FUNCTIONAL SERVICING & STORMWATER MANAGEMENT REPORT

3005 DUNDAS WEST

TOWN OF OAKVILLE

PROJECT 2022-5281 **APRIL 2023**

Revision	Description	Prepared		Checked	
		By	Date	By	Date
0.0	Original Report	J.Pathmanapan	April 2023	S.Katukurunde	April 2023

SCHAEFFERS
CONSULTING ENGINEERS
6 Ronrose Drive
Vaughan, Ontario L4K 4R3

CONTENTS

List of Figures

List of Tables

Appendices

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1.0 INTRODUCTION

1.1 Study Objective and Location

This Functional Servicing Report is provided in support of a proposed mixed-use site plan located at 3005 Dundas Street, in the Town of Oakville. The subject site is bound by Dundas Street West to the south, Old Bronte Road to the east, Bronte Road to the west, as shown in **Figure 1.1**.

The objective of this report is to define a feasible servicing plan for the proposed site plan development and to establish a servicing strategy. This report provides high-level information regarding the water supply, sanitary servicing, and stormwater management (SWM) for the subject lands; while ensuring compatibility with existing services and conforming to the Town of Oakville and Halton Region design criteria.

1.2 Existing Condition & Proposed Development Plan

Currently, the subject site is vacant land with predominantly grassed area. The site is approximately 0.78ha and the proposed development will consider two towers with a connecting podium. The proposed development plan is shown in **Figure 1.2**.

Based on the Region's population density (see **Appendix B**) the expected population is approximately 212 people. **Table 1-1** summarizes the estimated population for the proposed development. Please note that the Region's guidelines for water and wastewater design recommend a population density of 285 persons/ha for apartment developments with over six storeys and 90 persons/ha for light commercial areas. As per this criterion, the population from the proposed development is anticipated to be approximately 212 people (**Table 1-1**). However, this population is impractical as this would result in less than one person/unit. Therefore, to be more conservative, the population has been calculated on a persons per unit (ppu) basis. Reference has been made to the Region's Development Charges (DC) Background Study (September 2021) to determine the proposed population on a ppu basis, which indicates a population of approximately 1,119 people. Since the population of 1,119 people provides a more conservative estimate, this population will be considered in this analysis to determine the water and wastewater demands.

Table 1-1: Design Population Summary – Region's Design Criteria

Land Use	Area (ha)	Population Density (person/ha)	Population
Apartment (over 6 storeys)*	0.72	285	206
Retail - Light Commercial**	0.06	90	6
Total	***0.78***	***-***	***212***

**Based on Town of Oakville design criteria*

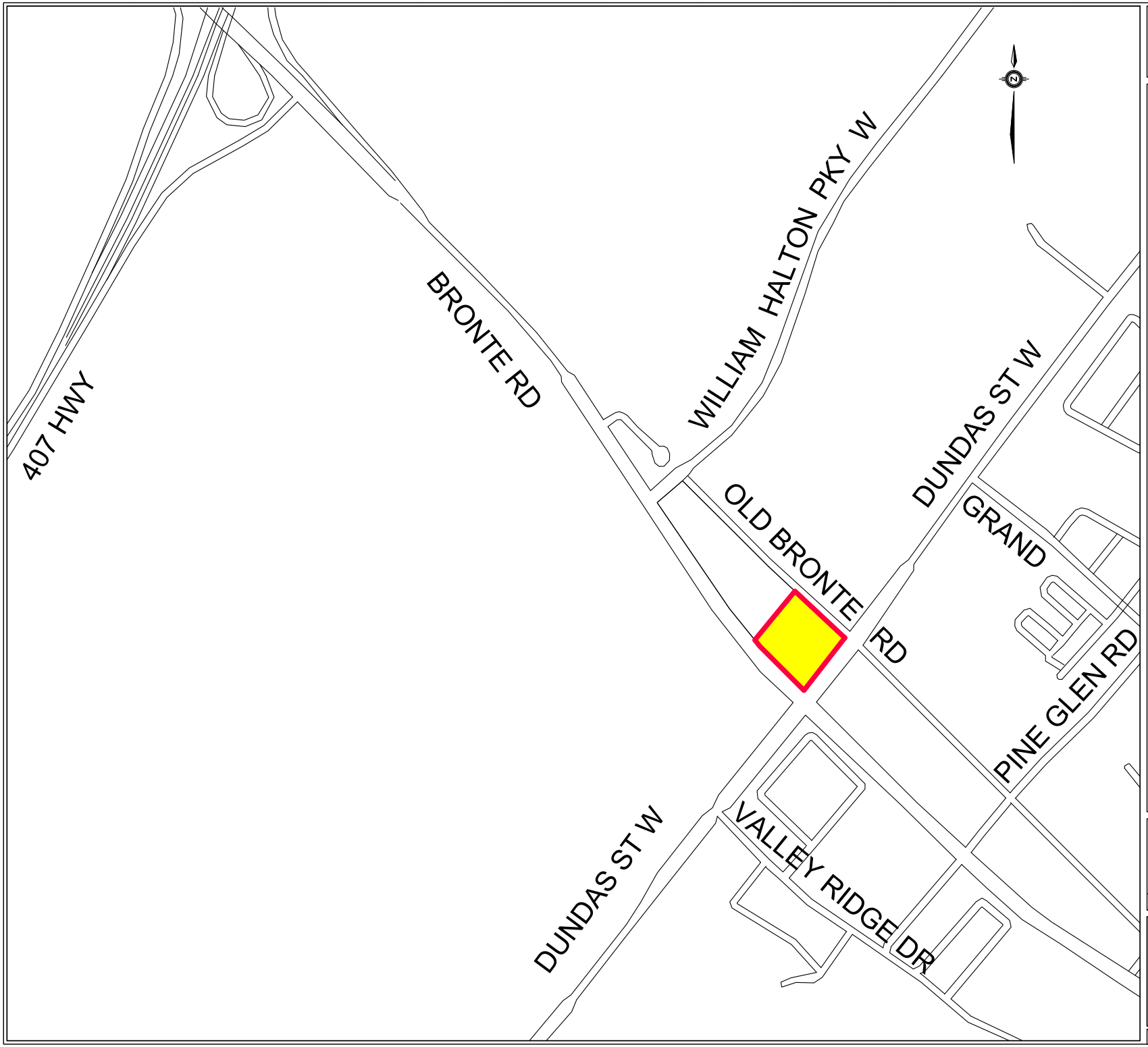
***Based on Regional Municipality of Halton Water & Wastewater Linear Design Manual (April 2019)*

Table 1-2: Design Population Summary – Region's DC Background Study (PPU)

Land Use	Res. Units	Non Res. Area (ha)	Pop. Density (person/ha)	Pop. Density Unit	Population
Apartment < 2 Bedrooms*	462	-	1.46	ppu	675
Apartment > 2 Bedrooms*	228	-	1.92	ppu	438
Retail - Light Commercial**	-	0.06	90	persons/ha	6
Total	***690***	***0.06***	***-***	***-***	***1,119***

**Based on Region of Halton Development Charges Background Study (2021)*

***Based on Regional Municipality of Halton Water & Wastewater Linear Design Manual (April 2019)*



3005 DUNDAS STREET WEST
TOWN OF OAKVILLE

LEGEND

SUBJECT LOCATION

SCHAEFFERS
CONSULTING ENGINEERS
6 Ronrose Drive, Concord, Ontario L4K 4R3
Tel: (905) 738-6100 Email: general@schaeffers.com
www.schaeffers.com

FIGURE 1.1
LOCATION PLAN

2022-5281	APRIL 2023	SCALE: N.T.S.

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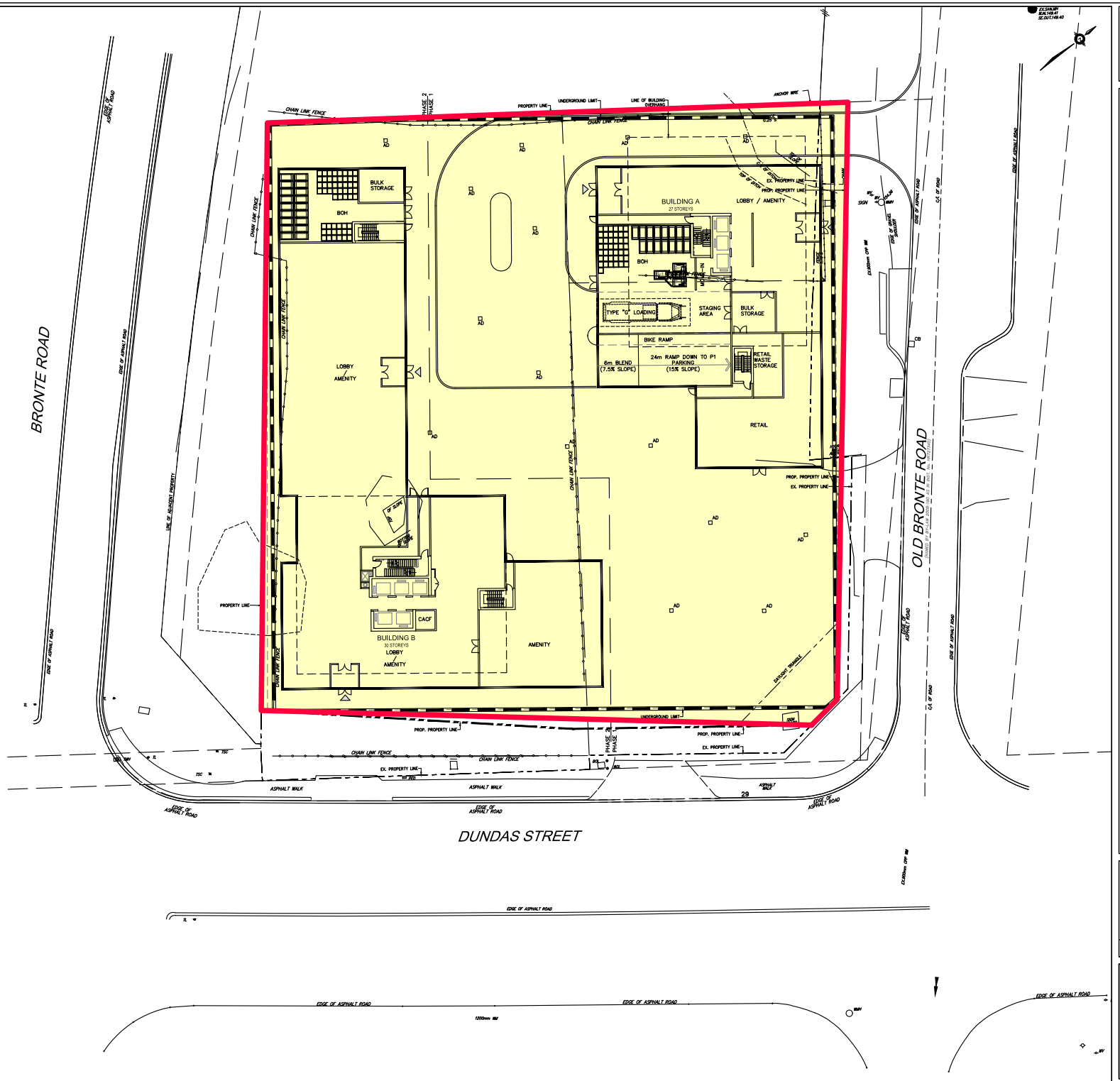

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CONSULTING ENGINEERS
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FIGURE 1.2
PROPOSED DEVELOPMENT PLAN

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1.3→ Background Reports

The following material has been reviewed in order to identify existing conditions, servicing constraints, and criteria, which govern the proposed development within the subject area and form the basis of this report.

- ***Water and Wastewater Linear Design Manual***

  Prepared by: Regional Municipality of Halton; October 2019

- ***Oakville Development Engineering Department: Procedures & Guidelines Manual***

  Prepared by: Town of Oakville, 2011

- ***Sustainable Halton Water & Wastewater Master Plan***

  Prepared by: AECOM, 2011

- ***Infrastructure Ontario Area Servicing Plan - Sixteen Hollow Employment Area***

  Prepared by: Walterfedy, 2014

- ***Region of Halton Development Charges Background Study***

  Prepared by: Halton Region, 2021

2.0 WATER SUPPLY

The following section provides a summary of the existing and proposed water supply services within the vicinity of the site. Preliminarily calculations are provided to support the servicing of the proposed site plan in **Appendix A**. The water supply servicing plan is shown in **Figure 2.1**.

2.1 Existing/Planned Water Supply Infrastructure

The Master Plan indicates that the site lies within Pressure Zone (PZ) O3, which is currently serviced by the Kitchen (Z3) Pumping Station (PS). The Kitchen (Z3) PS has an estimated firm capacity of 71.4 MLD (megalitres per day) for 2026.

The following exist within the vicinity of the site:

- 900mmØ CPP watermain along Old Bronte Road, and
- 1200mmØ watermain along Dundas Street West.

It is to be noted that future 300mmØ watermains along Old Bronte Road and Dundas Street West and a 600mmØ watermain along Bronte Road are proposed to be constructed. Currently, timing to construct these pipes is unknown. Direct connection to the existing 900mmØ CPP watermain is not recommended; therefore, the preferred site servicing option is via the future watermains once they are constructed. Reference can be made to the excerpt from the Sixteen Hollow Area Servicing Plan in **Appendix A** for the location of the future infrastructure.

2.2 Water Supply Design Criteria

The proposed water supply scheme will be designed in accordance with the Town's and Region's design criteria. The following summarizes the relevant design criteria.

- The system shall be designed to provide sufficient flow and pressure to meet the greater of the Fire Flow Demand plus the Maximum Daily Demand, or the Peak Hour Demand;
- Design populations are estimated based on the Region's DC Background Study:
    - Apartment < 2 Bedrooms →1.46 ppu
    - Apartment > 2 Bedrooms →1.92 ppu
- Average Daily Demand of 0.275 m^3/capita/day or 78.375m^3/ha/day;
- Fire Flows in accordance with Water Supply for Public Fire Protection Fire Underwriters

Survey (FUS);

- Population density of 90 persons/ha for light commercial uses as per the Region's design criteria;
- Maximum Daily Demand and Maximum Hourly Demand peaking factors shall be 2.25 and 4.00, respectively;
- Operating pressure requirements are noted as follows:

Description	Pressure
Minimum Pressure	275 kPa (40 psi)
Maximum Pressure	690 kPa (100 psi)
Minimum Pressure (Max. Daily Demand Plus Fire Flow)	140 kPa (20 psi)

2.3 *Proposed Water Supply*

The site is recommended to be serviced via the future 300mmØ watermain on Old Bronte Road. Based on an FUS calculation of the largest tower, a fire flow of 133 L/s is estimated. The fire flows for both buildings have been calculated using the FUS methodology. This estimate considers the use of non-combustible, unprotected vertical openings, and a minimum NFPA 13 sprinkler system. The total demand expected from the proposed development is approximately 141.35 L/s. **Appendix B** presents detailed calculations. The hydraulic conditions can be confirmed with a hydrant flow test during the detailed design stage, weather permitting.

Table 2.1: Water Supply Demands

Land Use	Pop.	Average Demand (L/s)	Max Day (L/s)	Max Hour (L/s)	Fire Flow (L/s)	Max Day + Fire (L/s)
High Density Res	1,113	3.54	7.97	14.17		7.97
Light Commercial	6	0.02	0.04	0.08		0.04
Total	**1,119**	**3.56**	**8.01**	**14.25**	**133**	**141.35**

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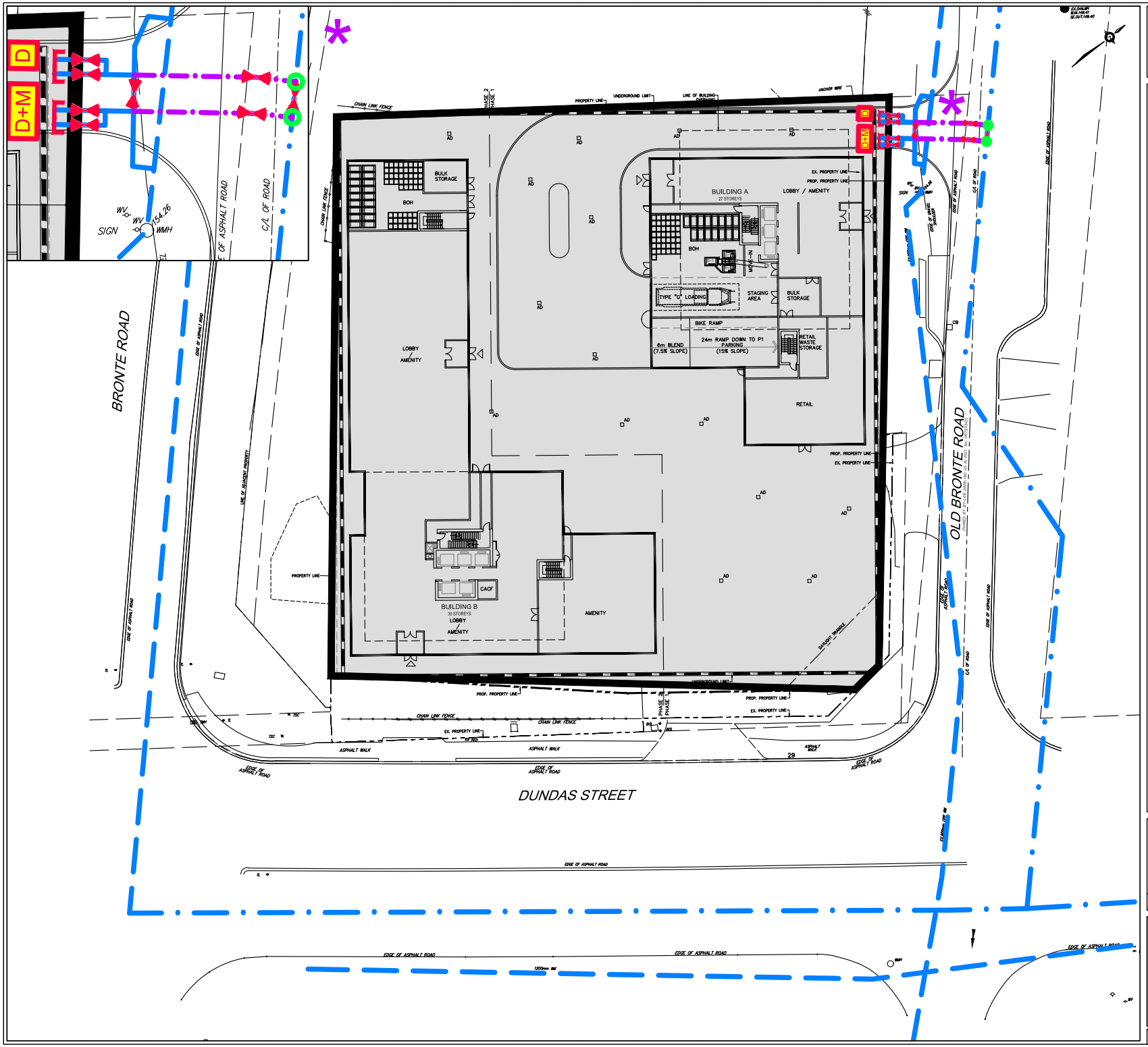

3005 DUNDAS STREET WEST
TOWN OF OAKVILLE

LEGEND

- SUBJECT LOCATION
- PROPOSED WATERMAIN
- EXISTING WATERMAIN
- FUTURE 200Ø WATERMAIN
- FUTURE 300Ø WATERMAIN BY OTHERS
- FUTURE 200Ø CONNECTIONS TO FUTURE 300Ø WATERMAIN

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FIGURE 2.1
WATER SUPPLY SERVICING PLAN

2022-5281	APRIL 2023	SCALE: N.T.S.

3.0 SANITARY SERVICING

The following section provides a summary of the sanitary infrastructure within the vicinity of the site. All sanitary calculations are provided in **Appendix C**.

3.1 Existing/Planned Sanitary Infrastructure

The Master Plan indicates that the site is located within the Mid-Halton drainage area where flows eventually discharge to the Mid-Halton Wastewater Treatment Plant and Pump Station (WWTP and PS). There is an existing 825mmØ sanitary sewer, which lies directly east of the site along Old Bronte Road. This sewer runs in the north-south direction and brings flow from Milton to the Mid-Halton WWTP and PS.

As per the Sixteen Hollow Employment Area Servicing Plan, the existing sanitary sewers and Mid-Halton WWTP and PS have been identified to have sufficient capacity to service future developments within the Sixteen Hollow SP area.

It is to be noted that the SP report outlines that a 375mmØ sanitary sewer is proposed to be constructed along Old Bronte Road. Currently, timing to construct this sewer is unknown. Reference can be made to the excerpt from the Sixteen Hollow Area Servicing Plan in **Appendix A** for the location of the future sewer.

3.2 Design Criteria

The proposed sanitary servicing for the site will be designed in accordance with the Region's design criteria. These criteria, where applicable to the proposed development, are summarized below:

- Average dry weather sanitary flow for existing local sewers is 250 L/c/d for commercial and 240 L/c/d for residential;
- The design flow is equal to the Average Dry Weather Flow multiplied by the Average Peak Sanitary Flow Factor, plus the Infiltration Allowance;
- The Average Dry Weather Flow is based on 0.275 m^3/c/d (apartments over 6 stories);
- The Average Dry Weather Flow is based on 24.75 m^3/ha/d (light commercial areas);
- For residential areas, the peak sanitary flow factor is based on the Harmon formula;
- (M = 1 + 14/(4 + P0.5), where P is population in thousands;

- Except under unusual circumstances, infiltration allowance shall be determined at 0.286 x 10-3 m^3/s/ha for all types of land use and;
- Maximum velocity shall not be greater than 3.00 m/s with pipe flowing full, and minimum velocity shall not be less than 0.60 m/s at actual flow.

3.3 Proposed Sanitary Servicing

Since timing to construct the new 375mmØ sewer is currently unknown, as an interim servicing solution, the site is recommended to be serviced via the existing 825mmØ trunk sewer. Two interim connections, one connection for each building, is proposed to the existing trunk sewer. Once the future 375mmØ sewer on Old Bronte Road is constructed, the connection to the trunk sewer can be removed and the site can be serviced via the new 375mmØ sewer. Reference can be made to the sanitary servicing plan in **Figure 4.1** for more information.

Please note that the future sewer is expected to be sized adequately to accommodate downstream flows to the outlet location. Therefore, a downstream capacity analysis may not be required for the new sewer; however, in the event the Town requests this, an analysis can be completed.

3.4 Proposed Sanitary Demand

The table below summarizes the expected demand from the site. The proposed design population consists of approximately 1,119 persons and would generate an estimated peak flow of 13.67 L/s.

Table 3.1: Sanitary Flow Summary

Area (ha)	Expected Population	Avg. Sewage Flow (L/s) *	Harmon Peaking Factor	Peak Flow (L/s)	Infiltration (L/s) **	Total Flow (L/s)
Residential Flow						
0.78	1,113	3.54	3.77	13.35	0.22	13.58
Light Commercial Flow						
0.06	6	0.02	4.00	0.07	0.02	0.09
Total Flow						
	1,119	3.56		13.42	0.24	**13.67**

**Assuming average sanitary flows per capita of 24.750 m³/ha/day (Region of Halton Design Criteria)*
***Infiltration rate of 0.286 L/s/ha (Region of Halton Design Criteria)*

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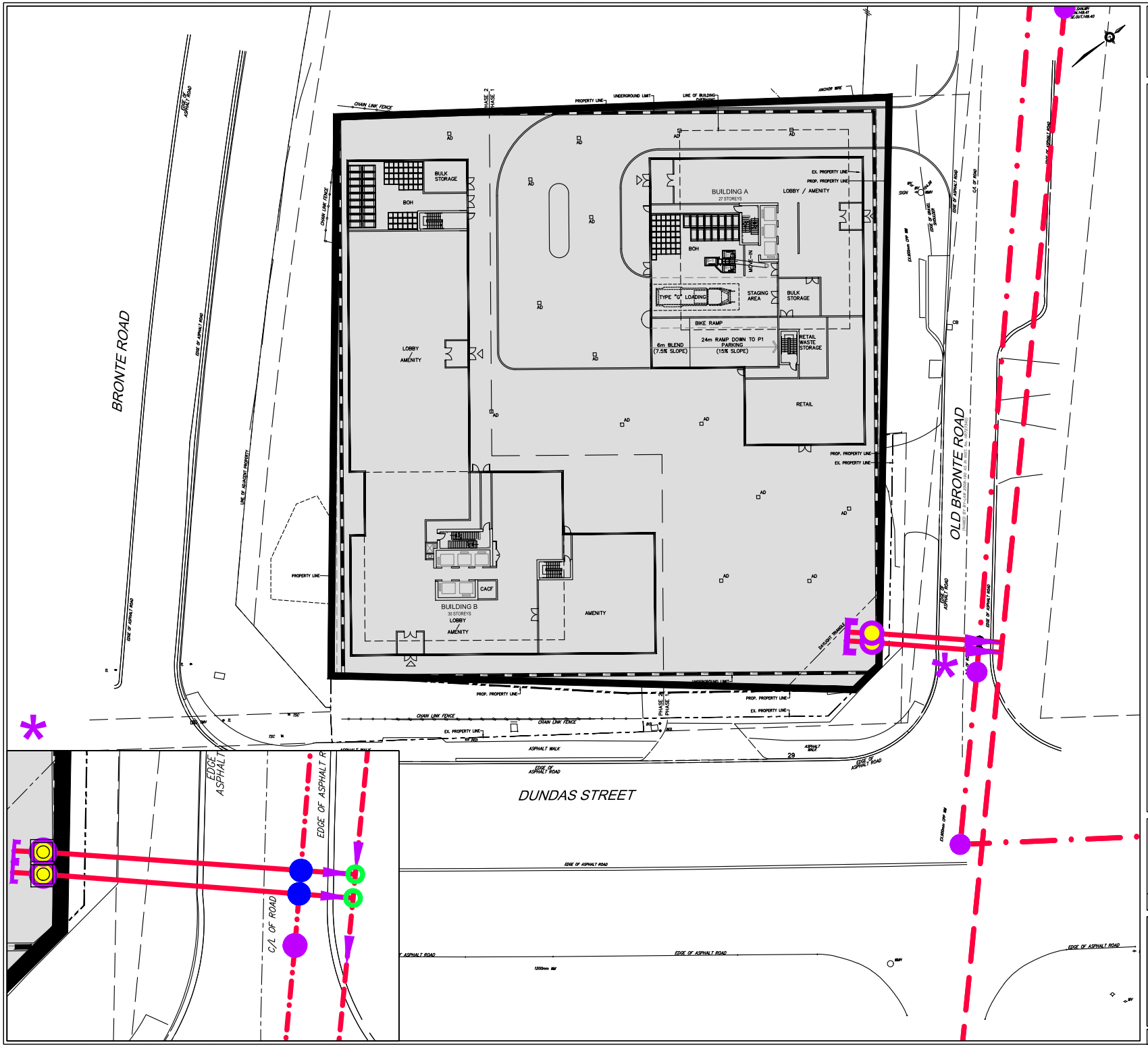

3005 DUNDAS STREET WEST
TOWN OF OAKVILLE

LEGEND

- SUBJECT LOCATION
- PROPOSED SANITARY SEWER
- EXISTING SANITARY SEWER
- FUTURE SANITARY SEWER BY OTHERS
- CONTROL MANHOLE
- FUTURE SANINTARY MANHOLE FOR FUTURE CONNECTION BY OTHERS
- INTERIM CONNECTION TO 825Ø SANITARY SEWER

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FIGURE 3.1
SANITARY SERVICING PLAN

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4.0 STORMWATER MANAGEMENT

4.1 Existing Conditions

The subject site is currently vacant land and consists of grassed area. The existing storm sewers within the vicinity of the site include:

- 600mmØ – 750mmØ storm sewers along Old Bronte Road,
- 300mmØ storm sewer along Dundas Street, and
- 900mmØ & 600mmØ – 750mmØ storm sewers along Bronte Road.

The pre-development drainage conditions are illustrated in **Figure 4.1**. Based on available topographic mapping, approximately 0.51 ha of the site generally drains easterly towards the storm sewers along Old Bronte Road and approximately 0.23 ha drains westerly towards the 900mmØ storm sewer on Bronte Road.

It is to be noted that there is an external drainage area of 0.10 ha, which is from another potential future development located north of the site. This external drainage area is considered to discharge to the Old Bronte Road storm sewers and is accounted for in the release rates.

4.2 Design Criteria

The stormwater flow calculations are based on the following the Town of Oakville's Development Engineering Procedures & Guidelines Manual:

- For major capture points the intensity equation was used, $I = A/(T + B)C$, where I is rainfall intensity in mm/hr, T is time of Concentration in hours, $A = 2150$, $B = 5.7$, $C = 0.861$, for the 100-year storm event;
- **Water Quantity** – Site post-development flows for storms up to and including the 100 year event to be controlled to the 5-year design storm event;
- **Water Quality** - to be achieved by providing a minimum enhanced level of TSS removal (80%) prior to discharging to the municipal sewer; and
- **Water Balance** - to be achieved through the retention of 5mm of flows across site impervious areas.

4.2.1 ALLOWABLE RELEASE RATE

As per the Town's design criteria, the site is to be controlled post-to-pre-development. **Table 4.1** shows that flows are required to be controlled to approximately 21L/s (5-Year event).

The table below summarizes the 2-100 year pre-development flows from the site based on the Town's IDF parameters. Reference can be made to **Appendix B** for details on the full calculations.

Table 4.1: Proposed Release Rate

Pre-development Runoff Coefficient, C	0.25	
Pre-development Drainage Area	0.29	ha
2-Year Peak Flow, Q2	15	l/s
5-Year Peak Flow, Q5	**21**	**l/s**
10-Year Peak Flow, Q10	25	l/s
25-Year Peak Flow, Q25	30	l/s
50-Year Peak Flow, Q50	34	l/s
100-Year Peak Flow, Q100	38	l/s

4.3 Proposed Stormwater Management Plan

The site proposes a new connection to the existing 600mmØ storm sewer on Old Bronte Road.

The proposed SWM design will capture and control site runoff to the pre-development 5-year frequency flow to the existing Old Bronte Road storm sewer. **Figure 4.1** and **Figure 4.2** and show the proposed drainage plan and proposed stormwater servicing plan.

4.3.1 WATER QUANTITY

As discussed in **Section 4.2.1**, the release rate from the site is approximately 21 L/s. A SWM tank is proposed on the P1 and P2 levels to achieve the water quantity requirements.

Given a total controlled area of 0.845 ha (0.745 ha on-site and 0.10 ha of external area shown in **Figure 4.2**), a runoff coefficient of 0.90, and a maximum controlled release rate of 21 L/s, the required storage volume is 378 m^3. A HWL of 152.05m has been considered for the orifice calculation. The peak flows will be controlled using a **135mmØ orifice plate** at the control manhole. Reference can be made to **Drawing SS-1** for more details. Detailed storage calculations are shown in **Appendix C**.

4.3.2 WATER QUALITY

Quality control is proposed with a proprietary treatment unit (i.e. jellyfish) or equivalent, which is to achieve 80% TSS removal.

4.3.3 GROUNDWATER CONSIDERATIONS

A hydrogeological investigation for the site has been undertaken by Fisher Engineering Ltd. and summarized in the Hydrogeological Investigation report, dated April 2022, to assess the potential effects of groundwater on the proposed development. Please refer to the Hydrogeology Investigation Report in **Appendix C** for further details.

The report notes that construction dewatering will be required, at a rate of 135,960 L/day and 147,750 L/day for four and five underground levels respectively. Furthermore, a permanent dewatering rate of 34.79 m^3/day and 46.54 m^3/day is estimated to be required for the site plan development. The permanent dewatering rate is equivalent to a maximum pumping rate of 1.26 L/s. It is to be noted that the rate of 1.26 L/s has been considered in the storage calculation. This pumping rate can be revised confirmation from the mechanical engineer is provided.

4.3.4 WATER BALANCE & EROSION CONTROL

Based on the Ontario Source Protection Information Atlas, the site is located outside of source water well-head protection areas and significant groundwater recharge areas. Furthermore, the site is located within the unregulated area of the Conservation Halton. Therefore, there is no requirement for a water balance analysis.

Erosion control is proposed to capture 5 mm across the development. 5 mm retention is provided via a rainwater harvesting (RWH) tank, requiring a volume of approximately 37m^3 (i.e. 0.745 ha x 10 x 5 mm). The volume of the RWH tank provided is 37.8 m^3. Please note that further coordination with mechanical and landscaping will be completed during the detailed design stage.

