Proposed 12-storey Mid-Rise Condominium Development
720 Granite Court, City of Pickering
1334281 Ontario Limited

FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT

May 2023

MAEL Reference 22-104

MASONGSONG ASSOCIATES ENGINEERING LIMITED
ENGINEERING SUSTAINABLE FUTURES

FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT

PROPOSED 12-storey Mid-Rise Condominium Development

720 Granite Court, Pickering

FOR

1334281 Ontario Limited

CITY OF PICKERING

May 2023

Prepared by:

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MAEL Project No. 22-104

1.0 INTRODUCTION

Masongsong Associates Engineering Limited has been retained by 1334281 Ontario Limited to prepare a *Functional Servicing and Stormwater Management Report* in support of a Rezoning Application for a proposed 12-storey Mid-Rise Condominium Development at 720 Granite Court, situated northwest of the Whites Road and Granite Court intersection in the City of Pickering.

This study provides an overview of the proposed development and examines servicing feasibility within the framework of existing infrastructure. Specifically, this report will address the Regional servicing jurisdiction of water distribution and sanitary sewerage, the City of Pickering criteria for storm drainage and grading as well as with Toronto and Region Conservation Authority (TRCA) for stormwater management.

1.1 Background

The subject development is located at the northwest corner of Granite Court and Whites Road, which is just south of the Highway 401 Whites Road interchange in the City of Pickering. The triangular shaped site of approximately 1.18 ha (2.91 ac) is presently vacant land with municipal road frontage onto both Granite Court and Whites Road.

A Metrolinx railway line runs along the westerly boundary of the site. The top of rail is approximately 6-7 m lower than the table-lands of the subject site, and therefore is grade-separated running under both Whites Road and Granite Court.

The development proposal will consist of the construction of a 12-storey condominium apartment building with associated on-grade and 2-levels of below-grade parking. Vehicular access will be from Granite Court, with numerous pedestrians at-grade accesses to both Granite Court and Whites Road.

The total GFA in the current plan is approximately 216,320 sq.ft. with a total of 262 units.

A site statistic prepared by Onespace Architects is attached in Appendix A.

See Figure 1 for location plan.

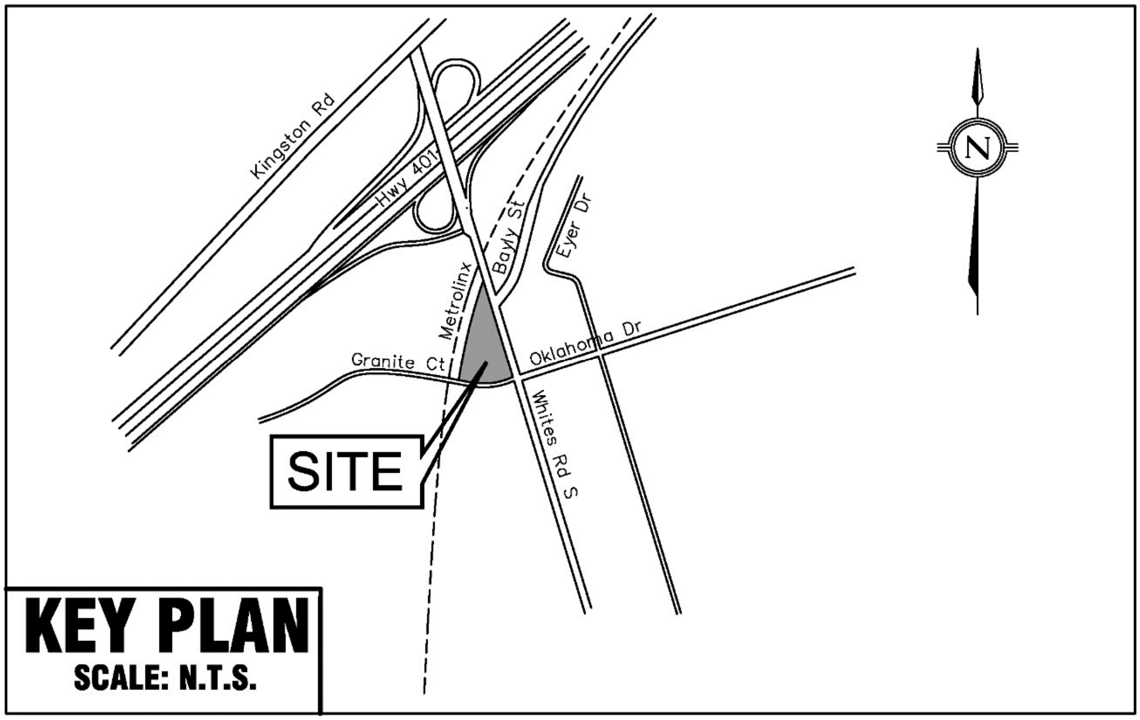


Figure 1 *Site Location Key Plan*

2.0 EXISTING INFRASTRUCTURE

There are existing municipal sewers and watermain in the vicinity of the subject site. A schematic of the existing services in the vicinity of the site is included in Appendix A as Figure 02. A discussion of the available existing infrastructure follows.

Watermain	A 300mm diameter CI watermain located on the north side of Granite Court.
Sanitary Sewerage	A 200mm diameter PVC sanitary sewer located at the southeast corner of Granite Court and Whites Road south intersection.
Storm Drainage	The majority of the subject site drainage sheet drains from north to south into a 450mm diameter culvert within the southwesterly of the site. This 450mm diameter culvert is connected to the double catchbasins on Granite Court and discharged into a 200m long V-ditch which runs parallel to the railway. The remainder of the site sheet drains into the north into an existing ditch at the north end of the site.

3.0 PROPOSED EQUIVALENT POPULATIONS

The equivalent population basis (for sanitary sewerage and water servicing demands) is derived from the Region of Durham's Design Standards.

The subject site comprises 262 apartment units (228 units of one-bedroom/bachelor and 34 units of two-bedrooms). Using the Region design criteria, the resulting equivalent population is therefore:

Apartment Units = (1.5 ppu x 228) + (2.5 ppu x 34)
= 427 persons

Therefore, the total residential population for this development is **427 persons.**

The population statistics are carried forward in the following sections on water demands and sanitary sewerage.

4.0 WATER DISTRIBUTION

The estimated total population is 427 persons. Using the MOE Guidelines for Drinking Water Systems (2008), the estimated water demand is summarized in Table 1 below.

Table 1 *Development Statistics*

Site Description	**Populations**	**Avg Consumption Rate** (450 L/c/d)	**Max Day Factor** (2.75 Factor)	**Peak Hour Factor** (4.13 Factor)
Total	**427**	**2.22 L/s**	**6.11 L/s**	**9.17 L/s**

4.1 Water Demand

Domestic:

The max-day domestic consumption rate of 6.11 L/s or 367 L/min is a fraction of the 300 mm diameter watermain; therefore, domestic water demand can be easily met.

Fire:

The critical demand on the local water system will be the fire demand, which is 2 orders to magnitude higher than the domestic demand requirements. Fire flow requirements are calculated in accordance with the Fire Underwriters Survey (FUS). An estimate of the required fire flow can be determined by the following formula:

Fire Flow (F) = 220 x C ($A^{0.50}$) L/min. where

F = Fire Flow (L/s)
C = coefficient in relation to the type of construction
A = Total Floor Area

1. The proposed building will be of reinforced concrete construction of fire resistive construction (C=0.60) where the vertical openings and exterior vertical communications are properly protected with at least one hour rating, the Area consideration can be limited to that of the largest floor plus 25 percent of each of the two immediately adjoining floors.

   The largest floor area is located on the ground floor having a total floor area of 2,365 m^2. The two immediately adjoining floors are the second (2,365 m^2) and third floor (2,365 m^2).

   Therefore, the total floor area can be estimated as:

   A = 2,365 m^2 + (2,365 x 25%) + (2,365 x 25%)
   = 3,548 m^2

   Solving for F = 220 x 0.60 x (3,548 $^{0.50}$)
   = 6,800 L/min

2. In determining the Occupancy Factor for having low contents fire hazard, the F value may be reduced by 15%

   F = 6,800 + (6,800 x -15%)
   = 5,780 L/min.

3. The value in 2. above may be reduced by up to 30% for an adequately designed system conforming to NFPA 13 and other NFPA sprinkler standards.

   F = 6,800 x -30%
   = -2,040 L/min.

4. For the value in 2. Above, a percentage should be added for structures exposed within 45 m by the fire area under consideration. 5% should be added to the north

property, 5% should be added to the south property. 5% should be added to the east property and 5% should be added to the west property for a combined 20%.

F = 6,800 x 20%
= 1,360 L/min.

5. The total required Fire Flow under FUS criteria is therefore:

F = 6,800 – 2,040 + 1,360
= 6,120 L/min
= 7,000 L/min (rounded)

Based on the above FUS calculations, the required fire flows is estimated at **7,000 L/min.**

A hydrant flow test, enclosed in Appendix B, was performed in November 03, 2022 to ascertain the available municipal supply on Granite Court. Detailed hydrant flows are calculated in Table F1 in Appendix B, confirming that the existing granite Court water system is capable of delivering a fire flow of **10,677 L/min. at the minimum pressure of 140 kPa**, which satisfies both FUS and ISO fire flows superimposed on the max-day domestic consumption rate of 389 L/min.

4.2 Proposed Water Connection

It is proposed to provide a new 200 mm diameter PVC water service connection and connect into the existing 300mm watermain in the north side (near-side) of Granite Court. The proposed 200 mm diameter connection will serve as the fire line, with a 150 mm diameter domestic cold-water supply branched off the main service in accordance with Region standards. Both the fire and domestic lines will enter at the southerly of the site where the meter room will be located on P1 parking level. Both fire and domestic lines will be provided with shut-off valves at the streetline and water meters in accordance with Region standards.

A Site Servicing Plan is attached in the Appendix drawings showing the location of the proposed watermain connection.

5.0 SANITARY SEWERAGE

5.1 Proposed Sanitary Flow Estimates

<u>Proposed Site Design Flow:</u>

Peak Flow Design Parameters

Total Population = 427 persons (as calculated in Section 3.0)
Res. Avg. Flow = 364 L/p/d
Peaking Factors = $1 + \{14/(4+(P/1000)^{0.50})\} = 3.80$ max.
Site Area = 1.19 ha
Infiltration rate = 0.026 L/s (long-term groundwater, see Section 8.0)

Calculation of Peak Design Flows

Design flow, $Q_{SANITARY}$ = *average daily flow * peaking factor + infiltration flow*
={(427 p x 364 L/p/d / 86400 s/d) x 3.80} + 0.026 L/s
= **<u>6.86 L/s</u>**

Therefore, the peak sanitary flow from the development site has been calculated to be **<u>6.86 L/s.</u>**

Similar to the water network, the downstream sanitary capacity is maintained by the Region, and therefore a detailed downstream sanitary analysis is not included with this report. However, based on preliminary discussion with Region staffs, sanitary capacity appear to be available to serve this proposed development.

5.2 Proposed Sanitary Connection

The subject is provided with a 200 mm diameter PVC sanitary service connection at the southeast corner of the site of Granite Court and Whites Road south intersection. A new maintenance hole will be installed on the property line in accordance with Region standards.

A Site Servicing Plan is attached in the Appendix drawings showing the location of the proposed sanitary connection.

6.0 STORM SEWERAGE SYSTEM

6.1 Existing Storm Sewers and Drainage

The subject property is currently vacant with sodded areas. The majority of the site drainage sheet drains from north to south into an existing a 450mm diameter culvert located at the southwesterly of the site. This 450mm diameter culvert is connected to the double catchbasins on Granite Court and discharged into a 200m long V-ditch with runs parallel to the railway. The remainder site area sheet drains into the north into an existing ditch. The existing storm sewers and drainage are illustrated on Figure 02 in Appendix C.

6.2 Allowable Discharge

Quantity control for the subject site will be restricted to the City's 5-year storm event with a maximum runoff coefficient of R=0.25 as per the pre-development drainage plan. All run-offs in excess of the 5-year design storm event, up to and including the 100-year storm event must be detained on-site.

To simulate site hydrology, the allowable post-development peak discharge rate for the site during 5-years through 100-years events has been quantified using the Modified Rational Method.

The following City of Pickering Storm Rainfall intensity equations were used for calculating the allowable release rate from the subject site:

$i_{5year} = (1082.901) / (t_c + 6.007)^{0.837}$

$i_{100year} = (2096.425) / (t_c + 6.485)^{0.863}$

5-year storm rainfall intensity and 100-year storm rainfall intensity, respectively.

Where:

i = rainfall intensity (mm/hr)
t_c= time of concentration (min)
*An initial time of concentration of (10 minutes) was used for determining peak pre and post-development flows.

$$\therefore i_5 = 106.31 mm/hr \qquad \therefore i_{100} = 186.69 mm/hr$$

The allowable release rate for the site is calculated as follows

Where: $$Q_{allow} = \frac{A_t R i_{10} i_{10}}{360} (m^3 / s)$$

Q_{allow} = Peak Stormwater Flow (m^3/s)
R = Runoff coefficient = 0.25
I_5 = Rainfall intensity (mm/hr) = 106.31mm/hr
A_t = Total Pre Development Area (ha) = 0.990 ha (only area into the south is accounted for allowable discharge)

$$\therefore Q_{allow} = \frac{0.8565 * 0.25 * 106.31}{360} = 63.2\ L/s$$

Therefore, the maximum release from the site into the 450mm CMP on Granite Court will be controlled to **63.2 L/s** as per the 5-year pre-development. The remainder portion of the north area will continue to drain uncontrolled to the north as per pre-development condition. Since post and pre-developments are almost the same in term of areas and runoff coefficients, quantity and quality control is not required.

6.3 Quantity Control

To meet the stormwater quantity objectives, the subject site is proposed to provide on-site water quantity control up to the maximum allowable release rate of **63.2 L/s**. A post-development drainage plan is attached in Appendix C as Figure 03.

The mass Rational Method was used to calculate the 100-year storage requirement for the site. Computation tables for the volumetric sizing are included in Appendix C. Below-grade cisterns are proposed to provide the volumetric attenuations. Due to the depth of the cisterns and the shallow municipal sewer system, the cisterns outflow must be pumped, and the discharge will be set at a maximum 63.2 L/s, with a high-level overflow for emergency spillover.

The proposed tanks and storm connection can be seen on the proposed Site Servicing Plan (SS-1) attached in the Appendix Drawings.

A summary of the storage required versus provided is shown below in Table 2.

Table 2 *Stormwater Management Quantity Control Summary*

Description	Total Area (ha.)	Avg. Runoff Coefficient "C"	Maximum Release Rate (L/S)	Required Storage (m^3)	Provided Storage (m^3)
Controlled Area	**0.8565**	**0.70**	**63.2**	**173**	**180**

In summary, total post development site discharge will be controlled to the 5-yr pre-development level; therefore, the existing storm sewers can accommodate the site without imposing any detrimental effects downstream.

6.4 Major Overland flow/External Drainage

The proposed grade within the subject site have been designed such that for storms greater than the 100-yr events or in the case of emergency overflow due to clogging in the storm system, safe overland flow route exist is established to convey flow away from the site and into the north-east as per pre-development drainage plan.

The overland flow routes will have no depth of ponding greater than 0.25m and will not result in flood damage to proposed and adjacent public and private properties.

6.5 Quality Control

TSS Removal

Spills control will be provided by oil-grit-separator (OGS stormceptor type or equivalent) for the subject site area. The unit has been sized to treat the parking areas based on a minimum of 80% TSS removal rate. The following table summarizes the date used for sizing the OGS and the associated treatment values.

Table 4 OGS Sizing and Treatment Information

OGS ID	Contributing Area (ha.)	Runoff Coefficient '(C)	Percent Imperviousness	Oil-Grit Separator Model	TSS Removal Rate (%)
OGS #2	**0.8565**	0.70	70%	EFO4	80%

Note: The Stormceptor modeling outputs are included in Appendix C.

Stormceptor Inspection and Maintenance:

The primary purpose of the stormwater management stormceptor is to filter and prevent pollutants from entering the waterways. Routine inspection and maintenance tasks are key to restore the stormceptor to its full efficiency and effectiveness. Maintenance activities may be required in the event of a chemical spill or after a major storm events.

Routine inspection and maintenance activities as shown in the attached Appendix C "Stormceptor Owner's Manual" should be implemented for the continued operation of the stormceptor.

5mm Water Balance

As outline in Figure 03, the impervious areas of the site comprise of a total of 5,954 m^2 of hard surface areas. The required 5mm volume is therefore:

$$V_{5mm\ Required} = 5,954\ m^2 \ X\ 0.005\ m$$
$$= 29.77\ m^3$$

To meet the 5mm water balance target, a cistern is proposed to capture rainwater from the rooftop areas for landscaped irrigation. The retained rainwater will be empty within 72 hours (maximum permitted drawdown time). A site irrigation usage report has been provided by the irrigation consultant confirming that the required irrigation system will require a total of 134m^3 in 72 hours of portable water during the irrigation months through evapotranspiration and water usage within the site; and therefore, ensuring that the water balance target objective can be met entirely with the site irrigation within the private lands.

7.0 EROSION AND SEDIMENT CONTROLS

An erosion and sediment control strategy should be implemented during the construction to mitigate the transportation of silt from the site.

To prevent construction generated sediments from entering the storm sewer or leaving the site by overland flow, the following measures should be implemented:

- Temporary silt fencing
- Temporary catch basin sediment control
- Temporary rock mud mats
- Seeding and mulching of disturbed undeveloped areas
- Erosion monitoring and sediment removal program throughout the construction period

An Erosion and Sediment Control Plan showing all of the measures is attached in the Appendix Drawings.

8.0 GROUNDWATER DISCHARGE CONSIDERATION

Soil Engineers Limited completed a hydrogeological assessment in regard to the groundwater needs for the site (excerpt of the report is attached in Appendix D).

Short Term Discharge (During Construction):

As indicated on page 13 of the hydrogeological assessment, the maximum short-term discharge rate for the site is 241,020.6 L/day or 2.79 L/s. An Environmental Activity Sector Registry (EASR) is required as the discharge rate is more than the allowable of 50,000 L/day.

The selection and design of the dewatering system should be prepared by a dewatering contractor. At the time of construction and prior to the discharge of groundwater into the municipal sewer system, the dewatering contractor will need to ensure all appropriate approvals are met.

Long Term Discharge (Post-Construction):

As indicated on page 16 of the hydrogeological assessment, the maximum long term groundwater discharge rate for the site is 2,249.82 L/day or 0.026 L/s. As the estimated drainage flow rates are below the EASR limit of 50,000 L/day, an EASR is not required.

Therefore, long-term ground discharge will be into the sanitary sewer system.

9.0 SUMMARY AND RECOMMENDATIONS

This functional servicing and stormwater management report demonstrates that the proposed condominium development can be accommodated by the existing local infrastructure. Specifically:

Water Service	will be provided by the existing 300 mm diameter municipal watermain located on Granite Court. A 200 mm service line will be tapped off the main to provide fire service with a 150 mm domestic branch at the streetline. Based on the hydrant testing results and analysis, there is adequate supply and pressures to meet the critical high-demand flow for fire-fighting plus the maximum-day domestic consumption rate.
Sanitary Sewerage	will be accommodated by the existing 200 mm diameter sanitary sewer on southeast corner of Granite Court and Whites Road. An equivalent population of 427 persons is calculated for this development which is an equivalent peak sanitary flow of 6.86 L/s. Preliminary discussion with Region staffs, sanitary capacity appear to be available to serve this proposed development.
Storm Drainage	will be collected on-site and discharged into the existing 450 CMP located on the southwest of the site off Granite Court. Post development release rate will be controlled to the 5-year pre-development discharge. The required volumes for the major storm events will be achieved in the proposed underground storage tanks.
TSS Removal	will be achieved by installing an OGS-Stormceptor model EF04 sized to provide quality control to 80% TSS removal.
Water Balance	will be achieved by collecting the entire rooftop areas and storing it in the proposed cistern for irrigation.
Groundwater	Short term dewatering during construction is estimated to be 2.79 L/s. An Environmental Activity Sector Registry (EASR) is required as the discharge rate is more than the allowable of 50,000 L/day. Longt term dewatering after construction is estimated to be 0.026 L/s. An Environmental Activity Sector Registry (EASR) is not required as the discharge rate is less than the allowable of 50,000

L/day. The proposed long term groundwater will be discharged into the sanitary sewer system.

Respectfully Submitted,

MASONGSONG ASSOCIATES ENGINEERING LIMITED

Professional Engineers
Ontario

Limited Licensee

Name: K. K. LO
Number: 100209166
Category: CIVIL
Limitations:
This licence is subject to the limitations as detailed on the certificate.
Association of Professional Engineers of Ontario

LICENSED PROFESSIONAL ENGINEER
W. C. IP
PROVINCE OF ONTARIO

Ken Lo, LEL, C.E.T.
Project Manager

Andrew Ip, P.Eng
Principal

Appendix A

Site Statistics •

Fig. 02 – Pre-Development Conditions•

(720 Granite Court) Statistics

(720 Granite Court, Pickering, Ontario)

Site Description	Plan 40M-1334 City of Pickering Regional Municipality of Durham

Subject To Zoning By-Law 6358/04

Average Grade at Ground Floor	105.20
Lot Area	11,932.94 m2

Condominium Tower

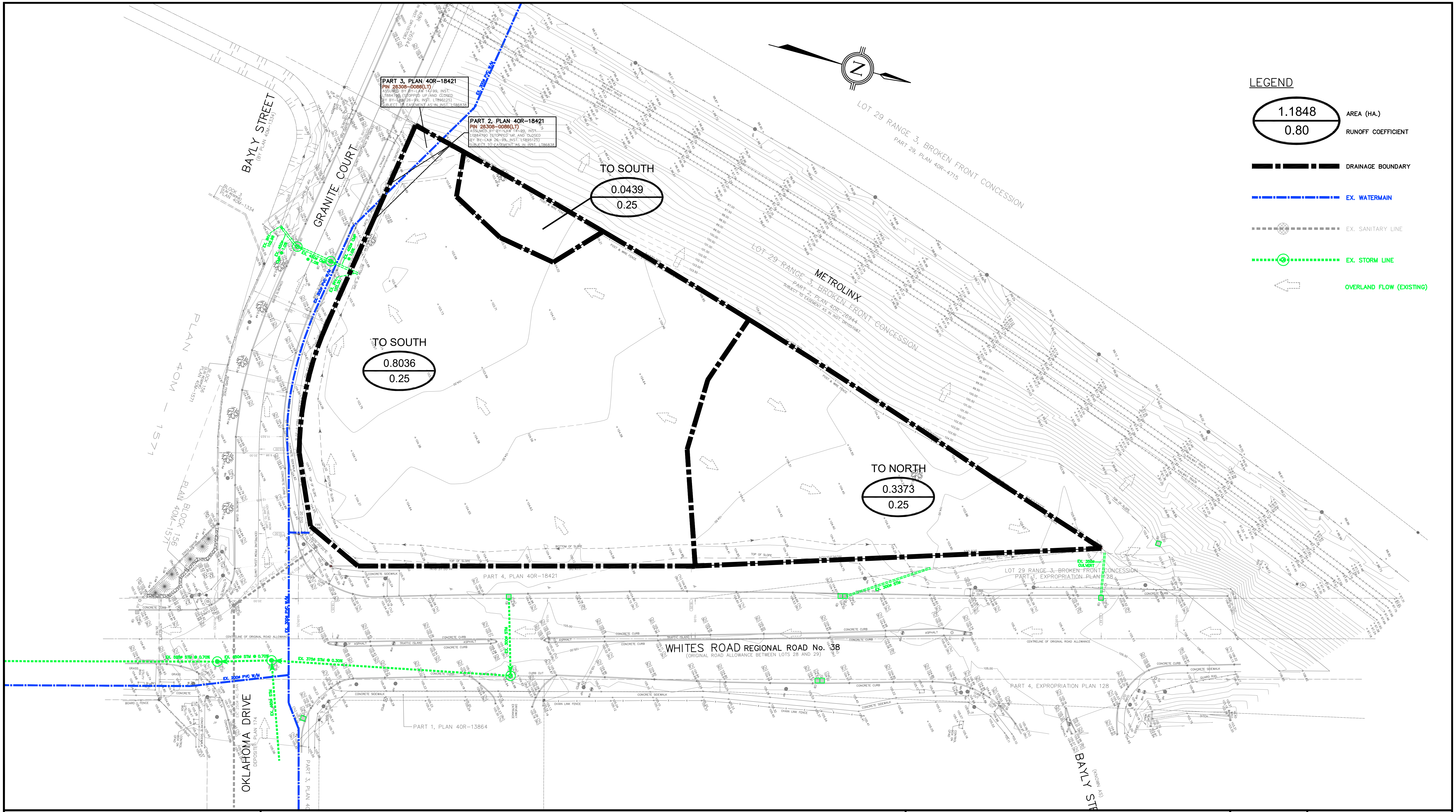
		Units						Gross Floor Area	
Floor No.	Storey	**Total Units**	BACH	1B	1B+D	2B	2B+D	**zoning GFA (m2)**	**zoning GFA (sq.ft.)**
-2	Parking Level 2	**0**	0	0	0	0	0	**0.00 m2**	**0.00 sq.ft.**
-1	Parking Level 1	**0**	0	0	0	0	0	**0.00 m2**	**0.00 sq.ft.**
1	Lobby/Amenity/Residential	**16**	1	14	0	0	1	**2,258.98 m2**	**24,315.66 sq.ft.**
2	Residential	**28**	1	13	11	1	2	**2,092.86 m2**	**22,527.55 sq.ft.**
3	Residential	**28**	1	12	11	1	3	**2,165.03 m2**	**23,304.38 sq.ft.**
4	Residential	**28**	1	12	11	1	3	**2,165.03 m2**	**23,304.38 sq.ft.**
5	Residential	**27**	1	22	1	0	3	**1,968.75 m2**	**21,191.63 sq.ft.**
6	Residential	**27**	1	22	0	1	3	**1,968.75 m2**	**21,191.63 sq.ft.**
7	Residential	**24**	1	22	0	1	0	**1,531.31 m2**	**16,483.02 sq.ft.**
8	Residential	**24**	1	22	0	1	0	**1,554.31 m2**	**16,730.59 sq.ft.**
9	Residential	**15**	0	13	1	1	0	**1,097.90 m2**	**11,817.80 sq.ft.**
10	Residential	**15**	0	9	2	4	0	**1,097.90 m2**	**11,817.80 sq.ft.**
11	Residential	**15**	0	9	2	4	0	**1,097.90 m2**	**11,817.80 sq.ft.**
12	Residential	**15**	0	9	2	4	0	**1,097.90 m2**	**11,817.80 sq.ft.**
	Mechanical	**0**	0	0	0	0	0	**0.00 m2**	**0.00 sq.ft.**
	Totals	**262**	8	179	41	19	15	**20,096.62 m2**	**216,320.02 sq.ft.**

Minimum Condo Setbacks Provided

Front Yard (m)	Side Yard (m)	Rear Yard (m)	Side Yard (m)
East	North	West	South
4.000	1.000	1.000	1.000

Required Condo Setbacks

Front Yard (m)	Side Yard (m)	Rear Yard (m)	Silde Yard (m)
East	North	West	South
4.000	1.000	1.000	4.000



MASONGSONG ASSOCIATES ENGINEERING LIMITED
Consulting Engineers • Planners • Project Managers

PROJECT:
PROPOSED 12-STOREY RESIDENTIAL DEVELOPMENT
720 GRANITE COURT, PICKERING

DWG. TITLE:
PRE-DEVELOPMENT CONDITIONS

DWG. No: **02**

DATE: **OCTOBER 2022**

PROJECT No. **22-104**

SCALE: **NTS**

FILE NAME: G:\projects\22\104\DESIGN\FIGURES\22104-SERVICING.dwg_PRE PRINTED ON: Wednesday 04/19/2023

Appendix B

Watermain Analysis:

Hydrant Flow Test •

FUS Fire Demand Calculation •

HYDRATEST

7-325 Nantucket Blvd, Scarborough ON M1P 4V5

JOB NO. ______ DATE NOVEMBER 3, 2022

LOCATION 720 GRANITE COURT, PICKERING

TEST DATA

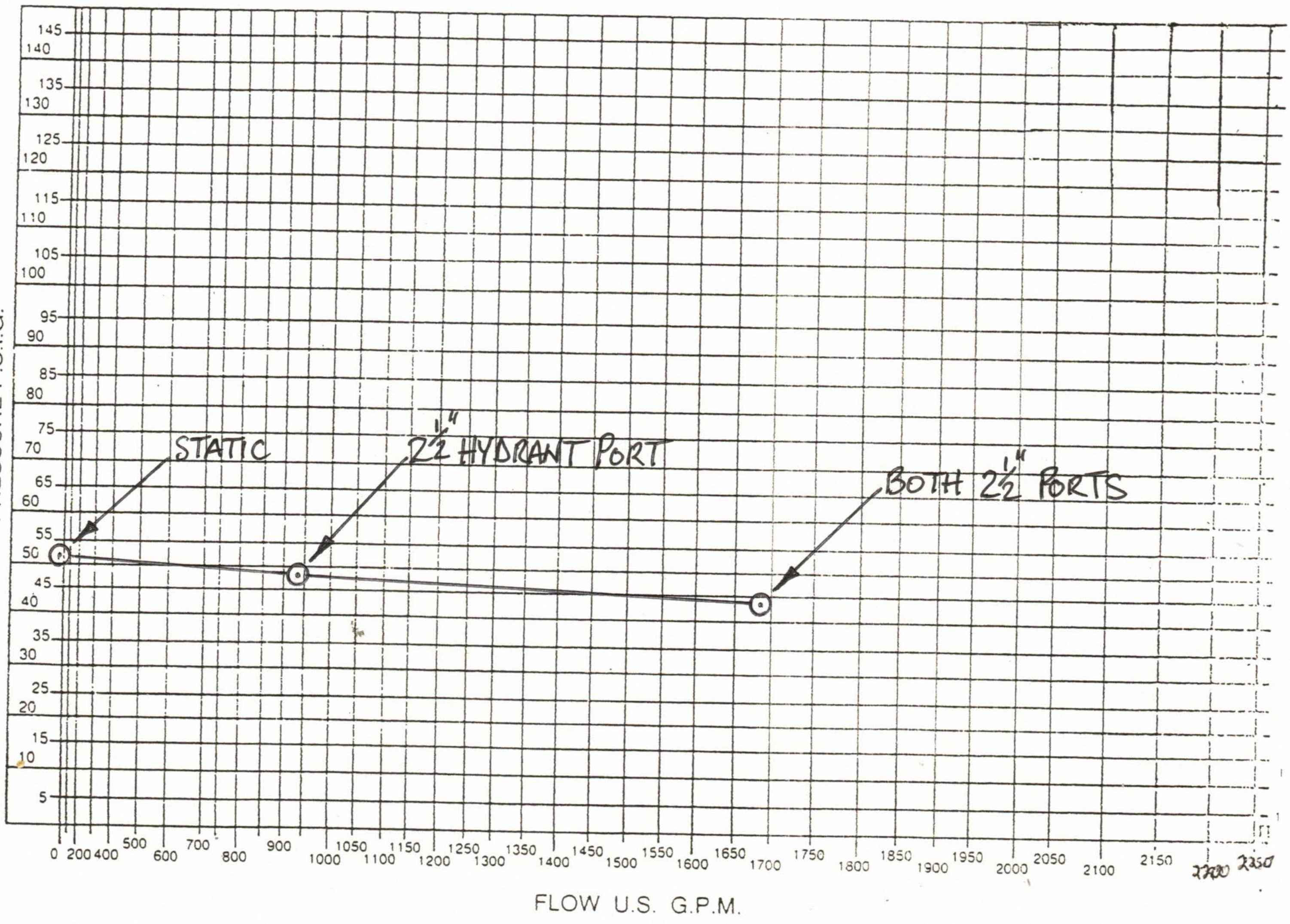
TIME OF TEST 11:10 A.M.

