BURNSIDE

315 & 323 Mapleview Drive West
Functional Servicing & Stormwater Management Report

Plaza REIT
307 – 110 Sheppard Avenue East
Toronto, ON M2N 6Y8

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Functional Servicing & Stormwater Management Report

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Toronto, ON M2N 6Y8

R.J. Burnside & Associates Limited
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October 2021 (Revised February 2023)
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1	February 23, 2023	Issued for OPA & ZBA #2

R.J. Burnside & Associates Limited

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Disclaimer

1.0 Introduction

1.1 Existing Site Description

R.J. Burnside & Associates Limited has been retained by Plaza Real Estate Investment Trust (the "Client") to prepare a Functional Servicing and Stormwater Management (FSR/SWM) Report for the proposed commercial development at 315 & 323 Mapleview Drive West in the City of Barrie.

The subject site is a 2.45 ha parcel of land located to the south of Mapleview Drive West, an existing car dealership to the east, future storage facility to the west (currently greenfield) and greenfield to the south. Refer to Figure 1 for details.

There is an existing easement in favor of the City of Barrie for the storm sewer, sanitary sewer and watermain services located within the northern side of the property extending to the east and west property lines. Located within this easement are storm, sanitary and water laterals for future connections to the site. Refer to Figure 2 for details.

This Functional Servicing and Stormwater Management Report has been prepared in support of an Official Plan Amendment and a Zoning Bylaw Amendment application. Detailed engineering designs and drawings related to site servicing and grading will incorporate the functional concepts outlined in this report.

1.2 Objectives

The objectives of this Functional Servicing and Stormwater Management Report are:

- To evaluate and confirm capacity for sanitary servicing.
- To evaluate and confirm adequate supply and onsite distribution of municipal water to meet domestic and fire flow requirements.
- To evaluate the stormwater management opportunities and constraints including:
  - Review of the existing quality and quantity control facilities for the site.
  - Determine suitable methods for attenuation and treatment of stormwater runoff.
  - Demonstrate compliance of the proposed stormwater control measures with the City of Barrie's Storm Drainage and Stormwater Management and Design Guidelines for stormwater management criteria.

The above will be completed in accordance with accepted engineering practices and governing criteria from the approval agencies in support of the development applications.

Site lighting, traffic, and parking considerations are not part of the scope of this report and will be addressed by others.

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Client

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TORONTO, ON
M2N 3B3

Drawing Title

315, 323 MAPLEVIEW DRIVE WEST BARRIE, ON L4N 9E8

SITE LOCATION PLAN

Drawn	Checked	Date	Drawing No.
GP	PM	21/09/23	**FIG1**
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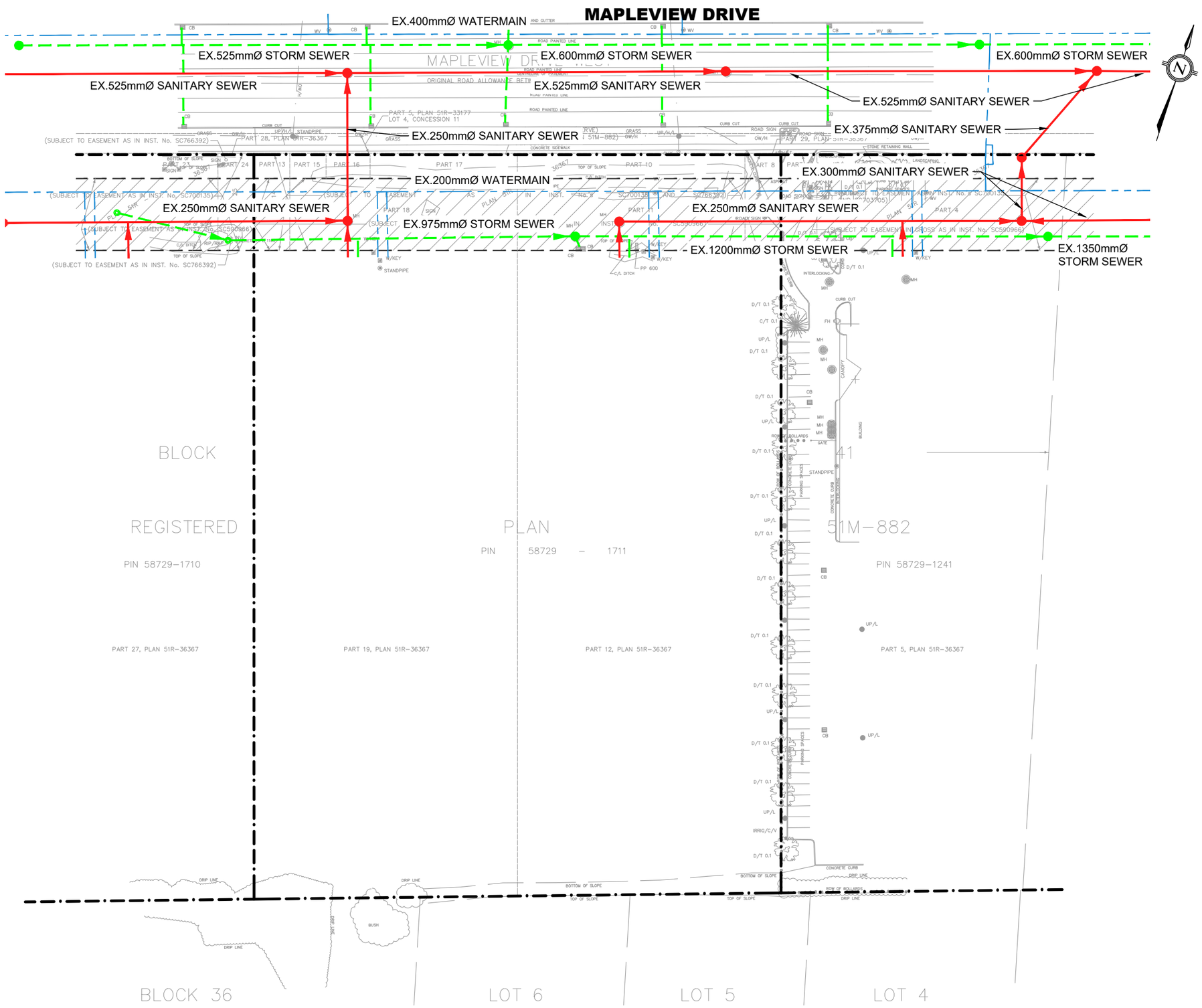

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LEGEND:

- SITE PROPERTY LINE
- EXISTING STORM SEWER
- EXISTING SANITARY SEWER
- EXISTING WATERMAIN
- EXISTING EASEMENT

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EXISTING SITE CONDITIONS

Drawn	Checked	Date	Drawing No.
GP	PM	21/09/23	**FIG2**
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1.3 Proposed Development

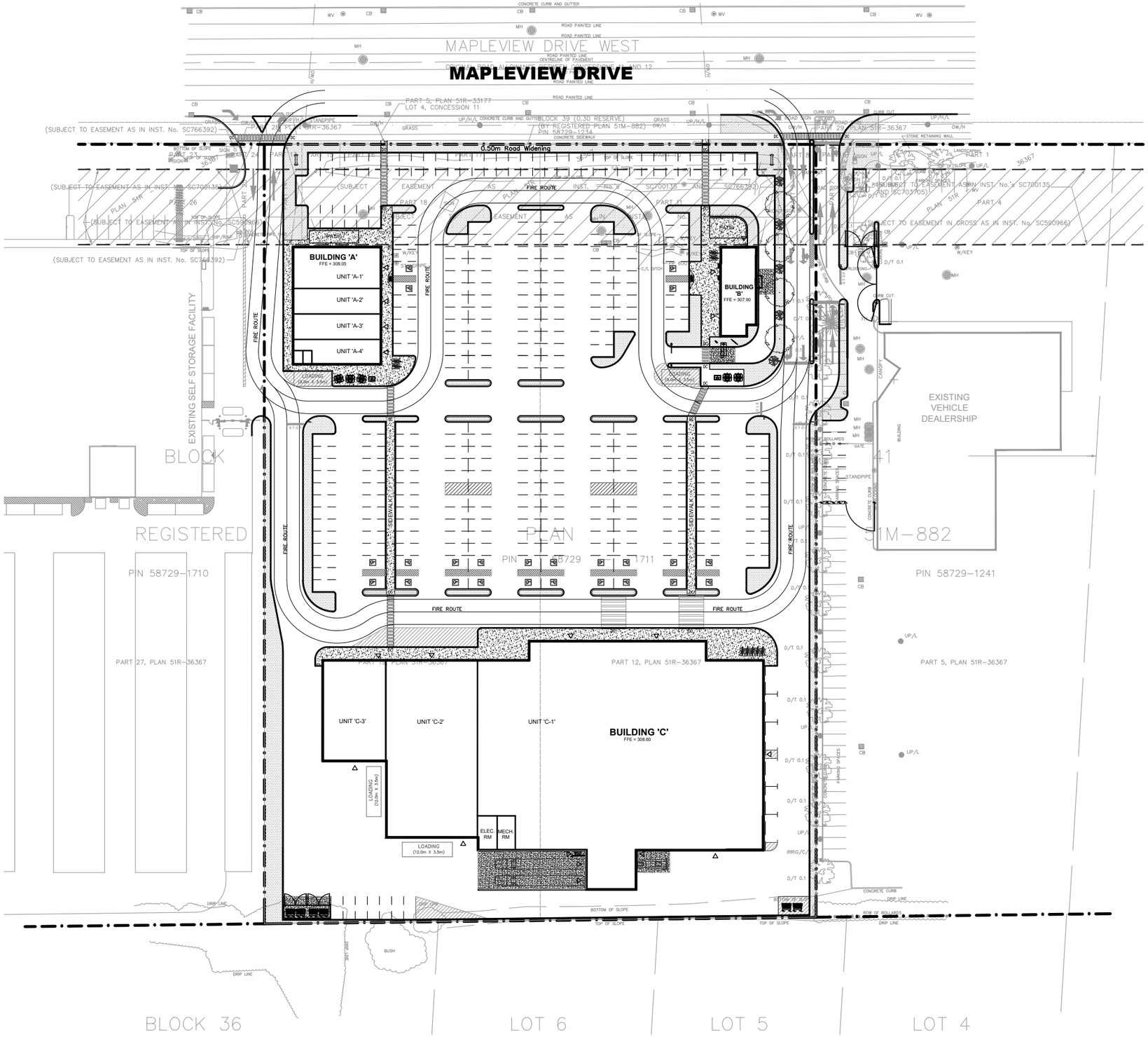
The proposed 2.45 ha development will consist of the construction of three commercial buildings with associated at grade parking. Proposed Building A and B will be located on the west and east side of the site. Building A will consist of four units, Building B will consist of one unit with a proposed drive-thru. Proposed Building C will be located on the south side of the site, and it will consist of three units.

There are two proposed driveway entrances into the site from Mapleview Drive West. A site breakdown of the proposed redevelopment is outlined in Table 1.

Table 1: Proposed Site Breakdown

Proposed Building A	0.06 ha
Proposed Building B	0.02 ha
Proposed Building C	0.48 ha
Asphalt / Concrete	1.71 ha
Landscaping	0.18 ha
Total	**2.45 ha**

Please refer to Figure 3 for the proposed development concept plan.



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SITE PROPERTY LINE

EXISTING EASEMENT

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PROPOSED SITE PLAN

Drawn	Checked	Date	Drawing No.
GP	PM	21/09/23	**FIG3**
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2.0 Water Servicing

2.1 Existing Water Infrastructure

There are two existing watermains located within the site area. An existing 400 mm diameter watermain is located within the Mapleview Drive West Right-of-Way and a 200 mm diameter watermain within the easement on the site. Refer to Drawing S1 (Servicing Plan) and Figure 2 for the location of the existing watermain.

2.2 Proposed Water Infrastructure

The proposed development of 315 & 325 Mapleview Drive West is proposed to be serviced via two 200 mm diameter connections to the existing 200 mm diameter watermain located within the easement on the site. The two existing 50 mm diameter connections for the subject property are proposed to be capped at the watermain and removed. The two existing 150 mm diameter connections will be removed and replaced with a 200 mm diameter connection via tapping sleeve valve and box.

A looped 200 mm diameter watermain is proposed to service the subject site, which will feed both the domestic connections for each building in addition to the hydrants and fire service for Building C. Each connection to the Municipal watermain will be equipped with a check valve chamber as per City of Barrie Standard 525. Refer to Figure 4 for the proposed watermain layout.

The internal onsite water supply and distribution system will be designed and specified to comply with the current standards and specifications of the County of Simcoe, City of Barrie, the Ontario Building Code and NFPA 13.

The following assumptions were made for the fire flow calculations:

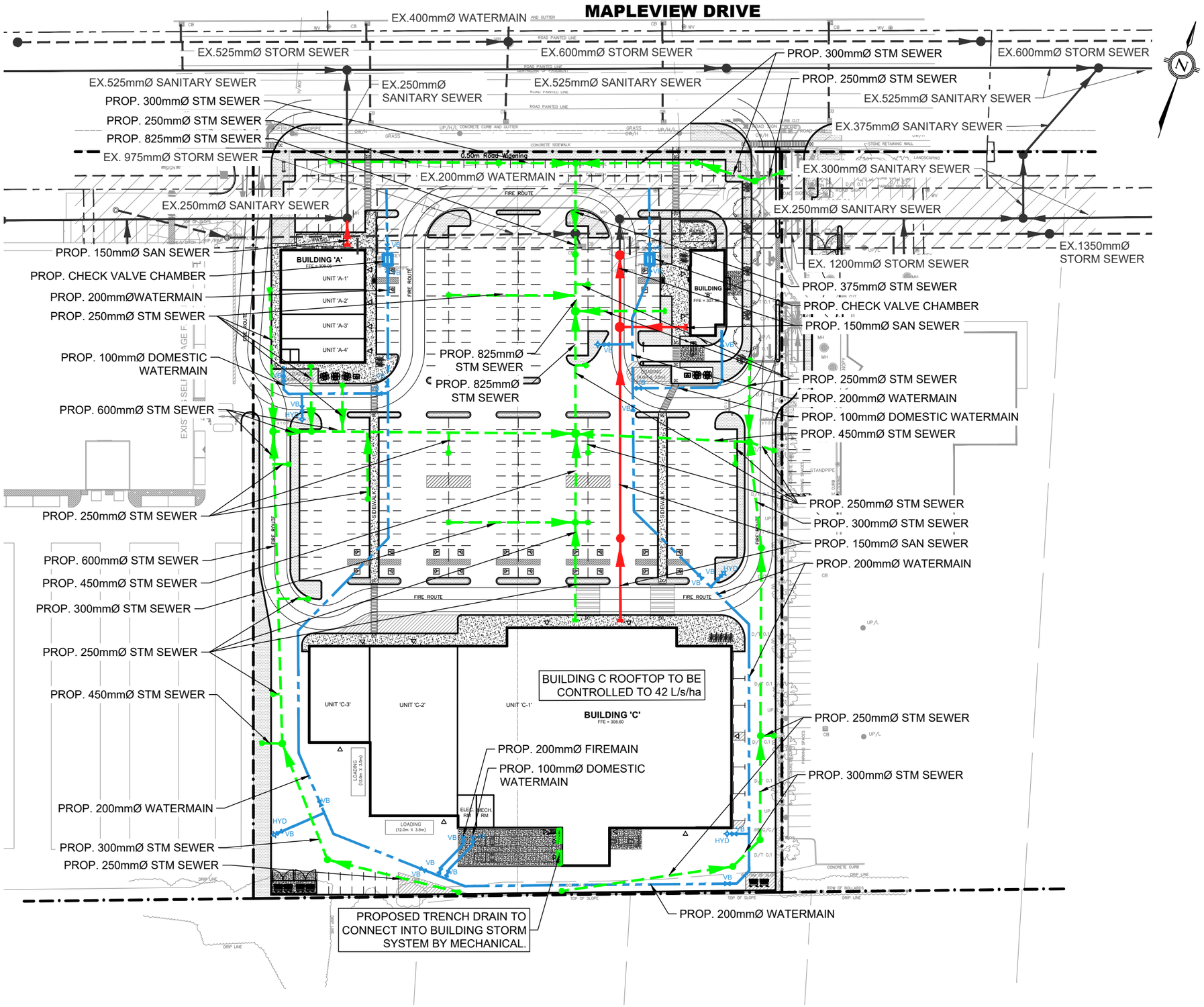
- The development will be ordinary construction with a coefficient of 1.0.
- A reduction of 30% has been considered for Building C (only) to include an NFPA Sprinkler System.

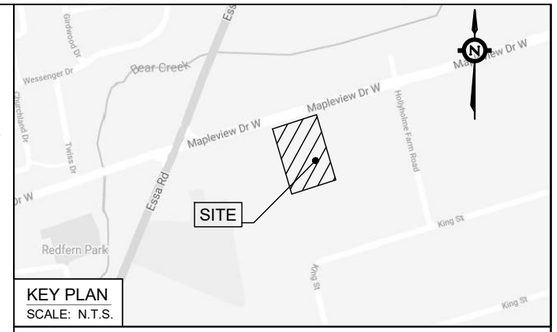
Using the Fire Underwriters Survey and completing the fire protection calculations as per the “Water Supply for Public Fire Protection, a Guide to Recommended Practice, 2020”, the fire flow calculations indicate that the domestic and fire flow requirements for the proposed commercial Building A, Building B and Building C are 1,453 GPM (92 L/s), 871 GPM (55 L/s) and 3,371 GPM (213 L/s), respectively. Therefore, the total domestic and fire flow requirements for the proposed development is 5,695 GPM (360 L/s). Refer to Appendix A for fire flow calculations for the proposed development.

Hydrant flow testing was completed by L&D Waterworks Inc. on August 10, 2021, for the existing fire hydrant on the north side of Mapleview Drive West across from the proposed development and on the existing fire hydrant on Hollyholme Farm Road. The

fire flow test results (refer to Appendix A) indicated that the flow is 5221 GPM at 20 psi for the hydrant on Mapleview Drive West and 3342 GPM at 20 psi for the hydrant on Hollyholme Farm Road. As such, Burnside can confirm that the existing water services can support the development of Building A, B and C and that no upgrades to the watermain are required.

Fire protection for the development will be provided using the existing hydrants within the Mapleview Drive West ROW adjacent to the site. Five private hydrants have been proposed within the site to provide additional fire protection. Refer to Drawing S1 (Servicing Plan) and Figure 4 for further details.





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LEGEND:

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- EXISTING SANITARY SEWER
- EXISTING WATERMAIN
- EXISTING EASEMENT
- PROPOSED STORM SEWER
- PROPOSED SANITARY SEWER
- PROPOSED WATERMAIN
- VB — PROPOSED VALVE AND BOX
- HYD — PROPOSED HYDRANT AND VALVE

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Drawing Title

315, 323 MAPLEVIEW DRIVE WEST
BARRIE, ON L4N 9E8

FUNCTIONAL SERVICING PLAN

Drawn	Checked	Date	Drawing No.
GP	PM	21/09/23	FIG4
Scale		Project No.	
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3.0 Sanitary Servicing

3.1 Existing Sanitary Sewer Infrastructure

There is an existing 525 mm diameter sanitary sewer located within the Mapleview Drive West Right-of-Way which flows in an easterly direction. There are two sanitary sewers within the easement. On the west side, there is a 250 mm diameter sanitary sewer that flows in an easterly direction into the site, the sewer then flows north and connects into the existing sanitary system on Mapleview Drive. On the east side, there is a 250 mm diameter sanitary sewer that also flows in an easterly direction out of the site, the sewer then flows north and connects into the existing sanitary system on Mapleview Drive.

As the site is a greenfield, the existing total peak sanitary flow for the site is 0.25 L/s, which accounts for infiltration.

Refer to Drawing S1 (Servicing Plan) and Figure 2 for the location of the existing sanitary infrastructure.

3.2 Proposed Sanitary Sewer Servicing

Two sanitary connections are proposed for this development. Building A is proposed to connect into the 250 mm diameter existing sanitary system located on the west end of the easement. Building B and Building C are proposed to connect into the 150 mm diameter existing sanitary system located on the east end of the easement.

To comply with the discreet sanitary sampling requirements in the City of Barrie Sewer Use By-law 2021-002, a sampling port has been provided on the connection from Building A and a property line maintenance hole has been provided on the east connection for sampling purposes.

The sanitary flows for the proposed development were calculated using the following regional standards:

- Average design flow rate of 28,000 L/day/ha for commercial uses.
- Infiltration rate of 0.1 L/s/ha.
- Peaking factor of two (2) has been applied to the total sanitary flow.

Using these standard’s, the proposed sanitary contribution to the sanitary sewer for each building component are as shown in Table 2.

Table 2: Proposed Sanitary Flows

Building	Area (ha)	Sanitary Flow (L/s)
Commercial Building A	0.06	0.05
Commercial Buildings B + C	0.49	0.42
Remainder of Site Infiltration	1.90	0.19
Total	**2.45**	**0.66**

As the proposed development will be contributing a minor increase of flow of 0.41 L/s (0.66 L/s – 0.25 L/s) into the existing 525 mm diameter sanitary sewer within Mapleview Drive West, we have assumed sufficient downstream capacity exists.

Refer to Appendix B for the sanitary design calculations and Drawing S1 (Servicing Plan) and Figure 4 for the location of the proposed sanitary servicing infrastructure.

4.0 Stormwater Management Criteria

4.1 Design Criteria

The proposed site is located within the City of Barrie, County of Simcoe under the jurisdiction of the Nottawasaga Valley Conservation Authority (NVCA). The proposed development is located along Mapleview Drive West, within the Bear Creek Watershed. As such, the site must comply with the City of Barrie, County of Simcoe and NVCA criteria for stormwater management and design; the following criteria will be applied to the site:

- Confirm that sufficient capacity is provided in the minor system to safely convey the 5-year design flow from the site.
- Pre-development flows were calculated using the receiving storm sewer design runoff coefficient as per the approved Mapleview West Industrial Park – Phase 1 Detailed Stormwater Management Report, prepared by Richardson Foster Ltd, updated in January 2007.
- On-site quantity controls shall be provided for proposed developments to ensure that the 5-year peak flow is reduced to the previously approved peak flow from the site.
- Post-development flows were calculated using runoff coefficients of:
  - Landscaping 0.25
  - Commercial, Industrial 0.95
  - Driveways/Parking Lots (asphalt and gravel) 0.95

The drainage of abutting properties shall not be adversely affected, and all drainage shall be collected and discharged at an approved location.

4.2 Method of Analysis

The Modified Rational Method was used to calculate runoff rates from all drainage catchments, to quantify the detention storage for all control measures, and to demonstrate the site's overall SWM compliance. Intensity-Duration-Frequency (IDF) curves from the City of Barrie were used to simulate rainfall data.

Refer to Appendix C for the Stormwater Management Calculations.

5.0 Stormwater Management Plan

5.1 Existing Stormwater Infrastructure

There is an existing 525 mm diameter and 600 mm diameter storm sewer located on the north side of Mapleview Drive which flows in an easterly direction.

There is an existing easement in favor of the City of Barrie located within the northern side of the property extending to the east and west property lines. This easement includes two (2) existing storm sewers, a 975 mm, and a 1350 mm. The existing storm sewer flows in an easterly direction where it ultimately outlets to the existing MIDI Phase 1 and 2 Stormwater Management Pond, located east of Hollyholme Road.

The existing site drainage is accumulated by overland flow which is directed towards the north side of the site where it is captured by existing catchbasins and conveyed by the existing 975 mm and 1350 mm diameter storm sewer to the stormwater management pond. No stormwater controls have been found on the site. Refer to Figure 5 for the existing stormwater drainage patterns.

5.2 Allowable Release Rate

As per the City of Barrie Storm Drainage and Stormwater Management Policies and Design Guidelines, when a previously approved storm drainage plan and design sheet is available for a site, it is to be confirmed that there is sufficient capacity provided in the minor system to safely convey the 5-year design flow from a proposed development. On-site quantity controls shall be provided for the proposed development to ensure that the 5-year peak flow is reduced to the previously approved peak flow (556.1 L/s) from the site.