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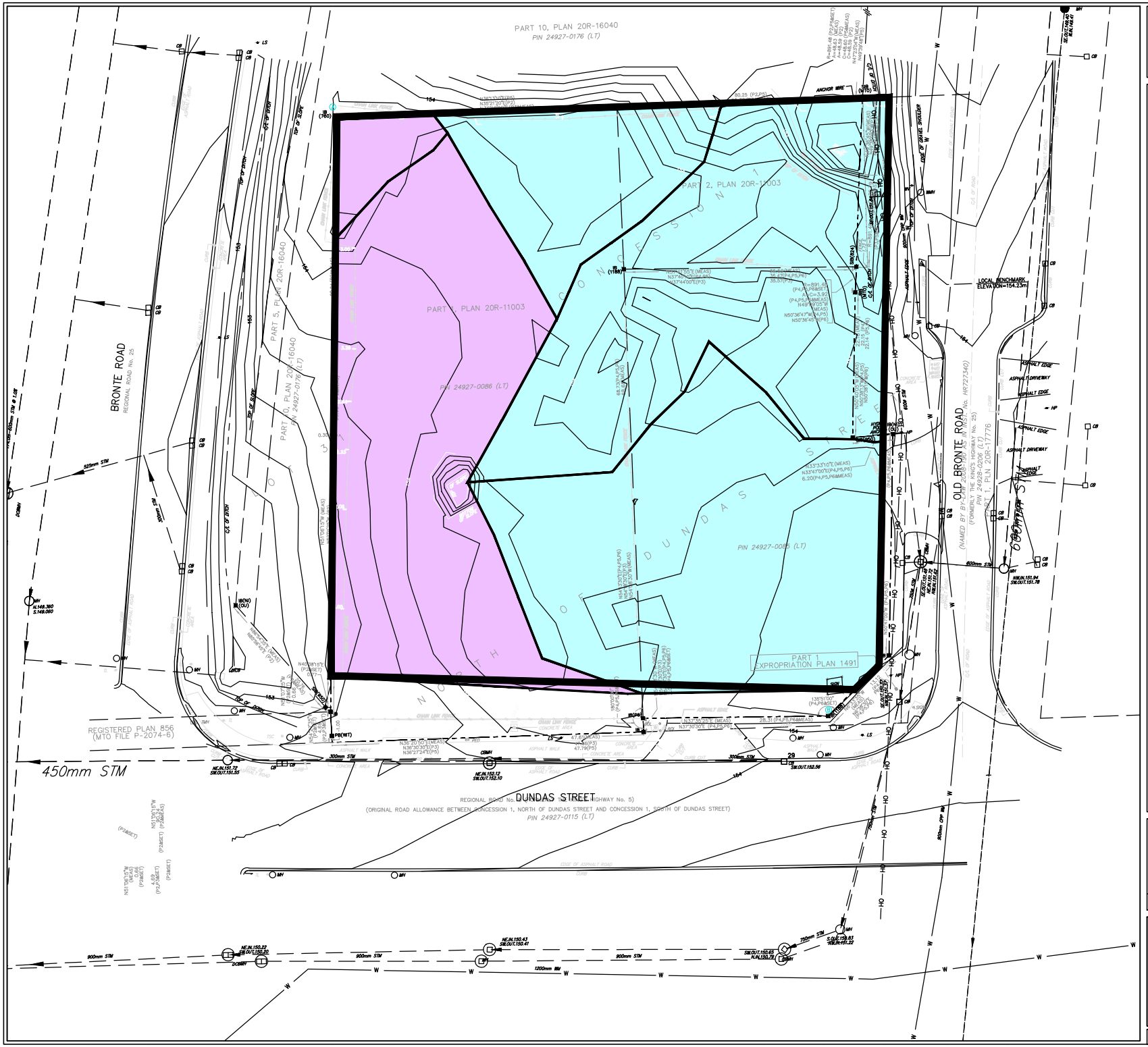

3005 DUNDAS STREET WEST
TOWN OF OAKVILLE

LEGEND

SUBJECT LOCATION

EXISTING DRAINAGE TO OLD BRONTE ROAD
AREA = 0.51ha

EXISTING DRAINAGE TO BRONTE ROAD
AREA = 0.23ha

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CONSULTING ENGINEERS
6 Ronrose Drive, Concord, Ontario L4K 4R3
Tel: (905) 738-6100 Email: general@schaeffers.com
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FIGURE 4.1
EXISTING DRAINAGE

2022-5281	APRIL 2023	SCALE: N.T.S.

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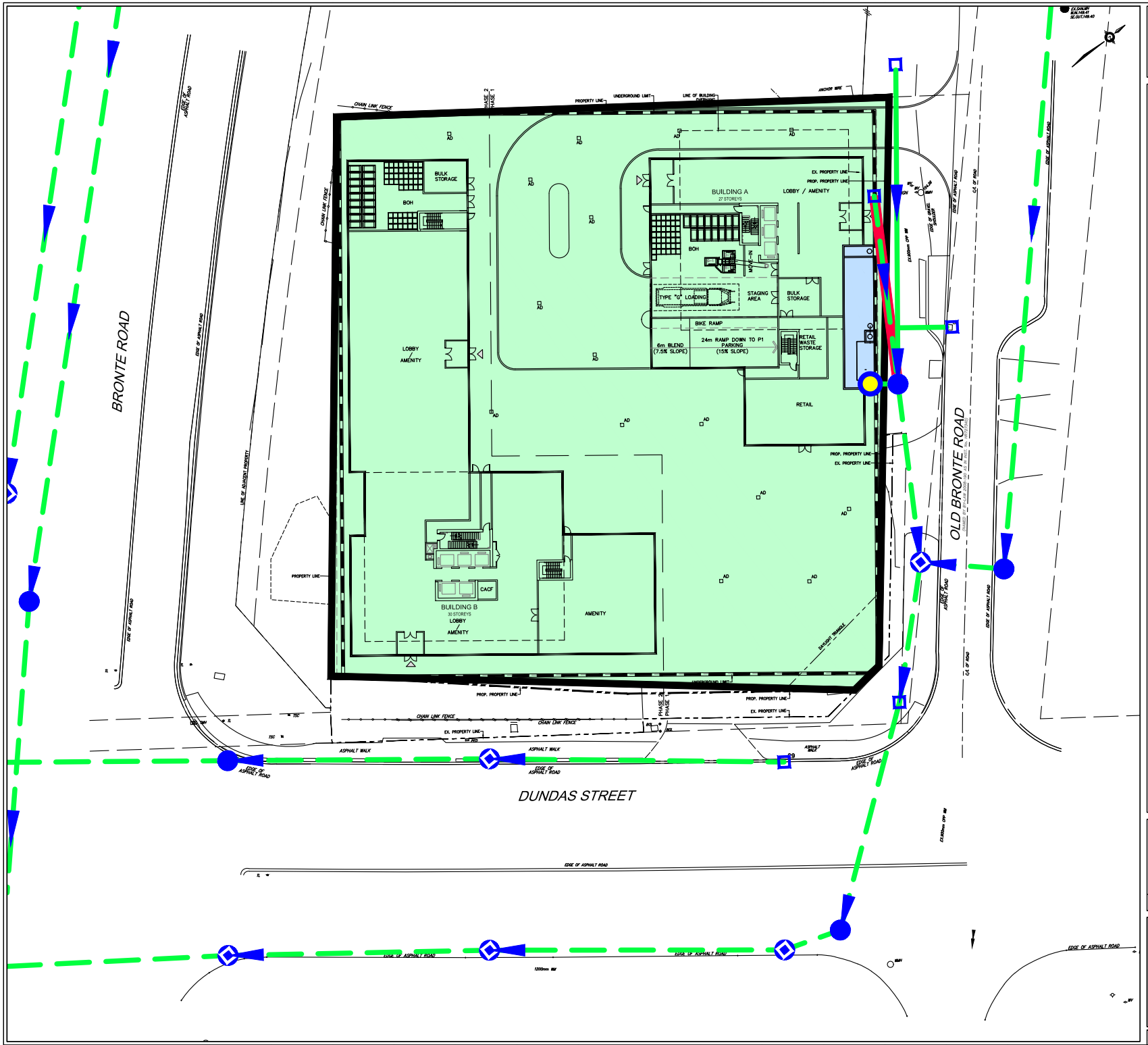

3005 DUNDAS STREET WEST
TOWN OF OAKVILLE

LEGEND

- SUBJECT LOCATION
- PROPOSED STORM SEWER
- EXISTING STORM SEWER
- EXISTING STORM SEWER TO BE REMOVED
- PROPOSED SWM DRAINAGE AREA = 0.74 RUNOFF COEFFICIENT = 0.90
- PROPOSED SWM TANK
- CONTROL MANHOLE
- CATCHBASIN MANHOLE

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6 Ronrose Drive, Concord, Ontario L4K 4R3
Tel: (905) 738-6100 Email: general@schaeffers.com
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FIGURE 4.2
PROPOSED SWM SERVICING

2022-5281	APRIL 2023	SCALE: N.T.S.

SUMMARY AND CLOSING REMARKS

This report discusses the servicing strategy for the proposed development at 3005 Dundas Street West in the Town of Oakville. The proposed municipal servicing strategy satisfies the Town's and Region's criteria. The key servicing components are summarized below.

Water Supply Servicing

- The site is recommended to be serviced via the future 300mmØ watermain on Old Bronte Road.
- A hydrant test is recommended to verify the pressure and can be completed at the detailed design stage.

Sanitary Servicing

- The site is recommended to be serviced via the future 375mmØ sewer on Old Bronte Road.
- The future 375mmØ sewer is anticipated to provide sufficient capacity to the outlet. Therefore, a downstream capacity analysis is not required.

Storm Servicing

- The site is to be serviced by a new connection to the existing 600mmØ storm sewer on Old Bronte Road.
- Quantity control will be provided by a SWM tank on the P1 and P2 levels. The required storage volume is 378 m^3.
- Quality control will be provided to meet the enhanced level of treatment. A proprietary treatment unit (i.e. jellyfish) or equivalent can be used to achieve 80% TSS removal.
- Erosion control is proposed to capture 5 mm across the development. 5 mm retention is provided via a rainwater harvesting tank, requiring a volume of 37.8 m^3.

Should you have any questions or comments please do not hesitate to contact the undersigned.

Respectfully Submitted,

SCHAEFFER & ASSOCIATES LTD.

Jenny Pathmanapan, C.E.T.
Water Resources Analyst

Sadh Katukurunde, P.Eng.
Junior Associate

APPENDIX A- BACKGROUND INFORMATION

SCHAEFFERS

ARCHITECTURAL DRAWING LIST

3005 DUNDAS STREET, OAKVILLE, ONTARIO

2023.04.14 A4 ISSUE FOR COORDINATION

PROJECT NUMBER : 08196.000

ENIROX GROUP
REAL ESTATE DEVELOPMENT

WZMH

SITE STATISTICS:

1. SITE AREA (m^2)							
TOTAL AREA:	7,762.98						
DEVELOPMENT AREA	7,343.90						
FSI	6.11						
2. UNIT COUNT							
UNIT MIX BUILDING A	STUDIO	1B	1B+D	2B	2B+D	3B	TOTAL
GROUND	0	0	0	0	0	0	0
2ND-3ND FLOOR (2 FLOORS)	0	2	14	6	8	2	32
5TH-26TH FLOOR (23 FLOORS)	0	46	138	92	0	0	276
TOTAL	0	48	152	98	8	2	308
UNIT MIX BUILDING B	STUDIO	1B	1B+D	2B	2B+D	3B	TOTAL
GROUND	0	0	0	0	0	0	0
2ND-3ND FLOOR (2 FLOORS)	0	18	28	8	0	4	58
4TH-13TH FLOOR (10 FLOORS)	0	30	50	40	0	0	120
14TH-30TH FLOOR (17 FLOORS)	0	34	102	68	0	0	204
TOTAL	0	82	180	116	0	4	382
GRAND TOTAL	690						
3. BUILDING HEIGHT (m)							
PERMITTED	48.00						
PROVIDED (BUILDING A)	88.80						
PROVIDED (BUILDING B)	97.80						
4. FLOOR AREA, NET	ZONING BY LAW 2015-018						
BELOW GRADE (BUILDING A+B)	RESIDENTIAL (m^2)		NON-RES (m^2)		TOTAL		
PARKING LEVEL P4	55.00		0.00		55.00		
PARKING LEVEL P3	55.00		0.00		55.00		
PARKING LEVEL P2	55.00		0.00		55.00		
PARKING LEVEL P1	55.00		0.00		55.00		
TOTAL BELOW GRADE	220.00		0.00		220.00		
ABOVE GRADE BUILDING A	RESIDENTIAL (m^2)		NON-RES (m^2)		TOTAL		
GROUND FLOOR	386.00		272.76		658.76		
2ND-3RD FLOOR (2 FLOORS)	2,141.30		0.00		2,141.30		
4TH-27TH FLOOR (24 FLOORS)	17,309.04		0.00		17,309.04		
TOTAL ABOVE GRADE	19,836.34		272.76		20,109.10		
ABOVE GRADE BUILDING B	RESIDENTIAL (m^2)		NON-RES (m^2)		TOTAL		
GROUND FLOOR	1,394.19		296.67		1,690.86		
2ND-3RD FLOOR (2 FLOORS)	3,762.92		0.00		3,762.92		
4TH-30TH FLOOR (27 FLOORS)	19,279.15		0.00		19,279.15		
TOTAL ABOVE GRADE	24,436.26		296.67		24,732.93		
GROSS TOTAL ABOVE GRADE	44,272.60		569.43		44,842.03		
BELOW AND ABOVE GRADE	44,492.60		569.43		45,062.03		
5. AMENITY SPACE	ZONING BY LAW 2015-018						
	RATE		# OF UNITS		TOTAL (m^2)		
REQUIRED	-		690				
PROVIDED	2.0m^2/unit		690		1,380.00		
BUILDING A_4TH FLOOR	679.81						
BUILDING B_GROUND FLOOR	668.43						
BUILDING B_4TH FLOOR	32.50						
TOTAL PROVIDED	1,380.74						
6. PARKING	ZONING BY LAW 2009-189						
	RESIDENTIAL	VISITORS	RETAIL	TOTAL			
REQUIRED	863	138	19	1,019			
PROVIDED	RESIDENTIAL	VISITORS	RETAIL	TOTAL			
PARKING LEVEL P1	44	138	8	190			
PARKING LEVEL P2	211	0	0	211			
PARKING LEVEL P3	214	0	0	214			
PARKING LEVEL P4	83	0	0	83			
TOTAL PARKING	552	138	8	698			
BARRIER FREE TOTAL	ZONING BY LAW 2009-189						
	RESIDENTIAL		NON-RES.	TOTAL			
REQUIRED	22		1	23			
	RESIDENTIAL		NON-RES.	TOTAL			
PROVIDED	22		1	23			
7. LOADING	ZONING BY LAW 2009-189						
REQUIRED				1			
PROVIDED AT GRADE (TYPE 'G')				1			
PROVIDED ON P1 (TYPE 'C')				1			
TOTAL				2			
8. BICYCLE PARKING	ZONING BY LAW 2009-189						
	LONG TERM	SHORT TERM	TOTAL	% NET AREA			
REQUIRED	150	50	200				
PROVIDED	150	50	200				
GROUND							
PARKING LEVEL P1	150	50	200	2%			
TOTAL							

ISSUES/REVISIONS

ISSUE	TITLE	DATE
A1	ISSUED FOR COORDINATION	12/15/2022
A2	ISSUED FOR COORDINATION	02/28/2022
A2-R1	ISSUED FOR COORDINATION	03/02/2022
A3	ISSUED FOR COORDINATION	03/22/2022
A4	ISSUED FOR COORDINATION	04/14/2022

ISSUES/REVISIONS

ISSUE	TITLE	DATE

KEY PLAN

Project North

Seal

MM/DD/YYYY
Date

CHECK, VERIFY AND REPORT ANY DISCREPANCIES TO THE CONSULTANT WHOSE SEAL IS AFFIXED TO THIS DRAWING. THIS DRAWING SHALL NOT BE SCALED FOR THE PURPOSE OF VERIFYING DIMENSIONS.
THIS DRAWING SHALL NOT BE USED FOR CONSTRUCTION PURPOSES UNTIL SIGNED AND DATED IN THE SPACE ABOVE BY THE NAMED CONSULTANT.

ENIROX GROUP
REAL ESTATE DEVELOPMENT

WZMH

WZMH Architects
95 St. Clair Ave W., Suite 1500
Toronto, Ontario, Canada M4V 1N6
Tel: 416-961-4111
www.wzmh.com

3005 DUNDAS
3005 DUNDAS STREET WEST,
OAKVILLE, ON, L6M 4J4

Drawing Title
Site Plan

Date	04/14/2023
Scale	1:150
Checked By	Checker
Drawn By	Author
Project No.	08196.000
Drawing No.	A-101

REGION OF HALTON

DEVELOPMENT CHARGES BACKGROUND STUDY

For

Recovery of Early Payment for Estimated Future Water, Wastewater and Roads Development Charges (Recovery DC)

September 15, 2021

Total Cost of Credit To Be Recovered	$	82,095,429
Anticipated SDE Unit Growth (2012-2021)		22,315
$DC Per SDE	**$**	**3,679**

The result of the calculation above is then distributed by residential dwelling types based on person per unit (PPU) rates as follows:

Residential Unit Type	PPU*	$DC
Single & Semi-Detached	3.56	$ 3,679
Multiples		
3 or more Bedrooms	2.76	$ 2,845
Less than 3 Bedrooms	2.09	$ 2,157
Apartments		
2 or more Bedrooms	1.92	$ 1,977
Less than 2 Bedrooms	1.46	$ 1,502
Special Care/Special Need	1.10	$ 1,135

* Person Per Unit (or forecasted occupancy rates) by unit category and number of bedrooms are based on statistics Canada custom tabulation provided by dwelling unit and dwelling age

7. Collection and Repayment of Recovery DC

As set out in the proposed by-law (Appendix 'B'), the Recovery DCs is calculated based on the number and type of dwelling units that were expected to proceed under allocation programs between 2012 and 2021. DCs will be payable at the time of subdivision agreement; at the building permit stage where subdivision agreement is not applicable; or in accordance with terms set out in an agreement entered into with the Region under the DCA.

Ontario
Infrastructure Ontario

AREA SERVICING PLAN

INFRASTRUCTURE ONTARIO

SIXTEEN HOLLOW EMPLOYMENT AREA
Project No.: 2013-0209-10

January 31, 2014 (revised June 26, 2014)

WALTERFEDY

HIGHWAY 407

GLENORCHY LANDS

GLENORCHY LANDS

407 WEST

BRONTE ROAD

OLD BRONTE ROAD

FOURTEEN MILE CREEK

BURNHAMTHORPE ROAD

DUNDAS STREET

STREET "C"

STREET "B"

McCRANEY CREEK

TAPLOW POND

MITIC PROPERTY

WESTERN ROAD

THIRD LINE

GLEN OAK POND

NOH

EOK

GRAND OAK TRAIL

A-1 4730 | 37.84

A-2 2558 | 20.458

A-3 237 | 1.89

B-1 1351 | 15.01

B-2 509 | 4.07

B-3 509 | 4.07

B-4 2053 | 16.42

C-1 1114 | 8.91

C-2 673 | 7.47

D-1 1085 | 4.62

D-2 625 | 5.00

D-3 803 | 6.42

D-4 944 | 7.55

D-5 1508 | 12.06

D-6 574 | 4.59

E-1 152 | 2.75

E-2 12 | 0.21

F-1 1653 | 18.36

G-1 447 | 3.57

G-2 TOTAL: 6.12ha; COMMERCIAL: 3.62ha; HOSPITAL BEDS: 35

G-3 444 | 5.71

G-4 TOTAL: 1.93ha; COMMERCIAL: 0; HOSPITAL BEDS: 84

G-5 TOTAL: 4.02ha; COMMERCIAL: 0; HOSPITAL BEDS: 256

G-6 TOTAL: 6.91ha; COMMERCIAL: 1.07ha; HOSPITAL BEDS: 236

G-7 343 | 2.74

1A 1B 1C 1D 1E 1F

2A 2B 2C 2D

3B 3D

4D 5D 6D 7D

EXT

2400Ø@0.25%

2400Ø@0.27%

825Ø@0.74%

675Ø@0.45%

LEGEND

- STUDY AREA
- SANITARY DRAINAGE AREA
- EXISTING SANITARY SEWER
- PROPOSED SANITARY SEWER
- 101 / 50 | 1.0 — CATCHMENT AREA NAME; AREA IN HECTARES; POPULATION — SANITARY DRAINAGE AREA
- HIGH CONSTRAINT CREEK CORRIDOR
- MEDIUM CONSTRAINT CREEK CORRIDOR
- LOW CONSTRAINT CREEK CORRIDOR
- CREEK CROSSING
- SPECIAL STUDY AREA
- EMPLOYMENT LANDS
- NATURAL HERITAGE SYSTEM AREA
- COMMUNITY PARK AREA

NO	Date	By	REVISIONS	MANU	CAD
1	14.05.09		ISSUED FOR ASP SUBMISISON		

Design	SVK	Ch'kd	
Drawn		Ch'kd	
Scale VER: 1:400 HOR: 1:4000		Date 2013.07.08	References

WALTERFEDY

Halton REGION

TITLE
SIXTEEN HOLLOW AREA SERVICING PLAN
WASTEWATER LAYOUT

TOWN OF OAKVILLE, ON

Consultant File NO	Regional Drawing NO
2013-0209-10	
CONTRACT NO	Figure NO 5.1

Drawing: \\BGL\JOB_FILES\2013\0209\00\06-DWGS\CIVIL\2013-0209-10_SAN.DWG
Layout Tab: FIG5.1 - SAN-FIGURE
Date: 05/08/2014 Time: 09:30:11 AM

HIGHWAY 407

300mmø WATERMAIN

J-48

J-46

GLENORCHY LANDS

407 WEST

BURNHAMTHORPE ROAD

BRONTE ROAD

OLD BRONTE ROAD

600mmø WATERMAIN

EXISTING 900mmø (ZONE M5) WATERMAIN (MILTON)

FOURTEEN MILE CREEK

STREET "C"

STREET "B"

McCRANEY CREEK

TAPLOW POND

WESTERN ROAD

THIRD LINE

NOH

GLEN OAK POND

EXISTING 400mmø WATERMAIN

EXISTING 1200mmø WATERMAIN

GRAND OAVK TRAIL

DUNDAS STREET

J28 J26 J24 J18 J14 J12 J30 J32 J34 J22 J20 J16 J10 J48 J50 J44 J42 J36

EOK

CP

LEGEND

- STUDY AREA
- EXISTING WATERMAIN
- EXISTING TRANSMISSION WATERMAIN
- PROPOSED WATERMAIN
- MODEL JUNCTION
- HIGH CONSTRAINT CREEK CORRIDOR
- MEDIUM CONSTRAINT CREEK CORRIDOR
- LOW CONSTRAINT CREEK CORRIDOR
- CREEK CROSSING
- SPECIAL STUDY AREA
- EMPLOYMENT LANDS
- NATURAL HERITAGE SYSTEM AREA
- COMMUNITY PARK AREA

NO	Date	By	REVISIONS	MANU	CAD
1	14.05.09		ISSUED FOR ASP SUBMISISON		

Design	DS	Ch'kd		Date 2013.07.08
Drawn	SVK	Ch'kd		References

Scale
VER: 1:400
HOR: 1:4000

WALTERFEDY

Halton REGION

TITLE
SIXTEEN HOLLOW
WATERMAIN LAYOUT
TOWN OF OAKVILLE, ON

Consultant File NO 2013-0209-10	Regional Drawing NO
CONTRACT NO	Figure NO 3.1

Drawing: \\BRLI_DB_FILES\2013\0209\10\06-DWGS\CIVIL\2013-0209-10_WATER.DWG
Layout Tab: DRAINAGE
Date: 05/09/2014 Time: 09:49:51 AM

APPENDIX B- WATER SUPPLY CALCULATIONS

Population Calculation - Region DC Background Study

Project: 3005 Dundas Street West
Project No: 5281

Population Estimate Calculation

Type of Development	Res. Units	Non Res. Area (ha)	Pop. Density	Pop. Density Units	Population
Apartment < 2 Bedrooms*	462		1.46	ppu	675
Apartment ≥ 2 Bedrooms*	228		1.92	ppu	438
Retail - Light Commercial**	-	0.06	90	persons/ha	6
Total	**690**	**0.06**	**-**	**-**	**1119**

**Based on Region of Halton Development Charges Background Study (2021)*
***Based on Regional Municipality of Halton Water & Wastewater Linear Design Manual (April 2019)*

Population Calculation - Region Design Criteria

Project: 3005 Dundas Street West
Project No: 5281

Population Estimate Calculation

Type of Development	Area (ha)	Pop. Density (Person/ha)	Population
Apartment (over 6 stories high)	0.72	285	206
Retail - Light Commercial	0.06	90	6
Total	**0.78**	**-**	**212**

**Based on Regional Municipality of Halton Water & Wastewater Linear Design Manual (April 2019)*

FUS Calculation - Tower A

Project:	3005 Dundas Street West
Project number:	5281
Municipality:	Town of Oakville

A = Type of Construction

Type of Construction:	C	Description
Wood Frame	1.5	(essentially all combustible)
Ordinary	1	(brick/masonry walls, combustible interior)
Non-Combustible	0.8	(unprotected metal structure, masonry/metal walls)
Fire-Resistive	0.6	(fully protected frame, roof, floors)

Construction Coefficient:	**0.8**	

B = Largest Floor

Area:	1070.65	square metres (of largest floor)

C = Height (storeys)

Height:	27	Storeys

D = Fire Flow (000's)

GFA	5,026	square metres
Construction Type	0.8	
Fire Flow	12,478	L/min.

-> Fire Flow	**12,000**	**L/min.**

E = Occupancy Factor

Fire Hazard of Contents	Charge
Non-Combustible	-25%
Limited Combustible	-15%
Combustible	0%
Free Burning	15%
Rapid Burning	25%

Occupancy Factor	-15%	
Fire Flow	**10,200**	**L/min.**

F = Sprinkler Factor

Sprinkler System	Charge
n/a	0%
NFPA 13 System	-30%
Water supply is standard for both the system and Fire Dep.	
Hose lines	-10%
Fully Supervised System	-50%

Sprinkler Factor:	-40%	incl 10% Standard Connection Size

G = Exposure Factor

Separation	Charge	
0 to 3 m	25%	
3.1 to 10 m	20%	
10.1 to 20 m	15%	
20.1 to 30 m	10%	
30.1 to 45 m	5%	1 side
Greater than 30	0%	3 sides

Exposure Factor	5.00%	(no more than 75%)

H - Net Fire Flow Required

	Charge
F + G Factors	-35%

	6630	L/min.
Fire Flow:	7000	L/min.
	117	L/s
	1849	USGPM

FUS Calculation - Tower B

Project:	3005 Dundas Street West
Project number:	5281
Municipality:	Town of Oakville

A = Type of Construction

Type of Construction:	C	Description
Wood Frame	1.5	(essentially all combustible)
Ordinary	1	(brick/masonry walls, combustible interior)
Non-Combustible	0.8	(unprotected metal structure, masonry/metal walls)
Fire-Resistive	0.6	(fully protected frame, roof, floors)

Construction Coefficient:	**0.8**	

B = Largest Floor

Area:	1881.46	square metres (of largest floor)

C = Height (storeys)

Height:	30	Storeys

D = Fire Flow (000's)

GFA	6,619	square metres
Construction Type	0.8	
Fire Flow	14,319	L/min.

-> Fire Flow	**14,000**	**L/min.**

E = Occupancy Factor

Fire Hazard of Contents	**Charge**
Non-Combustible	-25%
Limited Combustible	-15%
Combustible	0%
Free Burning	15%
Rapid Burning	25%

Occupancy Factor	-15%	
Fire Flow	**11,900**	**L/min.**

F = Sprinkler Factor

Sprinkler System	**Charge**
n/a	0%
NFPA 13 System	-30%
Water supply is standard for both the system and Fire Dep.	
Hose lines	-10%
Fully Supervised System	-50%

Sprinkler Factor:	-40%	incl 10% Standard Connection Size

G = Exposure Factor

Separation	**Charge**	
0 to 3 m	25%	
3.1 to 10 m	20%	
10.1 to 20 m	15%	
20.1 to 30 m	10%	
30.1 to 45 m	5%	1 side
Greater than 30	0%	3 sides

Exposure Factor	5.00%	(no more than 75%)

H - Net Fire Flow Required

	Charge
F + G Factors	-35%

	7735	L/min.
Fire Flow:	8000	L/min.
	133	L/s
	2114	USGPM

Water Supply Calculation

Project: 3005 Dundas Street West
Project No: 5281

FUS :	133	L/s
Average Daily Demand:	275	L/capita/day
Residential Area	0.78	ha
Light Commercial Area:	0.06	ha

Average Daily Demand

Land Use	Population	Average Day Demand (l/s)
Apartments	1113	**3.54**
Light Commercial Area	6	**0.02**
Total	**1119**	**3.56**

Max Daily Demand

Land Use	Population	Peaking Factor	Max Day Demand (L/s)
High Density Residential	1113	2.25	**7.97**
Light Commercial	6	2.25	**0.04**
Total	**1119**		**8.01**

Maximum Hour Demand

Land Use	Population	Peaking Factor	Peak Hour Demand (L/s)
High Density Residential	1113	4.0	**14.17**
Light Commercial	6	4.0	**0.08**
Total	**1119**		**14.25**

Max Day + Fire Flow

Land Use	Average Day Demand (L/s)	Max. Hour Demand Peaking Factor	Max Hour Demand (L/s)	Max Day Demand Peaking Factor	Max Day Demand (L/s)	Fire Flow (L/s)	Total Flow (L/s)
High Density Residential	3.54	4.0	**14.17**	2.25	**7.97**		**7.97**
Light Commercial	0.02	4.0	**0.08**	2.25	**0.04**		**0.04**
Total			**14.25**		**8.01**	**133**	**141.35**

APPENDIX C - SANITARY DEMAND CALCULATIONS

Project: 3005 Dundas Street West
Project number: 5281
Municipality: Town of Oakville

Residential Sanitary Flow Analysis

Area (ha)	Expected Population	Avg. Sewage Flow (L/s)*	Harmon Peaking Factor	Peak Flow (L/s)	Infiltration (L/s)**	Total Flow (L/s)
0.78	1113	3.54	3.77	13.35	0.22	**13.58**

**Based on Halton criteria of 275 L/c/d*
***Based on Halton criteria of 0.286 L/ha/s*

Commercial Sanitary Flow Analysis

Area (ha)	Expected Population	Avg. Sewage Flow (L/s)*	Harmon Peaking Factor	Peak Flow (L/s)	Infiltration (L/s)**	Total Flow (L/s)
0.06	6	0.02	4.00	0.07	0.02	**0.09**

**Based on Halton criteria of 24.750 m ^{3}/ha/day*
***Based on Halton criteria of 0.286 L/ha/s*

Total Sanitary Flow= **13.66** **L/s**

APPENDIX D- STORMWATER MANAGEMENT CALCULATIONS

Town of Oakville

Pre-development Release Rate to East (via 600mm sewer)

Project: 2022-5281

Criteria:

The Runoff Coefficients were taken from City's Design Criteria.

Rainfall intensity

Design Storm Event	A	B	C	I (mm/hr)
2-Year	725.0	4.8	0.808	76.013
5-Year	1170.0	5.8	0.843	105.807
10-Year	1400.0	5.8	0.848	124.814
25-Year	1680.0	5.6	0.851	149.979
50-Year	1960.0	5.8	0.861	168.383
100-Year	2150.0	5.7	0.861	185.630

Note:

T = 11.5 Minutes 0.167 Hours

I = A / (tc + B) ^ C

Existing Peak Discharge Rate from Site to Storm Sewer

Pre-development Runoff Coefficient, C		**0.25**	
Pre-development Drainage Area		**0.29**	ha
2-Year Peak Flow, Q2		15	l/s
5-Year Peak Flow, Q5		21	l/s
10-Year Peak Flow, Q10		25	l/s
25-Year Peak Flow, Q25		30	l/s
50-Year Peak Flow, Q50		34	l/s
100-Year Peak Flow, Q100		38	l/s

Storage Volume Calculation - East via 600mm Sewer

SCHAEFFERS CONSULTING ENGINEERS

Project: 3005 Dundas Street West

Modified Rational Method

Internal Area	Controlled Drainage Area (ha) =	0.745
	5-year C =	0.90
	100-year C =	0.90
	Allocated Release Rate (l/s) =	21
	Actual Release Rate (l/s) =	21

External Area	Area (ha) =	0.10
	C =	0.90

Groundwater Pump Rate		1.26 L/s

100 Year Storm

Design Storm =	Oakville
A =	2150
B =	5.7
C =	0.861

	100 Year					Total	Maximum	Required
Time	Intensity	Total	GW Pump	External	Total	Runoff	Release	Storage
(min)	100 year	Runoff	Rate	Runoff	Runoff	Volume	Volume	Volume
	(mm/hr)	(l/s)	(l/s)	(l/s)	(l/s)	(m^3)	(m^3)	(m^3)
10	200.80	374.19	1.26	50.24	425.69	255.42	12.60	242.8
11	190.41	354.82	1.26	47.64	403.72	266.45	13.86	252.6
12	181.11	337.49	1.26	45.31	384.06	276.52	15.12	261.4
13	172.74	321.89	1.26	43.22	366.37	285.77	16.38	269.4
14	165.16	307.77	1.26	41.32	350.36	294.30	17.64	276.7
15	158.27	294.93	1.26	39.60	335.79	302.21	18.90	283.3
16	151.97	283.19	1.26	38.02	322.47	309.57	20.16	289.4
17	146.18	272.41	1.26	36.58	310.25	316.45	21.42	295.0
18	140.86	262.49	1.26	35.24	298.99	322.91	22.68	300.2
19	135.93	253.31	1.26	34.01	288.58	328.98	23.94	305.0
20	131.37	244.80	1.26	32.87	278.93	334.71	25.20	309.5
21	127.12	236.89	1.26	31.81	269.95	340.14	26.46	313.7
22	123.16	229.50	1.26	30.81	261.58	345.28	27.72	317.6
85	44.35	82.65	1.26	11.10	95.01	484.56	107.10	377.5
90	42.35	78.92	1.26	10.60	90.78	490.21	113.40	376.8
100	38.88	72.45	1.26	9.73	83.44	500.62	126.00	374.6
105	37.36	69.62	1.26	9.35	80.23	505.46	132.30	373.2
110	35.97	67.02	1.26	9.00	77.28	510.07	138.60	371.5
115	34.68	64.63	1.26	8.68	74.56	514.49	144.90	369.6
120	33.49	62.41	1.26	8.38	72.05	518.74	151.20	367.5
125	32.38	60.35	1.26	8.10	69.71	522.82	157.50	365.3
130	31.35	58.43	1.26	7.84	67.53	526.75	163.80	362.9
135	30.39	56.63	1.26	7.60	65.50	530.54	170.10	360.4
140	29.49	54.96	1.26	7.38	63.60	534.21	176.40	357.8

Required Storage (m^3):	**377.5**
Provided Storage (m^3):	

Town of Oakville
Orifice Control

Allowable Release Rate = 0.0210 m^3/s

CALCULATE DIAMETER KNOWING Q & H	
Q(m^3/s)=	0.021
Td(m) =	0.32
Approx A=	0.0135
Approx D=	131
A(m^2) =	0.015
D(mm) =	**139**

Control Manhole Orifice Plate

DIA (mm)=	**135**
AREA m^2=	0.014
COEFF =	**0.62**
GRAVITY =	9.81
K =	1.0
D/S HGL=	0.00 m
Orifice Inv.=	151.70 m

Effective Head m	Depth Water At CTL MH m	Qp m^3/s	TOTAL FLOW Qp m^3/s	ELEVATION of Water m
0.00	0.067	0.0000	0.000	151.77
0.200	0.268	0.0176	0.018	151.97
0.225	0.292	0.0186	0.019	151.99
0.250	0.317	0.0197	0.020	152.02
0.287	0.355	0.0211	0.021	152.05
0.300	0.368	0.0215	0.022	152.07
0.350	0.417	0.0233	0.023	152.12

ORIFICE FLOW	Q(m^3/s)=	COEF*AREA*(2*GRAVITY*HEAD/K)^0.5	
	Approx A=	+$G$10/($B$8*(2*9.81*$G$11/K)^0.5)	
	Approx D=	((G12/@PI)^0.5)*2*1000	
	A(m^2) =	+$G$10/($B$8*(2*9.81*($G$11-(0.5*G21/1000))/K)^0.5)	
	D(mm) =	((G12/@PI)^0.5)*2*1000	
WEIR FLOW	Q(m^3/s)=	CLH^1.5	C=1.5

Printed: 19-Apr-23

FISHER ENGINEERING

ENGINEERING

Professional Engineers Ontario

LABORATORY

CALA
Canadian Association for Laboratory Accreditation Inc.