LOCATION OF TEST (FLOW) HYD. @ NW CORNER WHITES RD./GRANITE CRT.

(RESIDUAL) HYD. @ 750 OKLAHOMA DR. (UNIT #3)

MAIN SIZE 12"-300mm STATIC PRESSURE 52 P.S.I.

	NUMBER OF OUTLETS & ORIFICE SIZE	PITOT PRESSURE	FLOW (U.S.G.P.M.)	RESIDUAL PRESSURE
#1	2½" HYDRANT PORT	31	935	48
#2	2×2½" HYDRANT PORTS	25	1679	44



COMMENTS HYDRANT RATED CLASS AA - LIGHT BLUE

Authorized Signature ______ Hydratest Ltd. Signature ______

Table F1 Available Fire Flow Calculations

Project: **720 Granite Court**
Client: **1334281 Ontario Limited**

Outlet diameter:	**2.5**	in, one port	Location:	**720 Granite Court, Pickering**
Static pressure:	**52**	psi	Date of Test:	**03-Nov-22**
Resid. pressure:	**48**	psi, one port	Operator:	**Hydratest**

- **Observed Flow** $Q_F = 29.83 \text{ x } C \text{ x } (d^2) \text{ x } (p^{0.5})$

where

$C =$ **0.90** Coefficient
$d =$ **2.50** in, Outlet diameter
$p =$ **31.00** psi, Pitot Pressure

⇨ $Q_F =$ **918** USGPM
3,474 L/min

- **Available Flow** $Q_R = Q_F \text{ x } (h_R^{0.54}) / (h_F^{0.54})$

where

$h_F =$ 4.00 psi, Pressure difference, static to measured residual
$h_R =$ 32.00 psi, Pressure difference, static to required residual
Required = **20.00** psi

⇨ $Q_F =$ **2,821** USGPM
10,677 L/min

Table F2 Required Fire Flow Calculations

Project: **720 Granite Court**
Client: **1334281 Ontario Limited**

- **Base Flow** $F_B = 220 \times C_C \times A^{0.5}$

where $C_C =$ 0.60 from Table F3
$A =$ 3547.5 m^2 from Table F3
⇨ $F_B =$ 7,862 L/min
8,000 L/min rounded to nearest 1,000 L/min

- **Occupancy Factor** $C_O =$ **-15%** from Table F3

$F_O = F_B + (F_B \times C_O)$
$=$ 6,800 L/min

- **Sprinkler Factor** $C_S =$ **-30%** from Table F3

$f_S = F_O \times C_S$
$=$ -2,040 L/min

- **Exposure Factor** $C_E =$ **20%** from Table F3

$f_E = F_O \times C_E$
$=$ 1,360 L/min

- **Total Required Flow**

$F = F_O + f_S + f_E$
$=$ 6,120 L/min
$=$ **7,000** L/min rounded to nearest 1,000 L/min

Table F3 Building Area and Coefficients

Project:	**720 Granite Court**
Client:	**1334281 Ontario Limited**

- **Area of Building** **3,548** m^2

The total floor area in square metres (including all storeys, but excluding basements at least 50 percent below grade) in the building being considered.

For fire-resistive buildings, consider the two largest adjoining floors plus 50 percent of each of any floors immediately above them up to eight, when the vertical openings are inadequately protected.

If the vertical openings and exterior vertical communications are property protected (one hour rating), consider only the area of the largest floor plus 25 percent of each of the two immediately adjoining floors.

- **Construction Coefficient** floors. **0.60** ⇔

1.50	Wood Frame
1.00	Ordinary Construction
0.80	Non-Combustible
0.70	Fire Resistive (<2 hrs)
0.60	**Fire Resistive (>2 hrs)**

- **Occupancy Coefficient** C_O = **-15%** ⇔

-25%	Non-Combustible
-15%	**Limited Combustible**
0%	Combustible
15%	Free Burning
25%	Rapid Burning

- **Sprinkler Coefficient** C_S = **-30%** ⇔

-30%	**NFPA 13 standard**
-40%	+ fully supervised
-50%	+ std water supply

- **Exposure Coefficient** C_E = **20%** ⇔

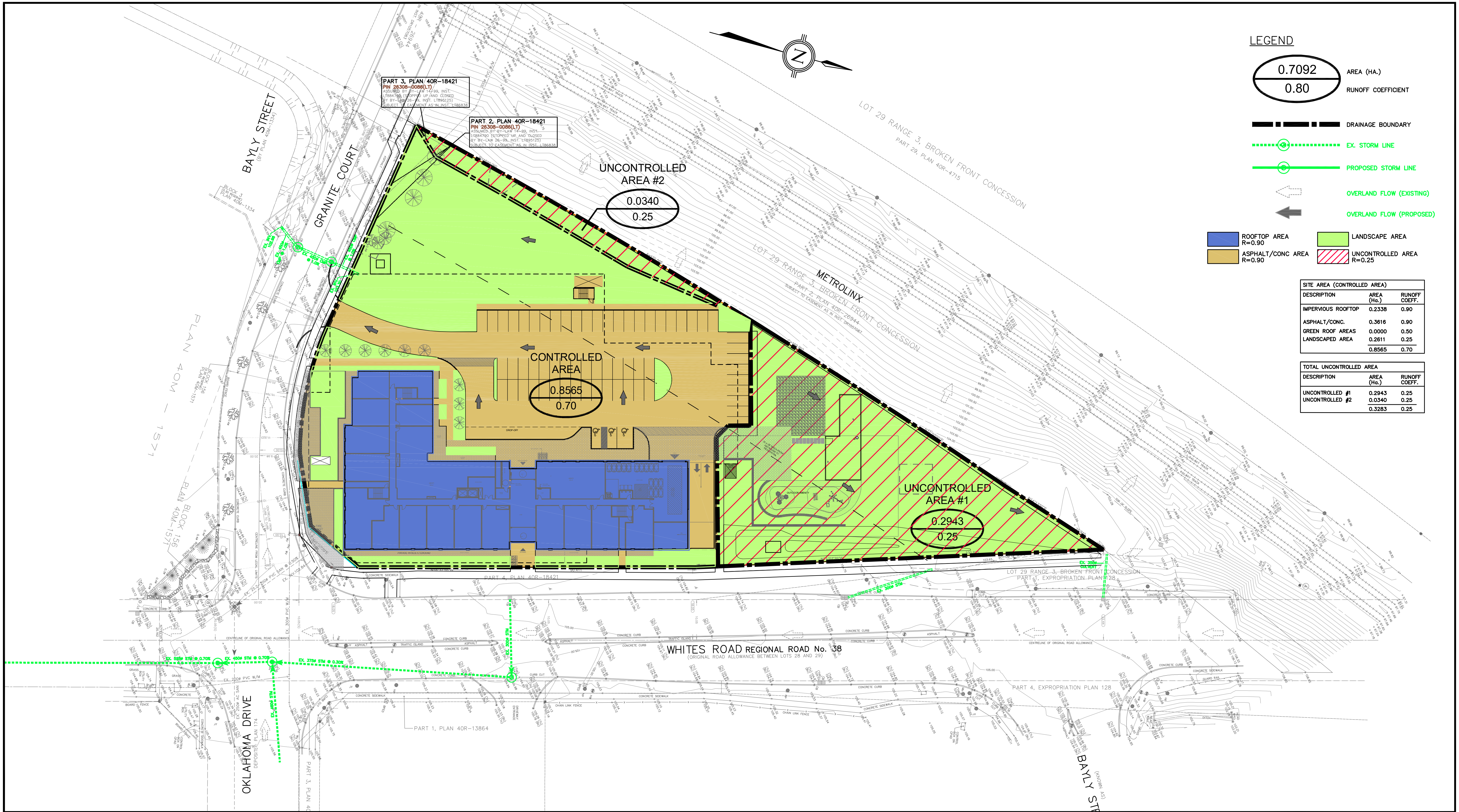
N	> 30m	5%
S	> 30m	5%
E	> 30m	5%
W	> 30m	5%

25%	0 - 3m separation
20%	3.1- 10m separation
15%	10.1- 20m separation
10%	20.1- 30m separation
5%	> 30m separation
	percentages counted per side, max 75%

Appendix C

SWM Calculations:

Fig. 03 – Post Development Drainage Plan •
Table C1 - On-site Storage Calculator •
Irrigation Calculations •
Stormceptor EFO Sizing Reports •



SITE AREA (CONTROLLED AREA)		
DESCRIPTION	AREA (Ha.)	RUNOFF COEFF.
IMPERVIOUS ROOFTOP	0.2338	0.90
ASPHALT/CONC.	0.3616	0.90
GREEN ROOF AREAS	0.0000	0.50
LANDSCAPED AREA	0.2611	0.25
	0.8565	0.70

TOTAL UNCONTROLLED AREA		
DESCRIPTION	AREA (Ha.)	RUNOFF COEFF.
UNCONTROLLED #1	0.2943	0.25
UNCONTROLLED #2	0.0340	0.25
	0.3283	0.25

MASONGSONG ASSOCIATES ENGINEERING LIMITED
Consulting Engineers • Planners • Project Managers

PROJECT:
PROPOSED 10-STOREY RESIDENTIAL DEVELOPMENT
720 GRANITE COURT, PICKERING

DWG. TITLE:
POST-DEVELOPMENT CONDITIONS

DWG. No: **03**
DATE: **OCTOBER 2022**
PROJECT No. **22-104**
SCALE: **NTS**

FILE NAME: G:\projects\22\104\DESIGN\FIGURES\22104-POST.dwg_POST PRINTED ON: Wednesday 04/19/2023

Table C1

On-Site Storage Calculator

Pickering 5-Year

Project: 720 Granite Court
Project No.: 22-104
By: KL
Date: 19-Apr-23

Location: **720 Granite Court**

$$i_{100} = 2096.425/(T + 6.485)^{0.863}$$

A = 0.8565 ha
Composite C = 0.70
i-5y $_{(Allowable)}$ = 106.31 mm/hr
$Q_{Allowable}$ = 0.0632 m^3/s
Q_{Actual} = 0.0632 m^3/s

t_c (min)	i_{100} (mm/hr)	Q_{100} (m^3/s)	Q_{stored} (m^3/s)	Peak Volume (m^3)	
1	369.022	0.6146	0.551	33.081	
2	331.171	0.5515	0.488	58.597	
3	300.813	0.5010	0.438	78.794	
4	275.885	0.4595	0.396	95.096	
5	255.027	0.4247	0.361	108.448	
6	237.299	0.3952	0.332	119.509	
7	222.033	0.3698	0.307	128.749	
8	208.740	0.3476	0.284	136.516	
9	197.054	0.3282	0.265	143.070	
10	186.695	0.3109	0.248	148.615	
11	177.443	0.2955	0.232	153.308	
12	169.127	0.2817	0.218	157.273	
13	161.610	0.2691	0.206	160.614	
14	154.778	0.2578	0.195	163.412	
15	148.541	0.2474	0.184	165.735	
16	142.822	0.2379	0.175	167.641	
17	137.558	0.2291	0.166	169.177	
18	132.696	0.2210	0.158	170.383	
19	128.190	0.2135	0.150	171.294	
20	124.002	0.2065	0.143	171.940	
21	120.099	0.2000	0.137	172.346	
22	116.452	0.1939	0.131	172.535	***
23	113.035	0.1883	0.125	172.525	
24	109.828	0.1829	0.120	172.335	
25	106.811	0.1779	0.115	171.979	
26	103.967	0.1731	0.110	171.470	
27	101.282	0.1687	0.105	170.821	

Irrigation Requirements

General Information: All measures are in Metric

Refer to the 'Water Efficiency' section of the LEED Canada-NC 1.0 Document.

Using the chart below please note:
Species Factor (Ks), Plant water needs is determined as follows:
North and East of the site will be shaded so enter the 'Low'
South and West of the site will be sunny so enter the 'High or Avg' based on building/other shade
Density Factor (Kd), Plant grouping spacing is determined as follows: Sparsely planted enter 'Low'
Densely Planted enter 'High'
Microclimate Factor (Kmc), Plant grouping exposure to wind, heat, reflected light: NE are shaded so enter 'Low'
SW are hot and gets the summer wind so enter 'Ave or High'

Kl=KsxKdxKmc
Etl= KlxETo (for Toronto and region)
IE can either be Rotor or Spray Heads
TPWA (L)=Area (sqm) x (Etl/IE)

May

Landscape	**Area**	**Species Factor**	**Density Factor**	**Microclimate**	Kl	ETl	IE	$TPWA$
Type	M^2	Ks	Kd	Kmc			**Spray (.450) Rotors (.550)**	(LITERS)
Shrubs/Perennials	835	0.5	1	1.3	0.65	**66.04**	0.389	**141,757**
Trees	2515	0.5	1	1.4	0.70	**71.12**	0.389	**459,812**
Mixed	122	0.5	1.3	1.4	0.91	**92.46**	0.389	**28,996**
Turfgrass	2343	0.7	1	1.2	0.84	**85.34**	0.389	**514,039**
							Subtotal [L]	1,144,604

Water Required [L] from Design Case for May: 1,144,604

June

Landscape	**Area**	**Species Factor**	**Density Factor**	**Microclimate**	Kl	ETl	IE	$TPWA$
Type	M^2	Ks	Kd	Kmc			**Spray (.450) Rotors (.550)**	(LITERS)
Shrubs/Perennials	835	0.5	1	1.3	0.65	**81.19**	0.389	**174,266**
Trees	2515	0.5	1	1.4	0.70	**87.43**	0.389	**565,261**
Mixed	122	0.5	1.3	1.4	0.91	**113.66**	0.389	**35,646**
Turfgrass	2343	0.7	1	1.2	0.84	**104.92**	0.389	**631,923**
							Subtotal [L]	1,407,096

Water Required [L] from Design Case for June: 1,407,096

July

Landscape	Area	Species Factor	Density Factor	Microclimate	Kl	ETl	IE	$TPWA$
Type	M^2	Ks	Kd	Kmc			Spray (.450) Rotors (.550)	(LITERS)
Shrubs/Perennials	835	0.5	1	1.3	0.65	89.83	0.389	192,823
Trees	2515	0.5	1	1.4	0.70	96.74	0.389	625,453
Mixed	122	0.5	1.3	1.4	0.91	125.76	0.389	39,442
Turfgrass	2343	0.7	1	1.2	0.84	116.09	0.389	699,214
							Subtotal [L]	1,556,931

Water Required [L] from Design Case for July: 1,556,931

August

Landscape	Area	Species Factor	Density Factor	Microclimate	Kl	ETl	IE	$TPWA$
Type	M^2	Ks	Kd	Kmc			Spray (.450) Rotors (.550)	(LITERS)
Shrubs/Perennials	835	0.5	1	1.3	0.65	71.76	0.389	154,035
Trees	2515	0.5	1	1.4	0.70	77.28	0.389	499,638
Mixed	122	0.5	1.3	1.4	0.91	100.46	0.389	31,508
Turfgrass	2343	0.7	1	1.2	0.84	92.74	0.389	558,562
							Subtotal [L]	1,243,743

Water Required [L] from Design Case for August: 1,243,743

September

Landscape	Area	Species Factor	Density Factor	Microclimate	Kl	ETl	IE	$TPWA$
Type	M^2	Ks	Kd	Kmc			Spray (.450) Rotors (.550)	(LITERS)
Shrubs/Perennials	835	0.5	1	1.3	0.65	46.54	0.389	99,899
Trees	2515	0.5	1	1.4	0.70	96.74	0.389	625,453
Mixed	122	0.5	1.3	1.4	0.91	125.76	0.389	39,442
Turfgrass	2343	0.7	1	1.2	0.84	116.09	0.389	699,214
							Subtotal [L]	1,464,008

Water Required [L] from Design Case for September: 1,464,008

Total Water Required [L] from Design Case for Growing Season:	**6,816,382**
Average Daily Water Use [L] (60 Days)	**44,552**
72 Hour Requirement (m3)	**134**

STORMCEPTOR®
ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

04/19/2023

Province:	Ontario
City:	Pickering
Nearest Rainfall Station:	TORONTO CITY
Climate Station Id:	6158355
Years of Rainfall Data:	20

Site Name:	720 Granite Court

Drainage Area (ha):	0.86
Runoff Coefficient 'c':	0.70

Project Name:	12-Storey Residential Building
Project Number:	22-104
Designer Name:	Ken Lo
Designer Company:	Masongsong Associates Engineering Limited
Designer Email:	kenl@maeng.ca
Designer Phone:	905-944-0162
EOR Name:	
EOR Company:	
EOR Email:	
EOR Phone:	

Particle Size Distribution:	Fine
Target TSS Removal (%):	80.0

Required Water Quality Runoff Volume Capture (%):	90.00
Estimated Water Quality Flow Rate (L/s):	19.45
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	No
Peak Conveyance (maximum) Flow Rate (L/s):	
Site Sediment Transport Rate (kg/ha/yr):	

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EFO4	80
EFO6	90
EFO8	95
EFO10	97
EFO12	98

Recommended Stormceptor EFO Model:	**EFO4**
Estimated Net Annual Sediment (TSS) Load Reduction (%):	**80**
Water Quality Runoff Volume Capture (%):	**> 90**

THIRD-PARTY TESTING AND VERIFICATION

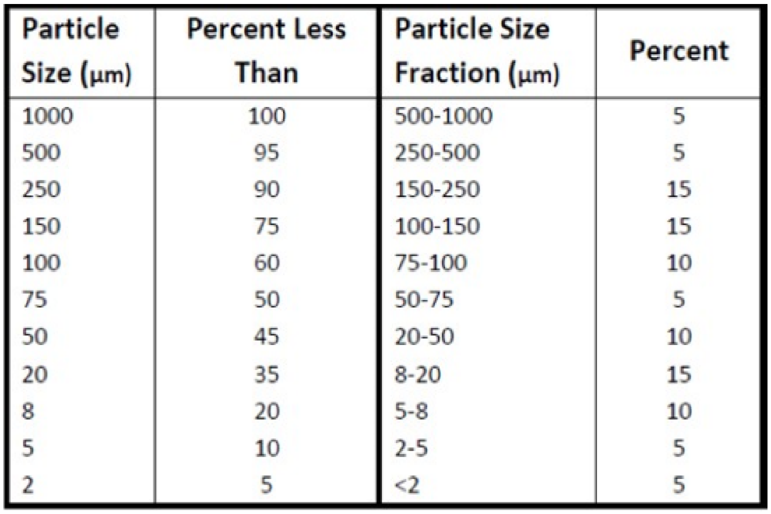
►**Stormceptor® EF and Stormceptor® EFO** are the latest evolutions in the Stormceptor® oil-grit separator (OGS) technology series, and are designed to remove a wide variety of pollutants from stormwater and snowmelt runoff. These technologies have been third-party tested in accordance with the Canadian 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.



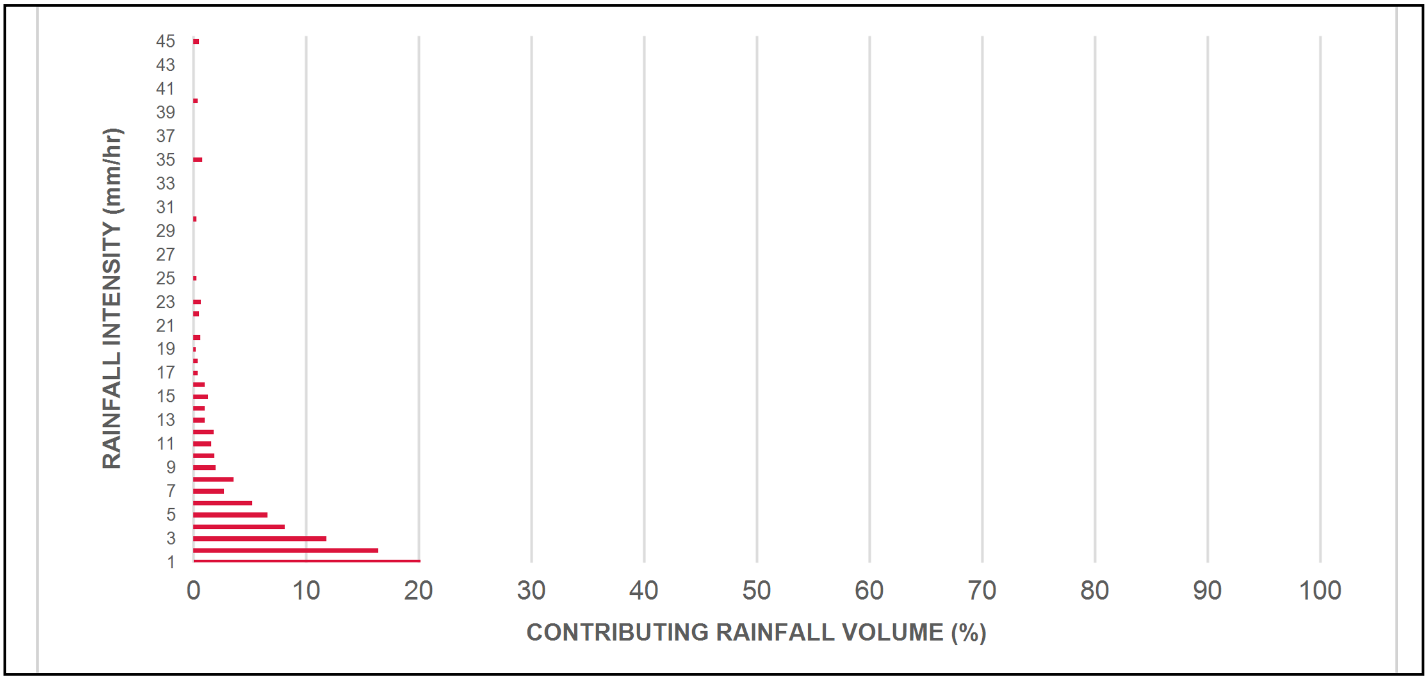
Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

Stormceptor® EF Sizing Report

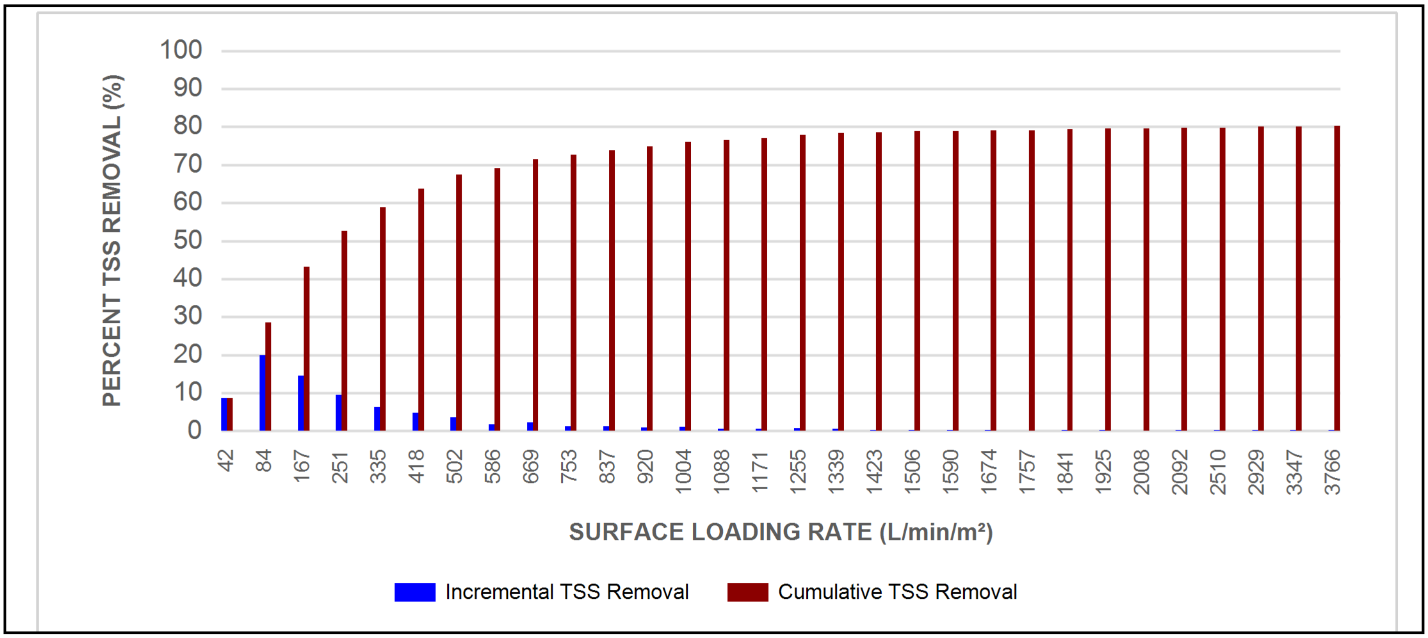
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m^2)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
0.5	8.7	8.7	0.84	50.0	42.0	100	8.7	8.7
1	20.2	28.9	1.67	100.0	84.0	98	19.9	28.6
2	16.4	45.3	3.35	201.0	167.0	88	14.5	43.1
3	11.8	57.1	5.02	301.0	251.0	81	9.5	52.6
4	8.1	65.2	6.69	402.0	335.0	77	6.3	58.9
5	6.6	71.9	8.37	502.0	418.0	73	4.9	63.7
6	5.2	77.1	10.04	602.0	502.0	69	3.6	67.4
7	2.7	79.8	11.71	703.0	586.0	66	1.7	69.1
8	3.6	83.4	13.39	803.0	669.0	64	2.3	71.4
9	2.0	85.4	15.06	904.0	753.0	63	1.3	72.7
10	1.9	87.3	16.74	1004.0	837.0	63	1.2	73.9
11	1.6	88.9	18.41	1105.0	920.0	62	1.0	74.9
12	1.8	90.7	20.08	1205.0	1004.0	62	1.1	76.0
13	1.0	91.6	21.76	1305.0	1088.0	60	0.6	76.6
14	1.0	92.7	23.43	1406.0	1171.0	58	0.6	77.1
15	1.3	93.9	25.10	1506.0	1255.0	56	0.7	77.9
16	1.0	95.0	26.78	1607.0	1339.0	54	0.6	78.4
17	0.4	95.3	28.45	1707.0	1423.0	52	0.2	78.6
18	0.4	95.7	30.12	1807.0	1506.0	49	0.2	78.8
19	0.2	95.9	31.80	1908.0	1590.0	46	0.1	78.9
20	0.6	96.5	33.47	2008.0	1674.0	44	0.3	79.1
21	0.0	96.5	35.14	2109.0	1757.0	42	0.0	79.1
22	0.5	97.0	36.82	2209.0	1841.0	40	0.2	79.3
23	0.7	97.7	38.49	2310.0	1925.0	38	0.3	79.6
24	0.0	97.7	40.17	2410.0	2008.0	37	0.0	79.6
25	0.3	98.0	41.84	2510.0	2092.0	35	0.1	79.7
30	0.3	98.3	50.21	3012.0	2510.0	29	0.1	79.8
35	0.8	99.1	58.57	3514.0	2929.0	25	0.2	80.0
40	0.4	99.5	66.94	4017.0	3347.0	22	0.1	80.1
45	0.5	100.0	75.31	4519.0	3766.0	20	0.1	80.2
Estimated Net Annual Sediment (TSS) Load Reduction =								**80 %**

Climate Station ID: 6158355 *Years of Rainfall Data*: 20

RAINFALL DATA FROM TORONTO CITY 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

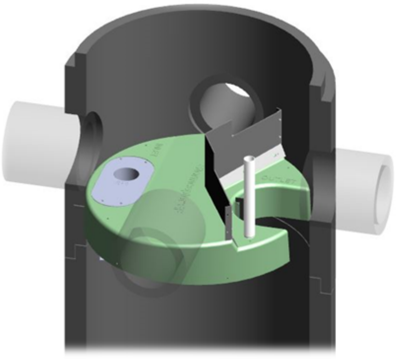
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test 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.