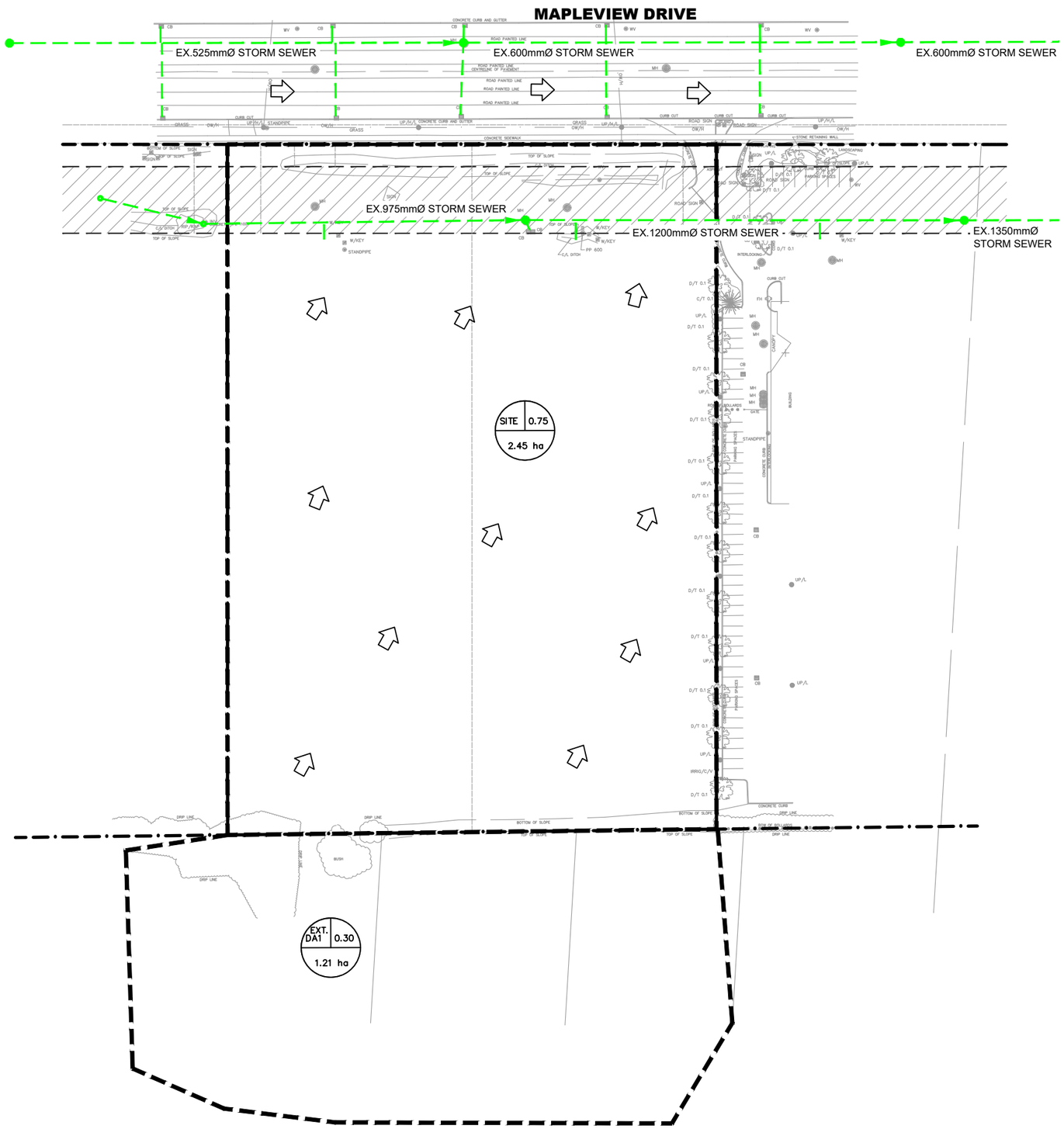
As per the approved Mapleview West Industrial Park – Phase 1 Detailed Stormwater Management Report, prepared by Richardson Foster Ltd, updated in January 2007, the site must be controlled to ensure that the release rate is within the design flow rate for the existing storm sewer system. The existing storm sewer system located within the easement at the north side of the subject site was sized to convey up to the 100-year storm event from the subject site with a runoff coefficient of 0.75.

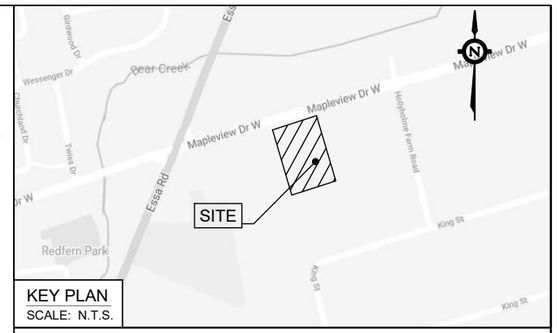
As per the City of Barrie standards, the sewers within the subject site will be designed to convey the 5-year peak flow in the minor system. As such, the allowable 5-year storm event release rate for the proposed development is 556.1 L/s.

South of the subject site, there is an existing external drainage area which drains overland to the north sewer system in the easement. To ensure no negative impacts to the existing drainage patterns in the proposed condition, the storm sewer system is to be

designed to convey the 100-year storm flows from the external area. The external area is 1.21 ha in size, and has a 100-year storm flow of 182.1 L/s.

As such, the allowable release rate considered for the proposed development is 738.2 L/s (556.1 L/s + 182.1 L/s). Refer to Appendix C and Figure 5 for further details.





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LEGEND:

- SITE PROPERTY LINE
- DRAINAGE BOUNDARY
- EXISTING STORM SEWER
- EXISTING EASEMENT
- DRAINAGE AREA NUMBER
- RUNOFF COEFFICIENT
- DRAINAGE AREA (ha)
- OVERLAND FLOW ROUTE

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PRE-DEVELOPMENT STORM DRAINAGE PLAN

Drawn	Checked	Date	Drawing No.
GP	PM	21/09/23	**FIG5**
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5.3 Proposed Stormwater Management

5.3.1 Stormwater Quantity Control

The proposed development was designed to outlet to the existing 1350 mm diameter storm sewer located within the easement at the north side of the property. The storm sewer system was designed to control the post to pre-development flows for the 5-year storm event, to ensure that the 5-year peak flow is reduced to the previously approved peak flow of 556.1 L/s from the site. The site's storm sewer system was designed to convey the existing external drainage area flow for the 100-year storm event.

The proposed site is 2.45 ha in size and consists of three single story commercial buildings and associated parking. The target release rate for the subject site is 738.2 L/s, which includes the 100-year external drainage area flow.

Due to the elevation of the existing storm sewer within the easement, two connections from the proposed development have been proposed at EX.STM.MH21. Due to limitations in depth, the catchbasins at the north side of the property are unable to cross the existing storm sewer. As such, the stormwater management for the site has been divided into two separate drainage areas.

5.3.1.1 Drainage Area 1

Drainage Area 1 is 2.16 ha in size and consists of the three single story commercial buildings, and a significant portion of the parking areas. Drainage Area 1 captures the drainage from the existing 1.21 ha external drainage area and conveys the 100-year flow through the site storm sewer system.

The runoff generated on site will be collected by the internal storm sewer system. Rooftop controls have been proposed for Building C to control the flow back to 42 L/s/ha, which eliminates the need for a stormwater storage tank for this drainage area. Drainage Area 1 is proposed to outlet to the existing storm sewer within the easement via 825 mm diameter connection to the south side of EX.STM.MH21. An orifice tube will be provided to control the release of the stormwater to the municipal sewer.

To ensure that the target release rate for the site is not exceeded, Drainage Area 1 has an allowable release rate of 674.0 L/s [491.9 L/s + 182.1 L/s].

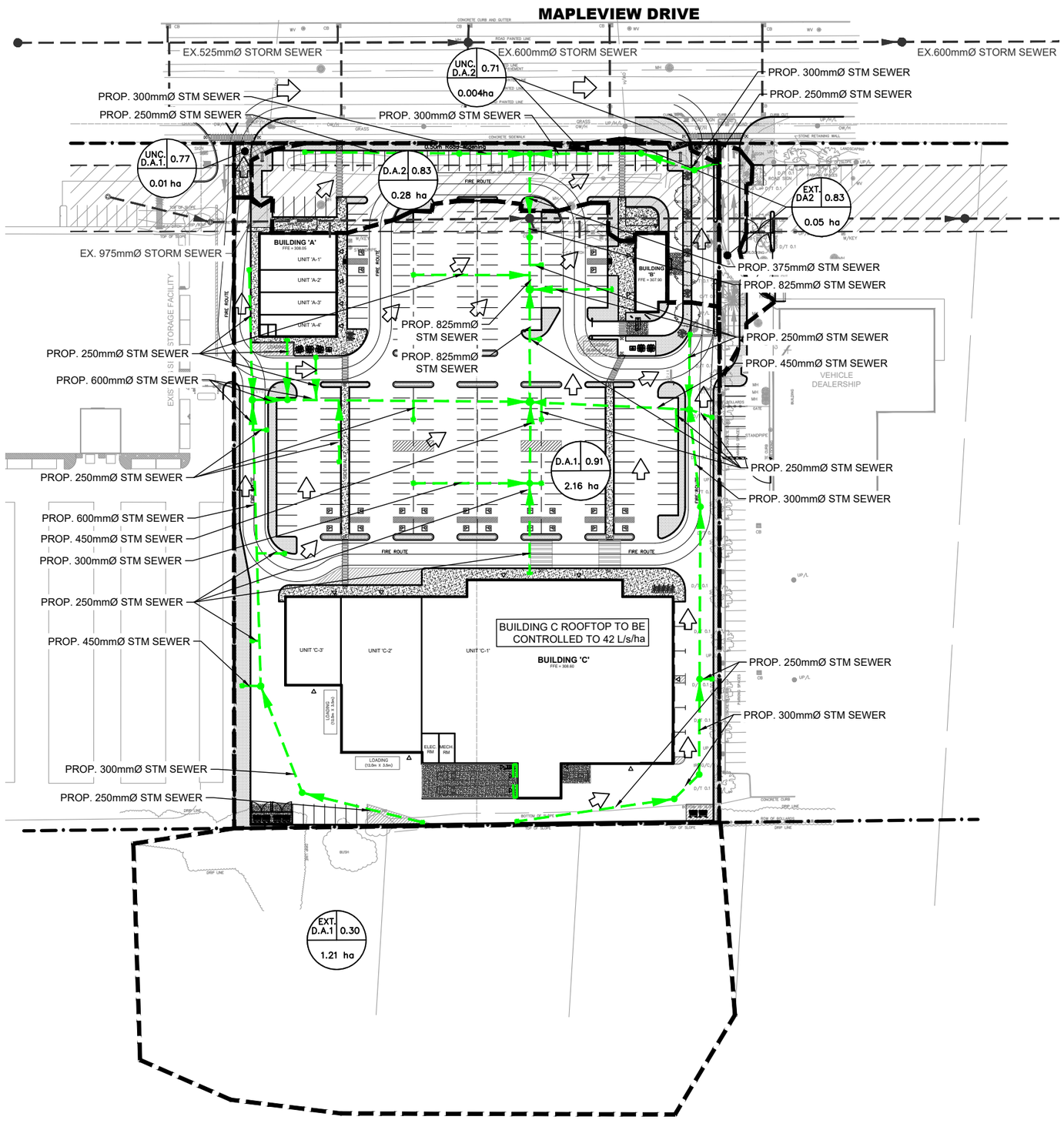
Table 3 summarizes the stormwater quantity requirements to meet the required release rate for Drainage Area 1. Refer to Figure 6 for the proposed stormwater design.

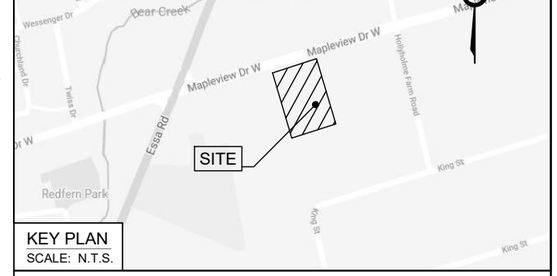
Table 3: Release Rates and Storage Volumes

Area ID	Area (ha)	Target Release Rate (L/s)	Actual Release Rate (L/s)	Required Storage (m^3)	Provided Storage (m^3)
Rooftop	0.56	674.0	648.1**	118.0	285.2***
Landscape	0.12			0.0	0.0
Hardscape	1.47				
External Area	1.21				
Uncontrolled Area	0.01		2.2	-	-
Total	**2.16***	**674.0**	**650.3**	**118.0**	**285.2**

* Note that the 1.21 ha external area is not included within the subject site area.
** Note that the release rate is the orifice-controlled flow.
*** Note that the available storage on the Building C Rooftop of 285.2 m^3 is based on a 0.06 m storage depth.

To ensure that the outlet of the proposed storm sewer system discharges at or below the target release rate to the existing 1350 mm diameter storm sewer, the use of an outlet orifice control is necessary. The orifice tube that releases at a rate nearest to the target release rate of 671.8 L/s [674.0 L/s – 2.2 L/s] is a 450 mm diameter PVC DR-18 pipe with inner diameter of 440.30 mm. As such, the orifice will be placed at the inlet of MH11 to control the flow entering the existing 1350 mm diameter storm sewer. Refer to Appendix C and Drawing S1 – Servicing Plan for further details.





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- DRAINAGE AREA NUMBER
- RUNOFF COEFFICIENT
- DRAINAGE AREA (ha)
- OVERLAND FLOW ROUTE

SITE 0.89 2.39 ha

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POST-DEVELOPMENT STORM DRAINAGE PLAN

Drawn	Checked	Date	Drawing No.
GP	PM	21/09/23	**FIG6**
Scale		Project No.	
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5.3.1.2 Drainage Area 2

Drainage Area 1 is 0.28 ha in size and consists of the north parking area and a portion of the west driveway entrance. Due to the modification to the existing driveway on the west side of the site to provide a shared access with the neighbouring property, Drainage Area 2 captures a small portion of external drainage from the existing car dealership. The storm sewer system has been designed to convey and control the 5-year flow from this new external drainage area through the site storm sewer system.

The runoff generated on site will be collected by the internal storm sewer system. Drainage Area 2 is proposed to outlet to the existing storm sewer within the easement via 375 mm diameter connection to the north side of EX.STM.MH21. An orifice tube will be provided to control the release of the stormwater to the municipal sewer.

To ensure that the target release rate for the site is not exceeded, Drainage Area 2 has an allowable release rate of 64.1 L/s.

Table 4 summarizes the stormwater quantity requirements to meet the required release rate for Drainage Area 2. Refer to Figure 6 for the proposed stormwater design.

Table 4: Release Rates and Storage Volumes

Area ID	Area (ha)	Target Release Rate (L/s)	Actual Release Rate (L/s)	Required Storage (m^3)	Provided Storage (m^3)
Landscape	0.05	64.1	60.0**	16.0	42.4
Hardscape	0.23				
External Area	0.05				
Uncontrolled Area	0.004		1.0	-	-
Total	**0.28**	**64.1**	**61.0**	**16.0**	**42.4**

* Note that the 0.05 ha external area is not included within the subject site area.
** Note that the release rate is the orifice-controlled flow.

To ensure that the outlet of the proposed storm sewer system discharges at or below the target release rate to the existing 1350 mm diameter storm sewer, the use of an outlet orifice control is necessary. The orifice tube that releases at a rate nearest to the target release rate of 63.1 L/s [64.0 L/s – 1.0 L/s] is a 150 mm diameter PVC DR-17 pipe with inner diameter of 147.29 mm. As such, the orifice will be placed at the outlet of MH12 to control the flow entering the existing 1350 mm diameter storm sewer. The 16.0 m^3 storage volume required will be provided through the use of parking lot ponding available within this portion of the parking lot. Refer to Appendix C and Drawing S1 – Servicing Plan for further details.

5.3.1.3 Stormwater Quantity Control Summary

As per the City of Barrie standards, the sewers within the subject site will be designed to convey the 5-year peak flow in the minor system. As such, the allowable 5-year storm

event release rate for the proposed development is 556.1 L/s. The subject site has been designed to convey the 100-year flow from the existing 1.21 ha external drainage area with a flow of 182.1 L/s. The total allowable release rate considered for the proposed development is 738.2 L/s (556.1 L/s + 182.1 L/s).

Drainage Areas 1 and 2 were designed to ensure that the allowable release rate for the site, including the new external area is not exceeded. Refer to Table 5 for further details.

Table 5: Stormwater Quantity Control Summary

Drainage Area	Target Release Rate (L/s)	Actual Release Rate (L/s)
1	738.2	650.3
2		61.0
Total	**738.2**	**711.3**

The actual release rate from the proposed development is less than the target release rate, as such, no negative impacts to the existing storm sewer system are anticipated.

5.3.2 Water Balance

As per the City of Barrie Storm Drainage and Stormwater Management Policies and Design Guidelines, sites that are less than 5 ha in size are to minimize changes between pre- and post-development water balance conditions. A minimum infiltration equivalent to the first 5 mm of any given rainfall event shall be provided.

The minimum rainfall reuse was calculated as follows:

$$\text{Minimum Rainfall Reuse} = \text{Site Area } (m^2) \times 5 \text{ mm}$$

$$\text{Minimum Rainfall Reuse} = 24{,}505 \text{ } m^2 \times 5 \text{ mm} = 122.53 \text{ } m^3$$

To achieve the water balance criteria, the required retention volume for the proposed site is 122.53 m^3.

Initial Abstraction calculations have been completed for the proposed site. A 1.0 mm credit was used for roof coverage and hardscape areas, and a 5.0 mm credit for landscape areas. The site can effectively retain 46.86 m^3 of rainfall through initial abstraction. A calculation summary is provided in Table 6.

Table 6: Initial Abstraction Summary

Cover Type	Area (m^2)	IA (mm)	Volume (m^3)
Rooftop	5,588	5.0	27.94
Landscape	1,783	1.0	1.78
Hardscape	17,134	1.0	17.13
Total	**24505**		**46.86**

The remaining water balance to be reused on site has been calculated as follows:

$$\text{Minimum Rainfall Reuse} = \text{Site Area } (m^2) \times 5 \text{ mm} - IA$$

$$\text{Minimum Rainfall Reuse} = 24{,}505\ m^2 \times 5 \text{ mm} - 46.86 = 75.67\ m^3$$

A Geotechnical Peer Review was completed by Pinchin Ltd., dated April 20, 2021 discussed a review of "Geotechnical Investigation, Proposed Industrial Development, Mapleview Drive West, City of Barrie, Ontario" by Terraprobe Limited (Terraprobe) and dated October 27, 2006".

Based on the peer review and the Geotechnical Investigation, the groundwater levels measured on site were encountered within 0.5 m to 4m from the ground surface. Due to the shallow elevations of the groundwater on site, the use of infiltration facilities as a method of water balance will not be feasible, as it will not be possible to provide 1 m clearance between the infiltration facility and existing groundwater levels. Refer to Appendix C for the stormwater calculations and Appendix D for the Geotechnical Investigation.

5.3.3 Stormwater Quality Control

As per the City of Barrie Storm Drainage and Stormwater Management Policies and Design Guidelines, an enhanced level of protection for water quality is required, and the site is to achieve a TSS removal efficiency of 80%.

The subject site is located within Phase 1 of the Mapleview West Industrial Park which ultimately outlets to the existing MIDI Phase 1 and 2 Stormwater Management Pond, located east of Hollyholme Road. As the flows from the proposed development have not increased above the approved Mapleview West Industrial Park – Phase 1 Detailed Stormwater Management Report, prepared by , updated in January 2007, the existing stormwater management pond will provide the enhanced level of protection for water quality.

6.0 Erosion and Sediment Control

The Erosion and Sediment Control Plan for the site will be designed in conformance with City of Barrie's Guidelines. The erosion and sediment control strategy will include the following:

- Temporary sediment control fence at construction limits and/or downstream of any disturbed areas prior to grading.
- Gravel mud mats at construction vehicle access points to minimize off-site tracking of any sediments.
- Sediment traps in existing and proposed catchbasins.
- Routine inspections, monitoring, and repair as necessary of all erosion and sediment control measures during construction.
- Removal of temporary controls once the areas they serve are restored and stable.

All reasonable measures will be taken to ensure that sediment loading is minimized both during and following construction. Refer to Drawing ESC1 (Erosion and Sediment Control Plan) for further details.

7.0 Conclusions and Recommendations

The analysis and recommendations for servicing of the proposed development are summarized in the sections below.

7.1 Water Servicing

- Domestic and fire flow requirements for the proposed commercial Building A, Building B and Building C are ,1,453 GPM (92 L/s), 871 GPM (55 L/s) and 3,371 GPM (213 L/s), respectively.
- The existing municipal water supply network will not be affected by the proposed development and can sufficiently service the site.
- Fire protection will be accommodated through the existing hydrant located on the north side of Mapleview Drive West and five proposed private hydrants.

7.2 Sanitary Servicing

- The total peak sanitary flow for the proposed development (including the infiltration allowance) has been calculated as 0.66 L/s which represents a 0.41 L/s increase from pre-development conditions.
- The new service connections will consist of two 150 mm diameter connections at a 2.0% slope and will be made to the 250 mm sanitary sewer located within the west side of easement and the 150 mm sanitary lateral located on east side of easement.

7.3 Stormwater Servicing

- The site will control the 5-year flows to the 5-year pre-development peak flow rate at runoff coefficient of 0.75.
- The proposed development will connect to the existing 1350 mm diameter storm sewer within the easement at the north side of the site.
- The storm sewer system has been designed to convey the 100-year flow of the external 1.21 ha drainage area.