HYDROGEOLOGICAL INVESTIGATION

PROPOSED NEW DEVELOPMENT,
3005 DUNDAS STREET WEST,
OAKVILLE, ONTARIO

Prepared for:

Enirox Group

Project No. FE-P 21-117137H

April 1, 2022

400 Esna Park Drive, Unit 15
Markham, ON
L3R 3K2

Tel: (905) 475-7755
Fax: (905) 475-7718
www.fisherenvironmental.com

Issued to:	Enirox Group 101 Railside Road North York, ON M3A 1B2
Contact:	Arash Kamali, B.Eng., CEO akamali@enirox.com
Project Name:	Hydrogeological Investigation for Proposed Development
Project Address:	3005 Dundas Street West, Oakville, ON.
Project Number:	FE-P 21-11713H
Issued on:	April 1, 2022
Report Prepared By:	 Clive Wiggan, PhD., PMP., Project Manager clive@fishereng.com
Report Reviewed By:	 Frank Fan, PEng., Geotechnical Engineer frank@fishereng.com

TABLE OF CONTENTS

1. INTRODUCTION

Fisher Engineering Limited was retained by Enirox Group to carry out a Hydrogeological Investigation for the proposed redevelopment at the property located at 3005 Dundas Street West, Oakville, Ontario, hereinafter referred to as the 'Site'.

The purpose of the Hydrogeological Investigation was to evaluate groundwater conditions with respect to the development of the site.

The report has been prepared specifically and solely for the proposed development regarding hydrogeological aspects for design and construction.

The Hydrogeological Review has been prepared in accordance with the Ontario Water Resources Act, Ontario Regulation 387/04 and the Ontario Halton Sanitary and Storm Sewer By-Law No. 02-03.

2. SITE AND PROJECT DESCRIPTIONS

Site Settings

The subject property is located on the northwest corner of the intersection of Dundas Street West and Old Bronte Road in a mixed commercial - residential neighborhood south of Highway 407, in the City of Oakville, and is bounded by Dundas Street West to the south, Bronte Road to the west, a vacant lot to the north and Old Bronte Road to the east. The site has an approximate area of 7,445m^2.

At the time of investigation, the site was unoccupied and covered in grass/shrubs and trees. Access to the property is via unpaved driveways of Old Bronte Road and Dundas Street West.

Topography

The site is generally flat and graded for drainage towards a ditch at the east of Bronte Road. Elevations change from approximately 154.00m at MW1 located at the southeast corner to 153.90m asl at MW6 located at the southwest corner.

Proposed Development

It was understood that the proposed development will consist of the construction of a highrise residential building with four or five underground levels extending to or close to the property boundaries. Finished floor elevations were not available during the investigation and it was therefore assumed that P4 or P5

slab would extend to approximate depths of 11.2m or 14m respectively (2.8m per level). Conventional footings, based on the geotechnical report was recommended at depths below 12m for four or five underground levels.

3. SCOPE OF HYDROGEOLOGICAL INVESTIGATION

The Hydrogeological Investigation works were required to:

1) Establish groundwater conditions for the design of dewatering works, if required, prior to construction of the proposed building.
2) Determine the need for permanent drainage and
3) Conduct calculations/analyses of the groundwater quantity and quality to be used for the necessary applications for permits prior to proceeding with construction dewatering and design of permanent drainage, if necessary.

The scope of this work generally consisted of the following:

- **Drilling/locating Monitoring Wells.** Drilling of monitoring wells and reviewing / compiling the borehole logs and onsite / laboratory testing.
- **Data Evaluation.** Evaluating the results of soil types, groundwater static levels, ground surface elevation, groundwater quality, flow direction and other available hydrogeological data for the site and their potential impact on the proposed development.
- **Hydraulic Conductivity Tests.** Conduct single well response tests and record groundwater level drawdown and recovery to model/calculate hydraulic conductivity.
- **Groundwater Quality Analysis.** Carry out laboratory analyses on groundwater to determine compliance with the Ontario Halton Sewer Use Bylaws No. 02-03 (Mar 2003) – Halton Sanitary Sewer and Halton Storm Sewer.
- **Groundwater Level Monitoring.** Conduct long-term monitoring of the groundwater levels to determine the seasonal high-water levels.
- **Hydrogeological Report.** Prepare and submit a report detailing the findings and recommendations of the Hydrogeological Investigation.

4. FIELD AND LABORATORY WORKS

Subsurface exploration for the Hydrogeological Investigation was conducted concurrent with drilling for the Geotechnical Investigation over the period November 22 to 26, 2021 and consisted of eight (8) boreholes advanced to depths of 6.71m to 18.29m below prevailing grades. Approximate locations of the boreholes and elevations are presented in Appendix A - Borehole Location Plan.

All boreholes were instrumented as monitoring wells (MW1 to MW8) with 2" diameter screens on completion of drilling. A clean silica sand pack was placed around the well screens and isolated with bentonite to depths below prevailing grades as shown in the borehole details in Appendix B.

A Track mounted drill rig equipped with solid stem augurs, supplied by Terra Firma Services, was used for all drilling work under direct supervision of Fisher Engineering personnel. Soil samples, in the overburden soils, were taken at regular intervals using a split–spoon sampler advanced by means of the Standard Penetration Test (SPT) which was conducted in general accordance with ASTM Specification D1586. Field tests to determine engineering parameters of the soils were carried out during drilling, which included Standard Penetration Tests (SPT). Rock coring was carried out in BH4 & BH5 between approximate depths of 6.5m & 13.7m (BH4) and from 9.10m to 18.3m in BH5.

Laboratory Analyses

Soil samples were taken to the Fisher Environmental laboratory for further visual assessment and classification. Eleven (11) representative soil samples from BH1, BH5, BH6 and BH8 were submitted for moisture content and four (4) for grain size analyses. Five (5) soil samples were submitted for chloride and sulphate analyses and four (4) for pH tests. Two (2) soil samples from were submitted for hydrometer tests. The laboratory samples were tested and classified in general accordance with the Unified Soil Classification System, ASTM D 2487, and Standard Practice for Classification of Soil for Engineering Purposes.

One (1) groundwater sample from MW6 was submitted to ALS Environmental laboratory for analyses of water quality under the Ontario Halton Sewer Use Bylaws No. 02-03 (Mar 2003) – Halton Sanitary Sewer and Halton Storm Sewer. The results are presented in Appendix D.

The soil samples recovered during the investigation were stored in the Fisher Environmental laboratory for a period of 30 days after submitting the geotechnical report and were discarded thereafter.

Site Survey

Ground surface elevations at borehole/monitoring well locations were interpolated from a topographic survey plan prepared by Sexton McKay Limited, dated April 5, 2007.

5. SUBSOIL CONDITIONS

Surface and subsurface conditions encountered at borehole locations are shown in Appendix B - Log of Boreholes and are summarized in the following sections. The logs include soil stratification at borehole locations along with detailed soil descriptions. Variations in soil stratification may occur and should be expected between borehole locations and elsewhere on the site.

Fill - Fill soils were found below surficial layer of all boreholes and extended to approximate depths below prevailing grades as shown in Table 1. The fill generally consisted of dark brown to brown/grey sand/silty sand to sand & gravel with some to trace of topsoil/roots and occasional pieces of asphalt/brick/metal and plastic.

Table 1: Fill Depths and Elevations

Borehole No.	BH1	BH2	BH3	BH4	BH5	BH6	BH7	BH8
Surface Elevation (m asl)	154.00	153.92	153.59	154.50	154.52	153.81	153.90	154.37
Depth of Borehole (m bgs)	12.35	6.71	6.71	13.72	18.29	8.38	6.71	6.71
Elevation at Bottom of Borehole (m asl)	141.65	147.21	146.88	140.78	136.23	145.43	147.19	147.66
Depth of Fill (m bgs)	1.52	2.29	2.13	1.98	1.22	1.37	0.46	1.60
Elevation at Bottom of Fill (m asl)	152.48	151.63	151.46	152.52	153.30	152.44	153.44	152.77

Grey/Reddish Brown Silt Till – The fill was underlain by grey and reddish brown, moist, compact to dense silt till extending to approximate depths of 4.65m (BH4) to 7.93m (BH6).

Greyish/Reddish Brown Weathered Shale – Grey becoming reddish brown, moist to dry, hard, weathered shale was encountered beneath the overburden soils in all boreholes at depths varying from 6.71m (BH8)

to 9.14m (BH5). Top of shale elevations, based generally on refusal to power auguring, vary from 145.88m (BH6) to 149.02m asl (BH7).

6. HYDROGEOLOGICAL STUDY

A hydrogeological study for the subject site was conducted based on the boreholes/wells' exploration, observation and site/laboratory testing. Groundwater details from the eight (8) newly installed monitoring wells were used in the Hydrogeological Study. The wells were constructed with 3.05m (10') long, 51mm diameter PVC slotted screen pipes, with the bases at approximate depths below existing grade as shown in Appendix B. Clean silica sand packs were placed around each well screen which was isolated with bentonite extending to slightly below existing grade.

Boreholes BH2, BH3, BH6, BH7 and BH8 were dry on completion of drilling while standing water was observed at 6.10m bgs in BH1. Boreholes BH4 and BH5 were drilled using mud rotary and consequently water levels on completion of drilling could not be ascertained.

6.1 Hydrogeological Conditions

Review of the available surficial geological and hydrogeological information for the area shows that the site is underlain generally with clay to silt-textured till derived from glaciolacustrine deposits or shale. Underlying bedrock is represented by shale, limestone, dolostone and siltstone of the Queenston Formation and is generally less than 10m below prevailing grade. Surficial geology and bedrock maps are presented in Appendix A.

The subsoils and hydrogeological conditions were observed and recorded during both the geotechnical and hydrogeological investigations. Based on the boreholes/wells' exploration, the water bearing soils on the site were dominated by wet seams interbedded in the grey and reddish brown silt till along with weathered shale at greater depths. The observed soil conditions are consistent with the surficial geology and bedrock descriptions.

All monitoring wells were purged/developed and allowed to fully recover prior to carrying out groundwater level measurements and sampling. Measured groundwater depths and elevations are summarized in Table 2.

Comments on Table 2:

The following general comments regarding groundwater conditions at the site are based on the groundwater level data and the geotechnical investigation:

- Static groundwater levels were observed at 1.55m to 6.47m bgs (152.45m to 148.05m asl). MW3 (depth of 4.57m bgs) was observed to be mostly dry or with very little water during the investigation.
- Pockets of perched and seepage water from more pervious soils may be expected on the site.
- Fourteen Mile Creek is located approximately 500m southwest of the site while other small creeks were observed within an approximate radius of 1km of the site.
- The site is located in a developed residential/commercial area, with some supply wells installed between 1951 and 1992. Most of these wells have been decommissioned. Water supply for new residential buildings in the area is generally via municipal water system.
- Groundwater levels are being monitored to determine seasonal highwater levels on the site.

Table 2: Groundwater Depths and Elevations

Borehole No.		MW1	MW2	MW3	MW4	MW5	MW6	MW7	MW8
Surface Elevation (m asl)		154.00	153.92	153.59	154.50	154.52	153.81	153.90	154.37
Depth of Well, m bgs		10.37	6.71	4.57	9.76	18.29	7.93	6.71	6.71
Elevation at well base, m asl		143.63	147.21	149.02	144.74	136.23	145.88	147.19	147.66
On Completion	GW level, m bgs	6.10	Dry	Dry	n/a - rock coring	n/a - rock coring	Dry	Dry	Dry
	GW Ele, m asl	147.90							
30-Nov-21	GW level, m bgs	2.16	4.85	Dry	2.55	5.10	1.67	5.10	1.67
	GW Ele, m asl	151.84	149.07		151.95	149.42	152.14	148.80	152.70
15-Dec-21	GW level, m bgs	1.56	4.72	Dry	2.16	6.23	5.13	5.32	5.25
	GW Ele, m asl	152.44	149.20		152.34	148.29	148.68	148.58	149.12
29-Dec-21	GW level, m bgs	1.61	4.76	Dry	2.39	6.47	5.40	5.31	5.39
	GW Ele, m asl	152.39	149.16		152.11	148.05	148.41	148.59	148.98

Borehole No.		MW1	MW2	MW3	MW4	MW5	MW6	MW7	MW8
12-Jan-22	GW level, m bgs	1.77	4.82	Dry	2.39	6.45	5.41	5.33	5.40
	GW Ele, m asl	152.23	149.10		152.11	148.07	148.40	148.57	148.97
26-Jan-22	GW level, m bgs	1.86	4.97	Dry	2.37	6.43	5.37	5.27	5.37
	GW Ele, m asl	152.14	148.95		152.13	148.09	148.44	148.63	149.00
9-Feb-22	GW level, m bgs	1.92	4.86	4.54	2.40	6.23	5.04	4.98	2.20
	GW Ele, m asl	152.08	149.06	149.05	152.10	148.29	148.77	148.92	152.17
9-Mar-22	GW level, m bgs	1.55	4.45	4.21	1.92	6.08	4.95	4.95	4.95
	GW Ele, m asl	152.45	149.47	149.38	152.58	148.44	148.86	148.95	149.42

6.2 Hydraulic Conductivity K Modeling Results

Rising Head Slug Tests

Rising head slug tests were conducted in MW1, MW6 and MW8 on March 23, 2022. The water bearing media mainly consisted of seams/pockets of pervious soils interbedded in the till along with weathered shale, and were assumed to be unconfined, homogenous, isotropic and of uniform thickness. It was also assumed that the wells fully penetrated the water bearing soils. Data from the single well response tests were used to calculate the hydraulic conductivity values using Luthin's method.

Calculated values for hydraulic conductivity (k) are summarized in Table 3 and are representative of the water bearing soil observed on the site. Details of the hydraulic conductivity analyses are presented in Appendix C.

Table 3: Summary of Slug Tests and Hydraulic Conductivity Results

Test Wells	Well Surface Elevation (m asl)	Groundwater Depth (m)	Screen Elevation (m asl)	Variance of water head created (m)	30 Minutes/ Recovery Percentage	Hydraulic Conductivity, K (Luthin's Method)	
						m/s	m/day
MW1	154.00	1.54	143.63 – 148.21	3.71	31 min / 9%	1.36×10^{-7}	0.012
MW6	153.81	4.90	145.88 – 153.81	1.95	31 min / 15%	3.03×10^{-7}	0.026
MW8	154.37	4.65	147.66 – 154.37	1.30	31 min / 14%	1.36×10^{-7}	0.012

6.3 Grain Size Analysis for Hydraulic Conductivity K

Representative samples from BH1, BH6 and BH8 were selected and submitted to the laboratory for grain size distribution and hydrometer analyses. The results for the grain size distribution and hydrometer analyses are presented in Appendix C and summarized in Table 4.

Based on the field soil description (Unified Soil Classification System) and grain size distribution, the overburden soils within the excavation depths can by classified as: SC – Clayey sands, sand-clay mixtures to SM – Silty sands, sand-silt mixtures with estimated coefficient of permeability k and corresponding percolation times T as shown in Table 4 based on Table 2 of the Supplementary Guidelines to the Ontario Building Code, 1997. These values are generally consistent with field observation and hydraulic conductivity tests.

Table 4: Hydraulic Conductivity Estimated from Grain Size Analyses

Location	Depth of soil sample (m)	Soil Classification	Permeability and Percolation Time (Suplementary Guidelines to the OBC)	
			Coefficient of permeability, k in cm/s	Percolation Time, T in mins/cm
BH1	1.50 – 1.95	Clay & Silt, some Sand, trace Gravel (Till)	10^{-4} - 10^{-6}	12 - 50
	4.55 – 5.00	Clay & Silt, some Sand, trace Gravel (Till)	10^{-4} - 10^{-6}	12 - 50
BH6	4.55 – 5.00	Clay & Silt, some Sand, trace Gravel (Till)	10^{-4} - 10^{-6}	12 - 50
	3.00 – 3.45	Clay & Silt, some Sand	10^{-4} - 10^{-6}	12 - 50
BH8	3.00 – 3.45	Sandy Clay & Silt, trace Gravel (Till)	10^{-3} - 10^{-5}	8 - 20
	4.55 – 5.00	Sandy Clayey Silt, trace Gravel (Till)	10^{-3} - 10^{-5}	8 - 20

7. CONSTRUCTION DEWATERING & PERMANENT DRAINAGE

7.1 Construction Dewatering

It was understood that the development will consist of a highrise residential building with four or five underground levels. Subsoil conditions were observed to be generally consistent across the site. P4 and P5 slab levels were assumed at depths of 11.2m and 14m bgs respectively (2.8m per level). Conventional strip and/or spread footing were recommended, in the geotechnical investigation report, at depths below 12m. Groundwater levels were observed between 1.55m and 6.47m bgs during the investigation. This means that the footings will likely extend below the groundwater levels observed during the investigation. The groundwater level should therefore be lowered to 1m below the designed footing depths to protect the footing subgrade from hydraulic pressure disturbance during construction.

It should also be noted that the open boreholes were mostly dry on completion of drilling and that the water observed during the investigation was due mainly to trapped pockets from from depths of approximately 4.5m bgs to the upper 3m of weathered shale. The following were used in calculating construction dewatering rates:

FFE ground floor – 154.30m asl
Excavation area – 7,445m^2
Hydraulic conductivity – 1.36 x 10^{-7} m/s
Groundwater level – 4m
Construction dewatering flowrates of **23.97 and 31.83 m^3/day (23,970 and 31,830 L/day)** were estimated for four and five underground levels respectively. Factored dewatering rates of **35.96 and 47.75 m^3/day (FS of 1.5)** should be used for planning purposes.

<u>Seasonal High Groundwater Levels</u>

Groundwater levels were monitored approximately biweekly over the period November 2021 to March 2022. Further groundwater level monitoring will be carried out during the rainy season to confirm seasonal highwater levels on the site. Groundwater levels observed so far are between 1.55m and 6.45m bgs. Higher levels were observed in MW1 and MW4 between 1.55m and 2.55 bgs. Lower water levels were observed in the other wells generally between 4.45m and 6.47m bgs. MW3 was mostly dry during the investigation. An average groundwater level of 4.0m was used to calculate construction dewatering rates. The average observed groundwater level was increased by 1m to 3m and used to estimate permanent drainage rates.

Accounting for Accumulated Precipitation

Provisions should be made to pump accumulated water from the excavation areas during construction, particularly following a period of heavy rainfall. For example, 25mm rainfall in 24 hrs may result in accumulation of up to 186m^3 in the excavated area. Excavation for four or five underground levels will be into hard, dry shale. Consequently, some amount of ponding of rainwater may be expected. A conservative accumulated volume of **100 m^3/day** may therefore be assumed for planning purposes. Accumulated precipitation may be stored on site for subsequent disposal to an MOECC-licensed facility. If the water is to be discharged into the public sewer system, then an application for the discharge of private water will have to be made to Halton Region. The water quality, at the time of the application, will need to be ascertained to ensure compliance with Ontario Sewer Use Bylaws – Halton Sanitary Sewer Bylaw No. 02-03.

Maximum construction discharge rates, taking into consideration accumulated precipitation volumes, are:

1. *For four underground levels - **123,970 L/day** (unfactored) and **135,960 L/day (factored**).*
2. *For five underground levels - **131,830 L/day** (unfactored) and **147,750 L/day (factored**).*

7.2 Permanent Drainage

Permanent drainage rates of **23.19 and 31.03 m^3/day (23,190 and 31,030 L/day)** were obtained for the building with four or five underground levels respectively. Factored permanent drainage rates of **34.79 and 46.54m^3/day (FS of 1.5)** should be used for planning purposes.

An application for permission to discharge to the municipal/regional sewer system will be required unless the subsurface structure of the building is designed as watertight or onsite disposal facilities are implemented.

Subdrain should be installed under the lowest parking level slab along with perimeter weepers for the building exterior walls as per Appendix G.

It is further recommended that the subsurface portion of the elevator shaft, below P4 or P5 level, be designed as watertight to prevent the need to have deeper groundwater sump pits for permanent drainage.

7.3 Permit to Take Water (PTTW)

As the calculated construction dewatering flowrates for the building, including accumulated precipitation, with four or five underground levels, are more than 50 m^3/day, registration on the MOECC Environmental Activity and Sector Registry (EASR) for Water Taking will be required for construction. An application for permission to take water (PTTW) will not be required for the building with four or five underground levels as the daily flowrate would be less than 50,000 L/day.

7.4 Groundwater Quality

The results (December 1, 2021) of analyses for groundwater quality under the Ontario Halton Sanitary Sewer Bylaw No. 02-03 (Mar 2003) and Halton Storm Sewer Bylaw No. 02-03 show compliance with all parameters as shown in Appendix D. The groundwater under conditions observed during the investigation may be discharged to the public Storm or Sanitary Sewer Systems without treatment.

It should be noted however that testing of groundwater at the depths observed during the investigation would not be representative of the water that might accumulate during a high rainfall event. Any accumulation of precipitation occurring in the excavation during construction, that may require offsite discharge, will have to be tested at the time of the event to determine the quality of water for discharge.

7.5 Dewatering Influence Zone

The estimated construction dewatering quantities are based on the worst-case groundwater conditions that might occur during the construction period. Calculated dewatering influence zones are expected to be up to 6.38m and 8.44m from the edge of the dewatering point in the predominantly silt till, for four and five underground levels respectively. Based on the field investigation, the soils to the proposed excavation depths are dominated by silt till with weathered to solid shale at greater depths. Recharge was observed to be relatively slow during rising head slug tests. Construction dewatering may therefore be carried out by pumping from sump pits. Dewaterinig influence zones will therefore be less than calculated.

7.6 Hydrogeological Impact

During the investigation, it was determined that there will not be any negative impact to the natural environment, Halton Region Sewer works nor surrounding properties due to construction dewatering because of the depth at which groundwater was observed and the type of soils on the site. No

groundwater induced depression at surface level is expected. Consequently, it is not expected that construction will impact public infrastructure, the natural environment, nor will there be any settlement issues.

7.7 Private Well Survey

A query of the MOECC water well records showed that there are approximately 30 supply well within an approximate radius of 500m of the site as shown in Appendix H. The wells were installed between 1951 and 1993 at depths of 6.1m to 33.8m below prevailing grade and mainly in the weathered to hard shale. Some wells were reportedly decommissioned.

It is expected that new residential developments in the area would be serviced by municipal water supply and that domestic water supply wells will not be widely used.

The type of material encountered at the expected excavation depths, below the surficial soils, are mainly silt till overlying weathered shale. Construction dewatering may be achieved by pumping from sump pits as required. It is not expected therefore that construction dewatering will impact the quality and quantity of supply wells, if any, in proximity to the site.

8. DISCUSSION

Hydraulic conductivity values (k) calculated from onsite single well response tests are 1.36×10^{-7} to 3.03×10^{-7} m/s (0.012 to 0.026 m/day) in the wells screened within the silt till and weathered shale. These are representative of the water bearing materials at the expected excavation depths for footings based on the geotechnical and hydrogeological field investigations for four or five underground levels.

Approximate construction dewatering discharge rates of 23.97 and 31.83 m^3/day will be required for the recommended footing depths for four or five underground levels respectively. Permanent drainage rates of 23.19 and 31.03 m^3/day will be required for four or five underground levels respectivley. A factor of safety of 1.5 should be applied to construction dewatering and permanent drainage rates.

Registration on the MOECP's EASR Website for water taking will be required during construction. An application for PTTW will not be required if the building is designed with four or five underground levels.

The groundwater quality determined by laboratory analyses revealed compliance to parameters of the existing Halton Region Storm and Sanitary sewer limits.

It should be noted that if it is intended that any accumulated water, following periods of heavy rainfall, be discharged into the public sewer, then a permit to discharge would be required along with laboratory analyses to ensure compliance with relevant sewer bylaws.

The discharge rates for construction dewatering and permanent drainage, given in the preceding, are based on common practice and reasonable assumption for excavation depths and are subject to further modifications when details of the structures become available.

9. LIMITATIONS

This report is limited in scope to those items specifically referenced in the text. The discussions and recommendations presented in this report are intended only as guidance for the named client, design engineers and those directly associated with implementing, regulating and monitoring of the project. The information on which these recommendations are based is subject to confirmation by engineering personnel at the time of construction. Localized variations in the subsoil conditions may be present between and beyond the boreholes and should be verified during construction.

As more specific subsurface information becomes available during excavations on the Site, this report should be updated. Contractors bidding on or undertaking the work should decide on their own investigations, as well as their own interpretations of the factual borehole results. This concern specifically applies to the classification of the subsurface soil and the potential reuse of these soils on/off Site. Contractors should draw their own conclusions as to how the near surface and subsurface conditions may affect them.

APPENDIX A – SITE AND LOCATION MAPS AND PLAN

FISHER ENGINEERING

400 Esna Park Dr., #15
Markham, Ontario
L3R 3K2

Tel: 905 475-7755
Fax: 905 475-7718

NORTH

N

LEGEND

SITE BOUNDARY

PROJECT NAME AND ADDRESS

HYDROGEOLOGICAL INVESTIGATION

3005 Dundas Street West, OAKVILLE,ONTARIO

FIGURE 1:

SITE LOCATION PLAN

SHEET NO.

PROJECT NO.

FE-P21-11713

DATE

APRIL 2022

SCALE

AS SHOWN

A1

FISHER ENGINEERING

400 Esna Park Dr., #15
Markham, Ontario
L3R 3K2

Tel: 905 475-7755
Fax: 905 475-7718

NORTH

LEGEND

SITE BOUNDARY

BOREHOLE WITH MONITORING WELL LOCATION

PROJECT NAME AND ADDRESS

HYDROGEOLOGICAL & GEOTECHNICAL INVESTIGATIONS

3005 Dundas Sreet West
Oakville, ON.

PROJECT NO.
FE-P 21-11713/11714

DATE.
MARCH 2022

SCALE.
AS SHOWN

FIGURE A2:
SITE PLAN WITH TEST HOLE AND MONITORING WELL LOCATIONS

SHEET NO.
A2

FISHER ENGINEERING
400 Esna Park Dr., #15
Markham, Ontario
L3R 3K2
Tel: 905 475-7755
Fax: 905 475-7718

KEY PLAN

N

LEGEND

Clay to silt-textured till derived from □laciolacustrine de□osits or shale.

PROJECT NAME AND ADDRESS

HYDROGEOLOGICAL INVESTIGATION

3005 Dundas Street West,
OAKVILLE, Ontario

PROJECT NO.
FE-P 21-11713H

DATE
APRIL 2022

SCALE

A3

Sur□icial Geolo□□ Ma□

FISHER ENGINEERING
400 Esna Park Dr., #15
Markham, Ontario
L3R 3K2
Tel: 905 475-7755
Fax: 905 475-7718

KEY PLAN

LEGEND

Shale, limestone, dolostone and siltstone from the Queenston Formation

PROJECT NAME AND ADDRESS

HYDROGEOLOGICAL INVESTIGATION

3005 Dundas Street West,
OAKVILLE, Ontario

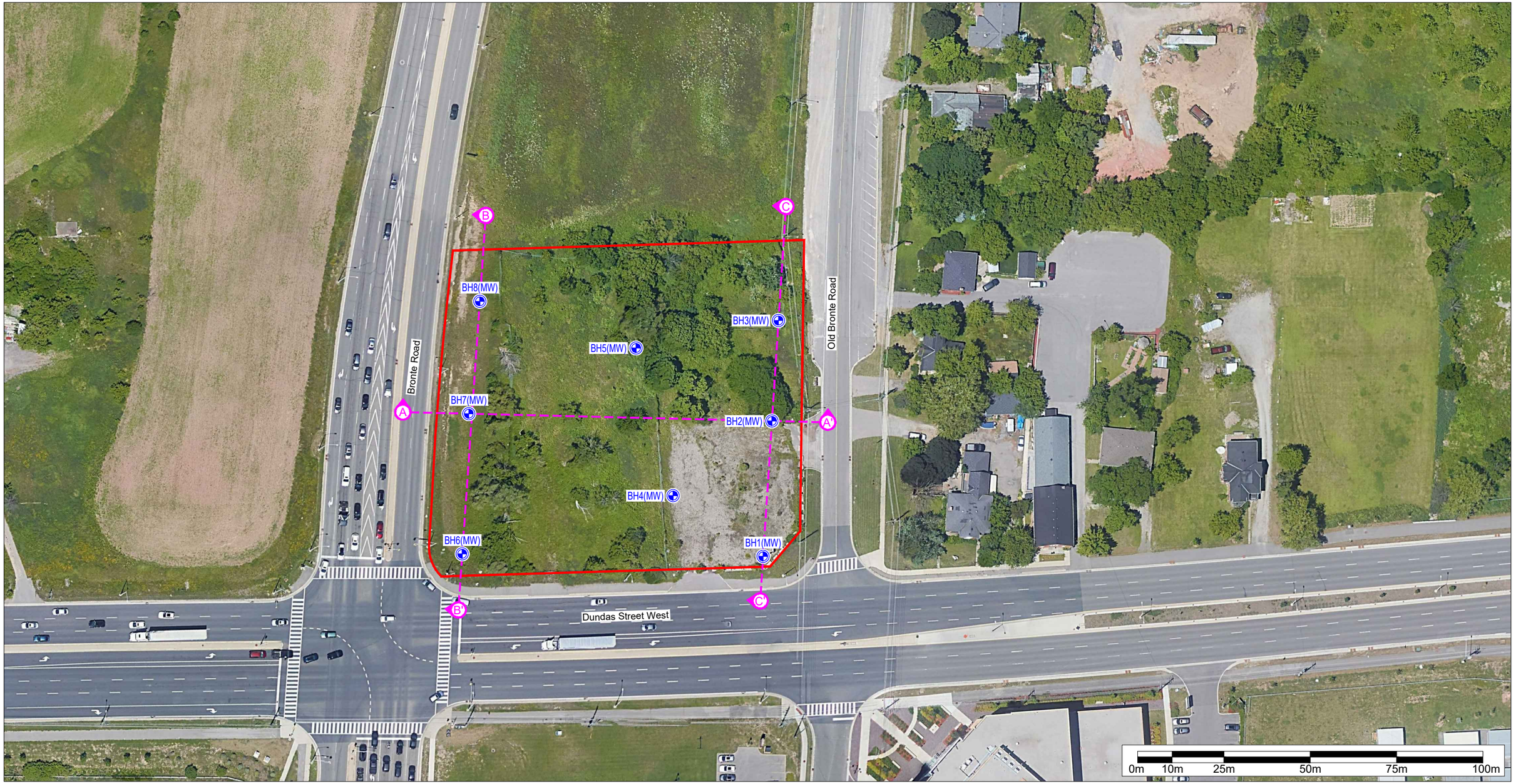
PROJECT NO.
FE-P 21-11713H

DATE
APRIL 2022

SCALE

A4

Bedrock Geolo□□ Ma□



FISHER ENGINEERING
400 Esna Park Dr., #15
Markham, Ontario
L3R 3K2
Tel: 905 475-7755
Fax: 905 475-7718

NORTH

LEGEND

- SITE BOUNDARY
- BUILDING FOUNDATIONS
- BOREHOLE WITH MONITORING WELL LOCATION
- CROSS SECTION LINE

PROJECT NAME AND ADDRESS

HYDROGEOLOGICAL & GEOTECHNICAL INVESTIGATIONS

3005 Dundas Street West, Oakville, ON.

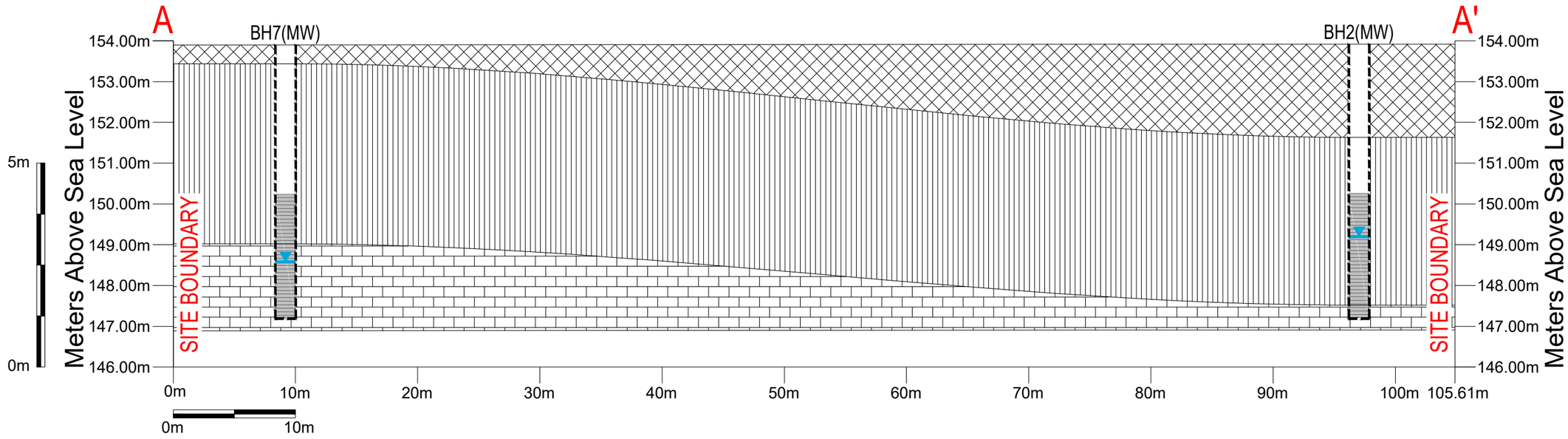
PROJECT NO. FE-P 21-11714

DATE. APRIL 2022

SCALE. AS SHOWN

FIGURE A5: SITE PLAN WITH CROSS SECTION LINES

SHEET NO. A5



FISHER ENGINEERING
400 Esna Park Dr., #15
Markham, Ontario
L3R 3K2
Tel: 905 475-7755
Fax: 905 475-7718