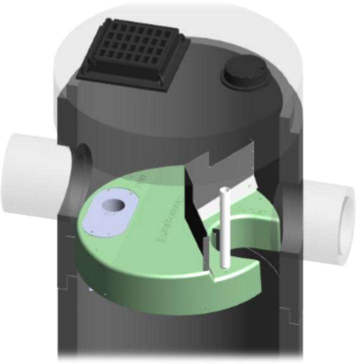
DESIGN FLEXIBILITY

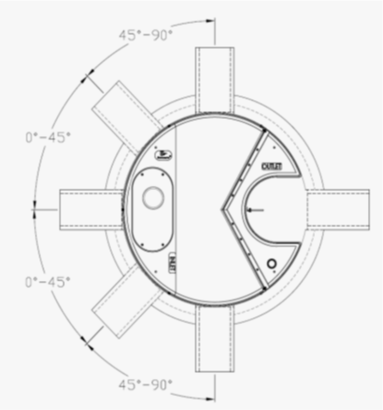
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend 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)	(ft^3)	(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/ft^3)

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

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.

Appendix D

Excerpts from Hydrological Assessment

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A REPORT TO
1334281 ONTARIO LIMITED

HYDROGEOLOGICAL ASSESSMENT FOR PROPOSED RESIDENTIAL DEVELOPMENT

720 GRANITE COURT

CITY OF PICKERING

REFERENCE NO. 2111-W043

MARCH 2023
(REVISION OF REPORT DATED MARCH 2022)

DISTRIBUTION

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One must understand that the mandate of Soil Engineers Ltd. is to obtain readily available current and past information pertinent to the subject site for a Hydrogeological Study only. No other warranty or representation, expressed or implied, as to the accuracy of the information is included or intended by this assessment. Site conditions are not static and this report documents site conditions observed at the time of the site reconnaissance.

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APPENDICES

1.0 EXECUTIVE SUMMARY

Soil Engineers Ltd. (SEL) has completed a Hydrogeological Assessment for a proposed residential development site, located at 720 Granite Court, in the City of Pickering.

Based on the updated architectural plans, dated February 14, 2023, project number 22035, prepared by Onespace Unlimited Inc., the proposed development is anticipated to be completed with 12-storey building over 2-levels of underground parking structure.

The subject site is located within the Physiographic Region of Southern Ontario known as the Iroquois plain, where the clay plain is the predominant physiographic feature for the area. The mapped surface geological unit consists of a Till Unit, consisting, predominantly of undifferentiated sandy silt to silt matrix, commonly rich in clasts and often high in total matrix calcium carbonate.

A review of the topography shows that the subject site is relatively flat, with the surrounding area exhibiting a gentle decline in elevation relief towards the west and southwest.

The proposed development site is located within the Petticoat Creek Watershed. Review of available mapping indicates that Petticoat Creek and its associated wooded areas and wetlands are located, approximately 550 m south of the subject site. In addition, the Rouge River and its associated wooded areas, Provincially Significant wetlands, water courses, water bodies and Areas of Natural and Scientific Interest (ANSI) are located, approximately 1,500 m southeast of the subject site.

This study has revealed that beneath a layer of topsoil, the native subsoils underlying the subject site consists of sandy silt till extending to the maximum investigated depth.

The groundwater monitoring program indicates that the measured groundwater levels ranged from 3.61 to 8.24 m below the prevailing ground surface, or at the elevations, ranging from 96.16 to 100.38 masl. The interpreted shallow groundwater flow pattern beneath the stie suggests that it flows in southerly and westerly directions.

The Single Well Response Tests (SWRT) estimates for hydraulic conductivity (K) for the underlying sandy silt till unit ranged from 1.4×10^{-8} to 1.9×10^{-7} m/sec. These results suggest that the hydraulic conductivity (K) estimates for the groundwater bearing sandy silt till unit are low, with correspondingly low to moderate anticipated groundwater seepage rates being anticipated into open excavations, below the groundwater table.

Based on the provided development plans, the estimated construction dewatering flow rate is anticipated to reach a daily rate of 80,340.2 L/day; by considering a 3 x safety factor, it could reach an approximate daily maximum of 241,020.6 L/day. The conceptual zone of influence may reach approximately 4.2 m away from construction dewatering array or well used or around for the excavation footprint for the construction of 2-levels underground parking structure. In accordance with the current policy of the Ministry of the Environment, Conservation and Parks (MECP), this dewatering flow rate for excavation, is above the groundwater taking threshold limit of 50,000 L/day, but is below Permit-To-Take-Water limit of 400,000 L/day, whereby a Environmental Activity and Sector Registry (EASR) would be required as an approval to facilitate the groundwater takings for a temporary construction dewatering program for groundwater control.

The conceptual zone of influence for any dewatering well or dewatering array used during installation of underground services is approximately 4.3 m away from the conceptual dewatering wells or array for the construction of the considered underground services. There are no natural features, such as; watercourses, bodies of water, wetlands or any groundwater receptors, including water supply wells on site, or within anticipated zones of influence for any temporary construction dewatering.

The long-term foundation drainage rates for the complete P2 underground structure from a mira drain for a conventionally shored exaction is 508.17 L/day and to the under-slab drainage network it is 241.77 L/day with the combined drainage rate being749.94 L/day by applying a safety factor of 3 it could reach a maximum rate of 2,249.82 L/day.

2.0 INTRODUCTION

2.1 Project Description

In accordance with authorization from Mr. Steve Margie of 1334281 Ontario Limited, we have carried out a hydrogeological study for a proposed development property, located at 720 Granite Court, which is located northwest of the intersection of Granite Court and Whites Road South in the City of Pickering. The location of the subject site is shown on Drawing No. 1.

The subject site currently comprises of vacant land that is covered in grass and weeds. The surrounding land uses consists of a highway the north, Whites Road South and existing residential and commercial properties to the east, Granite Court and residential properties to the south, along with a railway line and commercial/industrial properties to the west. Based on the updated architectural plan, dated February 14, 2023, project number 22035, prepared by Onespace Unlimited Inc., the proposed development is anticipated to be completed with 12-storey high building over 2-levels of underground parking structure. Based on the topographic plan, provided by the client, the finished floor elevation has been considered at an elevation of 105.20 masl.

This Hydrogeological Study summarizes findings of a field study and the associated groundwater monitoring and testing programs, and provides a description and characterization for the site's hydrogeological setting. The current study provides preliminary recommendations for any construction dewatering needs, and for any need to acquire an Environmental Activity and Sector Registry (EASR), or a Permit-To-Take Water (PTTW) as an approval to facilitate a temporary construction dewatering program in support of proposed earthworks.

2.2 Project Objectives

The major objectives of this Hydrogeological Study Report are as follows:

1. Establish the local and regional hydrogeological setting for the subject site and the local surrounding areas;
2. Interpret the site's shallow groundwater flow patterns;
3. Identify zones of higher groundwater yield as potential sources for on-going shallow groundwater seepage from the site's subsoil strata;
4. Characterizing the hydraulic conductivity (K) for groundwater-bearing subsoil strata;
5. Preparing an interpreted hydrogeostratigraphic cross-sections across the subject site;

6. Estimate the temporary dewatering flows that may be required to lower the groundwater table to facilitate earthworks and construction;
7. Estimate the anticipated zones of influence associated with any construction dewatering, if required, and to provide mitigation recommendations to safeguard nearby groundwater receptors from potential impacts, and;
8. Provide comments regarding any need to file an Environmental Activity and Sector Registry (EASR), or to acquire a Permit-To-Take Water (PTTW) as an approval to facilitate a construction dewatering program.

2.3 **Scope of Work**

The scope of work for the Hydrogeological Study is summarized below:

1. Clearance of underground services, drilling of four (4) boreholes, and installation of monitoring wells, one in each of three (3) selected boreholes, at the time of borehole drilling.
2. Monitoring well development, groundwater level monitoring and measurements at the three installed monitoring wells;
3. Monitoring well development and performance of Single Well Response Tests (SWRTs) at the monitoring wells to estimate the hydraulic conductivity (K) for shallow groundwater-bearing subsoil strata at the depths of the monitoring well screens;
4. Reviewing plotting and mapping of Ministry of the Environment, Conservation and Parks (MECP) water well records within 500 m of the subject site;
5. Describing the geological and hydrogeological setting for the subject site and the nearby surrounding areas;
6. Assessing the preliminary dewatering needs and estimating any anticipated temporary dewatering flows necessary to lower groundwater levels to facilitate earthworks and construction;
7. Review of groundwater receptors in the vicinity of the development site, and providing of preliminary recommendations for any monitoring, mitigation and discharge management plans to safeguard nearby groundwater receptors from potential adverse impacts associated with any construction dewatering, and;
8. Providing comments regarding any need to register an Environmental Activity and Sector Registry (EASR) approval, or to apply for and obtain a Permit-To-Take Water (PTTW) to facilitate a groundwater taking approval for any temporary construction dewatering or any long-term foundation drainage following construction.

3.0 METHODOLOGY

3.1 Borehole Advancement and Monitoring Well Installation

The field work for borehole drilling and monitoring well construction were performed on December 14, 16 and 17, 2021. It consisted of four (4) drilled boreholes (BH) and the installation of three (3) monitoring wells (MW), one (1) within each of three (3) selected boreholes drilled at the locations shown on Drawing No. 2. The boreholes were drilled using solid stem flight-augers. The drilling and monitoring well construction were completed by a licensed well contractor, DBW Drilling Limited, under the full-time supervision of a geotechnical technician from SEL, who also logged the subsoil strata encountered during borehole advancement and collected representative soil samples to confirm the subsoil textures. The Borehole and Monitoring Well Logs are enclosed as Figures 1 to 4.

The monitoring wells, consisting of 50 mm diameter PVC riser pipes and screen sections, which were installed in the boreholes in accordance with Ontario Regulation (O. Reg.) 903. All of the monitoring wells were equipped with above-ground, monument-type, steel protective casings. The monitoring well construction details are shown on the Borehole/Monitoring Well Logs and the details are summarized in Table 3-1.

The UTM coordinates and ground surface elevations at the borehole and monitoring well locations, together with the well construction details, are provided in Table 3-1.

Table 3-1 - Monitoring Well Installation Details

Well ID	Installation Date	East (m)	North (m)	Ground El. (masl)	Borehole Depth (mbgs)	Screen Interval (mbgs)	Casing Dia. (mm)
BH/MW 1	December 16, 2021	651771.5	4852735.8	104.50	12.3	6.0-9.0	50
BH/MW 2	December 16, 2021	651723.7	4852753.2	104.40	12.3	6.0-9.0	50
BH/MW 4	December 14, 2021	651735.7	4852844.0	103.99	12.3	6.0-9.0	50

Notes: mbgs -- metres below ground surface masl -- metres above sea level

3.2 Groundwater Monitoring

The groundwater levels in the monitoring wells were measured, manually by our representative on January 7, January 19, and February 1, 2022.

3.3 Mapping of Ontario Water Well Records

SEL reviewed the MECP Water Well Records (WWRs) for registered monitoring wells on the subject site, and within 500 m of the site boundaries (study area). The records indicate that fifteen (15) wells are located within the 500 m study area relative to the subject site boundaries. A summary of the Ontario WWRs reviewed for this study is provided in Appendix ‘A’ with the locations of the well records shown on Drawing No. 3.

3.4 Monitoring Well Development and Single Well Response Tests

All of the monitoring wells underwent development to prepare them for SWRTs to estimate the hydraulic conductivity (K) for the saturated aquifer subsoils at the monitoring well screen depths. The well development involved purging and removing several casing volumes of groundwater from each monitoring well to remove remnants of clay, silt and other debris introduced into the monitoring wells during construction, and to induce the flow of formation groundwater through the monitoring well screens, thereby improving the transmissivity of the groundwater bearing formation at the monitoring well screen depth intervals.

The K estimates provide an indication of the seepage yield capacity for the groundwater-bearing subsoil strata and can be used to estimate the flow of groundwater through the groundwater-bearing subsoil strata.

The SWRT involves the placement of a slug of known volume into the well, below the water table, to displace the groundwater level upward. The rate at which the groundwater level recovers to static conditions (falling head) is tracked using a data logger/ pressure transducer and/or manually using a water level tape, with this rate being used to estimate the K value for the groundwater-bearing subsoil formation at the well screen depths. All of the BH/MWs underwent a SWRT (Falling Head Tests) on February 1, 2022. The results for the tests are provided in Appendix ‘B’.

3.5 Review of Previous or Concurrent Reports

The following report was reviewed for the preparation of this hydrogeological study:
A Report to 1334281 Ontario Limited, A Geotechnical Investigation for Proposed Mid-Rise Residential Development, 720 Granite Court, City of Pickering, SEL Reference No. 2111-S043 dated January 2022.

4.0 REGIONAL AND LOCAL SETTING

4.1 Regional Geology

The subject site lies within the Physiographic Region of Southern Ontario, known as the Iroquois Plain, on the clay plains physiographic feature. The Iroquois Plain occupies the north shore of Lake Ontario, where it extends from Scarborough to Trenton and is considered an area of considerable complexity, not easily divisible into well-marked geological units. The Highland Creek and the Rouge River deposited sand into a former glacial lake to build the present-day sand plain in the southeast corner of the City of Scarborough and within the adjacent portions of the Cities of Pickering, Ajax and Whitby. Across the Regional Municipality of Durham, the Iroquois plain has a fairly consistent pattern (Chapman and Putnam, 1984).

Based on a review of a surface Geological Map of Ontario, the subject site is located on the Till deposits, consisting predominantly of undifferentiated sandy silt to silt matrix, commonly rich in clasts and often high in total matrix calcium carbonate content. Drawing No. 4, reproduced from Ontario Geological Survey mapping, illustrates the Quaternary surface soil geology for the subject site and the surrounding local areas.

The top of bedrock beneath the subject site lies at an elevation of approximately 76 to 78 masl (Bedrock Topography of the Markham Area, Southern Ontario, 1992) and consists of Upper Ordovician aged shale, limestone, dolostone and siltstone of the Georgian Bay Formation, the Blue Mountain Formation, the Billings Formation, the Collingwood Member and the Eastview Member (Ontario Ministry of Northern Department and Mines, 1991).

4.2 **Physical Topography**

A review of the topographic map for the subject site and surrounding area shows that it is relatively flat, with the surrounding area exhibiting a gentle decline in elevation relief towards the west and southwest. Drawing No. 5 shows the mapped topographic contours for the subject site and the local surrounding areas.

4.3 **Watershed Setting**

The subject site is located within the Petticoat Creek Watershed, as shown, mapped, on Drawing No. 6. The Petticoat Creek river systems have a total length of about 49 km and drains an area of approximately 27 square km, with portions of the associated watershed being within the Cities of Pickering, Markham, and Toronto. In contrast with many of the watersheds in the Greater Toronto Area (GTA), Petticoat Creek does not originate on the Oak Ridges Moraine. Its headwaters, or upper reaches, are located south of the Oak Ridges Moraine, between the larger Rouge River and Duffin’s Creek watersheds. Petticoat Creek flows south and empties into Lake Ontario at the Petticoat Creek Conservation Area (Toronto and Region Conservation Authority, 2012).

4.4 **Local Surface Water and Natural Features**

Records review shows that Petticoat Creek and its associated wooded areas and wetland are located, approximately 550 m south of the subject site. In addition, the Rouge River and its associated wooded areas, Provincially Significant wetlands, water courses, water bodies and Areas of Natural and Scientific Interest (ANSI) are located, approximately 1,500 m southeast of the subject site.

Drawing No. 7 shows the locations of the natural features around the subject site.

5.0 SOIL LITHOLOGY

This study has revealed that beneath a layer of topsoil, the native soils underlying the subject site consists of sandy silt till. A Key Plan and the interpreted geological cross-sections along north-to-south and west-to-east transects are presented on Drawing Nos. 8-1 and 8-2.

5.1 **Topsoil** (All BH and BH/MW locations)

Topsoil was found at the ground surface at all of the BH/MW locations. The thickness for the topsoil horizon ranges from 20 to 25 cm.

5.2 **Sandy Silt Till** (All BH/MW locations)

Sandy silt till was encountered beneath the topsoil horizon at all of the BH and BH/MW locations, where it extended to the maximum investigated depth of 12.3 m below grade. The sandy silt till unit is brown to grey in colour, is dense to very dense in consistency, and contains a trace of gravel with occasional silty clay layers and cobbles and boulders. The moisture contents for the retrieved subsoil samples ranged from to 11%, indicating damp to moist conditions. The estimated permeability for the sandy silt till ranges from about 10^{-7} cm/sec to 10^{-6} cm/sec. Grain size analyses were performed on three (3) subsoil samples, and the gradations are plotted on Figure 5.

6.0 GROUNDWATER STUDY

6.1 Review Summary of Previous Report

A review of the findings from the geotechnical soil investigation, prepared by SEL (Reference No. 2111-S043) has indicated that beneath the topsoil horizon, the underlying subsoils consist of sandy silt till. Upon completion of the boreholes, groundwater was recorded at depths of 8.1 to 10.4 m below the prevailing ground surface at BHs 1 and 2, while BHs 3 and 4 remained dry upon completion of the drilling.

6.2 Review of Ontario Water Well Records

The Ministry of the Environment, Conservation and Parks (MECP) water well records (WWRs) for the subject site and for the properties within a 500 m radius of the boundaries of the site were reviewed.

The records indicate that fifteen (15) wells are located within the 500 m study area relative to the site boundaries. The locations of these wells, based on the UTM coordinates provided by the records, are shown on Drawing No. 3. A detailed summary of the MECP WWRs is provided in Appendix ‘A’.

A review of the final status of the well records within the study area reveals that one (1) well is registered as an abandoned-supply well, four (4) are observation wells, four (4) are test hole wells, and six (6) are monitoring and test hole wells.

A review of the first status of the monitoring wells shows that eight (8) are registered as monitoring wells, five (5) are monitoring and test hole wells, one (1) well is not used and one (1) well has an unidentified status.

6.3 Groundwater Monitoring

Groundwater levels were measured within the monitoring wells to record the fluctuation of the groundwater table beneath the site over the monitoring period, covering the dates between January 7 and February 1, 2022. The groundwater level measurements and their corresponding elevations are summarized in Table 6-1.

Table 6-1 - Water Level Measurements

Well ID		January 7, 2022	January 19, 2022	February 1, 2022	Average	Fluctuation
BH/MW 1	mbgs	6.48	6.68	6.81	6.66	0.33
	masl	98.02	97.82	97.69	97.85	
BH/MW 2	mbgs	6.79	8.24	8.04	7.69	1.25
	masl	97.61	96.16	96.36	96.71	
BH/MW 4	mbgs	5.50	4.78	3.61	4.63	1.89
	masl	98.49	99.21	100.38	99.36	

Notes: mbgs -- metres below ground surface masl -- metres above sea level

As shown above, the groundwater levels generally decreased at BH/MWs 1 and 2, and increased at BH/MW 4 over the monitoring period, exhibiting small fluctuations in between. The highest shallow groundwater level fluctuation was recorded at BH/MW 2, which exhibited a 1.89 m difference in groundwater level over the monitoring period.

6.4 Single Well Response Test Analysis

All of the BH/MWs underwent Falling Head Tests (SWRT's) to assess the hydraulic conductivity (K) for saturated aquifer subsoils at the monitoring well screen depths. The results for the SWRT analysis are presented in Appendix 'B', with a summary of the findings shown in Table 6-2.

Table 6-2 - Summary of SWRT Results

Well ID	Ground El. (masl)	Monitoring Well Depth (mbgs)	Borehole Depth (mbgs)	Screen Interval (mbgs)	Screened Soil Strata	Hydraulic Conductivity (K) (m/sec)
BH/MW 1	104.50	9.0	12.3	6.0-9.0	Sandy silt till	1.9 x 10^{-7}
BH/MW 2	104.40	9.0	12.3	6.0-9.0	Sandy silt till	1.4 x 10^{-8}
BH/MW 4	103.99	9.0	12.3	6.0-9.0	Sandy silt till	6.1 x 10^{-8}

The SWRT results provide an indication of the yield capacity for the groundwater-bearing subsoil strata at the depths for the monitoring well screens. The results of the field investigation indicate low to moderate anticipated groundwater seepage rates are associated with the subsoils at the depths for the monitoring well screens.

6.5 Shallow Groundwater Flow Pattern

The average of groundwater levels, measured within the monitoring wells were used to interpret the shallow groundwater flow pattern across and beneath the subject site. Review of the groundwater table data indicates that shallow groundwater is interpreted to generally flow in south and westerly directions. The interpreted groundwater flow pattern beneath the subject site is illustrated on Drawing No. 9.

7.0 GROUNDWATER CONTROL DURING CONSTRUCTION

The hydraulic conductivity (K) estimates suggest that groundwater seepage rates into open excavations below the groundwater table, within the till subsoils will range from low to moderate. To provide safe, dry and stable conditions for excavation and construction for the proposed underground parking structure, and for the installation of the associated underground services, the shallow groundwater table may need to be lowered in advance of or during construction. The preliminary estimates for the temporary construction dewatering flows required to locally lower the groundwater table, based on the K test results are discussed in the following sections.

7.1 Groundwater Construction Dewatering Rates

Based on the updated architectural plan, dated February 14, 2023, project number 22035, prepared by Onespace Unlimited Inc., the proposed development is anticipated to be completed with 12-storeys high building over 2-levels of underground parking. Based on the topographic grading plan provided by the client, the finished floor elevation will be considered at an elevation of 105.20 masl, where the elevation for the P2 underground structure slab has been considered at elevation 98.2 masl which is about 7.0 m below the proposed finished grade level floor.

Dewatering Flow Rate Estimates for Construction of Proposed 2-Levels Underground Parking Structure

Based on the provided plans, the P2-slab elevation is considered at an elevation of 98.2 masl for this construction dewatering needs assessment. To facilitate excavation and construction in dry and stable subsoil conditions, it is proposed that the groundwater table be lowered to an elevation of 97.20 masl, which is about 1.0 m below the lowest proposed excavation depth. The highest, shallow groundwater level within the monitoring wells was measured at an elevation of. 100.38 masl. The subsoil profile consists of topsoil and sandy silt till, extending to the maximum anticipated excavation depth. Based on a review of the measured groundwater levels, the shallow groundwater levels are about 2.18 m above the considered elevations for the proposed underground parking structure. As such some limited construction dewatering is anticipated for the proposed development of the P2 underground structure. As a conservative approach, the highest estimated hydraulic conductivity values of 1.9×10^{-7} m/sec obtained from the installed monitoring wells on site was used for current dewatering needs assessments. The estimated construction dewatering flow rate is -anticipated to reach a daily rate of 80,340.2 L/day; by considering a 3=x safety factor, it could reach an approximate daily maximum of 241,020.6 L/day. It should be noted that the excavation footprints assumed for the dewatering needs flow rates are considered to be 140.0 m in length and 110.0 m in width, where the estimated perimeter for the construction footprints being considered at a length of 500.0 m. The conceptual zone of influence may reach approximately 4.2 m away from construction dewatering array or well used for dewatering purposed for the construction of 2-levels underground parking structure.

In accordance with the current policy of the Ministry of the Environment, Conservation and Parks (MECP), this dewatering flow rate for excavation, is above the groundwater taking threshold limit of 50,000 L/day, but is below Permit-To-Take-Water limit of 400,000 L/day, whereby a Environmental Activity and Sector Registry (EASR) would be required as an approval to facilitate the groundwater takings for a temporary construction dewatering program for groundwater control. This higher dewatering flow estimates may only occur at the beginning of the dewatering process, which includes; any rapid removal of collected runoff within the excavation area after a high intensity storm. It is anticipated that, following the lowering of the localized water table, groundwater seepage removed via dewatering from the open excavation will be a fraction of the above estimate, since much of the groundwater in the proposed excavation areas will have been removed from local storage. Furthermore, upon excavation for, any encountered, perched groundwater within the shallow fill horizons is expected to dissipate relatively quickly following commencement of earthworks.

It should be noted that shallow groundwater levels were monitored over the winter season and it is anticipated that they will increase over the high, precipitation, spring season. As such, it is recommended that shallow groundwater levels be monitored again, over the spring season, and that the dewatering estimates be updated if excavation and construction are planned for this season. It is also recommended that the construction dewatering needs assessment be revised if significant changes in the excavation depth and construction footprints are anticipated.

7.2 **Groundwater Control Methodology**

Low to moderate groundwater seepage rates which may be encountered in open excavations below the groundwater table can likely be controlled by occasional pumping from sumps. When and where needed during construction. Well points can be employed to lower water table if wet subsoil is unstable and seepage cannot be controlled via sump pumping. The final designs for the dewatering system will be the responsibility of the construction contractors.

7.3 **Mitigation of Potential Impacts Associated with Dewatering**

The conceptual zone of influence for any dewatering well or dewatering array is approximately 4.3 m away from the conceptual dewatering wells or array for the construction of 2-levels underground parking structure. There are no natural features, such as; watercourses, bodies of water, wetlands or any groundwater receptors, including water supply wells on site, or within anticipated zones of influence for any temporary construction dewatering.

7.4 **Groundwater Function for the Subject Site**

The zone of influence for any temporary construction dewatering array or wells could reach a maximum of 4.3 m away from the conceptual dewatering wells/array considered for the construction of 2-levels of underground parking structure. No private wells, bodies of water, watercourses, wetlands or any natural features are present within the conceptual zone of influence for any temporary construction dewatering array being considered for construction. In addition, the subject site is underlain by lower permeable subsoil, resulting in limited estimated zones of influence for temporary construction dewatering, resulting in minimal to negligible anticipated impacts to any nearby features from any temporary dewatering needs for construction. As such no long-term impacts to groundwater function of the subject site are anticipated.

7.5 **Long-Term Permanent Foundation Drainage**

Based on the updated architectural plan, dated February 14, 2023, project number 22035, prepared by Onespace Unlimited Inc., the proposed development is anticipated to be completed with 12-storey high building over 2-levels of underground parking. Based on the topographic grading plan provided by the client, the finished floor elevation is considered at an elevation of 105.20 masl, where the elevation of P2 slab is considered at 98.2 masl which is about 7.0 m below the finished floor.

Given the low seepage rate estimates for any long-term foundation drainage needs, a conventionally shored excavation, using pile and lagging methods can be designed and completed for the construction of the proposed 2-levels underground parking structures. A conventional, Mira drainage network can be included with the design for a conventionally shored excavation, along with a simple basement under-slab drainage network to address any long-term seepage needs to the excavation and the completed underground structure. These systems can be drained to separate sump pits, one for the shore wall, Mira drainage network, and the other for the under-basement floor slab drainage network. The drainage network should be designed by a qualified mechanical engineer, having experience with the designs for under-slab and Mira drainage networks.