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Appendix A

Water Demand Calculations

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CALCULATION SHEET

Project:	323 Mapleview Drive West	Prepared by:	JS
		Checked by:	PM
	Fire Flow Calculations	Project No:	300053710
		Date:	February 17, 2023

Fire Flow Calculation - Building A
Based on Fire Underwriters Survey

1 F= 220 C (sqrt (A))

Where F= Fire flow in Lpm
C= construction type coefficient
= 1 for ordinary construction
A = total floor area in sq.m. excluding basements, includes garage

Total	Area (sq.m)	%
Level 1	605	100%

Largest Area= 605 sq.m
F = 5,411 L/min

Round to nearest 1000 l/min
F = 5,000 l/min

2 Occupancy Reduction
0% reduction for normal residential occupancy
Reduction = 0 L/min
F = 5,000 L/min

3 Separation Charge

0%	North Side	Greater than 30m
0%	East Side	Greater than 30m
0%	South Side	Greater than 30m
10%	West Side	20.1m to 30m
10%	Total Separation Charge,	**500** L/min

Note: Maximum Total Separation Charge is 75%

4 Sprinkler Reduction
0% Reduction for NFPA Sprinkler System
Reduction = **0** L/min

5 Commercial Flow Calculations
Ave. Water Consumption Rate = 28 m3/ha/day
Area (ha) = 0.061 ha
Ave. Day Demand = 1.176 L/min

Max. Hourly Peaking Factor = 2.0
Max. Domestic Flow Rate F_{dom} = 2.4

F = 5,500 - 0 + 2 = 5,502 L/min
F = 92 L/s *Commercial minimum req. fire flow (L/s) = 283
F = 1453 GPM

Project:	323 Mapleview Drive West
	Fire Flow Calculations

CALCULATION SHEET

Prepared by:	JS
Checked by:	PM
Project No:	300053710
Date:	February 17, 2023

Fire Flow Calculation - Building B
Based on Fire Underwriters Survey

1 F= 220 C (sqrt (A))

Where F= Fire flow in Lpm
C= construction type coefficient
= 1 for ordinary construction
A = total floor area in sq.m. excluding basements, includes garage

Total	Area (sq.m)	%
Level 1	185	100%

Largest Area= 185 sq.m
F = 2,992 L/min

Round to nearest 1000 l/min
F = 3,000 l/min

2 Occupancy Reduction
0% reduction for normal residential occupancy
Reduction = 0 L/min
F = 3,000 L/min

3 Separation Charge

0%	North Side	Greater than 30m		
10%	East Side	20.1m to 30m		
0%	South Side	Greater than 30m		
0%	West Side	Greater than 30m		
10%		Total Separation Charge	**300**	L/min

Note: Maximum Total Separation Charge is 75%

4 Sprinkler Reduction
0% Reduction for NFPA Sprinkler System
Reduction = **0** L/min

5 Commercial Flow Calculations
Ave. Water Consumption Rate = 28 m3/ha/day
Area (ha) = 0.019 ha
Ave. Day Demand = 0.360 L/min

Max. Hourly Peaking Factor = 2.0
Max. Domestic Flow Rate F_{dom} = 1 L/min

F = 3,300 - 0 + 1 = 3,301 L/min
F = 55 L/s *Commercial minimum req. fire flow (L/s) = 283
F = 871 GPM

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CALCULATION SHEET

Project:	323 Mapleview Drive West	Prepared by:	JS
		Checked by:	PM
	Fire Flow Calculations	Project No:	300053710
		Date:	February 17, 2023

Fire Flow Calculation - Building C
Based on Fire Underwriters Survey

1 F= 220 C (sqrt (A))

Where F= Fire flow in Lpm
C= construction type coefficient
= 1 for ordinary construction
A = total floor area in sq.m. excluding basements, includes garage

Total	Area (sq.m)	%
Level 1	4,753	100%

Largest Area= 4,753 sq.m
F = 15,167 L/min

Round to nearest 1000 l/min
F = 15,000 l/min

2 Occupancy Reduction
0% reduction for normal residential occupancy
Reduction = 0 L/min
F = 15,000 L/min

3 Separation Charge

0%	North Side	Greater than 30m
0%	East Side	Greater than 30m
0%	South Side	Greater than 30m
15%	West Side	10.1m to 20m
15%	Total Separation Charge,	**2250** L/min

Note: Maximum Total Separation Charge is 75%

4 Sprinkler Reduction
30% Reduction for NFPA Sprinkler System
Reduction = **4500** L/min

5 Commercial Flow Calculations
Ave. Water Consumption Rate = 28 m3/ha/day
Area (ha) = 0.475 ha
Ave. Day Demand = 9.242 L/min

Max. Hourly Peaking Factor = 2.0
Max. Domestic Flow Rate F_{dom} = **18** L/min

F = 17,250 - 4500 + 18 = 12,768 L/min
F = 213 L/s *Commercial minimum req. fire flow (L/s) = 283
F = 3371 GPM

Hydrant Flow Test Report

SITE NAME:

SITE ADDRESS / MUNICIPALITY: **323 Mapleview Drive West, Barrie**

TEST HYDRANT LOCATION : 2nd Fire hydrant West of Hollyholme Farm Road on Mapleview Drive

BASE HYDRANT LOCATION: 3rd Fire hydrant west of Hollyholme Farm Road on Mapleview Drive

TEST BY: Luzia Wood

TEST DATE: August 10,2021

TEST TIME: 8:25Am

TEST DATA

FLOW HYDRANT — Pipe Diam. (in / mm): 400mm P.V.C

	PITOT 1	PITOT 2
SIZE OPENING (inches):	2.5	2.5
COEFFICIENT (**note 1**):	0.90	0.90
PITOT READING (psi):	44	36 / 36
FLOW (usgpm):	**1113**	**2014**

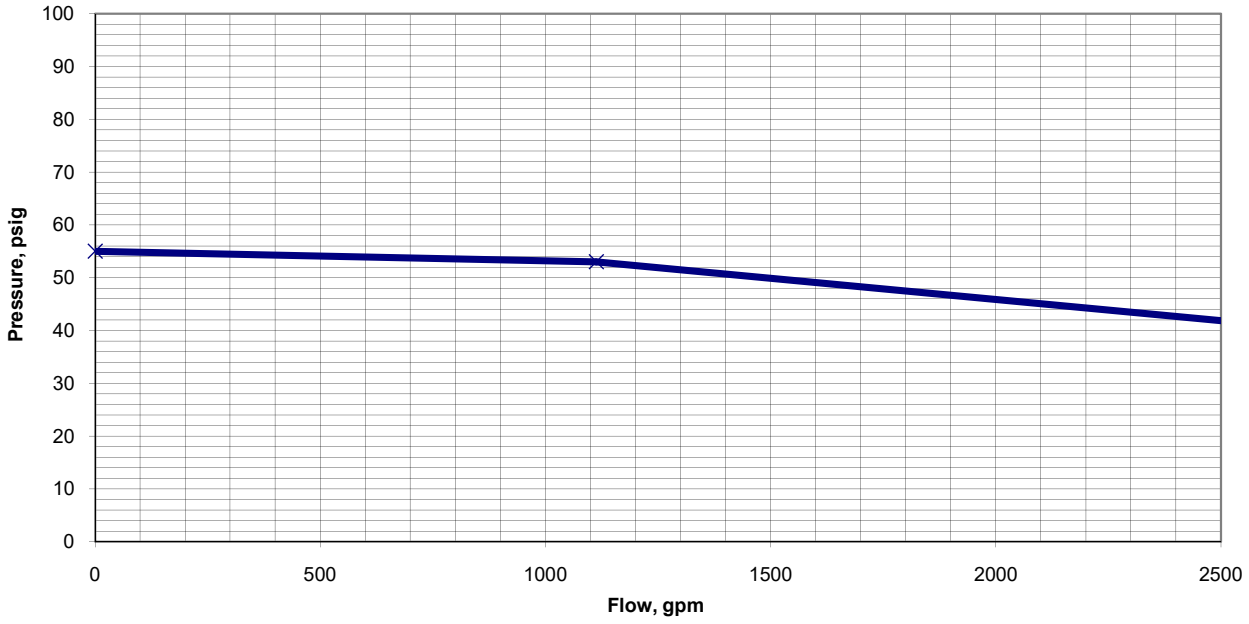
THEORETICAL FLOW @ 20 PSI 5221

BASE HYDRANT — Pipe Diam. (in / mm): 400mm P.V.C

STATIC READING (psi): 55 RESIDUAL 1 (psi): 53 RESIDUAL 2 (psi): 50

REMARKS: Flow hydrant and base hydrant are on the northsiad of Mapleview Drive West, the secondary valves to the flow and base hydrant were full open at time of flow test. Flow Hydrant I.D. 3532 and Base Hydrant I.D. 6.

NOTE 1: Conversion factor of .90 used for flow calculation based on rounded and flush internal nozzle configuration. No appreciable difference in pipe invert between flow and base hydrants.



J. & D. Waterworks Inc
491 Port Maitland Rd
Dunnville, ON N1A 2W6

Hydrant Flow Test Report

SITE NAME:

SITE ADDRESS / MUNICIPALITY: **323 Mapleview Drive West, Barrie**

TEST HYDRANT LOCATION : 1st Fire hydrant South of Mapleview Drive West on Hollyholme Farm

BASE HYDRANT LOCATION: 2nd Fire hydrant South of Mapleview Drive West on Hollyholme Farm Road

TEST BY: Luzia Wood

TEST DATE: August 10,2021

TEST TIME: 9:00Am

TEST DATA

FLOW HYDRANT — Pipe Diam. (in / mm): 200mm P.V.C

	PITOT 1	PITOT 2
SIZE OPENING (inches):	2.5	2.5
COEFFICIENT (**note 1**):	0.90	0.90
PITOT READING (psi):	42	34 / 34
FLOW (usgpm):	**1087**	**1957**

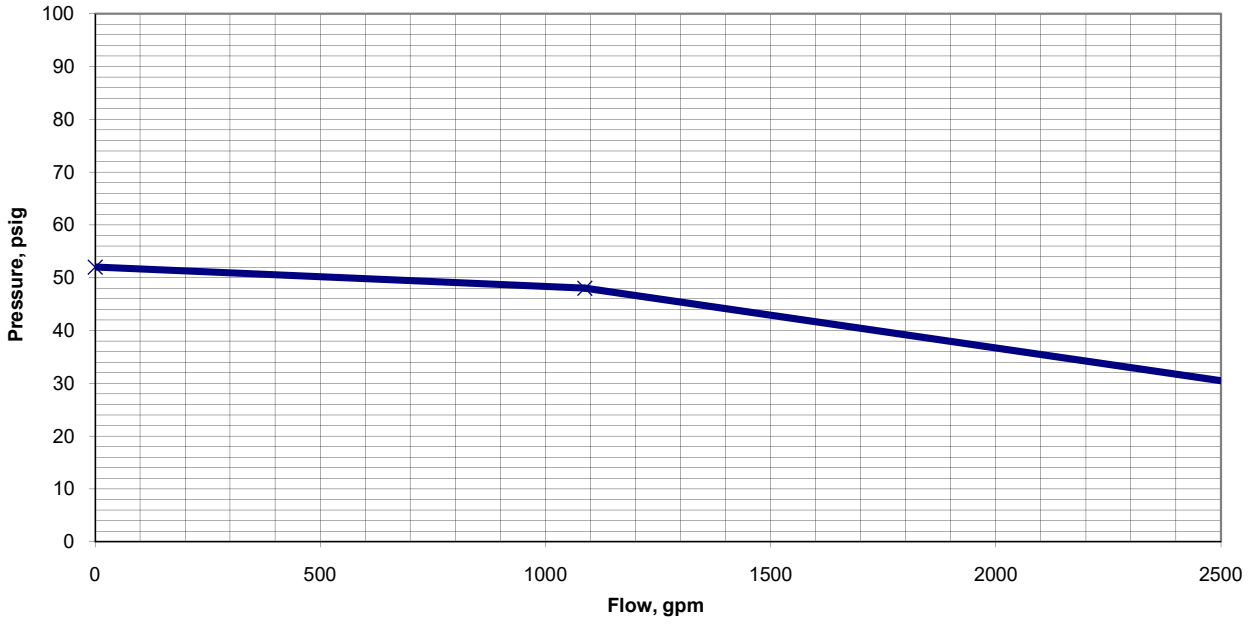
THEORETICAL FLOW @ 20 PSI 3342

BASE HYDRANT — Pipe Diam. (in / mm): 200mm P.V.C

STATIC READING (psi): 52 RESIDUAL 1 (psi): 48 RESIDUAL 2 (psi): 46

REMARKS: Flow hydrant and base hydrant are on the westsiad of Hollyholme Farm Drive, the secondary valves to the flow and base hydrant were full open at time of flow test. Flow Hydrant I.D. 3635 and Base Hydrant I.D. 3636

NOTE 1: Conversion factor of .90 used for flow calculation based on rounded and flush internal nozzle configuration. No appreciable difference in pipe invert between flow and base hydrants.



J & D Waterworks Inc
491 Port Maitland Rd
Dunnville, ON N1A 2W6

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Appendix B

Sanitary Servicing Analysis

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CALCULATION SHEET

Project:	**323 Mapleview Drive West** **Toronto, Ontario** ***Sanitary Servicing Analysis***	Prepared by: Checked by: Project No: Date:	JS PM 300053170 2/23/2023

Existing Site Flows

Commercial

Site area =	2.450	ha
Min. Ave. Design Flow Rate $_{(Commercial)}$=	0	L/day/ha
$Q_{(Commercial)}$=	0	L/Floor ha/day
$Q_{(Commercial)}$=	0.00	L/s
Infiltration Allowance=	0.1	L/s/ha
$Q_{infiltration}$=	0.25	L/s
**$Q_{Existing\ Total}$= **	**0.25**	**L/s**

Proposed Site Flows

Building A Commercial Flows:

Site area =	0.061	ha
Min. Ave. Design Flow Rate $_{(Commercial)}$=	28,000	L/day/ha
$Q_{(Commercial)}$=	0.020	L/s
Infiltration Allowance=	0.1	L/s/ha
$Q_{infiltration}$=	0.006	L/s
**$Q_{proposed\ total}$= **	**0.051**	**L/s**

Includes a FS of 2

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CALCULATION SHEET

Project:	**323 Mapleview Drive West** **Toronto, Ontario**	Prepared by:	JS
		Checked by:	PM
		Project No:	300053170
	Sanitary Servicing Analysis	Date:	2/23/2023

Building B Commercial Flows:

Site area =	0.019	ha	
Min. Ave. Design Flow Rate $_{(Commercial)}$=	28,000	L/day/ha	
$Q_{(Commercial)}$=	0.006	L/s	
Infiltration Allowance=	0.1	L/s/ha	
$Q_{infiltration}$=	0.002	L/s	
$Q_{proposed\ total}$=	**0.016**	**L/s**	Includes a FS of 2

Building C Commercial Flows:

Site area =	0.475	ha	
Min. Ave. Design Flow Rate $_{(Commercial)}$=	28,000	L/day/ha	
$Q_{(Commercial)}$=	0.15	L/s	
Infiltration Allowance=	0.1	L/s/ha	
$Q_{infiltration}$=	0.05	L/s	
$Q_{proposed\ total}$=	**0.403**	**L/s**	Includes a FS of 2

Remainder of Site (infiltration)

Site area =	1.896	ha	
Infiltration Allowance=	0.1	L/s/ha	
$Q_{infiltration}$=	0.19	L/s	
Q_{total}=	**0.660**	**L/s**	

Service Connection					
Diameter	Slope	Velocity	Capacity	Spare Capacity	Percent Full
(mm)	(%)	(m/s)	(L/s)	(L/s)	%
150	2.00	1.22	21.54	21.49	5.25%

SANITARY SEWER DESIGN SHEET

Proposed Sanitary Network

323 Mapleview Drive West, Barrie

Project #: 300053710
Date: 17-Feb-23
Designed: JS
Checked: PM

Min Diameter = 150 mm
Mannings 'n'= 0.013
Min. Velocity = 0.60 m/s
Max. Velocity = 3.00 m/s

Avg. Domestic Flow = 302.8 l/c/d
Infiltration = 0.100 l/s/ha
Max. Peaking Factor = 4.00
Min. Peaking Factor= 2.00

Factor of Safety = 10 %

NOMINAL PIPE SIZE USED

			RESIDENTIAL							COMMERCIAL/INDUSTRIAL/INSTITUTIONAL						FLOW CALCULATIONS							PIPE DATA					
DESCRIPTION	FROM MH	TO MH	AREA (ha)	ACC. AREA (ha)	UNITS (#)	DENISTY (P/ha)	DENSITY (P/unit)	POP	ACCUM. RES. POP.	AREA (ha)	ACC. AREA (ha)	EQUIV. POP. (p/ha)	FLOW RATE (l/s/ha)	EQUIV. POP.	ACCUM. EQUIV. POP.	INFILTRATION (l/s)	TOTAL ACCUM. POP.	PEAKING FACTOR	POP. FLOW (l/s)	CONSTANT COMM. FLOW (l/s)	ACCUM. COMM. FLOW (l/s)	TOTAL FLOW (l/s)	SLOPE (%)	PIPE DIAMETER (mm)	FULL FLOW CAPACITY (l/s)	FULL FLOW VELOCITY (m/s)	ACTUAL VELOCITY (m/s)	PERCENT FULL (%)
BLDG C STUB	BLDG C	MH1A	1.90	1.90						0.48	0.48		0.324			0.24				0.15	0.2	0.391	2.00	150	21.5	1.22	0.43	2%
	MH1A	MH2A		1.90							0.48					0.24					0.2	0.391	1.00	150	15.2	0.86	0.34	3%
BLDG B STUB	BLDG B	MH2A								0.02	0.02		0.324			0.00				0.01	0.0	0.008	2.00	150	21.5	1.22	0.32	0%
	MH2A	MH3A		1.90							0.49					0.24					0.2	0.399	1.00	150	15.2	0.86	0.34	3%
	MH3A	EX.STUB2		1.90							0.49					0.24					0.2	0.399	1.00	150	15.2	0.86	0.34	3%

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Appendix C

Stormwater Calculations

Created By: JS
Checked By: PM
Date: 2/21/2023

Project Title: 323 Mapleview Drive W.
Project #: 300053710

EXISTING SITE		
DESCRIPTION	**AREA (sq.m.)**	**AREA (ha)**
EXISTING SITE AREA	24505	2.45
EXISTING EXTERNAL AREA	12130	1.21
PROPOSED SITE		
DESCRIPTION	**AREA (sq.m.)**	**AREA (ha)**
EXISTING EXTERNAL AREA	12130	1.21
ROAD WIDENING	65	0.01
NEW EXTERNAL AREA	462	0.05
PROPOSED SITE - CONNECTION 1		
ROOFTOP	5588	0.56
CONTROLLED HARDSCAPE	14743	1.47
CONTROLLED LANDSCAPE	1252	0.13
UNCONTROLLED HARDSCAPE	71	0.007
UNCONTROLLED LANDSCAPE	25	0.003
TOTAL AREA 1	**21679**	2.17
PROPOSED SITE - CONNECTION 2		
CONTROLLED HARDSCAPE	2292	0.23
CONTROLLED LANDSCAPE	491	0.05
UNCONTROLLED HARDSCAPE	29	0.003
UNCONTROLLED LANDSCAPE	15	0.001
TOTAL AREA 2	**2826**	0.28
TOTAL SITE AREA	**24505**	2.45

BURNSIDE	Project: **323 Mapleview Drive W.**	Prepared by:	**JS**
	Task: **Pre-Development Flows**	Checked by:	**PM**
	Date: **21-Feb-23**	Project no.:	**300053710**

5-year Pre-Development Flow — **Connection 1**

A	853.608	
B	4.699	
C	0.766	
T	10.00	min

Land Use Description	Runoff Coefficient	Intensity (mm/hr)	Area (ha)	Runoff (L/s)
Site Area	0.75	108.92	2.17	**491.9**
TOTAL			2.17	**491.9**

$$Q_{\text{Allowable Release}} = \frac{CiA}{0.36}$$

491.9 **L/s**

BURNSIDE	Project: **323 Mapleview Drive W.**	Prepared by:	**JS**
	Task: **Pre-Development Flows**	Checked by:	**PM**
	Date: **21-Feb-23**	Project no.:	**300053710**

100-year Pre-Development Flow **Existing External Area**

A	1426.41	
B	5.273	
C	0.759	
T	10.00	min

Land Use Description	Runoff Coefficient	Intensity (mm/hr)	Area (ha)	Runoff (L/s)
Site Area	0.30	180.15	1.21	**182.1**
TOTAL			1.21	**182.1**

$$Q_{Allowable\ Release} = \frac{CiA}{0.36}$$

182.1 **L/s**

BURNSIDE	Project: **323 Mapleview Drive W.**	Prepared by:	**JS**
	Task: **Pre-Development Flows**	Checked by:	**PM**
	Date: **21-Feb-23**	Project no.:	**300053710**

5-year Pre-Development Flow — **Connection 2**

A	853.608	
B	4.699	
C	0.766	
T	10.00	min

Land Use Description	Runoff Coefficient	Intensity (mm/hr)	Area (ha)	Runoff (L/s)
Site Area	0.75	108.92	0.28	**64.1**
TOTAL			0.28	**64.1**

$$Q_{\text{Allowable Release}} = \frac{CiA}{0.36}$$

64.1 **L/s**

BURNSIDE	Project: **323 Mapleview Drive W.**	Prepared by:	**JS**
	Task: **Pre-Development Flows**	Checked by:	**PM**
	Date: **21-Feb-23**	Project no.:	**300053710**

5-year Pre-Development Flow **Existing Site**

A	853.608	
B	4.699	
C	0.766	
T	10.00	min

Land Use Description	Runoff Coefficient	Intensity (mm/hr)	Area (ha)	Runoff (L/s)
Site Area	0.75	108.92	2.45	**556.1**
TOTAL			2.45	**556.1**

$$Q_{Allowable\ Release} = \frac{CiA}{0.36}$$

556.1 **L/s**

Composite Runoff Coefficient Calculations

Controlled Site Area - Connection 1

Area ID	Area (ha)	RC	Area x RC
Rooftop	0.559	0.95	0.531
Controlled Landscape	0.125	0.25	0.031
Controlled Hardscape	1.474	0.95	1.401
Total:	2.158		1.963

Composite RC: 0.91

Composite Runoff Coefficient Calculations

Uncontrolled Site Area - Connection 1

Area ID	Area (ha)	RC	Area x RC
Uncontrolled Landscape	0.003	0.25	0.001
Uncontrolled Hardscape	0.007	0.95	0.007
Total:	0.010		0.007

Composite RC: 0.77

Composite Runoff Coefficient Calculations

Controlled Site Area - Connection 2

Area ID	Area (ha)	RC	Area x RC
Controlled Landscape	0.049	0.25	0.012
Controlled Hardscape	0.229	0.95	0.218
Total:	0.278		0.230

Composite RC: 0.83

Composite Runoff Coefficient Calculations

Uncontrolled Site Area - Connection 2

Area ID	Area (ha)	RC	Area x RC
Uncontrolled Landscape	0.001	0.25	0.000
Uncontrolled Hardscape	0.003	0.95	0.003
Total:	0.004		0.003

Composite RC: 0.71

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Composite Runoff Coefficient Calculations

New External Drainage Area - Connection 2

Area ID	Area (ha)	RC	Area x RC
Landscape	0.008	0.25	0.002
Hardscape	0.039	0.95	0.037
Total:	0.046		0.039

Composite RC: 0.83

Project:	**323 Mapleview Drive W.**	Prepared by: **JS**
Task:	**Post-Development**	Checked by: **PM**
Date:	**21-Feb-23**	Project no.: **300053710**

5-Year Post-Development Flows

A	853.608	
B	4.699	
C	0.766	**Connection 1**
T	10.00	min

Land Use Description	Runoff Coefficient	Intensity (mm/hr)	Area (ha)	Runoff (L/s)
Rooftop	0.95	108.92	0.56	160.6
Landscape	0.25	108.92	0.13	9.5
Hardscape	0.95	108.92	1.47	423.8
TOTAL			2.16	**593.8**

Uncontrolled Flows

Uncontrolled	0.77	108.92	0.01	2.2

$$Q_{\text{Allowable Release}} = \frac{CiA}{0.36}$$

596.1 **L/s**

Project:	**323 Mapleview Drive W.**	
Task:	**Post-Development**	
Date:	**21-Feb-23**	
Prepared by:	**JS**	
Checked by:	**PM**	
Project no.:	**300053710**	

5-Year Post-Development Flows

A	853.608	
B	4.699	
C	0.766	**Connection 2**
T	10.00	min

Land Use Description	Runoff Coefficient	Intensity (mm/hr)	Area (ha)	Runoff (L/s)
Landscape	0.25	108.92	0.05	3.7
Hardscape	0.95	108.92	0.23	65.9
TOTAL			0.28	**69.6**

Uncontrolled Flows

Uncontrolled	0.77	108.92	0.004	1.0

$$Q_{\text{Allowable Release}} = \frac{CiA}{0.36}$$

70.6 **L/s**

Project:	**323 Mapleview Drive W.**	Prepared by: **JS**
Task:	**Post-Development**	Checked by: **PM**
Date:	**21-Feb-23**	Project no.: **300053710**

5-Year Post-Development Flows

A	853.608	
B	4.699	
C	0.766	**New External Area**
T	10.00	min

Land Use Description	Runoff Coefficient	Intensity (mm/hr)	Area (ha)	Runoff (L/s)
External	0.83	108.92	0.05	11.7
TOTAL			0.05	**11.7**

$$Q_{Allowable\ Release} = \frac{CiA}{0.36}$$

11.7 **L/s**

Project: 323 Mapleview Drive W.
Project No.: 300053710
Modelled By: JS
Date: 2023/02/21

MODIFIED RATIONAL METHOD
POST-DEVELOPMENT CONTROLLED FLOWS - BUILDING C

Rainfall IDF Coefficients	5	-year	
A =		A =	853.608
C =		B =	4.699
		C =	0.766
Area =	0.48	ha	
Runoff Coefficient, C =	0.95		
C*A =	0.45		
Time of Concentration, t_c =	10.0	min	
Storm Duration Increment =	10.0	min	
Target Release Rate =	20	L/s	
Constant Inflow =		L/s	
Uncontrolled Outflow =		L/s	
Max. Allowable Outflow =	19.96	L/s	

