAL
INC.

IQ Environmental Inc.

P.O. BOX 199, MILLGROVE, ONTARIO L0R 1V0

FIRE FLOW TEST REPORT

Section 1.0 - Project Information

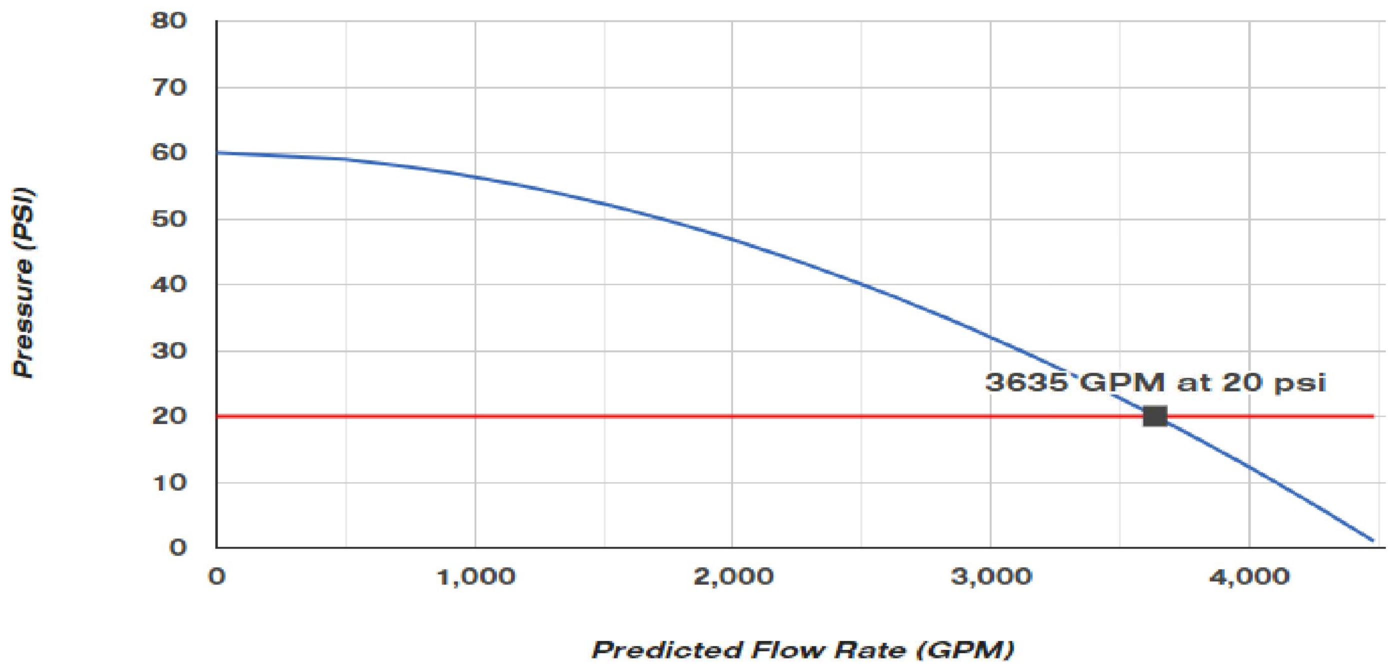
Client:	Rice Group	**IQ Job Number:**	128
Client Site Representative:		**Date of Test:**	10/29/2021
Project Name:		**Time of Test:**	11:45am
Project Location:	East Gwillimbury		

Section 2.0 - flow test results

Flow Hydrant Location:	FH0537 100m W on Green Ln		
Residual Hydrant Location:	FH0555 SW Corner of Green Ln and Harry Walker Parkway		
Diameter of Watermain:	?	**Static Pressure:**	60psi

Outlet Size / # of Outlets	**Pitot Pressure**	**Flow (USGPM)**	**Coefficient**	**Residual Pressure**
1 x 2.5"	50	1,184	0.9	56psi
2 x 2.5"	35	1,981	0.9	47psi
		3,635		20psi

Section 3.0 - flow test graph



Section 4.0 - confirmations / Signatures

	Name	signature	date
IQ Operator in Charge:	Justin Butler		10/29/2021
Client Representative:			

IQ Environmental Inc.
P.O. BOX 199, MILLGROVE, ONTARIO L0R 1V0

FIRE FLOW TEST REPORT

Section 1.0 - Project Information

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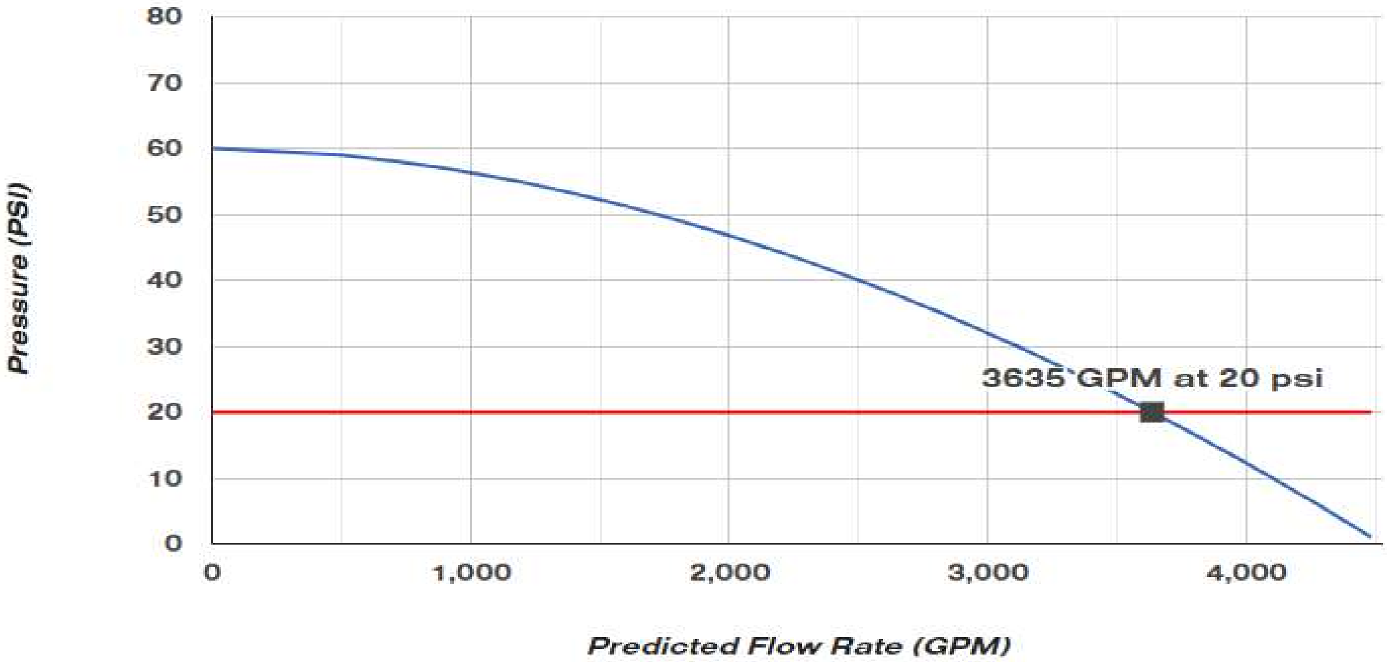
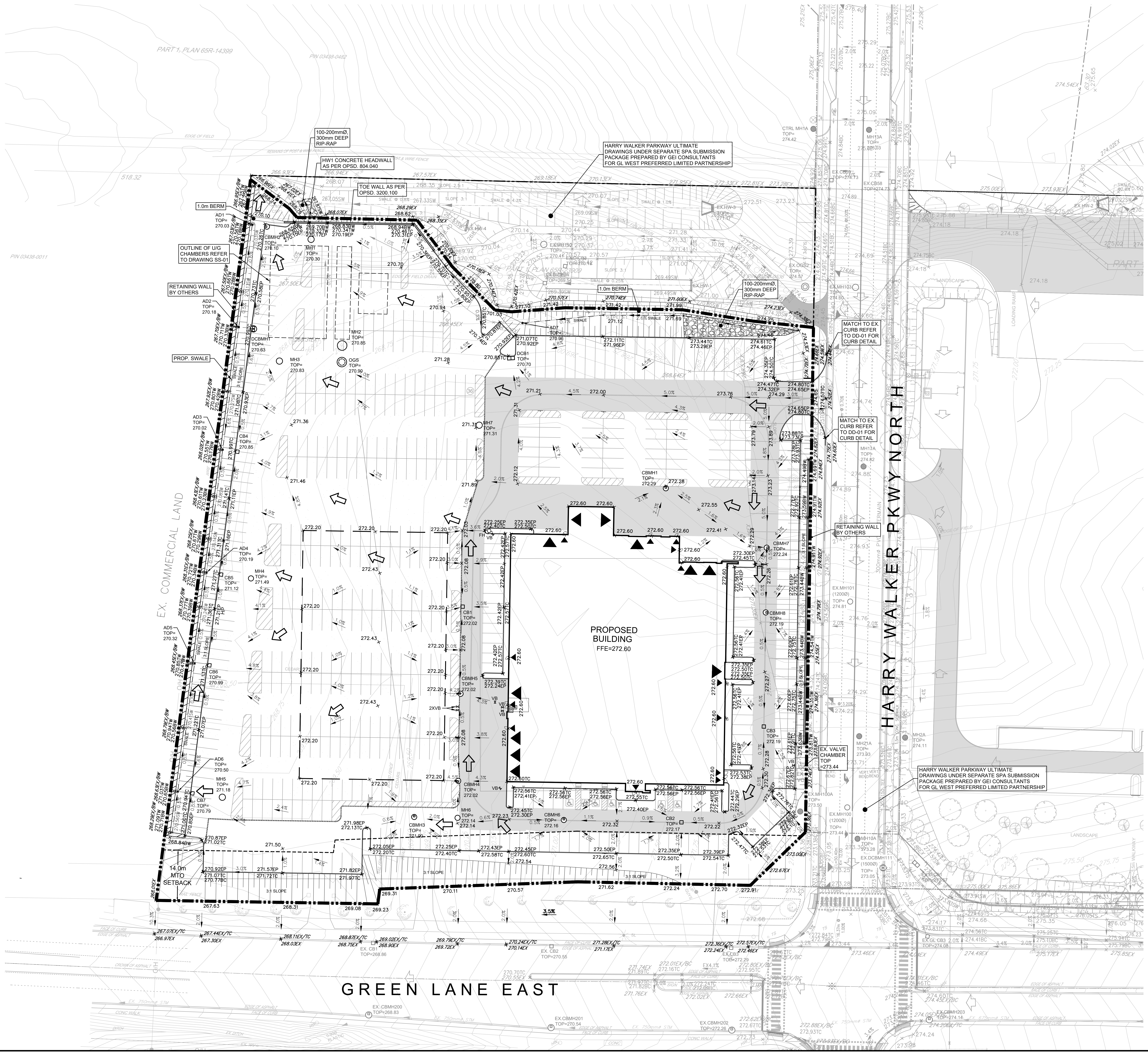


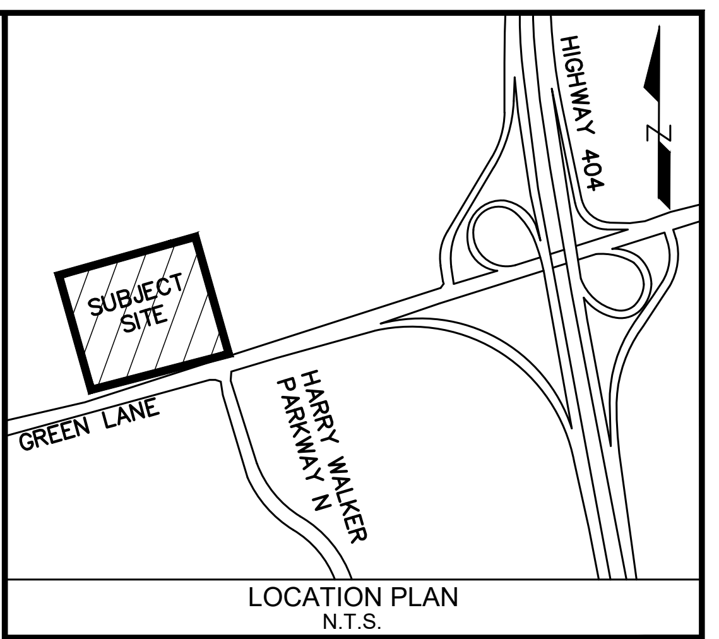
Section 4.0 - confirmations / Signatures

	Name	signature	date
IQ Operator in Charge:	Justin Butler		10/29/2021
Client Representative:			

Appendix E

Engineering Drawings





LOCATION PLAN
N.T.S.

LEGEND

PROPOSED GRADE	×149.50
PROPOSED GRADE (SWALE)	×149.75SW
PROPOSED GRADE (TOP OF CURB)	×149.75TC
PROPOSED GRADE (BOTTOM OF CURB)	×149.60BC
PROPOSED GRADE (TOP OF WALL)	×149.90TW
PROPOSED GRADE (BOTTOM OF WALL)	×149.20BW
EXISTING GRADE	× *149.33EX*
PROPERTY LINE	▬ ▪ ▪ ▬
14m MTO SETBACK	– – – –
SWALE	SWALE @ 2.0% →
SLOPE TICKS	┬┬┬
CURB	─
FUTURE BUILDING OUTLINE	── ──
HEAVY DUTY ASPHALT	▨
EMERGENCY OVERLAND FLOW ROUTE	⇦
EXISTING OVERLAND FLOW ROUTE	⇦
BUILDING ENTRANCE\OVERHEAD DOOR	▼ ▼
PROPOSED TOE-WALL	TOE-WALL
PROPOSED RETAINING WALL	RETAINING WALL
PROPOSED STORM MANHOLE	○
PROPOSED CATCHBASIN MANHOLE	⊡
PROPOSED CATCH BASIN	□
PROPOSED AREA DRAIN	⊠
PROPOSED SANITARY MANHOLE	●
PROPOSED WEIR	⊘
PROPOSED OIL-GRIT SEPARATOR	◎
EXISTING STORM MANHOLE	○
EXISTING CATCHBASIN	□
EXISTING SANITARY MANHOLE	●
PROPOSED FIRE HYDRANT	-○-
EXISTING FIRE HYDRANT	EX.FH -○-
PROPOSED VALVE AND BOX	⧗

LIST OF DRAWINGS

SG-01 - SITE GRADING PLAN
SS-01 - SITE SERVICING PLAN
EC-01 - EROSION AND SEDIMENT CONTROL PLAN
XS-01 - CROSS SECTIONS
DD-01 - DETAIL DRAWING
DD-02 - DETAIL DRAWING
DD-03 - DETAIL DRAWING

SITE PLAN INFORMATION

WARE MALCOMB ARCHITECTS INC.
30 ADELAIDE STREET E, SUITE 1254
TORONTO, ON, M5C 2C5
PHONE: (437) 537-5700

SURVEYOR INFORMATION

E.R. GARDEN LIMITED
ONTARIO LAND SURVEYOR
1260 JOURNEY'S END CIRCLE, UNIT 1,
NEWMARKET, ON, L3Y 8Z7
PHONE: (905) 895-5600
FAX: (905) 895-7127
WEBSITE: www.ergardenlimited.ca

BENCHMARK INFORMATION:
ELEVATIONS ARE GEODETIC AND ARE DERIVED FROM TOWN OF NEWMARKET BENCHMARK 1095 HAVING AN ELEVATION 273.91 METRES A.S.L.

5			
4			
3			
2			
1	2024/10/25	ISSUED FOR SPA SUBMISSION	TVL
No.	DATE	ISSUE/REVISION	INTIAL

T. J. VAN LIEROP
100508919
2024-10-25

NEWROADS - TOYOTA
NEWROADS AUTOMOTIVE GROUP
1656 GREEN LANE EAST
TOWN OF EAST GWILLIMBURY, ONTARIO

SITE GRADING PLAN

GEI Consultants

DESIGNED BY: PS	DATE: OCTOBER, 2024	CHECKED BY: TVL
DRAWN BY: PS	PROJECT No. 2406541	DRAWING No. SG-01
SCALE: 1:500		

5.0m 0 5.0m 10.0m 15.0m 20.0m 25.0m 30.0m

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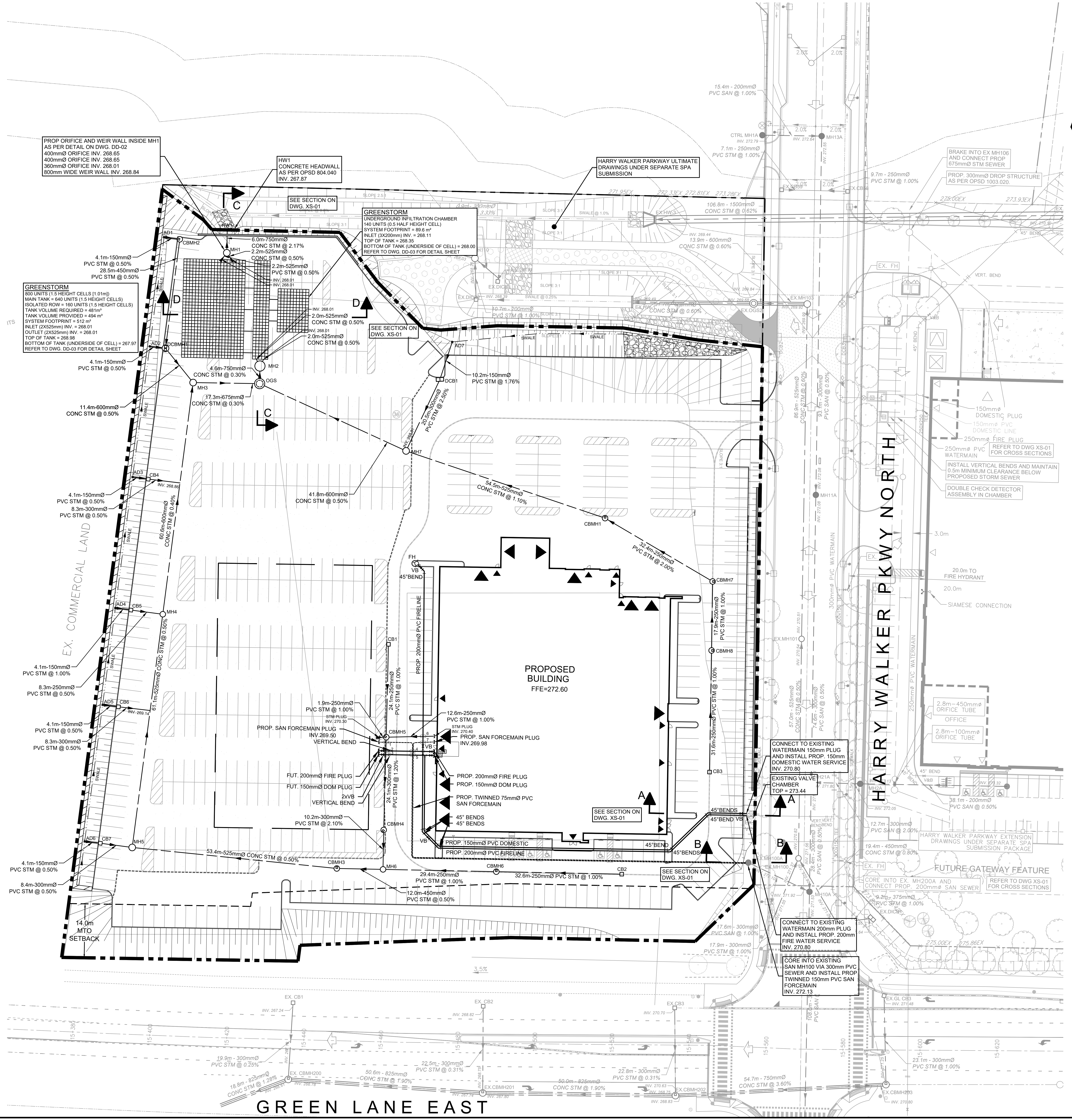
STORM SEWER STRUCTURE INVENTORY

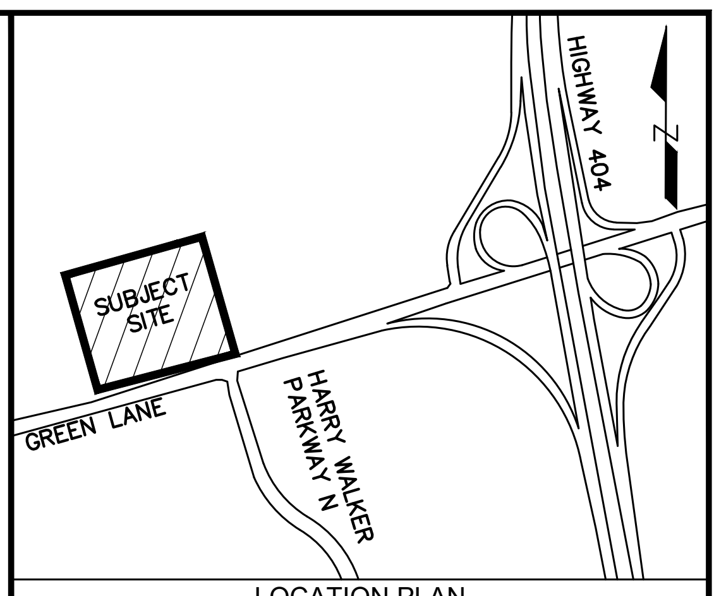
MH#	MH DIAMETER	MH OPSD	FRAME CITY/ OPSD	TOP ELEV.	INVERTS
AD1		ZURN 610	ZURN 610	270.03	E 269.08 (150mmØ)
AD2		ZURN 610	ZURN 610	270.18	E 268.94 (150mmØ)
AD3		ZURN 610	ZURN 610	270.02	E 269.07 (150mmØ)
AD4		ZURN 610	ZURN 610	270.19	E 269.20 (150mmØ)
AD5		ZURN 610	ZURN 610	270.32	E 269.35 (150mmØ)
AD6		ZURN 610	ZURN 610	270.50	E 269.49 (150mmØ)
AD7		ZURN 610	ZURN 610	270.96	S 269.66 (150mmØ)
CB1		705.010	400.010	272.02	S 270.52 (250mmØ)
CB2		705.010	400.010	272.17	W 270.67 (250mmØ)
CB3		705.010	400.010	272.19	N 270.69 (250mmØ)
CB4		705.010	400.010	270.85	W 269.05 (150 mmØ) E 268.90 (300mmØ)
CB5	[illegible]	705.010	400.010	271.12	W 269.16 (150 mmØ) E 269.06 (250mmØ)
CB6		705.010	400.010	270.99	W 269.33 (150 mmØ) E 269.18 (300mmØ)
CB7		705.010	400.010	270.79	W 269.47 (150 mmØ) E 269.32 (300mmØ)
CBMH1	1200 mmØ	701.010	400.010	272.29	E 269.47 (250 mmØ) W 269.19 (525mmØ)
CBMH2	1200 mmØ	701.010	400.010	270.10	W 269.06 (150 mmØ) S 268.76 (450mmØ)
CBMH3	1200 mmØ	701.010	400.010	271.90	E 269.48 (450 mmØ) W 269.41 (525mmØ)
CBMH4	1200 mmØ	701.010	400.010	272.02	N 269.94 (300 mmØ) S 269.91 (300mmØ)
CBMH5	1200 mmØ	701.010	400.010	272.02	N 270.28 (250 mmØ) E 270.28 (250 mmØ) W 270.28 (250 mmØ) S 270.23 (300mmØ)
CBMH6	1200 mmØ	701.010	400.010	272.16	E 270.34 (250 mmØ) W 270.29 (250mmØ)
CBMH7	1200 mmØ	701.010	400.010	272.24	S 270.17 (250 mmØ) W 270.12 (250mmØ)
CBMH8	1200 mmØ	701.010	400.010	272.19	S 270.37 (250 mmØ) N 270.34 (250mmØ)
DCB1		705.020	400.010	270.70	N 269.48 (150 mmØ) S 269.32 (300mmØ)
DCBMH1	1500 mmØ	701.011	401.010	270.63	N 268.62 (450 mmØ) W 268.92 (150 mmØ) SE 268.47 (600mmØ)
HW1		804.030		269.30	S 267.87 (750 mmØ)
MH1	1500 mmØ	701.011	401.010	270.30	S 268.00 (525 mmØ) SE 268.00 (525 mmØ) N 268.00 (750mmØ)
MH2	2400 mmØ	701.013	401.010	270.85	S 268.14 (750 mmØ) NW 268.02 (525mmØ) N 268.02 (525mmØ)
MH3	1500 mmØ	701.011	401.010	270.83	NW 268.41 (600 mmØ) S 268.43 (600 mmØ) E 268.35 (675mmØ)
MH4	1200 mmØ	701.010	401.010	271.49	W 269.02 (250 mmØ) S 268.74 (525 mmØ) N 268.67 (600mmØ)
MH5	1500 mmØ	701.011	401.010	271.18	E 269.14 (525 mmØ) W 269.27 (300 mmØ) N 269.05 (525mmØ)
MH6	1200 mmØ	701.010	401.010	272.14	N 269.69 (300 mmØ) E 270.00 (250 mmØ) W 269.54 (450mmØ)
MH7	1500 mmØ	701.011	401.010	271.31	N 268.81 (300 mmØ) E 268.58 (525 mmØ) W 268.51 (600mmØ)
OGS	2400 mmØ	STORMCEPTOR EFO8		270.90	E 268.30 (600 mmØ) W 268.30 (675 mmØ) N 268.15 (750mmØ)



PIPE CROSSING TABLE

INDEX	PIPE 1 DIAMETER	PIPE 1 TOP	PIPE 1 BOTTOM	PIPE 2 DIAMETER	PIPE 2 TOP	PIPE 2 BOTTOM	GAP DISTANCE
1	300mmSTM	270.510	270.210	75mmSAN	269.710	269.630	0.50
2	300mmSTM	270.490	270.190	200mmWM	269.690	269.490	0.50
3	300mmSTM	270.480	270.180	150mmWM	269.680	269.530	0.50
4	200mmWM	270.640	270.440	75mmSAN	269.940	269.860	0.50
5	150mmWM	270.650	270.500	75mmSAN	269.950	269.870	0.55
6	250mmSTM	270.630	270.380	200mmWM	269.880	269.680	0.50
7	200mmWM	270.750	270.550	75mmSAN	270.050	269.970	0.50

WHERE REQUIRED, INSTALL VERTICAL BENDS IN WATERMAIN TO ENSURE 0.5m VERTICAL SEPARATION BETWEEN WATERMAIN AND STM/SAN SEWER.



LOCATION PLAN
N.T.S.