In order to estimate the long-term foundation drainage needs for the shored excavations, the associated mira foundation drainage networks, and for the under-slab floor basement drainage networks at the subject site, Darcy's expression and equation was used. The base elevation for the 2-levels underground parking structure was considered to be at elevation of approximately 98.2 masl, which was used for the long-term foundation drainage needs estimation. Review of the measured groundwater levels indicates that the shallow groundwater levels are above the base elevations for the proposed P-2 underground parking structure. As such, it is anticipated that that some long-term foundation drainage needs may be required for the proposed underground parking structure. Darcy's Expression below, was used to assess the long-term foundation seepage flow estimates:

$$Q = KiA$$

Where:

Q = Estimated seepage drainage rate (m^3/day)

K = 1.90×10^{-7} m/sec (highest hydraulic conductivity (K) assessed for the silty clay till subsoil and shale bedrock aquifer encountered during the study)

A = 1,090.0 m^2 for the saturated Mira drain foundation walls and 967.61 m^2 for the under-slab floor drainage network which is the approximate area for weeper tiles comprising the under-basement floor slab drainage network (cross-sectional area of flow).

iv = 0.0152205 [unitless], Vertical Hydraulic Gradient for groundwater considered for the under-slab basement floor drainage system

ih = 0.0284 [unitless], Horizontal Hydraulic Gradient for groundwater considered for the perimeter, shore wall Mira drainage network system.

Based on review of the plans for the proposed 2-levels underground parking structure, the estimated long-term seepage drainage rate to the Mira drainage network is 508.17 L/day. The long-term drainage seepage drainage rate to the under-slab basement floor drainage networks 241.77 L/day. The combined long-term seepage rate from both the Mira shore wall foundation drainage network and from the under-slab basement floor drainage networks are estimated at 749.94 L/day. After applying a safety factor of three (3), the combined drainage flow rate is estimated at 2,249.82 L/day for the proposed 2-levels underground parking structure. As the estimated drainage flow rates are below the EASR limit of 50,000 L/day, the approval to facilitate the groundwater takings for a permanent foundation drainage program for the completed underground structure is not required to register with MECP with an EASR application.

Given that estimated drainage rates are low, the conventional pumping facility and sump system can be designed for the maximum expected seepage, drainage rates. The drainage piping should be properly constructed using weeper tiles surrounded by filter cloth, in turn, surrounded by bedding stone or concrete sand to minimize loss of fines and to prevent silt from clogging the weeper tiles. Over time, the foundation seepage drainage rates to the underground parking structures may diminish to a lower, or possibly negligible steady state rate. It is recommended that the long-term drainage system be design by a mechanical engineer with experience designing foundation drainage networks. It is recommended that the mira drain perimeter system be drained to a separate sump than the basement under-slab drainage network. Potential storm runoff could overwhelm the perimeter system if the shore wall gap between the building foundation and shore wall is not properly sealed against potential runoff accumulation.

The groundwater monitoring program was completed during the winter season when the shallow groundwater levels are typically lower than during the spring seasons.

7.6 **Ground Settlement**

Potential ground settlement to existing structures associated with temporary construction dewatering should be assessed by a geotechnical engineer prior to earthworks and construction.

8.0 CONCLUSIONS

Based on the findings of this Hydrogeological Study, the following conclusions and recommendations are provided:

1. The subject site is located within the Physiographic Region of Southern Ontario known as the Iroquois plain, where the clay plain is the predominant Physiographic feature for the area
2. A review of the topography information shows that the subject site is relatively flat, with the surrounding area exhibiting a gentle decline in elevation relief towards the west and southwest.
3. The proposed development site is located within the Petticoat Creek Watershed. Review of available mapping indicates that Petticoat Creek and its associated wooded areas and wetlands are located, approximately 550 m south of the subject site.
4. This study has revealed that beneath a layer of topsoil, the native subsoils underlying the subject site consists of sandy silt till, extending to the maximum investigated depth of 12.3 m below grade.
5. The groundwater monitoring program indicates that the measured groundwater levels ranged from the depths of 3.61 to 8.24 m below the prevailing ground surface, or at the elevations, ranging from 96.16 to 100.38 masl. The interpreted shallow groundwater flow pattern suggests that it flows in southerly and westerly directions.
6. The Single Well Response Tests (SWRT) estimates for hydraulic conductivity (K) for the underlying sandy silt till unit ranged from 1.4×10^{-8} to 1.9×10^{-7} m/sec. These results suggest that the hydraulic conductivity (K) estimates for the groundwater bearing sandy silt till unit is low, with correspondingly low anticipated groundwater seepage rates being anticipated into open excavations, below the groundwater table.
7. Based on the provided updated architectural plans, the estimated construction dewatering flow rate is anticipated to reach a daily rate of 80,340.2 L/day; by considering a 3 x safety factor, it could reach an approximate daily maximum of 241,020.6 L/day. The conceptual zone of influence may reach approximately 4.2 m away from construction dewatering array or well used for dewatering purposed for the construction of 2-levels underground parking structure. In accordance with the current policy of the Ministry of the Environment, Conservation and Parks (MECP), this dewatering flow rate for excavation, is above the groundwater taking threshold limit of 50,000 L/day, but is below Permit-To-Take-Water limit of 400,000 L/day, whereby a Environmental Activity and Sector Registry (EASR) would be required as an approval to facilitate the groundwater takings for a temporary construction dewatering program for groundwater control.
8. The conceptual zone of influence for any dewatering well or dewatering array used

during services installation is approximately 4.3 m away from the conceptual dewatering wells or array for the construction of 2-levels of underground parking. There are no natural features, such as; watercourses, bodies of water, wetlands or any groundwater receptors, including water supply wells on site, or within anticipated zones of influence for any temporary construction dewatering.

9. The long-term foundation drainage rates for the complete P2 underground structure from a mira drain for a conventionally shored exaction is 508.17 L/day and to the under-slab drainage network it is 241.77 L/day with the combined drainage rate being749.94 L/day by applying a safety factor of 3 it could reach a maximum rate of 2249.82 L/day.

Yours Truly,
SOIL ENGINEERS LTD.

Harshpinder Singh Brar, M.Eng.,EIT

Vivian Yu, B.Sc.

Gavin O’Brien, M.Sc., P.Geo.
HB/VY/GO

9.0 REFERENCES

1. The Physiography of Southern Ontario (Third Edition), L. J. Chapman and D. F. Putnam, 1984

2. Pettitcoat Creek Watershed Action Plan, 2012, Toronto and Region Conservation Authority

3. Bedrock Topography of the Markham Area, Southern Ontario, 1992, Open File Map 196, Mines and Minerals Division, Ontario Geological Survey

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FAX: (705) 721-7864	FAX: (905) 542-2769	FAX: (905) 725-1315	FAX: (905) 881-8335	FAX: (705) 684-8522	FAX: (905) 542-2769

FIGURES 1 TO 5

BOREHOLE LOGS AND GRAIN SIZE DISTRIBUTION GRAPHS

REFERENCE NO. 2111-W043

LIST OF ABBREVIATIONS AND DESCRIPTION OF TERMS

The abbreviations and terms commonly employed on the borehole logs and figures, and in the text of the report, are as follows:

SAMPLE TYPES

AS	Auger sample
CS	Chunk sample
DO	Drive open (split spoon)
DS	Denison type sample
FS	Foil sample
RC	Rock core (with size and percentage recovery)
ST	Slotted tube
TO	Thin-walled, open
TP	Thin-walled, piston
WS	Wash sample

PENETRATION RESISTANCE

Dynamic Cone Penetration Resistance:

A continuous profile showing the number of blows for each foot of penetration of a 2-inch diameter, 90° point cone driven by a 140-pound hammer falling 30 inches.

Plotted as '—•—'

Standard Penetration Resistance or 'N' Value:

The number of blows of a 140-pound hammer falling 30 inches required to advance a 2-inch O.D. drive open sampler one foot into undisturbed soil.

Plotted as '○'

WH	Sampler advanced by static weight
PH	Sampler advanced by hydraulic pressure
PM	Sampler advanced by manual pressure
NP	No penetration

SOIL DESCRIPTION

Cohesionless Soils:

'N' (blows/ft)	Relative Density
0 to 4	very loose
4 to 10	loose
10 to 30	compact
30 to 50	dense
over 50	very dense

Cohesive Soils:

Undrained Shear Strength (ksf)	'N' (blows/ft)	Consistency
less than 0.25	0 to 2	very soft
0.25 to 0.50	2 to 4	soft
0.50 to 1.0	4 to 8	firm
1.0 to 2.0	8 to 16	stiff
2.0 to 4.0	16 to 32	very stiff
over 4.0	over 32	hard

Method of Determination of Undrained Shear Strength of Cohesive Soils:

x 0.0	Field vane test in borehole; the number denotes the sensitivity to remoulding
△	Laboratory vane test
☐	Compression test in laboratory

For a saturated cohesive soil, the undrained shear strength is taken as one half of the undrained compressive strength

METRIC CONVERSION FACTORS

1 ft = 0.3048 metres
1lb = 0.454 kg
1 inch = 25.4 mm
1ksf = 47.88 kPa

JOB NO.: 2111-W043

LOG OF BOREHOLE: BH/MW 1

FIGURE NO.: 1

PROJECT DESCRIPTION: Proposed Mid-Rise Residential Development

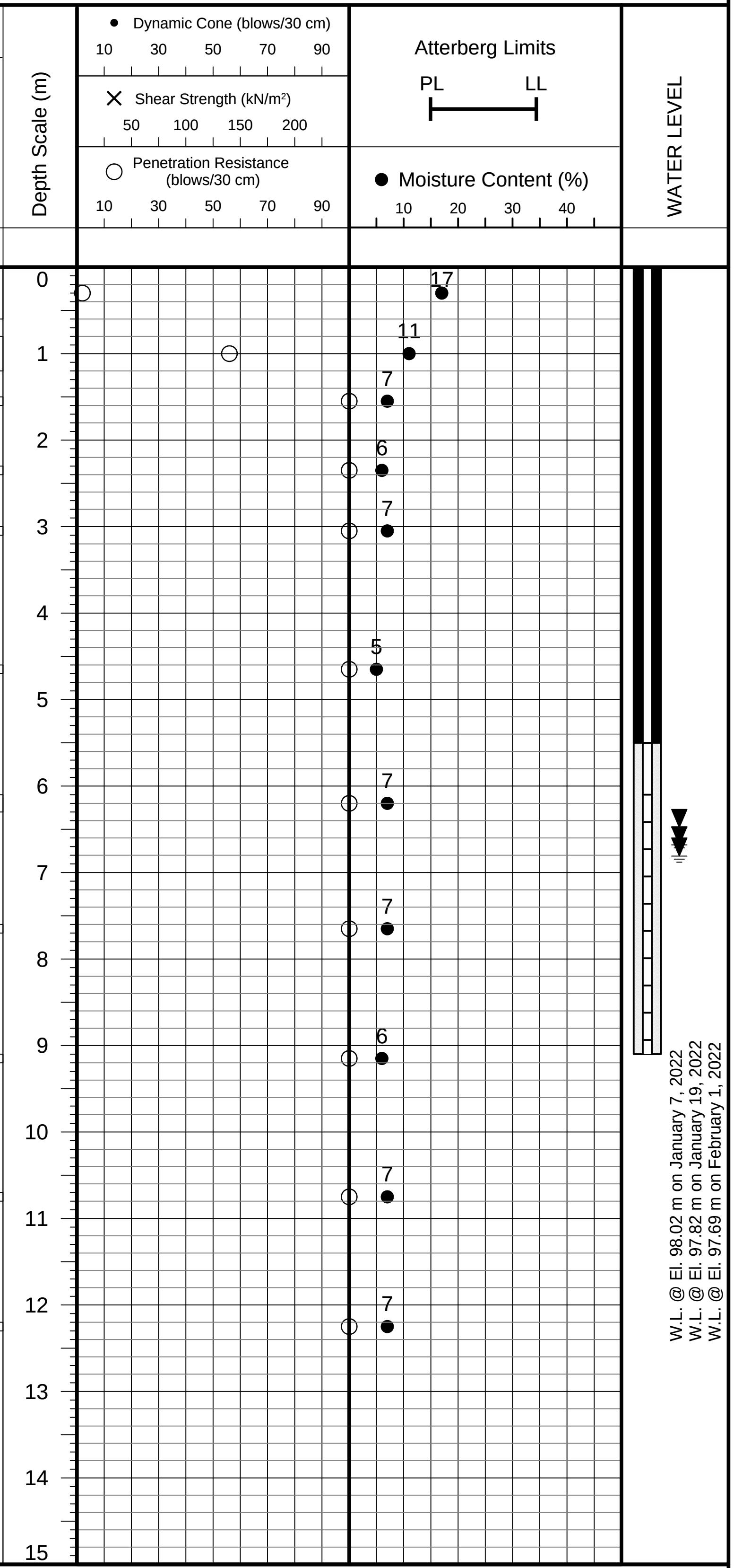
METHOD OF BORING: Flight Auger

PROJECT LOCATION: 720 Granite Court, City of Pickering

DRILLING DATE: December 16, 2021

El. (m) Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value
104.5	Ground Surface			
0.2	**23 cm TOPSOIL**	1	DO	2
	Very dense **SANDY SILT TILL** a trace of gravel occ. silty clay layers, cobbles and boulders weathered	2	DO	56
		3	DO	50/4
		4	DO	50/4
		5	DO	50/4
	brown grey			
		6	DO	50/5
		7	DO	50/6
		8	DO	50/3
		9	DO	50/1
		10	DO	50/3
92.2 12.3	**END OF BOREHOLE**	11	DO	50/3

Installed 50 mm Ø monitoring well to 9.0 m
3.1 m slotted screen from 5.9 m to 9.0 m
Sand backfill from 5.5 to 9.0 m
Bentonite seal from 0.0 m to 5.5 m
Provided with a monument steel casing



W.L. @ El. 98.02 m on January 7, 2022
W.L. @ El. 97.82 m on January 19, 2022
W.L. @ El. 97.69 m on February 1, 2022

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JOB NO.: 2111-W043

LOG OF BOREHOLE: BH/MW 2

FIGURE NO.: 2

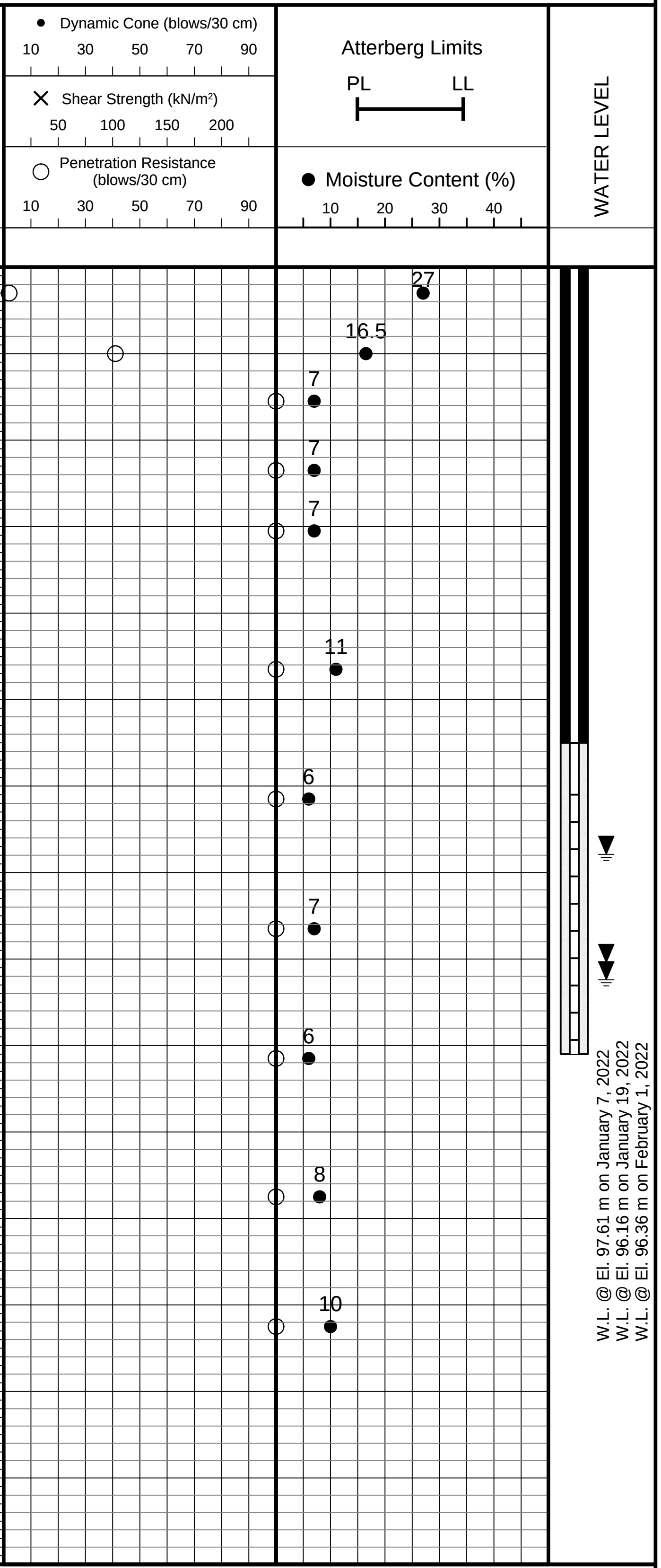
PROJECT DESCRIPTION: Proposed Mid-Rise Residential Development

METHOD OF BORING: Flight Auger

PROJECT LOCATION: 720 Granite Court, City of Pickering

DRILLING DATE: December 16, 2021

El. (m) Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Moisture Content (%)
104.4	Ground Surface					
0.2	**23 cm TOPOSIL**	1	DO	2	0	27
	Dense to very dense — weathered **SANDY SILT TILL** a trace of gravel occ. silty clay layers, cobbles and boulders	2	DO	41	1	16.5
		3	DO	50/3		7
		4	DO	50/5	2	7
		5	DO	50/6	3	7
	brown grey				4	
		6	DO	50/5		11
		7	DO	50/5	6	6
		8	DO	50/4	7	7
		9	DO	90/11	9	6
		10	DO	50/4	10	8
92.1 12.3	**END OF BOREHOLE** Installed 50 mm Ø monitoring well to 9.0 m 3.1 m slotted screen from 5.9 m to 9.0 m Sand backfill from 5.5 to 9.0 m Bentonite seal from 0.0 m to 5.5 m Provided with a monument steel casing	11	DO	50/2	12	10



W.L. @ El. 97.61 m on January 7, 2022
W.L. @ El. 96.16 m on January 19, 2022
W.L. @ El. 96.36 m on February 1, 2022

Soil Engineers Ltd.

JOB NO.: 2111-W043

LOG OF BOREHOLE: BH 3

FIGURE NO.: 3

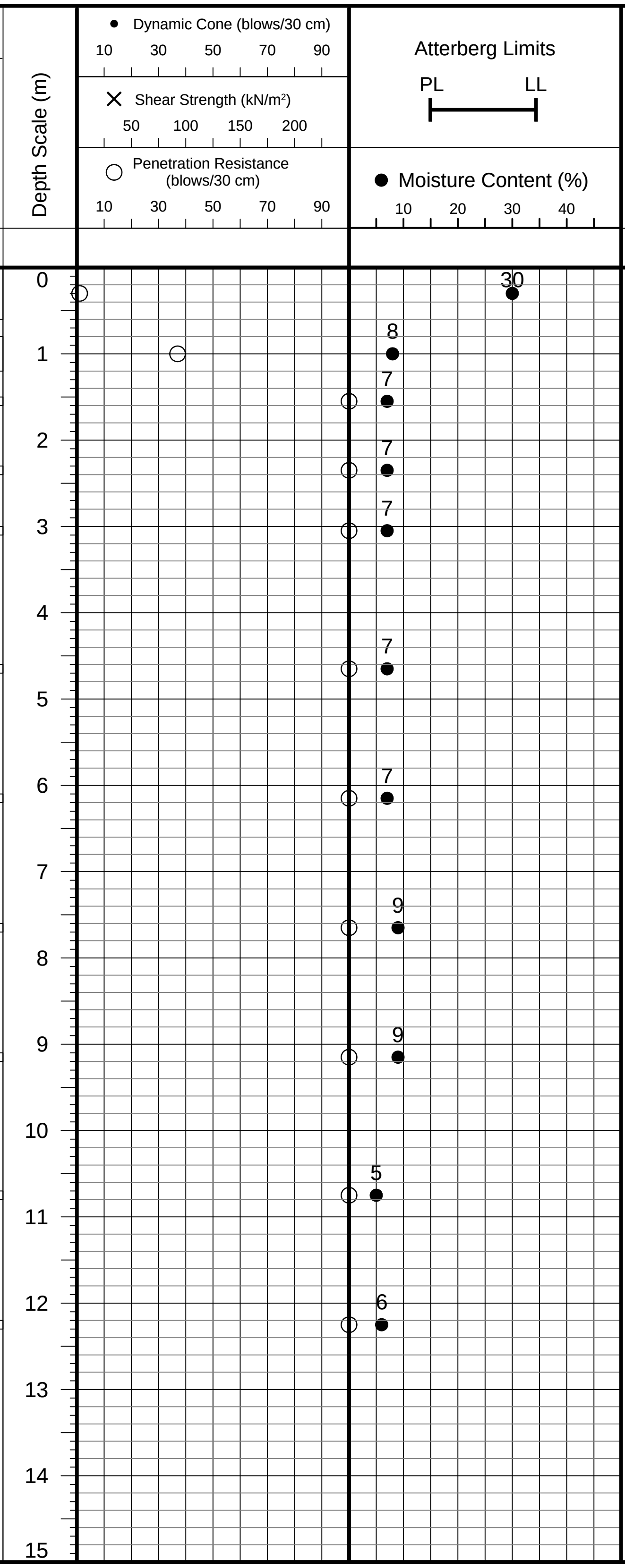
PROJECT DESCRIPTION: Proposed Mid-Rise Residential Development

METHOD OF BORING: Flight Auger

PROJECT LOCATION: 720 Granite Court, City of Pickering

DRILLING DATE: December 17, 2021

El. (m) Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value
104.9	Ground Surface			
0.2	**20 cm TOPSOIL**	1	DO	1
	Dense to very dense **SANDY SILT TILL** a trace of gravel occ. silty clay layers, cobbles and boulders weathered	2	DO	37
		3	DO	50/5
		4	DO	50/5
		5	DO	50/3
	brown grey			
		6	DO	50/5
		7	DO	50/6
		8	DO	50/3
		9	DO	50/4
		10	DO	50/3
92.6 12.3	**END OF BOREHOLE**	11	DO	50/3



WATER LEVEL

Dry upon completion

Soil Engineers Ltd.

JOB NO.: 2111-W043

LOG OF BOREHOLE: BH/MW 4

FIGURE NO.: 4

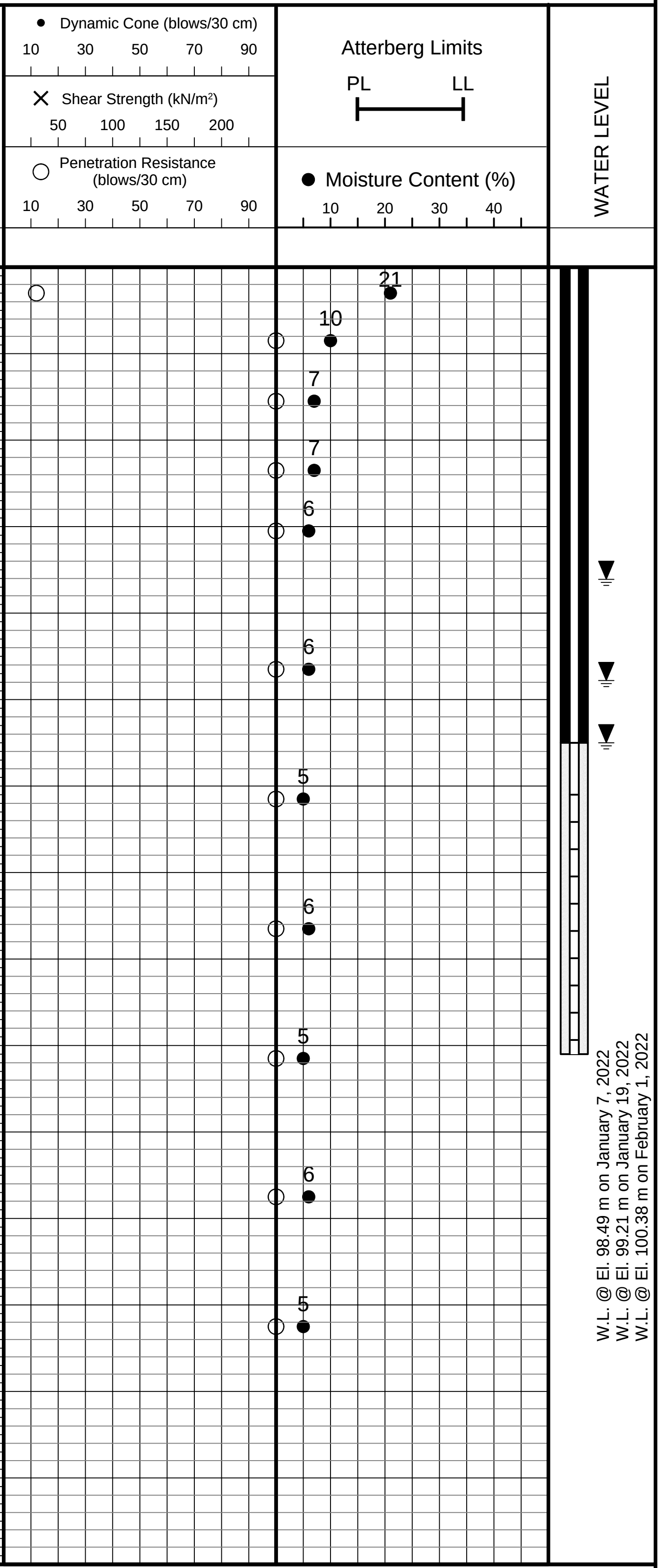
PROJECT DESCRIPTION: Proposed Mid-Rise Residential Development

METHOD OF BORING: Flight Auger

PROJECT LOCATION: 720 Granite Court, City of Pickering

DRILLING DATE: December 14, 2021

El. (m) Depth (m)	SOIL DESCRIPTION	SAMPLES Number	SAMPLES Type	SAMPLES N-Value	Depth Scale (m)
104.0	Ground Surface				
0.3	**25 cm TOPSOIL**	1	DO	12	0
	Very dense **SANDY SILT TILL** a trace of gravel occ. silty clay layers, cobbles and boulders weathered	2	DO	79/8	1
		3	DO	50/4	
		4	DO	50/4	2
		5	DO	50/4	3
	brown grey				4
		6	DO	50/3	5
		7	DO	50/3	6
		8	DO	50/2	7
		9	DO	50/2	9
		10	DO	50/4	11
91.7 12.3		11	DO	50/4	12
	END OF BOREHOEL Installed 50 mm Ø monitoring well to 9.0 m 3.1 m slotted screen from 5.9 m to 9.0 m Sand backfill from 5.5 to 9.0 m Bentonite seal from 0.0 m to 5.5 m Provided with a momument steel casing				13 14 15



W.L. @ El. 98.49 m on January 7, 2022
W.L. @ El. 99.21 m on January 19, 2022
W.L. @ El. 100.38 m on February 1, 2022

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Page: 1 of 1

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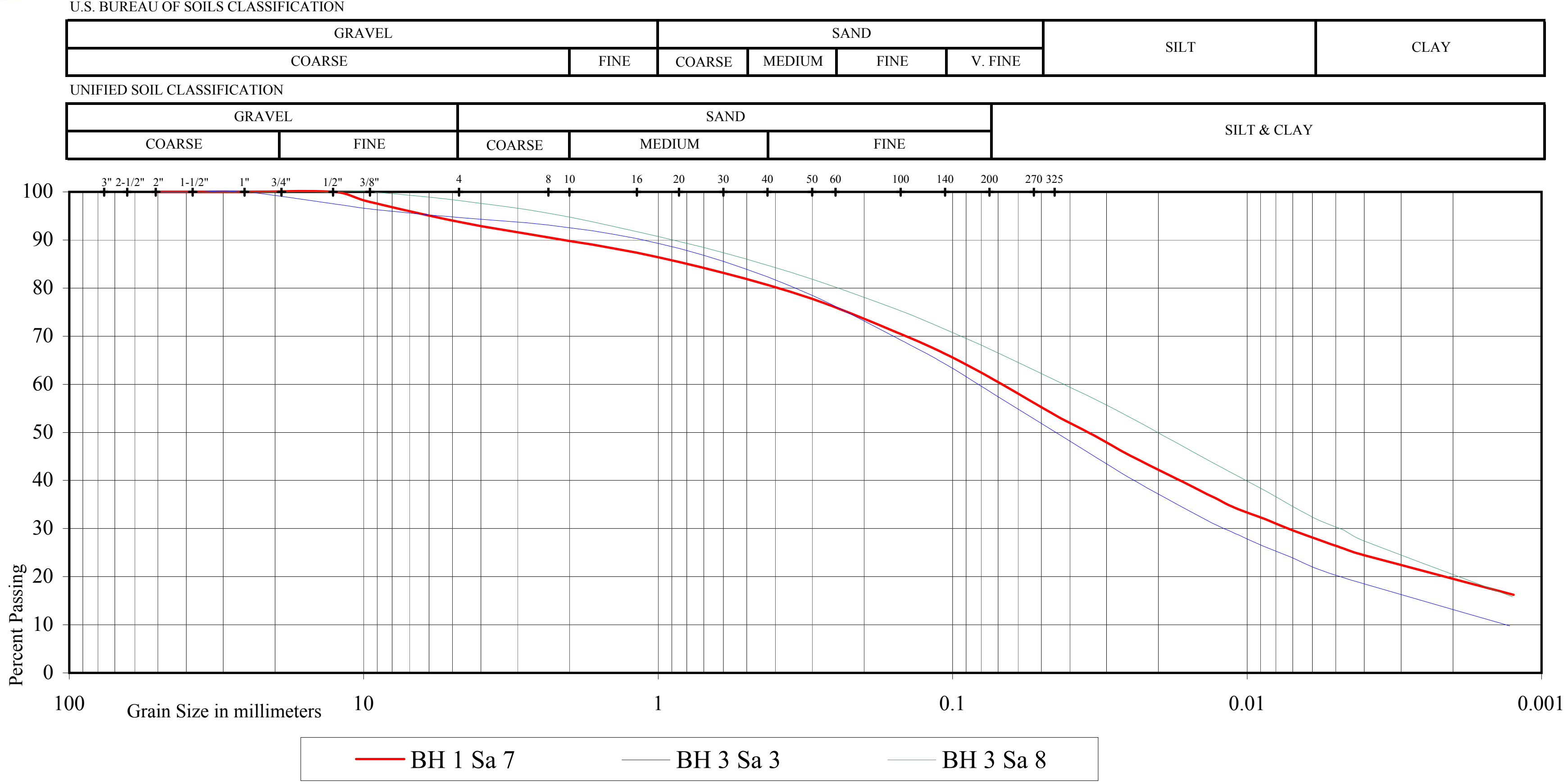
GRAIN SIZE DISTRIBUTION

Reference No: 2111-W043



Project: Proposed Residential Development

Location: 720 Granite Court, City of Pickering

Borehole No:	1	3	3
Sample No:	7	3	8
Depth (m):	6.1	1.5	7.6
Elevation (m):	98.4	103.4	97.3

BH 1 Sa. 7 Estimated Permeability (cm./sec.) = 10^{-7}

BH 3 Sa. 3 Estimated Permeability (cm./sec.) = 10^{-6}

BH 3 Sa. 8 Estimated Permeability (cm./sec.) = 10^{-7}

Classification of Sample [& Group Symbol]: SANDY SILT TILL

some clay, a trace of gravel

Figure: 5

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FAX: (705) 721-7864	FAX: (905) 542-2769	FAX: (905) 725-1315	FAX: (905) 881-8335	FAX: (705) 684-8522	FAX: (905) 542-2769

DRAWINGS 1 TO 9

REFERENCE NO. 2111-W043

N

☐ Approximate Boundary of Subject Site

→ Watercourse

═ Expressway/Freeway

━ Major Road

─ Local Road

┼┼ Railway

Soil Engineers Ltd.