NORTH

LEGEND

FILL

SILT

SHALE

GROUNDWATER POTENTIOMETRIC LEVEL

PROJECT NAME AND ADDRESS

HYDROGEOLOGICAL & GEOTECHNICAL INVESTIGATION

3005 Dundas Street West,
Oakville, ON.

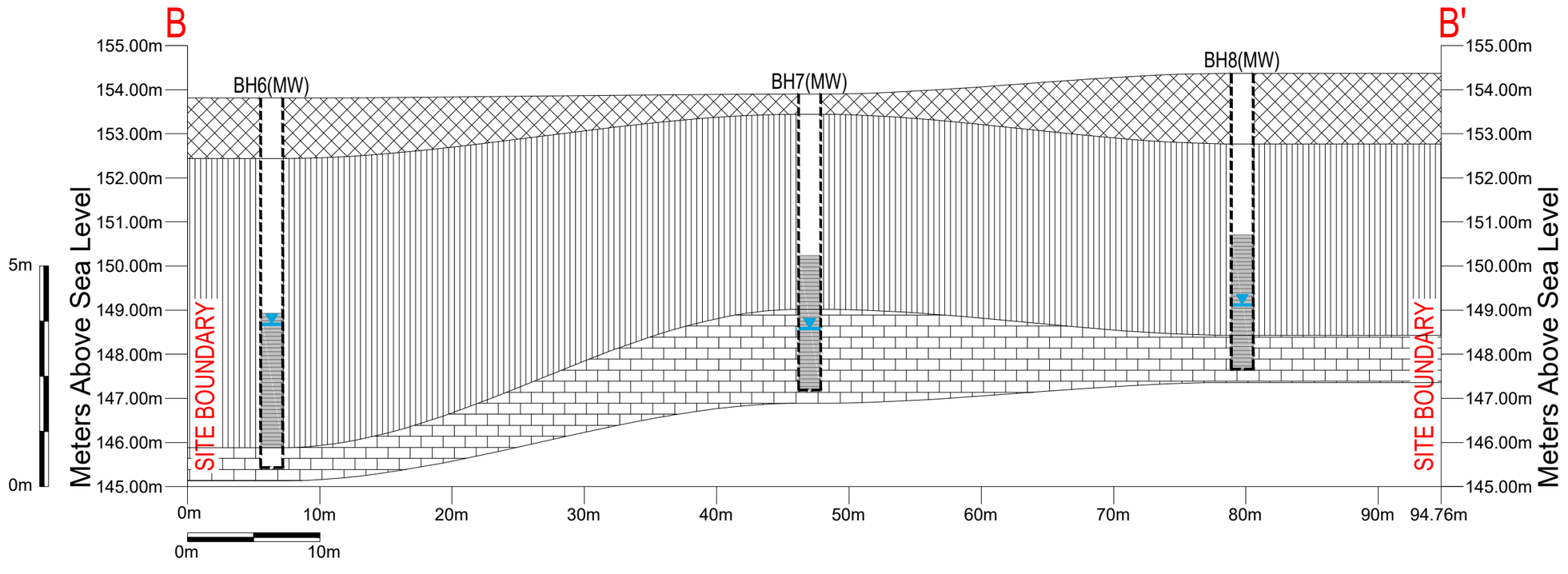
PROJECT NO.
FE-P 21-11714/ 13

DATE.
APRIL 2022

SCALE.
AS SHOWN

FIGURE 2.1:
CROSS-SECTION A - A';

SHEET NO.
A2.1



FISHER ENGINEERING

400 Esna Park Dr., #15
Markham, Ontario
L3R 3K2

Tel: 905 475-7755
Fax: 905 475-7718

NORTH

LEGEND

FILL
SILT
SHALE

GROUNDWATER POTENTIOMETRIC LEVEL

PROJECT NAME AND ADDRESS

HYDROGEOLOGICAL & GEOTECHNICAL INVESTIGATION

3005 Dundas Street West,
Oakville, ON.

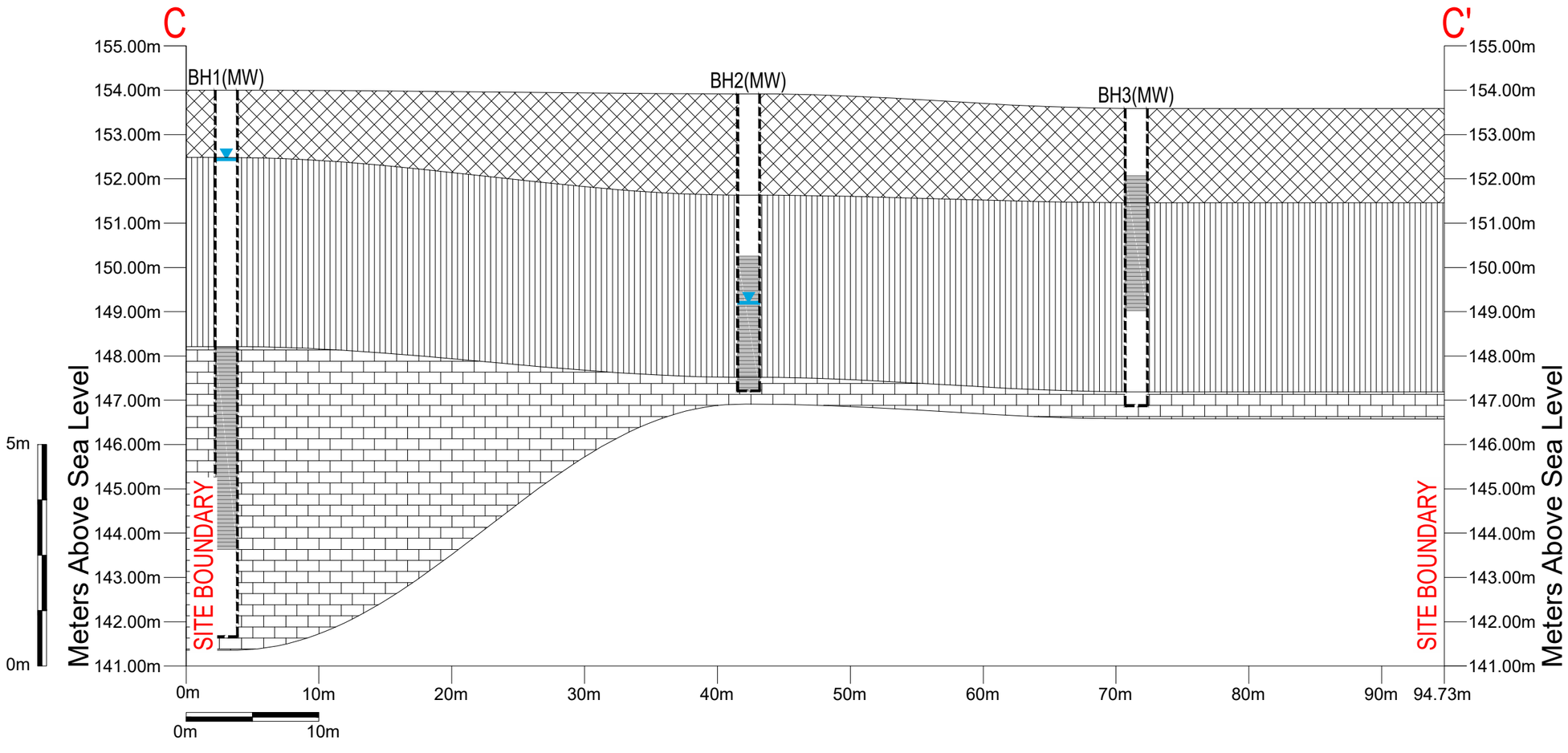
PROJECT NO.
FE-P 21-11714/ 13

DATE.
APRIL 2022

SCALE.
AS SHOWN

FIGURE 2.2:
CROSS-SECTION B - B';

SHEET NO.
A5.2



FISHER ENGINEERING
400 Esna Park Dr., #15
Markham, Ontario
L3R 3K2
Tel: 905 475-7755
Fax: 905 475-7718

NORTH

LEGEND

FILL

SILT

SHALE

GROUNDWATER POTENTIOMETRIC LEVEL

PROJECT NAME AND ADDRESS

HYDROGEOLOGICAL & GEOTECHNICAL INVESTIGATION

3005 Dundas Street West,
Oakville, ON.

PROJECT NO.
FE-P 20-11714/ 13

DATE.
APRIL 2022

SCALE.
AS SHOWN

FIGURE A5.3:
CROSS-SECTION C - C';

SHEET NO.
A5.3

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

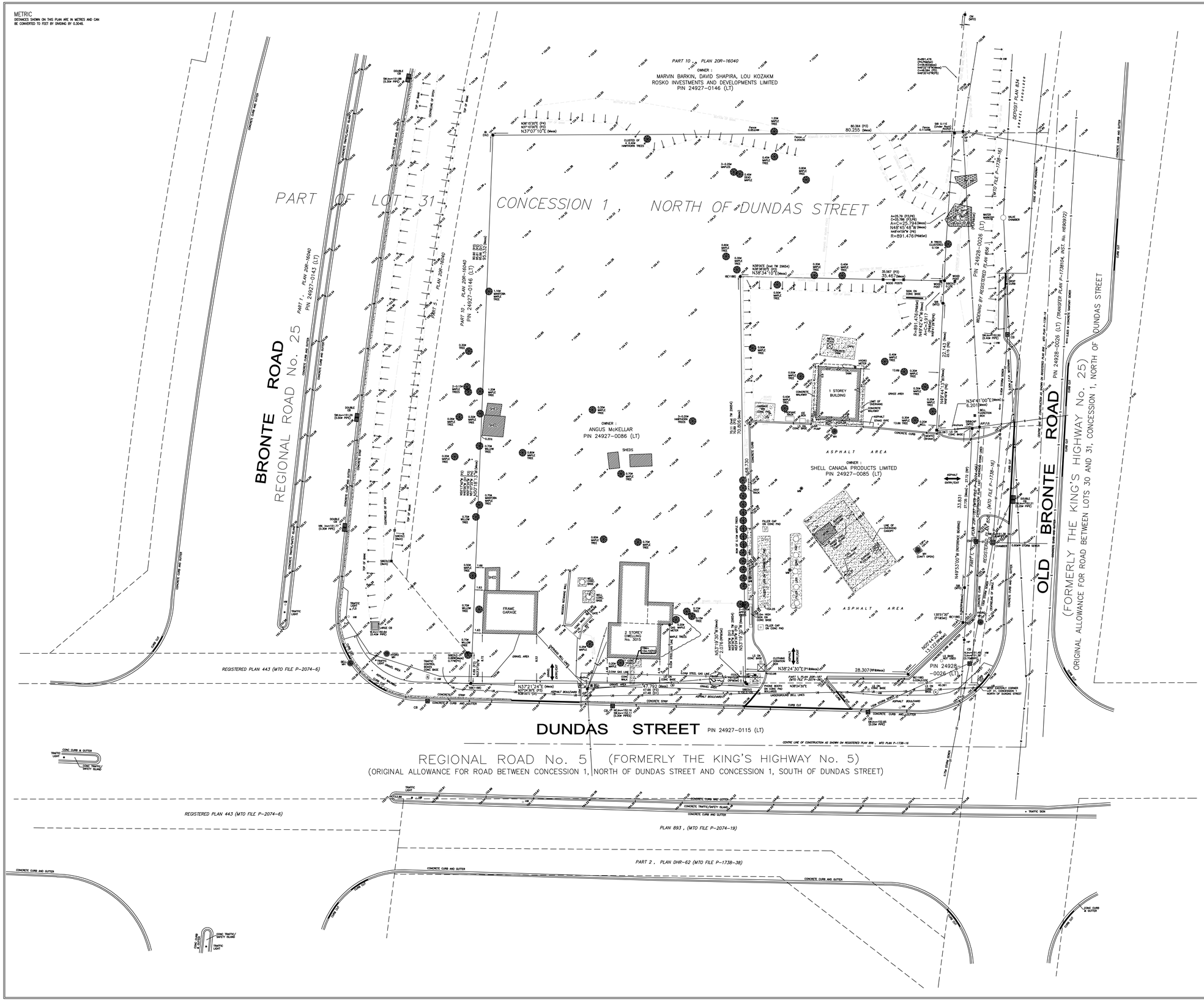
SURVEYOR'S REAL PROPERTY REPORT
PART 1) PLAN OF

PART OF LOT 31, CONCESSION 1 NORTH OF DUNDAS STREET
(GEOGRAPHIC TOWNSHIP OF TRAFALGAR)

TOWN OF OAKVILLE
REGIONAL MUNICIPALITY OF HALTON

SCALE 1: 200
5 4 3 2 1 0 5 10 15 METRES

SEXTON McKAY LIMITED
ONTARIO LAND SURVEYORS
CANADA LANDS SURVEYOR



PART 2) Report Summary

DESCRIPTION OF LAND:
BEING PART OF LOT 31, CONCESSION 1, NORTH OF DUNDAS STREET (GEOGRAPHIC TOWNSHIP OF TRAFALGAR) NOW IN THE TOWN OF OAKVILLE, MUNICIPAL No. 3015 DUNDAS STREET
REGISTERED EASEMENTS and/or RIGHTS-OF-WAY:
NONE
ENCROACHMENTS:
COMPLIANCE WITH MUNICIPAL ZONING BY-LAWS:
NOT CERTIFIED BY THIS REPORT
ADDITIONAL REMARKS:
NOTE: 1) 2) 3)

LEGEND

■	DENOTES SURVEY MONUMENT FOUND
CT	DENOTES SURVEY MONUMENT SET
SIB	DENOTES STANDARD IRON BAR
IB	DENOTES IRON BAR
SSIB	DENOTES SHORT STANDARD IRON BAR
CC	DENOTES CUT CROSS
ø	DENOTES ROUND
MP	DENOTES MONUMENT
RP	DENOTES REPORTED PLAN 1491
P2	DENOTES SURVEY PLAN BY C.A. SEXTON, OLS DATED MAY 16th., 1974
P3	DENOTES PLAN 20R-11003
P4	DENOTES PLAN 20R-16040
P5	DENOTES DEPOSITED PLAN 834
P6	DENOTES DEPOSITED PLAN 858
D1	DENOTES INSTRUMENT No. 67448
MH	DENOTES MANHOLE
CB	DENOTES CATCH BASIN
B	DENOTES BOLLARD
LS	DENOTES LIGHT STANDARD
MW	DENOTES MONITORING WELL
WM	DENOTES WATER METER
HP	DENOTES HYDRO POLE
OH	DENOTES OVERHEAD WIRE
TLS	DENOTES TRAFFIC LIGHT SIGNAL
TS	DENOTES TRAFFIC SIGN
HM	DENOTES HAND MELL
-o-o-	DENOTES OVERHEAD HYDRO
-u-u-	DENOTES UNDERGROUND HYDRO
-x-x-	DENOTES CHAINLINK
-w-w-	DENOTES WATERMAIN
-s-s-	DENOTES SANITARY SEWER
-st-	DENOTES STORM SEWER
-ub-	DENOTES UNDERGROUND BELL LINES

NOTE
BEARINGS SHOWN HEREON ARE ASTRONOMIC AND ARE REFERRED TO THE SOUTHWESTERLY LIMIT OF PART 1, AS SHOWN ON REGISTERED PLAN 1491, (MTO FILE P-2074-67) HAVING A BEARING OF N49°53'00"W.

BENCH MARK
ELEVATIONS SHOWN HEREON ARE GEODETIC AND WERE ORIGINALLY DERIVED FROM MINISTRY OF TRANSPORTATION, ONTARIO BENCH MARK.

DESCRIPTION/LOCATION

TOP OF NORTH BOLT ON THE BASE OF SHELL SIGN LOCATED AT THE NORTH CORNER OF PROPERTY.

ELEVATION :
PUBLISHED ELEVATION = 154.14 (SEE SURVEY PLAN BY C.A. SEXTON, OLS DATED MAY 16th., 1974)

TEMPORARY BENCH MARK (TBM)
TOP OF CONCRETE PORCH IN FRONT OF HOUSE No. 3015 DUNDAS STREET AND SHOWN ON FACE OF PLAN

ELEVATION = 154.72

THIS REPORT WAS PREPARED FOR SHELL CANADA PRODUCTS AND THE UNDERSIGNED ACCEPTS NO RESPONSIBILITY FOR USE BY OTHER PARTIES.

SURVEYOR'S CERTIFICATE

I CERTIFY THAT

1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT AND THE LAND TITLES ACT AND THE REGULATIONS MADE UNDER THEM.
2. THE SURVEY WAS COMPLETED ON THE DAY OF MARCH, 2007.

DATE

C.A. SEXTON
ONTARIO LAND SURVEYOR

CAUTION

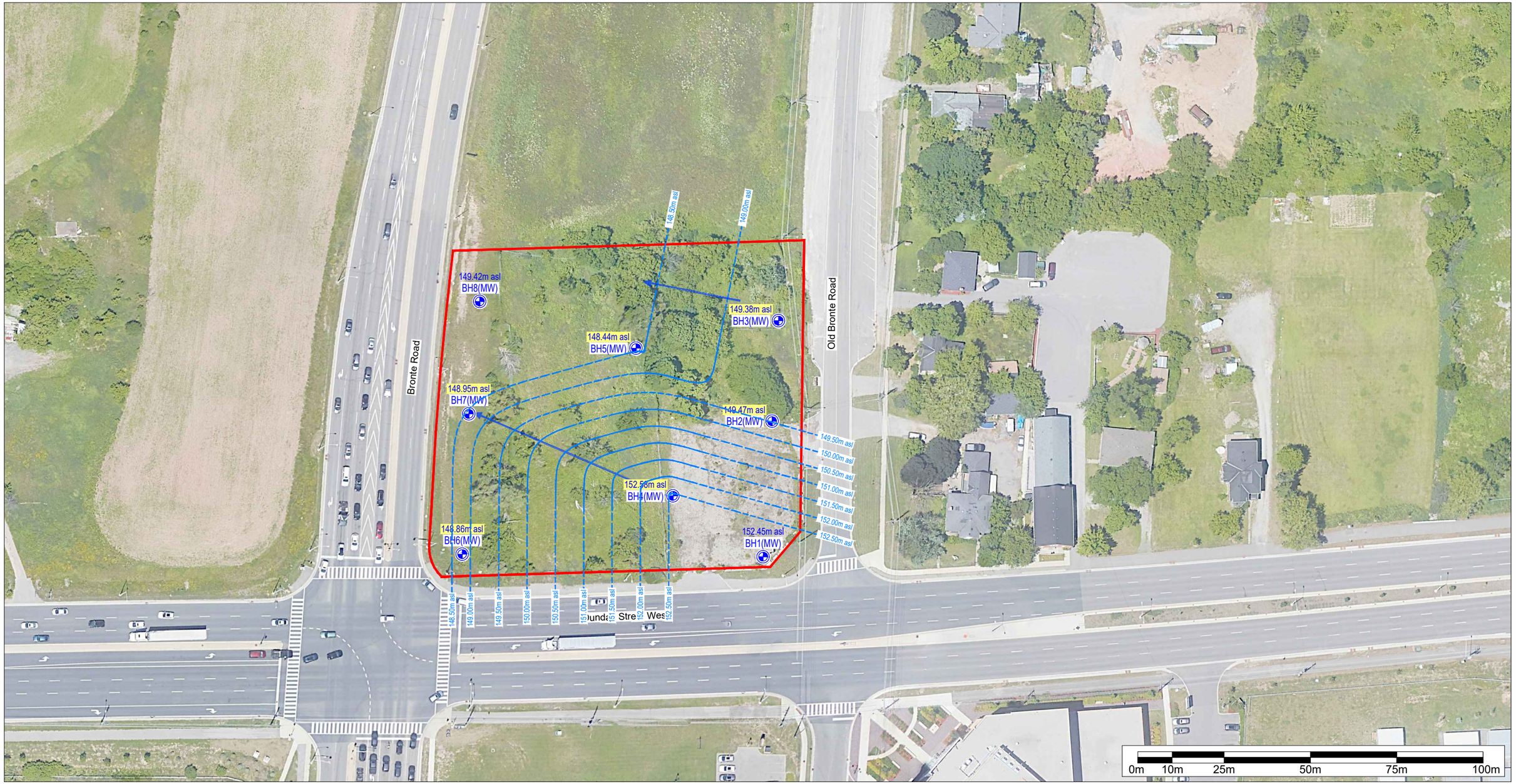
LOCATIONS OF UNDERGROUND SERVICES ARE APPROXIMATE, OTHER BURIED UTILITIES MAY EXIST WHICH ARE NOT SHOWN BECAUSE OF INSUFFICIENT INFORMATION. CONTACT ALL POTENTIAL OWNERS OF UNDERGROUND UTILITIES PRIOR TO COMMENCEMENT OF CONSTRUCTION

SHELL CANADA PRODUCTS

DRAWN BY: JD	JOB No. 20384
CHECKED BY: C.A. SEXTON, OLS	

SEXTON McKAY LIMITED - ONTARIO LAND SURVEYORS - CANADA LANDS SURVEYOR
70 EAST BEAVER CREEK ROAD, UNIT 44 & 45, RICHMOND HILL, ONTARIO L4B 3B2
Tel:(905)889-9103 Fax:(905)889-8941

PLOT DATE : APRIL 5, 2007



FISHER ENGINEERING
400 Esna Park Dr., #15
Markham, Ontario
L3R 3K2
Tel: 905 475-7755
Fax: 905 475-7718

NORTH

LEGEND

- SITE BOUNDARY
- BOREHOLE WITH MONITORING WELL LOCATION
- GROUNDWATER FLOW DIRECTION
- GROUNDWATER ELEVATION CONTOUR
- 152.45m asl GROUNDWATER ELEVATION 9 March 2022

PROJECT NAME AND ADDRESS

HYDROGEOLOGICAL & GEOTECHNICAL INVESTIGATIONS

3005 Dundas St West
Oakville, ON.

PROJECT NO. FE-P 21-11714	FIGURE A7: GROUNDWATER FLOW DIRECTION (March 9, 2021)	SHEET NO. A7
DATE. APRIL 2022		
SCALE. AS SHOWN		

APPENDIX B – LOG OF BOREHOLES

FISHER ENGINEERING

LOG OF BOREHOLE NO. BH1 SHEET. 1 of 2

PROJECT NO.: FE-P 21-11713/14/15

PROJECT NAME: Phase II ESA, Geotechnical & Hydrogeological Investigations

LOCATION: 3005 Dundas Street W., Oakville, Ontario

DRILLING METHOD: CME-75, Solid Stem

DRILLING DATE: November 22, 2021

DEPTH (feet)	DEPTH (metres)	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	LAB ID:	TYPE NUMBER	"N" VALUE
		GROUND SURFACE (m asl)		154.00			
0	0	FILL: gravel & sand, some silt, some roots, brown, moist.				SS-1	Auger
2	1					SS-2	9
4				1.52/ 152.48			
6	2	GREY SILT TILL: some clay/sand, trace of gravel, moist, wet seams, compact.				SS-3	14
8						SS-4	17
10	3			3.35/ 150.65		SS-5	67
12	4	REDDISH BROWN SILT TILL: some clay/sand, trace of gravel, occasional pieces of shale, dry to moist, very dense.					
14							
16	5					SS-6	80
18				5.79/ 148.21			
20	6	GREYISH BROWN WEATHERED SHALE: moist, hard.				SS-7	100+
22				6.71/ 147.29			
24	7	REDDISH BROWN WEATHERED SHALE: dry, hard.					
26	8					SS-8	100+
28							
30	9					SS-9	100+
32	10						

PENETRATION TESTING (SPT) ▲ 20 40 60 80
SHEAR STRENGTH (Kpa) ✚ 40 80 120 160

VAPOUR READING (ppm) □ 20 40 60 80
MOISTURE CONTENT (%) ● 10 20 30 40

SS-3: 17%
SS-4: 12%
SS-6: 12%
SS-8: 9%

PIEZOMETER OR WELL CONSTRUCTION

1.56

Flush Mount Cover
Bentonite Pellets
50mm blank PVC
50mm Slotted Pipe
Silica Sand

Groundwater Depth: on completion: 6.10m; on Nov. 30, 2021: 2.16m; on Dec. 15, 2021: 1.56m

DRAWN: BL LOGGED: CW CHECKED: RC

FISHER ENGINEERING

LOG OF BOREHOLE NO. BH1(MW) SHEET. 2 of 2

PROJECT NO.: FE-P 21-11713/14/15

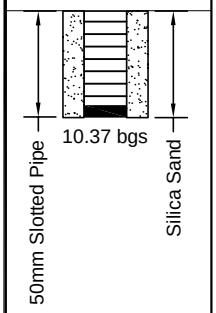
PROJECT NAME: Phase II ESA, Geotechnical & Hydrogeological Investigations

LOCATION: 3005 Dundas Street W., Oakville, Ontario

DRILLING METHOD: CME-75, Solid Stem

DRILLING DATE: November 22, 2021

DEPTH (feet)	DEPTH (metres)	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: LAB ID:	SAMPLES: TYPE NUMBER	SAMPLES: "N" VALUE	PENETRATION TESTING (SPT) ▲ 20 40 60 80 / SHEAR STRENGTH (Kpa) ✚ 40 80 120 160	VAPOUR READING (ppm) □ 20 40 60 80 / MOISTURE CONTENT (%) ● 10 20 30 40	PIEZOMETER OR WELL CONSTRUCTION
		GROUND SURFACE (m asl)								
32	10	REDDISH BROWN WEATHERED SHALE: moist to dry, hard.								
34										
36	11					SS-10	100+			
38										
40	12			12.34/ 141.66		SS-11	100+			
		End of Borehole								
42	13									
44		Refusal to augering at 12.34m.								
46	14									
48										
50	15									
52	16									
54										
56	17									
58										
60	18									
62	19									
64										
66										



Groundwater Depth: on completion: 6.10m; on Nov. 30, 2021: 2.16m; on Dec. 15, 2021: 1.56m

DRAWN: BL LOGGED: CW CHECKED: RC

FISHER ENGINEERING

LOG OF BOREHOLE NO. BH2 SHEET. 1 of 1

PROJECT NO.: FE-P 21-11713/14/15

PROJECT NAME: Phase II ESA, Geotechnical & Hydrogeological Investigations

LOCATION: 3005 Dundas Street W., Oakville, Ontario

DRILLING METHOD: CME-75, Solid Stem

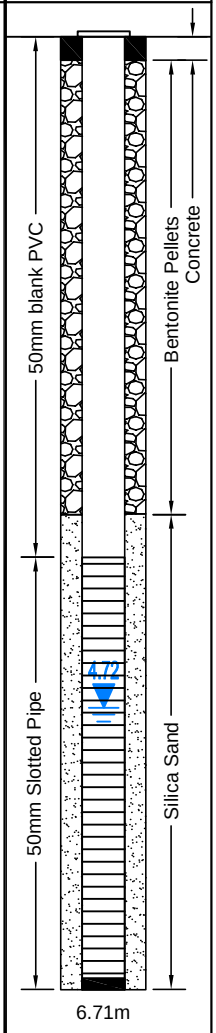
DRILLING DATE: November 22, 2021

DEPTH (feet)	DEPTH (metres)	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	LAB ID:	TYPE NUMBER	"N" VALUE
		GROUND SURFACE (m asl)		153.92			
0	0	FILL: sand & gravel, some silt, some roots, boulders, moist.				SS-1	10
2							
4	1					SS-2	13
6	2					SS-3	7
				2.29/ 151.63			
8		GREY SILT TILL: some clay/sand, trace of gravel, stains, moist, compact to dense.				SS-4	25
10	3					SS-5	30
12							
14	4			4.27/ 149.65			
16	5	REDDISH BROWN SILT TILL: some clay/sand, trace of gravel, occasional pieces of shale, dry to moist, very dense.				SS-6	100+
18							
20	6			6.40/ 147.52		SS-7	100+
22	7	REDDISH BROWN WEATHERED SHALE: dry, hard.		6.71/ 147.21			
24		End of Borehole					
26	8	Refusal to augering at 6.71m.					
28							
30	9						
32	10						

PENETRATION TESTING (SPT) ▲ 20 40 60 80
SHEAR STRENGTH (Kpa) ✚ 40 80 120 160

VAPOUR READING (ppm) □ 20 40 60 80
MOISTURE CONTENT (%) ● 10 20 30 40

PIEZOMETER OR WELL CONSTRUCTION



Groundwater Depth: on completion: dry; on Nov. 30, 2021: 4.85m; on Dec. 15, 2021: 4.72m

DRAWN: BL LOGGED: CW CHECKED: RC

FISHER ENGINEERING

LOG OF BOREHOLE NO. BH3 SHEET. 1 of 1

PROJECT NO.: FE-P 21-11713/14/15

PROJECT NAME: Phase II ESA, Geotechnical & Hydrogeological Investigations

LOCATION: 3005 Dundas Street W., Oakville, Ontario

DRILLING METHOD: CME-75, Solid Stem

DRILLING DATE: November 24, 2021

DEPTH (feet)	DEPTH (metres)	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	LAB ID:	TYPE NUMBER	"N" VALUE
		GROUND SURFACE (m asl)		153.59			
0	0	FILL: topsoil, silty sand, trace gravel, some roots, moist, compact.				SS-1	11
2							
4	1					SS-2	14
6						SS-3	13
	2			2.13/ 151.46			
8		GREY SILT TILL: some clay/sand, trace of gravel, stains, moist, compact to dense.				SS-4	28
10	3					SS-5	30
12				3.66/ 149.93			
	4	REDDISH BROWN SILT TILL: some clay/sand, trace of gravel, occasional pieces of shale, dry to moist, very dense.					
14							
16	5					SS-6	75
18							
20	6			6.40/ 147.19		SS-7	100+
22		RED WEATHERED SHALE: moist to dry, hard.		6.71/ 146.88			
	7	End of Borehole					
24		Refusal to augering at 6.71m.					
26	8						
28							
30	9						
32	10						

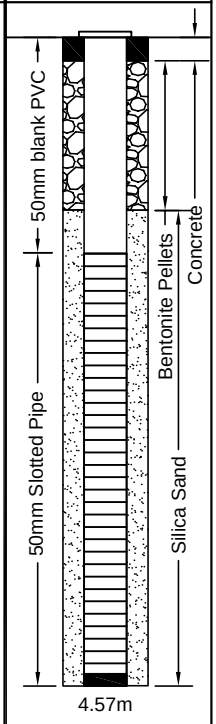
PENETRATION TESTING (SPT) ▲ 20 40 60 80

SHEAR STRENGTH (Kpa) ✚ 40 80 120 160

VAPOUR READING (ppm) □ 20 40 60 80

MOISTURE CONTENT (%) ● 10 20 30 40

PIEZOMETER OR WELL CONSTRUCTION



Groundwater Depth: on completion: dry; on Nov. 30, 2021: n/a; on Dec. 15, 2021: dry

DRAWN: BL LOGGED: CW CHECKED: RC

FISHER ENGINEERING

LOG OF BOREHOLE NO. BH4 SHEET. 1 of 2

PROJECT NO.: FE-P 21-11713/14/15

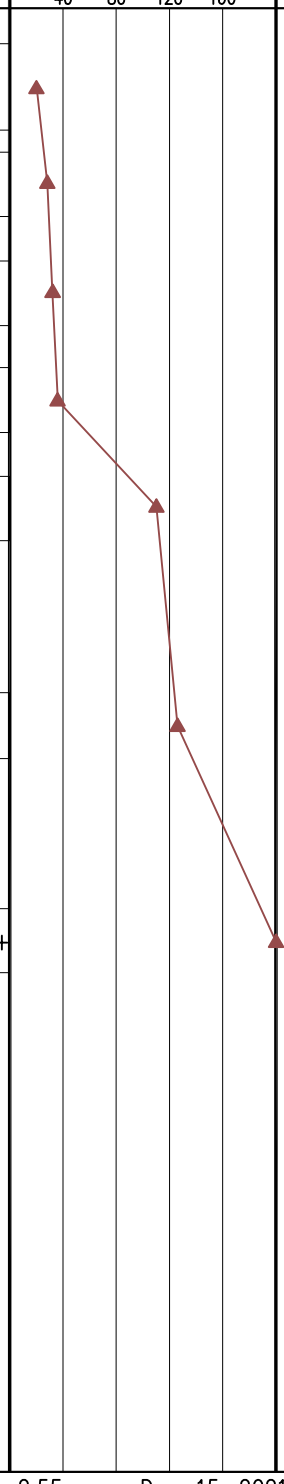
PROJECT NAME: Phase II ESA, Geotechnical & Hydrogeological Investigations

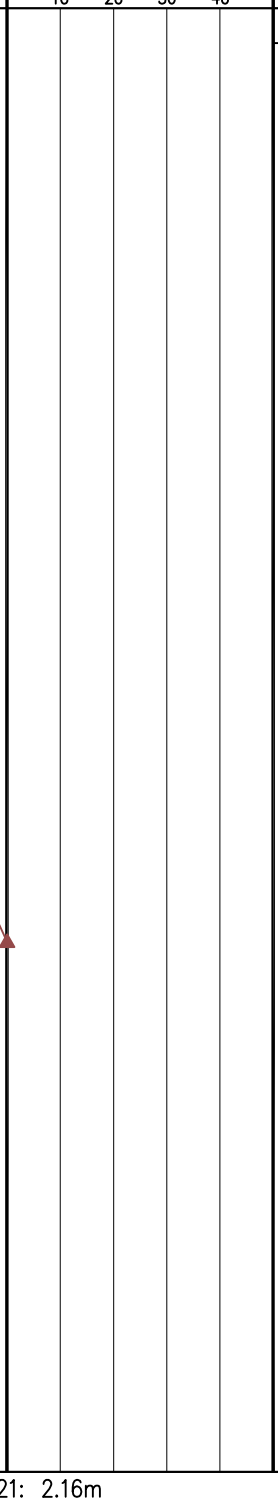
LOCATION: 3005 Dundas Street W., Oakville, Ontario