LEGEND

PROPOSED STORM MANHOLE	○
PROPOSED CATCHBASIN MANHOLE	⊡
CATCH BASIN	□
PROPOSED VALVE & BOX	⋈
PROPOSED HYDRANT & VALVE	⊣◇
PROPOSED AREA DRAIN	⊠
EXISTING STORM MANHOLE	○
EXISTING SANITARY MANHOLE	●
EXISTING CATCHBASIN	□ EX.CB.
EXISTING DOUBLE CATCHBASIN	□□ EX.CB.
EXISTING VALVE & CHAMBER	⊗ EX.V&C
EXISTING HYDRANT & VALVE	⊣◇ EX.H&V
EXISTING DOUBLE DITCH INLET CATCHBASIN MANHOLE	⊖
PROPOSED STORM SEWER	──
PROPOSED STORM SEWER (INSULATED)	══
PROPOSED SANITARY SEWER	──
PROPOSED WATERMAIN	──
EXISTING STORM SEWER	┄┄
EXISTING SANITARY SEWER	──
EXISTING WATERMAIN	┄┄
14m MTO SETBACK	- - - -
PROPERTY LINE	━ ▪ ━
PROPOSED BLDG. OUTLINE AT GROUND FLOOR	━━
HEAVY DUTY ASPHALT	▨
PROPOSED TOE-WALL	TOE-WALL
PROPOSED RETAINING WALL	RETAINING WALL
PROPOSED TRANSFORMERS	◬ ⊠
BOREHOLE AS PER GEOTECHNICAL REPORT	⊕ BH/MW4
LIGHT STANDARD	○ □
PROPOSED SUBDRAIN	─□─
PROPOSED DOMESTIC WATER METER	M
PROPOSED DOUBLE CHECK DETECTOR ASSEMBLY	D
PROPOSED BACKFLOW PREVENTER	B

LIST OF DRAWINGS

SG-01 - SITE GRADING PLAN
SS-01 - SITE SERVICING PLAN
EC-01 - EROSION AND SEDIMENT CONTROL PLAN
XS-01 - CROSS SECTIONS
DD-01 - DETAIL DRAWING
DD-02 - DETAIL DRAWING
DD-03 - DETAIL DRAWING

SITE PLAN INFORMATION

WARE MALCOMB ARCHITECTS INC.
30 ADELAIDE STREET E, SUITE 1254
TORONTO, ON, M5C 2C5
PHONE: (437) 537-5700

SURVEYOR INFORMATION

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ONTARIO LAND SURVEYOR
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FAX: (905) 895-7127
WEBSITE: www.ergardenlimited.ca

BENCHMARK INFORMATION:
ELEVATIONS ARE GEODETIC AND ARE DERIVED FROM TOWN OF NEWMARKET BENCHMARK 1095 HAVING AN ELEVATION 273.91 METRES A.S.L.

5			
4			
3			
2			
1	2024/10/25	ISSUED FOR SPA SUBMISSION	TVL
No.	DATE	ISSUE/REVISION	INTIAL

T. J. VAN LIEROP
100508919
2024-10-25

TOWN OF EAST GWILLIMBURY
YORK REGION

NEWROADS - TOYOTA
NEWROADS AUTOMOTIVE GROUP
1656 GREEN LANE EAST
TOWN OF EAST GWILLIMBURY, ONTARIO

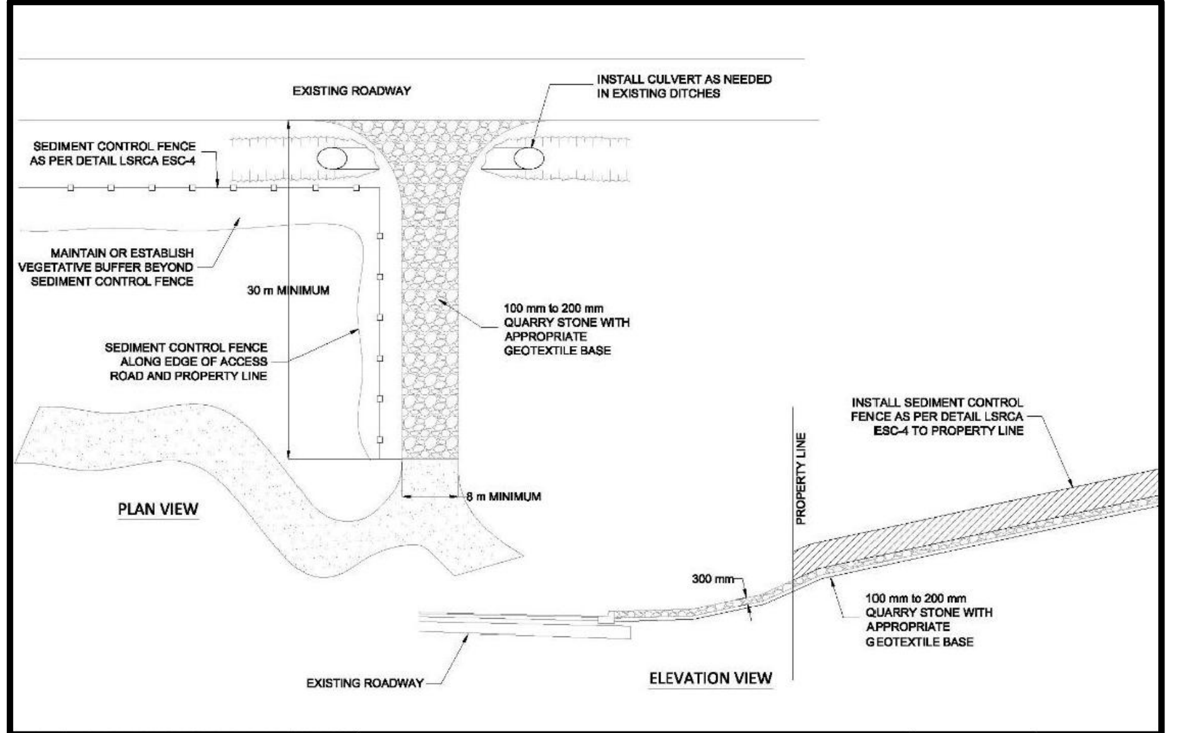
SITE SERVICING PLAN

GEI Consultants

DESIGNED BY: PS	DATE: OCTOBER, 2024	CHECKED BY: TVL
DRAWN BY: PS	PROJECT No. 2406541	DRAWING No. SS-01
SCALE: 1:500		

5.0m 0 5.0m 10.0m 15.0m 20.0m 25.0m 30.0m

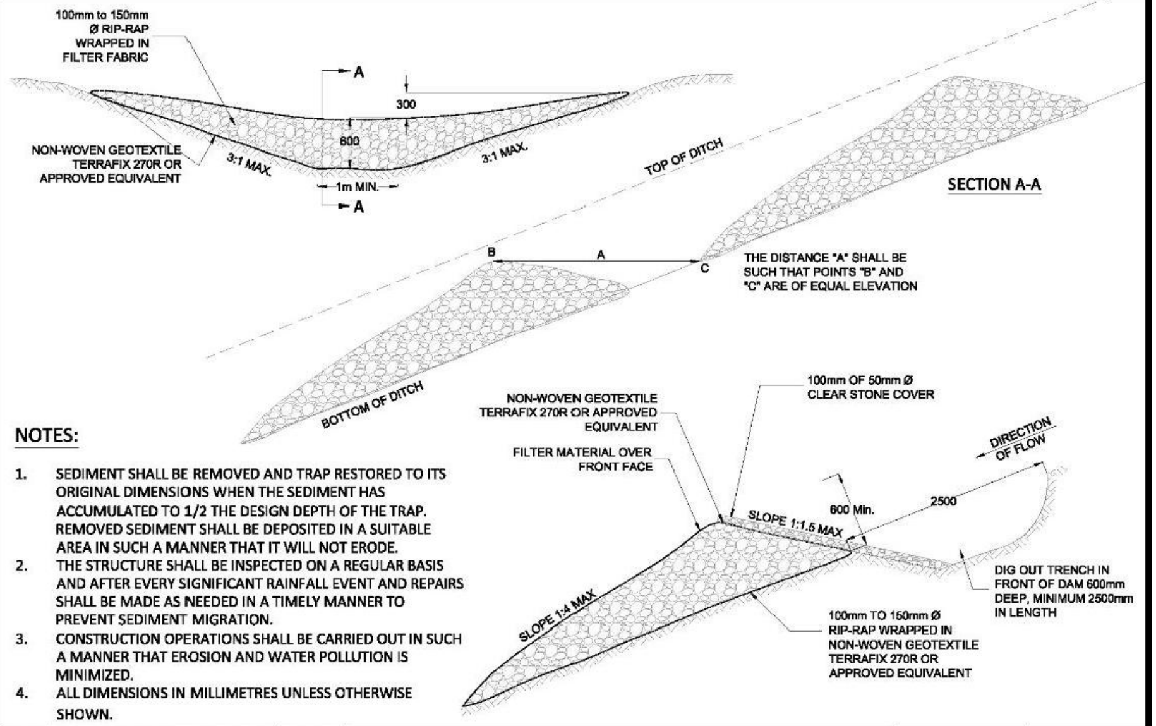
B:\Working\NEWROADS AUTOMOTIVE GROUP\2406541 1656 Green Lane East-EG\00_CAD\Design\Sheets\2406541 - SS-01.dwg - 10/25/2024



NO.	REVISION	DATE
1	SWM GUIDELINES UPDATE	06.2016

CONSTRUCTION ACCESS MAT

DATE: 06.2016
SCALE: NTS
LSRCA ESC-3



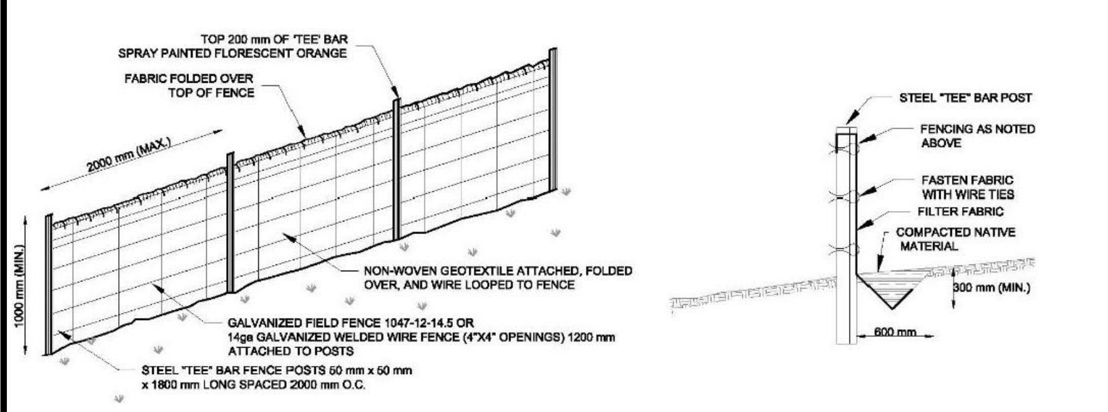
NOTES:

1. SEDIMENT SHALL BE REMOVED AND TRAP RESTORED TO ITS ORIGINAL DIMENSIONS WHEN THE SEDIMENT HAS ACCUMULATED TO 1/2 THE DESIGN DEPTH OF THE TRAP. REMOVED SEDIMENT SHALL BE DEPOSITED IN A SUITABLE AREA IN SUCH A MANNER THAT IT WILL NOT ERODE.
2. THE STRUCTURE SHALL BE INSPECTED ON A REGULAR BASIS AND AFTER EVERY SIGNIFICANT RAINFALL EVENT AND REPAIRS SHALL BE MADE AS NEEDED IN A TIMELY MANNER TO PREVENT SEDIMENT MIGRATION.
3. CONSTRUCTION OPERATIONS SHALL BE CARRIED OUT IN SUCH A MANNER THAT EROSION AND WATER POLLUTION IS MINIMIZED.
4. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SHOWN.

NO.	REVISION	DATE
1	SWM GUIDELINES UPDATE	06.2016

SWALE AND ROCK CHECK DAM

DATE: 06.2016
SCALE: NTS
LSRCA ESC-2



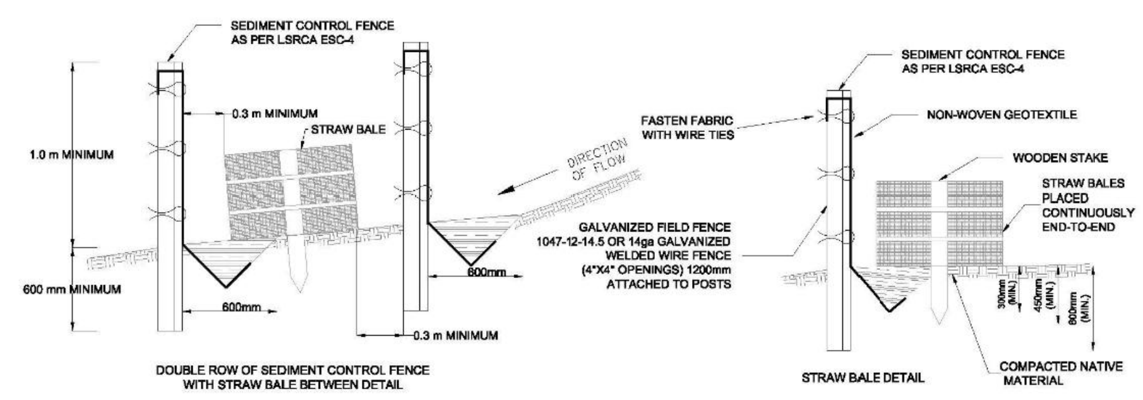
NOTES:

1. SEDIMENT CONTROL FENCE SHOULD BE ALIGNED WITH CONTOURS FOR SHEET OVERLAND FLOW.
2. SEDIMENT CONTROL FENCE IS TO BE LOCATED IN AREAS OF LOW SEDIMENT YIELD ON SLOPES THAT CONFORM TO MTO DRAINAGE MANUAL VOLUME 2 CHART F4-3C TOPOGRAPHIC FACTOR LS BASED ON SLOPE LENGTH AND GRADIENT.
3. SEDIMENT CONTROL FENCE SHALL BE INSTALLED WITH FILTER MEDIA FABRIC TIED INTO THE SOIL A MINIMUM OF 300 mm BY EITHER STATIC SLICING OR TRENCH METHODS WITH COMPACTION OF TRENCH MATERIAL MEETING 95% STANDARD PROCTOR DENSITY.
4. STEEL 'T' BAR POSTS ARE TO BE SPACED A MAXIMUM DISTANCE OF 2000 mm ON CENTER.
5. FROZEN GROUND CONDITIONS REQUIRE FILTER FABRIC TO BE BACKFILLED IN TRENCH WITH CLEAR STONE.
6. GEOTEXTILE FABRIC TO BE COMPRISED OF NON-WOVEN U.V. STABILIZED MATERIAL FABRIC TO BE FOLDED OVER TOP OF FENCE A MINIMUM OF 300 mm AND WIRE FASTENED.
7. CONSTRUCTION OPERATIONS SHALL BE CARRIED OUT IN SUCH A MANNER THAT EROSION AND WATER POLLUTION IS MINIMIZED.
8. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SHOWN.

NO.	REVISION	DATE
1	SWM GUIDELINES UPDATE	06.2016

SEDIMENT CONTROL FENCE

DATE: 06.2016
SCALE: NTS
LSRCA ESC-4



NOTES:

1. SEDIMENT CONTROL FENCE SHOULD BE ALIGNED WITH CONTOURS FOR SHEET OVERLAND FLOW.
2. SEDIMENT CONTROL FENCE IS TO BE LOCATED IN AREAS OF LOW SEDIMENT YIELD ON SLOPES THAT CONFORM TO MTO DRAINAGE MANUAL VOLUME 2 CHART F4-3C TOPOGRAPHIC FACTOR LS BASED ON SLOPE LENGTH AND GRADIENT.
3. SEDIMENT CONTROL FENCE SHALL BE INSTALLED WITH FILTER MEDIA FABRIC TIED INTO THE SOIL A MINIMUM OF 300 mm BY EITHER STATIC SLICING OR TRENCH METHODS WITH COMPACTION OF TRENCH MATERIAL MEETING 95% STANDARD PROCTOR MAXIMUM DRY DENSITY.
4. STEEL 'T' BAR POSTS ARE TO BE SPACED A MAXIMUM DISTANCE OF 2000 mm ON CENTER.
5. STRAW BALES TO BE PLACED END-TO-END CONTINUOUSLY BETWEEN SEDIMENT CONTROL FENCES.
6. FROZEN GROUND CONDITIONS REQUIRE FILTER FABRIC TO BE BACKFILLED IN TRENCH WITH CLEAR STONE.
7. GEOTEXTILE FABRIC TO BE COMPRISED OF NON-WOVEN U.V. STABILIZED MATERIAL FABRIC TO BE FOLDED OVER TOP OF FENCE A MINIMUM OF 300 mm AND WIRE FASTENED.
8. CONSTRUCTION OPERATIONS SHALL BE CARRIED OUT IN SUCH A MANNER THAT EROSION AND WATER POLLUTION IS MINIMIZED.
9. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE SHOWN.

NO.	REVISION	DATE
1	SWM GUIDELINES UPDATE	06.2016

DOUBLE ROW SEDIMENT CONTROL FENCE

DATE: 06.2016
SCALE: NTS
LSRCA ESC-5

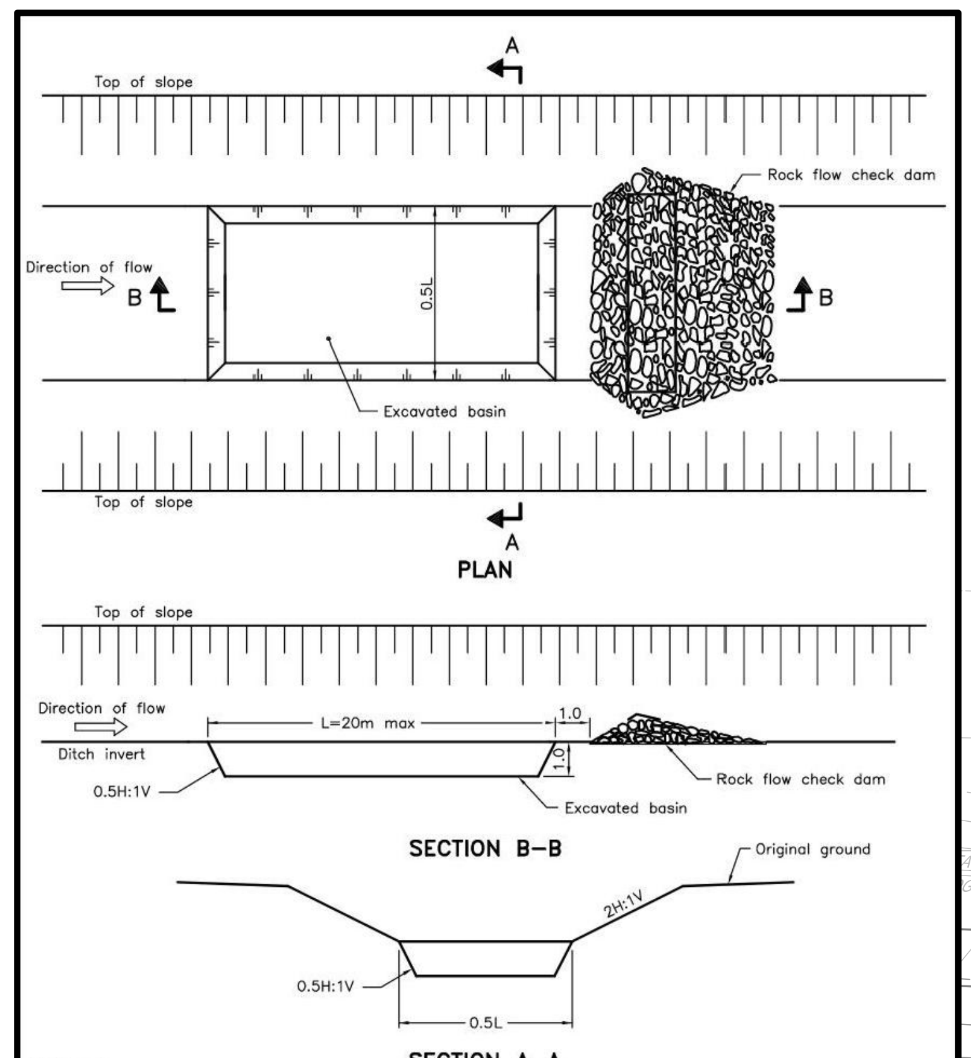
EROSION AND SEDIMENT CONTROL NOTES:

1. ALL SEDIMENT CONTROL MEASURES SUCH AS SEDIMENT CONTROL FENCE, TEMPORARY PONDS, CONSTRUCTION ACCESS MATS, SEDIMENT TRAPS, SWALES AND CHECK DAMS MUST BE INSTALLED PRIOR TO THE COMMENCEMENT OF SITE WORKS.
2. SEDIMENT CONTROLS SHOULD BE INSPECTED ON A REGULAR BASIS AND AFTER EVERY SIGNIFICANT RAINFALL EVENT. REPAIRS TO ESC MEASURES MUST BE COMPLETED IN A TIMELY MANNER TO PREVENT SEDIMENT MIGRATION.
3. ADDITIONAL MATERIALS SUCH AS CLEAR STONE, FILTER FABRIC, PUMPS, HOSES AND SILTSOXX TO BE KEPT ONSITE AT ALL TIMES FOR CONDUCTING REPAIRS TO SEDIMENT CONTROL MEASURES.
4. ALL DISTURBED AREAS LEFT INACTIVE FOR MORE THAN THIRTY DAYS ARE TO BE STABILIZED.
5. THE STABILIZATION SEED MIXTURE IS TO BE AS SPECIFIED ON THE EROSION AND SEDIMENT CONTROL PLAN.
6. THE STABILIZATION SEED MIXTURE IS TO BE APPLIED AT A MINIMUM RATE OF 25 kg/ha.
7. ENGINEERED CHANGES TO THE ESC MEASURES MAY BE NEEDED AS SITE CONDITIONS CHANGE THROUGHOUT THE CONSTRUCTION PROCESS. THESE UPDATES MUST REFLECT BEST MANAGEMENT PRACTICES TO CONTROL SEDIMENT AND EROSION ONSITE AND SHOULD BE COMPLETED BASED ON DIRECTION FROM THE SITE ENGINEER. ADDITIONAL MEASURES MAY BE REQUIRED AS DIRECTED BY AN ENGINEER THROUGHOUT THE CONSTRUCTION PROCESS.
8. THE CONSTRUCTION ENTRANCE MAT IS TO BE INSTALLED AS THE FIRST STEP IN THE SITE ALTERATION PROCESS.
9. SEDIMENT CONTROL FENCE IS TO BE INSTALLED DOWNSLOPE OF ALL DISTURBED AREAS. A DOUBLE ROW OF SEDIMENT CONTROL FENCE IS TO BE INSTALLED SURROUNDING ALL NATURAL HERITAGE FEATURES AND AS DIRECTED BY THE SITE ENGINEER. SEDIMENT CONTROL FENCE IS TO BE AS PER LSRCA STANDARD ESC-4 or ESC-5 AS A MINIMUM. LIGHT DUTY SEDIMENT CONTROL FENCE IS NOT ACCEPTABLE.
10. CUT-OFF SWALES OR DITCHES ARE TO BE INSTALLED AS SHOWN ON THE ESC PLANS AND AS NECESSARY BASED ON CHANGING SITE CONDITIONS TO DIRECT OVERLAND FLOW TO THE APPROPRIATE SEDIMENT TRAP OR TEMPORARY SEDIMENT POND.
11. CHECK DAMS ARE TO BE INSTALLED IN ALL SWALES AND DITCHES IN ACCORDANCE WITH DRAWING LSRCA ESC-2, AS A MINIMUM
12. TEMPORARY SEDIMENT TRAP(S) ARE TO BE CONSTRUCTED AT THE BEGINNING OF SITE GRADING AND IF THE SITE DRAINAGE CHANGES DURING CONSTRUCTION. IT MAY BE NECESSARY FOR TEMPORARY SWALES TO BE CONSTRUCTED TO DIRECT SITE FLOWS TO THE TEMPORARY SEDIMENT TRAP(S) DURING ROUGH GRADING AND AS CONSTRUCTION PROGRESSES.
13. TEMPORARY SEDIMENT POND(S) ARE TO BE CONSTRUCTED AT THE BEGINNING OF SITE GRADING AND IF THE SITE DRAINAGE CHANGES DURING CONSTRUCTION. IT MAY BE NECESSARY FOR TEMPORARY SWALES TO BE CONSTRUCTED TO DIRECT SITE FLOWS TO THE TEMPORARY SEDIMENT POND(S) DURING ROUGH GRADING AND AS CONSTRUCTION PROGRESSES.
14. FILTREXX SILTSOXX OR APPROVED EQUIVALENT TO BE INSTALLED DOWNSTREAM FROM SEDIMENT TRAP AND TEMPORARY SEDIMENT POND OUTLETS TO A MINIMUM HEIGHT OF 300mm.
15. IF STOCKPILES ARE USED ON-SITE FOR THE STORAGE OF EXCESS MATERIAL, THEY ARE TO BE IN ACCORDANCE WITH DETAIL DRAWING LSRCA ESC-6 OR BETTER.
16. ANY DEWATERING OCCURRING ONSITE MUST BE IN ACCORDANCE WITH AN APPROVED DEWATERING PLAN. ADDITIONAL DEWATERING REQUIREMENTS MAY BE DEEMED NECESSARY AND SHALL BE IMPLEMENTED AS DIRECTED BY THE ENGINEER, CONTRACT ADMINISTRATOR OR LOCAL MUNICIPALITY.
17. THE SITE TRAILER IS TO BE LOCATED ONLY AT THE DESIGNATED LOCATION SHOWN ON THE PLANS.
18. EQUIPMENT AND HYDROCARBON STORAGE IS TO OCCUR ONLY WITHIN THE DESIGNATED AREA SHOWN ON THE PLANS.
19. REFUELING IS TO TAKE PLACE ONLY WITHIN THE DESIGNATED AREA SHOWN ON THE PLANS AND SHALL BE A MINIMUM OF THIRTY METRES FROM ANY WATERCOURSE OR ENVIRONMENTALLY SENSITIVE AREA.
20. AN APPROVED SPILLS MANAGEMENT PLAN IS TO BE KEPT ONSITE.
21. SPILL CLEANUP EQUIPMENT SUCH AS ABSORPTIVE MEDIA IS TO BE MAINTAINED ONSITE FOR IMMEDIATE USE IN THE EVENT OF A SPILL.
22. SPILLS ARE TO BE REPORTED IMMEDIATELY TO THE MOECC SPILLS ACTION CENTRE AT 1-800-268-6060.
23. THE CONTRACTOR WILL BE RESPONSIBLE FOR CLEAN-UP AND RESTORATION, INCLUDING ALL COSTS, DUE TO THE RELEASE OF SEDIMENT FROM THE SITE.
24. LOW IMPACT DEVELOPMENT (LID) MEASURES ARE NOT TO BE USED AS SEDIMENT CONTROL DEVICES.
25. ADDITIONAL SEDIMENT CONTROL DEVICES MAY BE DEEMED NECESSARY AND AS SITE CONDITIONS CHANGE AND SHALL BE INSTALLED AS DIRECTED BY THE SITE ENGINEER, CONTRACT ADMINISTRATOR OR LOCAL MUNICIPALITY.