Title: Site Location Plan

Project:
Hydrogeological Assessment
Proposed Mid-Rise Residential Development
720 Granite Court
City of Pickering

Reference No. 2111-W043

Date: January 19, 2022

Scale:
0 25 50 100 150 200 250
Metres

Drawing No. 1

Source: Ontario Ministry of Natural Resources and Forestry
© Queen's Printer for Ontario, 2021

N

🟥 Approximate Boundary of Subject Site

⊕ Borehole

⊕ Borehole with Monitoring Well

━ Major Road

─ Local Road

┅ Railway

Soil Engineers Ltd.

Title: Borehole and Monitoring Well Location Plan

Project:

Hydrogeological Assessment
Proposed Mid-Rise Residential Development
720 Granite Court
City of Pickering

Reference No. 2111-W043

Date: January 19, 2022

Scale:
0 5 10 20 30 40 50
Metres

Drawing No. 2

Source: Ontario Ministry of Natural Resources and Forestry
Ⓒ Queen's Printer for Ontario, 2021

N

🟥 Approximate Boundary of Subject Site

▭ 500 metres from Subject Site Boundary

● 1 Well Location from MECP Well Records (see Appendix 'A')

→ Watercourse

🟩 Expressway/Freeway

━ Major Road

— Local Road

═ Railway

Soil Engineers Ltd.

Title: MECP Well Location Plan

Project:

Hydrogeological Assessment
Proposed Mid-Rise Residential Development
720 Granite Court
City of Pickering

Reference No. 2111-W043

Date: January 19, 2022

Scale:
0 25 50 100 150 200 250
Metres

Drawing No. 3

Source: Ontario Ministry of Natural Resources and Forestry
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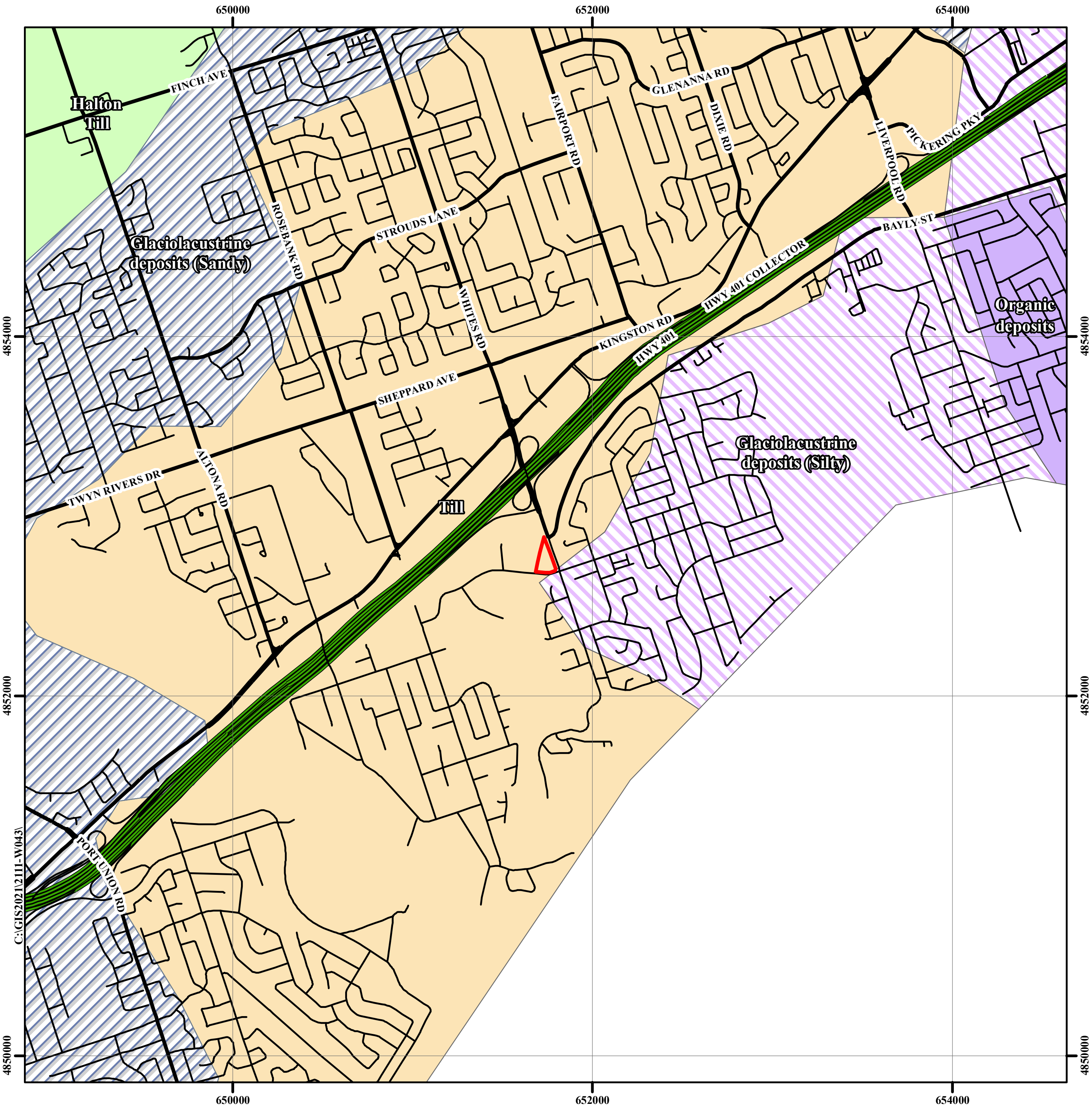


N

🟥	Approximate Boundary of Subject Site
▨	Glaciolacustrine deposits (Sandy) Material: sand, gravelly sand and gravel, nearshore and beach deposits
▨	Glaciolacustrine deposits (Silty) Material: silt and clay, minor sand, basin and quiet water deposits
🟩	Halton Till Material: predominantly silt to silty clay matrix, high in matrix carbonate content and clast poor
🟪	Organic deposits material: peat, muck and marl
🟧	Till Material: undifferentiated, predominantly sandy silt to silt matrix, commonly rich in clasts, often high in total matrix carbonate content
▬	Expressway/Freeway
▬	Major Road
—	Local Road

Soil Engineers Ltd.

Title: Quarternary and Surface Geology Map

Project:

Hydrogeological Assessment
Proposed Mid-Rise Residential Development
720 Granite Court
City of Pickering

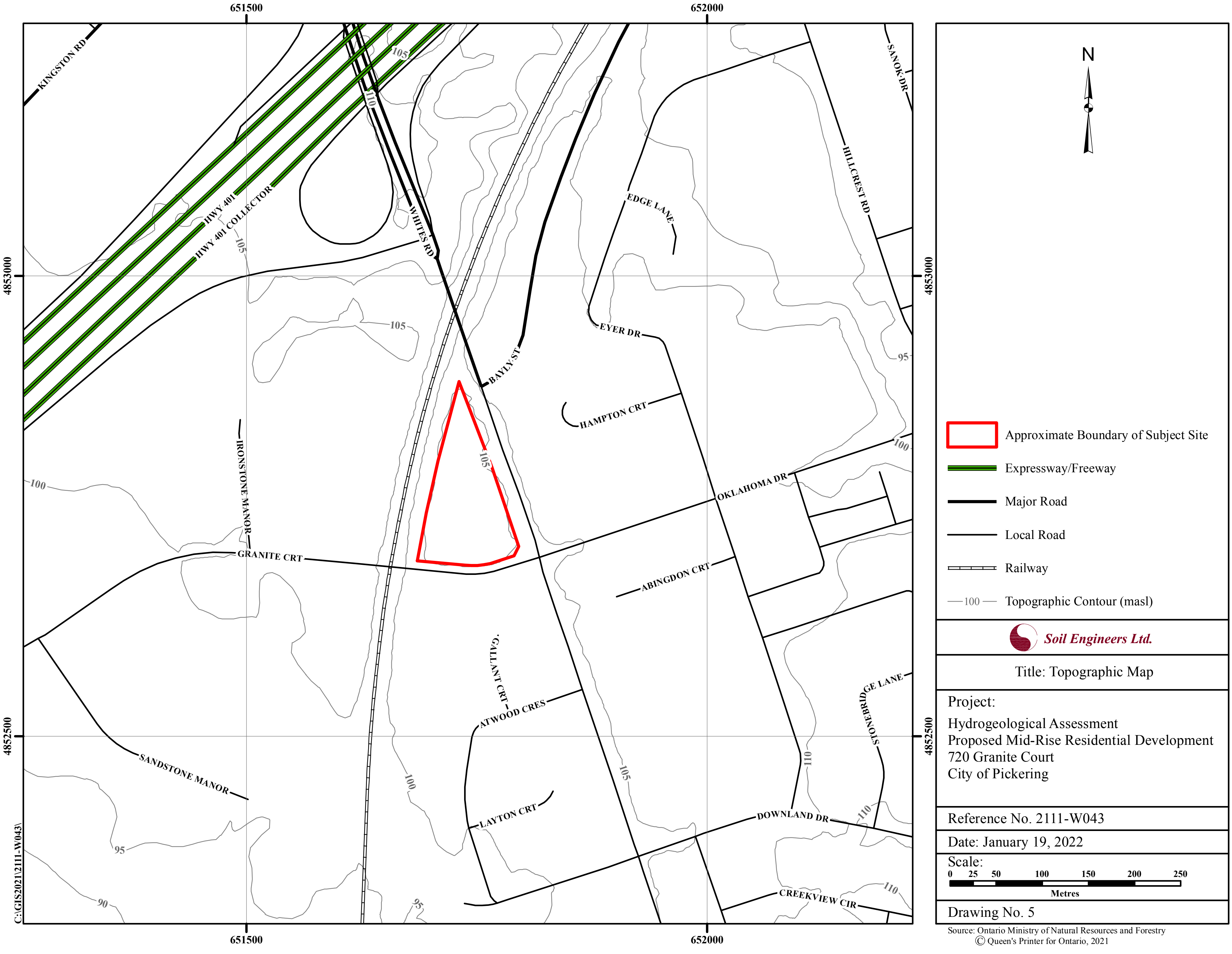
Reference No. 2111-W043

Date: January 19, 2022

Scale:
0 200 400 600 800 1,000
Metres

Drawing No. 4

Source: Ontario Geological Survey, 1997,
Surface Geology of Ontario; Ontario Geological Survey,
Miscellaneous Released-Data 0014



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Title: Topographic Map

Project:
Hydrogeological Assessment
Proposed Mid-Rise Residential Development
720 Granite Court
City of Pickering

Reference No. 2111-W043

Date: January 19, 2022

Scale:
0 25 50 100 150 200 250
Metres

Drawing No. 5

Source: Ontario Ministry of Natural Resources and Forestry
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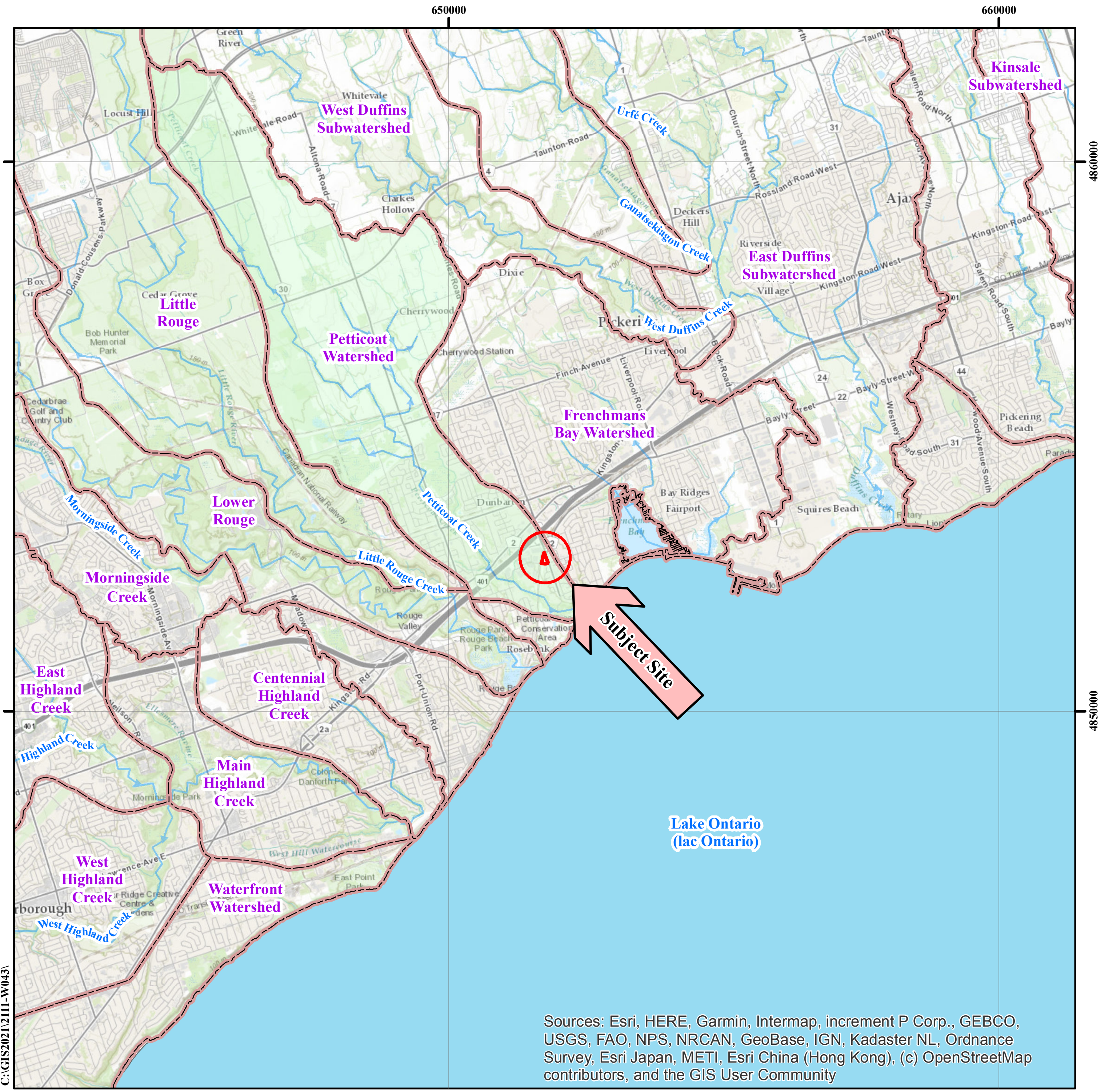

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

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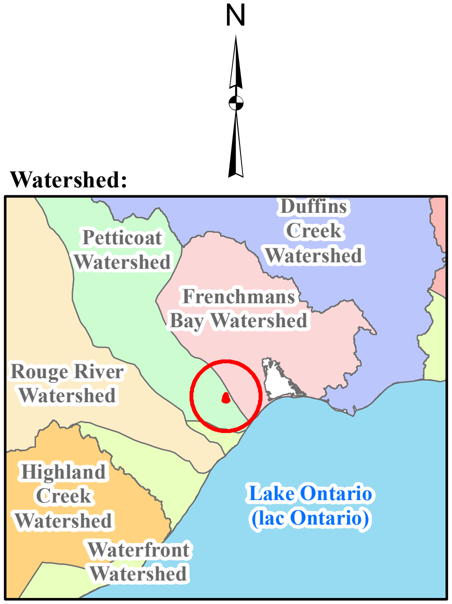


🟥 Approximate Boundary of the Subject Site

▭ Watershed Boundaries

🟦 Waterbody

— Watercourse

— Expressway/Major Road

Soil Engineers Ltd.

Title: Watershed and Subwatershed Map

Project:

Hydrogeological Assessment
Proposed Mid-Rise Residential Development
720 Granite Court
City of Pickering

Reference No. 2111-W043

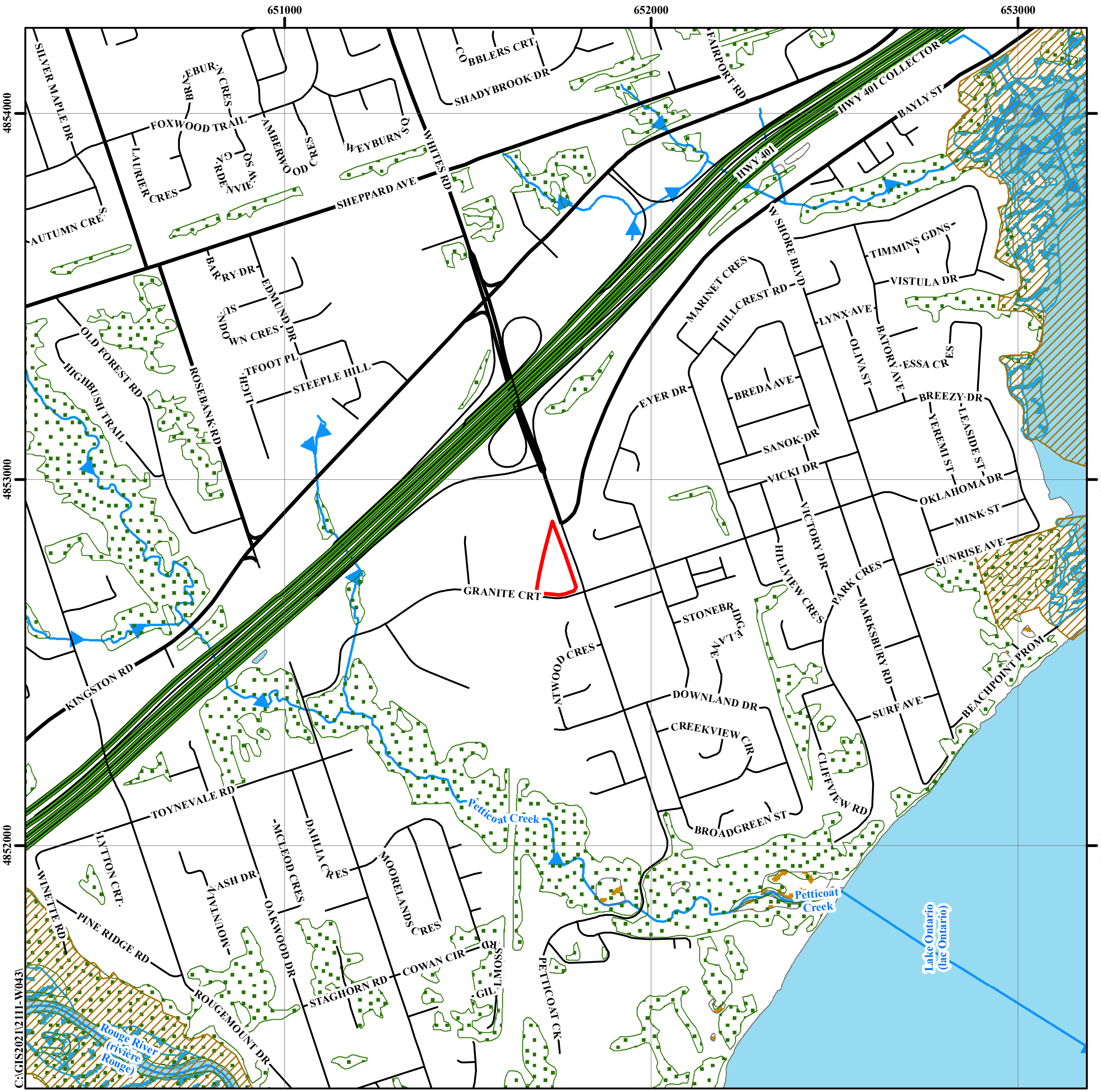
Date: January 19, 2022

Scale:

0 1,000 2,000 3,000 4,000 5,000
Metres

Drawing No. 6

This mapping was produced by SEL and should be used for information purposes only.
Data sources used in its production are of varying quality and accuracy and all boundaries should be considered approximate.



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Includes information: Provincial Park, Conservation Reserve, Area of Natural and Scientific Interest, Wetland, Niagara Escarpment Protection Area, Oak Ridges Moraine Conservation and Wilderness Areas

N

- ▭ Approximate Boundary of Subject Site
- ▨ Area of Natural and Scientific Interest (ANSI)
- ▨ Wetland (classified as Provincial)
- ◠ Wetland (Not evaluated per OWES)
- ▦ Wooded Area
- ■ Waterbody
- ➤ Watercourse
- ═ Expressway/Freeway
- ━ Major Road
- ─ Local Road

Soil Engineers Ltd.

Title: Natural Features and Protection Area Plan

Project:
Hydrogeological Assessment
Proposed Mid-Rise Residential Development
720 Granite Court
City of Pickering

Reference No. 2111-W043

Date: January 19, 2022

Scale:
0 100 200 300 400 500
Metres

Drawing No. 7

Source: Ontario Ministry of Natural Resources and Forestry
Ⓒ Queen's Printer for Ontario, 2021
OWES: Ontario Wetland Evaluation System

N

🟥	Approximate Boundary of Subject Site
⊕	Borehole
⊕	Borehole with Monitoring Well
━	Major Road
─	Local Road
┼┼┼	Railway
A ─ A'	Cross-Section Direction
—100—	Topographic Contour (masl)

Soil Engineers Ltd.

Title: Cross-Section Key Plan

Project:
Hydrogeological Assessment
Proposed Mid-Rise Residential Development
720 Granite Court
City of Pickering

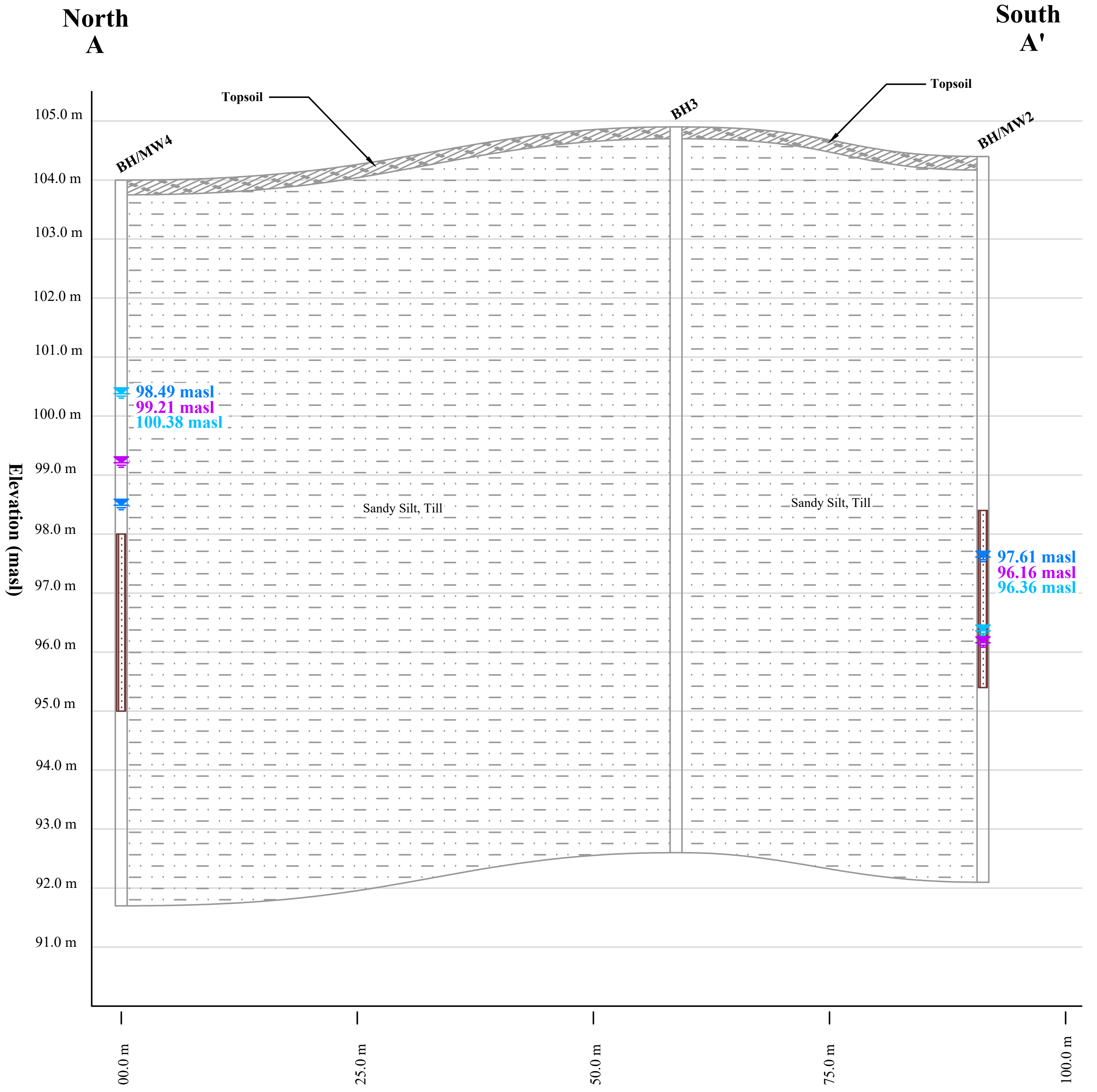
Reference No. 2111-W043

Date: March 1, 2022

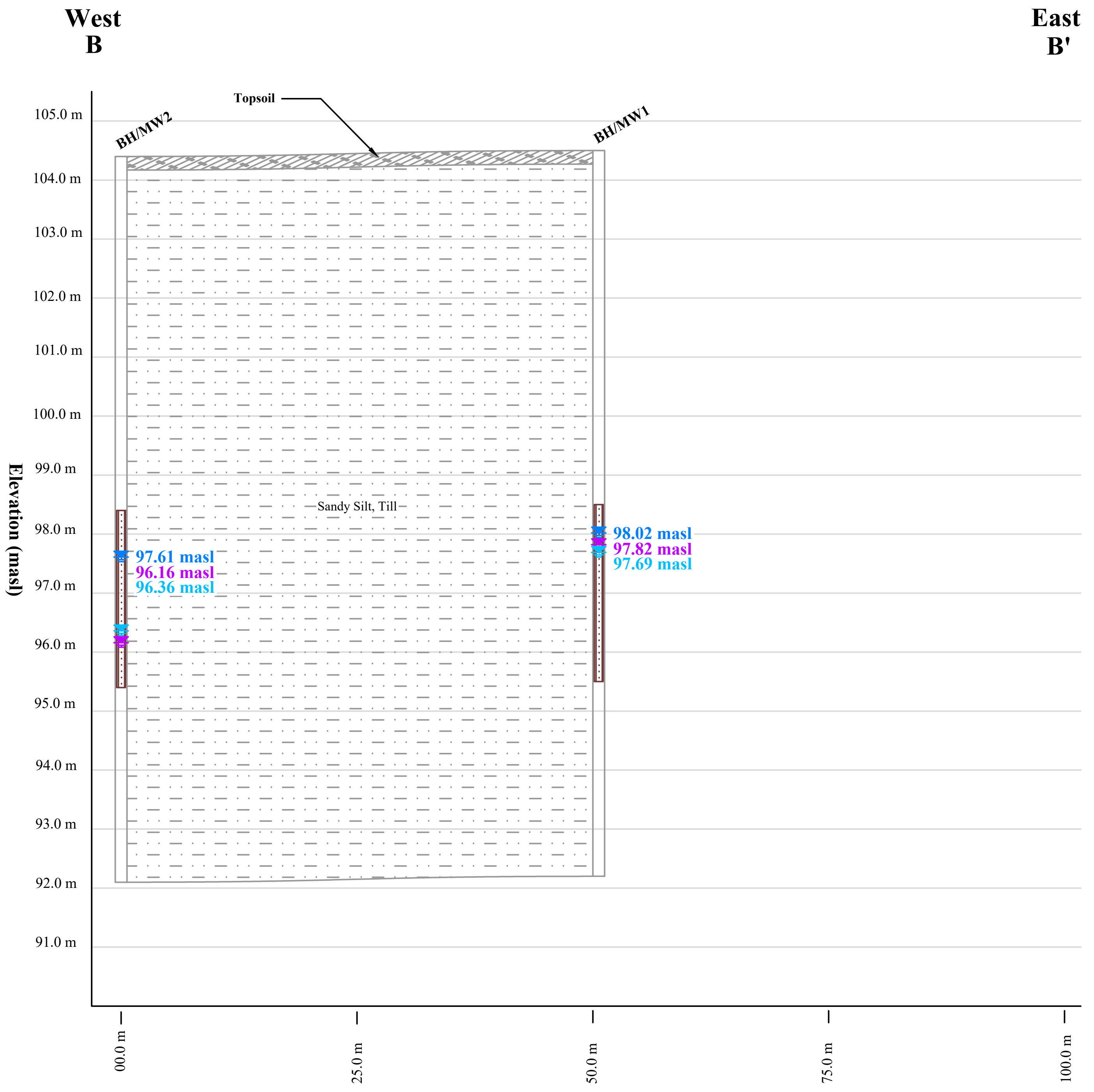
Scale:
0 5 10 20 30 40 50
Metres

Drawing No. 8-1

Source: Ontario Ministry of Natural Resources and Forestry



Section A-A'