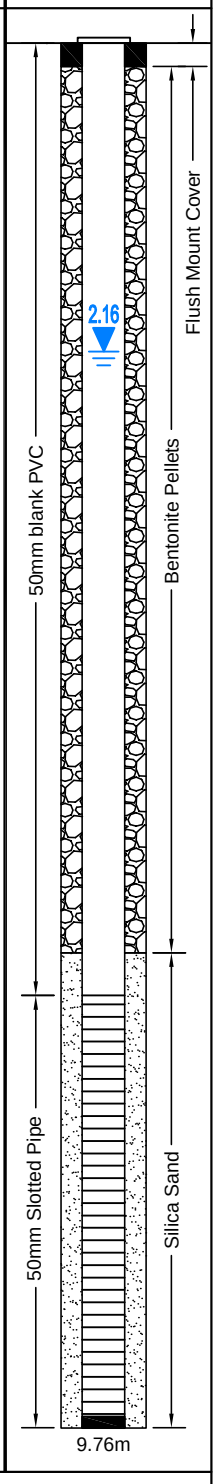
DRILLING METHOD: CME-75, Solid Stem

DRILLING DATE: November 26, 2021

DEPTH (feet)	DEPTH (metres)	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	LAB ID:	TYPE NUMBER	"N" VALUE
0	0	GROUND SURFACE (m asl)		154.50			
		FILL: sand & gravel with silt and roots, brown, moist, compact.				SS-1	10
2	1					SS-2	14
4							
6	2			1.98/ 152.52		SS-3	16
		GREY SILT TILL: some clay/sand, trace of gravel, stains, moist, compact to very dense.				SS-4	18
8							
10	3					SS-5	55
12	4			3.66/ 150.84			
		REDDISH BROWN SILT TILL: some clay/sand, trace of gravel, occasional pieces of shale, dry to moist, very dense.				SS-6	63
14							
16	5						
18							
20	6			6.40/ 148.10		SS-7	100+
22	7	REDDISH BROWN WEATHERED SHALE: dry, hard.					
24							
26	8						
28							
30	9						
32	10						







Groundwater Depth: on completion: n/a; on Nov. 30, 2021: 2.55m; on Dec. 15, 2021: 2.16m

DRAWN: BL LOGGED: CW CHECKED: RC

FISHER ENGINEERING

LOG OF BOREHOLE NO. BH4(MW) SHEET. 2 of 2

PROJECT NO.: FE-P 21-11713/14/15

PROJECT NAME: Phase II ESA, Geotechnical & Hydrogeological Investigations

LOCATION: 3005 Dundas Street W., Oakville, Ontario

DRILLING METHOD: CME-75, Solid Stem

DRILLING DATE: November 22, 2021

DEPTH (feet)	DEPTH (metres)	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: LAB ID:	SAMPLES: TYPE NUMBER	SAMPLES: "N" VALUE	PENETRATION TESTING (SPT) ▲ 20 40 60 80 / SHEAR STRENGTH (Kpa) ✚ 40 80 120 160	VAPOUR READING (ppm) □ 20 40 60 80 / MOISTURE CONTENT (%) ● 10 20 30 40	PIEZOMETER OR WELL CONSTRUCTION
		GROUND SURFACE (m asl)								
32	10	REDDISH BROWN WEATHERED SHALE: dry, hard.								
34										
36	11					RC-8	Run = 1.52m Rec = 1.51m = 99% RQD = 89%			
38										
40	12									
42	13					RC-9	Run = 1.52m Rec = 1.47m = 97% RQD = 93%			
44				13.72/ 140.78						
46	14	End of Borehole								
48										
50	15	Rock coring to 13.72m.								
52	16									
54										
56	17									
58										
60	18									
62	19									
64										
66										

Groundwater Depth: on completion: n/a; on Nov. 30, 2021: 2.55m; on Dec. 15, 2021: 2.16m

DRAWN: BL LOGGED: CW CHECKED: RC

FISHER ENGINEERING

LOG OF BOREHOLE NO. BH5 SHEET. 1 of 2

PROJECT NO.: FE-P 21-11713/14/15

PROJECT NAME: Phase II ESA, Geotechnical & Hydrogeological Investigations

LOCATION: 3005 Dundas Street W., Oakville, Ontario

DRILLING METHOD: CME-75, Solid Stem

DRILLING DATE: November 23, 2021

DEPTH (feet)	DEPTH (metres)	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	LAB ID:	TYPE NUMBER	"N" VALUE
		GROUND SURFACE (m asl)		154.52			
0	0	FILL: dark brown/grey clayey silt, some to trace of topsoil/ roots, trace of gravel, occasional pieces of brick/ plastic, moist.				SS-1	17
4	1			1.22/ 153.30			
6	2	REDDISH BROWN SILT TILL: some clay/sand, trace of gravel, moist, compact to dense.				SS-2	26
10	3					SS-3	47
14	4			4.65/ 149.87			
16	5	REDDISH BROWN SAND: trace of gravel, occasional cobbles, moist, very dense.				SS-4	69
18				5.79/ 148.73			
20	6	REDDISH BROWN WEATHERED SHALE: moist to dry, hard.				SS-5	100+
22	7						
24							
26	8						
28							
30	9			9.14/ 145.38			
32	10	Refusal to augering at 9.14m.				RC-6	Run = 1.52m Rec = 1.49m = 98% RQD = 90%

PENETRATION TESTING (SPT) ▲ 20 40 60 80

SHEAR STRENGTH (Kpa) ✚ 40 80 120 160

VAPOUR READING (ppm) □ 20 40 60 80

MOISTURE CONTENT (%) ● 10 20 30 40

● 13%

PIEZOMETER OR WELL CONSTRUCTION

Flush Mount Cover

50mm blank PVC

Bentonite Pellets

6.23

Groundwater Depth: on completion: n/a; on Nov. 30, 2021: 5.10m; on Dec. 15, 2021: 6.23m

DRAWN: BL LOGGED: PKS CHECKED: RC

FISHER ENGINEERING

LOG OF BOREHOLE NO. BH5(MW) SHEET. 2 of 2

PROJECT NO.: FE-P 21-11713/14/15

PROJECT NAME: Phase II ESA, Geotechnical & Hydrogeological Investigations

LOCATION: 3005 Dundas Street W., Oakville, Ontario

DRILLING METHOD: CME-75, Solid Stem

DRILLING DATE: November 23, 2021

DEPTH (feet)	DEPTH (metres)	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	LAB ID:	TYPE NUMBER	"N" VALUE
		GROUND SURFACE (m asl)					
32	10	REDDISH BROWN WEATHERED SHALE: moist to dry, hard.				RC-6	Run = 1.52m Rec = 1.49m = 98% RQD = 90%
36	11					RC-7	Run = 1.52m Rec = 1.5m = 99% RQD = 99%
40	12					RC-8	Run = 1.52m Rec = 1.47m = 97% RQD = 93%
46	14					RC-9	Run = 1.52m Rec = 1.49m = 98% RQD = 84%
50	15					RC-10	Run = 1.52m Rec = 1.38m = 91% RQD = 86%
56	17					RC-11	Run = 1.52m Rec = 1.42m = 93% RQD = 88%
60	18	End of Borehole		18.29/ 136.23			
62	19						
64							
66							

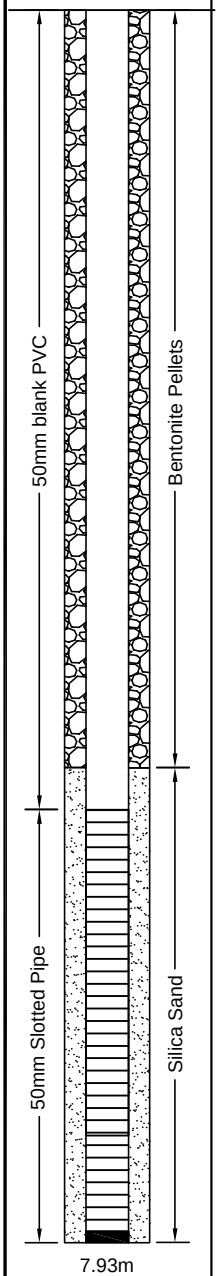
PENETRATION TESTING (SPT) ▲ 20 40 60 80

SHEAR STRENGTH (Kpa) ✚ 40 80 120 160

VAPOUR READING (ppm) □ 20 40 60 80

MOISTURE CONTENT (%) ● 10 20 30 40

PIEZOMETER OR WELL CONSTRUCTION



Groundwater Depth: on completion: n/a; on Nov. 30, 2021: 5.10m; on Dec. 15, 2021: 6.23m

DRAWN: BL LOGGED: PKS CHECKED: RC

FISHER ENGINEERING

LOG OF BOREHOLE NO. BH6 SHEET. 1 of 1

PROJECT NO.: FE-P 21-11713/14/15

PROJECT NAME: Phase II ESA, Geotechnical & Hydrogeological Investigations

LOCATION: 3005 Dundas Street W., Oakville, Ontario

DRILLING METHOD: CME-75, Solid Stem

DRILLING DATE: November 22, 2021

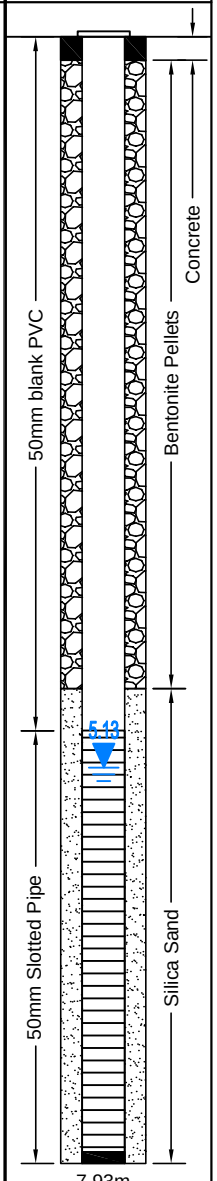
DEPTH (feet)	DEPTH (metres)	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	LAB ID:	SAMPLES TYPE NUMBER	SAMPLES "N" VALUE
0	0	GROUND SURFACE (m asl)		153.81			
0	0	FILL: brown sandy silt, some gravel, trace roots, pieces of bricks, moist.				SS-1	12
2	1					SS-2	12
4	1			1.37/ 152.44			
6	2	GREY SILT TILL: some clay/sand, trace of gravel, moist, compact to very dense.				SS-3	27
8	2					SS-4	33
10	3					SS-5	58
12	4						
14	4						
16	5					SS-6	82
18	5			5.49/ 148.32			
20	6	REDDISH BROWN SILT TILL: some clay/sand, trace of gravel, moist to dry, very dense.				SS-7	100+
22	7						
24	7						
26	8			7.93/ 145.88		SS-8	100+
26	8	REDDISH BROWN WEATHERED SHALE: dry, hard.		8.38/ 145.43			
28	9	End of Borehole					
30	9	Refusal to augering at 8.38m.					
32	10						

PENETRATION TESTING (SPT) ▲ 20 40 60 80
SHEAR STRENGTH (Kpa) ✚ 40 80 120 160

VAPOUR READING (ppm) □ 20 40 60 80
MOISTURE CONTENT (%) ● 10 20 30 40

13%
11%
9%

PIEZOMETER OR WELL CONSTRUCTION



Groundwater Depth: on completion: dry; on Nov. 30, 2021: 1.67m; on Dec. 15, 2021: 5.13m

DRAWN: BL LOGGED: CW CHECKED: RC

FISHER ENGINEERING

LOG OF BOREHOLE NO. BH7 SHEET. 1 of 1

PROJECT NO.: FE-P 21-11713/14/15

PROJECT NAME: Phase II ESA, Geotechnical & Hydrogeological Investigations

LOCATION: 3005 Dundas Street W., Oakville, Ontario

DRILLING METHOD: CME-75, Solid Stem

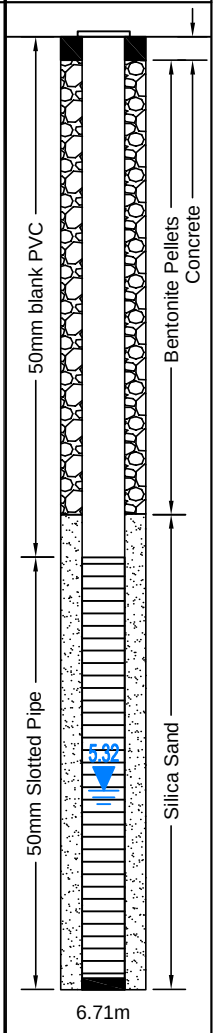
DRILLING DATE: November 23, 2021

DEPTH (feet)	DEPTH (metres)	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	LAB ID:	SAMPLES TYPE NUMBER	SAMPLES "N" VALUE
0	0	GROUND SURFACE (m asl)		153.90			
		FILL: dark brown sandy silt/silty sand, trace of clay, gravel, asphalt, roots & topsoil, moist.		0.46/ 153.44		SS-1	8
2						SS-2	28
4	1						
6		REDDISH BROWN SILT TILL: some clay/sand, trace of gravel, moist, compact to very dense.				SS-3	57
8	2					SS-4	100+
10						SS-5	100+
12	3						
14	4						
16				4.88/ 149.02		SS-6	100+
	5	REDDISH BROWN WEATHERED SHALE: dry, hard.					
18							
20	6					SS-7	100+
22				6.71/ 147.19			
	7	End of Borehole					
24		Refusal to augering at 6.71m.					
26	8						
28							
30	9						
32	10						

PENETRATION TESTING (SPT) ▲ 20 40 60 80
SHEAR STRENGTH (Kpa) ✚ 40 80 120 160

VAPOUR READING (ppm) □ 20 40 60 80
MOISTURE CONTENT (%) ● 10 20 30 40

PIEZOMETER OR WELL CONSTRUCTION



Groundwater Depth: on completion: dry; on Nov. 30, 2021: 5.10m; on Dec. 15, 2021: 5.32m

DRAWN: BL LOGGED: PKS CHECKED: RC

FISHER ENGINEERING

LOG OF BOREHOLE NO. BH8 SHEET. 1 of 1

PROJECT NO.: FE-P 21-11713/14/15

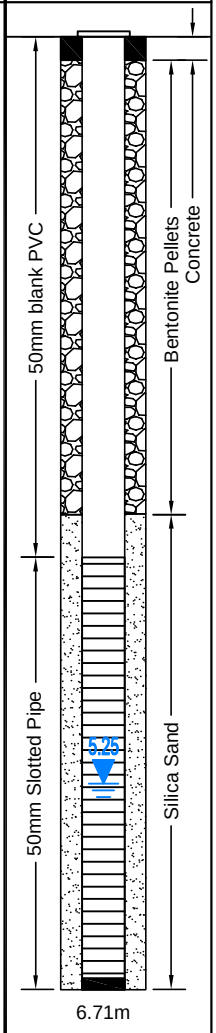
PROJECT NAME: Phase II ESA, Geotechnical & Hydrogeological Investigations

LOCATION: 3005 Dundas Street W., Oakville, Ontario

DRILLING METHOD: CME-75, Solid Stem

DRILLING DATE: November 23, 2021

DEPTH (feet)	DEPTH (metres)	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	LAB ID:	SAMPLES TYPE NUMBER	SAMPLES "N" VALUE	PENETRATION TESTING (SPT) ▲ / SHEAR STRENGTH (Kpa) ✚	VAPOUR READING (ppm) □ / MOISTURE CONTENT (%) ●	PIEZOMETER OR WELL CONSTRUCTION
		GROUND SURFACE (m asl)		154.37				20 40 60 80 / 40 80 120 160	20 40 60 80 / 10 20 30 40	
0	0	FILL: dark brown/grey silty sand, trace of clay/gravel, occasional pieces of asphalt/metal, moist.				SS-1	7			
2										
4	1					SS-2	28			
				1.60/ 152.77						
6	2	REDDISH BROWN SILT TILL: some clay/sand, trace of gravel, moist, dense to very dense.				SS-3	32		14%	
8						SS-4	100+			
10	3					SS-5	100+		12%	
12	4									
14										
16	5					SS-6	100+		6%	
18										
				5.94/ 148.43						
20	6	REDDISH BROWN WEATHERED SHALE: dry, hard.				SS-7	100+			
				6.71/ 147.66						
22	7	End of Borehole								
24		Refusal to augering at 6.71m.								
26	8									
28										
30	9									
32	10									



Groundwater Depth: on completion: dry; on Nov. 30, 2021: 1.67m; on Dec. 15, 2021: 5.25m

DRAWN: BL LOGGED: PKS CHECKED: RC

APPENDIX C – MOISTURE CONTENT AND GRAIN SIZE DISTRIBUTION ANALYSES

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Client: ENIROX 3005 DUNDAS LP
Address: 101 Railside Road
Toronto, ON
M3A 1B2
Tel.: 416-661-6900
Email:
Attn.: Arash Kamali

F.E. Job #: 21-7631A
Project Name: Geotechnical Hydrogeological Phase 2 ESA
Project ID: FE-P 21-11714/21-11713
Date Sampled: 29-Nov-2021
Date Received: 30-Nov-2021
Date Reported: 7-Dec-2021
Location: 3005 Dundas Street West

Certificate of Analysis

Analyses	Matrix	Quantity	Date Extracted	Date Analyzed	Lab SOP	Method Reference
pH	Soil	3	30-Nov-21	1-Dec-21	pH-EC-SAR F-16	SW-846, 9045D
Chloride	Soil	4	N/A	3-Dec-21	Chloride F-20	SM 4500-Cl-E
Sulphate	Soil	4	2-Dec-21	3-Dec-21	Sulphate F-21	SM 4500-SO_4
Moisture Content	Soil	11	N/A	1-Dec-21	Support Procedures F-99	Carter (1993)
Grain Size	Soil	4	N/A	3-Dec-21	Grain Size F-28	ASTM D6913-04

Fisher Environmental Laboratories is accredited by CALA (the Canadian Association for Laboratory Accreditation Inc.) for specific parameters as required by Ontario Regulation 153/04. All analytical testing has been performed in accordance with ISO 17025 and the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act published by Ontario Ministry of the Environment.

Authorized by:

Roger Lin, Ph. D., C. Chem.
Laboratory Manager

Results related only to the items tested

Certificate of Analysis

Analysis Requested:	pH, Sulphate, Chloride, Moisture Content, Grain Size
Sample Description:	11 Soil Sample(s)

Parameter	***21-7631-4*** BH1 7.55-8.05m	***21-7631-9*** BH8 3.00-3.45m	***21-7631-11*** BH5 3.00-3.45m			**Soil Standards** *
pH *(pH unit)*	8.45	8.16	7.94			(5-11) 5-9

* Surface soil pH value from 5 - 9, Sub-surface soil pH value from 5-11.

QA/QC Report

Parameter	**LCS**	**AR**	**Duplicate**	**AR**		
	Absolute Difference *(pH Unit)*					
pH *(pH unit)*	7.16	6.90-7.20	0.02	<0.3		

LEGEND:
LCS - Laboratory Control Sample
AR - Acceptable Range

Certificate of Analysis

Analysis Requested:	pH, Sulphate, Chloride, Moisture Content, Grain Size
Sample Description:	11 Soil Sample(s)

Parameter	***21-7631-2*** BH1 2.25-2.70m	***21-7631-6*** BH6 3.00-3.45m	***21-7631-10*** BH8 4.55-5.00m	***21-7631-11*** BH5 3.00-3.45m		
	Concentration (µg/g)					
Chloride in Soil	22.1	20.2	18.2	50.8		

< result obtained was below RL (Reporting Limit).

QA/QC Report

Parameter	**Blank**	**RL**	**LCS**	**AR**	**MS**	**AR**
	(µg/g)		**Recovery (%)**		**Recovery (%)**	
Chloride in Soil	<10	10	97	70-130	87	70-130

Parameter	**Duplicate**	**AR**				
	RPD (%)					
Chloride in Soil	0.0	0-20				

LEGEND:

RL - Reporting Limit
LCS - Laboratory Control Sample
MS - Matrix Spike
AR - Acceptable Range
RPD - Relative Percent Difference

Certificate of Analysis

Analysis Requested:	pH, Sulphate, Chloride, Moisture Content, Grain Size
Sample Description:	11 Soil Sample(s)

Parameter	***21-7631-2*** BH1 2.25-2.70m	***21-7631-6*** BH6 3.00-3.45m	***21-7631-10*** BH8 4.55-5.00m	***21-7631-11*** BH5 3.00-3.45m		
Sulphate *(mg/kg)*	52.7	87.4	118.3	84.6		

QA/QC Report

Parameter	**Blank**	**RL**	**LCS/Spike**	**AR**	**Duplicate**	**AR**
	(mg/kg)		**Recovery (%)**		**RPD (%)**	
Sulphate	<1	1	107	70-130	5	0-30

LEGEND:

RL - Reporting Limit
LCS - Laboratory Control Sample
AR - Acceptable Range
RPD - Relative Percent Difference

Certificate of Analysis

Analysis Requested:	pH, Sulphate, Chloride, Moisture Content, Grain Size
Sample Description:	11 Soil Sample(s)

Parameter	***21-7631-1*** BH1 1.50-1.95m	***21-7631-2*** BH1 2.25-2.70m	***21-7631-3*** BH1 4.55-5.00m	***21-7631-4*** BH1 7.55-8.05m	***21-7631-5*** BH6 1.50-1.95m	***21-7631-6*** BH6 3.00-3.45m
Geo Moisture Content (%)	17	12	12	9	13	11

Parameter	***21-7631-7*** BH6 4.55-5.00m	***21-7631-8*** BH8 1.50-1.95m	***21-7631-9*** BH8 3.00-3.45m	***21-7631-10*** BH8 4.55-5.00m	***21-7631-11*** BH5 3.00-3.45m	
Geo Moisture Content (%)	9	14	12	6	13	

QA/QC Report

Parameter	**Blank**	**RL**	**LCS**	**AR**	**Duplicate**	**AR**
			Recovery (%)		**RPD (%)**	
Geo Moisture Content (%)	<0.1	0.1	100	70-130	5.3	0-20

LEGEND:

RL - Reporting Limit
LCS - Laboratory Control Sample
AR - Acceptable Range
RPD - Relative Percent Difference

Certificate of Analysis

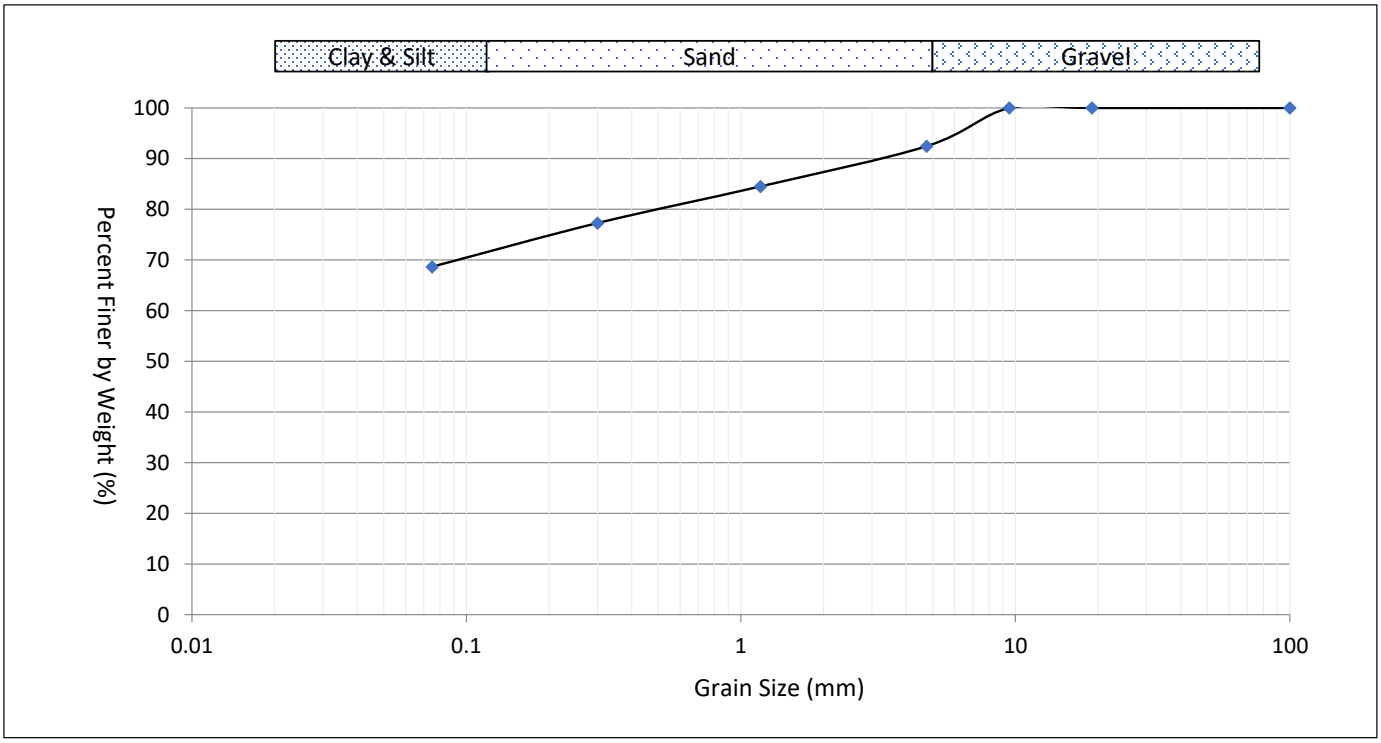
Analysis Requested:	pH, Sulphate, Chloride, Moisture Content, Grain Size
Sample Description:	11 Soil Sample(s)

Parameter	***21-7631-1*** BH1 1.50-1.95m	***21-7631-3*** BH1 4.55-5.00m	***21-7631-7*** BH6 4.55-5.00m	***21-7631-9*** BH8 3.00-3.45m		
Grain Size (%)						
>19mm	0.0	0.0	0.0	0.0		
9.5mm-19mm	0.0	1.9	0.0	0.0		
4.75mm-9.5mm	7.5	0.8	0.8	3.3		
1.18m-4.75mmm	7.9	3.5	8.3	7.8		
300um-1.18mm	7.3	3.7	5.4	9.3		
75um-300um	8.6	14.4	12.7	11.2		
<75um	68.7	75.7	72.9	68.5		
Clay & Silt	**69**	**76**	**73**	**68**		
Sand	**24**	**22**	**26**	**28**		
Gravel	**8**	**3**	**1**	**3**		

Grain Size Distribution

Sample ID: 21-7631-1 BH1 1.50-1.95m

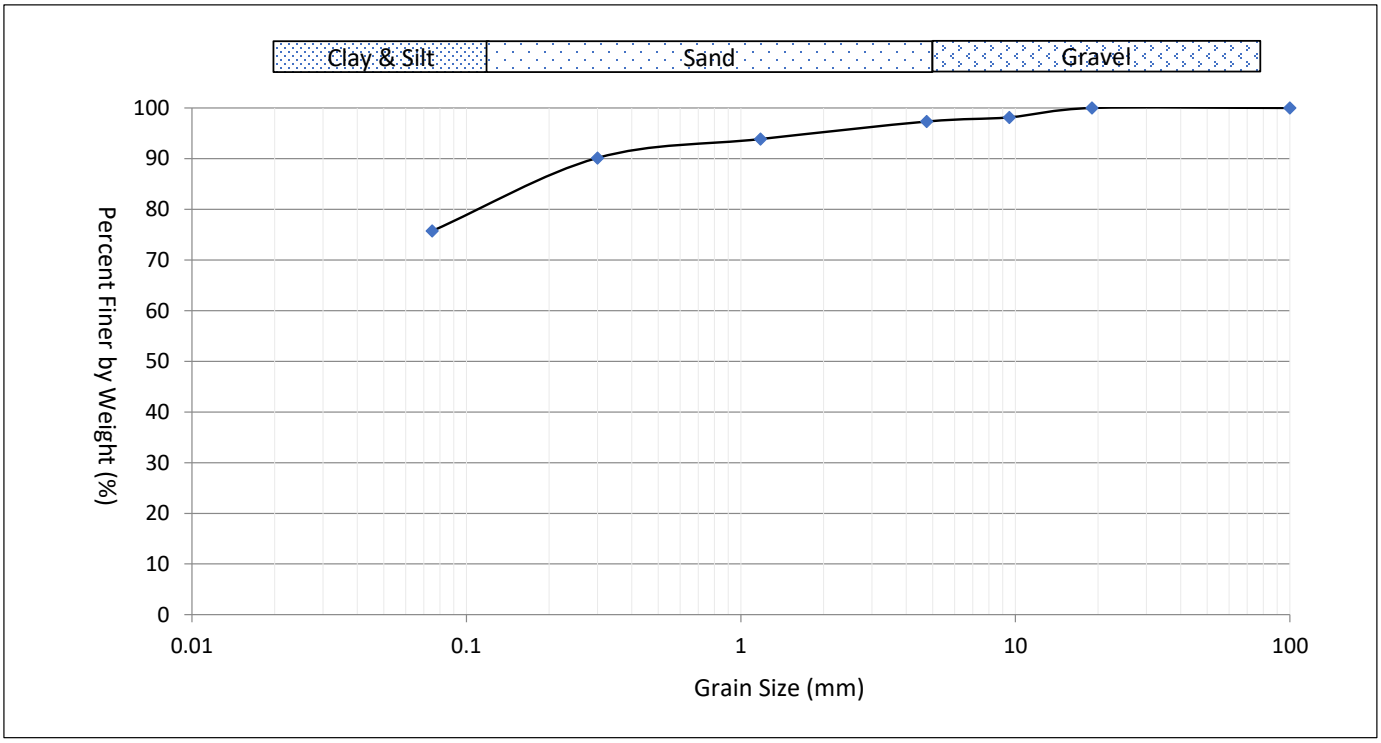
Clay & Silt: 69% Sand: 24% Gravel: 8%



Grain Size Distribution

Sample ID: 21-7631-3 BH1 4.55-5.00m

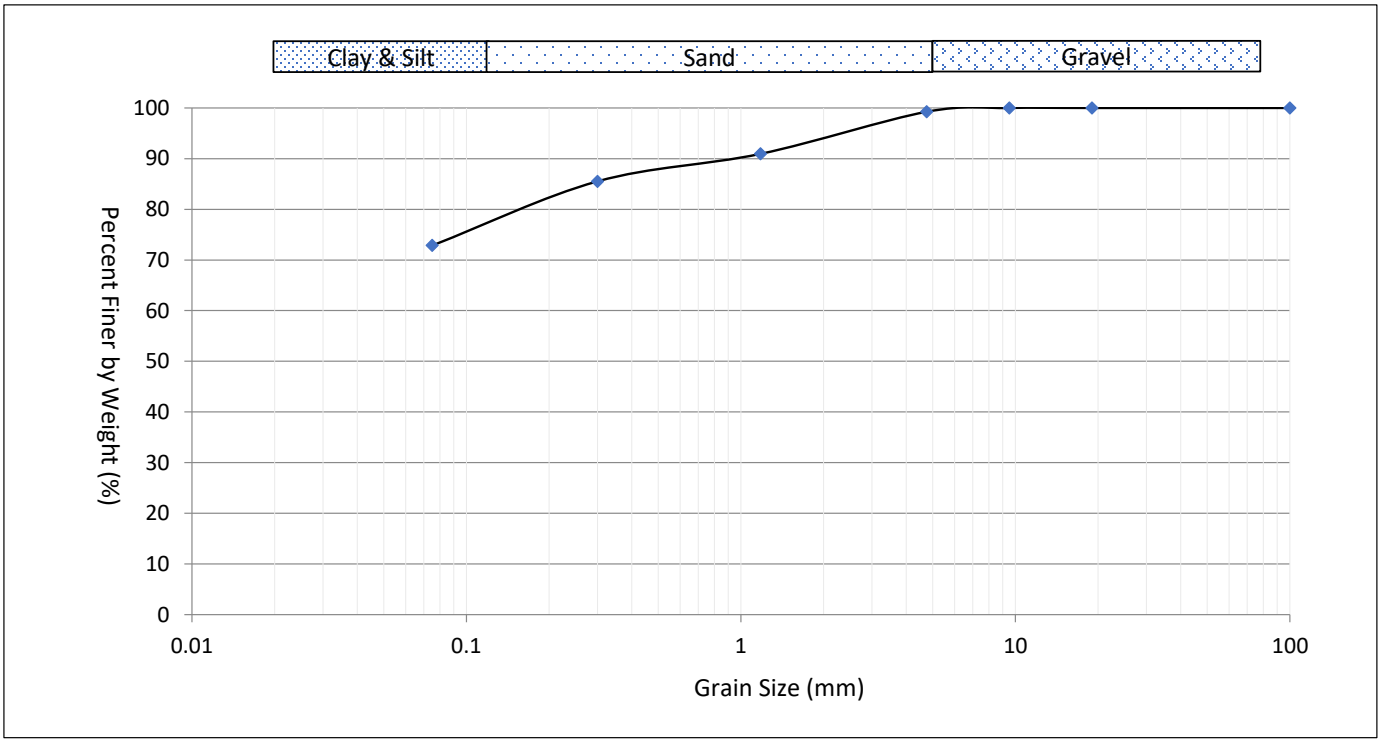
Clay & Silt: 76% Sand: 22% Gravel: 3%



Grain Size Distribution

Sample ID: 21-7631-7 BH6 4.55-5.00m

Clay & Silt: 73% Sand: 26% Gravel: 1%

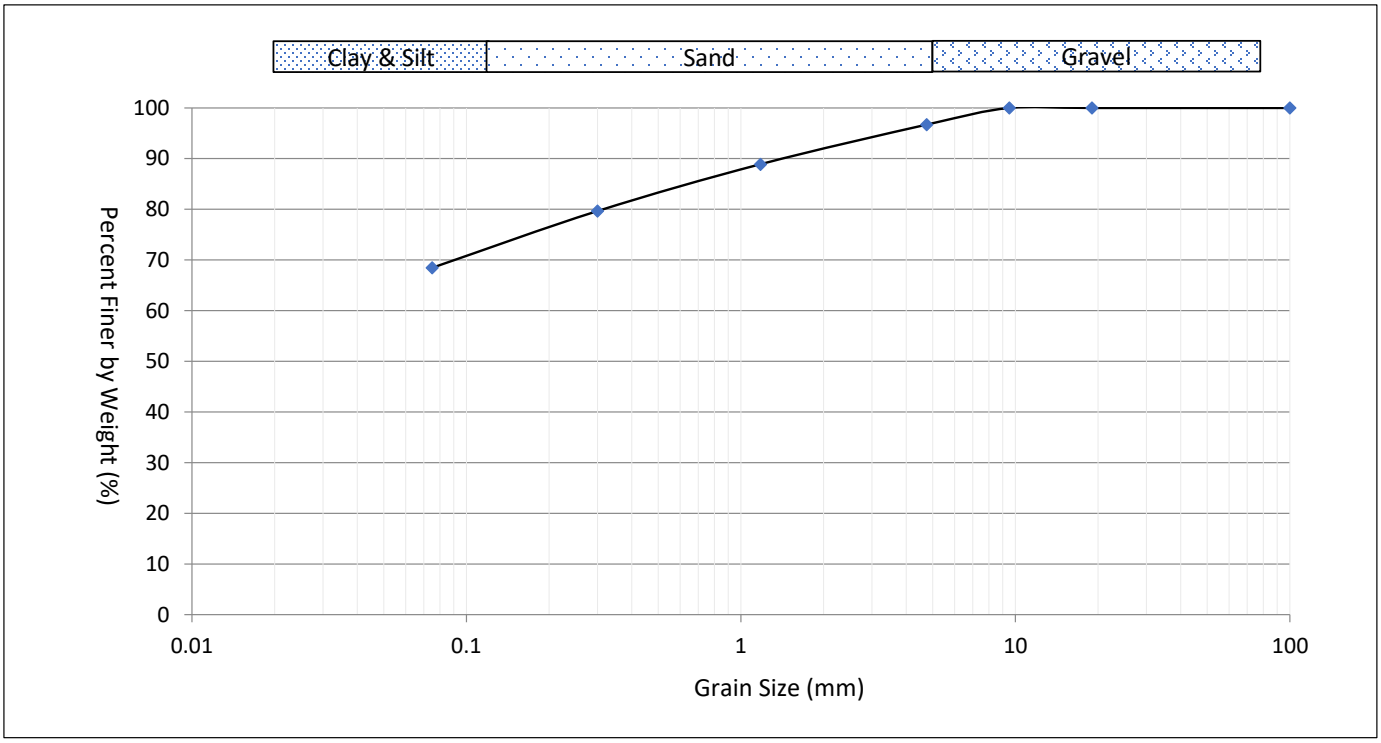


Client: ENIROX 3005 DUNDAS LP ***F.E. Job #:*** 21-7631A

Grain Size Distribution

Sample ID: 21-7631-9 BH8 3.00-3.45m

Clay & Silt: 68% Sand: 28% Gravel: 3%



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Client:	ENIROX 3005 DUNDAS LP	***F.E. Job #:***	21-7631B
Address:	101 Railside Road	***Project Name:***	Geotechnical Hydrogeological
	Toronto, ON		Phase 2 ESA
	M3A 1B2	***Project ID:***	FE-P 21-11714/21-11713
Tel.:	416-661-6900	***Date Sampled:***	29-Nov-2021
Email:		***Date Received:***	30-Nov-2021
Attn.:	Arash Kamali	***Date Reported:***	7-Dec-2021
		Location:	3005 Dundas Street West

Certificate of Analysis

Analyses	Matrix	Quantity	Date Extracted	Date Analyzed	Lab SOP	Method Reference
Hydrometer	Soil	2	N/A	7-Dec-21	Hydrometer SOP	ASTM D7928-17

Fisher Environmental Laboratories is accredited by CALA (the Canadian Association for Laboratory Accreditation Inc.) for specific parameters as required by Ontario Regulation 153/04. All analytical testing has been performed in accordance with ISO 17025 and the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act published by Ontario Ministry of the Environment.