NO.	REVISION	DATE
1	SWM GUIDELINES UPDATE	06.2016

EROSION AND SEDIMENT CONTROL PLAN NOTES

DATE: 06.2016
SCALE: NTS
LSRCA ESC-1



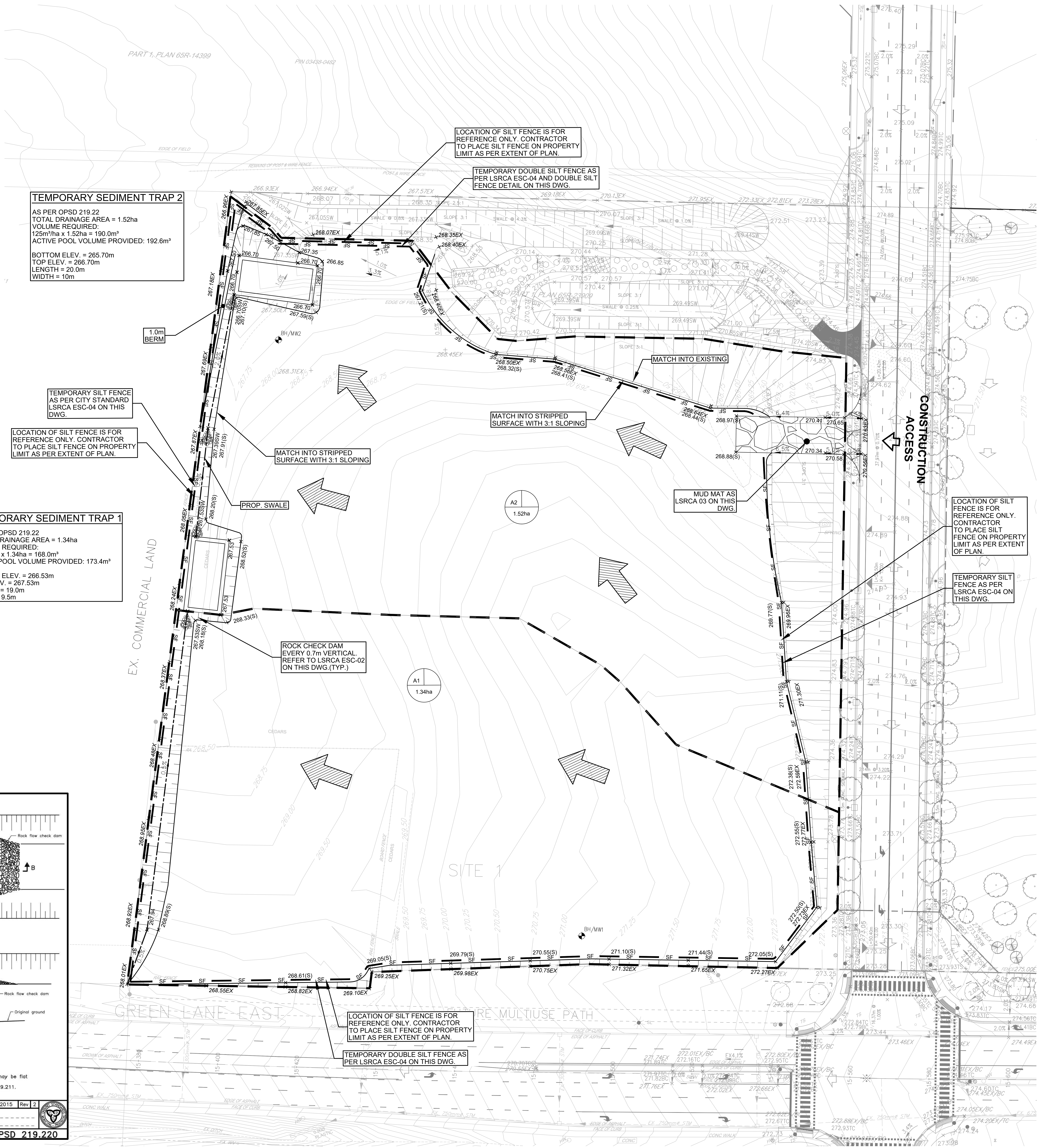
NOTES:

A Ditch cross–section upstream or downstream of sediment trap may be flat bottom or V–shaped. Flat bottom shown.
B This OPSD shall be read in conjuction with OPSD 219.210 or 219.211.
C All dimensions are in metres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING | Nov 2015 | Rev 2

SEDIMENT TRAP IN DITCH

OPSD 219.220



TEMPORARY SEDIMENT TRAP 2

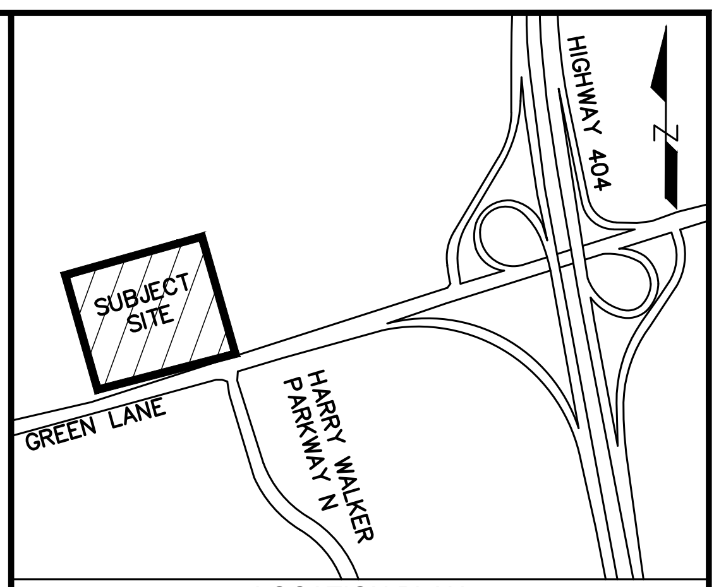
AS PER OPSD 219.22
TOTAL DRAINAGE AREA = 1.52ha
VOLUME REQUIRED:
125m³/ha x 1.52ha = 190.0m³
ACTIVE POOL VOLUME PROVIDED: 192.6m³

BOTTOM ELEV. = 265.70m
TOP ELEV. = 266.70m
LENGTH = 20.0m
WIDTH = 10m

TEMPORARY SEDIMENT TRAP 1

AS PER OPSD 219.22
TOTAL DRAINAGE AREA = 1.34ha
VOLUME REQUIRED:
125m³/ha x 1.34ha = 168.0m³
ACTIVE POOL VOLUME PROVIDED: 173.4m³

BOTTOM ELEV. = 266.53m
TOP ELEV. = 267.53m
LENGTH = 19.0m
WIDTH = 9.5m



LOCATION PLAN
N.T.S.

LEGEND

PROPERTY LINE	― - - ―
MTO SETBACK LINE	■■■■■■■■■■■
EXISTING ELEVATION	× 272.50EX
PROPOSED ELEVATION	× 272.50
PROPOSED SWALE ELEVATION	× 272.50SW
EXISTING STRIPPED ELEVATION	× 272.50(S)
3:1 SLOPE	┬┬┬┬┬┬┬
EMERGENCY OVERLAND FLOW ROUTE	⇦
TEMPORARY ROCK CHECK DAM (LSRCA ESC-2)	▨
CONSTRUCTION ACCESS	⇦ CONSTRUCTION ACCESS
EXISTING CONTOUR	― 205.00 ―
TEMPORARY SILT FENCE	― SF ―
DRAINAGE DIVIDE	▬ ▬
DRAINAGE AREA	A 1.34ha

LIST OF DRAWINGS

SG-01 - SITE GRADING PLAN
SS-01 - SITE SERVICING PLAN
EC-01 - EROSION AND SEDIMENT CONTROL PLAN
XS-01 - CROSS SECTIONS
DD-01 - DETAIL DRAWING
DD-02 - DETAIL DRAWING
DD-03 - DETAIL DRAWING

SITE PLAN INFORMATION

WARE MALCOMB ARCHITECTS INC.
30 ADELAIDE STREET E, SUITE 1254
TORONTO, ON, M5C 2C5
PHONE: (437) 537-5700

SURVEYOR INFORMATION

E.R. GARDEN LIMITED
ONTARIO LAND SURVEYOR
1260 JOURNEY'S END CIRCLE, UNIT 1,
NEWMARKET, ON, L3Y 8Z7
PHONE: (905) 895-5600
FAX: (905) 895-7127
WEBSITE: www.ergardenlimited.ca

BENCHMARK INFORMATION:
ELEVATIONS ARE GEODETIC AND ARE DERIVED FROM TOWN OF NEWMARKET BENCHMARK 1095 HAVING AN ELEVATION 273.91 METRES A.S.L.

No.	DATE	ISSUE/REVISION	INTIAL
5			
4			
3			
2			
1	2024/10/25	ISSUED FOR SPA SUBMISSION	TVL

T. J. VAN LIEROP
100508919
2024-10-25

TOWN OF EAST GWILLIMBURY
YORK REGION

NEWROADS - TOYOTA
NEWROADS AUTOMOTIVE GROUP
1656 GREEN LANE EAST
TOWN OF EAST GWILLIMBURY, ONTARIO

EROSION AND SEDIMENT CONTROL PLAN

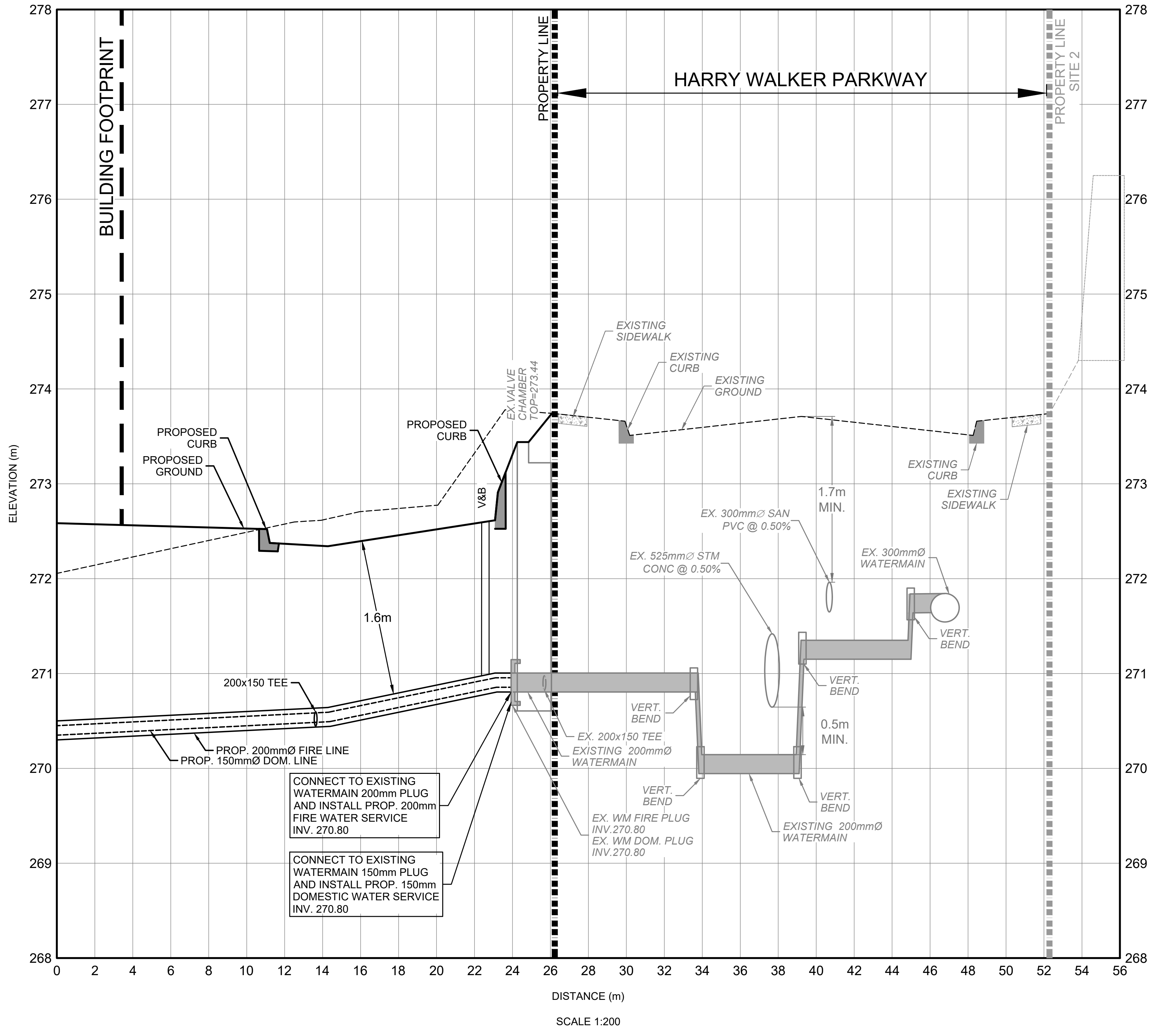
GEI Consultants

DESIGNED BY: PS	DATE: OCTOBER, 2024	CHECKED BY: TVL
DRAWN BY: PS	PROJECT No. 2406541	DRAWING No. EC-01
SCALE: 1:500		

5.0m 0 5.0m 10.0m 15.0m 20.0m 25.0m 30.0m

B:\Working\NEWROADS AUTOMOTIVE GROUP\2406541 1656 Green Lane East-EG\00_CAD\Design\Sheets\2406541 - ESC.dwg - 9/13/2024

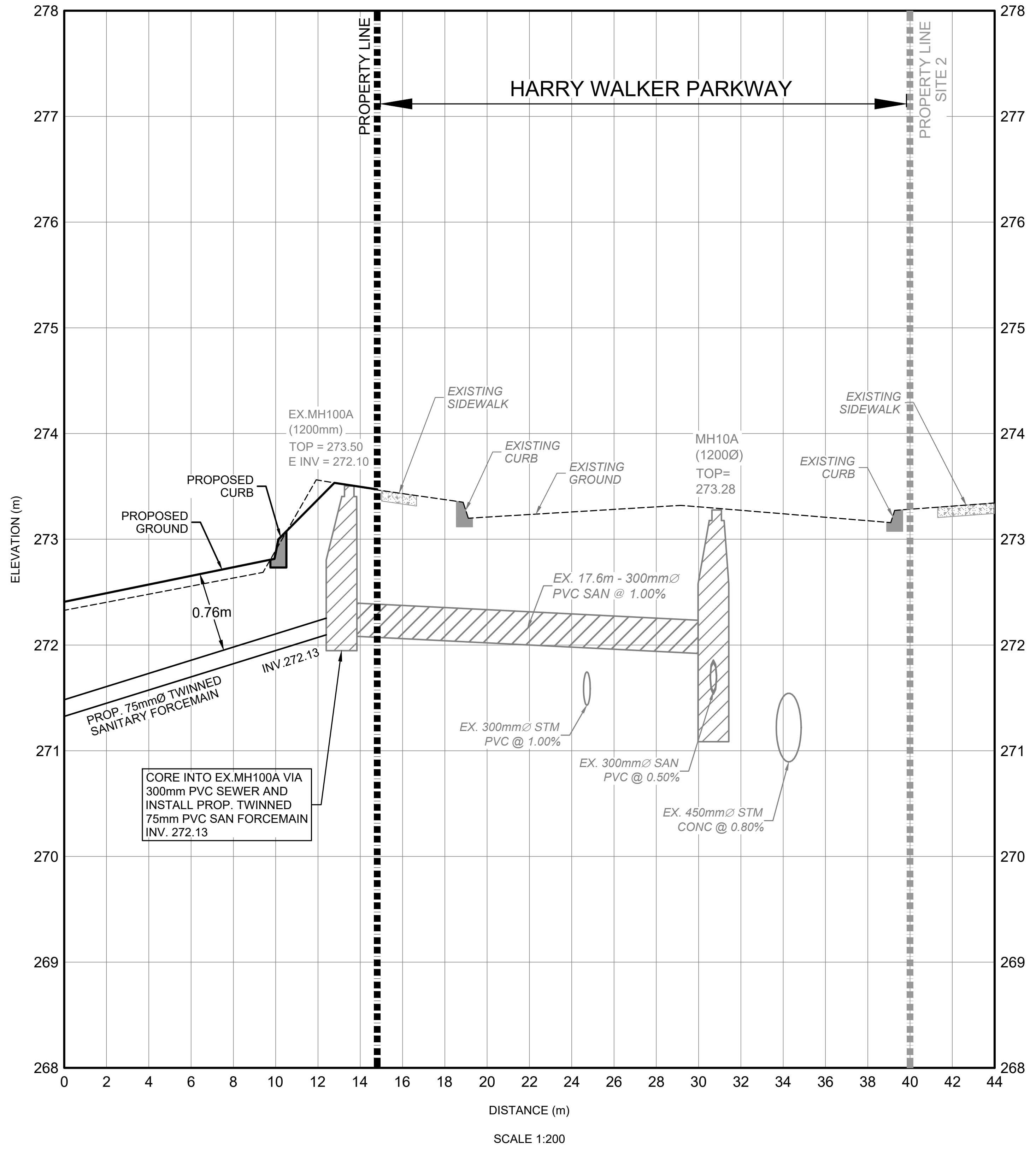
SECTION A-A: WATERMAIN CONNECTION



CONNECT TO EXISTING WATERMAIN 200mm PLUG AND INSTALL PROP. 200mm FIRE WATER SERVICE INV. 270.80

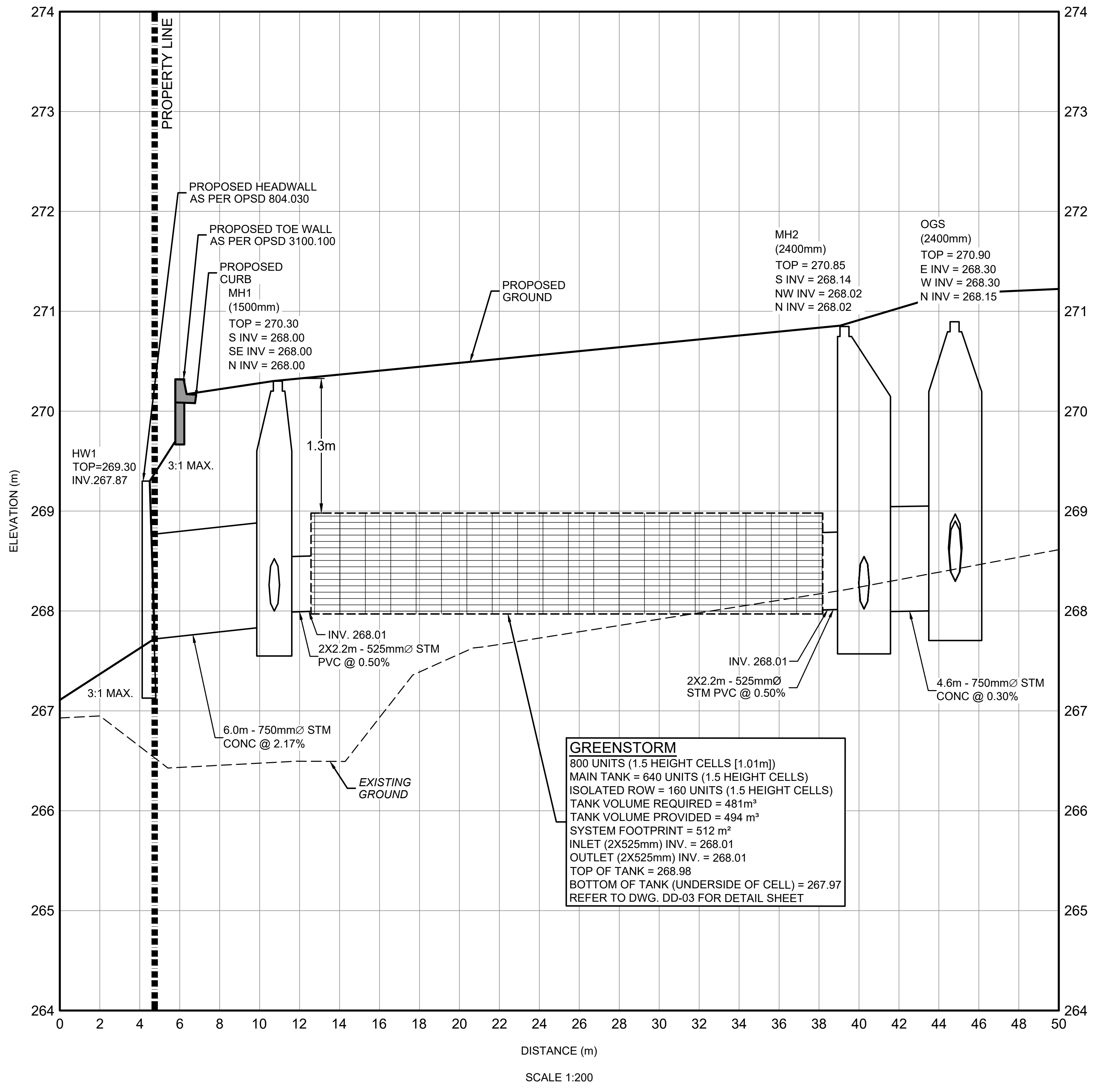
CONNECT TO EXISTING WATERMAIN 150mm PLUG AND INSTALL PROP. 150mm DOMESTIC WATER SERVICE INV. 270.80

SECTION B-B: SANITARY CONNECTION



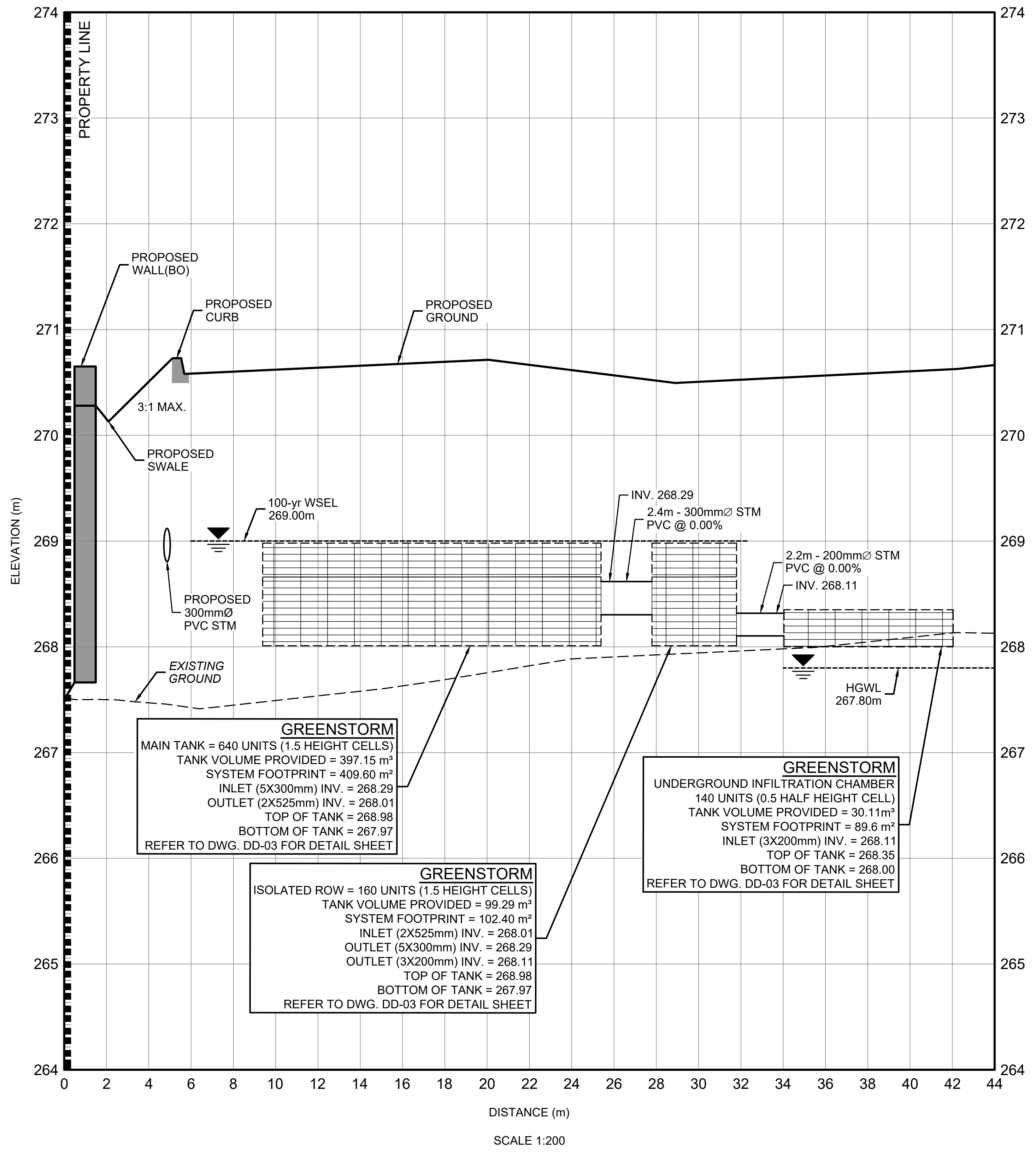
CORE INTO EX.MH100A VIA 300mm PVC SEWER AND INSTALL PROP. TWINNED 75mm PVC SAN FORCEMAIN INV. 272.13

SECTION C-C: STORM CONNECTION



GREENSTORM
800 UNITS (1.5 HEIGHT CELLS [1.01m])
MAIN TANK = 640 UNITS (1.5 HEIGHT CELLS)
ISOLATED ROW = 160 UNITS (1.5 HEIGHT CELLS)
TANK VOLUME REQUIRED = 481m³
TANK VOLUME PROVIDED = 494 m³
SYSTEM FOOTPRINT = 512 m²
INLET (2X525mm) INV. = 268.01
OUTLET (2X525mm) INV. = 268.01
TOP OF TANK = 268.98
BOTTOM OF TANK (UNDERSIDE OF CELL) = 267.97
REFER TO DWG. DD-03 FOR DETAIL SHEET

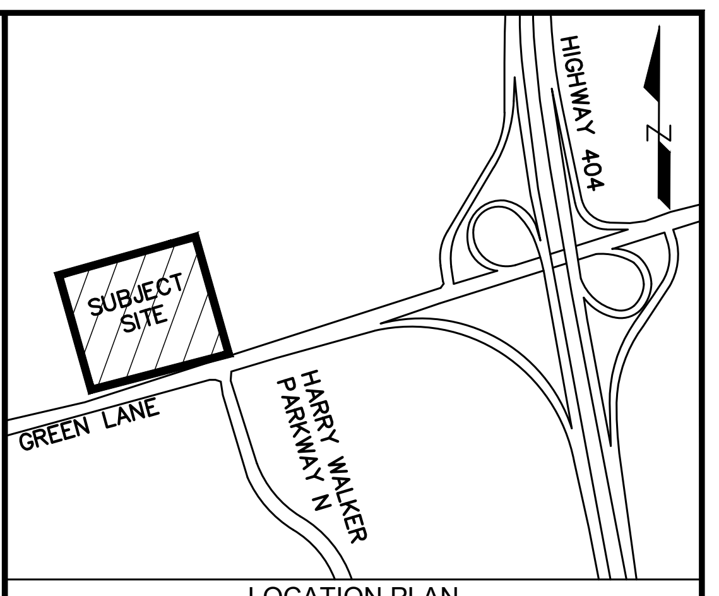
SECTION D-D CHAMBER



GREENSTORM
MAIN TANK = 640 UNITS (1.5 HEIGHT CELLS)
TANK VOLUME PROVIDED = 397.15 m³
SYSTEM FOOTPRINT = 409.60 m²
INLET (5X300mm) INV. = 268.29
OUTLET (2X525mm) INV. = 268.01
TOP OF TANK = 268.98
BOTTOM OF TANK = 267.97
REFER TO DWG. DD-03 FOR DETAIL SHEET

GREENSTORM
ISOLATED ROW = 160 UNITS (1.5 HEIGHT CELLS)
TANK VOLUME PROVIDED = 99.29 m³
SYSTEM FOOTPRINT = 102.40 m²
INLET (2X525mm) INV. = 268.01
OUTLET (5X300mm) INV. = 268.29
OUTLET (3X200mm) INV. = 268.11
TOP OF TANK = 268.98
BOTTOM OF TANK = 267.97
REFER TO DWG. DD-03 FOR DETAIL SHEET

GREENSTORM
UNDERGROUND INFILTRATION CHAMBER
140 UNITS (0.5 HALF HEIGHT CELL)
TANK VOLUME PROVIDED = 30.11m³
SYSTEM FOOTPRINT = 89.6 m²
INLET (3X200mm) INV. = 268.11
TOP OF TANK = 268.35
BOTTOM OF TANK = 268.00
REFER TO DWG. DD-03 FOR DETAIL SHEET



LOCATION PLAN
N.T.S.