Section B-B'

▨ **Topsoil**

▭ **Sandy Silt, Till**

▯ **3.0 m Screen**

▼ **Water Table on January 7, 2022**

▼ **Water Table on January 19, 2022**

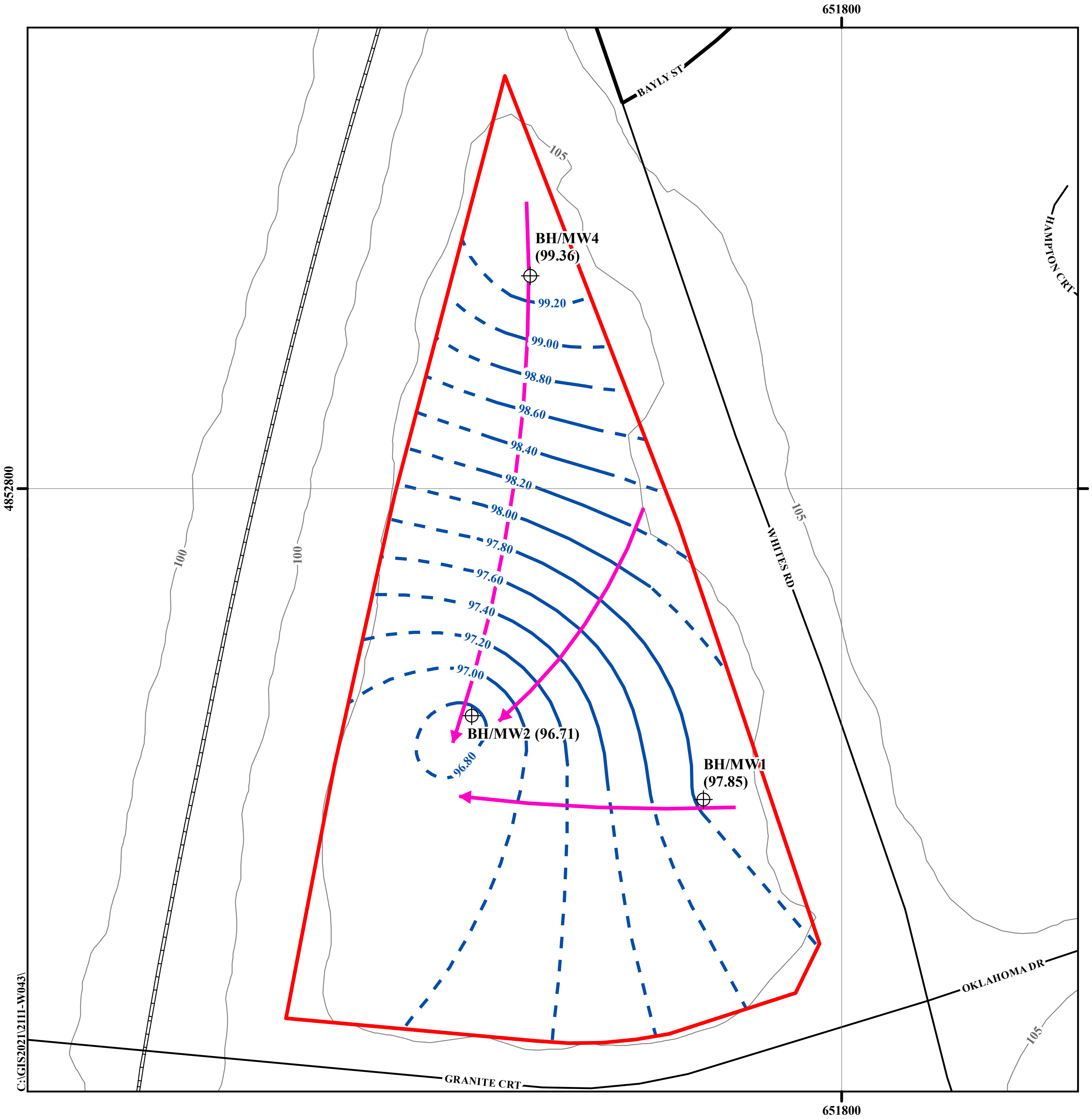
▼ **Water Table on February 1, 2022**

Soil Engineers Ltd.
CONSULTING SOIL, FOUNDATION & ENVIRONMENTAL ENGINEERS

Title: Geological Cross-Section (A-A' and B-B')

Project: Hydrogeological Assessment
Proposed Mid-Rise Residential Development
720 Granite Court, City of Pickering

Reference No:	Date:	Scale: V	Scale: H	Drawing No.
2111-W043	March, 2022	1:100	1:2500	8-2



Soil Engineers Ltd.

Title: Shallow Groundwater
Flow Pattern Plan

Project:

Hydrogeological Assessment
Proposed Mid-Rise Residential Development
720 Granite Court
City of Pickering

Reference No. 2111-W043

Date: March 1, 2022

Scale:

Drawing No. 9

Source: Ontario Ministry of Natural Resources and Forestry
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CONSULTING ENGINEERS
GEOTECHNICAL • ENVIRONMENTAL • HYDROGEOLOGICAL • BUILDING SCIENCE
90 WEST BEAVER CREEK ROAD, SUITE 100, RICHMOND HILL, ONTARIO L4B 1E7 · TEL: (416) 754-8515 · FAX: (905) 881-8335

BARRIE	MISSISSAUGA	OSHAWA	NEWMARKET	GRAVENHURST	HAMILTON
TEL: (705) 721-7863	TEL: (905) 542-7605	TEL: (905) 440-2040	TEL: (905) 853-0647	TEL: (705) 684-4242	TEL: (905) 777-7956
FAX: (705) 721-7864	FAX: (905) 542-2769	FAX: (905) 725-1315	FAX: (905) 881-8335	FAX: (705) 684-8522	FAX: (905) 542-2769

APPENDIX ‘A’

MECP WATER WELL RECORDS SUMMARY

REFERENCE NO. 2111-W043

Ontario Water Well Records

WELL ID	MECP WWR ID	Construction Method	Well Depth (m)**	Well Usage		Water Found (m)**	Static Water Level (m)**	Top of Screen Depth (m)**	Bottom of Screen Depth (m)**
				Final Status	First Use				
1	4601906	Rotary (Convent.)	37.49	Abandoned-Supply	-	28.35	19.20	-	-
2	7041862	Boring	6.00	Observation Wells	Not Used	-	-	1.50	6.00
3	7125150	Boring	3.90	Test Hole	Monitoring	-	-	0.90	3.90
4	7125150	Boring	3.90	Test Hole	Monitoring	-	-	0.90	3.90
5	7125150	Boring	3.90	Test Hole	Monitoring	-	-	0.90	3.90
6	7125150	Boring	3.90	Test Hole	Monitoring	-	-	0.90	3.90
7	7183708	Direct Push	6.10	Monitoring and Test Hole	Monitoring and Test Hole	-	-	3.10	6.10
8	7183709	Direct Push	6.10	Monitoring and Test Hole	Monitoring and Test Hole	-	-	3.10	6.10
9	7253328	Auger	4.57	Monitoring and Test Hole	Monitoring and Test Hole	-	-	1.52	4.57
10	7253330	Auger	4.57	Monitoring and Test Hole	Monitoring and Test Hole	-	-	1.52	4.57
11	7253329	Auger	6.10	Monitoring and Test Hole	Monitoring and Test Hole	-	-	3.10	6.10
12	7335757	Auger	9.14	Observation Wells	Monitoring	-	-	6.10	9.14
13	7335758	Auger	19.81	Observation Wells	Monitoring	15.24	-	16.76	19.81
14	7335759	Auger	9.14	Monitoring and Test Hole	Monitoring	7.32	-	6.10	9.14
15	7335763	Auger	4.27	Observation Wells	Monitoring	-	-	2.74	4.27

*MECP WWID: Ministry of Environment, Conservation, and Parks Water Well Records Identification

**metres below ground surface

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90 WEST BEAVER CREEK ROAD, SUITE 100, RICHMOND HILL, ONTARIO L4B 1E7 · TEL: (416) 754-8515 · FAX: (905) 881-8335

BARRIE	MISSISSAUGA	OSHAWA	NEWMARKET	GRAVENHURST	HAMILTON
TEL: (705) 721-7863	TEL: (905) 542-7605	TEL: (905) 440-2040	TEL: (905) 853-0647	TEL: (705) 684-4242	TEL: (905) 777-7956
FAX: (705) 721-7864	FAX: (905) 542-2769	FAX: (905) 725-1315	FAX: (905) 881-8335	FAX: (705) 684-8522	FAX: (905) 542-2769

APPENDIX ‘B’

SINGLE WELL RESPONSE TEST RESULTS

REFERENCE NO. 2111-W043

Falling Head Test (Slug Test)

Test Date:		1-Feb-22	
Piezometer/Well No.:		BH/MW 1	
Ground level:		104.50	m
Screen top level:		98.40	m
Screen bottom level:		95.40	m
Test El. (at midpoint of screen):		96.90	m
Test depth (at midpoint of screen):		7.6	m
Screen length	L=	3.0	m
Diameter of undisturbed portion of aquifer	2R=	0.22	m
Standpipe diameter	2r=	0.05	m
Initial unbalanced head	Ho=	-0.2057	m
Initial water depth		6.81	m
Aquifer material:		**Sandy Silt Till**	

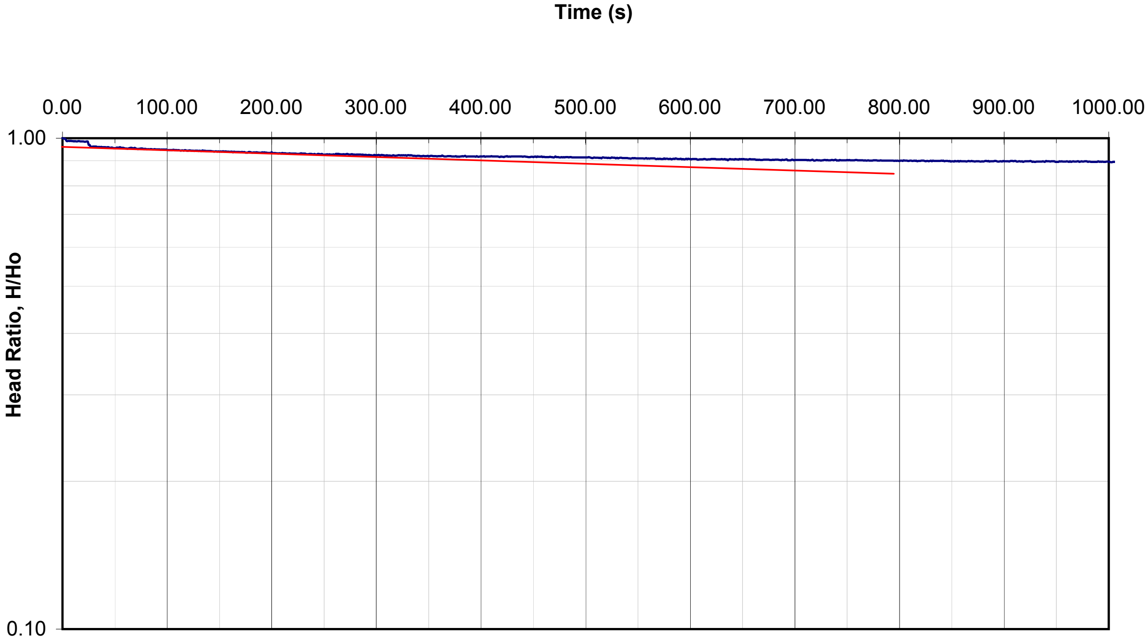
Shape factor F= 2 x 3.14 x L / ln(L/R) = 5.701815 m

Permeability K= 3.14 x r2 / F x (t2 - t1) x ln (H1/H2) (Bouwer and Rice Method)

ln (H1/H2) / (t2 - t1) = 0.000549589

K= **1.9E-05** cm/s

1.9E-07 m/s



Falling Head Test (Slug Test)

Test Date:		1-Feb-22	
Piezometer/Well No.:		BH/MW 2	
Ground level:		104.40	m
Screen top level:		98.10	m
Screen bottom level:		95.10	m
Test El. (at midpoint of screen):		96.60	m
Test depth (at midpoint of screen):		7.8	m
Screen length	L=	3.0	m
Diameter of undisturbed portion of aquifer	2R=	0.22	m
Standpipe diameter	2r=	0.05	m
Initial unbalanced head	Ho=	-0.5609	m
Initial water depth		8.04	m
Aquifer material:		**Sandy Silt Till**	

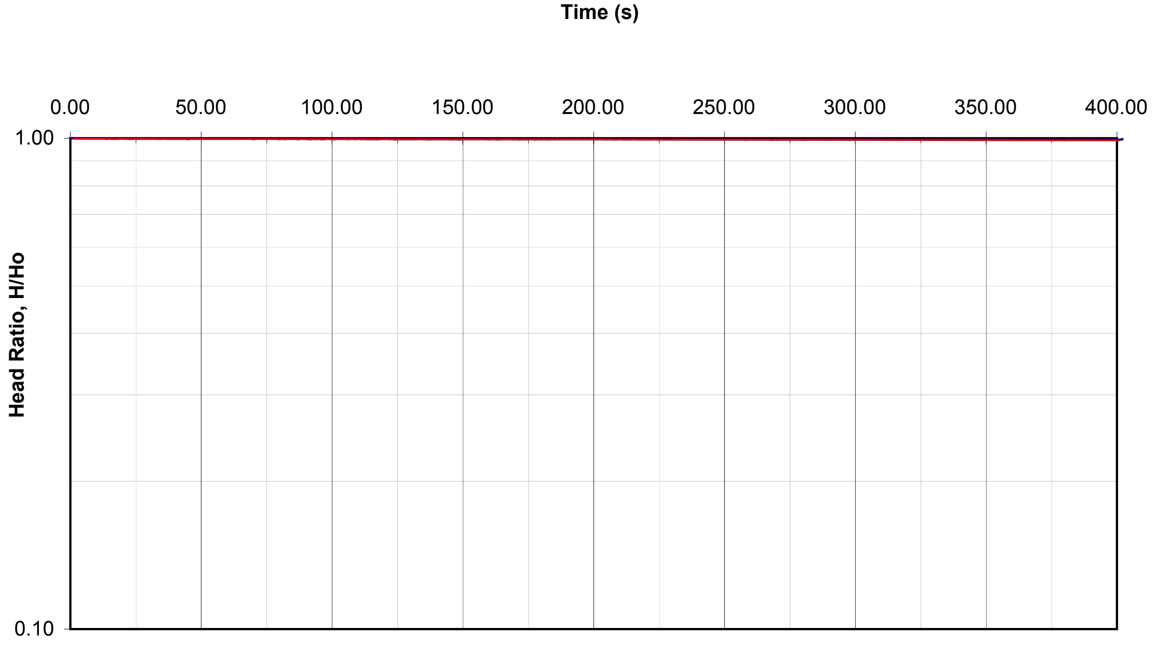
Shape factor F= 2 x 3.14 x L / ln(L/R) = 5.701815 m

Permeability K= 3.14 x r2 / F x (t2 - t1) x ln (H1/H2) (Bouwer and Rice Method)

ln (H1/H2) / (t2 - t1) = 4.10898E-05

K= **1.4E-06** cm/s

1.4E-08 m/s



Falling Head Test (Slug Test)

Test Date:		1-Feb-22	
Piezometer/Well No.:		BH/MW 4	
Ground level:		103.99	m
Screen top level:		97.69	m
Screen bottom level:		94.69	m
Test El. (at midpoint of screen):		96.19	m
Test depth (at midpoint of screen):		7.8	m
Screen length	L=	3.0	m
Diameter of undisturbed portion of aquifer	2R=	0.22	m
Standpipe diameter	2r=	0.05	m
Initial unbalanced head	Ho=	-0.4395	m
Initial water depth		3.61	m
Aquifer material:		**Sandy Silt Till**	

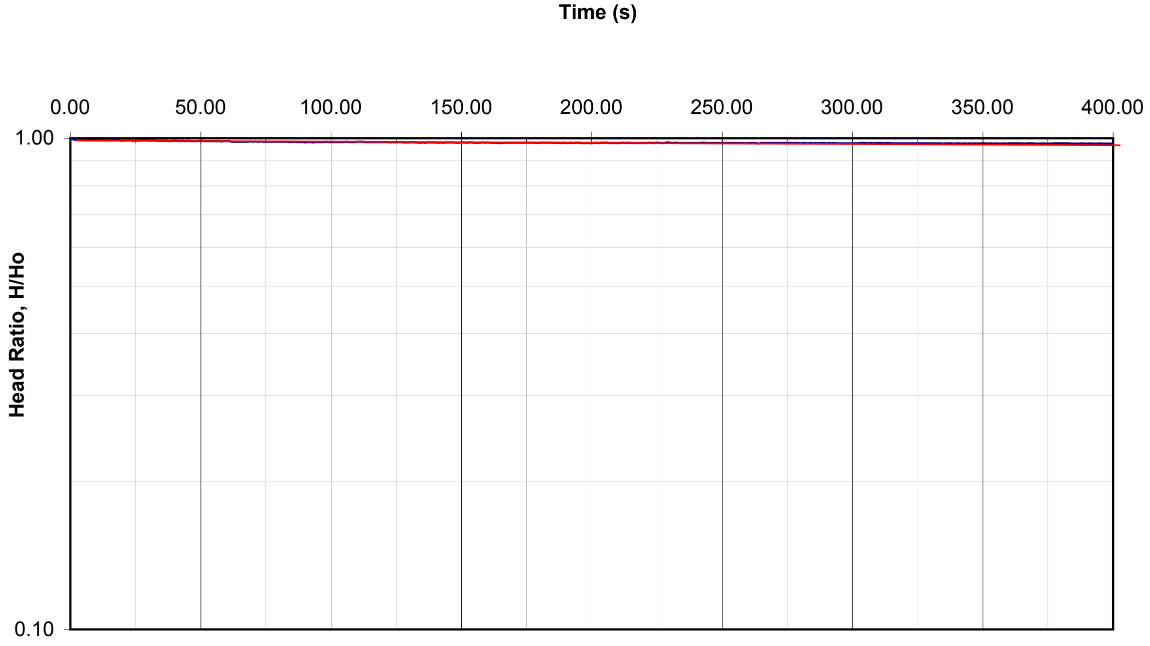
Shape factor F= 2 x 3.14 x L / ln(L/R) = 5.701815 m

Permeability K= 3.14 x r2 / F x (t2 - t1) x ln (H1/H2) (Bouwer and Rice Method)

ln (H1/H2) / (t2 - t1) = 0.000176752

K= **6.1E-06** cm/s

6.1E-08 m/s



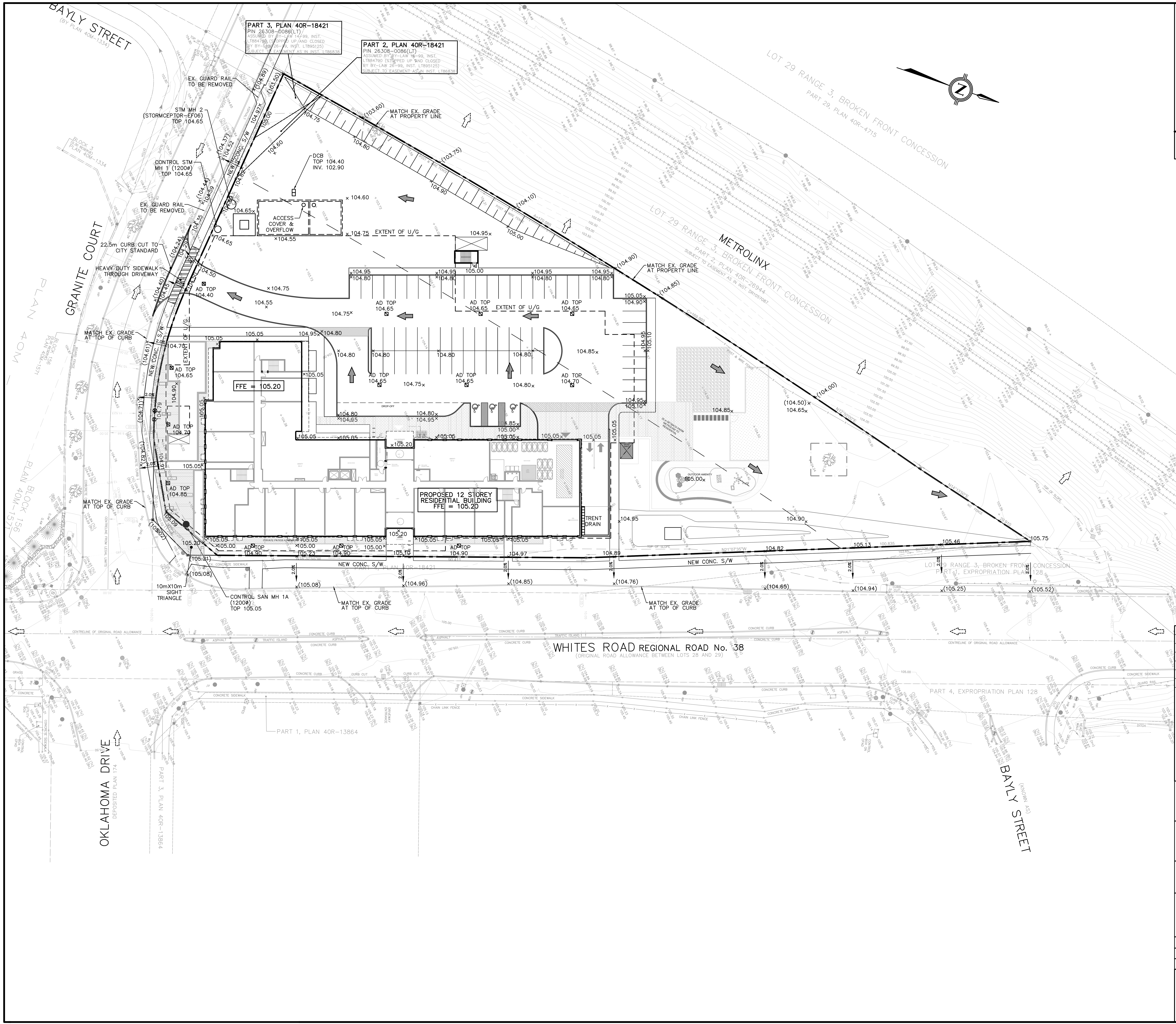
Appendix Drawings

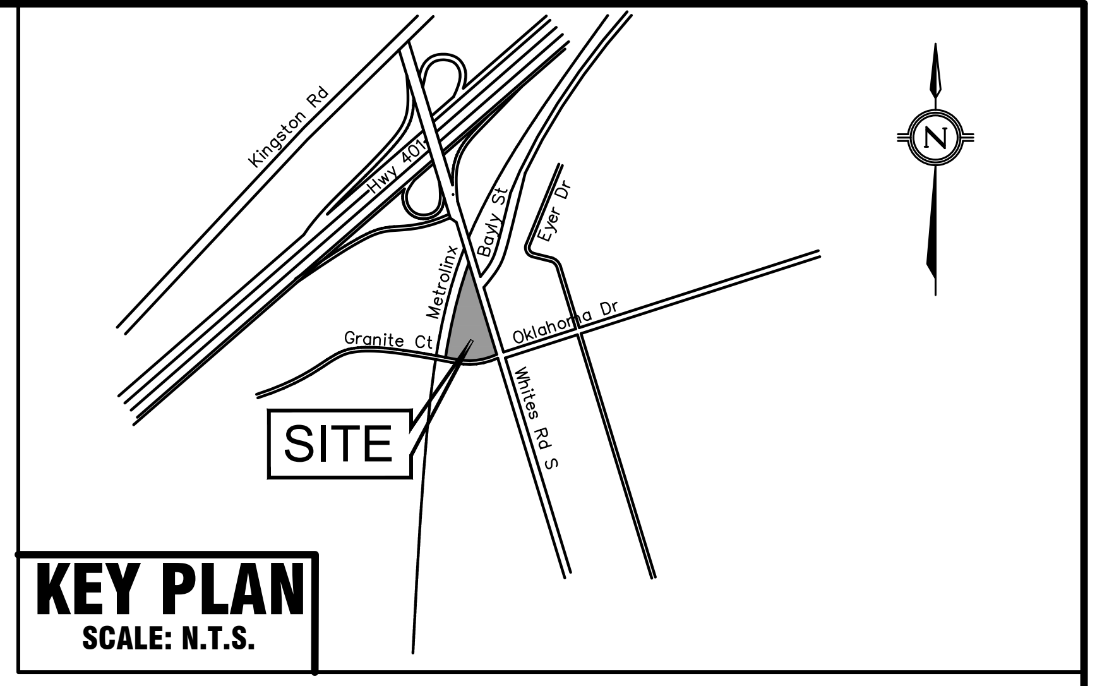
SS-1 – Site Servicing Plan •

GR-1 – Site Grading Plan •

GEN-1 – General Notes Plan •

ESC-1 – Erosion and Sediment Control Plan •





KEY PLAN
SCALE: N.T.S.

BENCHMARK:

ELEVATIONS SHOWN HEREON ARE GEODETIC AND ARE REFERRED TO CITY OF PICKERING BENCHMARK No. R-055 HAVING A PUBLISHED ELEVATION OF 107.485 METRES.

TOPO INFORMATION TAKEN FROM PLAN OF SURVEY OF PART OF BAYLY STREET, PLAN 40M-1334, CITY OF PICKERING IN THE REGIONAL MUNICIPALITY OF DURHAM. PLAN OF SURVEY PREPARED BY KRCMAR SURVEYORS LTD, OLS; DATED DECEMBER 7, 2021.