Authorized by:

Roger Lin, Ph. D., C. Chem.
Laboratory Manager

Client: ENIROX 3005 DUNDAS LP ***F.E. Job #:*** 21-7631B

Certificate of Analysis

Analysis Requested:	Hydrometer
Sample Description:	2 Soil Sample(s)

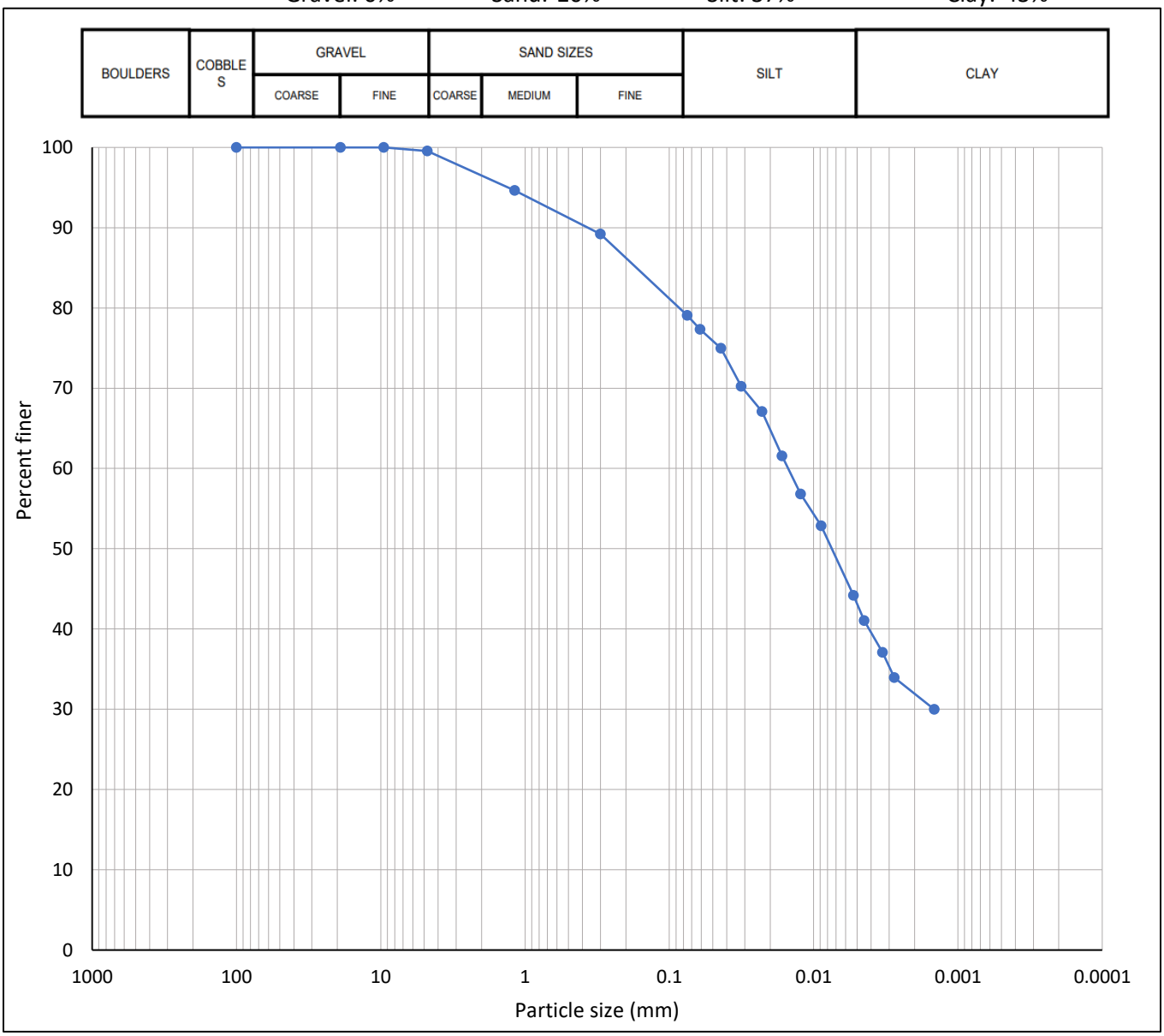
Parameter	***21-7631-6*** BH6 3.00-3.45m	***21-7631-10*** BH8 4.55-5.00m				
Grain Size (%)						
>19mm	0.0	0.0				
9.5mm-19mm	0.0	0.0				
4.75mm-9.5mm	0.4	5.1				
1.18mm-4.75mm	4.9	9.5				
300um-1.18mm	5.4	7.5				
75um-300um	10.1	9.8				
5um-75um	37	43				
2um-5um	11	9				
<2um	32	16				
Clay	**43**	**25**				
Silt	**37**	**43**				
Sand	**20**	**27**				
Gravel	**0**	**5**				

Client: ENIROX 3005 DUNDAS LP ***F.E. Job #:*** 21-7631B

Grain Size Distribution

Sample ID: 21-7631-6 BH6 3.00-3.45m

Gravel: 0% Sand: 20% Silt: 37% Clay: 43%



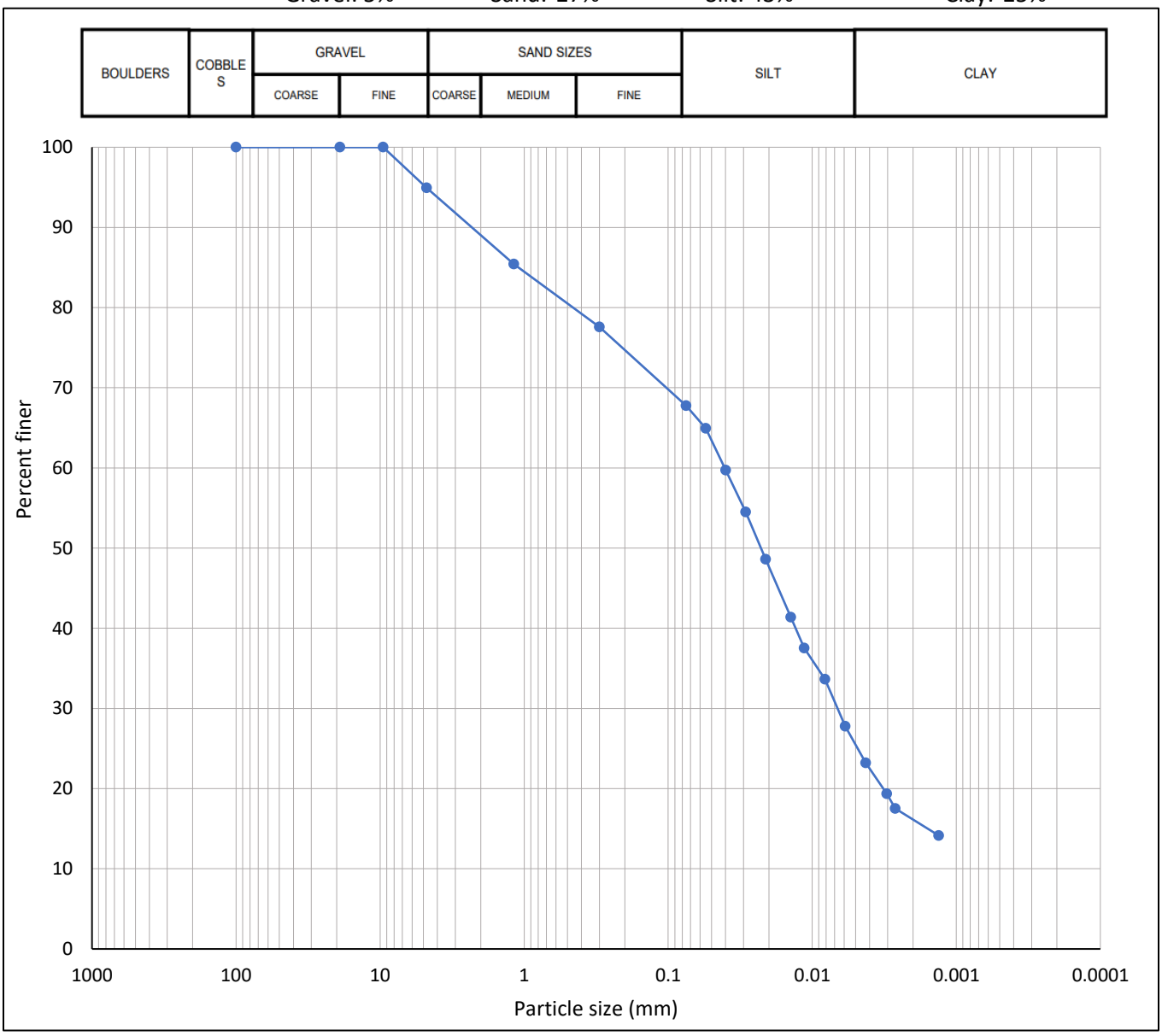
Sample ID: 21-7631-6 BH6 3.00-3.45m		
Diameter	***Weight (%)***	***Grain Size***
>4.75mm	0.4	Gravel
1.18mm-4.75mm	4.9	Coarse Sand
300um-1.18mm	5.4	Medium Sand
75um-300um	10.1	Fine Sand
5um-75um	37	Silt
2um-5um	11	Clay
<2um	32	

Client: ENIROX 3005 DUNDAS LP ***F.E. Job #:*** 21-7631B

Grain Size Distribution

Sample ID: 21-7631-10 BH8 4.55-5.00m

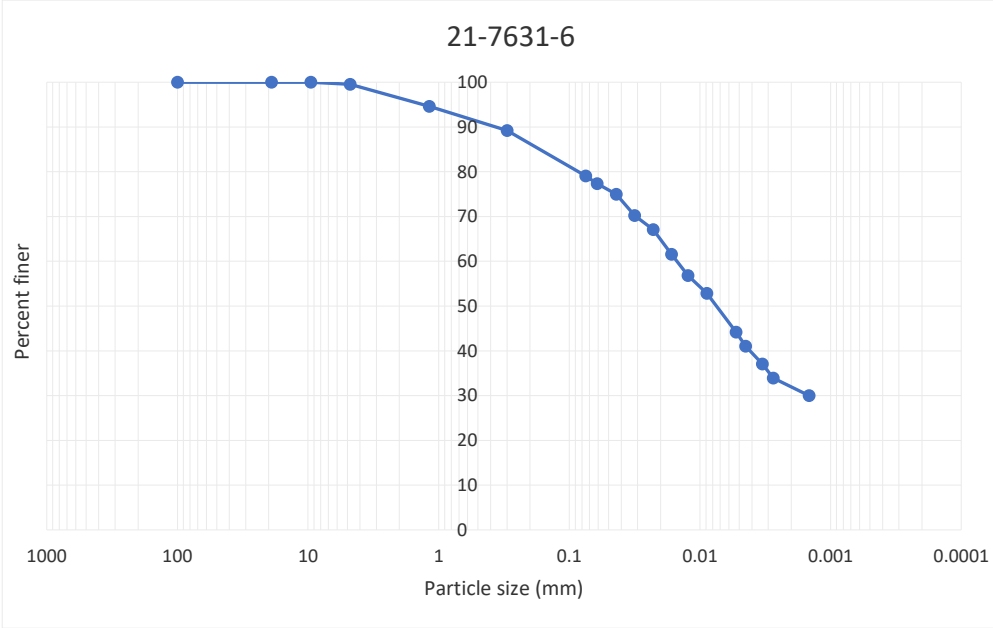
Gravel: 5% Sand: 27% Silt: 43% Clay: 25%



Sample ID: 21-7631-10 BH8 4.55-5.00m		
Diameter	***Weight (%)***	***Grain Size***
>4.75mm	5.1	Gravel
1.18mm-4.75mm	9.5	Coarse Sand
300um-1.18mm	7.5	Medium Sand
75um-300um	9.8	Fine Sand
5um-75um	43	Silt
2um-5um	9	Clay
<2um	16	

Temp(K/C)	Soil Weight (g)	Water g/ml	viscosity (poise)	G(solid)	Specific Gravity							
297	52	0.997329795	0.009120211	2.5	F	FS	FSW	FW	S	DW	DS	G
24					122.804	138.649	335.394	324.193	15.845	1	15.845	2.5

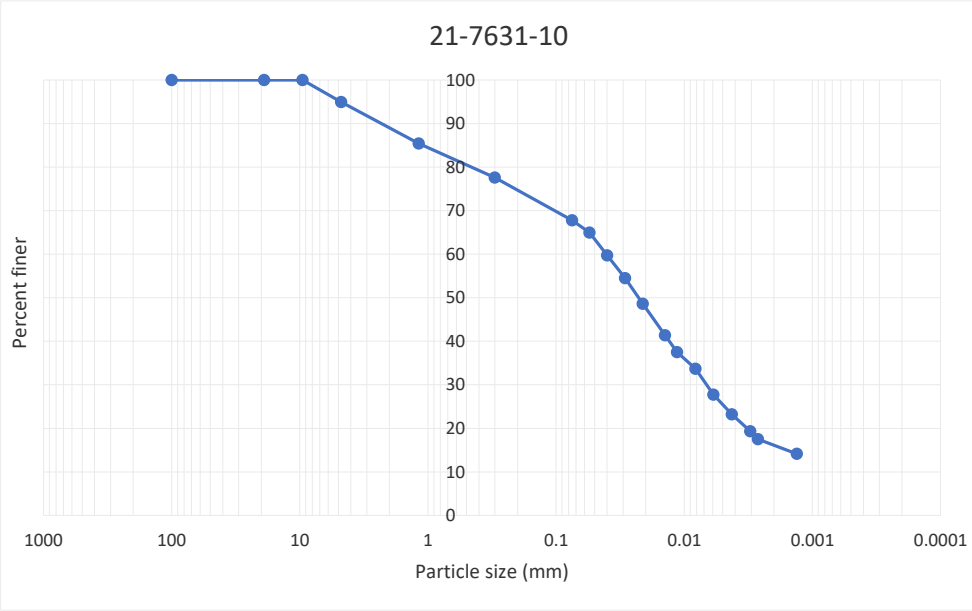
Time	Reading	Comp Correction	Corrected Reading	Hm (cm)	Particle size (µm)	Percent Finer	% finer whole
30	51.5	4	47.5	10.03665	61.15723654	97.78012821	77.32452538
60	49.5	3.5	46	10.28819	43.78324231	94.78685897	74.95744808
120	46.5	3.5	43	10.79127	31.70732833	88.80032051	70.22329346
240	44.5	3.5	41	11.12665	22.76620684	84.80929487	67.06719038
480	41	3.5	37.5	11.71358	16.51726584	77.825	61.54401
900	38	3.5	34.5	12.21665	12.3188138	71.83846154	56.80985538
1800	35	3	32	12.63588	8.858916026	66.84967949	52.86472654
5400	29.5	3	26.5	13.55819	5.298074097	55.87435897	44.18544308
7800	27.5	3	24.5	13.89358	4.462453945	51.88333333	41.02934
14400	25	3	22	14.31281	3.333459522	46.89455128	37.08421115
21600	23	3	20	14.64819	2.75346243	42.90352564	33.92810808
79200	20.5	3	17.5	15.06742	1.458380723	37.91474359	29.98297923
		3	-3	18.50511	#DIV/0!	-2.993269231	-2.367077308
		3	-3	18.50511	#DIV/0!	-2.993269231	-2.367077308



100		100	
19		100	
9.5		100	
4.75		99.56	
1.18		94.62	
0.3		89.21	
0.075		79.08	
0.061157	77.3245	77.3245	"corrected" for sieve data
0.043783	74.9574	74.9574	
0.031707	70.2233	70.2233	
0.022766	67.0672	67.0672	
0.016517	61.5440	61.5440	
0.012319	56.8099	56.8099	
0.008859	52.8647	52.8647	
0.005298	44.1854	44.1854	
0.004462	41.0293	41.0293	
0.003333	37.0842	37.0842	
0.002753	33.9281	33.9281	
0.001458	29.9830	29.9830	
#DIV/0!	-2.3671	-2.3671	
#DIV/0!	-2.3671	-2.3671	

Temp(K/C)	Soil Weight (g)	Water g/ml	viscosity (poise)	G(solid)	Specific Gravity							
				3	F	FS	FSW	FW	S	DW	DS	G
297	47	0.997329795	0.009120211									
24					122.804	138.649	335.394	324.193	15.845	1	15.845	3

Time	Reading	Comp Correction	Corrected Reading	Hm (cm)	Particle size (µm)	Percent Finer	% finer whole
30	47	4	43	10.79127	54.91870365	88.42244681	59.9238922
60	43	3.5	39.5	11.37819	39.87545497	81.46787234	55.21077709
120	39.5	3.5	36	11.96511	28.91428551	74.51329787	50.49766197
240	35.5	3.5	32	12.63588	21.01076418	66.56521277	45.11124469
570	30.5	3.5	27	13.47435	14.07865177	56.63010638	38.3782231
900	28	3.5	24.5	13.89358	11.37706987	51.66255319	35.0117123
1800	25	3	22	14.31281	8.165274907	46.695	31.6452015
3600	21	3	18	14.98358	5.907464857	38.74691489	26.25878422
7200	18	3	15	15.48665	4.246754876	32.78585106	22.21897127
14400	15.5	3	12.5	15.90588	3.043282824	27.81829787	18.85246047
19188	14.5	3	11.5	16.07358	2.650245213	25.8312766	17.50585615
79200	12	3	9	16.49281	1.321384945	20.8637234	14.13934535
		3	-3	18.50511	#DIV/0!	-2.980531915	-2.019906479
		3	-3	18.50511	#DIV/0!	-2.980531915	-2.019906479



100		100	
19		100	
9.5		100	
4.75		94.92	
1.18		85.43	
0.3		77.58	
0.075		67.77	
0.054919	59.9239	64.9239	"corrected" for sieve data
0.039875	55.2108	59.7108	
0.028914	50.4977	54.4977	
0.021011	45.1112	48.6112	
0.014079	38.3782	41.3782	
0.011377	35.0117	37.5117	
0.008165	31.6452	33.6452	
0.005907	26.2588	27.7588	
0.004247	22.2190	23.2190	
0.003043	18.8525	19.3525	
0.00265	17.5059	17.5059	
0.001321	14.1393	14.1393	
#DIV/0!	-2.0199	-2.0199	
#DIV/0!	-2.0199	-2.0199	

FISHER ENVIRONMENTAL LABORATORIES

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laboratory@fisherenvironmental.com

LAB JOB #: 7631

CHAIN OF CUSTODY 2588

Page 1 of 1

CLIENT INFORMATION
Company Name:
Contact:
Address: 3005 Dundas St West
Oakville
Phone:
Fax: Fax results? Y/N
Email: Email results? Y/N

PROJECT INFORMATION
Project Name: Geotechnical/Hydrog & Phase 2 ESA
Project ID: 21-11714/11713
Sampled By: CAW

TURNAROUND TIME (TAT) REQUIRED

STD - Standard (5-7 working days)		Working Time: Monday-Friday 9:00am-5:00pm
SR - Semi Rush (48 hours)	50%	Surcharges apply; Sample received after 2pm will be considered received the next business day
R - Rush (24 hours)	75%	
SD - Same Day - 100%	100%	

BILLING INFORMATION
Purchase Order #:
Verbal Authorization:
Credit Card (type):
Credit Card #:
Expiry Date:

LAB SAMPLE ID	CLIENT'S SAMPLE ID AND DESCRIPTION	SAMPLING DATE/TIME	SAMPLE MATRIX	CONTAINER # & TYPE	TAT (Above)	ANALYSIS REQUESTED (Check or Specify) Metals	PHCs	VOCs	PAHs	PCBs	Asbestos	GS	M	Hydro	NOTES
1	BH1 S-6½	Nov 29/2021	Soil	Bag								✓	✓		
2	" 7½-9	"	"	"				✓	✓				✓		
3	" 15-16½	"	"	"								✓	✓		
4	" 25-26½	"	"	"			✓						✓		
5	BH6 S-6½	"	"	"									✓		
6	10-11½	"	"	"				✓	✓				✓	✓	
7	15-16½	"	"	"								✓	✓		
8	BH8 S-6½	"	"	"									✓		
9	10-11½	"	"	"			✓					✓	✓		
10	15-16½	"	"	"				✓	✓				✓	✓	
11	BH5 10-11½	"	"	"			✓	✓	✓				✓		
							✓	✓	✓						

Relinquished by: (Signature & Print)
CLIVE
Date & Time: Nov 29, 2021
Method of Shipment: By hand

Received by: (Signature & Print)
Nicholas Nicholas
Date & Time: Nov 30, 2021 4pm

Client's Comments:

Arrival Temperature (°C):

Laboratory Remarks:

Regulatory Requirements

Reg. 153
Table _____
☐ Residential / Parkland
☐ Industrial / Commercial
☐ Agricultural
Soil Texture
☐ Coarse ☐ Med/Fine

Sewer Use
☐ Sanitary
☐ Storm
Region _____

Reg. 558
☐ TCLP

Revision: 2.2

APPENDIX D – SEWER BYLAW RESULTS

FISHER ENVIRONMENTAL
ATTN: Clive Wiggan
15-400 ESNA PARK DRIVE
MARKHAM ON L3R 3K2

Date Received: 02-DEC-21
Report Date: 09-DEC-21 14:52 (MT)
Version: FINAL

Client Phone: 905-475-7755

Certificate of Analysis

Lab Work Order #: L2668669

Project P.O. #: NOT SUBMITTED
Job Reference: 3005 DUNDAS ST. WEST OAKVILLE HALTON REGION SEWER DISCHARGE
C of C Numbers: 20-893216
Legal Site Desc:

Emily Hansen
Account Manager

ANALYTICAL REPORT

Summary of Guideline Exceedances

Guideline ALS ID	Client ID	Grouping	Analyte	Result	Guideline Limit	Unit

Ontario Halton Santitary Sewer By-law No. 02-03 (MAR, 2003) - Halton Sanitary Sewer By-Law No. 02-03

(No parameter exceedances)

Ontario Halton Santitary Sewer By-law No. 02-03 (MAR, 2003) - Halton Storm Sewer By-Law No, 02-03

(No parameter exceedances)

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Physical Tests - WATER

Analyte	Unit	Guide Limits #1	Guide Limits #2	Lab ID: L2668669-1 Sample Date: 01-DEC-21 Sample ID: MW6(UNFILTERED)
pH	pH units	6.00-10.0	6.5-8.5	7.48
Total Suspended Solids	mg/L	350	-	44.5

Guide Limit #1: Halton Sanitary Sewer By-Law No. 02-03
Guide Limit #2: Halton Storm Sewer By-Law No, 02-03

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Anions and Nutrients - WATER

Analyte	Unit	Guide Limits #1	Guide Limits #2	Lab ID: L2668669-1 Sample Date: 01-DEC-21 Sample ID: MW6(UNFILTERED)
Fluoride (F)	mg/L	10	-	0.30 DLDS
Total Kjeldahl Nitrogen	mg/L	100	-	1.11
Phosphorus, Total	mg/L	10.0	-	0.0195
Sulfate (SO4)	mg/L	1500	-	464 DLDS

Guide Limit #1: Halton Sanitary Sewer By-Law No. 02-03
Guide Limit #2: Halton Storm Sewer By-Law No, 02-03

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Cyanides - WATER

Analyte	Unit	Guide Limits #1	Guide Limits #2	Lab ID: L2668669-1 Sample Date: 01-DEC-21 Sample ID: MW6(UNFILTERED)
Cyanide, Total	mg/L	2	-	<0.0020

Guide Limit #1: Halton Sanitary Sewer By-Law No. 02-03
Guide Limit #2: Halton Storm Sewer By-Law No, 02-03

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Bacteriological Tests - WATER

Analyte	Unit	Guide Limits #1	Guide Limits #2	Lab ID: L2668669-1 Sample Date: 01-DEC-21 Sample ID: MW6(UNFILTERED)
E. Coli	CFU/100mL	-	200	0

Guide Limit #1: Halton Sanitary Sewer By-Law No. 02-03
Guide Limit #2: Halton Storm Sewer By-Law No, 02-03

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Total Metals - WATER

Analyte	Unit	Guide Limits #1	Guide Limits #2	Lab ID: L2668669-1 Sample Date: 01-DEC-21 Sample ID: MW6(UNFILTERED)
Aluminum (Al)-Total	mg/L	50	-	0.775 DLHC
Antimony (Sb)-Total	mg/L	5	-	<0.0010 DLHC
Arsenic (As)-Total	mg/L	1	-	0.0046 DLHC
Beryllium (Be)-Total	mg/L	5	-	<0.0010 DLHC
Cadmium (Cd)-Total	mg/L	1	-	0.000228 DLHC
Chromium (Cr)-Total	mg/L	3	-	<0.0050 DLHC
Cobalt (Co)-Total	mg/L	5	-	0.0014 DLHC
Copper (Cu)-Total	mg/L	3	-	<0.0050 DLHC
Iron (Fe)-Total	mg/L	50	-	1.17 DLHC
Lead (Pb)-Total	mg/L	3	-	<0.00050 DLHC
Manganese (Mn)-Total	mg/L	5	-	0.190 DLHC
Mercury (Hg)-Total	mg/L	0.05	-	<0.0000050
Molybdenum (Mo)-Total	mg/L	5	-	0.00450 DLHC
Nickel (Ni)-Total	mg/L	3	-	<0.0050 DLHC
Selenium (Se)-Total	mg/L	5	-	<0.00050 DLHC
Silver (Ag)-Total	mg/L	5	-	<0.00050 DLHC
Tin (Sn)-Total	mg/L	5	-	<0.0010 DLHC
Titanium (Ti)-Total	mg/L	5	-	0.0101 DLHC
Zinc (Zn)-Total	mg/L	3	-	<0.030 DLHC

Guide Limit #1: Halton Sanitary Sewer By-Law No. 02-03
Guide Limit #2: Halton Storm Sewer By-Law No, 02-03

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Aggregate Organics - WATER

Analyte	Unit	Guide Limits #1	Guide Limits #2	Lab ID: L2668669-1 Sample Date: 01-DEC-21 Sample ID: MW6(UNFILTERED)
BOD Carbonaceous	mg/L	300	-	<3.0 BODL
Oil and Grease, Total	mg/L	-	-	<5.0
Animal/Veg Oil & Grease	mg/L	150	-	<5.0
Mineral Oil and Grease	mg/L	15	-	<2.5
Phenols (4AAP)	mg/L	1.0	-	<0.0010

Guide Limit #1: Halton Sanitary Sewer By-Law No. 02-03
Guide Limit #2: Halton Storm Sewer By-Law No, 02-03

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

ANALYTICAL REPORT

Volatile Organic Compounds - WATER

			Lab ID	L2668669-1
			Sample Date	01-DEC-21
			Sample ID	MW6(UNFILTERED)
Analyte	Unit	Guide Limits #1	#2	
Benzene	ug/L	10	-	<0.50 OWP
Chloroform	ug/L	40	-	<1.0 OWP
1,4-Dichlorobenzene	ug/L	80	-	<0.50 OWP
Dichloromethane	ug/L	2000	-	<2.0 OWP
Ethylbenzene	ug/L	160	-	<0.50 OWP
Tetrachloroethylene	ug/L	1000	-	<0.50 OWP
Toluene	ug/L	16	-	<0.50 OWP
Trichloroethylene	ug/L	400	-	<0.50 OWP
Surrogate: 4-Bromofluorobenzene	%	-	-	98.0
Surrogate: 1,4-Difluorobenzene	%	-	-	100.2

Guide Limit #1: Halton Sanitary Sewer By-Law No. 02-03
Guide Limit #2: Halton Storm Sewer By-Law No, 02-03

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Polycyclic Aromatic Hydrocarbons - WATER

			Lab ID	L2668669-1
			Sample Date	01-DEC-21
			Sample ID	MW6(UNFILTERED)
Analyte	**Unit**	**Guide Limits #1**	**#2**	
Naphthalene	ug/L	140	-	<0.020
Surrogate: d8-Naphthalene	%	-	-	89.8

Guide Limit #1: Halton Sanitary Sewer By-Law No. 02-03
Guide Limit #2: Halton Storm Sewer By-Law No, 02-03

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
BODL	Limit of Reporting for BOD was increased to account for the largest volume of sample tested.
OWP	Organic water sample contained visible sediment (must be included as part of analysis). Measured concentrations of organic substances in water can be biased high due to presence of

Reference Information

sediment.

DLHC Detection Limit Raised: Dilution required due to high concentration of test analyte(s).

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**
BOD-C-WT	Water	BOD Carbonaceous	APHA 5210 B (CBOD)

This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.

CN-TOT-WT	Water	Cyanide, Total	ISO 14403-2

Total cyanide is determined by the combination of UV digestion and distillation. Cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex.

When using this method, high levels of thiocyanate in samples can cause false positives at ~1-2% of the thiocyanate concentration. For samples with detectable cyanide analyzed by this method, ALS recommends analysis for thiocyanate to check for this potential interference

EC-SCREEN-WT	Water	Conductivity Screen (Internal Use Only)	APHA 2510

Qualitative analysis of conductivity where required during preparation of other tests - e.g. TDS, metals, etc.

EC-WW-MF-WT	Water	E. Coli	SM 9222D

A 100 mL volume of sample is filtered through a membrane, the membrane is placed on mFC-BCIG agar and incubated at 44.5 –0 .2 °C for 24 – 2 h. Method ID: WT-TM-1200

F-IC-N-WT	Water	Fluoride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HG-T-CVAA-WT	Water	Total Mercury in Water by CVAAS	EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

MET-T-CCMS-WT	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

OGG-SPEC-CALC-WT	Water	Speciated Oil and Grease A/V Calc	CALCULATION

Sample is extracted with hexane, sample speciation into mineral and animal/vegetable fractions is achieved via silica gel separation and is then determined gravimetrically.

OGG-SPEC-WT	Water	Speciated Oil and Grease-Gravimetric	APHA 5520 B

The procedure involves an extraction of the entire water sample with hexane. Sample speciation into mineral and animal/vegetable fractions is achieved via silica gel separation and is then determined gravimetrically.