Storm Duration (min)	Rainfall Intensity (mm/hr)	Max. Runoff Flow (L/s)	Runoff Volume (m^3)	Released Volume (m^3)	Storage Volume (m^3)	Max. Storage Volume Required (m^3)	Drawdown Time (hrs)
10.0	108.92	136.62	82	12	70		
20.0	73.19	91.80	110	18	92		
30.0	56.41	70.76	127	24	103		
40.0	46.47	58.28	140	30	110		
50.0	39.81	49.93	150	36	114		
60.0	35.00	43.90	158	42	116		
70.0	31.35	39.33	165	48	117		
80.0	28.48	35.72	171	54	118	118	3.36
90.0	26.14	32.79	177	60	117		
100.0	24.21	30.36	182	66	116		
110.0	22.58	28.32	187	72	115		
120.0	21.18	26.56	191	78	113		
130.0	19.96	25.04	195	84	111		
140.0	18.89	23.70	199	90	109		
150.0	17.95	22.52	203	96	107		
160.0	17.11	21.46	206	102	104		

Project: 323 Mapleview Drive W.
Project No.: 300053710
Modelled By: JS
Date: 2023/02/21

MODIFIED RATIONAL METHOD
POST-DEVELOPMENT CONTROLLED FLOWS - CONNECTION 1

Rainfall IDF Coefficients	5	-year			
A =			A =	853.608	
C =			B =	4.699	
			C =	0.766	
Area =	1.60	ha			
Runoff Coefficient, C =	0.91				
C*A =	1.45				
Time of Concentration, t_c =	10.0	min			
Storm Duration Increment =	10.0	min			
Target Release Rate =	674	L/s			
Constant Inflow =	182	L/s			
Uncontrolled Outflow =	2	L/s			
Max. Allowable Outflow =	648.05	L/s			

Storm Duration (min)	Rainfall Intensity (mm/hr)	Max. Runoff Flow (L/s)	Runoff Volume (m^3)	Runoff Volume From Roof C (m^3)	Total Runoff Volume (m^3)	Released Volume (m^3)	Storage Volume (m^3)	Max. Storage Volume Required (m^3)	Drawdown Time (hrs)
10.0	108.92	622.19	373	12	385	389	0		
20.0	73.19	477.83	573	18	591	583	0		
30.0	56.41	410.03	738	24	762	778	0		
40.0	46.47	369.84	888	30	918	972	0		
50.0	39.81	342.94	1029	36	1065	1166	0		
60.0	35.00	323.53	1165	42	1207	1361	0		
70.0	31.35	308.79	1297	48	1345	1555	0		
80.0	28.48	297.16	1426	54	1480	1750	0		
90.0	26.14	287.73	1554	60	1614	1944	0		
100.0	24.21	279.92	1679	66	1745	2139	0		
110.0	22.58	273.31	1804	72	1876	2333	0		
120.0	21.18	267.66	1927	78	2005	2527	0		
130.0	19.96	262.75	2049	84	2133	2722	0		
140.0	18.89	258.44	2171	90	2261	2916	0		
150.0	17.95	254.63	2292	96	2388	3111	0		
160.0	17.11	251.24	2412	102	2514	3305	0		

Project: 323 Mapleview Drive W.
Project No.: 300053710
Modelled By: JS
Date: 2023/02/21

MODIFIED RATIONAL METHOD
POST-DEVELOPMENT CONTROLLED FLOWS - CONNECTION 2

Rainfall IDF Coefficients	5	-year	
A =		A =	853.608
C =		B =	4.699
		C =	0.766
Area =	0.28	ha	
Runoff Coefficient, C =	0.83		
C*A =	0.23		
Time of Concentration, t_c =	10.0	min	
Storm Duration Increment =	10.0	min	
Target Release Rate =	64	L/s	
Constant Inflow =	12	L/s	
Uncontrolled Outflow =		L/s	
Max. Allowable Outflow =	59.99	L/s	

Storm Duration (min)	Rainfall Intensity (mm/hr)	Max. Runoff Flow (L/s)	Runoff Volume (m^3)	Released Volume (m^3)	Storage Volume (m^3)	Max. Storage Volume Required (m^3)	Drawdown Time (hrs)
10.0	108.92	81.24	49	36	13		
20.0	73.19	58.41	70	54	16	16	0.34
30.0	56.41	47.69	86	72	14		
40.0	46.47	41.34	99	90	9		
50.0	39.81	37.09	111	108	3		
60.0	35.00	34.02	122	126	0		
70.0	31.35	31.69	133	144	0		
80.0	28.48	29.85	143	162	0		
90.0	26.14	28.36	153	180	0		
100.0	24.21	27.12	163	198	0		
110.0	22.58	26.08	172	216	0		
120.0	21.18	25.18	181	234	0		
130.0	19.96	24.41	190	252	0		
140.0	18.89	23.72	199	270	0		
150.0	17.95	23.12	208	288	0		
160.0	17.11	22.59	217	306	0		

BURNSIDE	Project:	**323 Mapleview Drive W.**	Prepared by: **JS**
	Task:	**Orifice Sizing**	Checked by: **PM**
	Date:	**21-Feb-23**	Project no.: **300053710.00**

Orifice Tube	**Connection 1**		
Manholoe Top =	307.48		
Pipe Outlet Invert =	305.95		
Ponding Height at MH=	0		
Height =	1.31	m	
C =	0.84		
d_{orfice} =	**440.3**	mm (minimum)	**450 mm diameter DR 18 with Inner Diameter 440.30mm**
r_{orfice} =	220.15	mm	
$Q_{Orifice}$ =	**0.6480**	m^3/s	

$Q = CA(\sqrt{2gh})$

Discharge Coefficients Plate = 0.62 ; Tube = 0.84 ; Tube w/ 90deg transition = 0.71

BURNSIDE	Project:	**323 Mapleview Drive W.**	Prepared by: **JS**
	Task:	**Orifice Sizing**	Checked by: **PM**
	Date:	**21-Feb-23**	Project no.: **300053710.00**

Orifice Tube	**Connection 2**		
Manholoe Top =	307.26		
Pipe Outlet Invert =	306.29		
Ponding Height at MH=	0		
Height =	0.90	m	
C =	0.84		
d_{orfice} =	**147.29**	mm (minimum)	**150 mm diameter DR 17 with Inner Diameter 147.29mm**
r_{orfice} =	73.645	mm	
$Q_{Orifice}$ =	**0.0600**	m^3/s	

$Q = CA(\sqrt{2gh})$

Discharge Coefficients Plate = 0.62 ; Tube = 0.84 ; Tube w/ 90deg transition = 0.71

BURNSIDE	Project:	**323 Mapleview Drive W.**	Prepared by: **JS**
	Task:	**Retention Volume Calculations**	Checked by: **PM**
	Date:	**2/21/2023**	Project no.: **300053710**

Retention Volume Calculations

Redevelopment Area		
Area =	24505	m^2
Rainfall depth =	5.00	mm
Required volume =	**122.53**	m^3

Initial Abstraction Calculations

Cover Type	Area (m^2)	IA (mm)	Volume (m^3)
Rooftop	5,588	5.0	27.94
Landscape	1,783	1.0	1.78
Hardscape	17,134	1.0	17.13
Total	24505		46.86

Reuse Volume Required (Retention Volume - IA)	75.67 m^3

OUTPUT DATA:

STORM SEWER DESIGN SHEET: (5 Year Storm)

SYSTEM 1

323 Mapleview Drive West, Barrie

Project #: 53710.0
Date: 23-Feb-23
Designed: JS
Checked: PM

Min. Diameter = 250 mm
Mannings 'n'= 0.013
Starting Tc = 10 min
Factor of Safety = 15 %

Rainfall Intensity = $\frac{A}{(Tc+B)^c}$ *where Tc is in minutes*

A = 853.608
B = 4.699
C = 0.766
(5 Yr)

NOMINAL PIPE SIZE USED

DESCRIPTION	FROM MH	TO MH	AREA (ha)	RUNOFF COEFFICIENT "R"	'AR'	ACCUM. 'AR'	RAINFALL INTENSITY (mm/hr)	FLOW (m3/s)	CONSTANT FLOW (m3/s)	ACCUM. CONSTANT FLOW (m3/s)	TOTAL FLOW (m3/s)	LENGTH (m)	SLOPE (%)	PIPE DIAMETER (mm)	FULL FLOW CAPACITY (m3/s)	FULL FLOW VELOCITY (m/s)	INITIAL Tc (min)	TIME OF CONCENTRATION (min)	ACC. TIME OF CONCENTRATION (min)	PERCENT FULL (%)
CB1	CB1	CBMH1	0.02	0.95	0.02	0.02	108.9	0.005			0.005	33.7	0.40	250	0.038	0.77	10.00	0.73	10.73	14%
CBMH1	CBMH1	MH1	0.11	0.95	0.10	0.12	104.9	0.036			0.036	31.2	0.40	300	0.061	0.87	10.73	0.60	11.33	58%
EXTERNAL AREA	EXT1	CB2					108.9		0.182	0.182	0.182	1.0	1.00	450	0.285	1.79	10.00	0.01	10.01	64%
CB2	CB2	MH1	0.03	0.95	0.03	0.03	108.9	0.008		0.182	0.190	4.9	2.00	450	0.403	2.54	10.01	0.03	10.04	47%
	MH1	BL1				0.15	101.9	0.043		0.182	0.225	12.2	0.40	600	0.388	1.37	11.33	0.15	11.48	58%
CB3	CB3	BL1	0.03	0.95	0.03	0.03	108.9	0.010			0.010	1.6	2.00	250	0.084	1.71	10.00	0.02	10.02	11%
	BL1	BL2				0.18	101.2	0.051		0.182	0.233	24.0	0.40	600	0.388	1.37	11.48	0.29	11.77	60%
CB4	CB4	BL2	0.05	0.95	0.05	0.05	108.9	0.016			0.016	8.8	2.00	250	0.084	1.71	10.00	0.09	10.09	19%
	BL2	BL3				0.23	99.8	0.065		0.182	0.247	33.7	0.40	600	0.388	1.37	11.77	0.41	12.18	64%
CB5	CB5	BL3	0.04	0.95	0.04	0.04	108.9	0.013			0.013	4.0	2.00	250	0.084	1.71	10.00	0.04	10.04	15%
	BL3	MH2				0.27	98.0	0.075		0.182	0.257	8.0	0.40	600	0.388	1.37	12.18	0.10	12.28	66%
CB6	CB6	MH2	0.03	0.95	0.03	0.03	108.9	0.009			0.009	35.4	0.40	250	0.038	0.77	10.00	0.77	10.77	23%
	MH2	MH3				0.30	97.5	0.082		0.182	0.264	9.6	0.40	600	0.388	1.37	12.28	0.12	12.40	68%
BLDGA	STUBA	MH3	0.06	0.95	0.06	0.06	108.9	0.017			0.017	16.5	2.00	250	0.084	1.71	10.00	0.16	10.16	21%
	MH3	BL4				0.36	97.0	0.097		0.182	0.279	7.7	0.40	600	0.388	1.37	12.40	0.09	12.49	72%
CB7	CB7	BL4	0.03	0.95	0.03	0.03	108.9	0.009			0.009	10.9	2.00	250	0.084	1.71	10.00	0.11	10.11	10%
	BL4	BL5				0.39	96.6	0.104		0.182	0.287	6.0	0.40	600	0.388	1.37	12.49	0.07	12.56	74%
CB8	CB8	BL5	0.10	0.95	0.10	0.10	108.9	0.029			0.029	16.6	2.00	250	0.084	1.71	10.00	0.16	10.16	35%
	BL5	BL6				0.49	96.3	0.130		0.182	0.312	20.3	0.40	600	0.388	1.37	12.56	0.25	12.81	80%
CB9	CB9	BL6	0.07	0.95	0.07	0.07	108.9	0.021			0.021	5.0	2.00	250	0.084	1.71	10.00	0.05	10.05	24%
	BL6	MH4				0.55	95.3	0.146		0.182	0.329	31.7	0.40	600	0.388	1.37	12.81	0.38	13.19	85%
LOADING DOCK	DOCK	STUBC	0.05	0.95	0.05	0.05	108.9	0.014			0.014	1.0	1.00	250	0.059	1.21	10.00	0.01	10.01	24%

OUTPUT DATA:

STORM SEWER DESIGN SHEET: (5 Year Storm)

SYSTEM 1

323 Mapleview Drive West, Barrie

Project #: 53710.0
Date: 23-Feb-23
Designed: JS
Checked: PM

Min. Diameter = 250 mm
Mannings 'n'= 0.013
Starting Tc = 10 min
Factor of Safety = 15 %

Rainfall Intensity = $\frac{A}{(Tc+B)^{c}}$ *where Tc is in minutes*

A = 853.608
B = 4.699
C = 0.766
(5 Yr)

NOMINAL PIPE SIZE USED

DESCRIPTION	FROM MH	TO MH	AREA (ha)	RUNOFF COEFFICIENT "R"	'AR'	ACCUM. 'AR'	RAINFALL INTENSITY (mm/hr)	FLOW (m3/s)	CONSTANT FLOW (m3/s)	ACCUM. CONSTANT FLOW (m3/s)	TOTAL FLOW (m3/s)	LENGTH (m)	SLOPE (%)	PIPE DIAMETER (mm)	FULL FLOW CAPACITY (m3/s)	FULL FLOW VELOCITY (m/s)	INITIAL Tc (min)	TIME OF CONCENTRATION (min)	ACC. TIME OF CONCENTRATION (min)	PERCENT FULL (%)
BUILDING C	STUBC	MH5	0.48				108.9		0.020	0.020	0.020	24.7	2.00	250	0.084	1.71	10.00	0.24	10.24	24%
CB10	CB10	MH5	0.14	0.95	0.13	0.13	108.9	0.039			0.039	26.8	0.40	300	0.061	0.87	10.00	0.52	10.52	64%
CB11	CB11	MH5	0.12	0.95	0.11	0.11	108.9	0.034			0.034	3.2	2.00	250	0.084	1.71	10.00	0.03	10.03	40%
	MH5	BL7				0.24	106.1	0.071		0.020	0.091	17.4	0.40	450	0.180	1.13	10.52	0.26	10.77	50%
CB12	CB12	BL7	0.08	0.95	0.07	0.07	108.9	0.022			0.022	3.0	2.00	250	0.084	1.71	10.00	0.03	10.03	26%
	BL7	MH4				0.31	104.7	0.091		0.020	0.111	4.9	0.40	450	0.180	1.13	10.77	0.07	10.84	62%
CB13	CB13	CBMH2	0.01	0.95	0.01	0.01	108.9	0.004			0.004	43.2	0.40	250	0.038	0.77	10.00	0.94	10.94	11%
CBMH2	CBMH2	MH6	0.09	0.95	0.08	0.10	103.9	0.028			0.028	9.5	0.40	300	0.061	0.87	10.94	0.18	11.12	46%
	MH6	MH7				0.10	103.0	0.028			0.028	26.0	0.40	300	0.061	0.87	11.12	0.50	11.62	46%
CB14	CB14	MH7	0.06	0.95	0.05	0.05	108.9	0.016			0.016	3.4	2.00	250	0.084	1.71	10.00	0.03	10.03	19%
	MH7	MH8				0.15	100.5	0.042			0.042	46.9	0.40	300	0.061	0.87	11.62	0.90	12.53	69%
	MH8	MH9				0.15	96.5	0.040			0.040	26.6	0.40	300	0.061	0.87	12.53	0.51	13.04	66%
CB15	CB15	MH9	0.16	0.95	0.15	0.15	108.9	0.047			0.047	6.5	2.00	250	0.084	1.71	10.00	0.06	10.06	56%
CB16	CB16	MH9	0.03	0.95	0.03	0.03	108.9	0.009			0.009	20.1	2.00	250	0.084	1.71	10.00	0.20	10.20	11%
	MH9	BL8				0.34	94.3	0.088			0.088	3.6	0.40	450	0.180	1.13	13.04	0.05	13.09	49%
CB17	CB17	BL8	0.07	0.95	0.06	0.06	108.9	0.020			0.020	7.7	2.00	250	0.084	1.71	10.00	0.07	10.07	23%
	BL8	MH4				0.40	94.1	0.105			0.105	39.9	0.40	450	0.180	1.13	13.09	0.59	13.68	58%
	MH4	BL10				1.27	91.8	0.323		0.202	0.525	16.8	0.40	825	0.908	1.70	13.68	0.16	13.84	58%
CB18	CB18	BL10	0.09	0.95	0.09	0.09	108.9	0.027			0.027	7.1	2.00	250	0.084	1.71	10.00	0.07	10.07	32%
	BL10	MH10				1.36	91.2	0.343		0.202	0.545	13.7	0.40	825	0.908	1.70	13.84	0.13	13.98	60%
BUILDING B	STUBB	MH10	0.02	0.95	0.02	0.02	108.9	0.005			0.005	22.5	2.00	250	0.084	1.71	10.00	0.22	10.22	6%
	MH10	BL11				1.37	90.7	0.346		0.202	0.548	3.1	0.40	825	0.908	1.70	13.98	0.03	14.01	60%
CB20	CB20	BL11	0.17	0.95	0.16	0.16	108.9	0.048			0.048	31.2	2.00	250	0.084	1.71	10.00	0.30	10.30	57%
	BL11	BL12				1.53	90.6	0.385		0.202	0.587	2.7	0.40	825	0.908	1.70	14.01	0.03	14.04	65%
CB19	CB19	BL12	0.13	0.95	0.13	0.13	108.9	0.038			0.038	2.3	2.00	250	0.084	1.71	10.00	0.02	10.02	45%
	BL12	MH11				1.66	90.5	0.416		0.202	0.618	7.3	0.40	825	0.908	1.70	14.04	0.07	14.11	68%
	MH11C	EX.STM.MH21					108.9		0.648	0.648	0.648	5.2	0.40	825	0.908	1.70	10.00	0.05	10.05	71%

OUTPUT DATA:

STORM SEWER DESIGN SHEET: (5 Year Storm)

SYSTEM 2

323 Mapleview Drive West, Barrie

Project #: 53710.0
Date: 23-Feb-23
Designed: JS
Checked: PM

Min. Diameter = 250 mm
Mannings 'n'= 0.013
Starting Tc = 10 min
Factor of Safety = 15 %

Rainfall Intensity = $\frac{A}{(Tc+B)^{c}}$ *where Tc is in minutes*

A = 853.608
B = 4.699
C = 0.766
(5 Yr)

NOMINAL PIPE SIZE USED

DESCRIPTION	FROM MH	TO MH	AREA (ha)	RUNOFF COEFFICIENT "R"	'AR'	ACCUM. 'AR'	RAINFALL INTENSITY (mm/hr)	FLOW (m3/s)	CONSTANT FLOW (m3/s)	ACCUM. CONSTANT FLOW (m3/s)	TOTAL FLOW (m3/s)	LENGTH (m)	SLOPE (%)	PIPE DIAMETER (mm)	FULL FLOW CAPACITY (m3/s)	FULL FLOW VELOCITY (m/s)	INITIAL Tc (min)	TIME OF CONCENTRATION (min)	ACC. TIME OF CONCENTRATION (min)	PERCENT FULL (%)
CB21	CB20	CBMH3	0.06	0.95	0.06	0.06	108.9	0.017			0.017	42.1	0.40	250	0.038	0.77	10.00	0.92	10.92	44%
CBMH3	CBMH3	MH12	0.12	0.95	0.12	0.17	104.0	0.049			0.049	19.3	0.40	300	0.061	0.87	10.92	0.37	11.29	81%
CB22	CB21	CBMH4	0.02	0.95	0.02	0.02	108.9	0.006			0.006	7.0	0.40	250	0.038	0.77	10.00	0.15	10.15	17%
CBMH4	CBMH4	CBMH5	0.07	0.95	0.06	0.08	108.1	0.025			0.025	15.2	0.40	300	0.061	0.87	10.15	0.29	10.45	41%
CBMH5	CBMH5	MH12	0.07	0.95	0.07	0.15	106.5	0.045			0.045	30.2	0.40	300	0.061	0.87	10.45	0.58	11.03	73%
	MH12C	EX.STM.MH21					108.9		0.060	0.060	0.060	16.8	0.40	375	0.111	1.00	10.00	0.28	10.28	54%

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix D

Geotechnical Investigation

April 20, 2021

Plaza REIT
110 Sheppard Avenue East, Suite 307
Toronto, Ontario M2N 6Y8

E-mail: bill.bilkas@plaza.ca

Attention: Bill Bilkas

Re: Geotechnical Peer Review
315 and 323 Mapleview Drive West, Barrie, Ontario
Pinchin File: 289668

Pinchin Ltd. (Pinchin) is pleased to provide the findings of our Geotechnical Peer Review (PR) to Plaza REIT (Client) for the property located at 315 and 323 Mapleview Drive West, Barrie, Ontario (Site).

The Site currently consists of a 2.45 hectare (6 acre) parcel of vacant undeveloped land. It is Pinchin's understanding that the proposed development will comprise three slab-on-grade commercial buildings. The development will be provided with municipal services and roadways meeting an urban standard.

Pinchin was advised by the Client that the purpose of the PR was for due diligence purposes to assess the geotechnical information available from the provided report in order to highlight any soil or groundwater concerns which will affect the design and construction of the commercial development.

REPORTS REVIEWED

The Client provided Pinchin with the following document:

- Report entitled *"Geotechnical Investigation, Proposed Industrial Development, Mapleview Drive West, City of Barrie, Ontario"* by Terraprobe Limited (Terraprobe) and dated October 27, 2006 (Terraprobe Geotechnical Report).

SUMMARY OF REPORT REVIEWED

Terraprobe Geotechnical Report

The Terraprobe Geotechnical Report was prepared for a 40 hectare proposed industrial development on the south side of Mapleview Road, just east of Essa Road in Barrie, Ontario.

The field investigation for the Terraprobe Geotechnical Report consisted of advancing a total of ten (10) boreholes to depths ranging from approximately 5.0 to 11.1 metres below existing ground surface (mbgs), of which one borehole is located on the Site, Borehole BH2.

Based on the borehole logs provided for the Site by Terraprobe, the subsurface conditions consist of 25 to 300 mm of topsoil underlain by silty sand to sandy silt. Specifically, at Borehole BH2 the topsoil thickness was 300 mm and the sandy silt to silty sand material had a compact to very dense relative density.

Water levels were measured in the monitoring wells installed at the Site on March 21, 2006 and ranged between Elevation 311.8 and 302.3 masl. A monitoring well installed in Borehole BH2 had a measured water level of 1.7 mbgs (Elevation 307.0 masl). The Terraprobe Geotechnical Report noted that groundwater levels are subject to seasonal fluctuations.

Based on the soil conditions encountered in Borehole BH2 the following recommendations from the Terraprobe Geotechnical Report would be relevant for the development at the Site:

- The Terraprobe Geotechnical Report provides foundation recommendations for the native compact sand and silt material below the topsoil, with an allowable bearing pressure of 150 kPa, which would be equivalent to a factored bearing resistance at Ultimate Limit States of 225 kPa, and a bearing resistance at Serviceability Limit States of 150 kPa.
- Any fill required to raise grades at the Site should comprise a dry compacted material placed in 200 mm thick lifts. The fill is to be compacted to 95% Standard Proctor Maximum Dry Density (SPMDD) below the proposed parking areas, and 98% SPMDD below the proposed structures. Pinchin would recommend that the engineered fill placed below the proposed building be compacted to 100% SPMDD. The structural fill placed below the proposed structures should extend well beyond (i.e. in excess of 1.8 m) the building envelope to ensure that the building as well as the stress zone below the proposed footings are constructed within engineered fill.
- The Terraprobe Geotechnical Report provided a recommendation for 150 mm of Ontario Provincial Standard Specification (OPSS) 1010 Granular ‘A’ material below any lightly loaded floor slabs, constructed on native soil or approved engineered fill.
- Due to the high water level at the Site, installation of Site services and potentially foundations, depending on final Site grading, will require a positive dewatering system.
- The soils at the site would be considered a Type 3 soil above the water table and excavations at the Site will need to be sloped at 1 horizontal to 1 vertical from the base of the excavation. The native sand and silt material from above the groundwater table will be suitable for reuse as trench backfill.
- The Terraprobe Geotechnical Report provided a pavement structure design for preliminary industrial use.