LEGEND

LIST OF DRAWINGS
- SG-01 - SITE GRADING PLAN
- SS-01 - SITE SERVICING PLAN
- EC-01 - EROSION AND SEDIMENT CONTROL PLAN
- XS-01 - CROSS SECTIONS
- DD-01 - DETAIL DRAWING
- DD-02 - DETAIL DRAWING
- DD-03 - DETAIL DRAWING

SITE PLAN INFORMATION

WARE MALCOMB ARCHITECTS INC.
30 ADELAIDE STREET E, SUITE 1254
TORONTO, ON, M5C 2C5
PHONE: (437) 537-5700

SURVEYOR INFORMATION

E.R. GARDEN LIMITED
ONTARIO LAND SURVEYOR
1260 JOURNEY'S END CIRCLE, UNIT 1,
NEWMARKET, ON, L3Y 8Z7
PHONE: (905) 895-5600
FAX: (905) 895-7127
WEBSITE: www.ergardenlimited.ca

BENCHMARK INFORMATION:
ELEVATIONS ARE GEODETIC AND ARE DERIVED FROM TOWN OF NEWMARKET BENCHMARK 1095 HAVING AN ELEVATION 273.91 METRES A.S.L.

5			
4			
3			
2			
1	2024/10/25	ISSUED FOR SPA SUBMISSION	TVL
No.	DATE	ISSUE/REVISION	INTIAL

LICENSED PROFESSIONAL ENGINEER
T. J. VAN LIEROP
100508919
2024-10-25
PROVINCE OF ONTARIO

NEWROADS - TOYOTA
NEWROADS AUTOMOTIVE GROUP
1656 GREEN LANE EAST
TOWN OF EAST GWILLIMBURY, ONTARIO

CROSS SECTIONS

GEI Consultants

DESIGNED BY: PS	DATE: OCTOBER, 2024	CHECKED BY: TVL
DRAWN BY: PS	PROJECT No. 2406541	DRAWING No. XS-01
SCALE: 1:300		

5.0 0 5.0m 10.0m 15.0m 20.0m

---- B:\Working\NEWROADS AUTOMOTIVE GROUP\2406541 1656 Green Lane East-EG\00_CAD\Design\Sheets\2406541 - CS-01.dwg - 10/25/2024

1. GENERAL NOTES

1.1. ALL SERVICES ARE TO BE TO THE TOWN OF EAST GWILLIMBURY ENGINEERING DEPARTMENT STANDARDS AND SPECIFICATIONS AND TO THE SATISFACTION OF THE TOWN.

1.2. LOCATIONS OF EXISTING SERVICES IS NOT GUARANTEED. THE CONTRACTOR IS TO NOTIFY UTILITY COMPANIES FORTY–EIGHT (48) HOURS PRIOR TO COMMENCEMENT OF ANY WORK.

1.3. ALL WORKS MUST BE CARRIED OUT ACCORDING TO THE OCCUPATIONAL HEALTH AND SAFETY ACT (UPDATED 2021), REGULATIONS FOR CONSTRUCTION PROJECTS AND ALL RELATED ONTARIO REGULATIONS APPLICABLE TO CONSTRUCTION ACTIVITY.

1.4. SEWER AND WATERMAIN TRENCHES SHALL BE BACKFILLED TO TOWN OF EAST GWILLIMBURY STANDARDS AND COMPACTED TO A MINIMUM OF 95% STANDARD PROCTOR DENSITY.

1.5. ALL STANDARD DRAWINGS SHALL BE PER O.P.S.D. (MOST RECENT REVISION) UNLESS OTHERWISE SPECIFIED.

2. MEASUREMENTS

2.1. ALL DIMENSIONS SHALL BE IN METRES EXCEPT PIPE DIAMETER, WHICH IS IN MILLIMETRES, UNLESS OTHERWISE SPECIFIED.

3. ROADWORKS

3.1. COMPACTION: ROAD SUBGRADE TO BE COMPACTED TO MINIMUM 95% STANDARD PROCTOR DENSITY. GRANULAR MATERIALS ARE TO BE SPREAD AND COMPACTED IN 200 MM LAYERS TO A MINIMUM OF 100% STANDARD PROCTOR DENSITY. ASPHALT IS TO BE COMPACTED TO MINIMUM 96% STANDARD PROCTOR DENSITY.

ITEM	COMPACTION REQUIRED (% OF STANDARD PROCTOR DENSITY
GRANULAR "B"	MINIMUM 95%
GRANULAR "A" OR 16mm CRUSHER RUN STONE	MINIMUM 100%
HL–6 OR HL–8	MINIMUM 96%
HL–3	MINIMUM 96%

3.2. ROAD DESIGN – (MINIMUM)

PAVEMENT STRUCTURE		LIGHT DUTY	HEAVY DUTY
ASPHALTIC CONCRETE:	OPSS HL3 OR EQUIVALENT	65mm	40mm
	OPSS HL8 OR EQUIVALENT	–	60mm
BASE:	OPSS GRANULAR A OR 20mm CRUSHER–RUN	150mm	150mm
SUB–BASE:	OPSS GRANULAR B OR 50mm CRUSHER–RUN	300mm	450mm

NOTE:
- ASPHALT AND GRANULAR THICKNESS MAY VARY AS RECOMMENDED BY THE GEOTECHNICAL REPORT SUBJECT TO THE TOWN'S APPROVAL.
- PER THINKING GREEN STANDARDS, 30% OR MORE RECYCLED/RECLAIMED MATERIALS MAY BE USED WITH THE PAVEMENT MAKE–UP SUBJECT TO THE GEOTECHNICAL ENGINEER'S APPROVAL.

3.3. CURBS:

URBAN – TOWN STANDARD OPSD 600.040 OR OPSD 600.070 (TWO–STAGE CURB) ESTATE RESIDENTIAL – TOWN STANDARD OPSD 600.100

3.4. INTERSECTIONS OF CURBS AND SIDEWALKS SHALL BE DEPRESSED, AS PER STANDARD OPSD 310.031.

3.5. ALL AREAS DISTURBED BY CONSTRUCTION SHALL BE REINSTATED TO ORIGINAL OR BETTER CONDITION.

3.6. SUB–DRAINS ARE TO BE INSTALLED THROUGHOUT UNLESS OTHERWISE APPROVED.

3.7. NO MANHOLE COVERS WILL BE PERMITTED TO BE CONSTRUCTED IN ANY PART OF THE SIDEWALK.

3.8. ALL NEW SIGNS WILL BE TYPE IV HIGH REFLECTIVITY SIGNS, MADE OF STEEL AND WILL INCLUDE THE TOWN NAME AND YEAR OF MANUFACTURE ON THE BORDER OF THE SIGN. SIGN
RETRO–REFLECTIVITY IS DETERMINED USING MUTCD TABLE 2A.3 (THE STANDARDS IN THE OTM REFER TO NEW SIGN RETRO–REFLECTIVITY).

4. STORM SEWERS

4.1. ALL CONCRETE PIPE SHALL HAVE SEALED JOINTS WITH GASKETS AND PIPE CLASS AS SHOWN ON DRAWINGS.

4.2. ALL PVC GRAVITY SEWER PIPE SHALL BE EQUAL TO ASTM SPEC. D–3034–C SDR–35 WITH "LOCK–IN" RUBBER SEALING RING.

4.3. MANHOLES:

4.3.1. MANHOLES SHALL BE AS PER STANDARD DRAWINGS OPSD 701.010. TO 701.013. (INCLUSIVE).

4.3.2. ALL STORM MANHOLES TO BE BENCHED THROUGHOUT TO THE CROWN OF ALL PIPES ON A VERTICAL PROJECTION FROM SPRING LINE, AS PER STANDARD DRAWINGS, EXCEPT AS OTHERWISE NOTED.

4.4. SEWER BEDDING SHALL BE TO STANDARD DRAWING OPSD 802.030. CLASS "B" BEDDING OR AS APPROVED BY THE TOWN.

4.5. CATCHBASINS:

4.5.1. CATCHBASINS SHALL BE AS PER STANDARD DRAWINGS (OPSD 705.010).

4.5.2. LEADS FOR A SINGLE CATCHBASIN SHALL BE 250mm AND FOR A DOUBLE CATCHBASIN 300mm.

4.5.3. ALL CATCHBASINS SHALL BE CONNECTED TO THE STORM SEWER BY TEES WHERE POSSIBLE, STANDARD DRAWINGS OPSD 708.010 AND 708.030.

4.6. ALL STORM OUTFALLS THAT EMPTY INTO A DITCH OR WATERCOURSE MUST BLEND WITH THE FLOW OF SAME.

4.7. ALL PVC JOINTS AT MANHOLES SHALL BE CONSTRUCTED BY MEANS OF A PVC MANHOLE ADAPTER.

4.8. STORM SERVICE CONNECTION SHALL BE 150 mm PVC, C/W 150 X 125 CLEANOUT AT PROPERTY LINE. SERVICES SHALL BE EXTENDED 1.5 M INSIDE THE PROPERTY LINE AND PLUGGED. PIPE TO BE WHITE IN COLOUR. ALL SERVICES TO BE MARKED WITH 50mm X 100mm X 2.4m STAKES, PAINTED WHITE FOR STORM.

5. WATERMAIN

5.1. WATERMAIN PIPE SHALL BE PVC C900 (THICK WALL PIPE). PIPE IS TO BE WRAPPED WITH STRAND 14–GAUGE STRAND COPPER WIRE AND WIRE IS TO BE BROUGHT TO GRADE AT ALL MAINLINE VALVES AND HYDRANT SECONDARY VALVES, AND A HOLE DRILLED SIX INCHES (6") DOWN FROM UPPER SECTION AND WIRE INSERTED THROUGH THIS HOLE FOR PROTECTION. TOP OF WATERMAIN SHALL BE MINIMUM 1.7 M BELOW CENTRELINE OF ROAD GRADE. ALL SPLICES ARE TO BE DONE ABOVE GRADE OR USING A MOISTURE–PROOF SEAL.

5.2. HYDRANTS AND VALVES SHALL BE PER TOWN STANDARDS DRAWING NO. OPSD 1105.010. ALL HYDRANTS ARE TO BE SELF–DRAINING (UNLESS IN AREAS WITH HIGH WATER TABLE). ALL HYDRANTS ARE TO BE EQUIPPED WITH ONE (1) FOUR–INCH (4") PUMPER PORT WITH MANUFACTURER'S "STORTZ" FITTING. TOWN APPROVED HYDRANTS ARE CANADA VALVE (CANVAL) – ONLY.

5.3. SERVICES:

5.3.1. RESIDENTIAL SERVICES SHALL BE 19mm, TYPE "K" COPPER, AS PER STANDARD DRAWING OPSD 1104.010 AND HAVE A MINIMUM COVER OF 1.6m.

5.3.2. ALL SERVICES SHALL BE SINGLE SERVICES TO THE MIDDLE OF THE LOT.

5.4. ALL SERVICE CONNECTION STUBS SHALL BE MARKED WITH 50mm X 100mm X 2.4m STAKES, PAINTED BLUE FOR WATER.

5.5. ALL CURB STOPS, MAIN STOPS AND COUPLINGS ARE TO BE COMPRESSION–TYPE FITTINGS, I.E. CAMBRIDGE SUCCESSOR BALL VALVE TYPE, WHICH MUST BE APPROVED BY THE TOWN C/W STAINLESS STEEL RODS AND BRASS PIN.

5.6. ALL BENDS AND TEES SHALL BE OPSD 1103.01 AND 1103.02 AND BLOCKED TO UNDISTURBED GROUND.

5.7. WHERE THE TOWN APPROVES WATERMAIN CONSTRUCTION WITH LESS THAN THE ABOVE NOTED MINIMUM COVER, THE WATERMAIN SHALL BE INSULATED TO THE TOWN'S SATISFACTION.

5.8. ALL MECHANICAL CONNECTIONS SHALL BE PROTECTED AGAINST CORROSION THROUGH THE USE OF CORROSION PROTECTION DURATION NUTS. NUTS SHALL BE USED ON 50% OF ALL T–BOLTS PER CONNECTION AND ARE TO BE USED IN ADDITION TO STANDARD FASTENING NUTS, NOT IN PLACE OF STANDARD NUTS.

6. SANITARY SEWERS

6.1. PIPE:

6.1.1. ALL PVC GRAVITY SEWER PIPE SHALL BE EQUAL TO A.S.T.M. SPECIFICATIONS D–3034–77C WITH "LOCK–IN" RUBBER SEALING RING.

6.1.2. ALL HOUSE SERVICES SHALL BE CONNECTED TO SEWER WITH TEES. PIPE: 125mm PVC, C/W 125 X 100 PVC WATERTIGHT CLEANOUT AT PROPERTY LINE. SERVICES SHALL BE EXTENDED 1.5 M INSIDE THE PROPERTY LINE AND PLUGGED. PIPE TO BE GREEN IN COLOUR. ALL SERVICES TO BE MARKED WITH 50mm X 100mm X 2.4m STAKES, PAINTED GREEN FOR SANITARY.

6.1.3. ALL SEWER CONNECTIONS TO MANHOLES SHALL BE CONSTRUCTED BY MEANS OF A PVC MANHOLE ADAPTER.

6.1.4. THE BEDDING MATERIAL SHALL EXTEND TO 300mm ABOVE THE PIPE AND COMPACTION TESTS ARE REQUIRED BEFORE THE TRENCH IS BACKFILLED. BACKFILL SHALL BE COMPACTED TO MINIMUM 95% STANDARD PROCTOR DENSITY.

6.2. MANHOLES:

6.2.1. MANHOLES SHALL BE TO STANDARD DRAWINGS OPSD 701.010 TO 701.013 (INCLUSIVE).

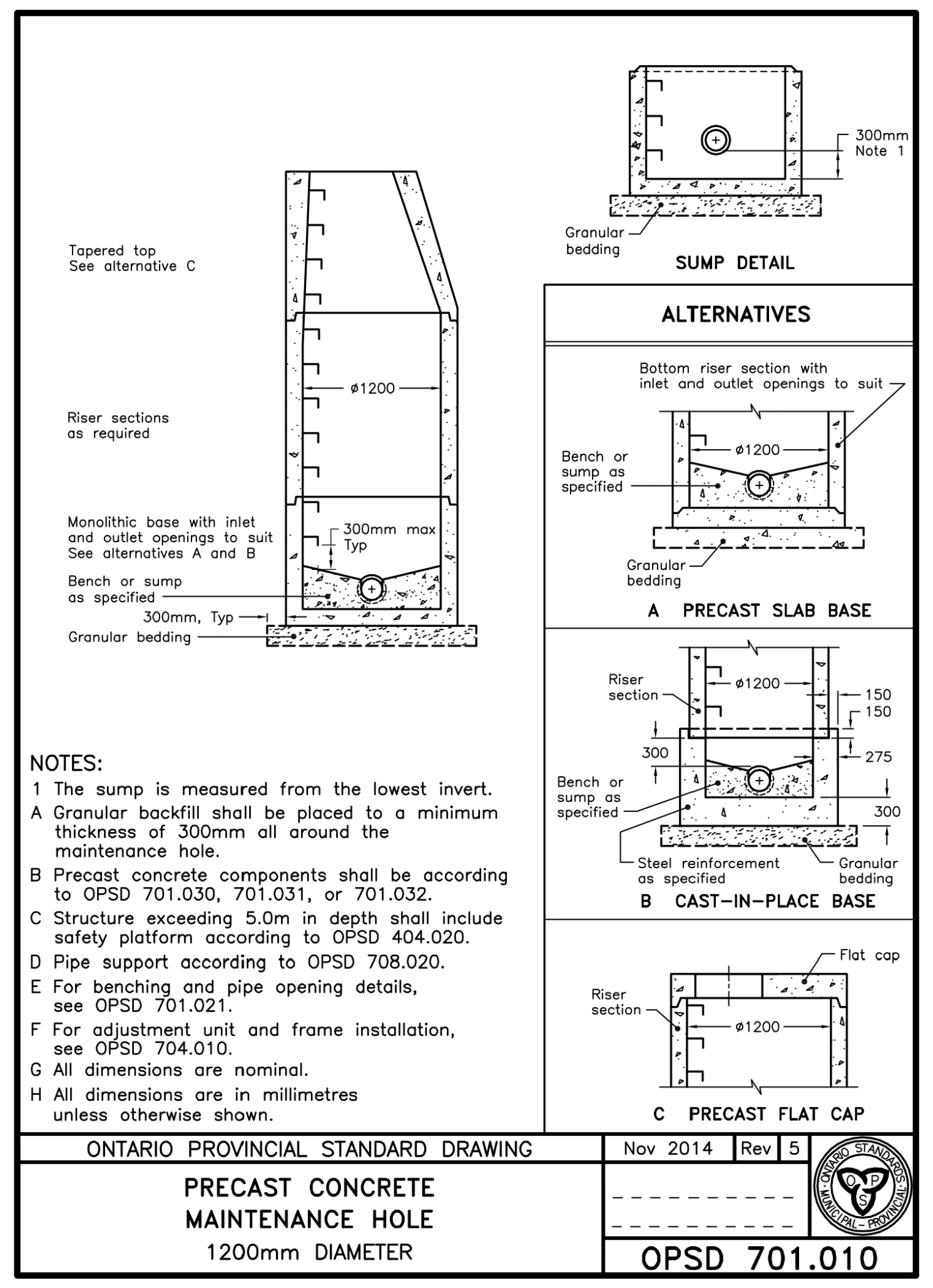
6.2.2. ALL SANITARY MANHOLES SHALL BE BENCHED THROUGHOUT TO THE SPRING LINE, AS PER STANDARD DRAWINGS, EXCEPT AS OTHERWISE NOTED.

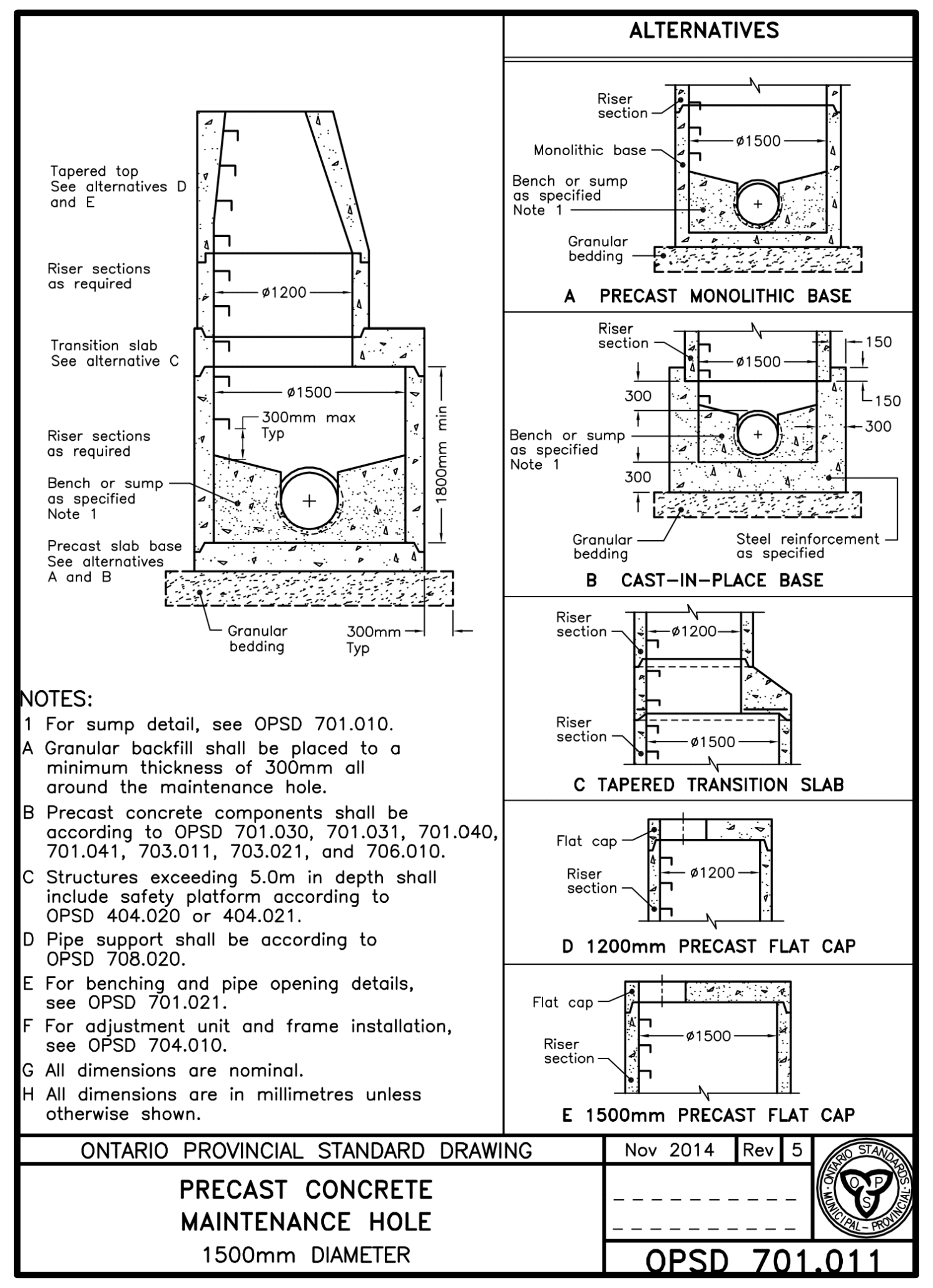
6.2.3. ALL SANITARY MANHOLES SHALL HAVE MONOLITHIC PRE–BENCHED BASES WITH PRE–MANUFACTURED CONNECTIONS.

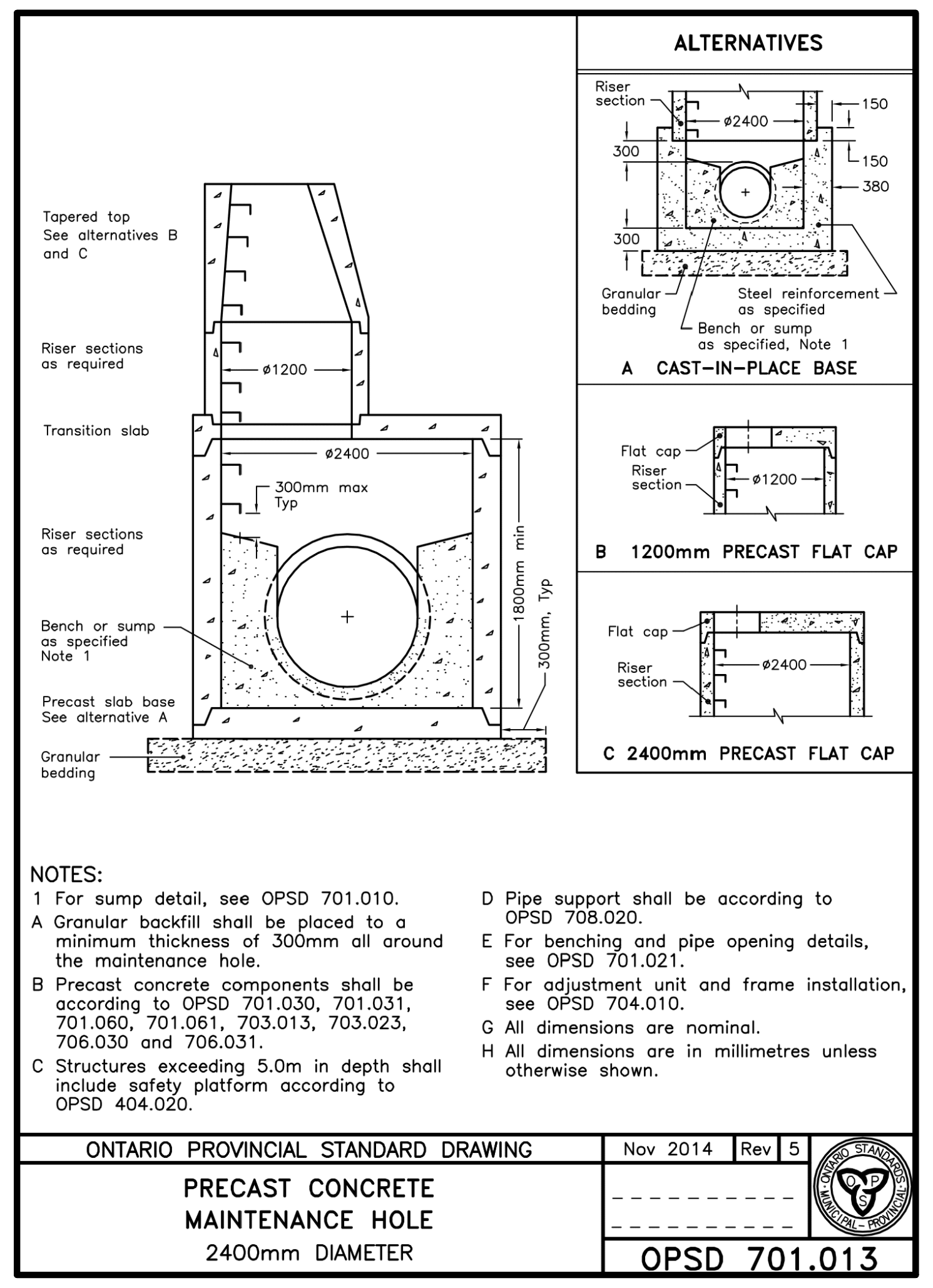
6.2.4. ALL SANITARY MANHOLES CONSTRUCTED IN THE VICINITY OF LOW POINTS OR OUTSIDE OF THE PAVED ROADWAY SHALL HAVE WATERTIGHT COVERS. ALL MANHOLES LOCATED IN CUL–DE–SACS SHALL HAVE WATERTIGHT COVERS.