LEGEND:

176.40	PROPOSED ELEVATION
176.44 TW 176.31 BW	PROP. TOP OF WALL PROP. BOTTOM OF WALL
(175.93)	EXISTING ELEVATION TO REMAIN
●	PROPOSED SANITARY MANHOLE
○	PROPOSED STORM MANHOLE
□	PROPOSED CATCHBASIN
⊠	PROPOSED AREA DRAIN
⊗	PROPOSED WATER VALVE & BOX
	PROPOSED HYDRANT
Ⓜ	WATER METER LOCATION
← 2.0%	DRAINAGE FLOW
⇦	OVERLAND FLOW DIRECTION (GREATER THAN 100 YEAR)
Ⓢ	PROPOSED STORMCEPTOR MANHOLE
— · —	PROPERTY LINE
176.00	EXISTING ELEVATION
⇦	EXTERNAL OVERLAND FLOW DIRECTION
▤	EXISTING CATCHBASIN
▩	EXISTING SANITARY MANHOLE
◎	EXISTING STORM MANHOLE
	EXISTING HYDRANT
	EXISTING VALVE & BOX
●	EXISTING UTILITY POLE
	3:1 SLOPE (MAX)
D.C.	DEPRESSED CURB

6			
5			
4			
3			
2			
1	ISSUED FOR REZONING	.	K.L.
	DESCRIPTION	DATE	BY

STAMP: REVISIONS

STAMP:

LICENSED PROFESSIONAL ENGINEER
W. C. IP
MAY 11/23
PROVINCE OF ONTARIO

CITY OF PICKERING
ENGINEERING SERVICES DEPARTMENT

PROJECT:

PROPOSED 12-STOREY RESIDENTIAL BUILDING
720 GRANITE COURT, PICKERING

SITE GRADING PLAN

CONSULTANT:

MASONGSONG ASSOCIATES

7800 KENNEDY ROAD
SUITE 201
MARKHAM, ONTARIO
L3R 2C7
T: (905) 944-0162
www.maeng.ca

DESIGN BY: K.L.		CHECKED BY:	K.L.	PROJECT No. 22-104
DRAWN BY: MAEL-CAD		CHECKED BY:	A.I.	
SCALE:	1:400	DATE:	OCTOBER 2022	

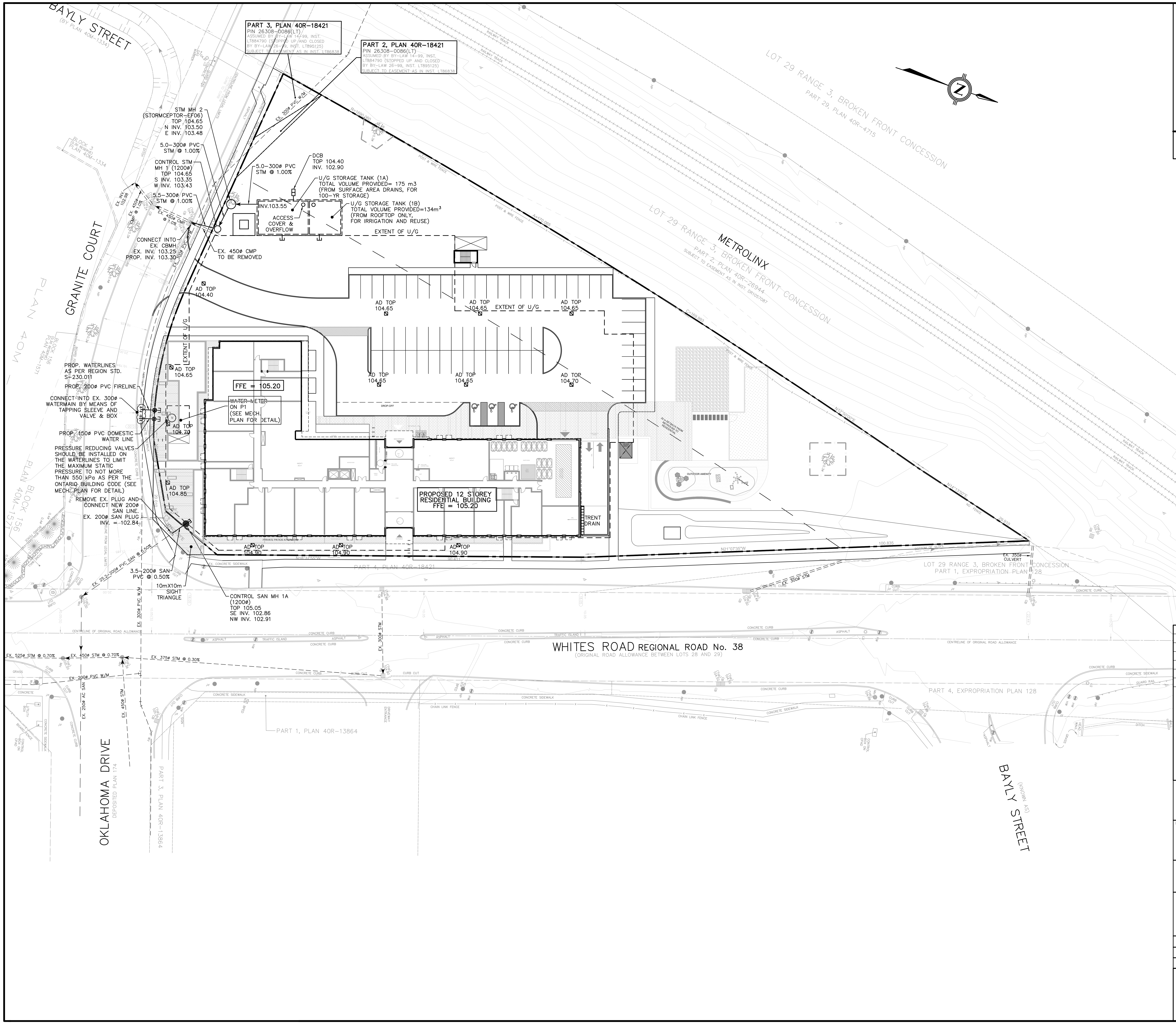
Approved as to form in reliance upon the professional skill and ability of Masongsong Associates, Consulting Engineers, as to design and specification.

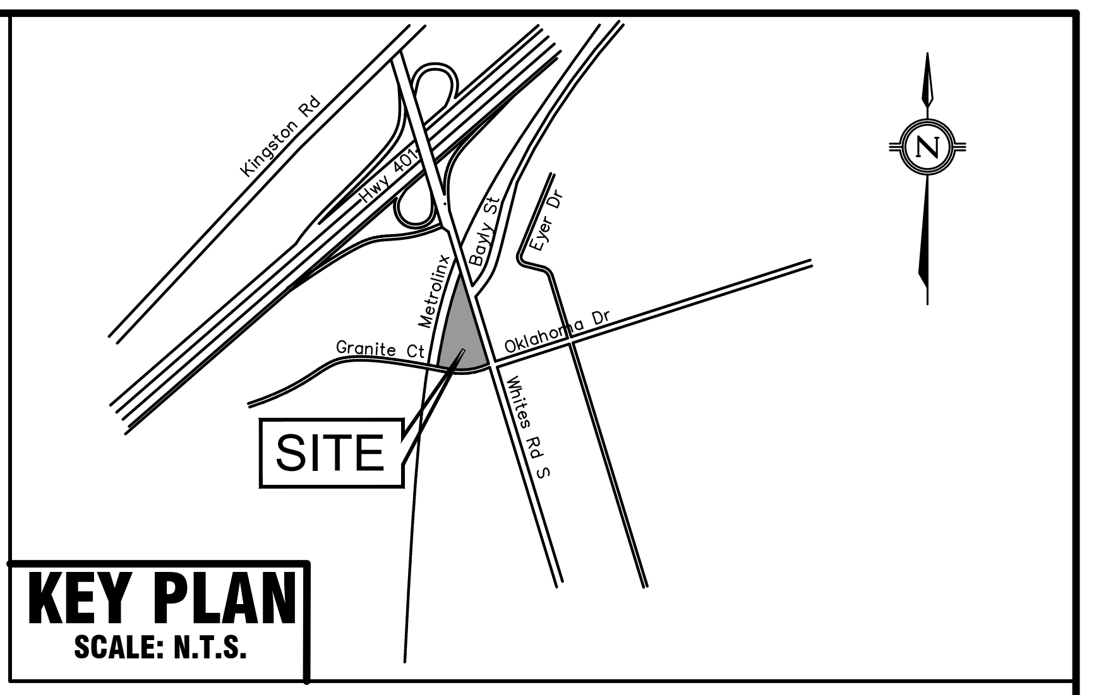
Director of Engineering

Date

DRAWING No.

GR-1





KEY PLAN
SCALE: N.T.S.

BENCHMARK:

ELEVATIONS SHOWN HEREON ARE GEODETIC AND ARE REFERRED TO CITY OF PICKERING BENCHMARK No. R-055 HAVING A PUBLISHED ELEVATION OF 107.485 METRES.

TOPO INFORMATION TAKEN FROM PLAN OF SURVEY OF PART OF BAYLY STREET, PLAN 40M-1334, CITY OF PICKERING IN THE REGIONAL MUNICIPALITY OF DURHAM. PLAN OF SURVEY PREPARED BY KRCMAR SURVEYORS LTD, OLS; DATED DECEMBER 7, 2021.

LEGEND:

●	PROPOSED SANITARY MANHOLE
○	PROPOSED STORM MANHOLE
□	PROPOSED CATCHBASIN
⧄	PROPOSED AREA DRAIN
⊗	PROPOSED WATER VALVE & BOX
⚲	PROPOSED HYDRANT
Ⓜ	WATER METER LOCATION
Ⓢ	PROPOSED STORMCEPTOR MANHOLE
━ ▪ ━	PROPERTY LINE
▤	EXISTING CATCHBASIN
▩	EXISTING SANITARY MANHOLE
◎	EXISTING STORM MANHOLE
⚲	EXISTING HYDRANT
⚲	EXISTING VALVE & BOX
● UP/L	EXISTING UTILITY POLE
D.C.	DEPRESSED CURB

6			
5			
4			
3			
2			
1	ISSUED FOR REZONING	.	K.L.
	DESCRIPTION	DATE	BY

STAMP: REVISIONS

STAMP:
W. C. IP
MAY 11/23

CITY OF PICKERING
ENGINEERING SERVICES DEPARTMENT

PROJECT:

PROPOSED 12-STOREY RESIDENTIAL BUILDING
720 GRANITE COURT, PICKERING

SITE SERVICING PLAN

CONSULTANT:

MASONGSONG ASSOCIATES
7800 KENNEDY ROAD
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DESIGN BY:	K.L.	CHECKED BY:	K.L.	PROJECT No. 22-104
DRAWN BY:	MAEL-CAD	CHECKED BY:	A.I.	
SCALE:	1:400	DATE:	OCTOBER 2022	

Approved as to form in reliance upon the professional skill and ability of Masongsong Associates, Consulting Engineers, as to design and specification.

Director of Engineering

Date

DRAWING No.
SS-1

G:\projects\22\104\DESIGN\22104-SGR.dwg, Masongsong Associates Engineering Limited

GENERAL NOTES

1. ALL WORK TO CONFORM WITH THE APPLICABLE STANDARDS OF THE REGIONAL MUNICIPALITY OF DURHAM, CITY OF PICKERING, AND ONTARIO PROVINCIAL STANDARD DRAWINGS AND SPECIFICATIONS.
2. FOR ALL CONSTRUCTION DETAILS NOT SHOWN ON PLANS, REFERENCE SHALL BE MADE TO THE ENGINEERING DESIGN CRITERIA AND STANDARD DRAWINGS OF THE CITY OF PICKERING AND REGIONAL MUNICIPALITY OF DURHAM.
3. THE LOCATION OF UTILITIES IS APPROXIMATE ONLY, AND THE EXACT LOCATION SHOULD BE DETERMINED BY CONSULTING THE MUNICIPAL AUTHORITIES AND UTILITY COMPANIES CONCERNED. THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL UTILITIES AND SHALL BE RESPONSIBLE FOR ADEQUATE PROTECTION FROM DAMAGE DURING CONSTRUCTION.
4. ALL DISTURBED AREA WITHIN MUNICIPAL RIGHT OF WAY SHALL BE RESTORED TO THE SATISFACTION OF THE CITY/MUNICIPAL ENGINEER.
5. ALL RESTORATIONS AND RELOCATIONS WITHIN THE REGIONAL RIGHT–OF–WAY TO BE COMPLETED TO THE SATISFACTION OF THE DIRECTOR OF ENGINEERING AND THE REGION OF DURHAM.
6. ROAD CURB AND PARKING LOT CURBS TO BE OPSD–600.11.

SEWER PIPE MATERIAL

1. ALL POLYVINYL CHLORIDE (PVC) SANITARY AND STORM SEWER PIPES SHALL MEET CURRENT M.O.E.E. SPECIFICATIONS.
2. ALL CONCRETE SEWER PIPES AND FITTING UP TO AND INCLUDING 450 mm IN DIAMETER SHALL BE FABRICATED IN ACCORDANCE WITH CSA–A257.1–M92 CLASS 3 OR LATEST AMENDMENT UNLESS OTHERWISE NOTED.
3. ALL CONCRETE SEWER PIPES AND FITTINGS 525 mm DIAMETER AND LARGER SHALL BE FABRICATED IN ACCORDANCE WITH CSA SPECIFICATIONS CSA–A257–2–M92 REINFORCED CLASSES AS SPECIFIED, OR LATEST AMENDMENT UNLESS OTHERWISE NOTED.
4. WHERE WATER BEARING SAND AND SILT OCCUR, THE SERVER JOINTS SHOULD BE LEAK–PROOF, OR WRAPPED WITH A WATER PROOF MEMBRANE TO PREVENT SUBGRADE MIGRATION THROUGH LEAKY JOINTS RESULTING FROM INADVERTENT FAULTY INSTALLATION. THE NECESSITY OF IMPLEMENTING THESE MEASURES CAN BEST BE DETERMINED DURING SEWER CONNECTION.

SEWER BEDDING

1. STORM, SANITARY AND FDC SEWER BEDDING TO BE AS OPSD 802.010 CLASS 'B' FOR FLEXIBLE PIPE AND OPSD 802.030 CLASS 'B' FOR RIGID PIPES, OR AS SPECIFIED.
2. ALL SERVICES AND STRUCTURES LOCATED IN TRENCH CUT TO BE SUPPORTED BY COMPACTED GRANULAR TO UNDISTURBED OR STRUCTURALLY COMPACTED GROUND.

MANHOLES

1. ALL STORM AND SANITARY MANHOLES SHALL BE AS PER OPSD 701.010, 701.011, 701.012 AND 701.013 WITH FRAME AND COVER AS PER OPSD 401.010.
2. 'MODULOC' OR APPROVED MANHOLE ADJUSTERS TO BE USED IN LIEU OF BRICKING.

BACK FILL

1. ALL STORM MANHOLES AND CATCHBASIN EXCAVATIONS TO BE BACKFILLED WITH GRANULAR 'B' COMPACTED TO 95% PROCTOR DENSITY.

ESC AND CONSTRUCTION TIMING NOTES

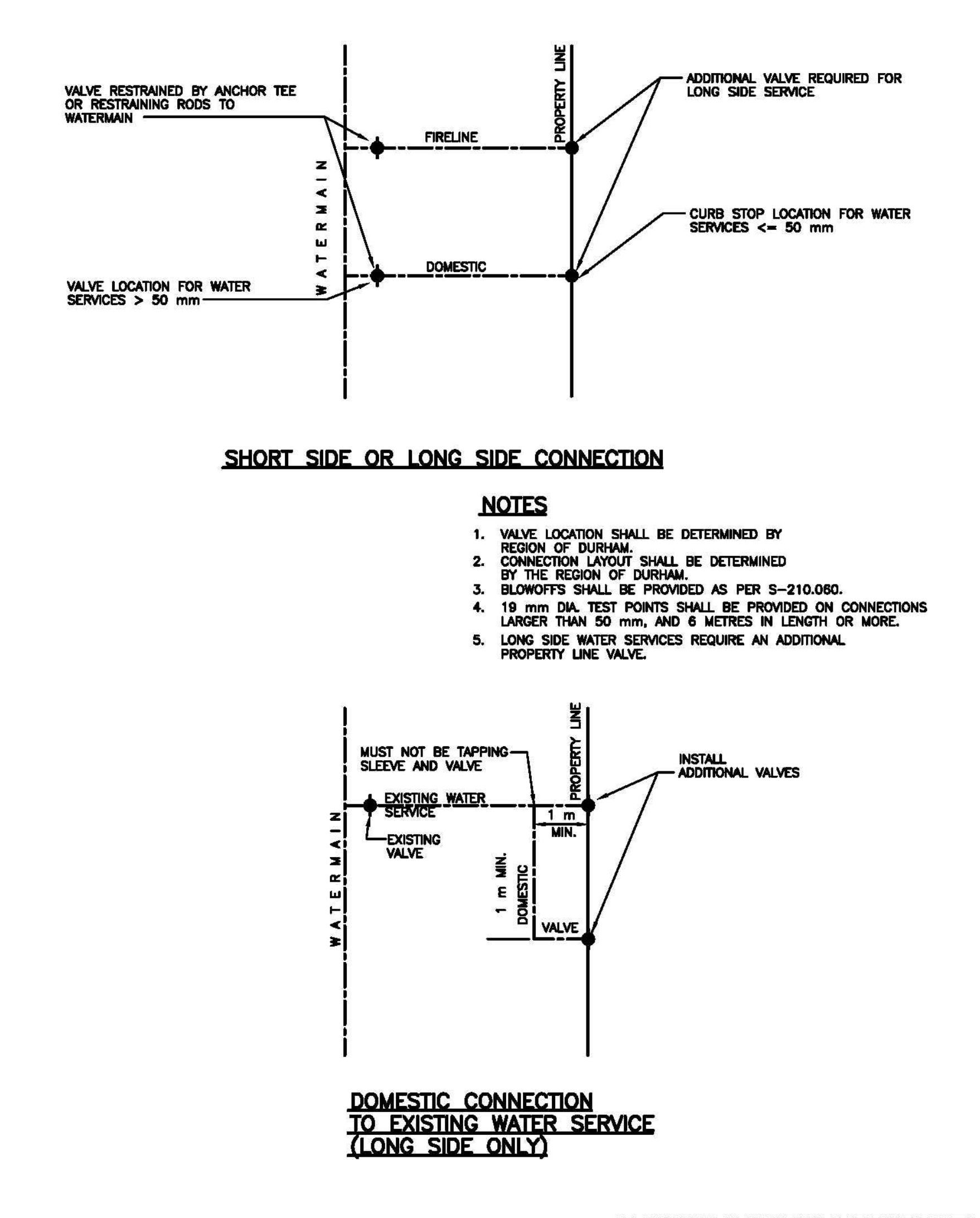
1. ALL EROSION AND SEDIMENT CONTROL MEASURES TO BE INSTALLED PRIOR TO ANY SITE ALTERATION OR BUILDING ACTIVITIES, IN ACCORDANCE WITH DRAWING ES1, AND AS DIRECTED ON–SITE BY THE CONSULTING ENGINEER.
2. ALL EROSION AND SEDIMENT CONTROL MEASURES TO BE INSPECTED AT LEAST ONCE A WEEK AND IMMEDIATELY AFTER EVERY RAINFALL. ANY DEFICIENCIES IN THE ESC MEASURES TO BE RECTIFIED IMMEDIATELY, AND AS DIRECTED BY THE ENGINEER.
3. THE INFILTRATION TRENCH AND PRE–TREATMENT FILTER STRIP ARE TO BE INSTALLED AS THE FINAL STAGE OF CONSTRUCTION, AND NO EARLIER THAN AFTER COMPLETION OF ASPHALT PAVING OPERATIONS.
4. ESC MEASURES ARE TO REMAIN IN PLACE UNTIL THE COMPLETION OF ALL CONSTRUCTION ACTIVITIES, ALL DISTURBED AREAS ARE COMPLETELY RE–ESTABLISHED AND STABILIZED, AND AS DIRECTED BY THE ENGINEER AFTER FINAL INSPECTION.

CATCHBASINS

1. ALL CATCHBASINS AND DOUBLE CATCHBASINS SHALL BE PRECAST AS PER OPSD 705.010 AND 705.020 RESPECTIVELY.
2. ALL CATCHBASIN FRAME AND COVER SHALL BE AS PER OPSD 400.020.

WATERMAINS

1. WATERMAINS AND APPURTENANCES SHALL BE AS PER REGION OF DURHAM SPECIFICATIONS.
2. WATERMAIN SHALL BE POLYVINYL CHLORIDE (PVC) CLASS 150, DR18 CONFORMING TO AWWA C–900, CLASS 'P' BEDDING. 19mm SERVICE CONNECTIONS TO BE TYPE K COPPER (REGION OF DURHAM STANDARD S–410).
3. ALL WATERMAIN AND SERVICE CONNECTIONS SHALL HAVE A MINIMUM COVER OF 1.80 m.



SHORT SIDE OR LONG SIDE CONNECTION

NOTES

1. VALVE LOCATION SHALL BE DETERMINED BY REGION OF DURHAM.
2. CONNECTION LAYOUT SHALL BE DETERMINED BY THE REGION OF DURHAM.
3. BLOWOFFS SHALL BE PROVIDED AS PER S–210.060.
4. 19 mm DIA. TEST POINTS SHALL BE PROVIDED ON CONNECTIONS LARGER THAN 50 mm, AND 6 METRES IN LENGTH OR MORE.
5. LONG SIDE WATER SERVICES REQUIRE AN ADDITIONAL PROPERTY LINE VALVE.

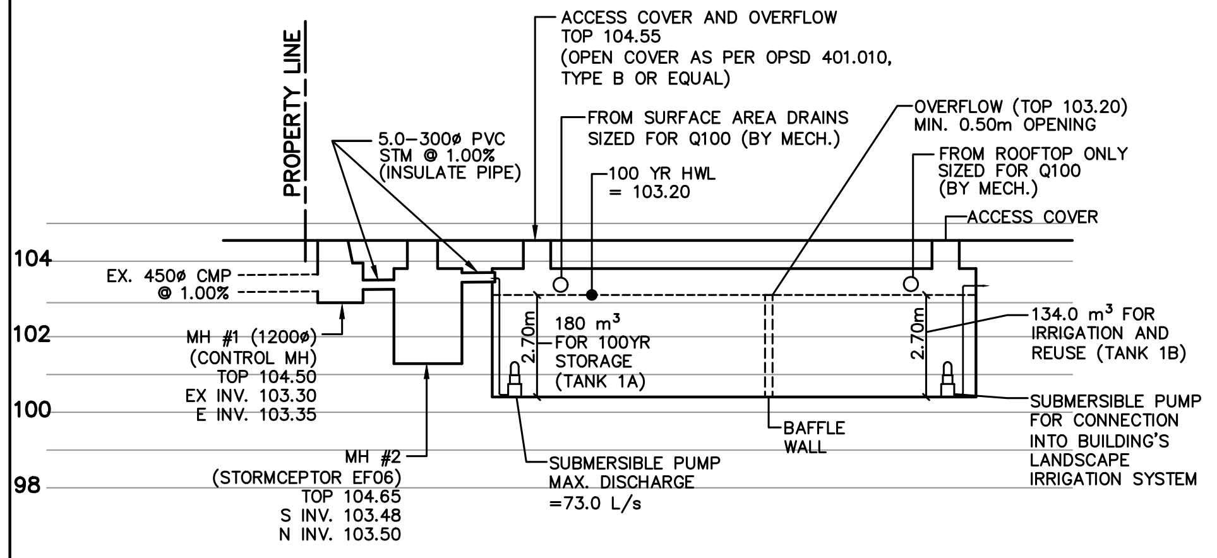
DOMESTIC CONNECTION TO EXISTING WATER SERVICE (LONG SIDE ONLY)

ALL DIMENSIONS IN MILLIMETRES EXCEPT WHERE NOTED.

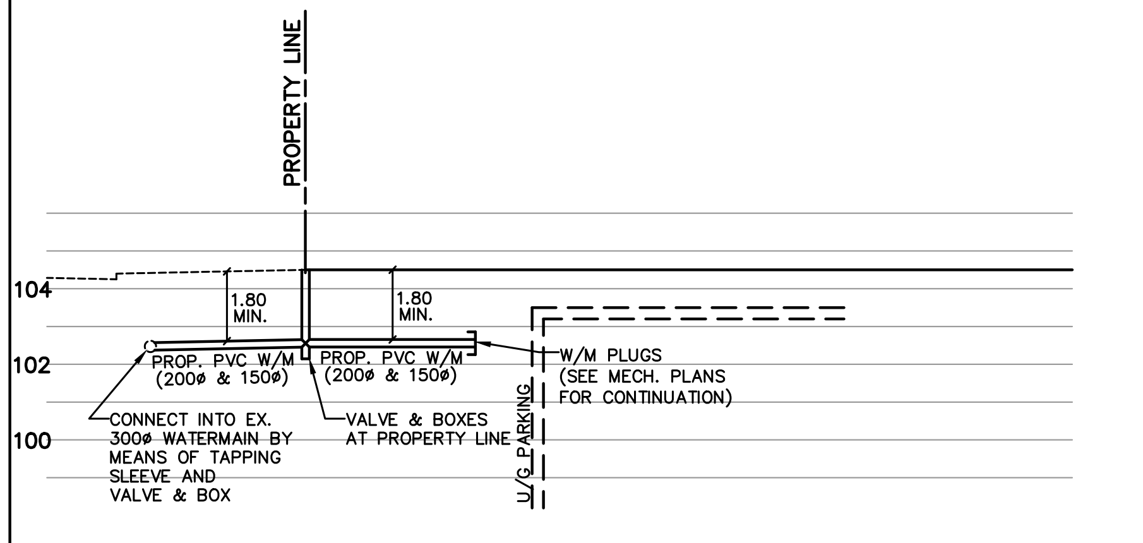
DURHAM REGION
WORKS DEPARTMENT

PIPING & FITTINGS FOR COMMERCIAL, INDUSTRIAL & MULTI–RESIDENTIAL CONNECTIONS (DOMESTIC & FIRELINE)

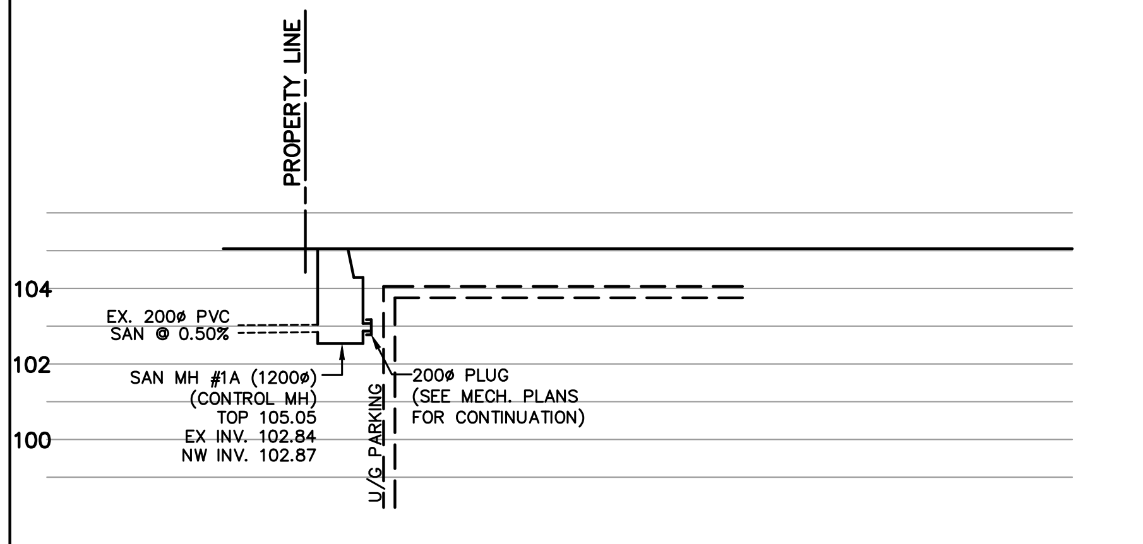
DWG. DATE: 1988 09
REVISION NO.: 9
REV. DATE: 2020 04
SCALE: N.T.S.
S-230.011