CONCLUSIONS

Based on a review of the Terraprobe Geotechnical Report and specifically the soil conditions near the Site, the bearing resistances, slab on grade construction recommendations, and pavement design provided above and within the Terraprobe Geotechnical Report are suitable for the proposed development. As only one borehole was completed on the subject Site, the soil conditions beyond this borehole may change and it is recommended that additional boreholes be completed at the Site to confirm the recommendations provided above.

Groundwater levels are shallow in and around the Site and may impact the servicing of the Site, as positive dewatering may be required. It is therefore recommended that during the additional geotechnical investigation for the Site, additional monitoring wells be installed to confirm the stabilized groundwater table at the Site.

TERMS AND LIMITATIONS

This PR was performed for Plaza REIT (Client) in order to assess the soil and groundwater conditions for a potential development associated with the property at 315 and 323 Mapleview Drive West, Barrie, Ontario (Site), based on information collected and provided by others.

This letter was prepared for the exclusive use of the Client, subject to the terms, conditions and limitations contained within the duly authorized work plan for this project. Any use which a third party makes of this letter, or any reliance on or decisions to be made based on it, is the sole responsibility of such third parties. Pinchin accepts no responsibility for damages suffered by any third party as a result of decisions made or actions conducted.

If additional parties require reliance on this letter, written authorization from Pinchin will be required. Pinchin disclaims responsibility of consequential financial effects on transactions or property values, or requirements for follow-up actions and costs. Furthermore, this letter should not be construed as legal advice. Pinchin will not provide results or information to any party unless disclosure by Pinchin is required by law.

This PR was performed in general accordance with currently acceptable practices for geotechnical site investigations, as applicable to the Site. The information provided in this letter is based upon analysis of available documents, records and drawings and personal interviews. In evaluating the Site, Pinchin has relied in good faith on information provided by other individuals noted in this letter. Pinchin has assumed that the information provided is factual and accurate. Pinchin accepts no responsibility for any deficiency, misstatement or inaccuracy contained in this letter as a result of omissions, misinterpretations or fraudulent acts of persons interviewed or contacted.

Pinchin makes no other representations whatsoever, including those concerning the legal significance of its findings, or as to other legal matters touched on in this letter, including, but not limited to, ownership of any property, or the application of any law to the facts set forth herein. With respect to regulatory compliance issues, regulatory statutes are subject to interpretation and these interpretations may change over time.

CLOSING REMARKS

We trust that the foregoing information is satisfactory for your present needs. Should you have any questions or require additional information, please do not hesitate to contact the undersigned.

Pinchin Ltd.

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Template: Master Letter Template, March 15, 2019

Terraprobe

Consulting Geotechnical & Environmental Engineering
Construction Materials Engineering, Inspection & Testing

GEOTECHNICAL INVESTIGATION
PROPOSED INDUSTRIAL DEVELOPMENT
MAPLEVIEW DRIVE WEST
CITY OF BARRIE, ONTARIO

Prepared For: Mapleview Industrial Park Ltd.
27 Clapperton Street, Suite 300
Barrie, Ontario
L4M 8E6

Attention: Mr. Don Pratt

October 27, 2006
File No. 3-05-1141

Distribution:
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Table 1: Summary of Door-to-Door Survey
Borehole Logs 1 and 10
Figure 1: Site Location Plan
Figure 2: Borehole Location Plan
Figure 3 to 12: Grain Size Analyses

1. INTRODUCTION

Terraprobe is pleased to present the results of a geotechnical investigation carried out on the proposed industrial development located on the south side of Mapleview Drive West, just east of Essa Road in the City of Barrie, Ontario, as shown on Figure 1.

Authorization to carry out this investigation was provided by Mr. Bryan Richardson of Richardson Foster Ltd. on February 10, 2006.

The purpose of the investigation was to determine the soil and groundwater conditions across the subject property in order to assist the designers in development of a grading plan and design and construction of roads, municipal services and building foundations. Borehole locations were selected to provide general coverage of the proposed site including two stormwater management pond areas. The southeast corner was heavily treed and not accessible for this investigation.

The subject property is approximately 40ha in size and has recently been cleared of fence rows and farm buildings in preparation of proposed earthworks.

The site is gently rolling terrain with surface grades dropping to the north and west. The central area of the site had been an aggregate extraction operation. Significant importation of topsoil subsequently occurred.

Detailed assessment of this topsoil fill has been completed by others. Removal of the topsoil has also been tendered by the owner.

It is our understanding that the development will comprise of numerous industrial land parcels. This site will be serviced with full municipal services. Stormwater management facilities will direct runoff towards ponds located in the northeast and southwest corners of the site.

2. METHODOLOGY

A crawler-mounted drill rig was mobilized to the site and advanced ten (10) boreholes on the subject property to depths of 5.0 to 11.1m between March 13 and 14, 2006.

The boreholes were advanced using crawler-mounted equipment conducting Standard Penetration Testing at regular 0.75 to 1.5m intervals in each borehole. All samples were sealed in plastic containers and returned to our laboratory for further visual examination and moisture content determination. Grain size analyses were conducted on ten (10) soil samples collected during our investigation in order to better define the soil conditions.

Slotted standpipe type piezometers were installed in select boreholes upon completion in order to facilitate measurement of static water levels during a return visit to the site. All of the standpipes were monitored on March 21, 2006.

The ground surface elevation and the final locations of the boreholes were surveyed and provided by Richardson Foster Ltd. It is our understanding that the elevations presented are referenced to geodetic datum.

The locations of the boreholes are presented on Figure 2.

3. SUBSURFACE CONDITIONS

The details of the subsurface conditions encountered in each borehole are presented on the attached Borehole Logs. It should be noted that these conditions are confirmed at the borehole locations only and could vary between and beyond these boreholes.

In general, the boreholes encountered 25 to 300mm of topsoil underlain by silty sand to sandy silt and sand deposits. A layer of clayey silt was encountered in Boreholes 1 and 6 below a depth of about 4m. Borehole 10 encountered a 4m thick surficial layer of sand with trace to some silt and gravel which is believed to be fill associated with an excavation around the old farm buildings. Similar deep fills and/or topsoil fill are present in the central area of the site from a previous aggregate extraction operation. This area was not specifically investigated as it was studied by others and the deleterious materials removed under a contract with the owner.

The topsoil was underlain typically by a sand to silty sand or sandy silt type of strata. Standard Penetration Values in the upper 5m of native soils varied between 4 to greater than 50 blows per 0.3m of penetration indicating a loose to very dense condition. Moisture contents in the deposits varied from 6 to 26% by weight.

Cobbles were noted in Boreholes 2 and 4.

The groundwater level in each of the boreholes was typically encountered within 0.5 to 4m of the ground surface and generally fell in elevation to the west and south across the site.

The table below summarizes the ground surface elevation and the groundwater elevation in all of the boreholes.

Borehole Number	Ground Surface Elevation (m)	Water Level Elevation (m)	
		Noted During Drilling	Measured Mar. 21/06
1	312.2	311.0	310.3
2	308.7	306.7	307.0
3	308.7	306.9	--
4	308.2	305.2	--
5	306.0	303.5	302.3
6	310.8	306.8	--
7	309.8	307.1	308.0
8	312.2	312.2	311.8
9	312.7	311.5	--
10	309.7	307.7	--

The groundwater levels measured do indicate that the shallow groundwater flow direction is primarily south and westward and represents shallow groundwater flow emanating from higher grounds further to the southeast.

It is important to note that the groundwater levels encountered on the subject property and on the adjacent properties will likely vary seasonally and could be altered in the long-term as a result of the development in the area.

4. DISCUSSION AND RECOMMENDATIONS

The following discussion and recommendations are provided for use by the design engineers only. Contractors bidding on this project or developing construction schedules should provide their own interpretation of the data and/or provide their own investigations if they feel warranted.

4.1 Structure Foundations and Basements

The organic deposits and surficial sand fill encountered in the boreholes will not be suitable for support of conventional footings, roads and/or other services associated with the development. Foundations for structures should extend below the organic deposits onto the native compact sand. A nominal maximum allowable bearing pressure of 150 kPa at least 0.5 to 1.0m below existing grade may be used for general design purposes. However, we do caution that there are loose to marginally compact areas indicated particularly as for example at Borehole 10 in the upper 4m where old fills are suspected. Where loose conditions are encountered it may be necessary to step footings down. Site specific inspections should be conducted to confirm the maximum allowable bearing pressures after site redevelopment and regrading.

As an alternative to placement of foundations directly on undisturbed native sand, foundations may be placed on at least 0.5m of engineered fill compacted to at least 98% of Standard Proctor Maximum Dry Density (SPMDD). The fill would be placed on an approved, stable subgrade under full-time geotechnical supervision in order to support foundations. Further consultation with Terraprobe is required for this option with associated additional geotechnical investigation.

If greater bearing capacity is required then Terraprobe should be consulted to determine another founding option and whether additional investigation is warranted.

The basements or lower levels for the proposed structures should be kept at least 0.3m above the seasonally high groundwater table. Based on the findings of this investigation, we would suggest that this would represent an elevation probably between current ground surface level and 4.0m below.

A minimum soil cover of 1.2m above footing bases should be provided for foundations subject to freezing conditions in order to provide frost protection.

All foundation walls for the structures should be designed to resist lateral earth pressures assuming a unit weight of backfill (γ) of 20 kN/m^3 and a soil internal angle of friction value (ϕ) of 30°. A lateral earth pressure co- efficient for "at rest" conditions (ie. rigid walls) should be taken to be approximately 0.5. However, this value may need to be increased if there is substantial grade rise, up and away from the structure or surcharge loads which could induce higher lateral earth pressures.

4.2 Site Grading

At the time this report was prepared, details with respect to site grading were being developed. However, it is anticipated that placement of engineered fill to raise the grades back up to the proposed founding levels for the structures as well as to final grades may be required in some areas.

Temporary groundwater control during construction may have to be considered, especially for services. This will likely entail in some cases installation of well points and/or deep wells to lower the water table where clean sand deposits are encountered below the water level. These should be reviewed with the dewatering specialist working in conjunction with the grading contractor and servicing contractors. Excavations below the water level in the native silty sand to sandy silt and clayey silt soils will yield much less water seepage and will likely be handled adequately using extra wide trenches and properly filtered sumps.

All general earth fill placed to raise grades should be comprised of a dry, compacted material that can be placed in maximum 200mm loose lifts and compacted uniformly to a minimum of 95% of Standard Proctor Maximum Dry Density. However, since the site grading operations will likely comprise of primarily engineered fill to support services, roads and foundations, this criteria should incorporate a full-time inspection program during placement and compaction of the material to 98% of Standard Proctor Maximum Dry Density (SPMDD) or greater in order to be able support settlement sensitive structures. Specific details with respect to monitoring, control and placement of engineered fill can be discussed with Terraprobe at a later date. However, at this point it is important to note that engineered fill to support structures for example must extend well beyond the building envelope to ensure that the building as well as the stress zone below the proposed footings are constructed within engineered fill.

Terraprobe should have the opportunity to review with the designers the ultimate proposed site grading plans in order to provide further geotechnical comment.

4.3 Concrete Slabs-On-Grade

Conventional lightly loaded concrete slabs-on-grade can be placed on compacted, approved fill or on the existing native soil subgrade below all deleterious or topsoil material provided a layer consisting of a minimum of 150mm of OPSS Granular 'A' type material compacted to a minimum of 100% of Standard Procter Maximum Dry Density (SPMDD) is placed.

4.4 Excavation and Backfill

Conventional servicing for the property will entail excavations to depths of several metres below existing ground surface. This will entail excavation through organic deposits into silty sand to sandy silt and sand deposits below the water table. As noted above, it is envisioned that positive dewatering with well points and/or deep wells will be required to facilitate installation of services where sand deposits are encountered, such as at Boreholes 5, 7 and 10.

The site soils in their current condition are considered a Type 3 Soil above the water level according to the Occupational Health and Safety Act. In this regard, excavations more than 1.2m depth where workers must enter the excavations must be sloped at a 1:1 (horizontal to vertical) line from the base of excavation to ground surface.

Localized sloughing to inclinations in the order of 1.5:1 may occur where very loose conditions are encountered.

The majority of the dry sandy deposit materials encountered on the site will be suitable for reuse as fill on the property.

All fill used to backfill trenches should be compacted in maximum 200mm loose lifts to a minimum of 95% of Standard Proctor Maximum Dry Density.

Long-term slope cuts will remain stable above the water level at inclinations of 2:1 (horizontal to vertical) or flatter. Any sections proposed steeper than 2:1 will require retaining structures and/or slope stabilization measures designed by a specialist in the field.

4.5 Lateral Earth Pressures on Subsurface Walls

The boreholes encountered primarily sand to silty sand soils, for the most part in a compact to dense condition within the upper 1 to 4m of ground surface, becoming very dense with increasing depth.

For design of buried rigid concrete walls, the following design parameters are recommended when considering larger commercial and/or multi storey type structures in particular.

		Compact (1 to 2m depth)	Dense to Very Dense
soil unit weight	γ	18 kN/m^3	19 kN/m^3
angle of internal friction	ϕ	32°	36°
coefficient of lateral earth pressure	k_o	0.47	0.41

The recommended design angle of friction between concrete and the native soil is 24°.

For design of temporary shoring systems, the following design parameters are recommended:

		Compact (1 to 2m depth)	Dense to Very Dense
soil unit weight	γ	18 kN/m^3	19 kN/m^3
angle of internal friction	ϕ	32°	36°
coefficient of lateral earth pressure (active)	k_a	0.31	0.26

Associated with the above is the inherent assumption that hydrostatic pressure will not be allowed to develop behind these wall structures. In this regard, perimeter drainage systems will need to be implemented.

4.6 Pipe Bedding

The pipe bedding details may be altered depending on the invert elevations that are ultimately designed for as well as the effectiveness of the groundwater control carried out during construction. If a dry trench base can be obtained and maintained during excavation, then an OPSS Granular 'A' type bedding may be placed and compacted to 95% of Standard Proctor Maximum Dry Density to support all services. However, in the event that wet or unstable base conditions are encountered it would be necessary to the consider use of a HL-

8 coarse aggregate fully wrapped in a geotextile cloth as a pipe bedding. It would be favourable to ensure that the site area can be dewatered prior to excavation and hence a test dig for the bidding contractors would be prudent.

4.7 Pavements

It is envisioned that the southwest portion of the property may need to be raised in grade with an approved sand or silty sand material. The subgrade for the east half of the property is anticipated to be of the native soils. All organic deposits encountered on the site below proposed roads will be subexcavated and removed.

Based on a sand to silty sand and sandy silt subgrade, we would suggest the following minimum pavement design for primarily industrial use.

Materials	Thickness (mm)
HL-3 Surface Asphalt	40
HL-8 Binder Asphalt	100
OPSS Granular 'A'	150
OPSS Granular 'B'	300

All granular components should be compacted to a minimum of 100% of Standard Proctor Maximum Dry Density. All hot rolled asphaltic concrete materials should be rolled uniformly to a minimum of 97% of Marshall Bulk Density.

Prior to placing any granular materials, it is important to have the subgrade heavily proof rolled and inspected by Terraprobe to identify any soft or weak spots. Any weak areas should be further subexcavated and replaced with a compacted OPSS Granular 'B' material.

It is our recommendation that continuous, filtered subdrains leading to positive outlets such as catchbasins are constructed for all roads.

Ten (10) grain size analyses were conducted by Terraprobe on the native soil samples collected from the site (see Figures 3 to 12). The gradation reports indicate silt and clay contents (fines) ranging from 2 to 97%. Only one of the six near surface samples which were compared to a Granular 'B' material conformed to this

specification (Borehole 10) which is likely an imported material as indicated on the borehole log rather than native granular. Therefore, no significant quantity of granular subbase type material was encountered on the property.

Previous testing and inspection across the property as part of an Environmental Site Assessment conducted by Terraprobe suggests that there is localized pockets of pit run gravel towards the east property boundary. It is suspected that the previous aggregate extraction operation intercepted the bulk of better material.

Terraprobe should have the opportunity to provide inspection and testing services during all phases of the pavement construction in order to confirm that specifications are met.

4.8 Stormwater Management Facilities

The current understanding is that it is proposed to proceed with an expansion to the existing stormwater pond at the northeast corner of the site as well as create a new pond in the southeast corner.

Boreholes 1 and 5 are located in the areas of the expansion and new ponds respectively.

In addition, grain size analyses were carried out on samples from these boreholes which are also appended.

A preliminary design concept for the south pond has been provided to us by Richardson Foster Limited.

The design generally entails the construction of a pond to a base elevation of approximately 303.3m sustaining a 1.4m head of water with a permanent pool level proposed at elevation 304.7m.

Based on the borehole results, the ponds will be primarily constructed in dense to very dense sand and silt containing trace to some clay, trace gravel with a base elevation at or above the measured water table of 302.3m at Borehole 5 measured in March 2006. The base of the northeast pond will likely be below the measured ground water level.

Based on the nature of the soils encountered at this locations the intrinsic permeability of these silty soils is likely to be in the order of 10^{-6} to 10^{-7}cm/sec.

Inside side slopes through these materials may be constructed as steep as 3:1 (horizontal to vertical) inclination with minimal anticipated problems with respect to overall long-term stability.

We note that the design being proposed at this time suggests a variance of slopes from 3:1 to as flat as 7:1 (horizontal to vertical) inclination.

We do note that the sand and silt layer does break into underlying very dense to dense water bearing sand deposit below elevation 300.0m at Borehole 5.

If in the ultimate pond design the base will need to extend into this lower layer then the interior side slope should be sloped at inclinations between 4:1 and 5:1 (horizontal to vertical) for long-term stability and minimal maintenance issues.

4.9 Impact to Local Wells

Terraprobe was requested to conduct a well survey at properties within about 300m of the subject property.

Terraprobe staff visited the residences surrounding the proposed work area to determine the nature and type of water supply in accordance with the City of Barrie requirements. The field work was conducted on May 18, 26, 31 and October 19, 2006.

The attached Table 1: Summary of Door-to-Door Well Survey summarizes the findings of our survey along Mapleview Drive West and Essa Road.

The majority of the responses indicated connection to municipal water supply. However, one shallow drilled well (11.9m deep) and two deeper drilled wells were identified in the area.

No response was received from three (3) residences (#381 Mapleview Drive West and #724 and 733 Essa Road) during the four visits made to this area by Terraprobe. One resident did not wish to answer any questions (#737 Essa Road).

It is Terraprobe's recommendation that these wells continue to be monitored prior to, periodically during and following the service installation activities proposed in the area.

Since excavations for the services are anticipated to be fairly shallow (i.e in the upper 5 to 6m) we do not expect any negative impacts on the existing wells from the proposed construction.

We trust this report adequately summarizes our investigation and our geotechnical recommendations or comments. If you should have any questions, or need any further assistants, please do not hesitate to contact the undersigned.

Sincerely,

Terraprobe Limited

Blair E. Goss, P. Eng.
Associate

LICENSED PROFESSIONAL ENGINEER
Oct. 30/06
B. E. GOSS
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Kirk R. Johnson, P. Geo., P. Eng.
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Oct 30/06
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TABLE

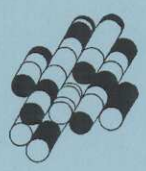

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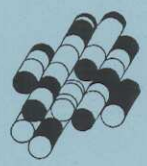
Table 1
Summary of Door to Door Well Survey
Proposed Mapleview Drive West Development

Municipal Address	Well Construction	Depth of Well (m)	Water Depth(m) / Date	Water Sample for Chemical Analysis	Comments
Essa Road					
674	City Water				
724	Unknown				No answer during visits of May 18, 26 & 31, 2006.
729	City Water				
730	City Water				
733	Unknown				No answer during visits of May 18, 26, 31 & October 19, 2006.
737	Unknown				Respondent did not know if they were on City water or private well and did not wish to answer questions.
743	Drilled	11.9	5.32 - Oct.19/06	No	New well in Oct. 2006. Water is still silty. Good quality and quantity. Old well went dry. Buys bottled water for daycare.
749	City Water				
759	City Water				
765	City Water				
Mapleview Drive West					
320	Drilled	54.9	35.87 - Oct.19/06	No	Very good quality, some lime. Good quantity. Buys bottled water for convenience.
365	City Water				

Table 1
Summary of Door to Door Well Survey
Proposed Mapleview Drive West Development

367	Drilled	45.7	Inaccessible	No	Hard water but good quality and quantity. No treatment, never had to buy water, no problems.
369	City Water				
381	Unknown				No answer during visits of May 18, 26, 31 & October 19, 2006.
387	City Water				

BOREHOLE LOGS



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ABBREVIATIONS, TERMINOLOGY, GENERAL INFORMATION

BOREHOLE LOGS

SAMPLING METHOD

SS	split spoon
ST	Shelby tube
AS	auger sample
WS	wash sample
RC	rock core
WH	weight of hammer
PH	pressure, hydraulic

PENETRATION RESISTANCE

Standard Penetration Test (SPT) resistance ('N' values) is defined as the number of blows by a hammer weighing 63.6 kg (140 lb.) falling freely for a distance of 0.76 m (30 in.) required to advance a standard 50 mm (2 in.) diameter split spoon sampler for a distance of 0.3 m (12 in.).

Dynamic Cone Test (DCT) resistance is defined as the number of blows by a hammer weighing 63.6 kg (140 lb.) falling freely for a distance of 0.76 m (30 in.) required to advance a conical steel point of 50 mm (2 in.) diameter and with 60° sides on 'A' size drill rods for a distance of 0.3 m (12 in.).

SOIL DESCRIPTION - COHESIONLESS SOILS

Relative Density	'N' value
very loose	< 4
loose	4 - 10
compact	10 - 30
dense	30 - 50
very dense	> 50

SOIL DESCRIPTION - COHESIVE SOILS

Consistency	Undrained Shear Strength, kPa	'N' value
very soft	< 12	< 2
soft	12 - 25	2 - 4
firm	25 - 50	4 - 8
stiff	50 - 100	8 - 16
very stiff	100 - 200	16 - 32
hard	> 200	> 32

SOIL COMPOSITION

	% by weight
'trace' (e.g. trace silt)	< 10
'some' (e.g. some gravel)	10 - 20
adjective (e.g. sandy)	20 - 35
'and' (e.g. sand and gravel)	35 - 50

TESTS, SYMBOLS

MH	mechanical sieve and hydrometer analysis
w, w_c	water content
w_l	liquid limit
w_p	plastic limit
I_p	plasticity index
k	coefficient of permeability
γ	soil unit weight, bulk
ϕ'	angle of internal friction
c'	cohesion shear strength
C_c	compression index

GENERAL INFORMATION, LIMITATIONS

The conclusions and recommendations provided in this report are based on the factual information obtained from the boreholes and/or test pits. Subsurface conditions between the test holes may vary.

The engineering interpretation and report recommendations are given only for the specific project detailed within, and only for the original client. Any third party decision, reliance, or use of this report is the sole and exclusive responsibility of such third party. The number and siting of boreholes and/or test pits may not be sufficient to determine all factors required for different purposes.

It is recommended Terraprobe be retained to review the project final design and to provide construction inspection and testing.

Terraprobe

LOG OF BOREHOLE ..1..

PROJECT NAME: N 1/2 Lot 4, Concession 11, Barrie PROJECT No.: 3-05-1141

CLIENT: Mapleview Industrial Park Ltd. BORING DATE: March 14, 2006

LOCATION: Barrie, Ontario ELEVATION DATUM: Geodetic

BORING METHOD: D50 Crawler-mounted Drill Rig / 108mm Diameter Solid Stem Augers

DEPTH SCALE IN METRES

DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	"N" VALUE
GROUND SURFACE		312.2			
275mm – TOPSOIL		0.0			
Brown Loose to Very Dense Moist to Wet			1	SS	7
			2	SS	16
SILT & SAND, to SANDY SILT, trace gravel			3	SS	41
			4	SS	60
			5	SS	50
Brown Hard Moist		308.2 4.0			
CLAYEY SILT, trace sand			6	SS	48
			7	SS	41
Brown Very Dense Wet		305.2 7.0			
SILTY SAND, trace clay			8	SS	50/100mm
			9	SS	77

PENETRATION RESISTANCE PLOT 20 40 60 80

SHEAR STRENGTH kPa nat.V – + Q – ● rem.V – ⊕ U – ○ 20 40 60 80

WATER CONTENT (%) wP w wL 10 20 30

INSTALLATION INFORMATION

Bentonite Seal

1.9m

Terraprobe

LOG OF BOREHOLE ..1..