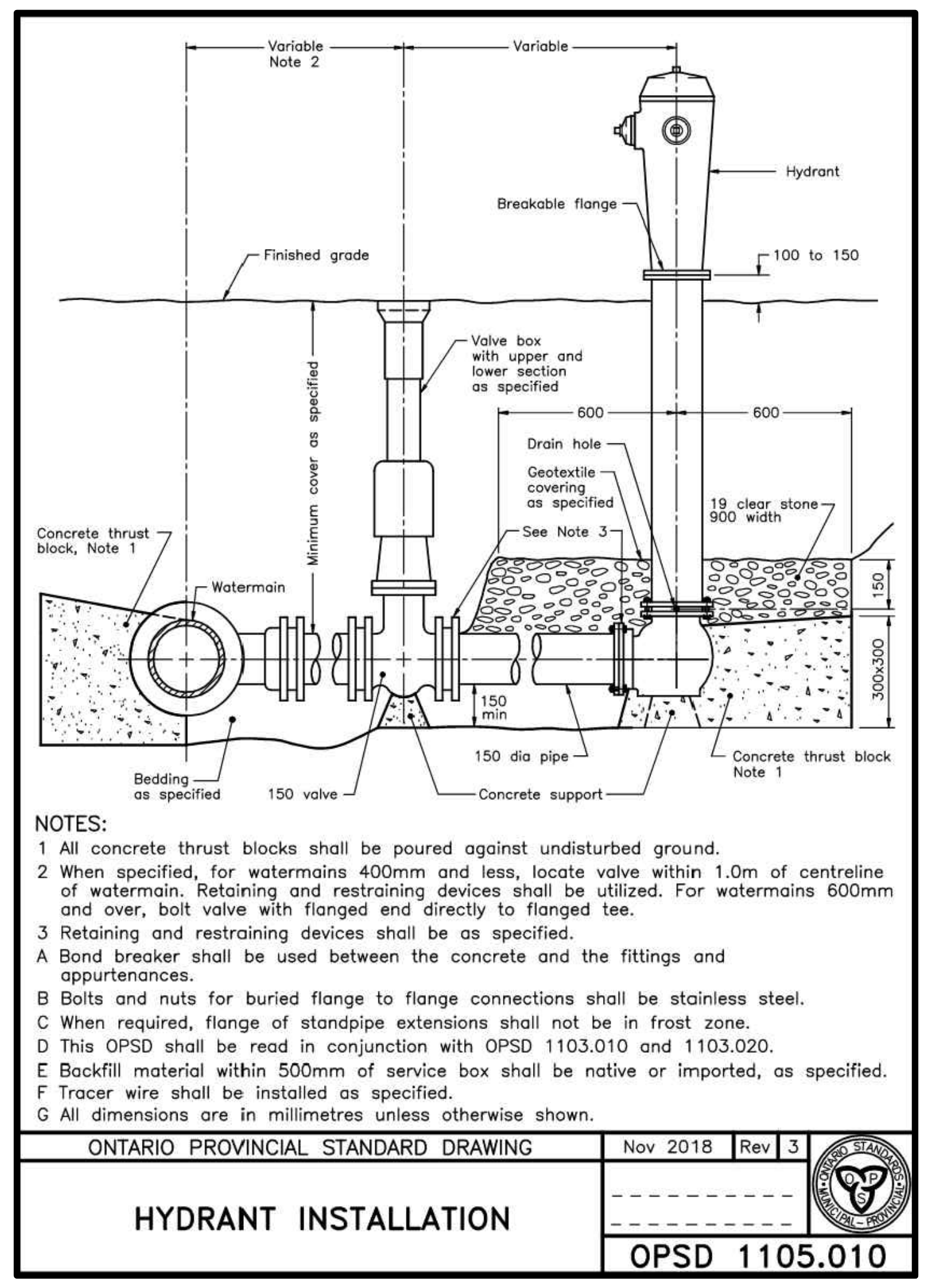
6.3. SANITARY SEWER BEDDING SHALL BE TO STANDARD DRAWING OPSD 802.030, CLASS "B" (UNLESS OTHERWISE NOTED AND APPROVED).

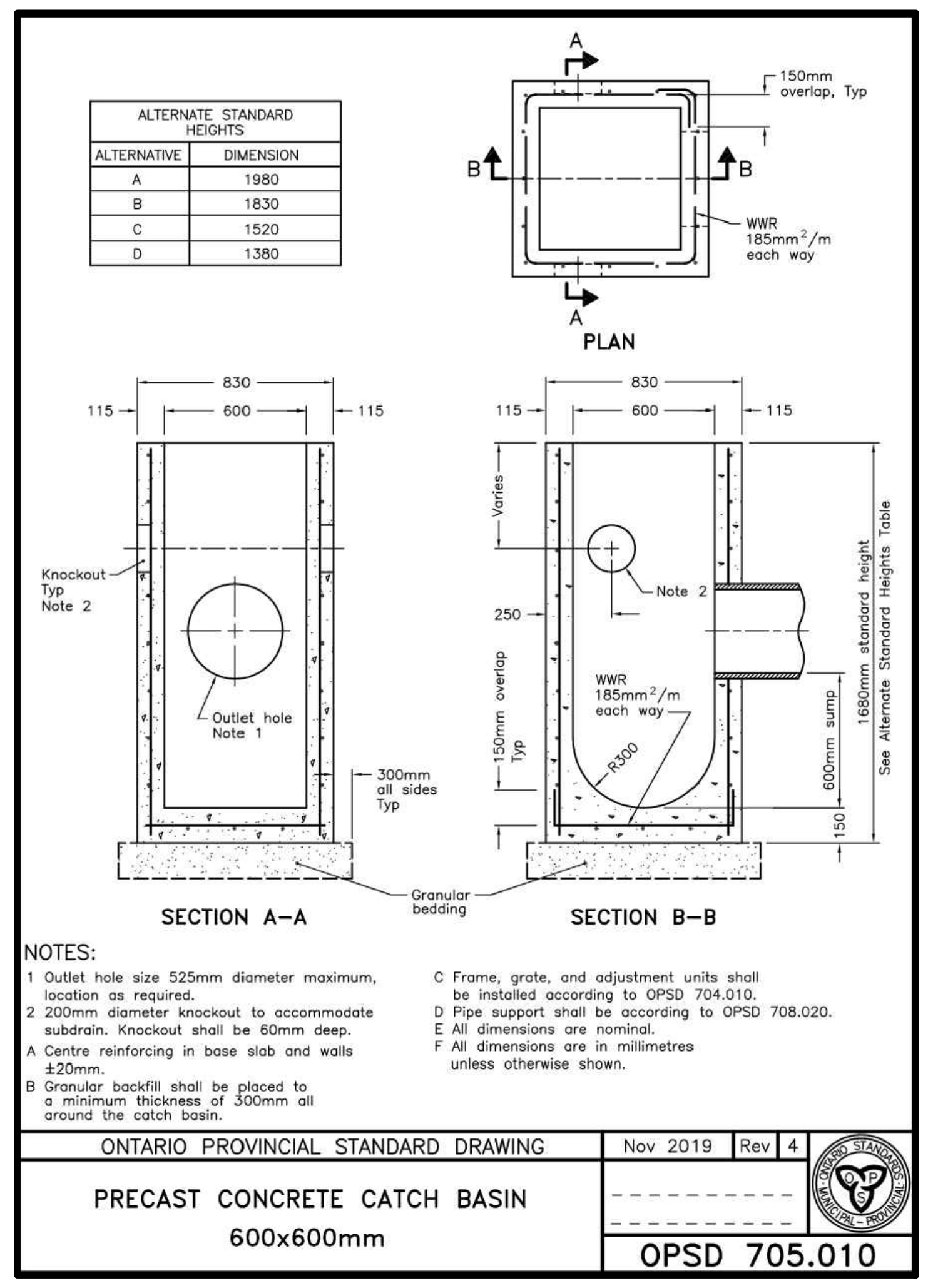
6.4. LATERALS – ALL LATERALS SHALL BE CONSTRUCTED ACCORDING TO STANDARD DRAWING OPSD 1006.010.

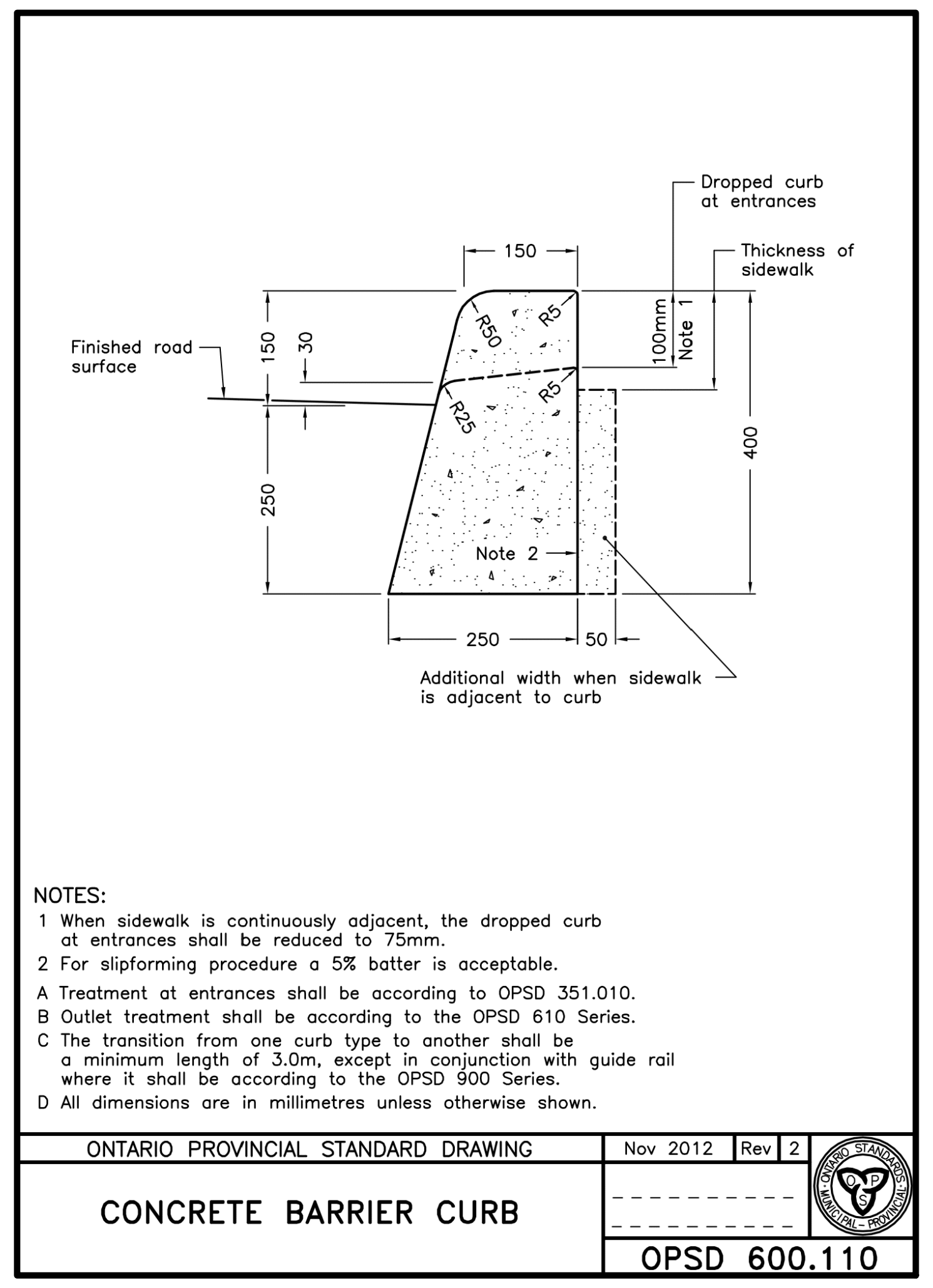


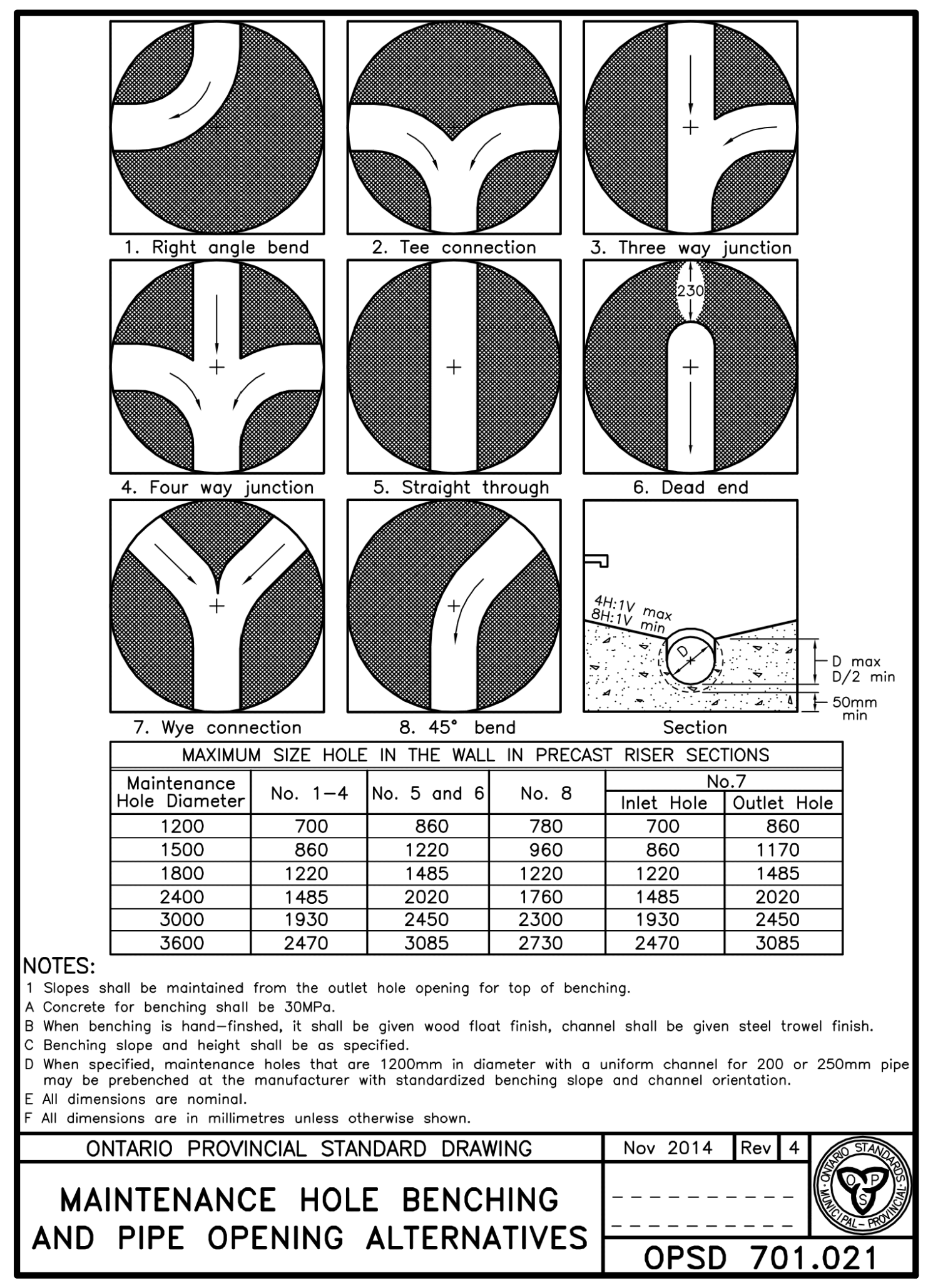


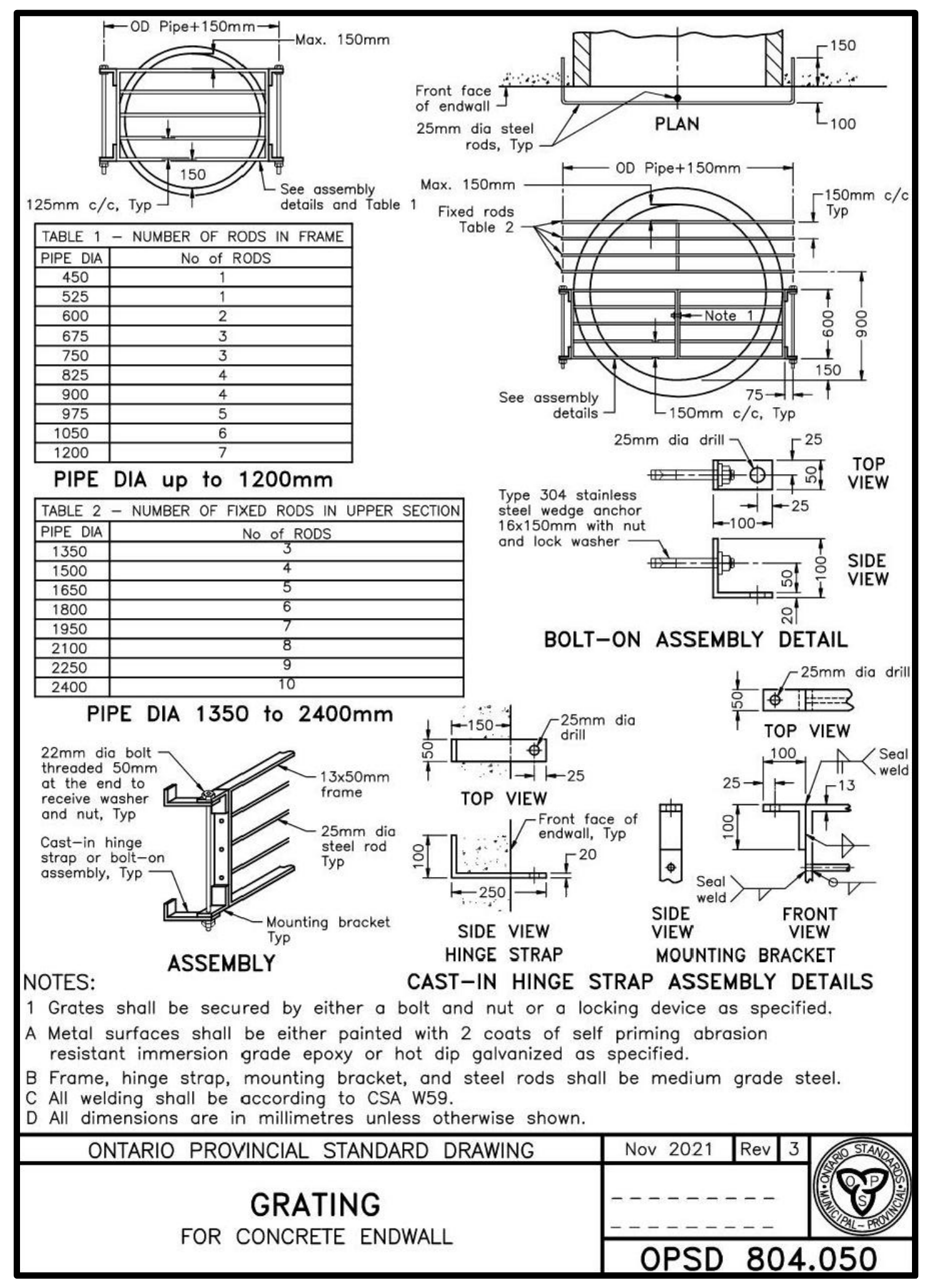


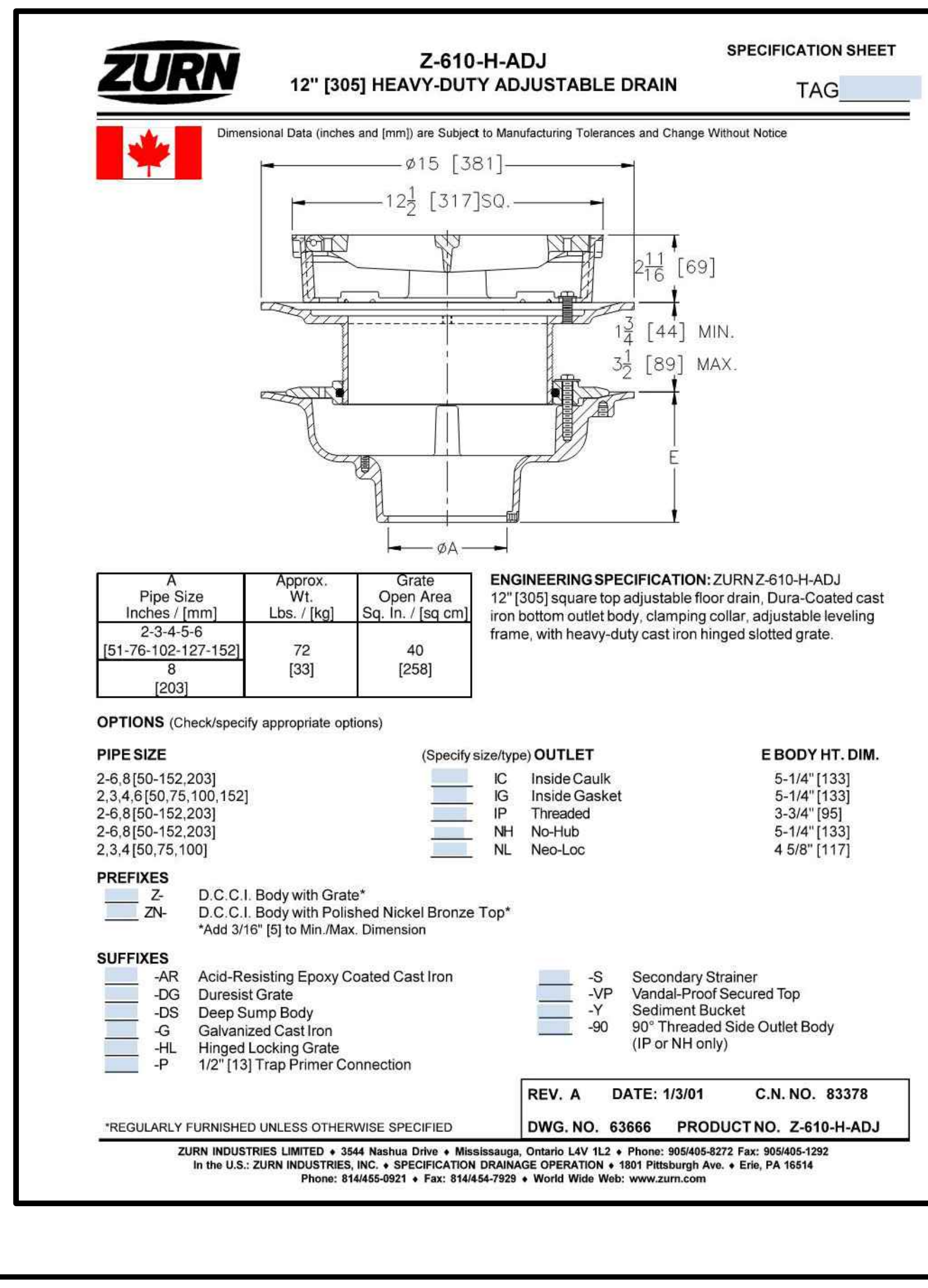


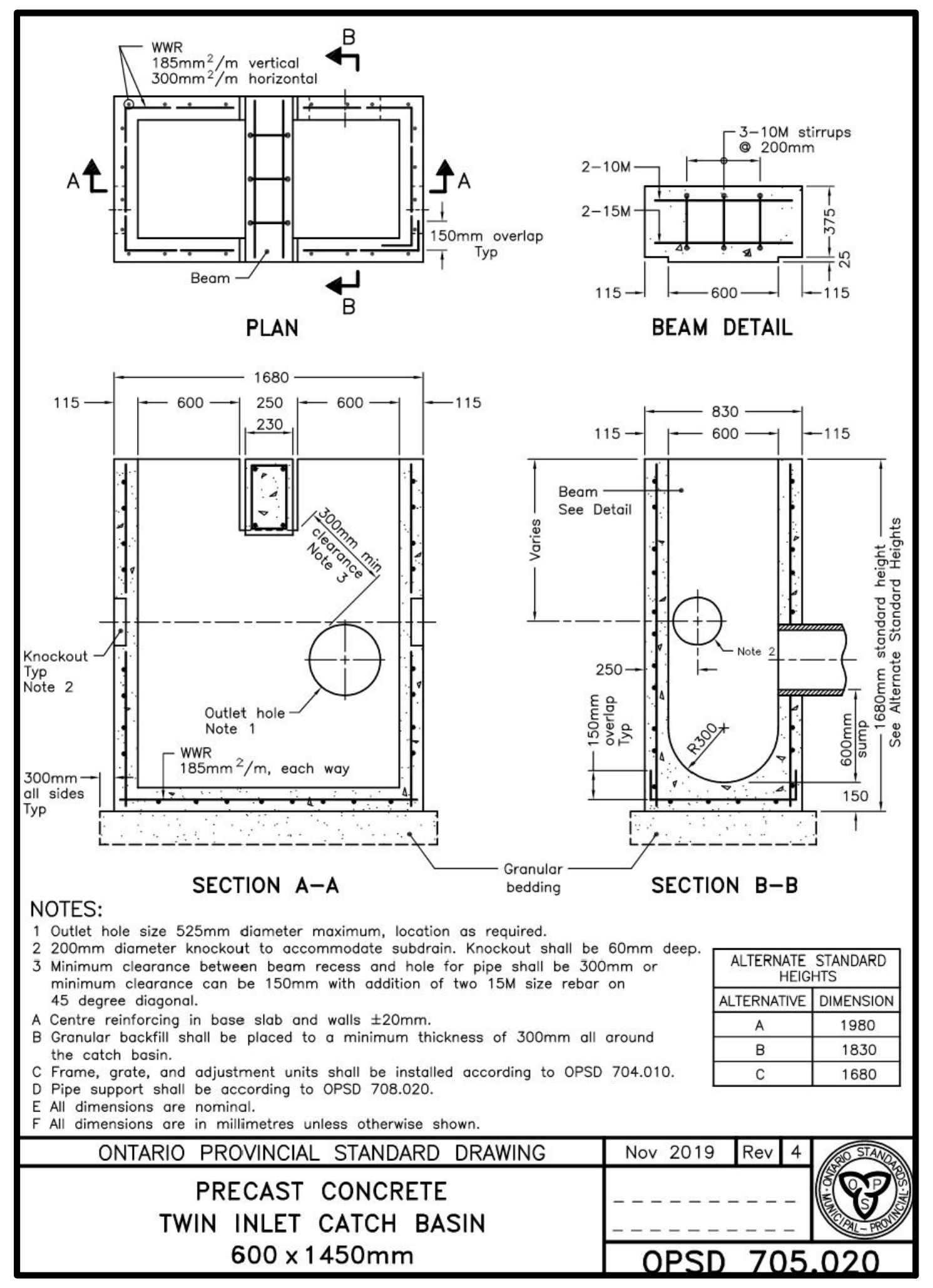


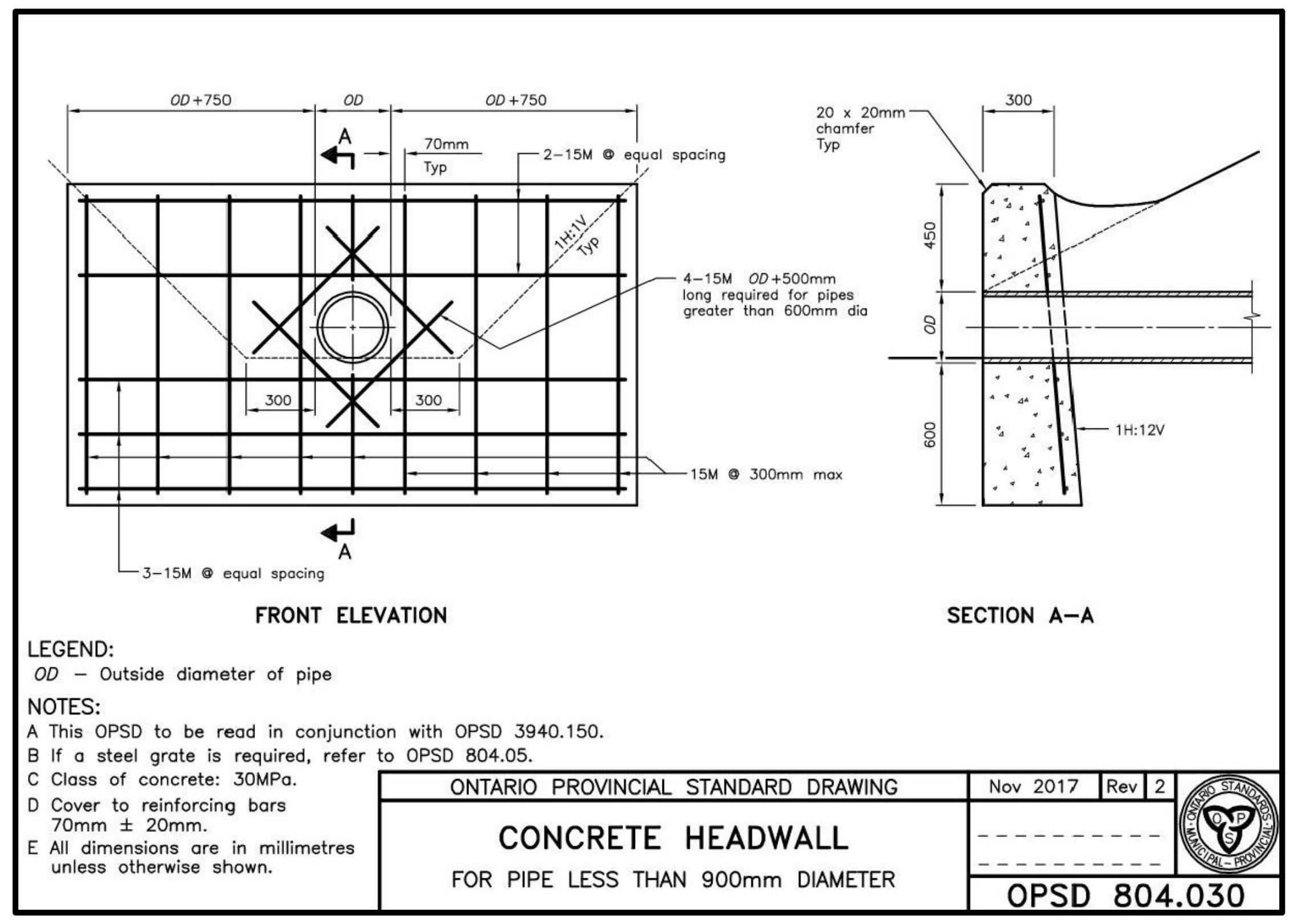


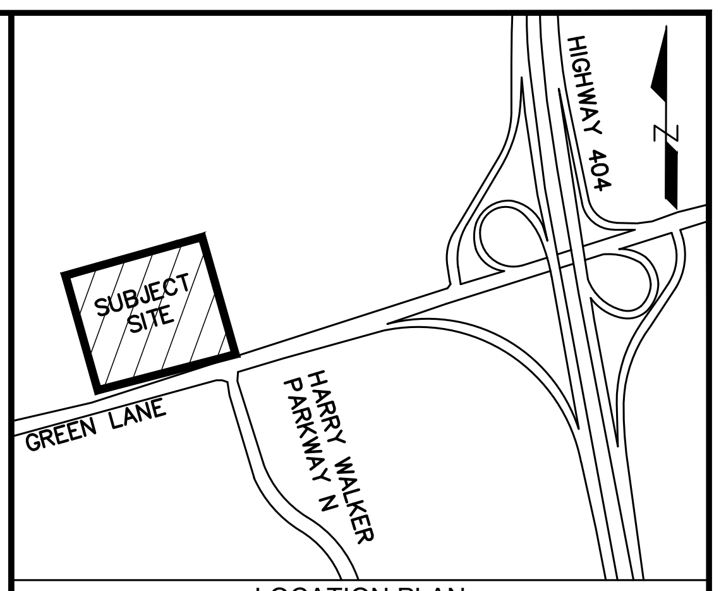












LOCATION PLAN
N.T.S.