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**
P-T-COL-WT	Water	Total P in Water by Colour	APHA 4500-P PHOSPHORUS
This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.			
PAH-NAPHTHALENE-WT	Water	Polyaromatic Hydrocarbons (PAHs)	SW846 8270
Sample is extracted at neutral pH using separate aliquots of dichloromethane with a modified separatory funnel technique, extracts are then concentrated and analyzed by GC/MSD.			
PH-WT	Water	pH	APHA 4500 H-Electrode
Water samples are analyzed directly by a calibrated pH meter.			
Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011). Holdtime for samples under this regulation is 28 days			
PHENOLS-4AAP-WT	Water	Phenol (4AAP)	EPA 9066
An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.			
SO4-IC-N-WT	Water	Sulfate in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
SOLIDS-TSS-WT	Water	Suspended solids	APHA 2540 D-Gravimetric
A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 104–1°C for a minimum of four hours or until a constant weight is achieved.			
TKN-F-WT	Water	TKN in Water by Fluorescence	J. ENVIRON. MONIT., 2005,7,37-42,RSC
Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection			
VOC-ROU-HS-WT	Water	Volatile Organic Compounds	SW846 8260
Aqueous samples are analyzed by headspace-GC/MS.			

**ALS test methods may incorporate modifications from specified reference methods to improve performance.

Chain of Custody Numbers:

20-893216

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Reference Information

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, fitness for a particular purpose, or non-infringement. ALS assumes no responsibility for errors or omissions in the information. Guideline limits are not adjusted for the hardness, pH or temperature of the sample (the most conservative values are used). Measurement uncertainty is not applied to test results prior to comparison with specified criteria values.

Quality Control Report

Workorder: L2668669 Report Date: 09-DEC-21

Client: FISHER ENVIRONMENTAL
15-400 ESNA PARK DRIVE
MARKHAM ON L3R 3K2
Contact: Clive Wiggan

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BOD-C-WT	**Water**							
Batch R5669079								
WG3669067-6 DUP		**L2668227-2**						
BOD Carbonaceous		<3.0	<3.0	RPD-NA	mg/L	N/A	30	02-DEC-21
WG3669067-7 LCS								
BOD Carbonaceous			99.5		%		85-115	02-DEC-21
WG3669067-5 MB								
BOD Carbonaceous			<2.0		mg/L		2	02-DEC-21
CN-TOT-WT	**Water**							
Batch R5666016								
WG3669489-3 DUP		**WG3669489-5**						
Cyanide, Total		<0.010	<0.0020	RPD-NA	mg/L	N/A	20	03-DEC-21
WG3669489-2 LCS								
Cyanide, Total			94.1		%		80-120	03-DEC-21
WG3669489-1 MB								
Cyanide, Total			<0.0020		mg/L		0.002	03-DEC-21
WG3669489-4 MS		**WG3669489-5**						
Cyanide, Total			89.5		%		70-130	03-DEC-21
EC-WW-MF-WT	**Water**							
Batch R5664712								
WG3669439-3 DUP		**L2668879-6**						
E. Coli		0	0		CFU/100mL	0.0	65	03-DEC-21
WG3669439-4 DUP		**L2668879-4**						
E. Coli		0	0		CFU/100mL	0.0	65	03-DEC-21
WG3669439-1 MB								
E. Coli			0		CFU/100mL		1	03-DEC-21
F-IC-N-WT	**Water**							
Batch R5665797								
WG3669665-9 DUP		**WG3669665-8**						
Fluoride (F)		0.057	0.057		mg/L	0.5	20	03-DEC-21
WG3669665-7 LCS								
Fluoride (F)			102.1		%		90-110	03-DEC-21
WG3669665-6 MB								
Fluoride (F)			<0.020		mg/L		0.02	03-DEC-21
WG3669665-10 MS		**WG3669665-8**						
Fluoride (F)			94.6		%		75-125	03-DEC-21
HG-T-CVAA-WT	**Water**							

Quality Control Report

Client: FISHER ENVIRONMENTAL
15-400 ESNA PARK DRIVE
MARKHAM ON L3R 3K2
Contact: Clive Wiggan

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-T-CVAA-WT	**Water**							
Batch R5663044								
WG3669374-3 DUP		**L2662925-3**						
Mercury (Hg)-Total		<0.0000050	<0.000005C	RPD-NA	mg/L	N/A	20	03-DEC-21
WG3669374-2 LCS								
Mercury (Hg)-Total			93.4		%		80-120	03-DEC-21
WG3669374-1 MB								
Mercury (Hg)-Total			<0.000005C		mg/L		0.000005	03-DEC-21
WG3669374-4 MS		**L2667794-1**						
Mercury (Hg)-Total			98.8		%		70-130	03-DEC-21
MET-T-CCMS-WT	**Water**							
Batch R5660884								
WG3669146-4 DUP		**WG3669146-3**						
Aluminum (Al)-Total		0.135	0.138		mg/L	2.3	20	02-DEC-21
Antimony (Sb)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	02-DEC-21
Arsenic (As)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	02-DEC-21
Beryllium (Be)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	02-DEC-21
Cadmium (Cd)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	02-DEC-21
Chromium (Cr)-Total		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	02-DEC-21
Cobalt (Co)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	02-DEC-21
Copper (Cu)-Total		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	02-DEC-21
Iron (Fe)-Total		0.49	0.50		mg/L	1.9	20	02-DEC-21
Lead (Pb)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	02-DEC-21
Manganese (Mn)-Total		0.0994	0.101		mg/L	1.8	20	02-DEC-21
Molybdenum (Mo)-Total		0.00436	0.00442		mg/L	1.4	20	02-DEC-21
Nickel (Ni)-Total		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	02-DEC-21
Selenium (Se)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	02-DEC-21
Silver (Ag)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	02-DEC-21
Tin (Sn)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	02-DEC-21
Titanium (Ti)-Total		0.0075	0.0078		mg/L	3.4	20	02-DEC-21
Zinc (Zn)-Total		0.286	0.282		mg/L	1.4	20	02-DEC-21
WG3669146-2 LCS								
Aluminum (Al)-Total			103.1		%		80-120	02-DEC-21
Antimony (Sb)-Total			98.4		%		80-120	02-DEC-21
Arsenic (As)-Total			100.9		%		80-120	02-DEC-21
Beryllium (Be)-Total			99.9		%		80-120	02-DEC-21
Cadmium (Cd)-Total			98.5		%		80-120	02-DEC-21

Quality Control Report

Client: FISHER ENVIRONMENTAL
15-400 ESNA PARK DRIVE
MARKHAM ON L3R 3K2
Contact: Clive Wiggan

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R5660884								
WG3669146-2 LCS								
Chromium (Cr)-Total			101.0		%		80-120	02-DEC-21
Cobalt (Co)-Total			101.3		%		80-120	02-DEC-21
Copper (Cu)-Total			98.0		%		80-120	02-DEC-21
Iron (Fe)-Total			98.4		%		80-120	02-DEC-21
Lead (Pb)-Total			100.4		%		80-120	02-DEC-21
Manganese (Mn)-Total			101.8		%		80-120	02-DEC-21
Molybdenum (Mo)-Total			100.7		%		80-120	02-DEC-21
Nickel (Ni)-Total			100.5		%		80-120	02-DEC-21
Selenium (Se)-Total			96.5		%		80-120	02-DEC-21
Silver (Ag)-Total			98.4		%		80-120	02-DEC-21
Tin (Sn)-Total			99.5		%		80-120	02-DEC-21
Titanium (Ti)-Total			98.1		%		80-120	02-DEC-21
Zinc (Zn)-Total			96.5		%		80-120	02-DEC-21
WG3669146-1 MB								
Aluminum (Al)-Total			<0.0050		mg/L		0.005	02-DEC-21
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	02-DEC-21
Arsenic (As)-Total			<0.00010		mg/L		0.0001	02-DEC-21
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	02-DEC-21
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	02-DEC-21
Chromium (Cr)-Total			<0.00050		mg/L		0.0005	02-DEC-21
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	02-DEC-21
Copper (Cu)-Total			<0.00050		mg/L		0.0005	02-DEC-21
Iron (Fe)-Total			<0.010		mg/L		0.01	02-DEC-21
Lead (Pb)-Total			<0.000050		mg/L		0.00005	02-DEC-21
Manganese (Mn)-Total			<0.00050		mg/L		0.0005	02-DEC-21
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	02-DEC-21
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	02-DEC-21
Selenium (Se)-Total			<0.000050		mg/L		0.00005	02-DEC-21
Silver (Ag)-Total			<0.000050		mg/L		0.00005	02-DEC-21
Tin (Sn)-Total			<0.00010		mg/L		0.0001	02-DEC-21
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	02-DEC-21
Zinc (Zn)-Total			<0.0030		mg/L		0.003	02-DEC-21
WG3669146-5 MS		**WG3669146-6**						
Aluminum (Al)-Total			119.5		%		70-130	02-DEC-21

Quality Control Report

Client: FISHER ENVIRONMENTAL
15-400 ESNA PARK DRIVE
MARKHAM ON L3R 3K2
Contact: Clive Wiggan

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R5660884								
WG3669146-5 MS		**WG3669146-6**						
Antimony (Sb)-Total			108.8		%		70-130	02-DEC-21
Arsenic (As)-Total			111.7		%		70-130	02-DEC-21
Beryllium (Be)-Total			109.0		%		70-130	02-DEC-21
Cadmium (Cd)-Total			109.4		%		70-130	02-DEC-21
Chromium (Cr)-Total			106.9		%		70-130	02-DEC-21
Cobalt (Co)-Total			108.7		%		70-130	02-DEC-21
Copper (Cu)-Total			108.0		%		70-130	02-DEC-21
Iron (Fe)-Total			N/A	MS-B	%		-	02-DEC-21
Lead (Pb)-Total			103.3		%		70-130	02-DEC-21
Manganese (Mn)-Total			N/A	MS-B	%		-	02-DEC-21
Molybdenum (Mo)-Total			112.0		%		70-130	02-DEC-21
Nickel (Ni)-Total			104.6		%		70-130	02-DEC-21
Selenium (Se)-Total			110.0		%		70-130	02-DEC-21
Silver (Ag)-Total			103.4		%		70-130	02-DEC-21
Tin (Sn)-Total			108.2		%		70-130	02-DEC-21
Titanium (Ti)-Total			108.6		%		70-130	02-DEC-21
Zinc (Zn)-Total			N/A	MS-B	%		-	02-DEC-21
OGG-SPEC-WT	**Water**							
Batch R5663496								
WG3669056-2 LCS								
Oil and Grease, Total			94.5		%		70-130	02-DEC-21
Mineral Oil and Grease			90.4		%		70-130	02-DEC-21
WG3669056-1 MB								
Oil and Grease, Total			<5.0		mg/L		5	02-DEC-21
Mineral Oil and Grease			<2.5		mg/L		2.5	02-DEC-21
P-T-COL-WT	**Water**							
Batch R5666017								
WG3669192-3 DUP		**L2668669-1**						
Phosphorus, Total		0.0195	0.0172		mg/L	13	20	06-DEC-21
WG3669192-2 LCS								
Phosphorus, Total			98.5		%		80-120	06-DEC-21
WG3669192-1 MB								
Phosphorus, Total			<0.0030		mg/L		0.003	06-DEC-21
WG3669192-4 MS		**L2668669-1**						
Phosphorus, Total			98.5		%		70-130	06-DEC-21

Quality Control Report

Client: FISHER ENVIRONMENTAL
15-400 ESNA PARK DRIVE
MARKHAM ON L3R 3K2
Contact: Clive Wiggan

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-NAPHTHALENE-WT	**Water**							
Batch R5663248								
WG3669114-2 LCS								
Naphthalene			85.8		%		50-130	03-DEC-21
WG3669114-1 MB								
Naphthalene			<0.020		ug/L		0.02	03-DEC-21
Surrogate: d8-Naphthalene			90.5		%		60-140	03-DEC-21
PH-WT	**Water**							
Batch R5666550								
WG3669991-4 DUP		**WG3669991-3**						
pH		7.48	7.46	J	pH units	0.02	0.2	04-DEC-21
WG3669991-2 LCS								
pH			7.04		pH units		6.9-7.1	04-DEC-21
PHENOLS-4AAP-WT	**Water**							
Batch R5666236								
WG3669232-3 DUP		**L2668436-1**						
Phenols (4AAP)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	03-DEC-21
WG3669232-2 LCS								
Phenols (4AAP)			101.4		%		85-115	03-DEC-21
WG3669232-1 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	03-DEC-21
WG3669232-4 MS		**L2668436-1**						
Phenols (4AAP)			93.8		%		75-125	03-DEC-21
SO4-IC-N-WT	**Water**							
Batch R5665797								
WG3669665-9 DUP		**WG3669665-8**						
Sulfate (SO4)		41.5	41.5		mg/L	0.1	20	03-DEC-21
WG3669665-7 LCS								
Sulfate (SO4)			101.2		%		90-110	03-DEC-21
WG3669665-6 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	03-DEC-21
WG3669665-10 MS		**WG3669665-8**						
Sulfate (SO4)			101.6		%		75-125	03-DEC-21
SOLIDS-TSS-WT	**Water**							
Batch R5667701								
WG3670445-3 DUP		**L2668765-1**						
Total Suspended Solids		68	71		mg/L	4.3	20	07-DEC-21
WG3670445-2 LCS								
Total Suspended Solids			102.3		%		85-115	07-DEC-21

Quality Control Report

Client: FISHER ENVIRONMENTAL
15-400 ESNA PARK DRIVE
MARKHAM ON L3R 3K2
Contact: Clive Wiggan

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TSS-WT	**Water**							
Batch R5667701								
WG3670445-1 MB								
Total Suspended Solids			<3.0		mg/L		3	07-DEC-21
TKN-F-WT	**Water**							
Batch R5664498								
WG3669194-3 DUP		**L2668526-1**						
Total Kjeldahl Nitrogen		1.24	1.10		mg/L	12	20	03-DEC-21
WG3669194-2 LCS								
Total Kjeldahl Nitrogen			106.3		%		75-125	03-DEC-21
WG3669194-1 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	03-DEC-21
WG3669194-4 MS		**L2668526-1**						
Total Kjeldahl Nitrogen			112.8		%		70-130	03-DEC-21
VOC-ROU-HS-WT	**Water**							
Batch R5665477								
WG3670187-4 DUP		**WG3670187-3**						
1,4-Dichlorobenzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	06-DEC-21
Benzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	06-DEC-21
Chloroform		<1.0	<1.0	RPD-NA	ug/L	N/A	30	06-DEC-21
Dichloromethane		<2.0	<2.0	RPD-NA	ug/L	N/A	30	06-DEC-21
Ethylbenzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	06-DEC-21
Tetrachloroethylene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	06-DEC-21
Toluene		<0.50	<0.40	RPD-NA	ug/L	N/A	30	06-DEC-21
Trichloroethylene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	06-DEC-21
WG3670187-1 LCS								
1,4-Dichlorobenzene			109.0		%		70-130	06-DEC-21
Benzene			105.5		%		70-130	06-DEC-21
Chloroform			104.4		%		70-130	06-DEC-21
Dichloromethane			107.8		%		70-130	06-DEC-21
Ethylbenzene			114.2		%		70-130	06-DEC-21
Tetrachloroethylene			106.2		%		70-130	06-DEC-21
Toluene			109.7		%		70-130	06-DEC-21
Trichloroethylene			105.4		%		70-130	06-DEC-21
WG3670187-2 MB								
1,4-Dichlorobenzene			<0.50		ug/L		0.5	06-DEC-21
Benzene			<0.50		ug/L		0.5	06-DEC-21

Quality Control Report

Client: FISHER ENVIRONMENTAL
15-400 ESNA PARK DRIVE
MARKHAM ON L3R 3K2
Contact: Clive Wiggan

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-ROU-HS-WT	**Water**							
Batch R5665477								
WG3670187-2 MB								
Chloroform			<1.0		ug/L		1	06-DEC-21
Dichloromethane			<2.0		ug/L		2	06-DEC-21
Ethylbenzene			<0.50		ug/L		0.5	06-DEC-21
Tetrachloroethylene			<0.50		ug/L		0.5	06-DEC-21
Toluene			<0.40		ug/L		0.4	06-DEC-21
Trichloroethylene			<0.50		ug/L		0.5	06-DEC-21
Surrogate: 1,4-Difluorobenzene			101.3		%		70-130	06-DEC-21
Surrogate: 4-Bromofluorobenzene			99.0		%		70-130	06-DEC-21
WG3670187-5 MS		**WG3670187-3**						
1,4-Dichlorobenzene			102.7		%		50-150	06-DEC-21
Benzene			99.8		%		50-150	06-DEC-21
Chloroform			99.9		%		50-150	06-DEC-21
Dichloromethane			104.4		%		50-150	06-DEC-21
Ethylbenzene			105.9		%		50-150	06-DEC-21
Tetrachloroethylene			97.3		%		50-150	06-DEC-21
Toluene			101.9		%		50-150	06-DEC-21
Trichloroethylene			98.8		%		50-150	06-DEC-21

Quality Control Report

Workorder: L2668669 Report Date: 09-DEC-21

Client: FISHER ENVIRONMENTAL
15-400 ESNA PARK DRIVE
MARKHAM ON L3R 3K2
Contact: Clive Wiggan

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Chain of Custody (COC)

L2668669-COFC

COC Number: 20 - 893216

Page of

www.alsglobal.com

Report To	Contact and company name below will appear on the final report
Company:	Fisher Environmental
Contact:	Clive
Phone:	416 - 605 - 9722
	Company address below will appear on the final report
Street:	15-401 Esna Park Dr.
City/Province:	Markham ON
Postal Code:	L3R 3K2
Invoice To	Same as Report To ☐ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	Fisher Environmental
Contact:	Clive

Project Information	
ALS Account # / Quote #:	
Job #:	
PO / AFE:	
LSD:	
ALS Lab Work Order # (ALS use only):	L2668669 WH

Select Report Format:	☒ PDF ☐ EXCEL ☐ EDD (DIGITAL)
Merge QC/QCI Reports with COA	☐ YES ☐ NO ☐ N/A
☐ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☒ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	Clive@FE
Email 2	
Email 3	

Invoice Recipients	
Select Invoice Distribution:	☐ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	
Email 2	

Oil and Gas Required Fields (client use)	
AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	
ALS Contact:	Sampler:

Turnaround Time (TAT) Requested

- ☐ Routine [R] if received by 3pm M-F - no surcharges apply
- ☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
- ☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
- ☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
- ☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
- ☐ Same day [E2] if received by 10am M-S - 200% rush surcharge. Additional fees may apply to rush requests on weekends, statutory holidays and non-routine tests

Date and Time Required for all E&P TATs:

For all tests with rush TATs requested, please contact your AM to confirm availability.

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Analysis Request

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below: Halton Region Sewer discharge bylaws (Unfiltered)	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	3005 Dundas St West Oakville Halton Region Sewer discharge bylaws MW6 (Unfiltered)	01/12/21		Water					

Drinking Water (DW) Samples[1] (client use)	Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)
Are samples taken from a Regulated DW System? ☐ YES ☒ NO	
Are samples for human consumption/ use? ☐ YES ☒ NO	

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☐ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				8.4			

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by: Nnameli	Date: 01/12/21	Time:	Received by:	Date:	Time:	Received by: HD	Date: 12/2/21	Time: 11:30

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

ALS 2016 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

APPENDIX E – HYDRAULIC CONDUCTIVITY ANALYSES

HYDRAULIC CONDUCTIVITY ANALYSIS

Location: *3005 Dundas Street West, Oakville*
Project: *FE-P-21-11713H*
Test Date: *3/23/2022*
Tested By: *CAW*
Well No. *MW1*

Equilibrium Water level (from top of pipe) HE	*154*	*cm*
Initial Water level (from top of pipe) Ho	*525*	*cm*
Monitoring well inner diameter d	*0.05*	*m*
Initial Time offset To	*5*	*second*
Reverse of Luthin's reference system Ru = Ho - HE	*371.00*	*cm*
Slope of Log((ho-he)/(ht-he)) / T	*9.00E-06*	
G = Ru / (HT - HE)		

Hydraulic conductivity computed k =

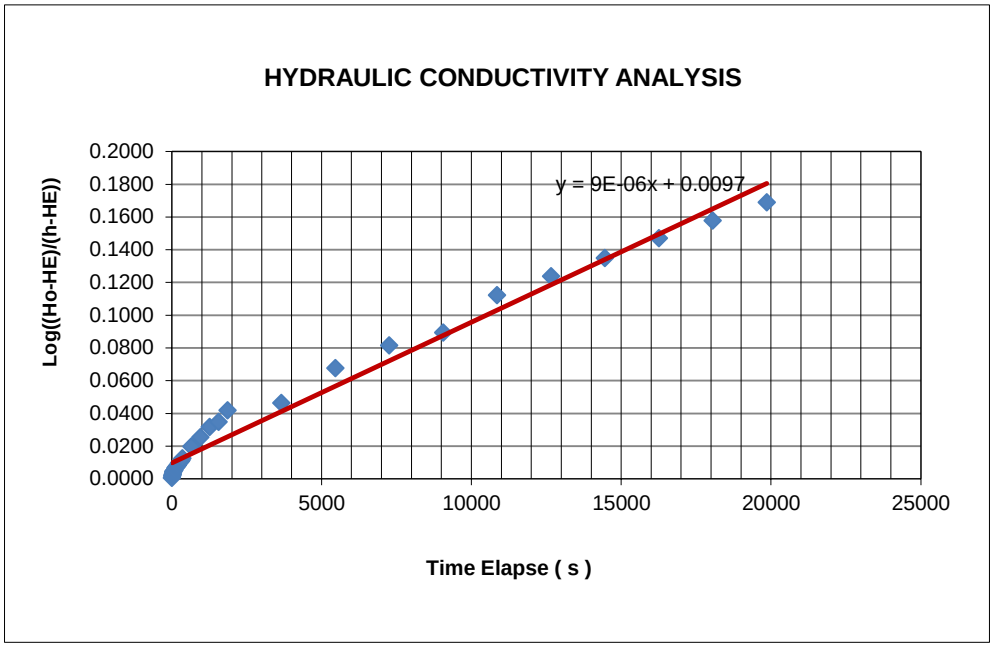
0.0000136	**cm/s**
1.36E-07	**m/s**
0.012	**m/day**

Time		HT (Water Drop)		G	LOG (G)
(Interval s)	(Elapsed s)	(m)	(cm)		
	0	5.250			
10	10	5.245	524.50	1.0013	0.0006
10	20	5.235	523.50	1.0041	0.0018
10	30	5.230	523.00	1.0054	0.0023
10	40	5.225	522.50	1.0068	0.0029
10	50	5.215	521.50	1.0095	0.0041
10	60	5.210	521.00	1.0109	0.0047
30	90	5.205	520.50	1.0123	0.0053
30	120	5.195	519.50	1.0150	0.0065
30	150	5.190	519.00	1.0164	0.0071
30	180	5.185	518.50	1.0178	0.0077
30	210	5.180	518.00	1.0192	0.0083
30	240	5.170	517.00	1.0220	0.0095
30	270	5.165	516.50	1.0234	0.0101
30	300	5.160	516.00	1.0249	0.0107
30	330	5.155	515.50	1.0263	0.0113
30	360	5.145	514.50	1.0291	0.0125
300	660	5.085	508.50	1.0465	0.0198
300	960	5.040	504.00	1.0600	0.0253
300	1260	4.990	499.00	1.0754	0.0316
300	1560	4.965	496.50	1.0832	0.0347
300	1860	4.910	491.00	1.1009	0.0417
1800	3660	4.875	487.500	1.112	0.046
1800	5460	4.715	471.500	1.169	0.068
1800	7260	4.615	461.500	1.207	0.082
1800	9060	4.560	456.000	1.228	0.089
1800	10860	4.405	440.500	1.295	0.112
1800	12660	4.330	433.000	1.330	0.124
1800	14460	4.260	426.000	1.364	0.135
1800	16260	4.185	418.500	1.403	0.147
1800	18060	4.120	412.000	1.438	0.158
1800	19860	4.055	405.500	1.475	0.169

FISHER ENGINEERING

HYDRAULIC CONDUCTIVITY ANALYSIS

Location: *3005 Dundas Street West, Oakville*
Project: *FE-P-21-11713H*
Test Date: *3/23/2022*
Tested By: *CAW*
Well No. *MW1*



FISHER ENGINEERING

HYDRAULIC CONDUCTIVITY ANALYSIS

Location: *3005 Dundas Street West, Oakville*
Project: *FE-P-21-11713H*
Test Date: *3/23/2022*
Tested By: *CAW*
Well No. *MW6*

Equilibrium Water level (from top of pipe) HE	*490*	*cm*
Initial Water level (from top of pipe) Ho	*685*	*cm*
Monitoring well inner diameter d	*0.05*	*m*
Initial Time offset To	*5*	*second*
Reverse of Luthin's reference system Ru = Ho - HE	*195.00*	*cm*
Slope of Log((ho-he)/(ht-he)) / T	*2.00E-05*	
G = Ru / (HT - HE)		

Hydraulic conductivity computed k =

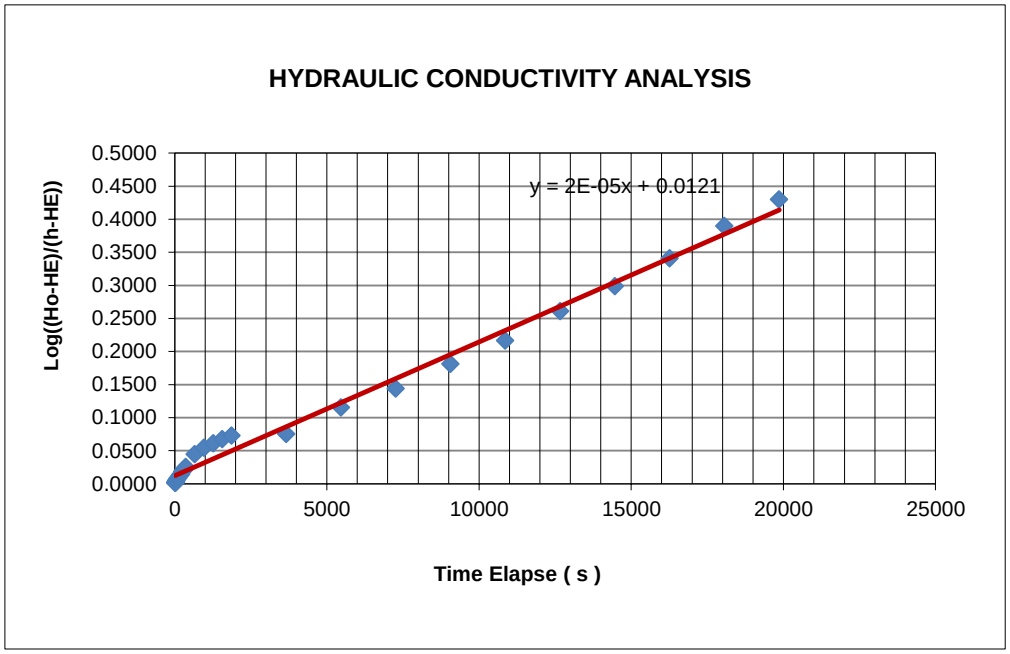
0.0000303	**cm/s**
3.03E-07	**m/s**
0.026	**m/day**

Time		HT (Water Drop)		G	LOG (G)
(Interval s)	(Elapsed s)	(m)	(cm)		
	0	6.850			
10	10	6.845	684.50	1.0026	0.0011
10	20	6.840	684.00	1.0052	0.0022
10	30	6.840	684.00	1.0052	0.0022
10	40	6.835	683.50	1.0078	0.0034
10	50	6.830	683.00	1.0104	0.0045
10	60	6.830	683.00	1.0104	0.0045
30	90	6.815	681.50	1.0183	0.0079
30	120	6.810	681.00	1.0209	0.0090
30	150	6.800	680.00	1.0263	0.0113
30	180	6.790	679.00	1.0317	0.0136
30	210	6.785	678.50	1.0345	0.0147
30	240	6.770	677.00	1.0428	0.0182
30	270	6.765	676.50	1.0456	0.0194
30	300	6.760	676.00	1.0484	0.0205
30	330	6.750	675.00	1.0541	0.0229
30	360	6.740	674.00	1.0598	0.0252
300	660	6.660	666.00	1.1080	0.0445
300	960	6.620	662.00	1.1337	0.0545
300	1260	6.595	659.50	1.1504	0.0609
300	1560	6.570	657.00	1.1677	0.0673
300	1860	6.550	655.00	1.1818	0.0726
1800	3660	6.540	654.00	1.1890	0.0752
1800	5460	6.395	639.50	1.3043	0.1154
1800	7260	6.300	630.00	1.3929	0.1439
1800	9060	6.185	618.50	1.5175	0.1811
1800	10860	6.085	608.50	1.6456	0.2163
1800	12660	5.970	597.00	1.8224	0.2607
1800	14460	5.880	588.00	1.9898	0.2988
1800	16260	5.790	579.00	2.1910	0.3406
1800	18060	5.695	569.50	2.4528	0.3897
1800	19860	5.625	562.50	2.6897	0.4297

FISHER ENGINEERING

HYDRAULIC CONDUCTIVITY ANALYSIS

Location: *3005 Dundas Street West, Oakville*
Project: *FE-P-21-11713H*
Test Date: *3/23/2022*
Tested By: *CAW*
Well No. *MW6*



FISHER ENGINEERING

HYDRAULIC CONDUCTIVITY ANALYSIS

Location: *3005 Dundas Street West, Oakville*
Project: *FE-P-21-11713H*
Test Date: *3/23/2022*
Tested By: *CAW*
Well No. *MW8*

Equilibrium Water level (from top of pipe) HE	*465*	*cm*
Initial Water level (from top of pipe) Ho	*595*	*cm*
Monitoring well inner diameter d	*0.05*	*m*
Initial Time offset To	*5*	*second*
Reverse of Luthin's reference system Ru = Ho - HE	*130.00*	*cm*
Slope of Log((ho-he)/(ht-he)) / T	*9.00E-06*	
G = Ru / (HT - HE)		

Hydraulic conductivity computed k =

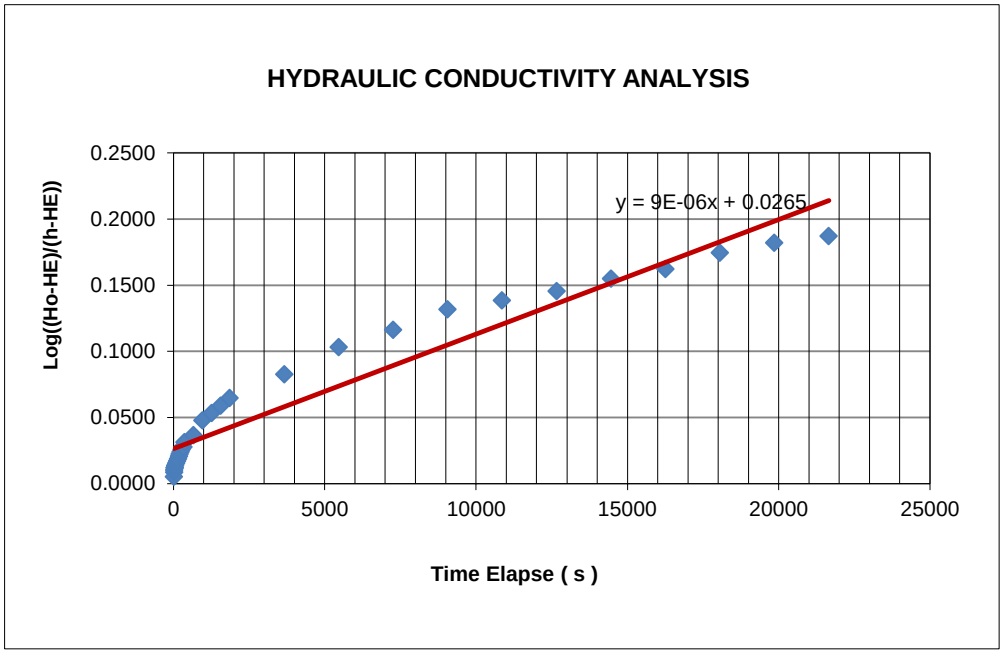
0.0000136	**cm/s**
1.36E-07	**m/s**
0.012	**m/day**

Time		HT (Water Drop)		G	LOG (G)
(Interval s)	(Elapsed s)	(m)	(cm)		
	0	5.950			
10	10	5.935	593.50	1.0117	0.0050
10	20	5.925	592.50	1.0196	0.0084
10	30	5.920	592.00	1.0236	0.0101
10	40	5.915	591.50	1.0277	0.0119
10	50	5.915	591.50	1.0277	0.0119
10	60	5.910	591.00	1.0317	0.0136
30	90	5.905	590.50	1.0359	0.0153
30	120	5.900	590.00	1.0400	0.0170
30	150	5.895	589.50	1.0442	0.0188
30	180	5.890	589.00	1.0484	0.0205
30	210	5.885	588.50	1.0526	0.0223
30	240	5.880	588.00	1.0569	0.0240
30	270	5.875	587.50	1.0612	0.0258
30	300	5.870	587.00	1.0656	0.0276
30	330	5.870	587.00	1.0656	0.0276
30	360	5.860	586.00	1.0744	0.0312
300	660	5.845	584.50	1.0879	0.0366
300	960	5.815	581.50	1.1159	0.0476
300	1260	5.800	580.00	1.1304	0.0532
300	1560	5.785	578.50	1.1454	0.0589
300	1860	5.770	577.00	1.1607	0.0647
1800	3660	5.725	572.50	1.2093	0.0825
1800	5460	5.675	567.50	1.2683	0.1032
1800	7260	5.645	564.50	1.3065	0.1161
1800	9060	5.610	561.00	1.3542	0.1317
1800	10860	5.595	559.50	1.3757	0.1385
1800	12660	5.580	558.00	1.3978	0.1455
1800	14460	5.560	556.00	1.4286	0.1549
1800	16260	5.545	554.50	1.4525	0.1621
1800	18060	5.520	552.00	1.4943	0.1744
1800	19860	5.505	550.50	1.5205	0.1820
1800	21660	5.495	549.50	1.5385	0.1871

FISHER ENGINEERING

HYDRAULIC CONDUCTIVITY ANALYSIS

Location: ***3005 Dundas Street West, Oakville***
Project: ***FE-P-21-11713H***
Test Date: ***3/23/2022***
Tested By: ***CAW***
Well No. ***MW8***



APPENDIX F – CONSTRUCTION DEWATERING AND PERMANENT DRAINAGE

Construction Dewatering Calculation

Location: *3005 Dundas Street West, Oakville*
Project: *FE-P-21-11713H*
Date: *3/30/2022*