PROJECT NAME: N 1/2 Lot 4, Concession 11, Barrie PROJECT No.: 3-05-1141

CLIENT: Mapleview Industrial Park Ltd. BORING DATE: March 14, 2006

LOCATION: Barrie, Ontario ELEVATION DATUM: Geodetic

BORING METHOD: D50 Crawler-mounted Drill Rig / 108mm Diameter Solid Stem Augers

DEPTH SCALE IN METRES

DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	"N" VALUE	PENETRATION RESISTANCE PLOT (20 40 60 80) / SHEAR STRENGTH kPa (nat.V – +, rem.V – ⊕, Q – ●, U – ○) (20 40 60 80)	WATER CONTENT (%) (wP, w, wL) (10 20 30)	INSTALLATION INFORMATION
Continued								
Brown Very Dense Wet								
SILTY SAND, trace clay		301.1	10	SS	50/125mm		○	
End of Borehole		11.1						

1. Borehole caved at 1.8m upon completion of drilling.

2. Water level noted at 1.2m during drilling.

3. Water level on March 21, 2006 measured at 1.9m (elev. 310.3m).

Terraprobe

LOG OF BOREHOLE ..2..

PROJECT NAME: N 1/2 Lot 4, Concession 11, Barrie PROJECT No.: 3-05-1141

CLIENT: Mapleview Industrial Park Ltd. BORING DATE: March 13, 2006

LOCATION: Barrie, Ontario ELEVATION DATUM: Geodetic

BORING METHOD: D50 Crawler-mounted Drill Rig / 108mm Diameter Solid Stem Augers

DEPTH SCALE IN METRES

DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	"N" VALUE	PENETRATION RESISTANCE PLOT (20 40 60 80) / SHEAR STRENGTH kPa (nat.V - +, rem.V - ⊕, Q - ●, U - ○) (20 40 60 80)	WATER CONTENT (%) (WP, W, WL) (10 20 30)	INSTALLATION INFORMATION
GROUND SURFACE		308.7						
300mm - TOPSOIL		0.0						
Brown Loose to Very Dense Moist to Wet			1	SS	8	x		Bentonite Seal
			2	SS	14	x		
SILT & SAND, trace gravel/ cobbles, grading to silt till below 4m			3	SS	19	x		▼ 1.7m
			4	SS	60	x		
			5	SS	72	x		
			6	SS	50/150mm			
		303.7						
End of Borehole		5.0						

1. Borehole remained open upon completion of drilling.

2. Water level noted at 2m during drilling.

3. Water level on March 21, 2006 measured at 1.7m (elev. 307.0m).

Terraprobe

LOG OF BOREHOLE ..3..

PROJECT NAME: N 1/2 Lot 4, Concession 11, Barrie PROJECT No.: 3-05-1141

CLIENT: Mapleview Industrial Park Ltd. BORING DATE: March 13, 2006

LOCATION: Barrie, Ontario ELEVATION DATUM: Geodetic

BORING METHOD: D50 Crawler-mounted Drill Rig / 108mm Diameter Solid Stem Augers

DEPTH SCALE IN METRES

DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUE	PENETRATION RESISTANCE PLOT / SHEAR STRENGTH kPa (nat.V – +, rem.V – ⊕, Q – ●, U – ○)	WATER CONTENT (%) (wP, w, wL)	INSTALLATION INFORMATION
GROUND SURFACE		308.7						
150mm – TOPSOIL		0.0						
Brown Loose to Very Dense Moist to Wet			1	SS	10	x	○	1. Borehole remained open upon completion of drilling.
			2	SS	19	x	○	2. Water level noted at 1.8m during drilling.
SILT & SAND, to SANDY SILT, trace gravel			3	SS	14	x	○	
			4	SS	31	x	○	
			5	SS	62	x	○	
			6	SS	52	x	○	
		303.7						
End of Borehole		5.0						

Terraprobe

LOG OF BOREHOLE ..4..

PROJECT NAME: N 1/2 Lot 4, Concession 11, Barrie PROJECT No.: 3-05-1141

CLIENT: Mapleview Industrial Park Ltd. BORING DATE: March 13, 2006

LOCATION: Barrie, Ontario ELEVATION DATUM: Geodetic

BORING METHOD: D50 Crawler-mounted Drill Rig / 108mm Diameter Solid Stem Augers

DEPTH SCALE IN METRES

SOIL PROFILE			SAMPLES			PENETRATION RESISTANCE PLOT	WATER CONTENT (%)	INSTALLATION INFORMATION
DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	"N" VALUE	20 40 60 80 SHEAR STRENGTH kPa nat.V - + Q - ● rem.V - ⊕ U - ○ 20 40 60 80	Wp W WL 10 20 30	
GROUND SURFACE		308.2						
0 175mm - TOPSOIL		0.0						1. Borehole remained open upon completion of drilling.
Brown Loose to Very Dense Moist to Wet			1	SS	5	x	○	2. Water level noted at 3m during drilling.
1 SILT & SAND, trace gravel/cobbles, grading to SILT TILL below 4m			2	SS	28	x	○	
			3	SS	42	x	○	
2			4	SS	50/125mm		○	
3			5	SS	54	x	○	
4			6	SS	50/150mm		○	
		303.2						
5 End of Borehole		5.0						
6								
7								
8								
9								

Terraprobe

LOG OF BOREHOLE ..5..

PROJECT NAME: N 1/2 Lot 4, Concession 11, Barrie PROJECT No.: 3-05-1141

CLIENT: Mapleview Industrial Park Ltd. BORING DATE: March 14, 2006

LOCATION: Barrie, Ontario ELEVATION DATUM: Geodetic

BORING METHOD: D50 Crawler-mounted Drill Rig / 108mm Diameter Solid Stem Augers

DEPTH SCALE IN METRES

SOIL PROFILE

DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)
GROUND SURFACE		306.0
150mm – TOPSOIL		0.0
Brown Loose to Very Dense Moist to Wet		
SAND & SILT, trace to some clay, trace gravel		
Brown Very Dense to Dense Wet		300.0 / 6.0
SAND, trace silt, stratified		

SAMPLES

NUMBER	TYPE	"N" VALUE
1	SS	8
2	SS	4
3	SS	36
4	SS	61
5	SS	62
6	SS	46
7	SS	70/100mm
8	SS	73/125mm
9	SS	64/125mm

PENETRATION RESISTANCE PLOT

20 40 60 80

SHEAR STRENGTH kPa

nat.V – + Q – ●

rem.V – ⊕ U – ○

20 40 60 80

WATER CONTENT (%)

wP w wL

10 20 30

INSTALLATION INFORMATION

Bentonite Seal

3.7m

Terraprobe

LOG OF BOREHOLE ..5..

PROJECT NAME: N 1/2 Lot 4, Concession 11, Barrie PROJECT No.: 3-05-1141

CLIENT: Mapleview Industrial Park Ltd. BORING DATE: March 14, 2006

LOCATION: Barrie, Ontario ELEVATION DATUM: Geodetic

BORING METHOD: D50 Crawler-mounted Drill Rig / 108mm Diameter Solid Stem Augers

DEPTH SCALE IN METRES	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUE	PENETRATION RESISTANCE PLOT (20 40 60 80) / SHEAR STRENGTH kPa (nat.V − +, rem.V − ⊕, Q − ●, U − ○) (20 40 60 80)	WATER CONTENT (%) (wP, w, wL) (10 20 30)	INSTALLATION INFORMATION
10	Continued								
	Brown Very Dense to Dense Wet								
	SAND, trace silt, stratified			10	SS	39	×	○	
11			294.9						
	End of Borehole		11.1						
12									
13									
14									
15									
16									
17									
18									
19									

1. Borehole caved at 4.8m upon completion of drilling.

2. Water level noted at 2.5m during drilling.

3. Water level on March 21, 2006 measured at 3.7m (elev. 302.3m).

Terraprobe

LOG OF BOREHOLE ..6..

PROJECT NAME: N 1/2 Lot 4, Concession 11, Barrie PROJECT No.: 3-05-1141

CLIENT: Mapleview Industrial Park Ltd. BORING DATE: March 13, 2006

LOCATION: Barrie, Ontario ELEVATION DATUM: Geodetic

BORING METHOD: D50 Crawler-mounted Drill Rig / 108mm Diameter Solid Stem Augers

DEPTH SCALE IN METRES

DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	"N" VALUE	PENETRATION RESISTANCE PLOT / SHEAR STRENGTH kPa (nat.V – +, rem.V – ⊕, Q – ●, U – ○)	WATER CONTENT (%) (wP, w, wL)	INSTALLATION INFORMATION
GROUND SURFACE		310.8						
75mm – TOPSOIL		0.0						
Brown Compact to Very Dense Moist to Wet			1	SS	12	x		1. Borehole remained open upon completion of drilling.
			2	SS	12	x		2. Water level noted at 4.0m during drilling.
SAND, some silt, trace gravel			3	SS	15	x		
			4	SS	97	x		
			5	SS	50/150mm			
		306.8						
Brown Hard Moist		4.0						
CLAYEY SILT, trace sand & gravel			6	SS	50/100mm			
		305.8						
End of Borehole		5.0						

SHEET 1 OF 1

Terraprobe

LOG OF BOREHOLE ..7..

PROJECT NAME: N 1/2 Lot 4, Concession 11, Barrie PROJECT No.: 3-05-1141

CLIENT: Mapleview Industrial Park Ltd. BORING DATE: March 13, 2006

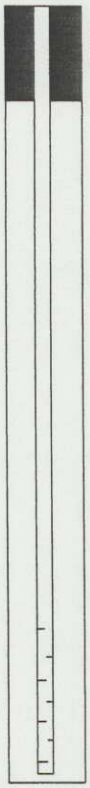
LOCATION: Barrie, Ontario ELEVATION DATUM: Geodetic

BORING METHOD: D50 Crawler-mounted Drill Rig / 108mm Diameter Solid Stem Augers

DEPTH SCALE IN METRES

DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	"N" VALUE	PENETRATION RESISTANCE PLOT (20 40 60 80) / SHEAR STRENGTH kPa (nat.V − +, rem.V − ⊕, Q − ●, U − ○; 20 40 60 80)	WATER CONTENT (%) (wP, w, wL; 10 20 30)
GROUND SURFACE		309.8					
25mm – TOPSOIL		0.0					
Brown Loose to Very Dense Moist to Wet			1	SS	8	x	○
SAND, trace to some silt, trace gravel			2	SS	50/150mm		○
			3	SS	71	x	○
		307.7					
Brown Compact to Very Dense Wet		2.1	4	SS	16	x	○
SILTY SAND, to some silt, trace gravel			5	SS	50/150mm		○
			6	SS	85/50mm		○
		304.8					
End of Borehole		5.0					

INSTALLATION INFORMATION



1. Borehole remained open upon completion of drilling.

2. Water level noted at 2.7m during drilling.

3. Water level on March 21, 2006 measured at 1.8m (elev. 308.0m).

Terraprobe

LOG OF BOREHOLE ..8..

PROJECT NAME: N 1/2 Lot 4, Concession 11, Barrie PROJECT No.: 3-05-1141

CLIENT: Mapleview Industrial Park Ltd. BORING DATE: March 14, 2006

LOCATION: Barrie, Ontario ELEVATION DATUM: Geodetic

BORING METHOD: D50 Crawler-mounted Drill Rig / 108mm Diameter Solid Stem Augers

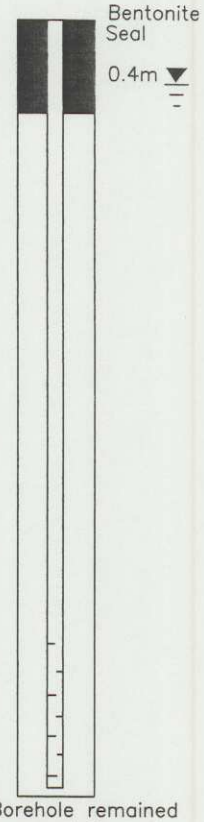
DEPTH SCALE IN METRES

DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	"N" VALUE
GROUND SURFACE		312.2			
125mm - TOPSOIL		0.0			
Brown Loose to Dense Wet			1	SS	4
SILTY SAND, trace to some gravel			2	SS	38
			3	SS	30
		310.0			
Brown Dense to Very Dense Wet		2.2	4	SS	39
SANDY SILT, some clay			5	SS	54
			6	SS	37
		307.2			
End of Borehole		5.0			

PENETRATION RESISTANCE PLOT
20 40 60 80
SHEAR STRENGTH kPa
nat.V - + Q - ●
rem.V - ⊕ U - ○
20 40 60 80

WATER CONTENT (%)
wP wL
10 20 30

INSTALLATION INFORMATION



1. Borehole remained open completion of drilling.

2. Water level noted at surface during drilling.

3. Water level on March 21, 2006 measured at 0.4m (elev. 311.8m).

Terraprobe

LOG OF BOREHOLE ..9..

PROJECT NAME: N 1/2 Lot 4, Concession 11, Barrie PROJECT No.: 3-05-1141

CLIENT: Mapleview Industrial Park Ltd. BORING DATE: March 14, 2006

LOCATION: Barrie, Ontario ELEVATION DATUM: Geodetic

BORING METHOD: D50 Crawler-mounted Drill Rig / 108mm Diameter Solid Stem Augers

DEPTH SCALE IN METRES

DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	"N" VALUE	PENETRATION RESISTANCE PLOT (20 40 60 80) / SHEAR STRENGTH kPa (nat.V – +, rem.V – ⊕, Q – ●, U – ○) (20 40 60 80)	WATER CONTENT (%) (wP, w, wL) (10 20 30)
GROUND SURFACE		312.7					
100mm – TOPSOIL		0.0					
Brown Loose to Very Dense Moist to Wet			1	SS	4	x	○
			2	SS	39	x	○
SANDY SILT, to SILTY SAND, some clay, trace gravel			3	SS	50	x	○
			4	SS	53	x	○
			5	SS	50/150mm		○
		307.7	6	SS	50/150mm	x	○
End of Borehole		5.0					

INSTALLATION INFORMATION

1. Borehole caved at 1.5m during drilling.

2. Water level noted at 1.2m during drilling.

Terraprobe

LOG OF BOREHOLE ..10..

PROJECT NAME: N 1/2 Lot 4, Concession 11, Barrie PROJECT No.: 3-05-1141

CLIENT: Mapleview Industrial Park Ltd. BORING DATE: March 14, 2006

LOCATION: Barrie, Ontario ELEVATION DATUM: Geodetic

BORING METHOD: D50 Crawler-mounted Drill Rig / 108mm Diameter Solid Stem Augers

DEPTH SCALE IN METRES

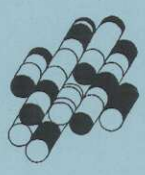
DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	"N" VALUE	PENETRATION RESISTANCE PLOT (20 40 60 80) / SHEAR STRENGTH kPa (nat.V – +, rem.V – ⊕, Q – ●, U – ○) (20 40 60 80)	WATER CONTENT (%) (wP, w, wL) (10 20 30)
GROUND SURFACE		309.7					
75mm – TOPSOIL		0.0					
Brown Compact to Very Loose Moist to Wet			1	SS	7	x	○
SAND, trace to some silt, trace gravel, possible fill			2	SS	18	x	○
			3	SS	10	x	○
			4	SS	9	x	○
			5	SS	3	x	○
		305.7					
Brown Very Dense Wet		4.0					
SAND, trace silt, some gravel			6	SS	50/125mm		○
		304.7					
End of Borehole		5.0					

INSTALLATION INFORMATION

1. Borehole caved at 2m upon completion of drilling.

2. Water level noted at 2m during drilling.

FIGURES



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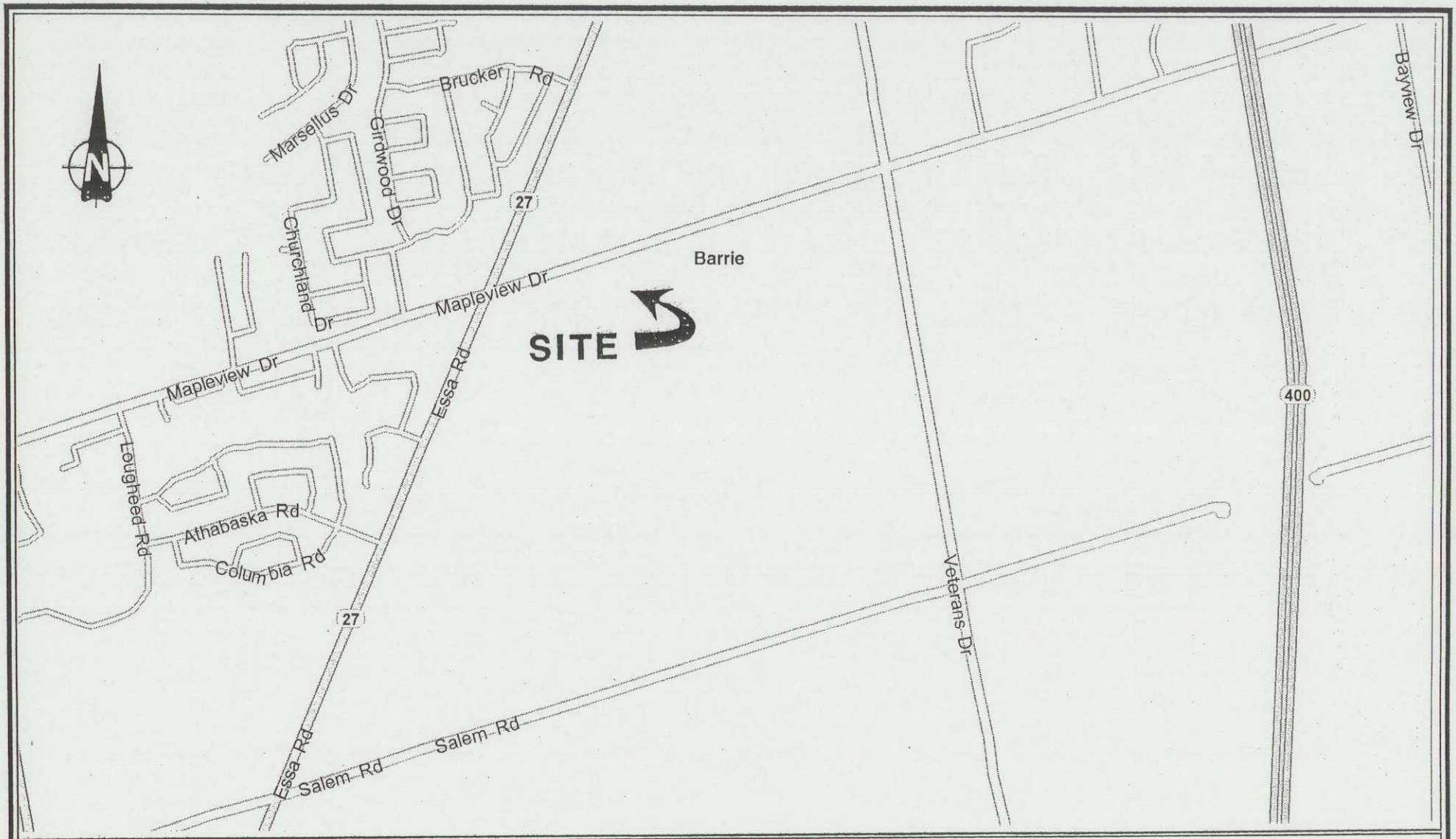
Limited