LEGEND

LIST OF DRAWINGS
SG-01 - SITE GRADING PLAN
SS-01 - SITE SERVICING PLAN
EC-01 - EROSION AND SEDIMENT CONTROL PLAN
XS-01 - CROSS SECTIONS
DD-01 - DETAIL DRAWING
DD-02 - DETAIL DRAWING
DD-03 - DETAIL DRAWING

SITE PLAN INFORMATION
WARE MALCOMB ARCHITECTS INC.
30 ADELAIDE STREET E, SUITE 1254
TORONTO, ON, M5C 2C5
PHONE: (437) 537-5700

SURVEYOR INFORMATION
E.R. GARDEN LIMITED
ONTARIO LAND SURVEYOR
1260 JOURNEY'S END CIRCLE, UNIT 1,
NEWMARKET, ON, L3Y 8Z7
PHONE: (905) 895-5600
FAX: (905) 895-7127
WEBSITE: www.ergardenlimited.ca

BENCHMARK INFORMATION:
ELEVATIONS ARE GEODETIC AND ARE DERIVED FROM TOWN OF NEWMARKET BENCHMARK 1095 HAVING AN ELEVATION 273.91 METRES A.S.L.

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4			
3			
2			
1	2024/10/25	ISSUED FOR SPA SUBMISSION	TVL
No.	DATE	ISSUE/REVISION	INTIAL

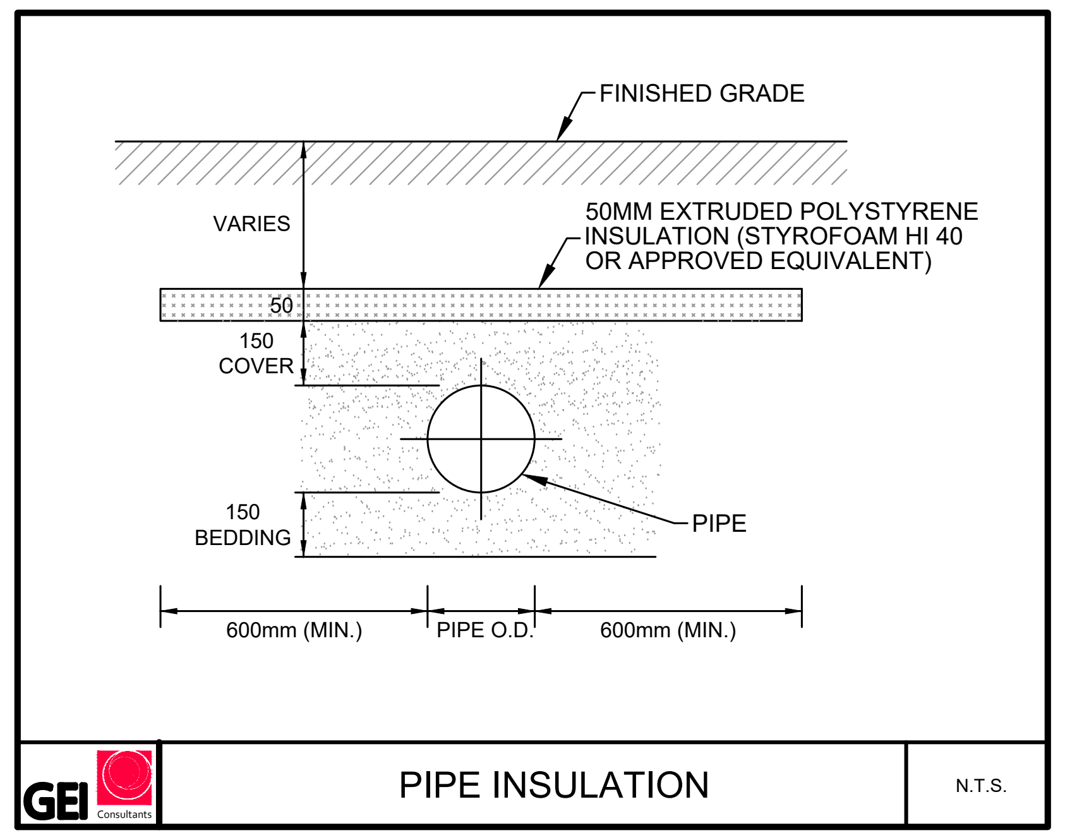
TOWN OF EAST GWILLIMBURY
YORK REGION

NEWROADS - TOYOTA
NEWROADS AUTOMOTIVE GROUP
1656 GREEN LANE EAST
TOWN OF EAST GWILLIMBURY, ONTARIO

DETAIL DRAWING

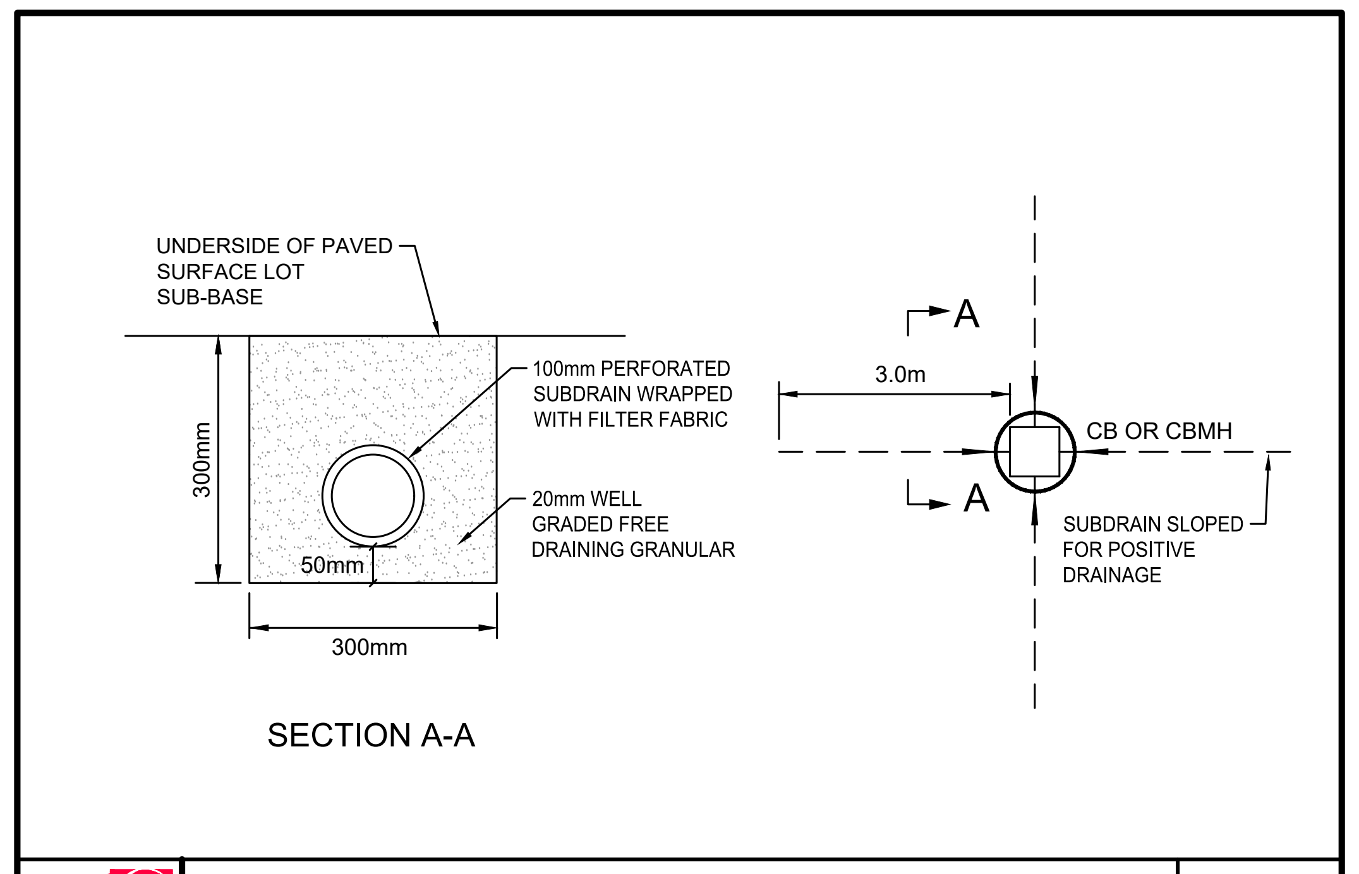
GEI Consultants

DESIGNED BY: PS	DATE: OCTOBER, 2024	CHECKED BY: TVL
DRAWN BY: PS	PROJECT No. 2406541	DRAWING No. DD-01
SCALE:		



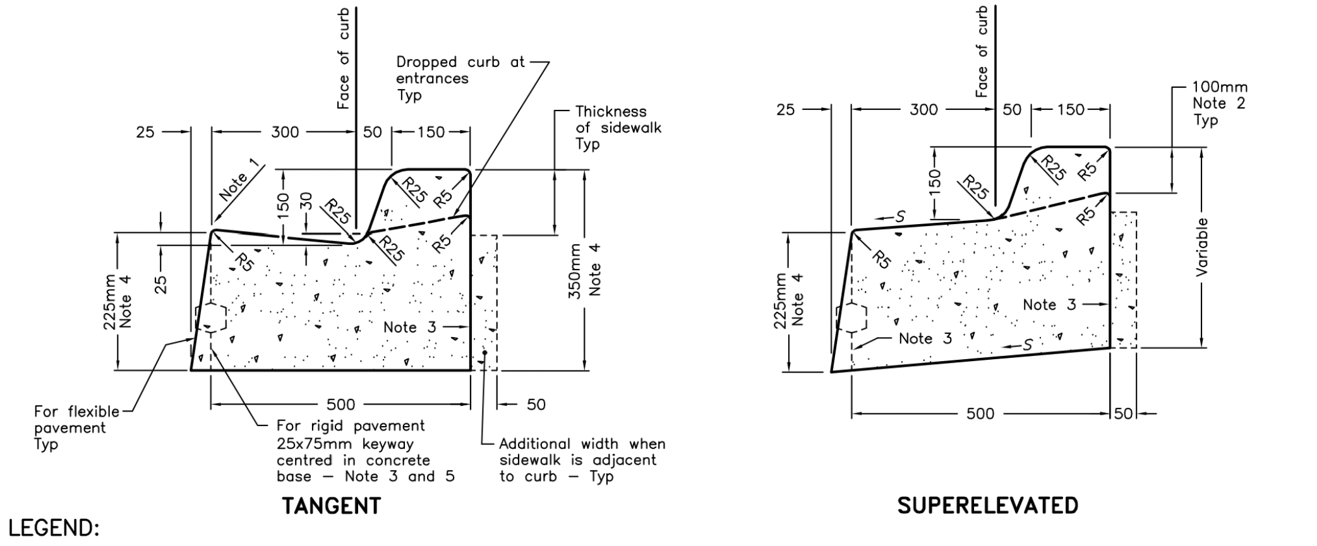
PIPE INSULATION

N.T.S.



SUBDRAIN DETAIL

N.T.S.



LEGEND:

S – Rate of pavement superelevation in percent, %.

NOTES:

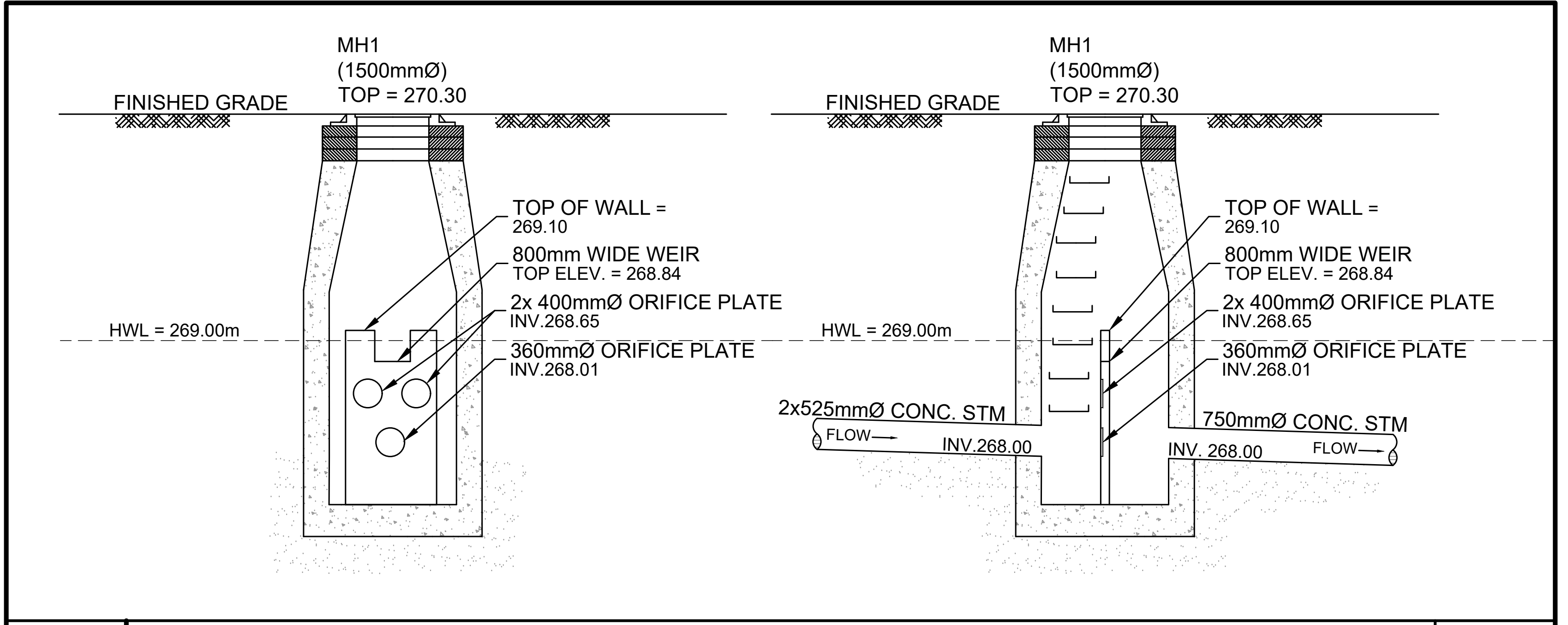
1 Flexible and composite pavement shall be placed 5mm above the adjacent edge of gutter.
2 When sidewalk is continuously adjacent, the dropped curb at entrances shall be reduced to 75mm.
3 For slipforming procedure a 5% batter is acceptable.
4 For composite pavement the depth of concrete curb shall be adjusted to depth of concrete pavement.
5 When tie bars are specified, refer to OPSD 552.010 and 552.020 for details.

A Treatment at entrances shall be according to OPSD 351.010.
B Outlet treatment shall be according to the OPSD 610 Series.
C The transition from one curb type to another shall be a minimum length of 3.0m, except in conjunction with guide rail where it shall be according to the OPSD 900 Series.
D All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING | Nov 2012 | Rev 2

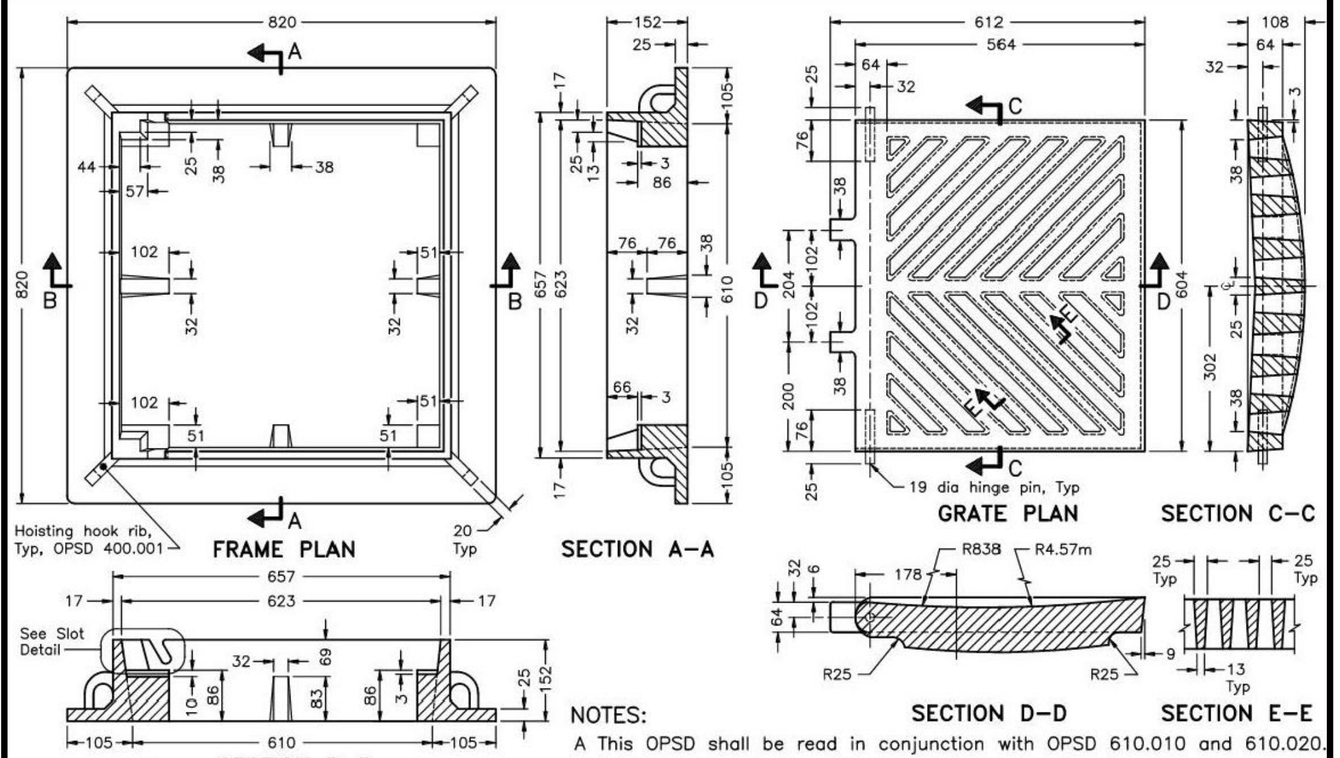
CONCRETE BARRIER CURB
WITH STANDARD GUTTER

OPSD 600.040



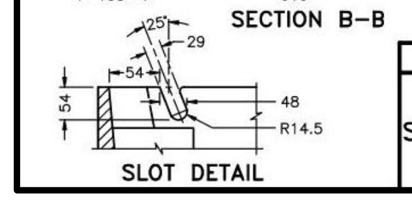
MANHOLE WITH WEIR WALL AND
ORIFICE PLATE INSIDE

N.T.S.



NOTES:

A This OPSD shall be read in conjunction with OPSD 610.010 and 610.020.
B All dimensions are in millimetres unless otherwise shown.

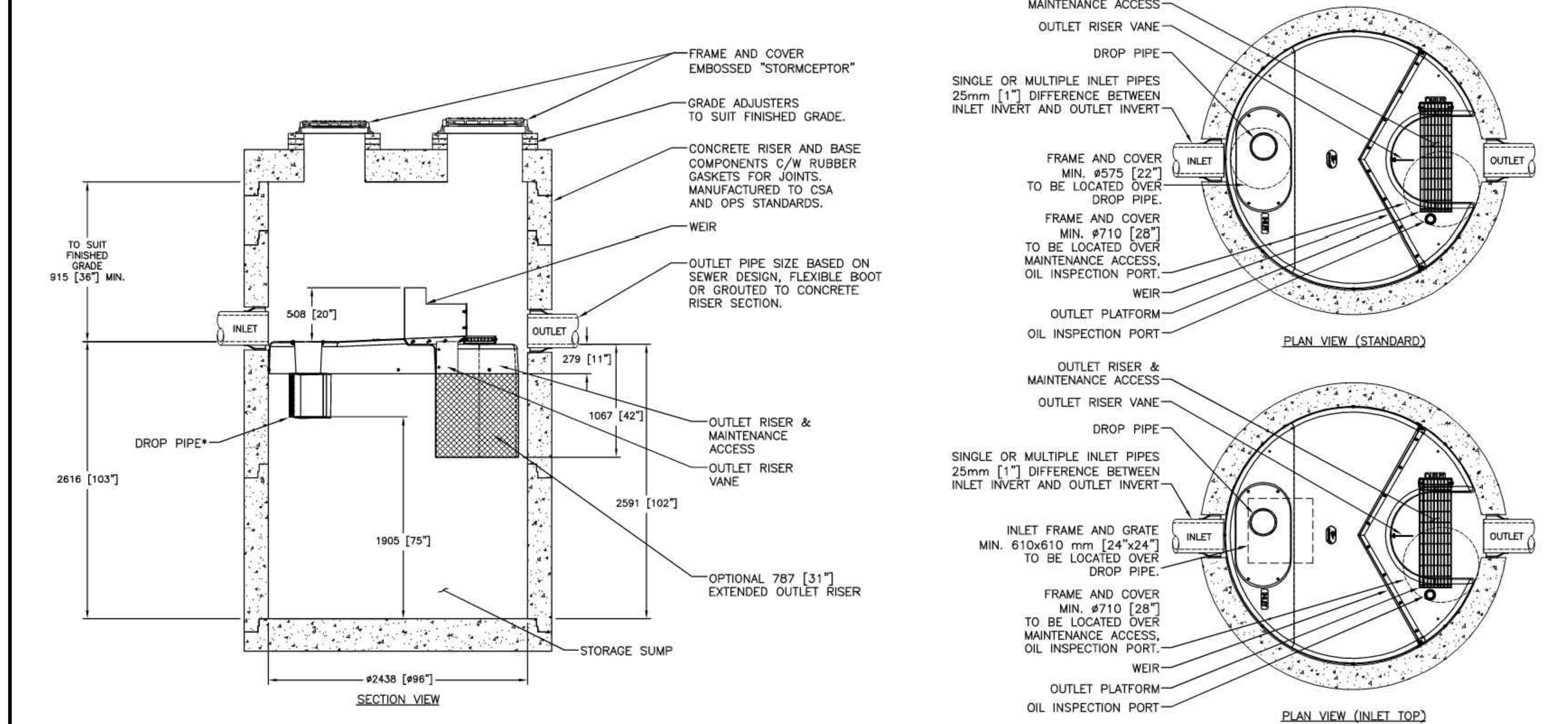


ONTARIO PROVINCIAL STANDARD DRAWING | Nov 2018 | Rev 3

CAST IRON, SQUARE FRAME WITH
SQUARE OVERFLOW TYPE DISHED GRATE FOR
CATCH BASINS, HERRING BONE OPENINGS

OPSD 400.010

DRAWING NOT TO BE USED FOR CONSTRUCTION



GENERAL NOTES:

* MAXIMUM SURFACE LOADING RATE (SLR) INTO LOWER CHAMBER THROUGH DROP PIPE IS 1135 L/min/m^2 (27.9 gpm/ft^2) FOR STORMCEPTOR EF8 AND 535 L/min/m^2 (13.1 gpm/ft^2) FOR STORMCEPTOR EFO8 (OIL CAPTURE CONFIGURATION).

1. ALL DIMENSIONS INDICATED ARE IN MILLIMETERS (INCHES) UNLESS OTHERWISE SPECIFIED.
2. STORMCEPTOR STRUCTURE INLET AND OUTLET PIPE SIZE AND ORIENTATION SHOWN FOR INFORMATIONAL PURPOSES ONLY.
3. UNLESS OTHERWISE NOTED, BYPASS INFRASTRUCTURE, SUCH AS ALL UPSTREAM DIVERSION STRUCTURES, CONNECTING STRUCTURES, OR PIPE CONDUITS CONNECTING TO COMPLETE THE STORMCEPTOR SYSTEM SHALL BE PROVIDED AND ADDRESSED SEPARATELY.
4. DRAWING FOR INFORMATION PURPOSES ONLY. REFER TO ENGINEER'S SITE/UTILITY PLAN FOR STRUCTURE ORIENTATION.
5. NO PRODUCT SUBSTITUTIONS SHALL BE ACCEPTED UNLESS SUBMITTED 10 DAYS PRIOR TO PROJECT BID DATE, OR AS DIRECTED BY THE ENGINEER OF RECORD.

INSTALLATION NOTES

A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STRUCTURE (LIFTING CLUTCHES PROVIDED)
C. CONTRACTOR WILL INSTALL AND LEVEL THE STRUCTURE, SEALING THE JOINTS, LINE ENTRY AND EXIT POINTS (NON-SHRINK GROUT WITH APPROVED WATERSTOP OR FLEXIBLE BOOT)
D. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT THE DEVICE FROM CONSTRUCTION-RELATED EROSION RUNOFF.
E. DEVICE ACTIVATION, BY CONTRACTOR, SHALL OCCUR ONLY AFTER SITE HAS BEEN STABILIZED AND THE STORMCEPTOR UNIT IS CLEAN AND FREE OF DEBRIS.