PROPOSED UNDERGROUND STORAGE TANKS
TOTAL VOLUME PROVIDED = 314 m3

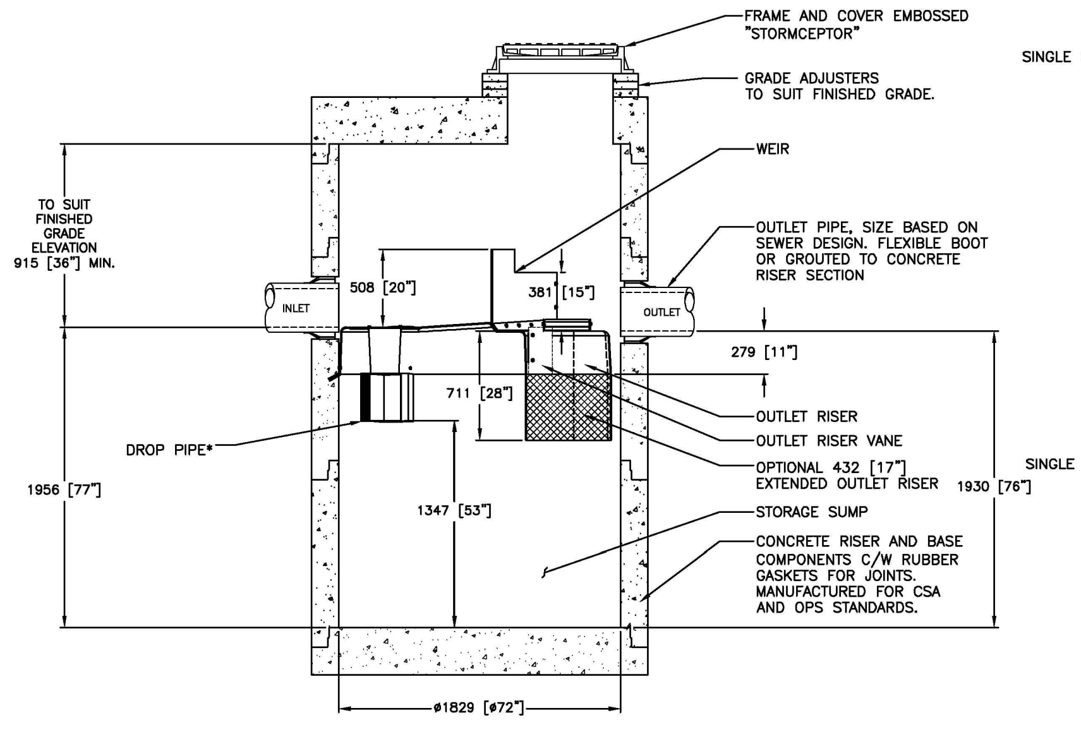


PROPOSED WATERMAIN CONNECTION

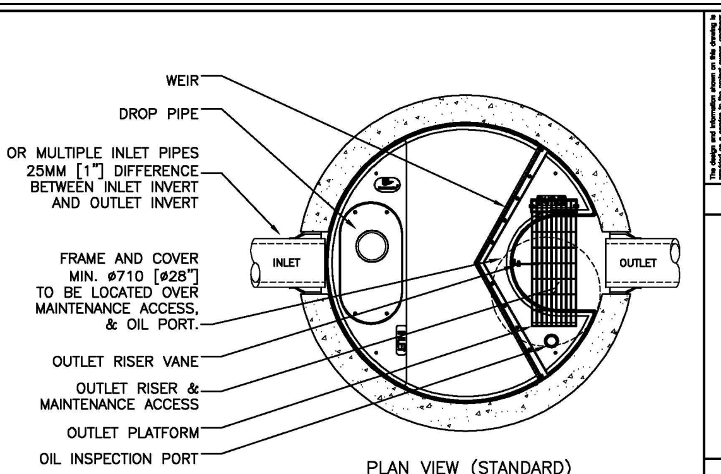


PROPOSED SANITARY CONNECTION

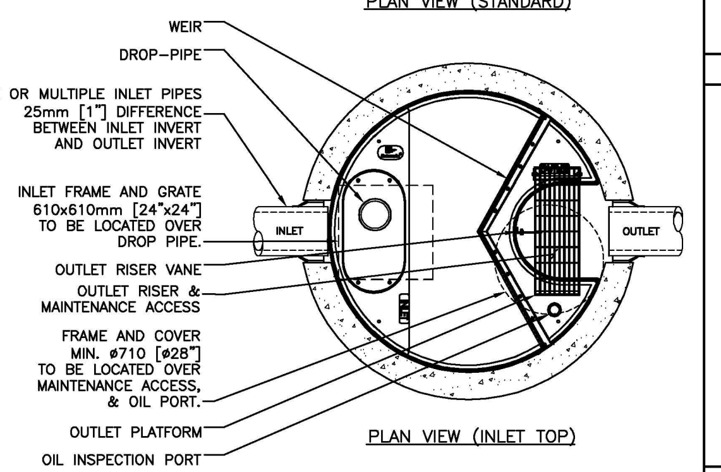
DRAWING NOT TO BE USED FOR CONSTRUCTION



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 EF6 AND 535 L/min/m^2 (13.1 gpm/ft^2) FOR STORMCEPTOR EFO6 (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	EFO6				
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

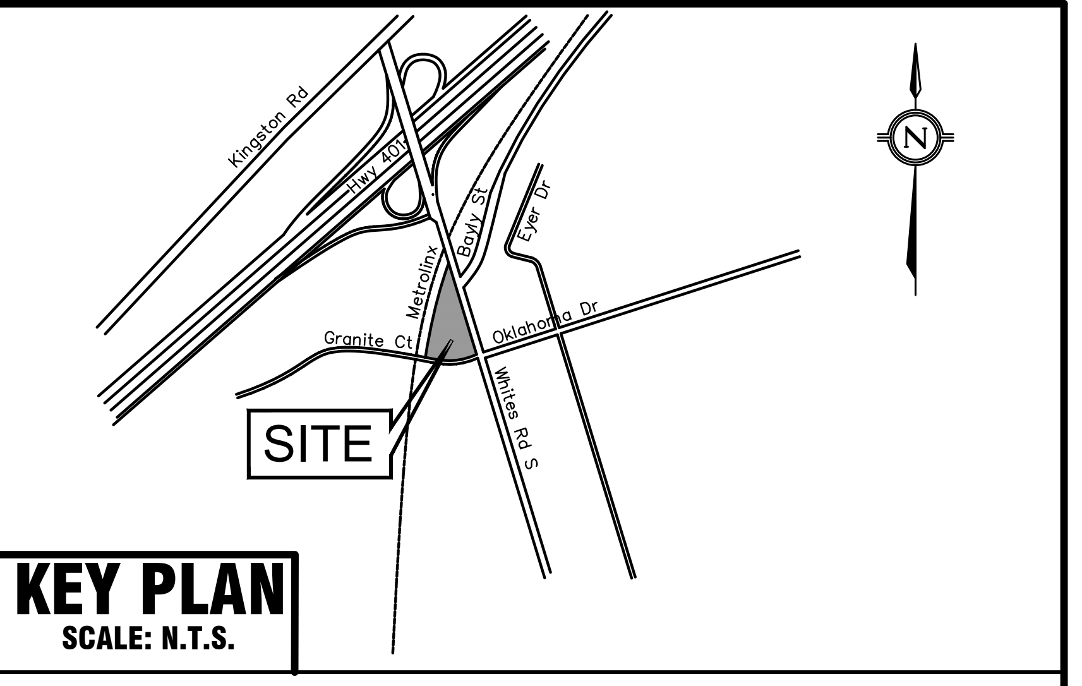
MARK	DATE	REVISION DESCRIPTION	BY
####	####	####	####
####	####	####	####
####	####	####	####
1	6/8/18	OUTLET PLATFORM	JSK
0	05/26/17	INITIAL RELEASE	JSK

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

DATE: 10/13/2017	
DESIGNED: JSK	DRAWN: JSK
CHECKED: BSF	APPROVED: SP
PROJECT No.: EFO6	SEQUENCE No.: *
SHEET: 1 OF 1	



KEY PLAN
SCALE: N.T.S.

BENCHMARK:

ELEVATIONS SHOWN HEREON ARE GEODETIC AND ARE REFERRED TO CITY OF PICKERING BENCHMARK No. R–055 HAVING A PUBLISHED ELEVATION OF 107.485 METRES.

TOPO INFORMATION TAKEN FROM PLAN OF SURVEY OF PART OF BAYLY STREET, PLAN 40M–1334, CITY OF PICKERING IN THE REGIONAL MUNICIPALITY OF DURHAM. PLAN OF SURVEY PREPARED BY KRCMAR SURVEYORS LTD, OLS; DATED DECEMBER 7, 2021.

	DESCRIPTION	DATE	BY
6			
5			
4			
3			
2			
1	ISSUED FOR REZONING	.	K.L.

REVISIONS

STAMP:

STAMP:
LICENSED PROFESSIONAL ENGINEER
W. C. IP
MAY 11/23
PROVINCE OF ONTARIO

CITY OF PICKERING
ENGINEERING SERVICES DEPARTMENT

PROJECT:
PROPOSED 12–STOREY
RESIDENTIAL BUILDING
720 GRANITE COURT, PICKERING

DETAIL PLAN

CONSULTANT:
MASONGSONG ASSOCIATES
7800 KENNEDY ROAD
SUITE 201
MARKHAM, ONTARIO
L3R 2C7
T: (905) 944-0162
www.maeng.ca

DESIGN BY:	K.L.	CHECKED BY:	K.L.
DRAWN BY:	MAEL–CAD	CHECKED BY:	A.I.
SCALE:		DATE:	OCTOBER 2022

PROJECT No.
22–104

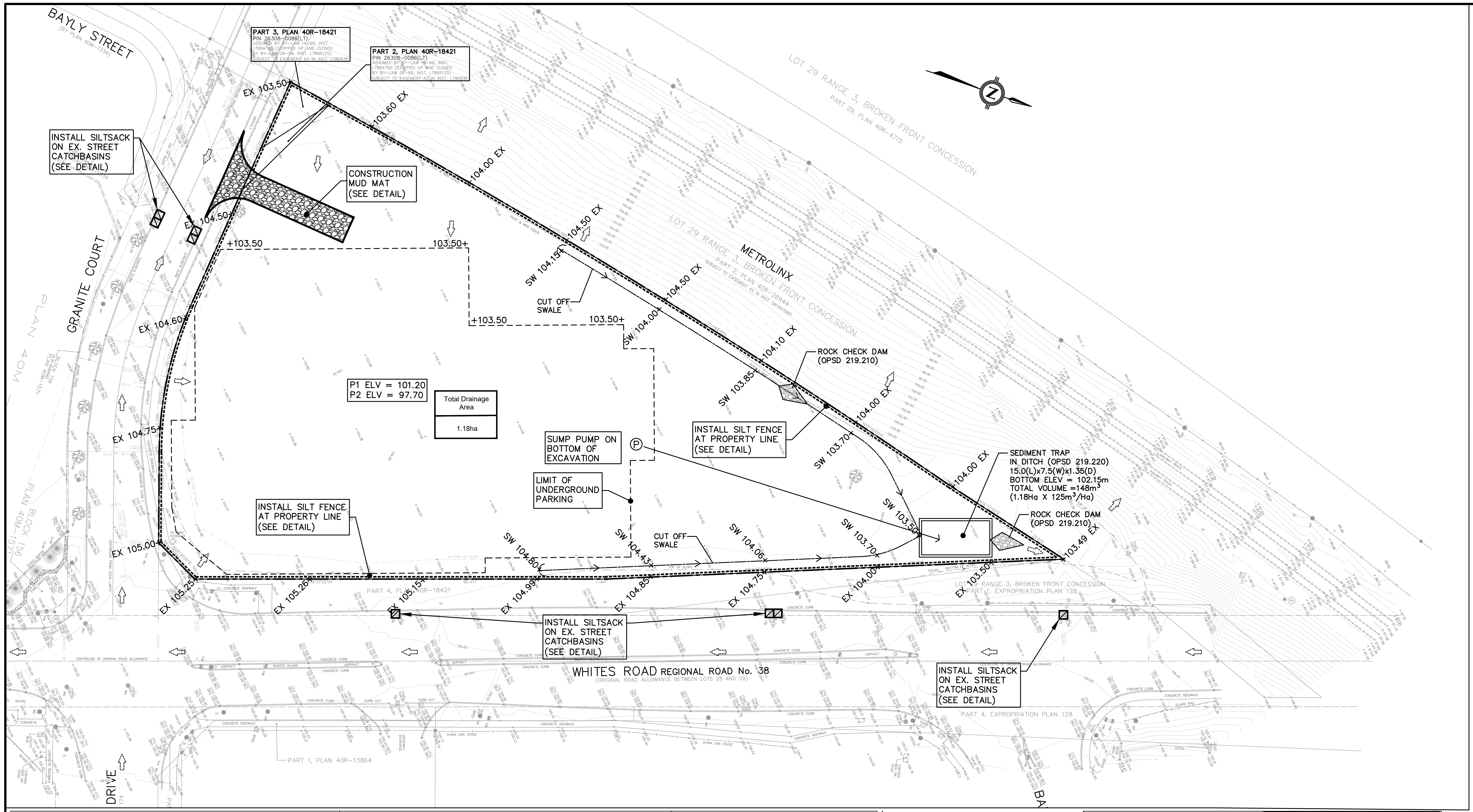
Approved as to form in reliance upon the professional skill and ability of Masongsong Associates, Consulting Engineers, as to design and specification.

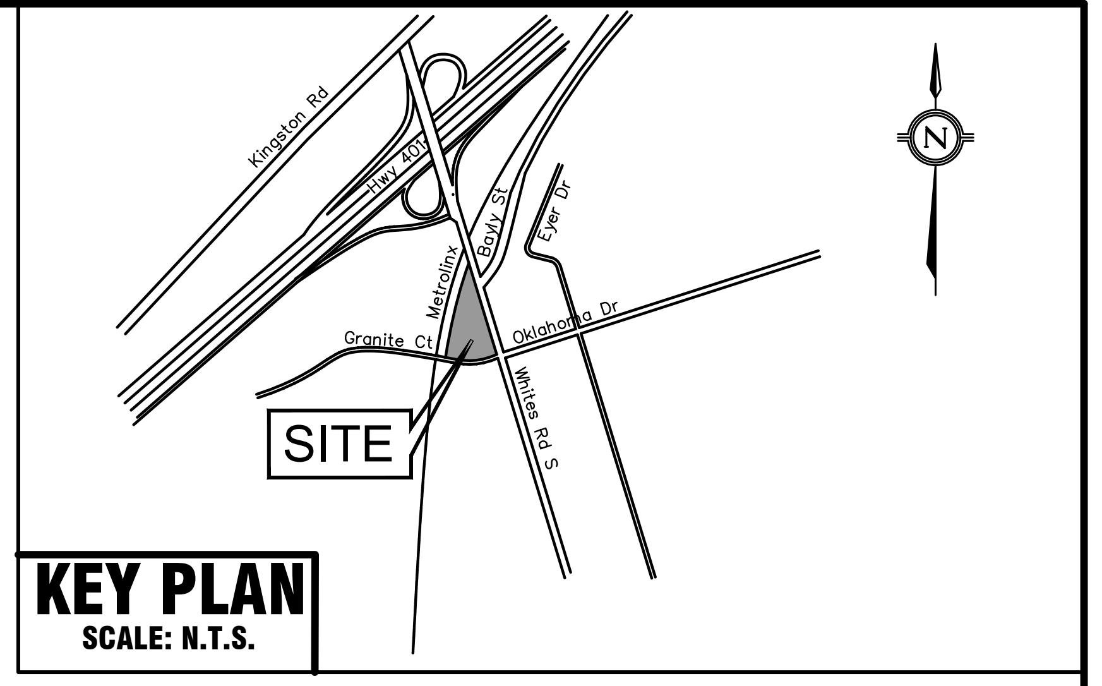
Director of Engineering

Date

DRAWING No.
DET–1

G:\projects\22\104\DESIGN\22104-DET.dwg, Masongsong Associates Engineering Limited





KEY PLAN
SCALE: N.T.S.

BENCHMARK:

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LEGEND:

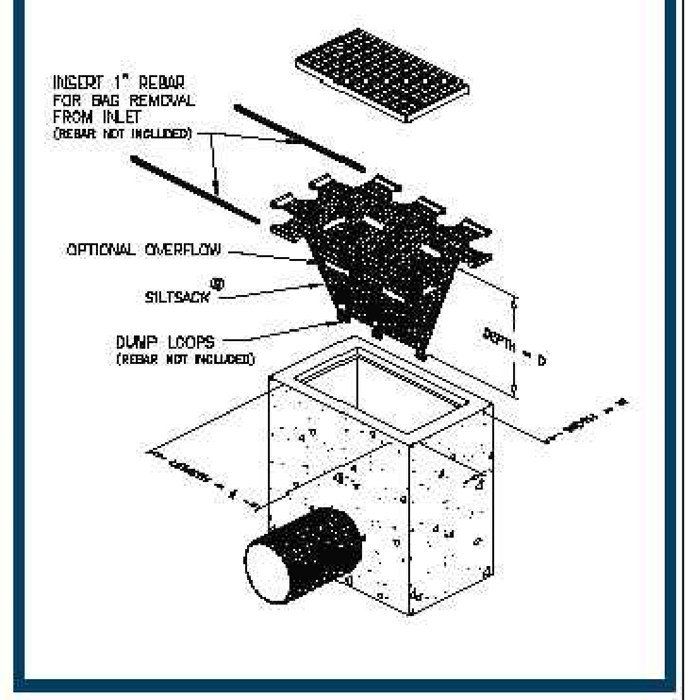
⇦	EXTERNAL OVERLAND FLOW DIRECTION
— - —	PROPERTY LINE
- - - - -	SEDIMENT CONTROL FENCE
☐	PROPOSED CATCHBASIN & AREA DRAIN
☐	EXISTING CATCHBASIN

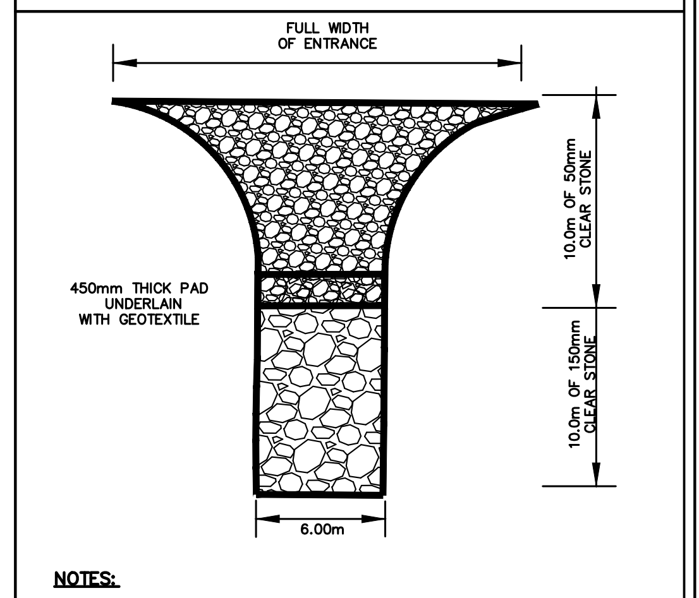
City of PICKERING

Erosion and Sediment Control General Notes

1. Prior to commencement of any on-site work/topsoil stripping, erosion and sediment control (ESC) measures, as per approved Erosion & Sediment Control Plan, must be installed to prevent surface runoff from leaving the site "untreated". All ESC measures are to be maintained until the site has been stabilized.
2. The contractor shall be responsible for the proper installation, maintenance and removal of all temporary erosion and sediment control measures during construction, as directed by the Engineer or the City of Pickering.
3. Sediment control fence to use geotextile with weave density of 270R terrafix or equivalent.
4. All exposed soils shall be immediately stabilized as directed by the Engineer or City of Pickering.
5. Check dams are to be used in any temporary drainage swales required during the construction period.
6. Additional erosion and sediment control measures may be required and shall be determined by the Engineer or the City of Pickering.
7. All swales are to be stabilized prior to use.
8. Inspection of the proposed erosion and sediment control measures will occur on a weekly basis, after rainfall events exceeding 10mm or after rapid snow melt events and daily during extended rain or snow melt periods. The silt control fence must be inspected for rips or tears, broken stakes, blow outs and accumulation of sediment. The silt control fence must be fixed and/or replaced immediately when damaged. Accumulated sediment must be removed from the silt control fence when accumulation reaches 50% of the height of the fence.
9. Rock check dams are to be cleaned of all accumulated sediment as soon as sediment has accumulated to a depth greater than 50% of all the upstream check dams.
10. Cleaning and repair of mud mats and any other temporary sediment control measures shall be done as necessary through regular inspection or as directed by the Engineer or City of Pickering. All damaged ESC measures shall be repaired and/or replaced within 48 hours of the inspection.
11. Materials to repair damaged ESC measures must be kept on-site at all times.
12. The ESC strategies on these plans are not static and may need to be upgraded/amended as site conditions change to prevent sediment releases. Failed ESC measures must be repaired immediately.
13. No construction activity or machinery shall intrude beyond the silt control fence or limit of development. All construction vehicles shall leave the site at designated locations as shown on the plans. All materials and equipment shall be stored on site in a designated area. No materials or equipment shall be stored on the Municipal right of way. No construction vehicles will park on Municipal roads.
14. Servicing of construction equipment on site is prohibited.
15. The contractor must clean adjacent roads on a regular basis. The road shall be, at a minimum scraped daily and flushed (if necessary) on Friday evenings or Saturday mornings.
16. Dust control to be reviewed daily. Water truck or calcium chloride is to be provided on-site and haul roads/working areas are to be treated as required to ensure that dust is controlled on-site.
17. At the end of construction period, accumulated sediment is to be removed off site prior to the removal of the silt fence.
18. All litter and debris shall be monitored and disposed of daily or as necessary through regular inspection.
19. All topsoil stockpiles shall be surrounded with sediment control fence and stabilized with seed mix as per this drawing.
20. Disturbed areas are to be minimized to the extent possible and stabilized as the work progresses. Any area exposed for more than 30 days will be stabilized.

Typical Siltsack® Construction - Type B

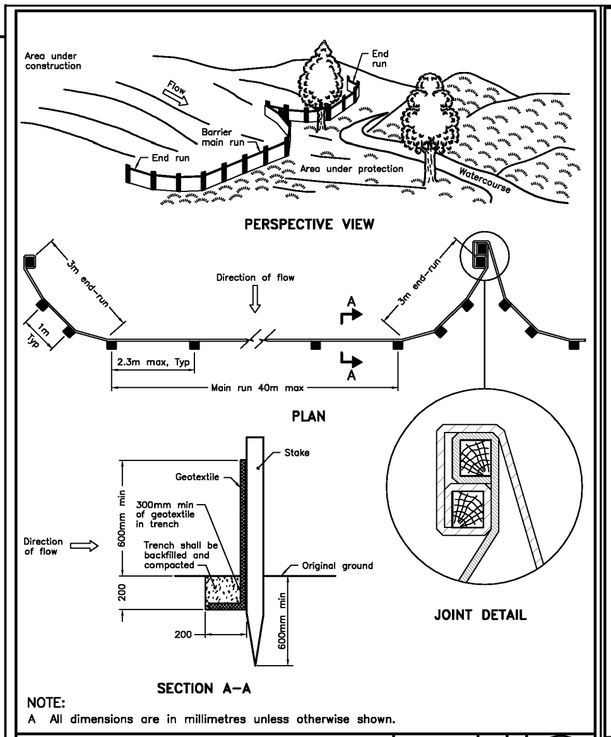




NOTES:

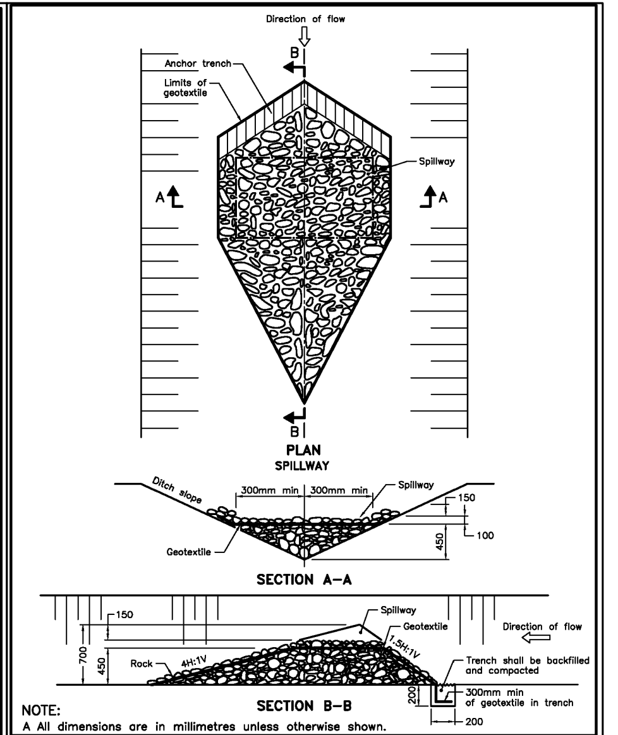
1. GRANULAR MATERIAL IS TO BE CLEAN APPROVED MATERIAL AND PLACED AT NOTED DIMENSION PRIOR TO LAND DISTURBANCE.
2. GEOTEXTILE IS TO BE PLACED OVER THE ENTIRE AREA PRIOR TO STONE PLACEMENT.
3. MAINTENANCE – THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL REDUCE TRACKING OR FLOWING OF SEDIMENT ONTO THE R.O.W. AND GRANULAR MATERIAL IS TO BE REPLACED AS DIRECTED BY THE TRANSPORTATION AND WORKS DEPARTMENT OF THE CITY OF TORONTO.

CONSTRUCTION MUD-MAT DETAIL



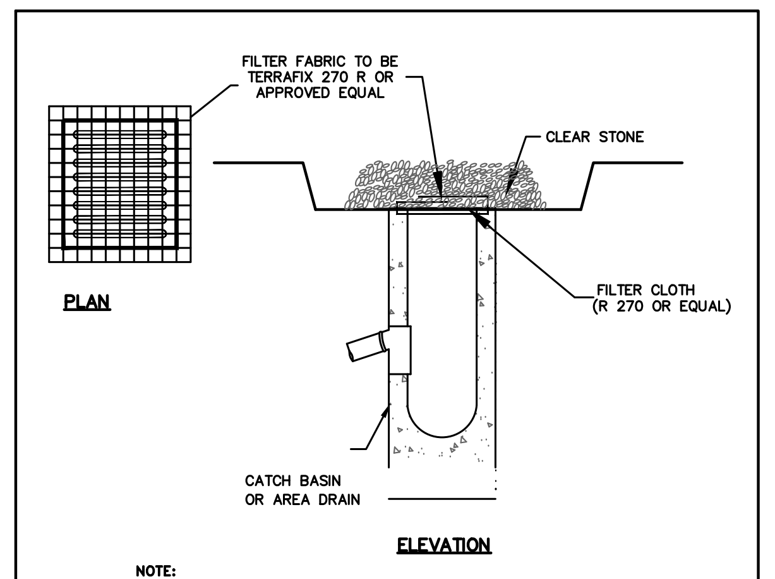
NOTE:
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2015	Rev 2
LIGHT-DUTY SILT FENCE BARRIER	OPSD 219.110	



NOTE:
A All dimensions are in millimetres unless otherwise shown.

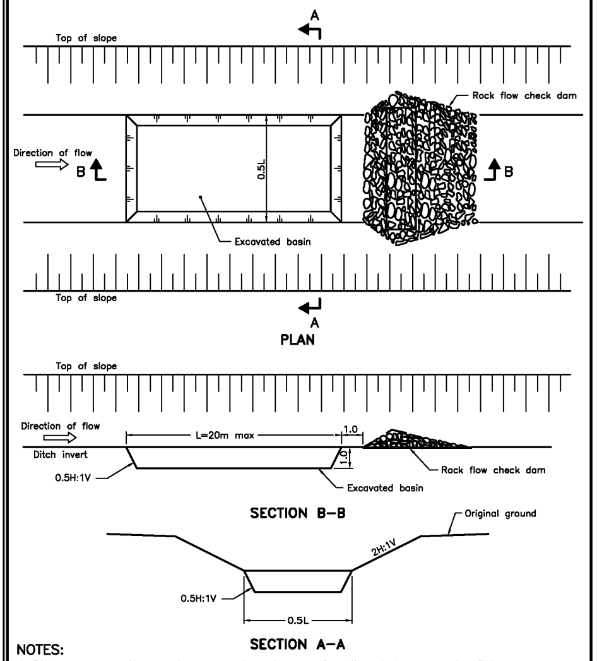
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2015	Rev 2
TEMPORARY ROCK FLOW CHECK DAM V-DITCH	OPSD 219.210	



NOTE:
TEMPORARY SEDIMENT CONTROL DEVICE TO BE INSTALLED AND MAINTAINED ON ALL ONSITE CB AND AD DURING CONSTRUCTION UNTIL ENTIRE SITE AREA HAS BEEN PAVED AND OR SODDED.

TEMPORARY SEDIMENT TRAP

N.T.S.



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	

6			
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4			
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1	ISSUED FOR REZONING	.	K.L.
	DESCRIPTION	DATE	BY

STAMP: REVISIONS

STAMP:

LICENSED PROFESSIONAL ENGINEER
W. C. IP
MAY 11/23
PROVINCE OF ONTARIO

CITY OF PICKERING
ENGINEERING SERVICES DEPARTMENT

PROJECT:
PROPOSED 12-STOREY RESIDENTIAL BUILDING
720 GRANITE COURT, PICKERING

EROSION AND SEDIMENT CONTROL PLAN

CONSULTANT:
MASONGSONG ASSOCIATES

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SUITE 201
MARKHAM, ONTARIO
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www.maeng.ca

DESIGN BY:	K.L.	CHECKED BY:	K.L.	PROJECT No. 22-104
DRAWN BY:	MAEL-CAD	CHECKED BY:	A.I.	
SCALE:	1:500	DATE:	OCTOBER 2022	

Approved as to form in reliance upon the professional skill and ability of Masongsong Associates, Consulting Engineers, as to design and specification.

Director of Engineering

Date

DRAWING No.
ESC-1

Municipal and Development Engineering

Water Resources Engineering

Planning

Project Manag

MASONGSONG ASSOCIATES ENGINEERING LIMITED
Consulting Engineers • Planners • Project Managers

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