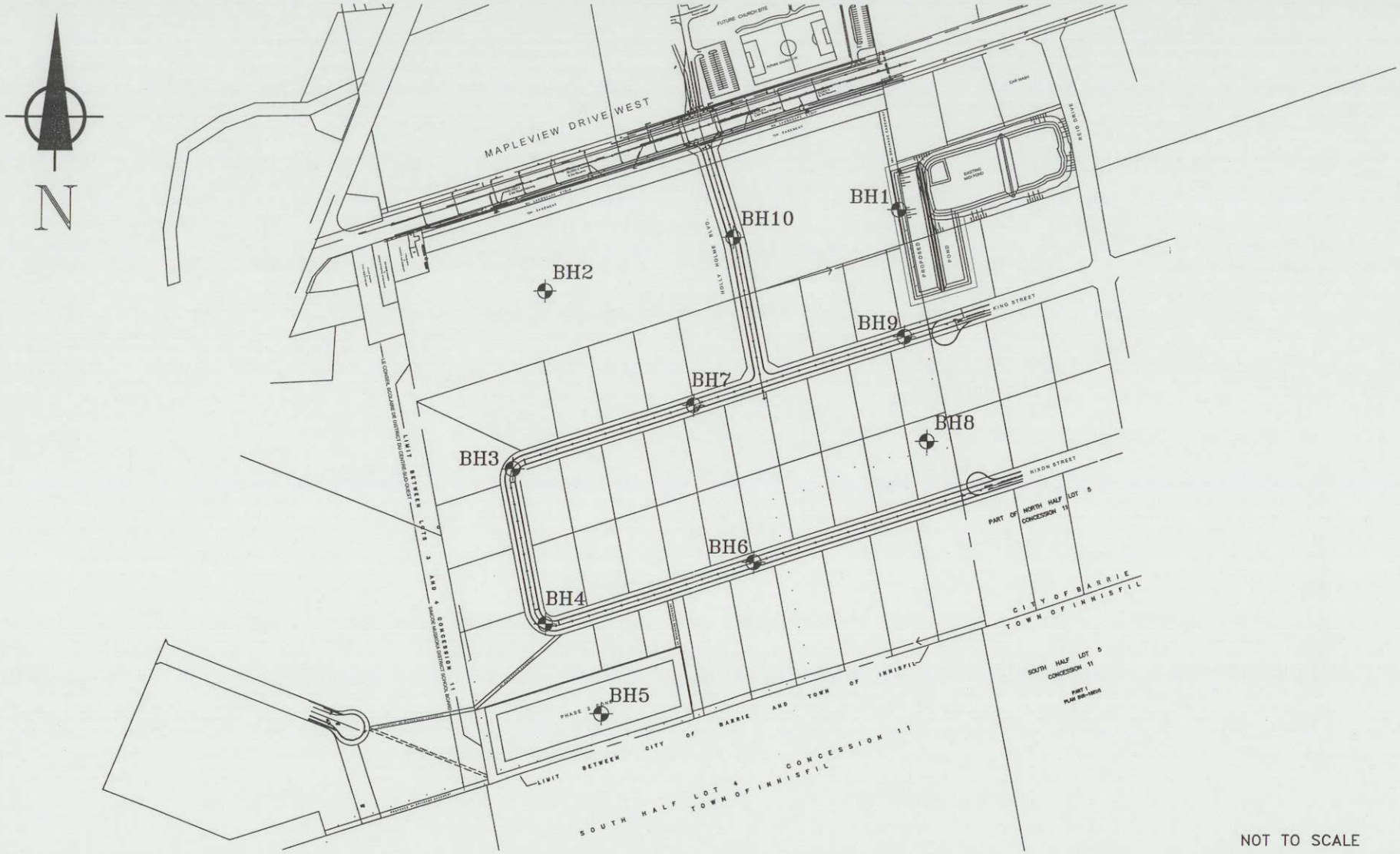


SITE LOCATION PLAN

Terraprobe
October 2005

File No. 3-05-1141

FIGURE 1



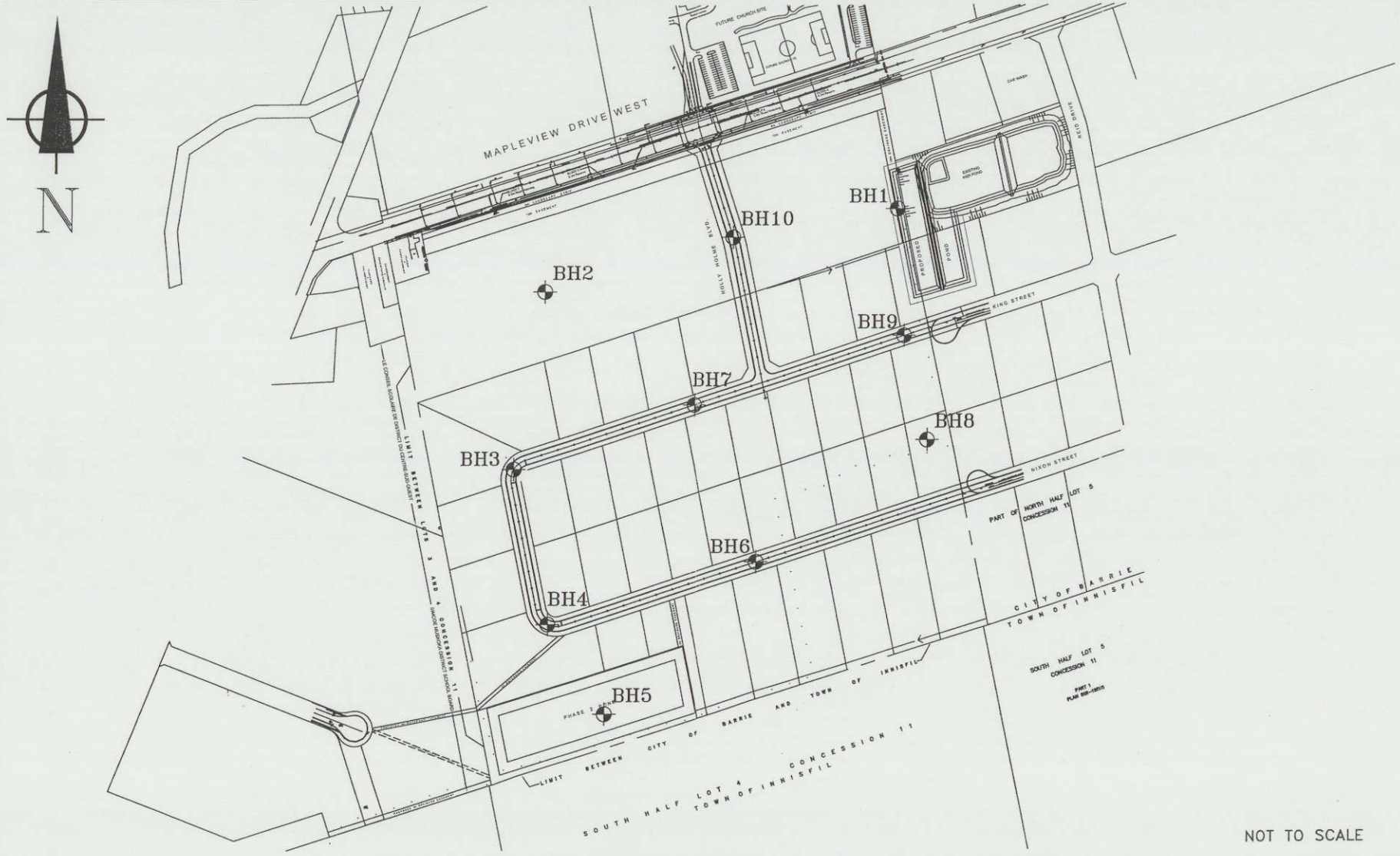
MARCH 2006

BOREHOLE LOCATION PLAN

3-05-1141

Terraprobe

FIGURE 2



MARCH 2006

BOREHOLE LOCATION PLAN

3-05-1141

Terraprobe

FIGURE 2

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SIEVE AND HYDROMETER ANALYSIS TEST REPORT

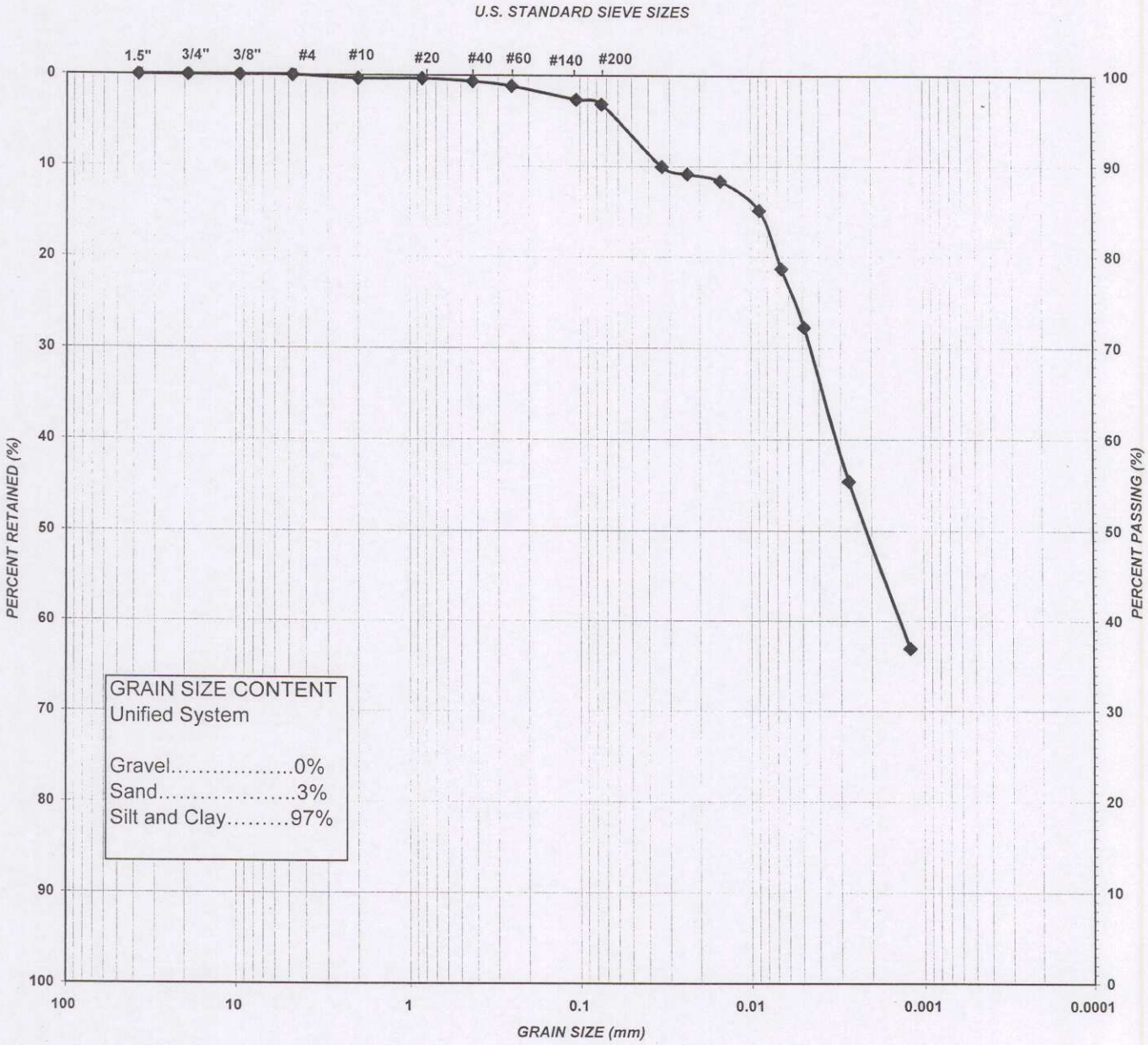
PROJECT: **N 1/2, Lot #4, Concession 11**
LOCATION: **Barrie, ON**
CLIENT: **Mapleview Industrial Park Ltd.**

FILE NO.: **3-05-1141**
LAB NO.: **3507a**
SAMPLE DATE: **Mar-22-06**
SAMPLED BY: **M.K.**

TEST PIT NUMBER: **1** SAMPLE DEPTH: **15'**
SAMPLE NUMBER: **6**
SAMPLE LOCATION: **as above**
SAMPLE DESCRIPTION: **Brown clayey silt, trace sand**

Figure 3

GRAIN SIZE DISTRIBUTION



MIT SYSTEM	GRAVEL		COARSE	MEDIUM	FINE	SILT	CLAY
			SAND				
UNIFIED SYSTEM	COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY	
	GRAVEL		SAND				

Terraprobe

SIEVE AND HYDROMETER ANALYSIS TEST REPORT

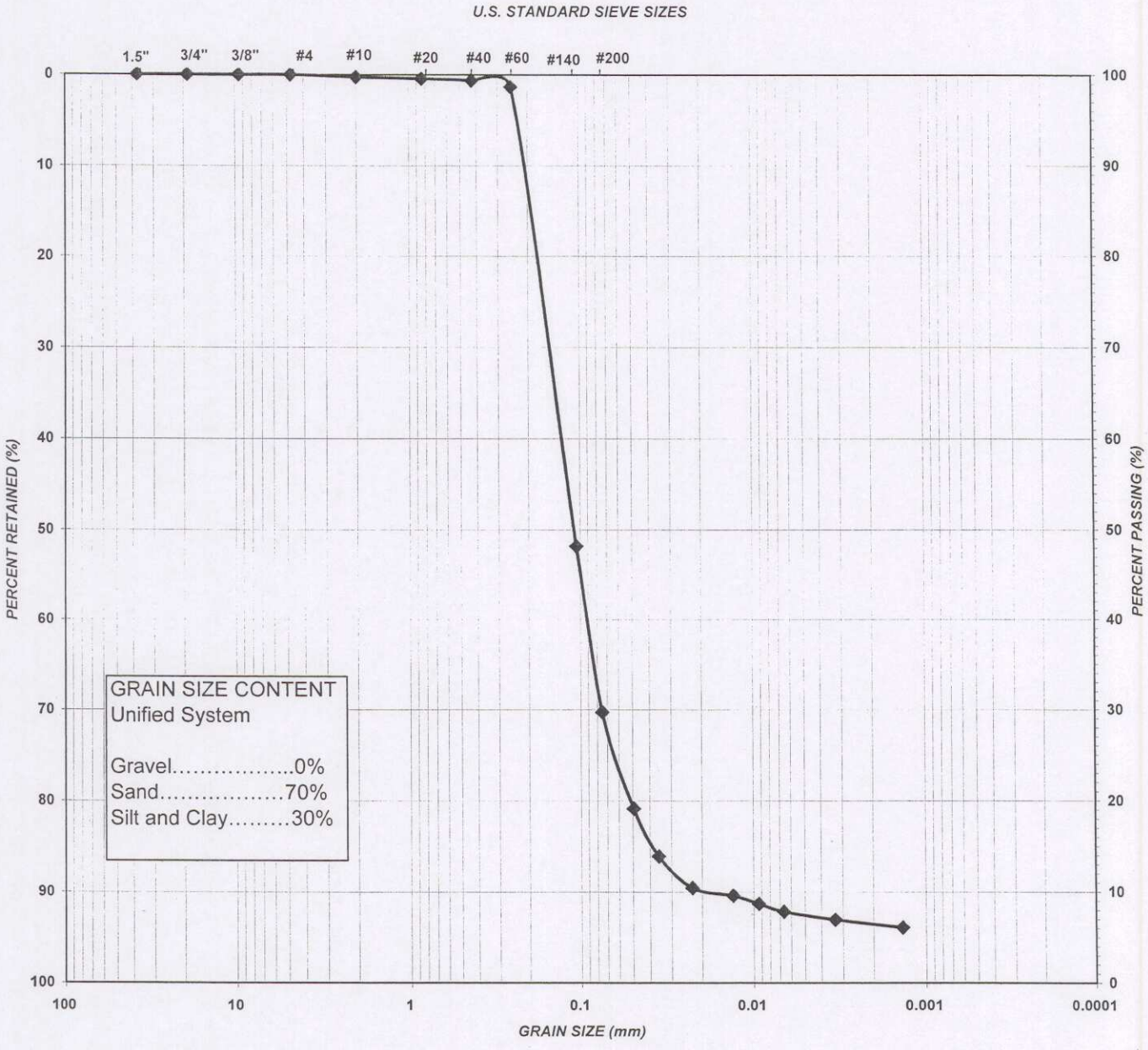
PROJECT: **N 1/2, Lot #4, Concession 11**
LOCATION: **Barrie, ON**
CLIENT: **Mapleview Industrial Park Ltd.**

FILE NO.: **3-05-1141**
LAB NO.: **3507b**
SAMPLE DATE: **Mar-22-06**
SAMPLED BY: **M.K.**

TEST PIT NUMBER: **1** SAMPLE DEPTH: **30'**
SAMPLE NUMBER: **9**
SAMPLE LOCATION: **as above**
SAMPLE DESCRIPTION: **Brown silty sand, trace clay**

Figure 4

GRAIN SIZE DISTRIBUTION



MIT SYSTEM	GRAVEL		SAND			SILT	CLAY
			COARSE	MEDIUM	FINE		

UNIFIED SYSTEM	GRAVEL		SAND			SILT AND CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Terraprobe

SIEVE GRADATION ANALYSIS

TEST RESULTS

PROJECT : **N 1/2 Lot 4, Concession11**
LOCATION: **Barrie, ON**
CLIENT : **Mapleview Industrial Park Ltd.**

FILE NO. **3-05-1141**
LAB NO: **3508a**

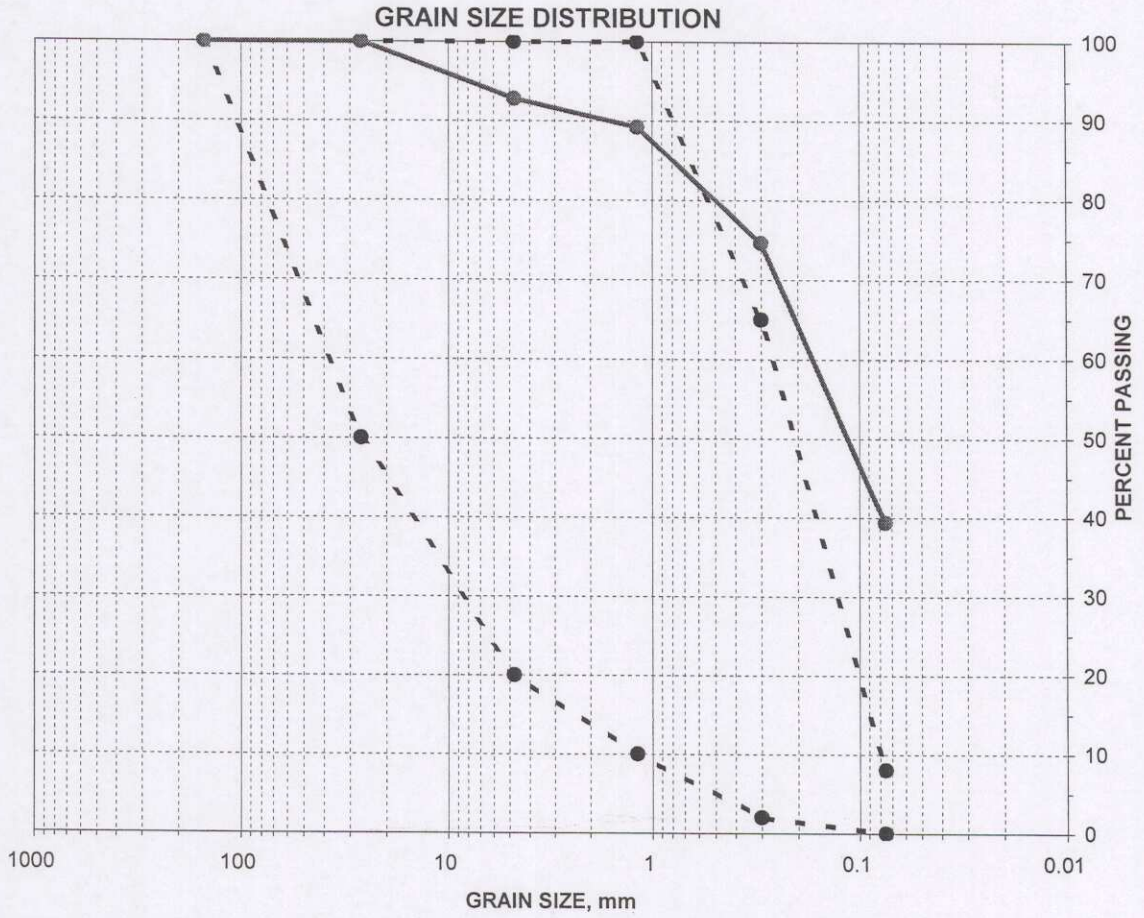
SAMPLE DATE: **Mar-14-06**

SAMPLED BY: **M.K.**

SAMPLE MATERIAL: **Granular B**

SAMPLE SOURCE: **Borehole 2, sample 2**

Figure 5



SIEVE SIZE mm	PERCENT PASSING SPECIFIED MIN.	SPECIFIED MAX.	SAMPLE
150.0	100	100	100
26.5	50	100	100.0
4.75	20	100	92.8
1.18	10	100	89.2
0.300	2	65	**74.6**
0.075	0	8	**39.4**

NOTES: GRANULAR 'B'
OPSS FORM 1010

Sample tested does not conform to OPSS 1010 for gradation

Terraprobe

SIEVE GRADATION ANALYSIS

TEST RESULTS

PROJECT : **N 1/2 Lot 4, Concession11**
LOCATION: **Barrie, ON**
CLIENT : **Mapleview Industrial Park Ltd.**

FILE NO. **3-05-1141**
LAB NO: **3508b**

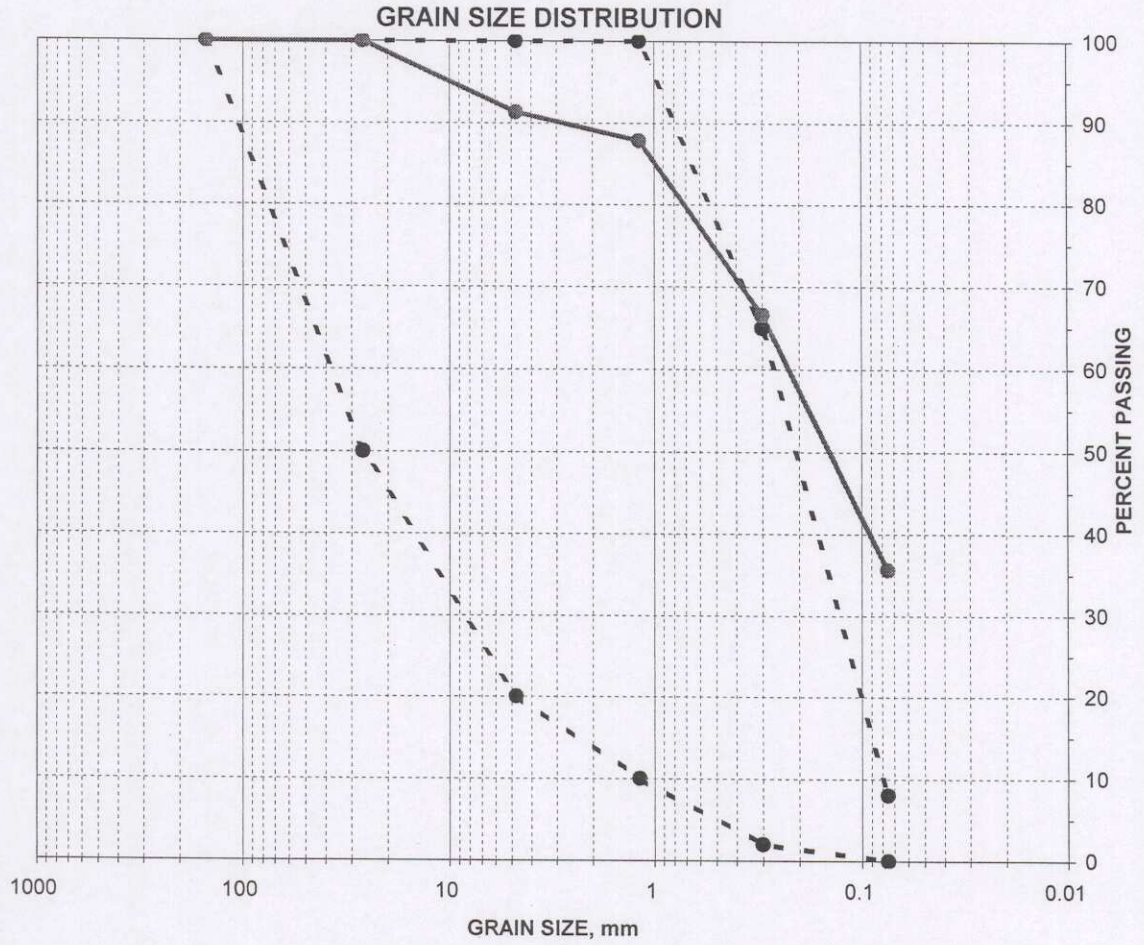
SAMPLE DATE: **Mar-14-06**

SAMPLE MATERIAL: **Granular B**

SAMPLED BY: **M.K.**

SAMPLE SOURCE: **Borehole 3, sample 3**

Figure 6



SIEVE SIZE mm	PERCENT PASSING SPECIFIED MIN.	SPECIFIED MAX.	SAMPLE
150.0	100	100	100
26.5	50	100	100.0
4.75	20	100	91.3
1.18	10	100	87.9
0.300	2	65	**66.6**
0.075	0	8	**35.6**

NOTES: GRANULAR 'B'
OPSS FORM 1010

Sample tested does not conform to OPSS 1010 for gradation

Terraprobe

SIEVE AND HYDROMETER ANALYSIS TEST REPORT

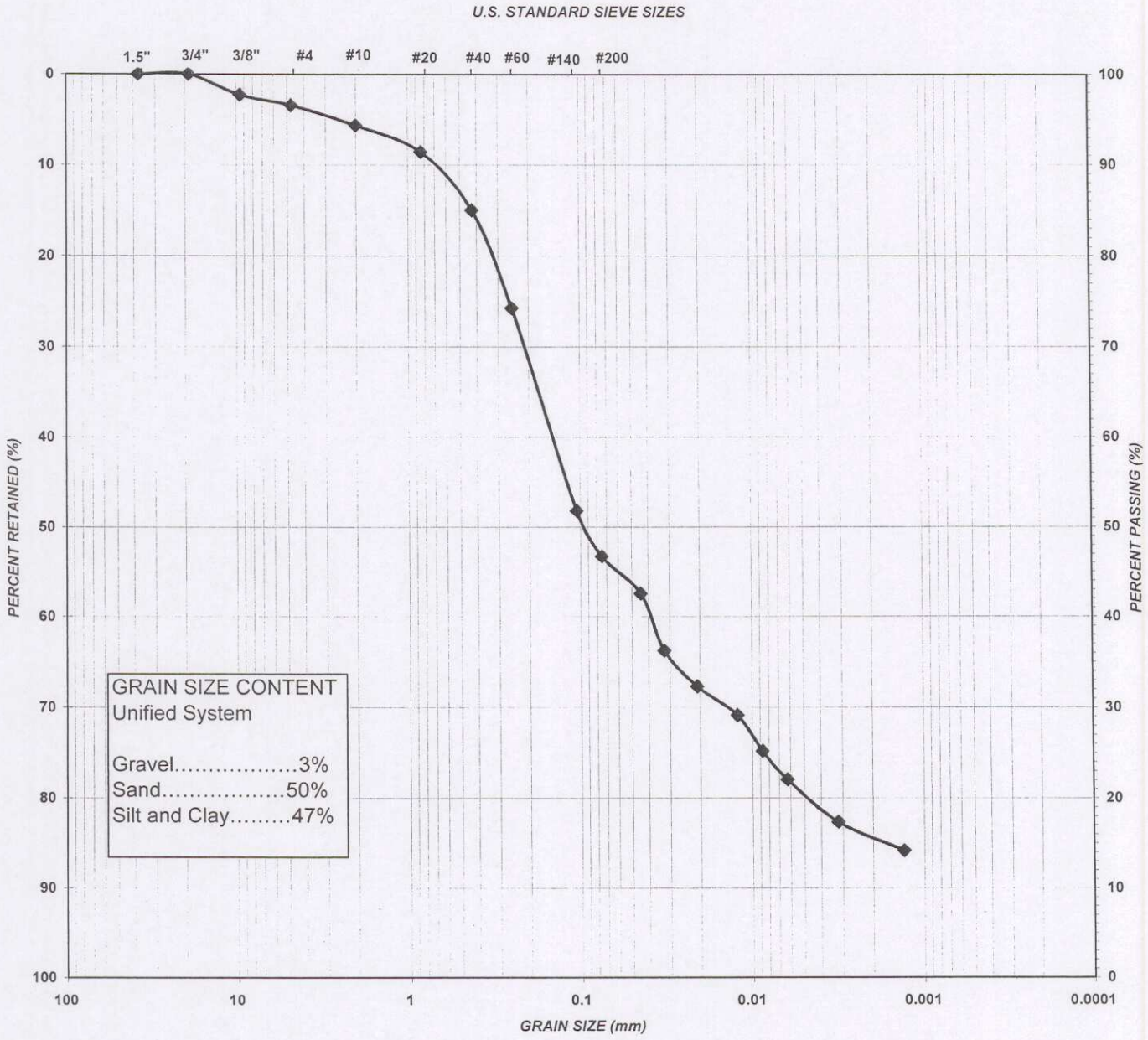
PROJECT: **N 1/2, Lot #4, Concession 11**
LOCATION: **Barrie, ON**
CLIENT: **Mapleview Industrial Park Ltd.**