FOR SITE SPECIFIC DRAWINGS PLEASE CONTACT YOUR LOCAL STORMCEPTOR REPRESENTATIVE. SITE SPECIFIC DRAWINGS ARE BASED ON THE BEST AVAILABLE INFORMATION AT THE TIME. SOME FIELD REVISIONS TO THE SYSTEM LOCATION OR CONNECTION PIPING MAY BE NECESSARY BASED ON AVAILABLE SPACE OR SITE CONFIGURATION REVISIONS. ELEVATIONS SHOULD BE MAINTAINED EXCEPT WHERE NOTED ON BYPASS STRUCTURE (IF REQUIRED).

STANDARD DETAIL
NOT FOR CONSTRUCTION

SITE SPECIFIC DATA REQUIREMENTS

STORMCEPTOR MODEL	EFO8				
STRUCTURE ID					*
HYDROCARBON STORAGE REQ'D (L)					*
WATER QUALITY FLOW RATE (L/s)					*
PEAK FLOW RATE (L/s)					*
RETURN PERIOD OF PEAK FLOW (yrs)					*
DRAINAGE AREA (HA)					*
DRAINAGE AREA IMPERVIOUSNESS (%)					*
PIPE DATA:	I.E.	MAT'L	DIA	SLOPE %	HGL
INLET #1	*	*	*	*	*
INLET #2	*	*	*	*	*
OUTLET	*	*	*	*	*

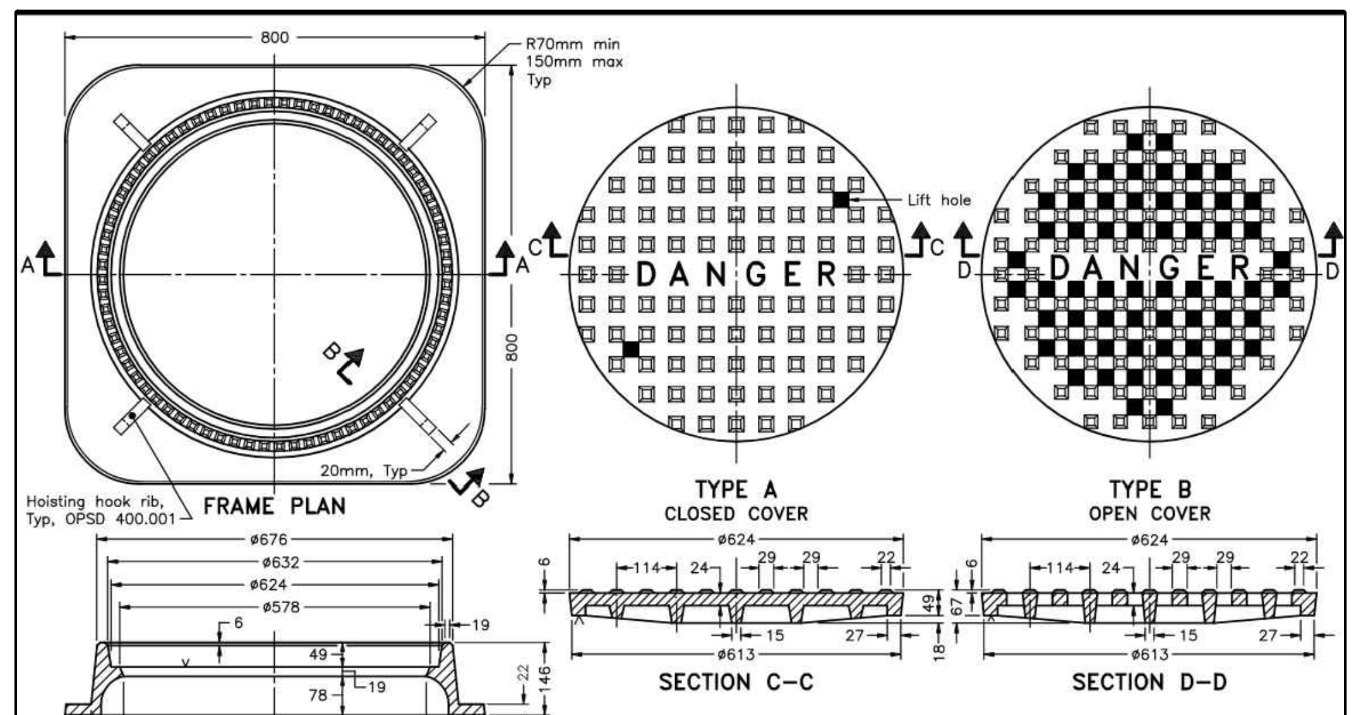
* PER ENGINEER OF RECORD

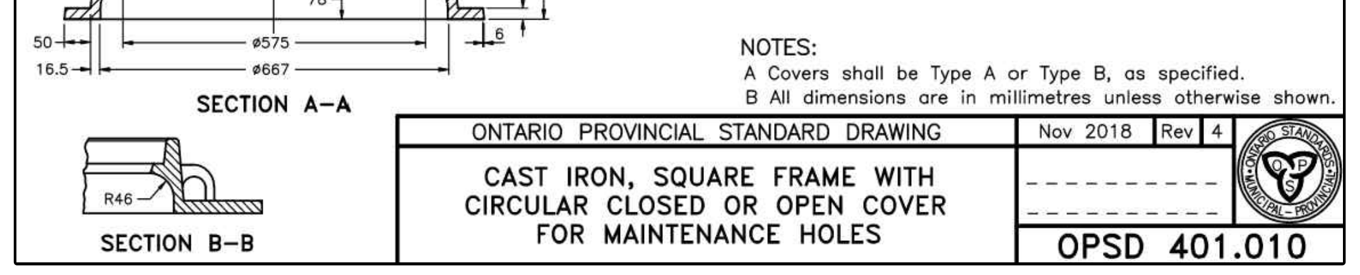
DATE: 10/13/2017	
DESIGNED: JSK	DRAWN: JSK
CHECKED: BSF	APPROVED: *
PROJECT No.: EFO8	SEQUENCE No.: *
SHEET: 1 OF 1	

Stormceptor® EF

imbrium®

SCALE = NTS





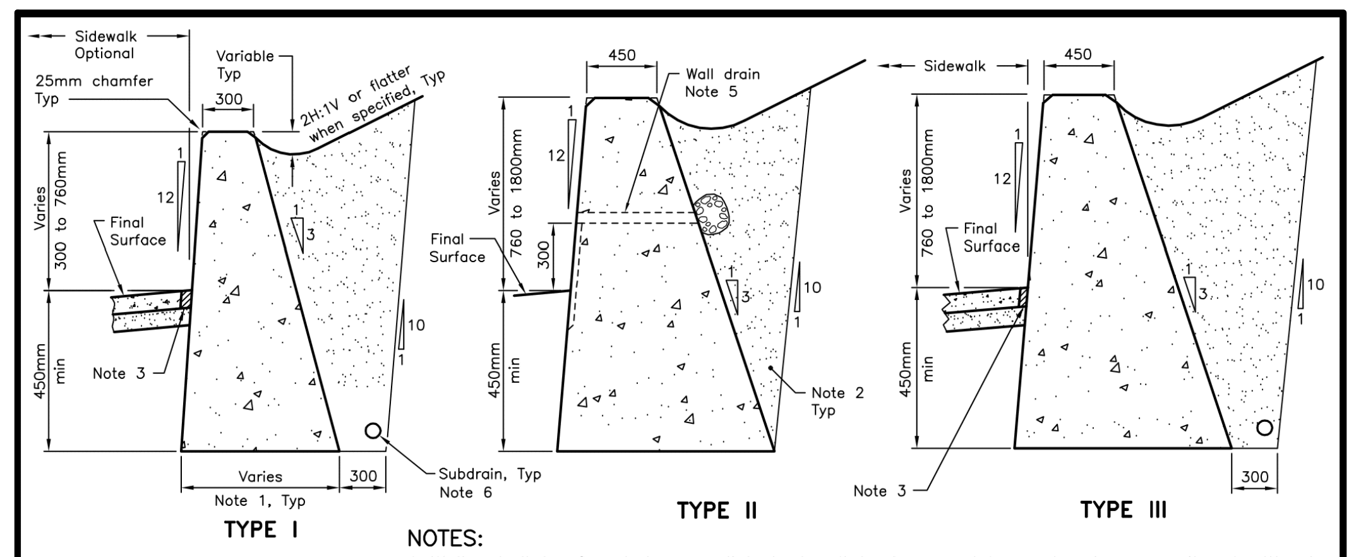
NOTES:

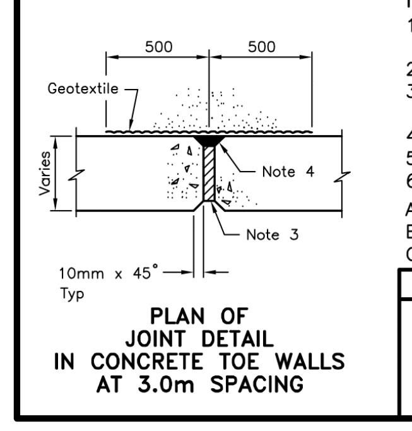
A Covers shall be Type A or Type B, as specified.
B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING | Nov 2018 | Rev 4

CAST IRON, SQUARE FRAME WITH
CIRCULAR CLOSED OR OPEN COVER
FOR MAINTENANCE HOLES

OPSD 401.010





NOTES:

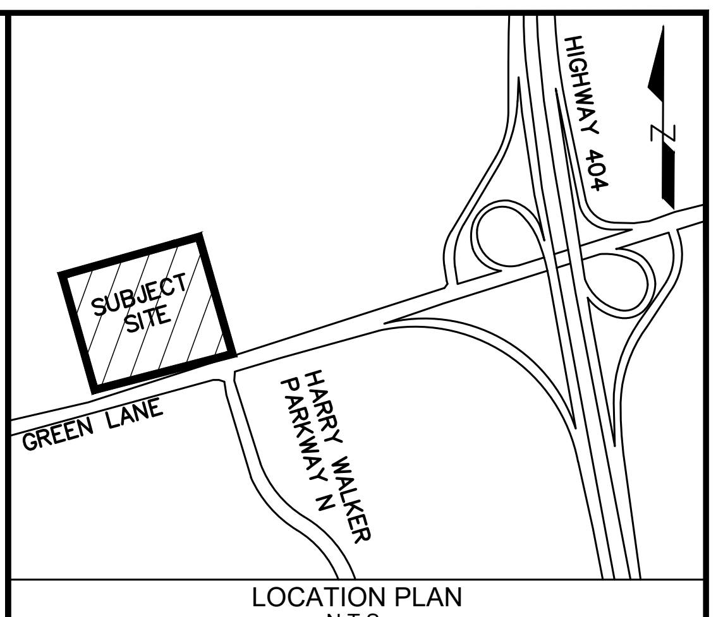
1 Walls shall be founded on undisturbed soil having a minimum bearing capacity at ultimate limit states of 200kPa for Type I and 300kPa for Type II and Type III.
2 Excavation for toe walls shall be backfilled with free draining granular material.
3 10mm preformed joint filler, Type A, non–extruding and resilient bituminous type as specified.
4 Cold applied rubber asphalt joint sealing compound.
5 Where specified, wall drains shall be installed as per OPSD 3190.100.
6 150mm dia perforated pipe subdrain wrapped in geotextile.

A Maximum height of slope above top of wall is 4m.
B Concrete for toe walls shall be 30MPa.
C All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING | Nov 2010 | Rev 2

WALLS
RETAINING
CONCRETE TOE WALL

OPSD 3120.100



LOCATION PLAN
N.T.S.

LEGEND

LIST OF DRAWINGS
- SG-01 - SITE GRADING PLAN
- SS-01 - SITE SERVICING PLAN
- EC-01 - EROSION AND SEDIMENT CONTROL PLAN
- XS-01 - CROSS SECTIONS
- DD-01 - DETAIL DRAWING
- DD-02 - DETAIL DRAWING
- DD-03 - DETAIL DRAWING

SITE PLAN INFORMATION
WARE MALCOMB ARCHITECTS INC.
30 ADELAIDE STREET E, SUITE 1254
TORONTO, ON, M5C 2C5
PHONE: (437) 537-5700

SURVEYOR INFORMATION
E.R. GARDEN LIMITED
ONTARIO LAND SURVEYOR
1260 JOURNEY'S END CIRCLE, UNIT 1,
NEWMARKET, ON, L3Y 8Z7
PHONE: (905) 895-5600
FAX: (905) 895-7127
WEBSITE: www.ergardenlimited.ca

BENCHMARK INFORMATION:
ELEVATIONS ARE GEODETIC AND ARE DERIVED FROM TOWN OF NEWMARKET BENCHMARK 1095 HAVING AN ELEVATION 273.91 METRES A.S.L.

No.	DATE	ISSUE/REVISION	INTIAL
5			
4			
3			
2			
1	2024/10/25	ISSUED FOR SPA SUBMISSION	TVL

T. J. VAN LIEROP
100508919
2024-10-25

TOWN OF EAST GWILLIMBURY
YORK REGION

NEWROADS - TOYOTA
NEWROADS AUTOMOTIVE GROUP
1656 GREEN LANE EAST
TOWN OF EAST GWILLIMBURY, ONTARIO

DETAIL DRAWING

GEI Consultants

DESIGNED BY: PS	DATE: OCTOBER, 2024	CHECKED BY: TVL
DRAWN BY: PS	PROJECT No. 2406541	DRAWING No. DD-02
SCALE:		

---- B:\Working\NEWROADS AUTOMOTIVE GROUP\2406541 1656 Green Lane East-EG\00_CAD\Design\Sheets\2406541 - DD-01.dwg - 10/21/2024

PROPOSED MAIN TANK SYSTEM ELEVATIONS

(TO BE APPROVED BY ENGINEER)
*ENGINEER TO CONFIRM MINIMUM AND MAXIMUM BURIAL REQUIREMENTS ARE MET

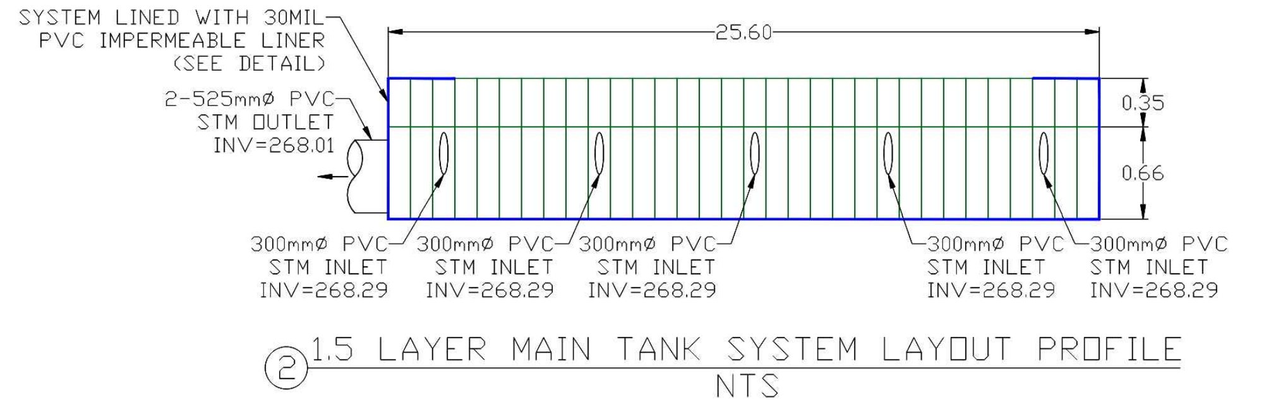
272.98	MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED)
269.78	MINIMUM ALLOWABLE GRADE
268.98	GREENSTORM STORAGE TOP ELEVATION LEVEL 1.5
268.63	GREENSTORM STORAGE TOP ELEVATION LEVEL 1
267.97	GREENSTORM BASE ELEVATION
267.82	BOTTOM OF EXCAVATION
<267.80	SEASONAL HIGH GROUNDWATER ELEVATION

GREENSTORM STORMWATER MANAGEMENT SYSTEM

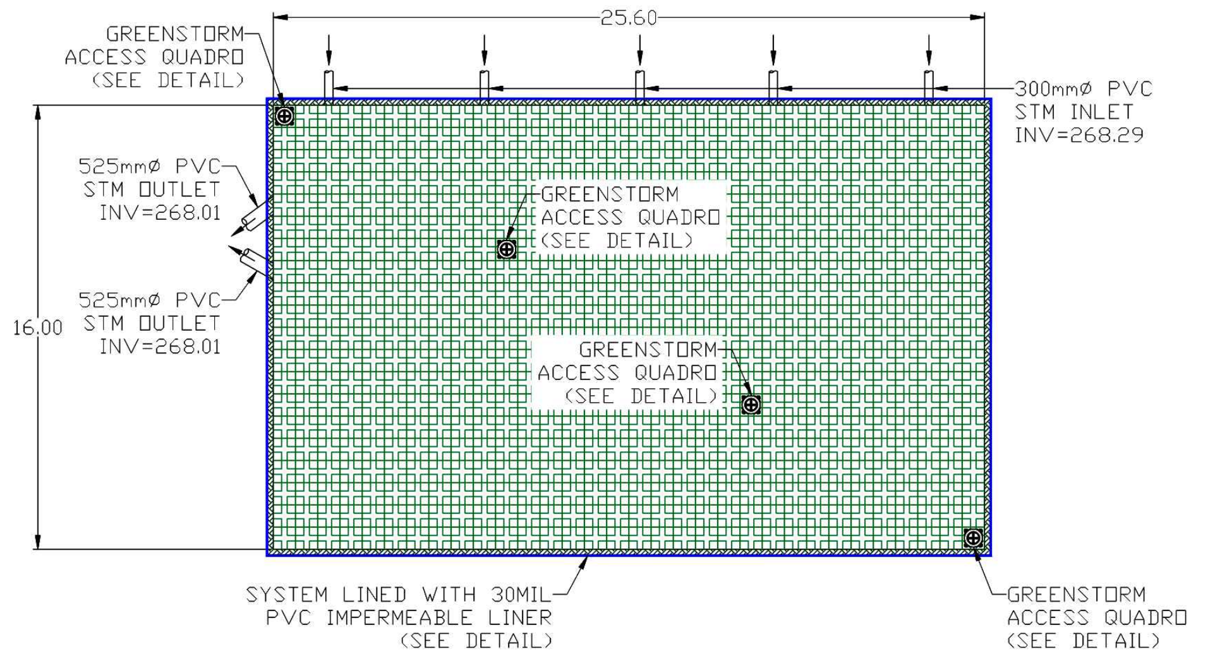
TOTAL STORAGE PROVIDED: 397.15 m^3
STORAGE VOID RATIO: 0.96
SYSTEM AREA: 409.60 m^2
DEPTH OF EMBEDMENT STONE: 0.00 m
DEPTH OF BEDDING STONE: 0.00 m
STONE PERIMETER: 0.00 m

GREENSTORM LEGEND

- ▦ GREENSTORM ST BLOCK
- ▨ GREENSTORM SIDEWALL GRID WITH 8 OZ NON-WOVEN GEOTEXTILE
- ⊕ GREENSTORM ACCESS QUADRO
- — 30MIL PVC IMPERMEABLE LINER



② 1.5 LAYER MAIN TANK SYSTEM LAYOUT PROFILE
NTS



① MAIN TANK SYSTEM LAYOUT PLAN
NTS

NOTE:*ALL EXTERNAL SYSTEM STRUCTURES, INLET/OUTLET PIPES, AND PROPOSED ELEVATIONS MUST BE DESIGNED AND APPROVED BY PROJECT ENGINEER OF RECORD. PROJECT ENGINEER OF RECORD MUST ENSURE CHAMBER BURIAL REQUIREMENTS ARE MET.

MATERIALS LIST SUPPLIED BY STORMCON
(SYSTEM MATERIALS LIST - SEE COVER SHEET FOR COMBINED PROJECT MATERIALS LIST)

GREENSTORM-ST	1912	PIECES
SINGLE LAYER CONNECTOR	1300	PIECES
MULTI LAYER CONNECTOR	1300	PIECES
SIDEWALL GRID	104	PIECES
HALF BLOCK SIDEWALL GRID	104	PIECES
HALF BLOCK COVER PLATE	636	PIECES
HALF BLOCK COVER PLATE QUADRO CONTROL	4	PIECES
QUADRO CONTROL	8	PIECES
QUADRO ADAPTERS	4	PIECES
EXTENSION PIPE	12	METER
CAST IRON COVER	4	PIECES
NO. OF 525mmØ PIPE ADAPTER	0	PIECES
NO. OF 450mmØ PIPE ADAPTER	0	PIECES
MIDDLE GRID	0	PIECES
MIDDLE GRID QUADRO CONTROL	0	PIECES
8 OZ NON-WOVEN GEOTEXTILE	1960	SQ. METER
30MIL PVC IMPERMEABLE LINER	700	SQ. METER
LINER TAPE	370	METER
GREENSTORM FULL TREATMENT ROW	0	PIECES
GREENSTORM HALF TREATMENT ROW	0	PIECES
100MM SUBDRAIN	0	METER

NOTE:*

1)USE OF VEHICLES WHEN APPLYING THE FIRST COVER LAYER :

THE FIRST COVER LAYER CAN BE APPLIED FOR EXAMPLE USING A WHEEL LOADER OR A FRONT-TYPE MOBILE EXCAVATOR. FOR A WHEEL LOADER OR MOBILE EXCAVATOR WITH A MAXIMUM TOTAL WEIGHT OF 15TONS(CHAIN,WHEELS,TWIN-TYRES), A COMPACTED COVER OF AT LEAST 30CM MUST BE PLACED OVER THE STORAGE/INFILTRATION SYSTEM. POSSIBLE FORMATION OF RUTS MUST BE TAKEN INTO ACCOUNT! AVOID STEERING MANOEUVRES AT THIS CONSTRUCTION STAGE

2) USE OF CONSTRUCTION VEHICLES:

DRIVING OVER THE COVER WITH HEAVY CONSTRUCTION VEHICLES WITH A WHEEL LOAD OF UP TO 50KN (E.G. HGV 30) IS POSSIBLE IF THE THICKNESS OF THE COMPACTED COVER IS NOT LESS THAN 60CM. POSSIBLE FORMATION OF RUTS MUST BE TAKEN INTO ACCOUNT! WHEN DUMPING THE EARTHQUAKE MATERIAL, THE WHEEL LOAD OF 140KN MUST NOT BE EXCEEDED;IF NECESSARY,LOAD DISTRIBUTION PLATES MUST BE USED.

69 CONNIE CRESCENT
CONCORD, ON
L4K 1L3

SALES@STORMCON.CA
www.STORMCON.CA

THIS DRAWING WAS PREPARED TO SUPPORT THE PROJECT ENGINEER OF RECORD FOR THE PROPOSED SYSTEM. IT IS THE ULTIMATE RESPONSIBILITY OF THE PROJECT ENGINEER OF RECORD TO ENSURE THAT THE SYSTEM IS DESIGN IN FULL COMPLIANCE WITH ALL APPLICABLE LAWS AND REGULATIONS. IT IS THE CONTRACTOR OF RECORD'S RESPONSIBILITY TO ENSURE THAT THE STORMCON PRODUCTS ARE INSTALLED IN ACCORDANCE WITH STORMCONS MINIMUM REQUIREMENTS. STORMCON DOES NOT APPROVE PLANS, SIZING, OR SYSTEM DESIGNS.

NEWROADS AUTOMOTIVE GROUP
1656 GREEN LANE EAST
TOWN OF EAST GWILLIMBURY
MAIN TANK SYSTEM LAYOUT SHEET

GREENSTORM STORMWATER CHAMBER

PROJECT NO:	2024-135	DATE:	10/18/2024
DESIGNED BY:	JD	CHECKED BY:	EC
SCALE:	N.T.S.	SHEET NO:	2 OF 9

PROPOSED ISOLATED ROW SYSTEM ELEVATIONS

(TO BE APPROVED BY ENGINEER)
*ENGINEER TO CONFIRM MINIMUM AND MAXIMUM BURIAL REQUIREMENTS ARE MET

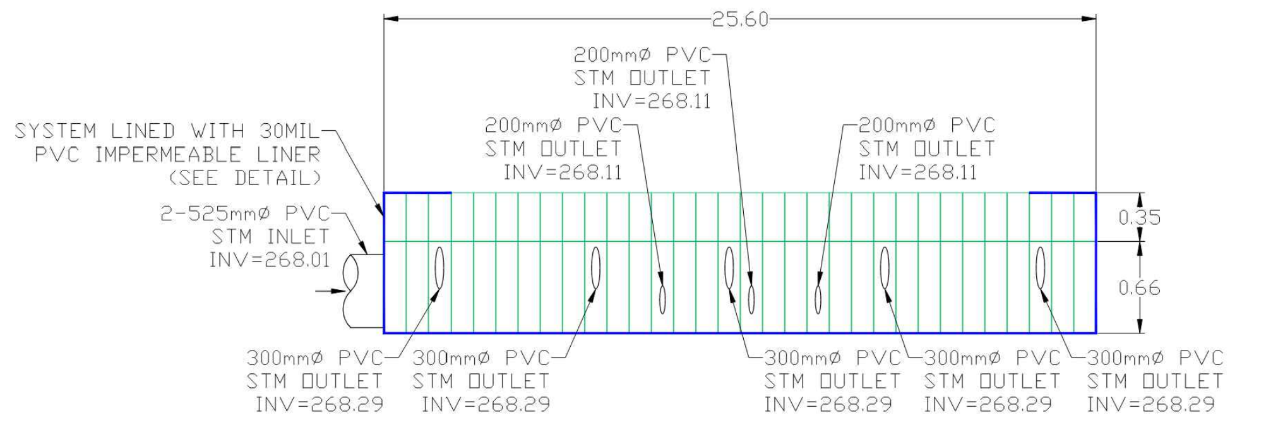
272.98	MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED)
269.78	MINIMUM ALLOWABLE GRADE
268.98	GREENSTORM STORAGE TOP ELEVATION LEVEL 1.5
268.63	GREENSTORM STORAGE TOP ELEVATION LEVEL 1
267.97	GREENSTORM BASE ELEVATION
267.82	BOTTOM OF EXCAVATION
<267.80	SEASONAL HIGH GROUNDWATER ELEVATION

GREENSTORM STORMWATER MANAGEMENT SYSTEM

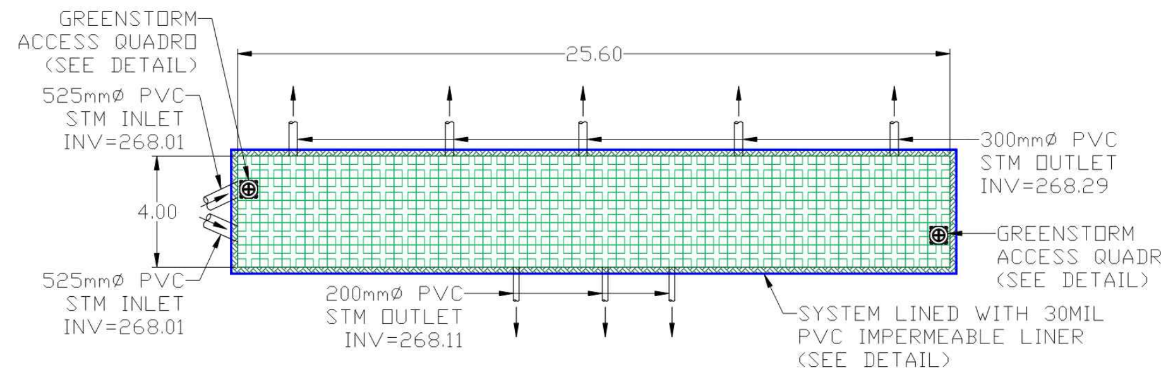
TOTAL STORAGE PROVIDED: 99.29 m^3
STORAGE VOID RATIO: 0.96
SYSTEM AREA: 102.40 m^2
DEPTH OF EMBEDMENT STONE: 0.00 m
DEPTH OF BEDDING STONE: 0.00 m
STONE PERIMETER: 0.00 m

GREENSTORM LEGEND

- ▦ GREENSTORM ST BLOCK
- ▨ GREENSTORM SIDEWALL GRID WITH 8 OZ NON-WOVEN GEOTEXTILE
- ⊕ GREENSTORM ACCESS QUADRO
- — 30MIL PVC IMPERMEABLE LINER



② 1.5 LAYER ISOLATED ROW SYSTEM LAYOUT PROFILE
NTS



① ISOLATED ROW SYSTEM LAYOUT PLAN
NTS

NOTE:*ALL EXTERNAL SYSTEM STRUCTURES, INLET/OUTLET PIPES, AND PROPOSED ELEVATIONS MUST BE DESIGNED AND APPROVED BY PROJECT ENGINEER OF RECORD. PROJECT ENGINEER OF RECORD MUST ENSURE CHAMBER BURIAL REQUIREMENTS ARE MET.

MATERIALS LIST SUPPLIED BY STORMCON
(SYSTEM MATERIALS LIST - SEE COVER SHEET FOR COMBINED PROJECT MATERIALS LIST)

GREENSTORM-ST	476	PIECES
SINGLE LAYER CONNECTOR	300	PIECES
MULTI LAYER CONNECTOR	300	PIECES
SIDEWALL GRID	74	PIECES
HALF BLOCK SIDEWALL GRID	74	PIECES
HALF BLOCK COVER PLATE	158	PIECES
HALF BLOCK COVER PLATE QUADRO CONTROL	2	PIECES
QUADRO CONTROL	4	PIECES
QUADRO ADAPTERS	2	PIECES
EXTENSION PIPE	4	METER
CAST IRON COVER	2	PIECES
NO. OF 525mmØ PIPE ADAPTER	0	PIECES
NO. OF 450mmØ PIPE ADAPTER	0	PIECES
MIDDLE GRID	0	PIECES
MIDDLE GRID QUADRO CONTROL	0	PIECES
8 OZ NON-WOVEN GEOTEXTILE	600	SQ. METER
30MIL PVC IMPERMEABLE LINER	230	SQ. METER
LINER TAPE	120	METER
GREENSTORM FULL TREATMENT ROW	0	PIECES
GREENSTORM HALF TREATMENT ROW	0	PIECES
100MM SUBDRAIN	0	METER

NOTE:*

1)USE OF VEHICLES WHEN APPLYING THE FIRST COVER LAYER :

THE FIRST COVER LAYER CAN BE APPLIED FOR EXAMPLE USING A WHEEL LOADER OR A FRONT-TYPE MOBILE EXCAVATOR. FOR A WHEEL LOADER OR MOBILE EXCAVATOR WITH A MAXIMUM TOTAL WEIGHT OF 15TONS(CHAIN,WHEELS,TWIN-TYRES), A COMPACTED COVER OF AT LEAST 30CM MUST BE PLACED OVER THE STORAGE/INFILTRATION SYSTEM. POSSIBLE FORMATION OF RUTS MUST BE TAKEN INTO ACCOUNT! AVOID STEERING MANOEUVRES AT THIS CONSTRUCTION STAGE

2) USE OF CONSTRUCTION VEHICLES:

DRIVING OVER THE COVER WITH HEAVY CONSTRUCTION VEHICLES WITH A WHEEL LOAD OF UP TO 50KN (E.G. HGV 30) IS POSSIBLE IF THE THICKNESS OF THE COMPACTED COVER IS NOT LESS THAN 60CM. POSSIBLE FORMATION OF RUTS MUST BE TAKEN INTO ACCOUNT! WHEN DUMPING THE EARTHQUAKE MATERIAL, THE WHEEL LOAD OF 140KN MUST NOT BE EXCEEDED;IF NECESSARY,LOAD DISTRIBUTION PLATES MUST BE USED.

69 CONNIE CRESCENT
CONCORD, ON
L4K 1L3

SALES@STORMCON.CA
www.STORMCON.CA

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NEWROADS AUTOMOTIVE GROUP
1656 GREEN LANE EAST
TOWN OF EAST GWILLIMBURY
ISOLATED ROW SYSTEM LAYOUT SHEET

GREENSTORM STORMWATER CHAMBER

PROJECT NO:	2024-135	DATE:	10/18/2024
DESIGNED BY:	JD	CHECKED BY:	EC
SCALE:	N.T.S.	SHEET NO:	4 OF 9

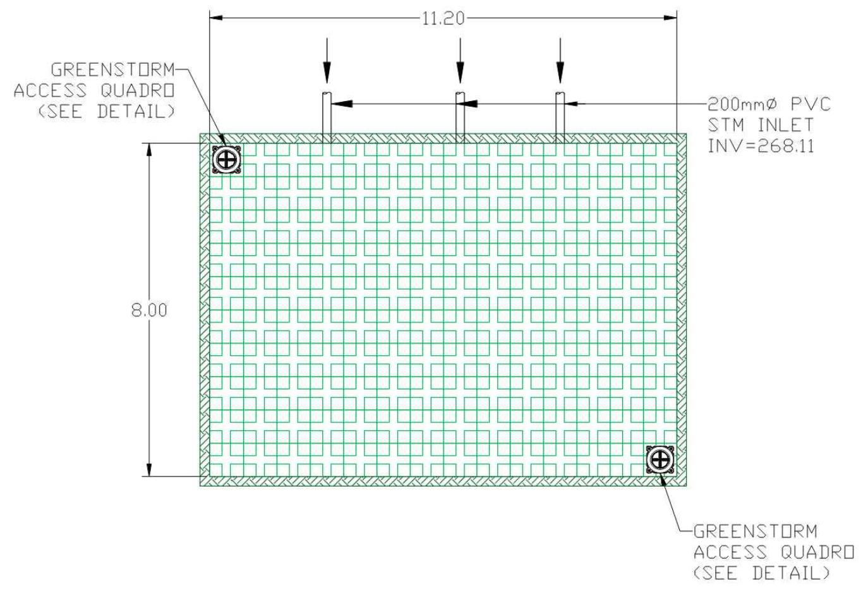
PROPOSED INFILTRATION TANK SYSTEM ELEVATIONS

(TO BE APPROVED BY ENGINEER)
*ENGINEER TO CONFIRM MINIMUM AND MAXIMUM BURIAL REQUIREMENTS ARE MET

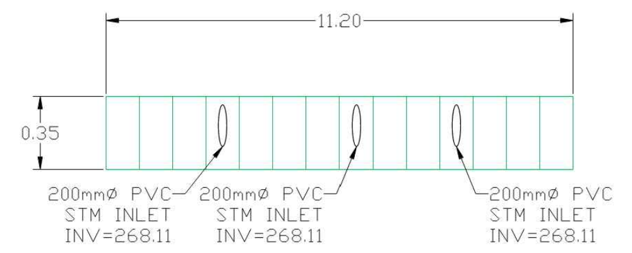
272.35	MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED)
269.15	MINIMUM ALLOWABLE GRADE
268.35	GREENSTORM STORAGE TOP ELEVATION LEVEL 0.5
268.00	GREENSTORM BASE ELEVATION
267.85	BOTTOM OF EXCAVATION
<267.80	SEASONAL HIGH GROUNDWATER ELEVATION

GREENSTORM STORMWATER MANAGEMENT SYSTEM

TOTAL STORAGE PROVIDED: 30.11 m^3
STORAGE VOID RATIO: 0.96
SYSTEM AREA: 89.60 m^2
DEPTH OF EMBEDMENT STONE: 0.00 m
DEPTH OF BEDDING STONE: 0.00 m
STONE PERIMETER: 0.00 m



① INFILTRATION TANK SYSTEM LAYOUT PLAN
NTS



② 0.5 LAYER INFILTRATION TANK SYSTEM LAYOUT PROFILE
NTS

NOTE:*ALL EXTERNAL SYSTEM STRUCTURES, INLET/OUTLET PIPES, AND PROPOSED ELEVATIONS MUST BE DESIGNED AND APPROVED BY PROJECT ENGINEER OF RECORD. PROJECT ENGINEER OF RECORD MUST ENSURE CHAMBER BURIAL REQUIREMENTS ARE MET.

MATERIALS LIST SUPPLIED BY STORMCON
(SYSTEM MATERIALS LIST - SEE COVER SHEET FOR COMBINED PROJECT MATERIALS LIST)

GREENSTORM-ST	140	PIECES
SINGLE LAYER CONNECTOR	300	PIECES
MULTI LAYER CONNECTOR	0	PIECES
SIDEWALL GRID	0	PIECES
HALF BLOCK SIDEWALL GRID	48	PIECES
HALF BLOCK COVER PLATE	138	PIECES
HALF BLOCK COVER PLATE QUADRO CONTROL	2	PIECES
QUADRO CONTROL	0	PIECES
QUADRO ADAPTERS	0	PIECES
EXTENSION PIPE	6	METER
CAST IRON COVER	2	PIECES
NO. OF 525mmØ PIPE ADAPTER	0	PIECES
NO. OF 450mmØ PIPE ADAPTER	0	PIECES
MIDDLE GRID	0	PIECES
MIDDLE GRID QUADRO CONTROL	0	PIECES
8 OZ NON-WOVEN GEOTEXTILE	270	SQ. METER
30MIL PVC IMPERMEABLE LINER	0	SQ. METER
LINER TAPE	0	METER
GREENSTORM FULL TREATMENT ROW	0	PIECES
GREENSTORM HALF TREATMENT ROW	0	PIECES
100MM SUBDRAIN	0	METER

GREENSTORM LEGEND

- ▦ GREENSTORM ST BLOCK
- ▨ GREENSTORM SIDEWALL GRID WITH 8 OZ NON-WOVEN GEOTEXTILE
- ⊕ GREENSTORM ACCESS QUADRO

NOTE:*

1)USE OF VEHICLES WHEN APPLYING THE FIRST COVER LAYER :

THE FIRST COVER LAYER CAN BE APPLIED FOR EXAMPLE USING A WHEEL LOADER OR A FRONT-TYPE MOBILE EXCAVATOR. FOR A WHEEL LOADER OR MOBILE EXCAVATOR WITH A MAXIMUM TOTAL WEIGHT OF 15TONS(CHAIN,WHEELS,TWIN-TYRES), A COMPACTED COVER OF AT LEAST 30CM MUST BE PLACED OVER THE STORAGE/INFILTRATION SYSTEM. POSSIBLE FORMATION OF RUTS MUST BE TAKEN INTO ACCOUNT! AVOID STEERING MANOEUVRES AT THIS CONSTRUCTION STAGE

2) USE OF CONSTRUCTION VEHICLES:

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69 CONNIE CRESCENT
CONCORD, ON
L4K 1L3

SALES@STORMCON.CA
www.STORMCON.CA

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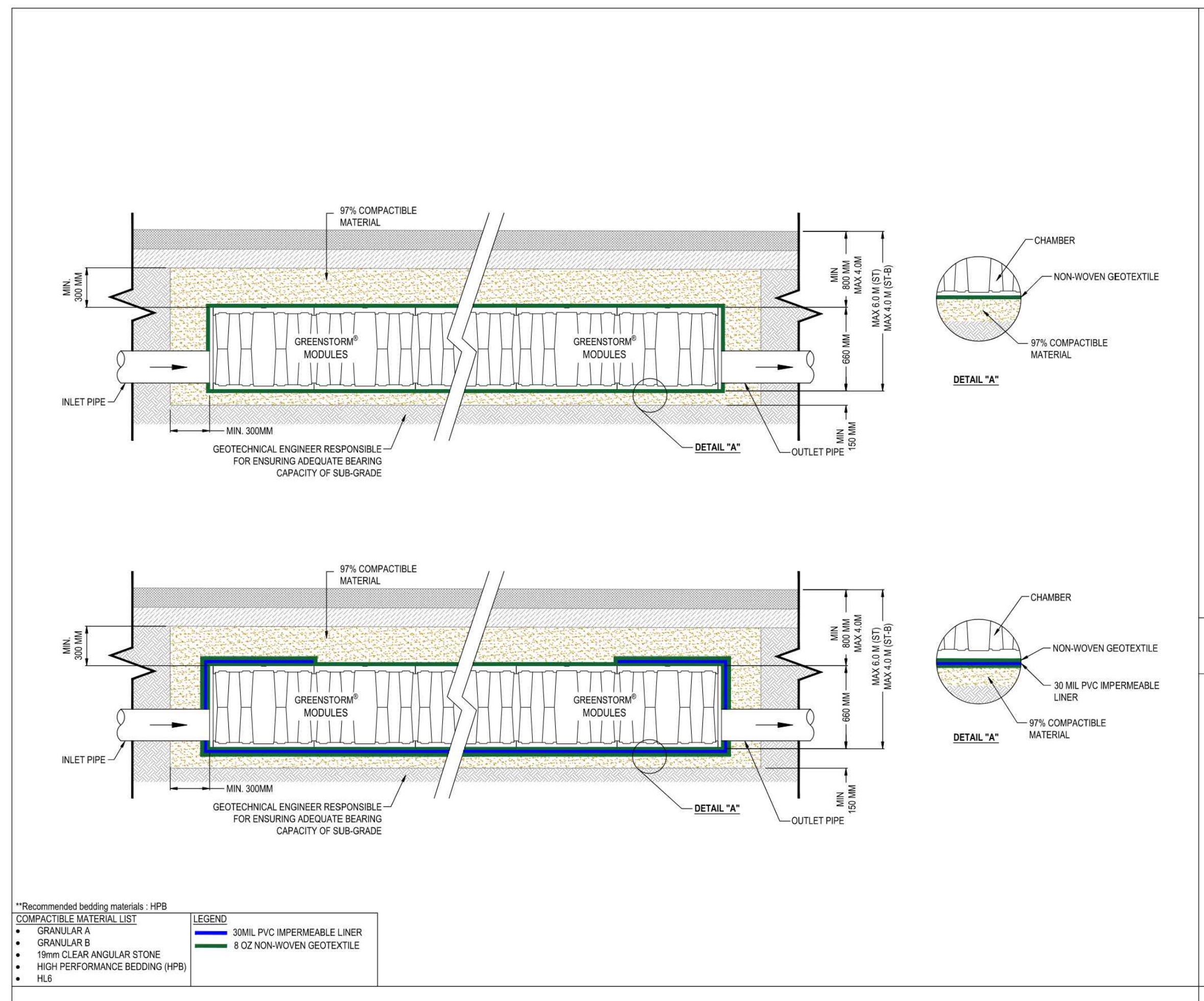
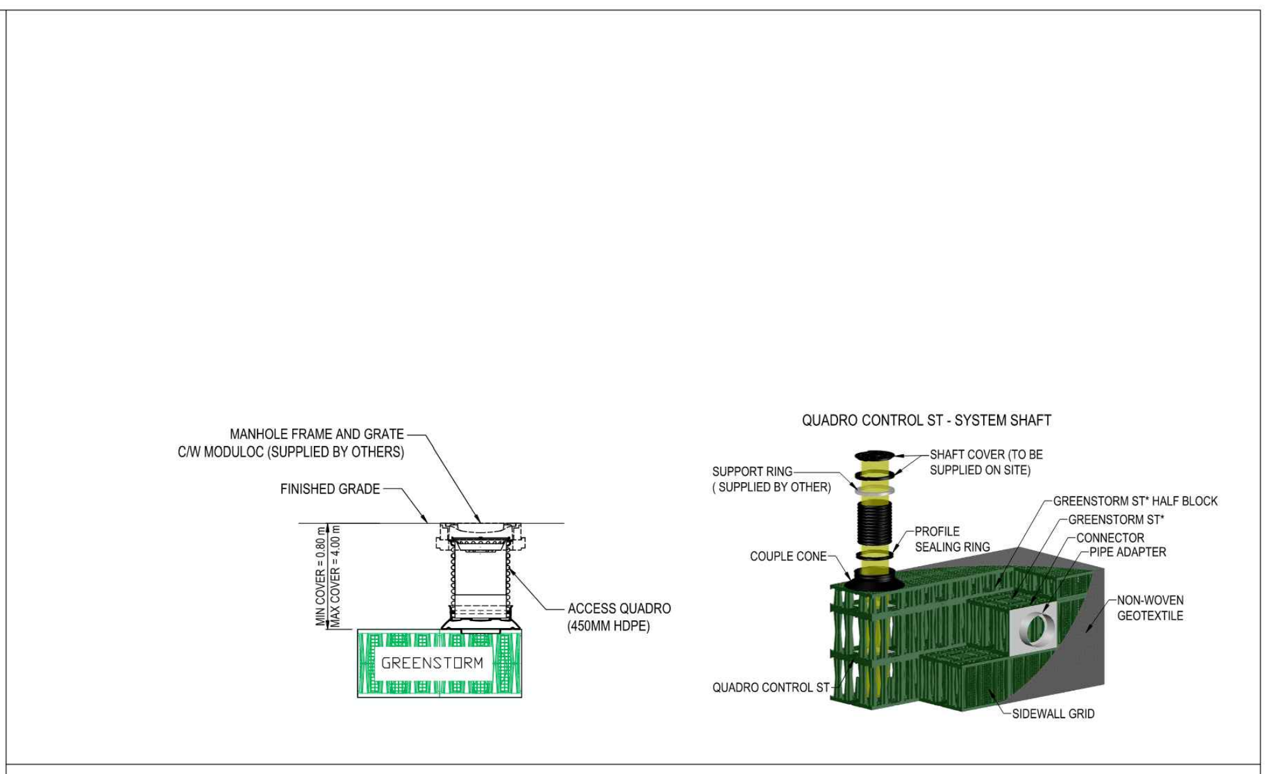
NEWROADS AUTOMOTIVE GROUP
1656 GREEN LANE EAST
TOWN OF EAST GWILLIMBURY
IINFILTRATION TANK SYSTEM LAYOUT SHEET

GREENSTORM STORMWATER CHAMBER

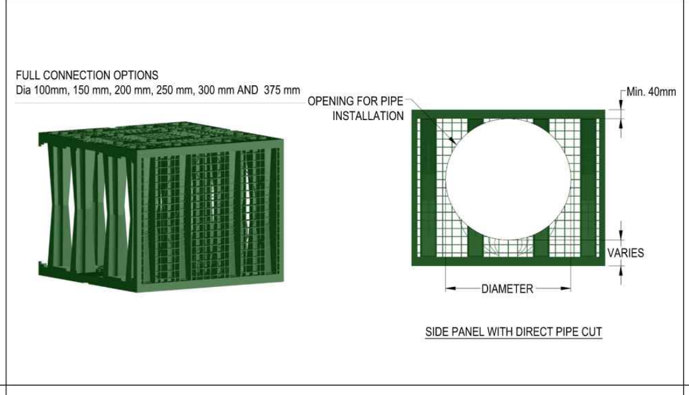
PROJECT NO:	2024-135	DATE:	10/18/2024
DESIGNED BY:	JD	CHECKED BY:	EC
SCALE:	N.T.S.	SHEET NO:	6 OF 9



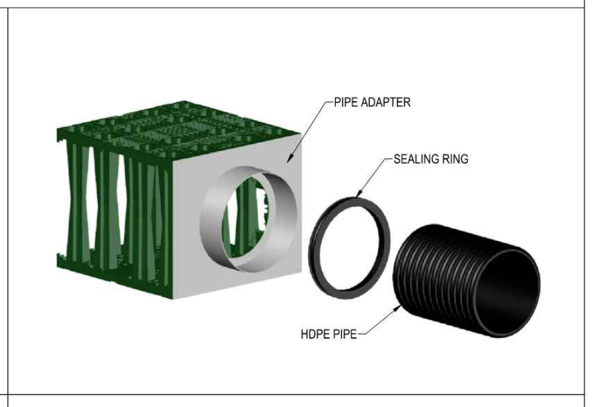
TYPICAL ONE LAYER GREENSTORM CROSS SECTION



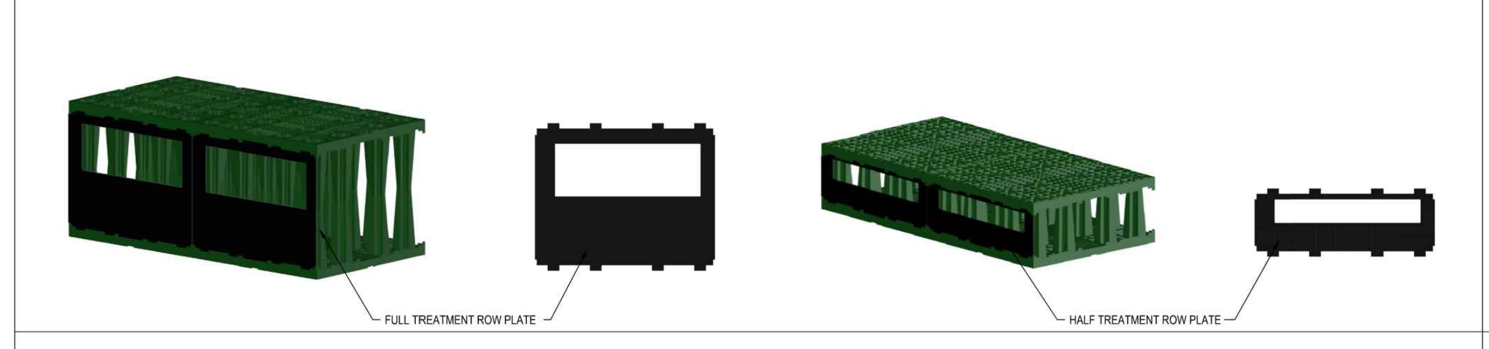
GREENSTORM ACCESS QUADRO DETAIL(WHERE APPLICABLE)



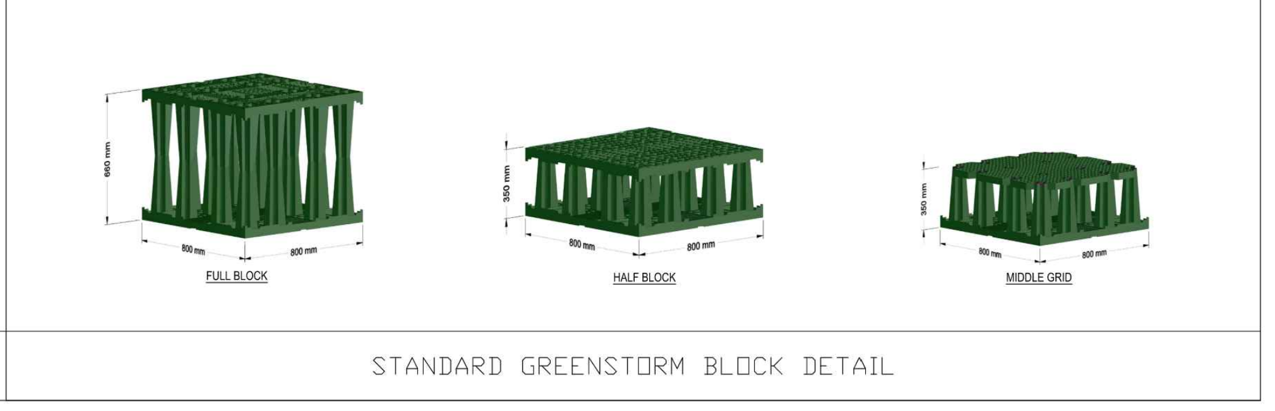
STANDARD SIDE PANEL WITH DIRECT PIPE CUT



STD. ADAPTER PANEL W/ DIA 450&525



STANDARD TREATMENT ROW DETAIL (WHERE APPLICABLE)



STANDARD GREENSTORM BLOCK DETAIL

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CONCORD, ON
L4K 1L3

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www.STORMCON.CA

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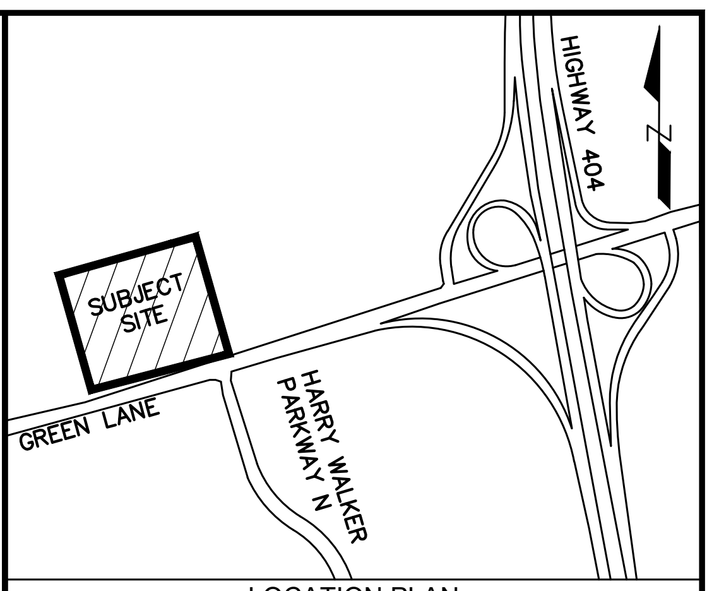
NEWROADS AUTOMOTIVE GROUP
1656 GREEN LANE EAST
TOWN OF EAST GWILLIMBURY

DETAILS SHEET

GREENSTORM STORMWATER CHAMBER

PROJECT NO:	2024-135	DATE:	10/18/2024
DESIGNED BY:	JD	CHECKED BY:	EC
SCALE:	N.T.S.	SHEET NO:	9 OF 9



LOCATION PLAN
N.T.S.

LEGEND

LIST OF DRAWINGS

SG-01 - SITE GRADING PLAN
SS-01 - SITE SERVICING PLAN
EC-01 - EROSION AND SEDIMENT CONTROL PLAN
XS-01 - CROSS SECTIONS
DD-01 - DETAIL DRAWING
DD-02 - DETAIL DRAWING
DD-03 - DETAIL DRAWING

SITE PLAN INFORMATION

WARE MALCOMB ARCHITECTS INC.
30 ADELAIDE STREET E, SUITE 1254
TORONTO, ON, M5C 2C5
PHONE: (437) 537-5700

SURVEYOR INFORMATION

E.R. GARDEN LIMITED
ONTARIO LAND SURVEYOR
1260 JOURNEY'S END CIRCLE, UNIT 1,
NEWMARKET, ON, L3Y 8Z7
PHONE: (905) 895-5600
FAX: (905) 895-7127
WEBSITE: www.ergardenlimited.ca

BENCHMARK INFORMATION:
ELEVATIONS ARE GEODETIC AND ARE DERIVED FROM TOWN OF NEWMARKET BENCHMARK 1095 HAVING AN ELEVATION 273.91 METRES A.S.L.

No.	DATE	ISSUE/REVISION	INTIAL
5			
4			
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TOWN OF EAST GWILLIMBURY
YORK REGION

NEWROADS - TOYOTA
NEWROADS AUTOMOTIVE GROUP
1656 GREEN LANE EAST
TOWN OF EAST GWILLIMBURY, ONTARIO

DETAIL DRAWING

GEI Consultants

DESIGNED BY: PS	DATE: OCTOBER, 2024	CHECKED BY: TVL
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SCALE:		

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