FILE NO.: **3-05-1141**
LAB NO.: **3507c**
SAMPLE DATE: **Mar-22-06**
SAMPLED BY: **M.K.**

TEST PIT NUMBER: **5** SAMPLE DEPTH: **7.5'**
SAMPLE NUMBER: **4**
SAMPLE LOCATION: **as above**
SAMPLE DESCRIPTION: **Brown silt and sand, some clay, trace gravel**

Figure 7

GRAIN SIZE DISTRIBUTION



MIT SYSTEM	GRAVEL		COARSE	MEDIUM	FINE	SILT	CLAY
			SAND				
UNIFIED SYSTEM	COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY	
	GRAVEL		SAND				

Terraprobe

SIEVE AND HYDROMETER ANALYSIS TEST REPORT

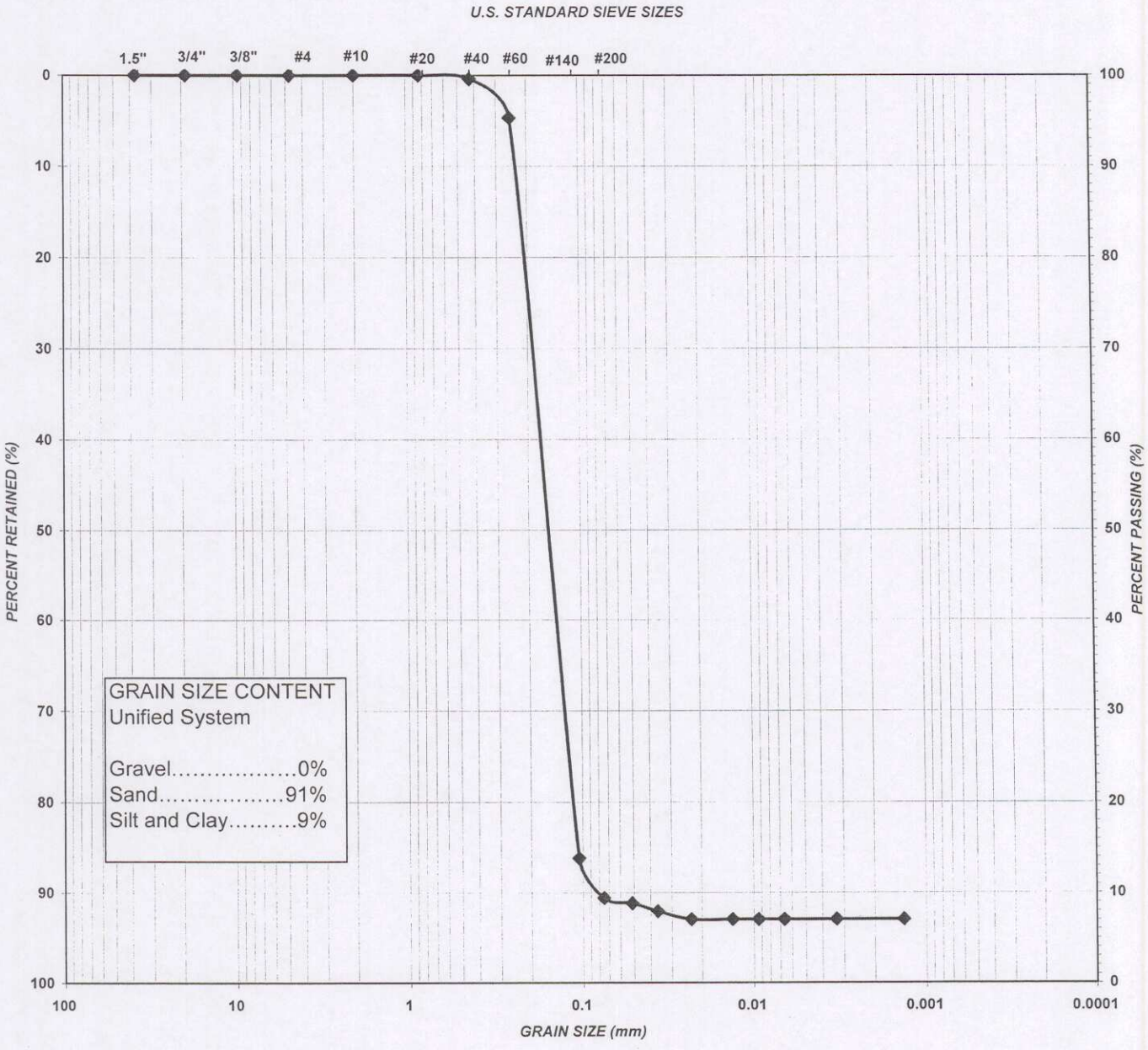
PROJECT: **N 1/2, Lot #4, Concession 11**
LOCATION: **Barrie, ON**
CLIENT: **Mapleview Industrial Park Ltd.**

FILE NO.: **3-05-1141**
LAB NO.: **3507d**
SAMPLE DATE: **Mar-22-06**
SAMPLED BY: **M.K.**

TEST PIT NUMBER: **5** SAMPLE DEPTH: **25'**
SAMPLE NUMBER: **8**
SAMPLE LOCATION: **as above**
SAMPLE DESCRIPTION: **Brown sand, trace silt**

Figure 8

GRAIN SIZE DISTRIBUTION



MIT SYSTEM	GRAVEL		COARSE	MEDIUM	FINE	SILT	CLAY	
			SAND					
UNIFIED SYSTEM	COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY		
	GRAVEL		SAND					

Terraprobe

SIEVE GRADATION ANALYSIS

TEST RESULTS

PROJECT : **N 1/2 Lot 4, Concession11**
LOCATION: **Barrie, ON**
CLIENT : **Mapleview Industrial Park Ltd.**

FILE NO. **3-05-1141**
LAB NO: **3508c**

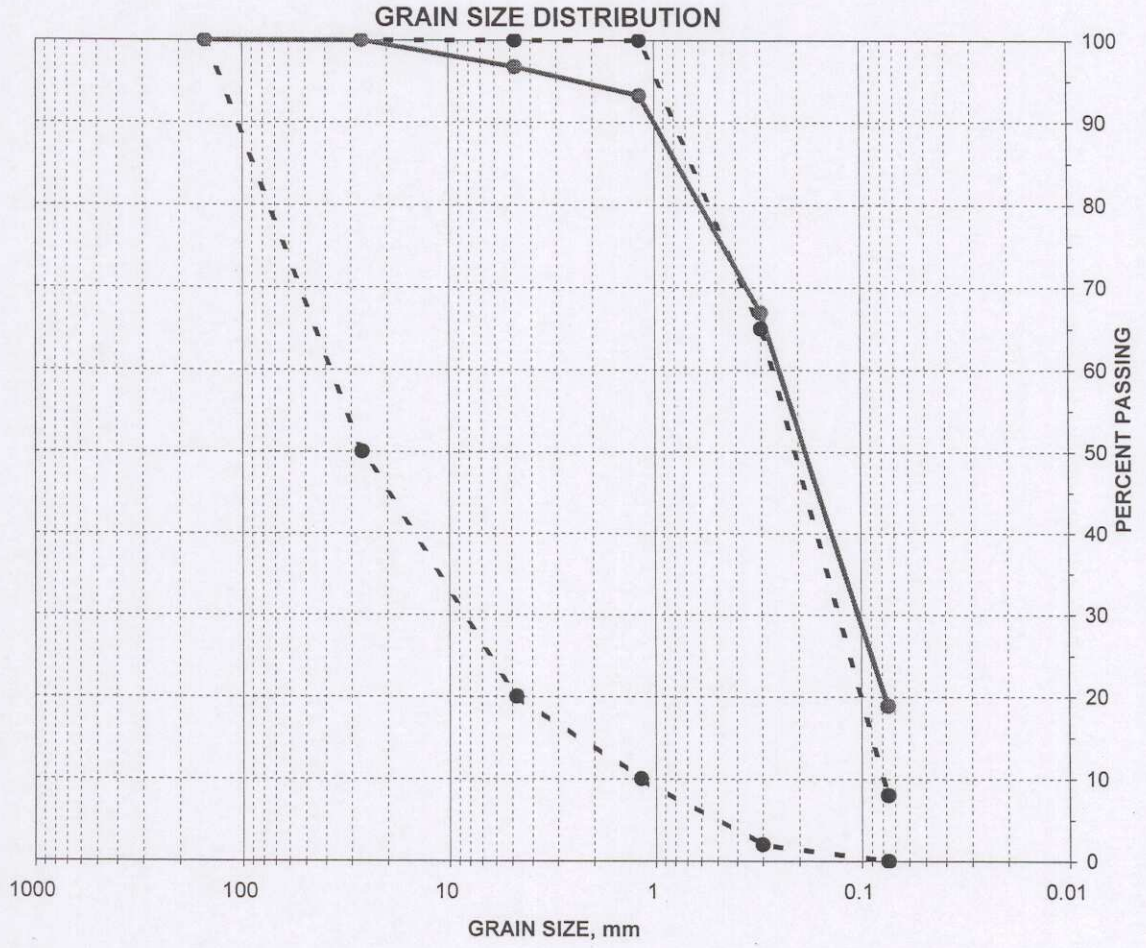
SAMPLE DATE: **Mar-14-06**

SAMPLE MATERIAL: **Granular B**

SAMPLED BY: **M.K.**

SAMPLE SOURCE: **Borehole 6, sample 2**

Figure 9



SIEVE SIZE mm	PERCENT PASSING SPECIFIED MIN.	SPECIFIED MAX.	SAMPLE
150.0	100	100	100
26.5	50	100	100.0
4.75	20	100	96.7
1.18	10	100	93.3
0.300	2	65	**66.9**
0.075	0	8	**18.9**

NOTES: GRANULAR 'B'
OPSS FORM 1010

Sample tested does not conform to OPSS 1010 for gradation

Terraprobe

SIEVE GRADATION ANALYSIS

TEST RESULTS

PROJECT : **N 1/2 Lot 4, Concession11**
LOCATION: **Barrie, ON**
CLIENT : **Mapleview Industrial Park Ltd.**

FILE NO. **3-05-1141**
LAB NO: **3508d**

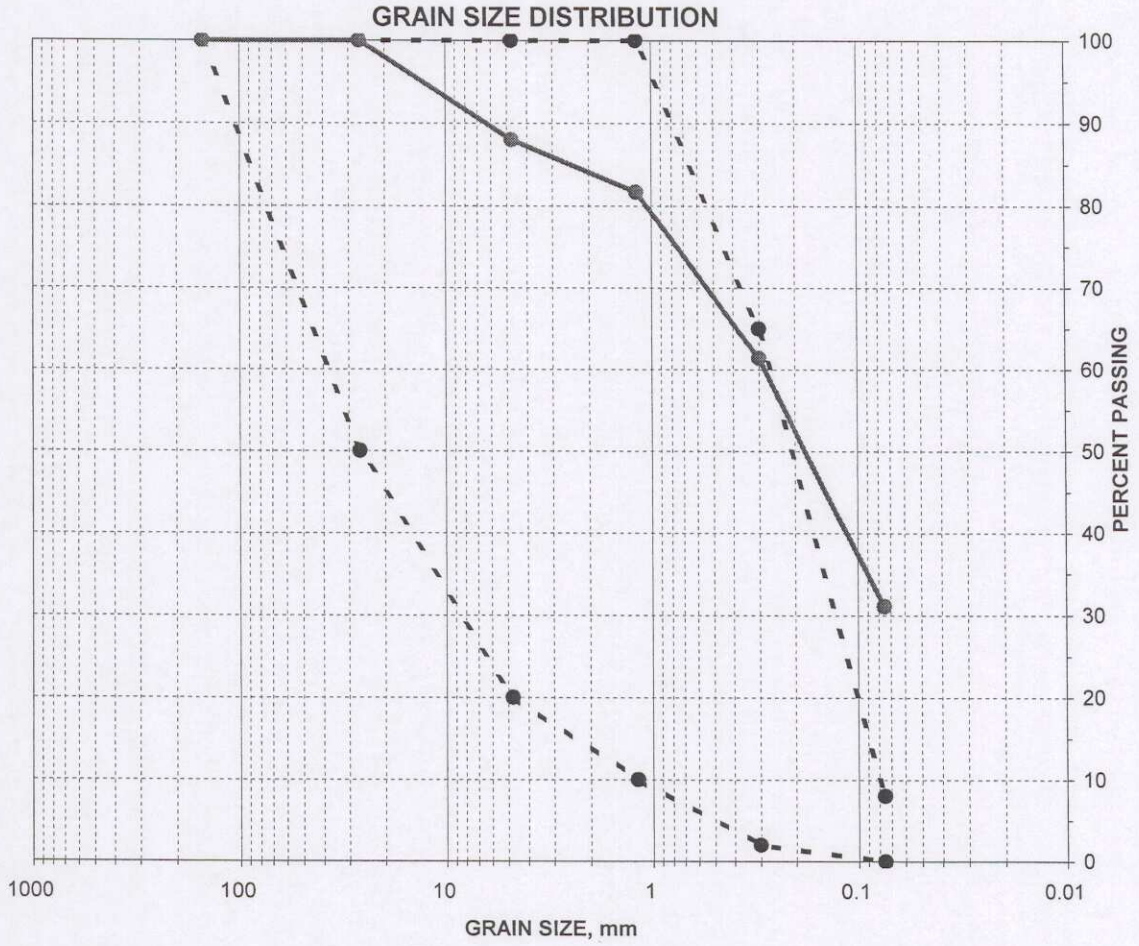
SAMPLE DATE: **Mar-14-06**

SAMPLED BY: **M.K.**

SAMPLE MATERIAL: **Granular B**

SAMPLE SOURCE: **Borehole 8, sample 2**

Figure 10



SIEVE SIZE mm	PERCENT PASSING SPECIFIED MIN.	SPECIFIED MAX.	SAMPLE
150.0	100	100	100
26.5	50	100	100.0
4.75	20	100	88.0
1.18	10	100	81.7
0.300	2	65	61.4
0.075	0	8	**31.1**

NOTES: GRANULAR 'B'
OPSS FORM 1010

Sample tested does not conform to OPSS 1010 for gradation

Terraprobe

SIEVE GRADATION ANALYSIS
TEST RESULTS

PROJECT : **N 1/2 Lot 4, Concession11**
LOCATION: **Barrie, ON**
CLIENT : **Mapleview Industrial Park Ltd.**

FILE NO. **3-05-1141**
LAB NO: **3508e**

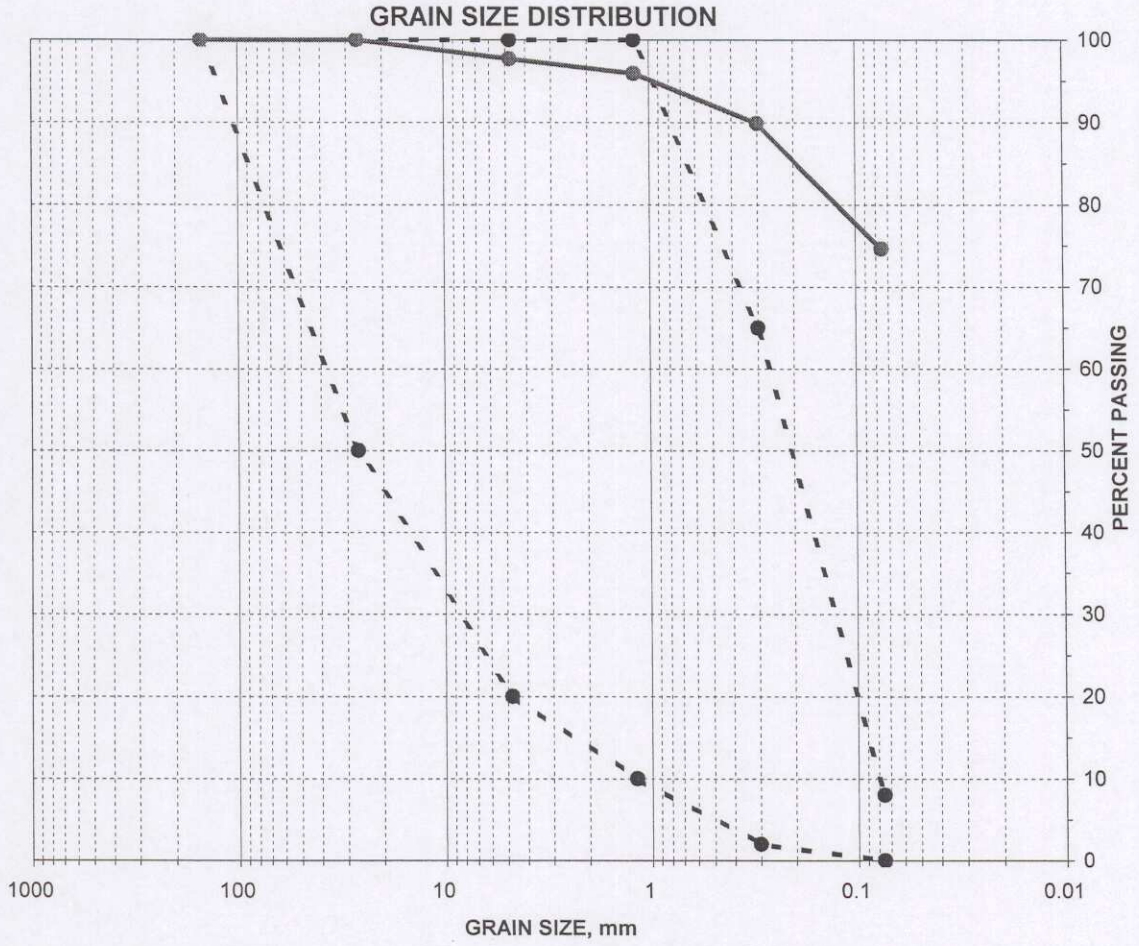
SAMPLE DATE: **Mar-14-06**

SAMPLED BY: **M.K.**

SAMPLE MATERIAL: **Granular B**

SAMPLE SOURCE: **Borehole 9, sample 2**

Figure 11



SIEVE SIZE mm	PERCENT PASSING SPECIFIED MIN.	SPECIFIED MAX.	SAMPLE
150.0	100	100	100
26.5	50	100	100.0
4.75	20	100	97.7
1.18	10	100	95.9
0.300	2	65	**89.9**
0.075	0	8	**74.6**

NOTES: GRANULAR 'B'
OPSS FORM 1010

Sample tested does not conform to OPSS 1010 for gradation

Terraprobe

SIEVE GRADATION ANALYSIS

TEST RESULTS

PROJECT : **N 1/2 Lot 4, Concession11**
LOCATION: **Barrie, ON**
CLIENT : **Mapleview Industrial Park Ltd.**

FILE NO. **3-05-1141**
LAB NO: **3508f**

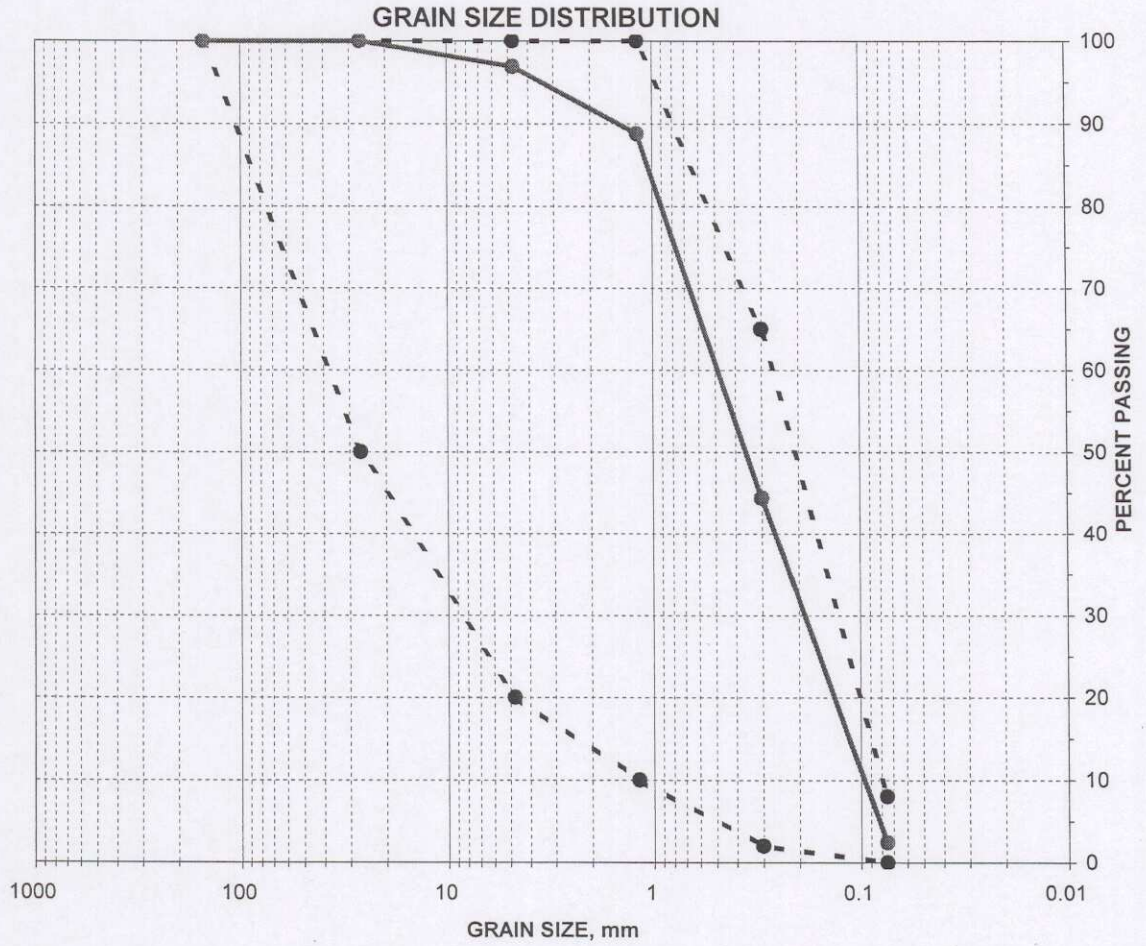
SAMPLE DATE: **Mar-14-06**

SAMPLE MATERIAL: **Granular B**

SAMPLED BY: **M.K.**

SAMPLE SOURCE: **Borehole 10, sample 2 and 3**

Figure 12



SIEVE SIZE mm	PERCENT PASSING SPECIFIED MIN.	SPECIFIED MAX.	SAMPLE
150.0	100	100	100
26.5	50	100	100.0
4.75	20	100	96.9
1.18	10	100	88.8
0.300	2	65	44.4
0.075	0	8	2.4

NOTES: GRANULAR 'B'
OPSS FORM 1010

Sample tested conforms to
OPSS 1010 for gradation

R.J. Burnside & Associates Limited