Dupuit Forcheimer for Radial Flow to a Closely Welled System or Excavation

Construction Units	TOS (m asl)	FFE (m asl)	Average Footing Elevation (m asl)	Required Dewatering Elevation (m asl)	Static water level		Well base elevation	H (m)	h_w (m)	H-h_w (m)	R_0 (m)		r_w	ab (m^2)	K (m/s)	H^2-h_w^2	lnR_0	lnr_w	Q, (m^3/s)	Q, (m^3/day)
					BGS (m)	Elevation (m asl)	(m)				Model	Adjusted								
Building with 4 UG levels	143.10	154.30	142.30	141.30	4.00	149.94	141.00	8.94	0.3	8.64	6.38	55.06	48.68	7445	1.36E-07	79.83	4.01	3.89	2.77E-04	23.97
Building with 5 UG levels	140.30	154.30	139.50	138.50	4.00	149.94	138.20	11.74	0.3	11.44	8.44	57.13	48.68	7445	1.36E-07	137.74	4.05	3.89	3.68E-04	31.83

Dupuit Forcheimer Equation

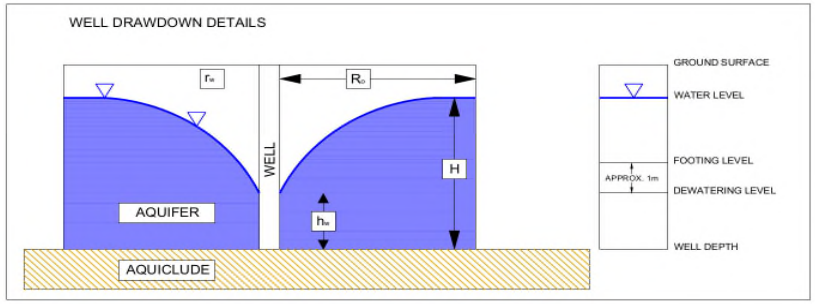
$$Q = \frac{\pi K(H^2 - h_w{}^2)}{lnR_0 - lnr_w}$$

Equivalent radius of well, r_w

$$r_w = \sqrt{\frac{ab}{\pi}}$$

Radius of influence in m, calculated from Sichardt's equation

$$R_0 = 2000(H - h_w)\sqrt{k}$$



Where:

r_w = equivalent radius of the well in m,
H = hydraulic head of the original water table (total saturated aquifer thickness) in m,
h_w = hydraulic head at maximum dewatering (proposed drawdown) in m,
R_0 = radius of influence in m, calculated from Sichardt's equation, and
K = hydraulic conductivity, in m/s
a = length of excavation area in m
b = width of excavation area in m

Permanent Drainage Rates

Location: *3005 Dundas Street West, Oakville*
Project: *FE-P-21-11713H*
Date: *3/30/2022*

Dupuit Forcheimer for Radial Flow to a Closely Welled System or Excavation

Construction Units	TOS (m asl)	FFE (m asl)	Average Footing Elevation (m asl)	Required Dewatering Elevation (m asl)	Static water level		Well base elevation	H (m)	h_w (m)	H-h_w (m)	R_0 (m)		r_w	ab (m^2)	K (m/s)	H^2-h_w^2	lnR_0	lnr_w	Q, (m^3/s)	Q, (m^3/day)
					BGS (m)	Elevation (m asl)	(m)				Model	Adjusted								
Building with 4 UG levels	143.10	154.30	142.30	142.80	3.00	151.25	142.55	8.70	0.3	8.45	6.24	54.92	48.68	7445	1.36E-07	75.63	4.01	3.89	2.68E-04	23.19
Building with 5 UG levels	140.30	154.30	139.50	140.00	3.00	151.25	139.75	11.50	0.3	11.25	8.30	56.99	48.68	7445	1.36E-07	132.19	4.04	3.89	3.59E-04	31.03

Dupuit Forcheimer Equation

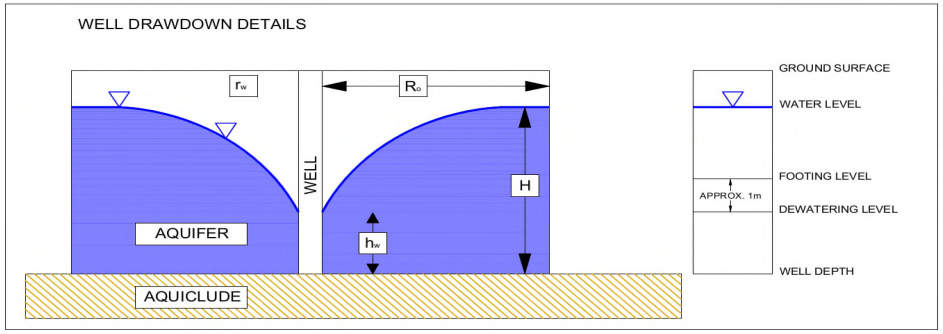
$$Q = \frac{\pi K(H^2 - h_w{}^2)}{lnR_0 - lnr_w}$$

Equivalent radius of well, r_w

$$r_w = \sqrt{\frac{ab}{\pi}}$$

Radius of influence in m, calculated from Sichardt's equation

$$R_0 = 2000(H - h_w)\sqrt{k}$$

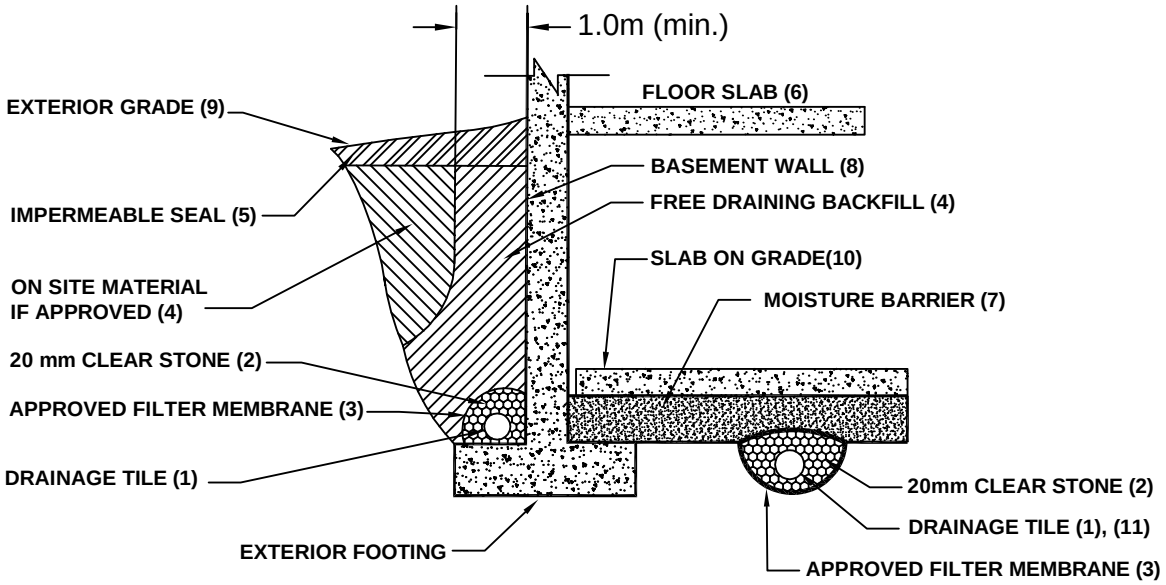


Where:

r_w = equivalent radius of the well in m,
H = hydraulic head of the original water table (total saturated aquifer thickness) in m,
h_w = hydraulic head at maximum dewatering (proposed drawdown) in m,
R_0 = radius of influence in m, calculated from Sichardt's equation, and
K = hydraulic conductivity, in m/s
a = length of excavation area in m
b = width of excavation area in m

APPENDIX G – BACKFILL AND DRAINAGE DESIGN

FISHER ENGINEERING



NOTES:

(1) DRAINAGE TILE TO CONSIST OF 100mm (4") DIAMETER WEEPING TILE OR EQUIVALENT PERFORATED PIPE LEADING TO A POSITIVE SUMP OR OUTLET.

(2) 20mm (3/4") CLEAR STONE - 150mm (6") TOP AND SIDE OF DRAIN. IF DRAIN IS NOT ON FOOTING, PLACE 100mm (4") OF STONE BELOW DRAIN.

(3) WRAP THE CLEAR STONE WITH AN APPROVED FILTER MEMBRANE (TERRAFIX 279R OR EQUIVALENT).

(4) FREE DRAINING BACKFILL - OPSS GRANULAR B OR EQUIVALENT COMPACTED TO THE SPECIFIED DENSITY. DO NOT USE HEAVY COMPACTION EQUIPMENT WITHIN 1.8m (6') OF WALL.

(5) IMPERMEABLE BACKFILL SEAL - COMPACTED CLAY, CLAYEY SILT OR EQUIVALENT. IF ORIGINAL SOIL IS FREE-DRAINING, SEAL MAY BE OMITTED. MAXIMUM THICKNESS OF SEAL TO BE 0.5m.

(6) DO NOT BACKFILL UNTIL WALL IS SUPPORTED BY BASEMENT AND FLOOR SLABS OR ADEQUATE BRACING.

(7) MOISTURE BARRIER TO BE AT LEAST 200mm (8") OF COMPACTED CLEAR 20mm (3/4") STONE OR EQUIVALENT FREE DRAINING MATERIAL. A VAPOUR BARRIER MAY BE REQUIRED FOR SPECIALTY FLOORS.

(8) BASEMENT WALL TO BE DAMP PROOFED.

(9) EXTERIOR GRADE TO SLOPE AWAY FROM BUILDING.

(10) SLAB ON GRADE SHOULD NOT BE STRUCTURALLY CONNECTED TO THE WALL OR FOOTING

(11) UNDERFLOOR DRAIN INVERT TO BE AT LEAST 300mm (12") BELOW UNDERSIDE OF FLOOR SLAB. DRAINAGE TILE PLACED IN PARALLEL ROWS 6 TO 8m (20-25') CENTERS ONE WAY. PLACE DRAIN ON 100mm (4") CLEAR STONE WITH 150mm (6") OF CLEAR STONE ON TOP AND SIDES. ENCLOSE STONE WITH FILTER FABRIC AS NOTED IN (3)

(12) THE ENTIRE SUBGRADE TO BE SEALED WITH APPROVED FILER FABRIC (TERRAFIX 270R OR EQUIVALENT) IF NON-COHESIVE(SANDY) SOILS BELOW GROUND WATER TABLE ENCOUNTERED.

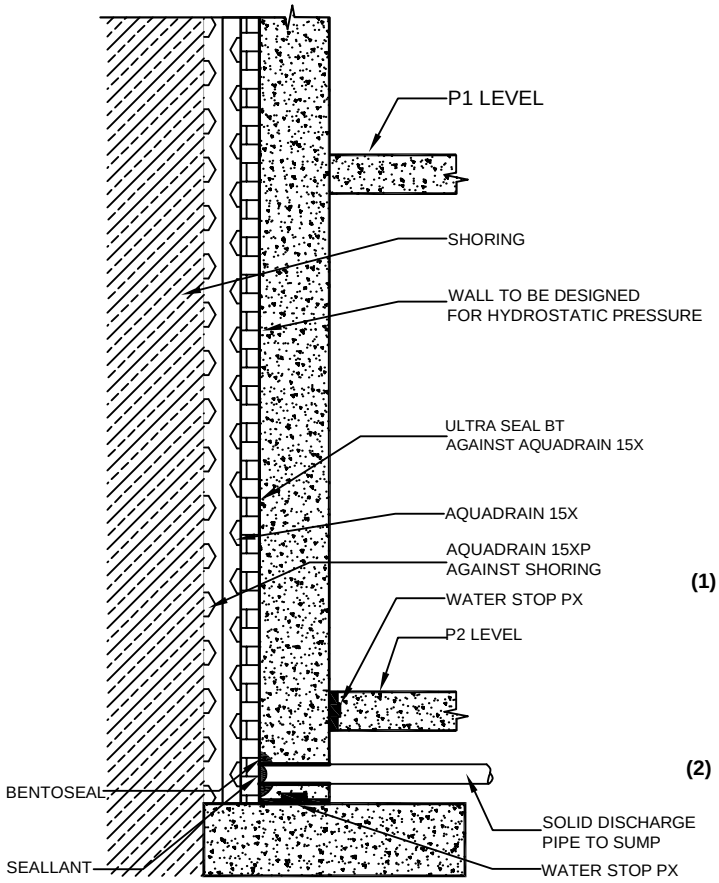
(13) DO NOT CONNECT THE UNDERFLOOR DRAINS TO PERIMETER DRAINS.

(14) REVIEW THE GEOTECHNICAL REPORT FOR SPECIFIC DETAILS.

DRAINAGE AND BACKFILL RECOMMENDATIONS

BASEMENT WITH UNDERFLOOR DRAINAGE

(NOT TO SCALE)



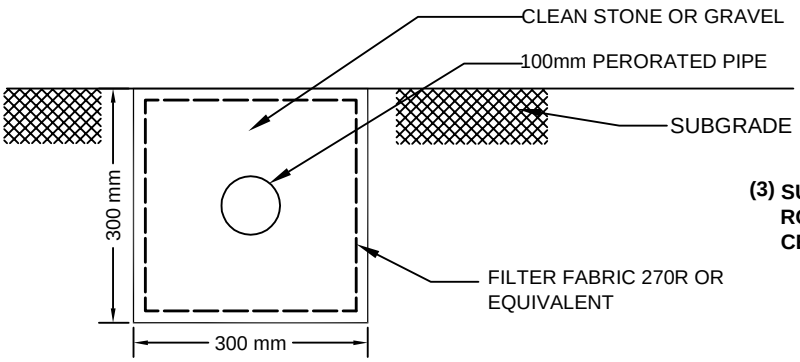
NOTES:

(1) ALL PERMANENT DRAINAGE PIPES MUST HAVE GEOTEXTILE FILTER SLEEVE TO PREVENT LONG TERM SILTING. TO FURTHER MINIMIZE SILTATION OF THE DRAINAGE SYSTEM, ALL DRAINAGE PIPE CONNECTION MUST BE SOLID PVC ELBOWS AND Ts. NO "BUTT" END CONNECTIONS SHOULD BE PERMITTED.

(2) PERIMETER COLLECTION PIPE TO BE SOLID PIPE,

SUGGESTED EXTERIOR DRAINAGE AGAINST SHORING

(NOT TO SCALE)

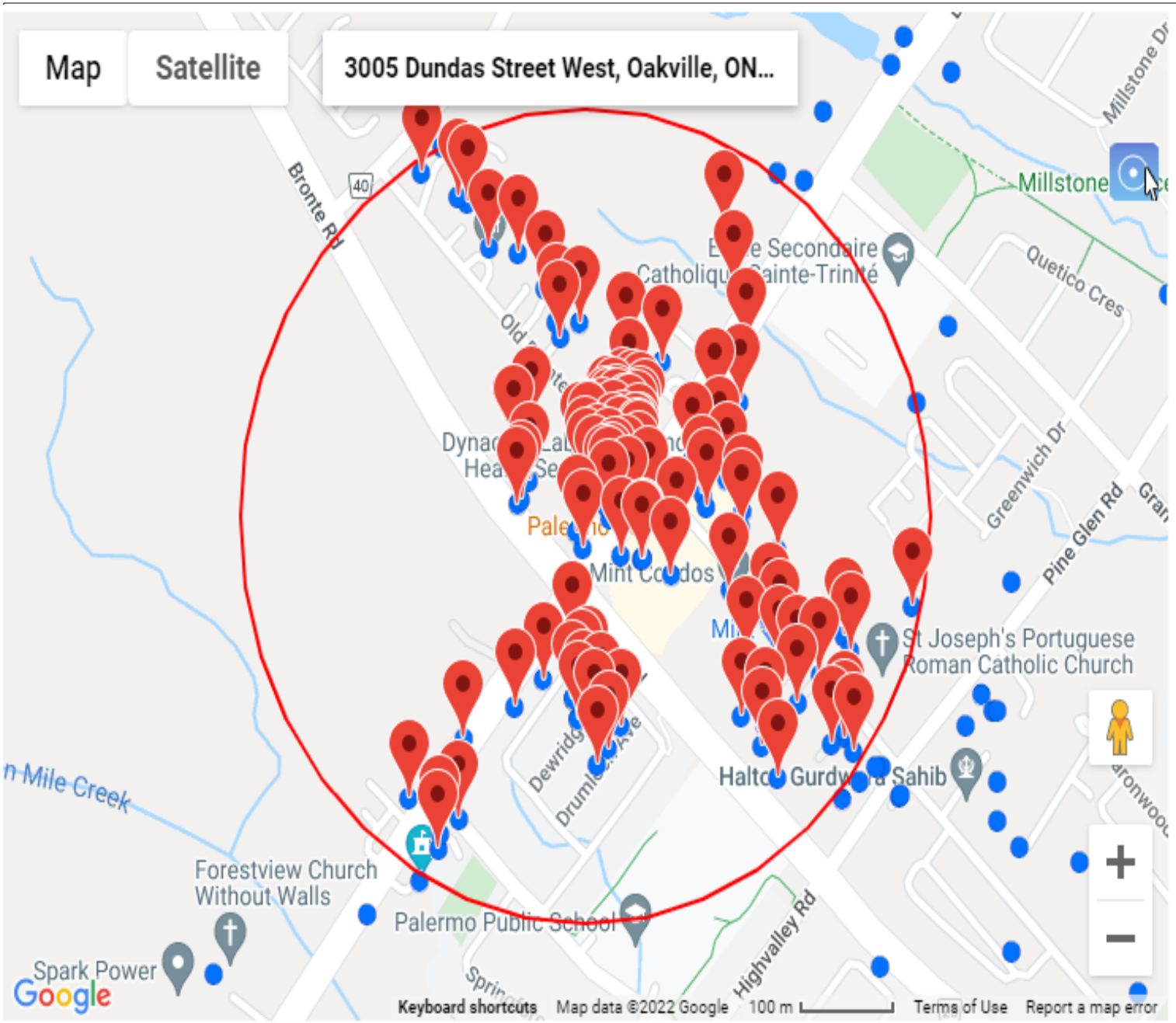


(3) SUBGRADE DRAIN TO BE PLACED IN PARALLEL ROWS 6-8 m (20'-25'), FROM CENTERLINE TO CENTERLINE.

DETAIL OF SUBGRADE DRAIN

(NOT TO SCALE)

APPENDIX H – PRIVATE WELL SURVEY



Latitude:43.43914, Longitude:-79.77057 (UTM Zone:17, Easting:599493, Northing:4810316)

FISHER ENGINEERING
400 Esna Park Dr., #15
Markham, Ontario
L3R 3K2
Tel: 905 475-7755
Fax: 905 475-7718

NORTH

N

LEGEND

SITE BOUNDARY

PROJECT NAME AND ADDRESS

HYDROGEOLOGICAL INVESTIGATION

3005 Dundas Street West,
OAKVILLE, ONTARIO

FIGUREH 1:

WELLS WITHIN 500M RADIUS

SHEET NO.

H1

PROJECT NO.
FE-P21-11713H

DATE
APRIL 2022

SCALE
AS SHOWN

December 14, 2021

Enirox Group
101 Railside Rd.
North York, ON, M3A 1B2

Attn: Arash Kamali, B.Eng., CEO
Email: akamali@enirox.com

Re: PRELIMINARY GEOTECHNICAL & HYDROGEOLOGICAL COMMENTS –
PROPOSED NEW DEVELOPMENT, 3005 DUNDAS STREET WEST, OAKVILLE, ONTARIO
Project Number: 21-11713/14

We are pleased to submit this letter of opinion regarding geotechnical and hydrogeological aspects of design/construction for the proposed new development at the captioned site.

Details of the proposed new development were not available; however, we understand that it will consist of a high-rise building with 4 to 5 levels of underground parking.

Eight (8) boreholes were put down to depths from 6.71m (BH2, 3, 7 & 8) to 18.29m (BH 5) below prevailing grades between November 22 & 26, 2021. Approximate borehole locations/elevations are shown on the appended site plan.

Borehole elevations were established by interpolation from a topographical survey plan, prepared by Sexton McKay Limited (plotted April 5, 2007) which was provided to Fisher during the investigation.

Rock coring was carried out in boreholes BH4 & BH5 between approximate depths of 10.57m & 13.7m (BH4) and 9.1m & 18.3m (BH5).

We present the following general comments regarding geotechnical aspects of design/construction based on the soil stratigraphy and groundwater conditions observed from MW1 to MW8.

SOIL STRATIGRAPHY

Fill soils extending to variable depths were encountered at the surface of boreholes in all locations. Surface elevations, approximate depths of fill below prevailing grades/elevations, bottom of fill/borehole elevations are summarized Table 1.

Table 1: Fill Depths and Elevations.

Borehole No.	BH1	BH2	BH3	BH4	BH5	BH6	BH7	BH8
Surface Elevation (m asl)	154.00	153.92	153.59	154.50	154.52	153.81	153.90	154.37
Depth of Borehole (m bgs)	12.35	6.71	6.71	13.72	18.29	8.38	6.71	6.71
Elevation at Bottom of Borehole (m asl)	141.65	147.21	146.88	140.78	136.23	145.43	147.19	147.66
Depth of Fill (m bgs)	1.52	2.29	2.13	1.98	1.22	1.37	0.46	1.60
Elevation at Bottom of Fill (m asl)	152.48	151.63	151.46	152.52	153.30	152.44	153.44	152.77

Fill composition varied from dark brown to brown/grey sand/silty sand to sand & gravel with some to trace of topsoil/roots and occasional pieces of asphalt/brick/metal or plastic.

Underlying natural soils predominantly consist of grey/reddish brown silty tills of relative densities varying from compact to very dense. The till soils extended to approximate depths varying from 4.88m (no. 7) to 7.93m (no. 6).

Silt till soils were followed by reddish brown hard weathered shale. Inferred surface elevation of weathered shale bedrock varied from 145.88m in borehole 6 to 149.02m in borehole 7. It should be noted that refusal to power auguring was encountered at depths/elevations varying from 12.34m/141.66m (no. 1) to 6.71m/147.66m (no. 8) indicating variable depths of weathering of rock across the site.

GROUNDWATER CONDITIONS

The open boreholes were observed to be generally dry on completion of drilling. Standing water was observed at 6.10m bgs in BH1. Mud rotary was used for rock coring in BH4 and BH5. Static groundwater levels, measured on November 30 and December 15, 2021, vary between 1.56m and 5.32m in the shallow wells (less than 10.5m deep) and 5.10m and 6.23m in the deep well (MW5) as shown in Table 2. The water bearing soils on the site consist of the silty till overburden material and the weathered/fractured sections of the predominantly hard shale at greater depth. Based on field soil description (Unified Soil Classification System), the water bearing overburden soils may be classified as silty sands/sandy silts (SM) with estimated hydraulic conductivity (K) values in the order of 10^{-3} to 10^{-5} cm/s.

For four to five underground levels, it is expected that some amount of groundwater will be encountered during construction, particularly in the overburden soils and weathered seams/sections of the shale. Ars.

A groundwater dewatering system may not be required depending on the time of year that excavation takes place. Once the groundwater in the overburden soils is controlled during construction, then localized dewatering may take place by pumping from sump pits in the silt till and shale at greater depth.

Provisions will also have to be made to rid the site of accumulated precipitation in the excavated areas during construction. This water will have to be tested and hauled by an MOE licensed contractor or be discharged to the City/Region sewer system during construction. Contingencies will also have to be made to dispose of groundwater accruing from permanent drainage unless the subsurface structures of the building are designed as watertight. Details of construction dewatering and permanent drainage quantities will be available following further investigation.

Table 2: Groundwater levels and elevations.

Well No.	Elev. at Ground (m)	Depth of Well		On Completion		30-Nov-21		15-Dec-21	
		m bgs	m asl	GW level, m bgs	GW Ele, m asl	GW level, m bgs	GW Ele, m asl	GW level, m bgs	GW Ele, m asl
MW1	154.00	10.37	143.63	6.10	147.90	2.16	151.84	1.56	152.44
MW2	153.92	6.71	147.21	Dry	-	4.85	149.07	4.72	149.20
MW3	153.59	4.57	149.02	Dry	-	Dry	-	Dry	-
MW4	154.50	9.76	144.74	n/a - rock coring	-	2.55	151.95	2.16	152.34
MW5	154.52	18.29	136.23	n/a - rock coring	-	5.10	149.42	6.23	148.29
MW6	153.81	7.93	145.88	Dry	-	1.67	152.14	5.13	148.68
MW7	153.90	6.71	147.19	Dry	-	5.10	148.80	5.32	148.58
MW8	154.37	6.71	147.66	Dry	-	1.67	152.70	5.25	149.12

FOUNDATIONS

We were advised that the proposed development will likely consist of high-rise building with four to five levels of underground parking.

The proposed building foundations will likely be placed at depths of 12.5m or below the prevailing grades.

For footings placed over undisturbed solid shale bedrock at or below approximate depth of 12.5m SLS bearing pressure of 4,000kPa and ULS bearing pressure of 6,000kPa will be available for design purposes. Loose/broken/weathered shale must be removed from the footing areas. Concrete skim coat must be placed to protect the exposed footing bases.

Based the information from the boreholes Site Class 'B' will be available for earthquake design purposes for footings supported by solid shale bedrock. We recommend that shear wave velocity measurements be carried out to confirm the site class/bedrock quality.

PARKING GARAGE EXCAVATION

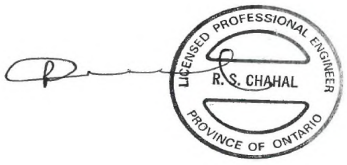
The onsite soils in boreholes can generally be classified as Type 3 to Type 2 Soils and will generally require side slopes of 1H:1V or flatter. In case of limited space for safe slopes, a shoring support system will be required. Fill and overburden soils/weathered shale can be supported by anchored soldier piles/lagging and/or caisson walls as required. Excavation in solid bedrock can be rock pins/wire mesh/shotcrete.

Some groundwater control measures will likely be required for excavations extending into/through wet seams/pockets/layers.

SLAB-ON-GRADE/ GARAGE WALLS/DRAINAGE

Permanent underfloor & perimeter drainage in addition to damp/water proofing of garage walls will be required. If the above is not feasible or permitted, then a bathtub design i.e., watertight structure along with design accommodations for lateral earth pressures & hydrostatic uplift pressures on parking garage walls/lowest slab-on-grade will be required.

Fisher Engineering Limited



Rajinder Chahal, P. Eng.
Senior Project Engineer
Mobile: 647.227.8473
rajinder@fishereng.com

FISHER ENGINEERING

LOG OF BOREHOLE NO. BH1 SHEET. 1 of 2

PROJECT NO.: FE-P 21-11713/14/15

PROJECT NAME: Phase II ESA, Geotechnical & Hydrogeological Investigations

LOCATION: 3005 Dundas Street W., Oakville, Ontario

DRILLING METHOD: CME-75, Solid Stem

DRILLING DATE: November 22, 2021

DEPTH (feet)	DEPTH (metres)	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	LAB ID:	TYPE NUMBER	"N" VALUE
		GROUND SURFACE (m asl)		154.00			
0	0	FILL: gravel & sand, some silt, some roots, brown, moist.				SS-1	Auger
2	1					SS-2	9
4				1.52/ 152.48			
6	2	GREY SILT TILL: some clay/sand, trace of gravel, moist, wet seams, compact.				SS-3	14
8						SS-4	17
10	3			3.35/ 150.65		SS-5	67
12	4	REDDISH BROWN SILT TILL: some clay/sand, trace of gravel, occasional pieces of shale, dry to moist, very dense.					
14							
16	5					SS-6	80
18				5.79/ 148.21			
20	6	GREYISH BROWN WEATHERED SHALE: moist, hard.				SS-7	100+
22				6.71/ 147.29			
24	7	REDDISH BROWN WEATHERED SHALE: dry, hard.					
26	8					SS-8	100+
28							
30	9					SS-9	100+
32	10						

PENETRATION TESTING (SPT) ▲ 20 40 60 80
SHEAR STRENGTH (Kpa) ✚ 40 80 120 160

VAPOUR READING (ppm) □ 20 40 60 80
MOISTURE CONTENT (%) ● 10 20 30 40

SS-3: 17%
SS-4: 12%
SS-6: 12%
SS-8: 9%

PIEZOMETER OR WELL CONSTRUCTION

1.56

Flush Mount Cover
Bentonite Pellets
50mm blank PVC
50mm Slotted Pipe
Silica Sand

Groundwater Depth: on completion: 6.10m; on Nov. 30, 2021: 2.16m; on Dec. 15, 2021: 1.56m

DRAWN: BL LOGGED: CW CHECKED: RC

FISHER ENGINEERING

LOG OF BOREHOLE NO. BH1(MW) SHEET. 2 of 2

PROJECT NO.: FE-P 21-11713/14/15

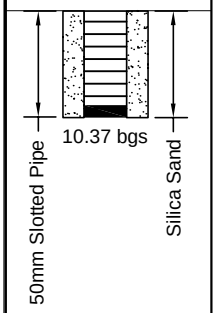
PROJECT NAME: Phase II ESA, Geotechnical & Hydrogeological Investigations

LOCATION: 3005 Dundas Street W., Oakville, Ontario

DRILLING METHOD: CME-75, Solid Stem

DRILLING DATE: November 22, 2021

DEPTH (feet)	DEPTH (metres)	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: LAB ID:	SAMPLES: TYPE NUMBER	SAMPLES: "N" VALUE	PENETRATION TESTING (SPT) ▲ 20 40 60 80 / SHEAR STRENGTH (Kpa) ✚ 40 80 120 160	VAPOUR READING (ppm) □ 20 40 60 80 / MOISTURE CONTENT (%) ● 10 20 30 40	PIEZOMETER OR WELL CONSTRUCTION
		GROUND SURFACE (m asl)								
32	10	REDDISH BROWN WEATHERED SHALE: moist to dry, hard.								
34										
36	11					SS-10	100+			
38										
40	12			12.34/ 141.66		SS-11	100+			
		End of Borehole								
42	13									
44		Refusal to augering at 12.34m.								
46	14									
48										
50	15									
52	16									
54										
56	17									
58										
60	18									
62	19									
64										
66										



Groundwater Depth: on completion: 6.10m; on Nov. 30, 2021: 2.16m; on Dec. 15, 2021: 1.56m

DRAWN: BL LOGGED: CW CHECKED: RC

FISHER ENGINEERING

LOG OF BOREHOLE NO. BH2 SHEET. 1 of 1

PROJECT NO.: FE-P 21-11713/14/15

PROJECT NAME: Phase II ESA, Geotechnical & Hydrogeological Investigations

LOCATION: 3005 Dundas Street W., Oakville, Ontario

DRILLING METHOD: CME-75, Solid Stem

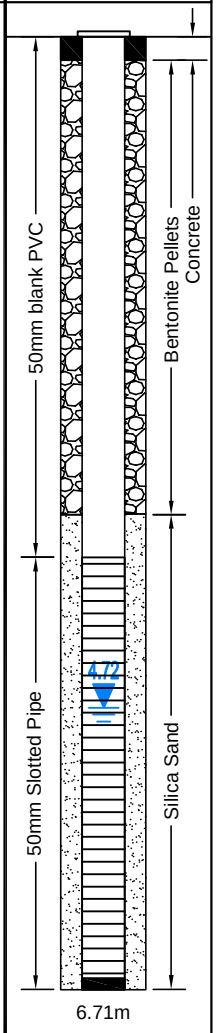
DRILLING DATE: November 22, 2021

DEPTH (feet)	DEPTH (metres)	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	LAB ID:	TYPE NUMBER	"N" VALUE
		GROUND SURFACE (m asl)		153.92			
0	0	FILL: sand & gravel, some silt, some roots, boulders, moist.				SS-1	10
2							
4	1					SS-2	13
6	2					SS-3	7
				2.29/ 151.63			
8		GREY SILT TILL: some clay/sand, trace of gravel, stains, moist, compact to dense.				SS-4	25
10	3					SS-5	30
12							
14	4			4.27/ 149.65			
16	5	REDDISH BROWN SILT TILL: some clay/sand, trace of gravel, occasional pieces of shale, dry to moist, very dense.				SS-6	100+
18							
20	6			6.40/ 147.52		SS-7	100+
22	7	REDDISH BROWN WEATHERED SHALE: dry, hard.		6.71/ 147.21			
24		End of Borehole					
26	8	Refusal to augering at 6.71m.					
28							
30	9						
32	10						

PENETRATION TESTING (SPT) ▲ 20 40 60 80
SHEAR STRENGTH (Kpa) ✚ 40 80 120 160

VAPOUR READING (ppm) □ 20 40 60 80
MOISTURE CONTENT (%) ● 10 20 30 40

PIEZOMETER OR WELL CONSTRUCTION



Groundwater Depth: on completion: dry; on Nov. 30, 2021: 4.85m; on Dec. 15, 2021: 4.72m

DRAWN: BL LOGGED: CW CHECKED: RC

FISHER ENGINEERING

LOG OF BOREHOLE NO. BH3 SHEET. 1 of 1

PROJECT NO.: FE-P 21-11713/14/15

PROJECT NAME: Phase II ESA, Geotechnical & Hydrogeological Investigations

LOCATION: 3005 Dundas Street W., Oakville, Ontario

DRILLING METHOD: CME-75, Solid Stem

DRILLING DATE: November 24, 2021

DEPTH (feet)	DEPTH (metres)	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	LAB ID:	TYPE NUMBER	"N" VALUE
		GROUND SURFACE (m asl)		153.59			
0	0	FILL: topsoil, silty sand, trace gravel, some roots, moist, compact.				SS-1	11
2							
4	1					SS-2	14
6						SS-3	13
	2			2.13/ 151.46			
8		GREY SILT TILL: some clay/sand, trace of gravel, stains, moist, compact to dense.				SS-4	28
10	3					SS-5	30
12				3.66/ 149.93			
	4	REDDISH BROWN SILT TILL: some clay/sand, trace of gravel, occasional pieces of shale, dry to moist, very dense.					
14							
16	5					SS-6	75
18							
20	6			6.40/ 147.19		SS-7	100+
22		RED WEATHERED SHALE: moist to dry, hard.		6.71/ 146.88			
	7	End of Borehole					
24		Refusal to augering at 6.71m.					
26	8						
28							
30	9						
32	10						

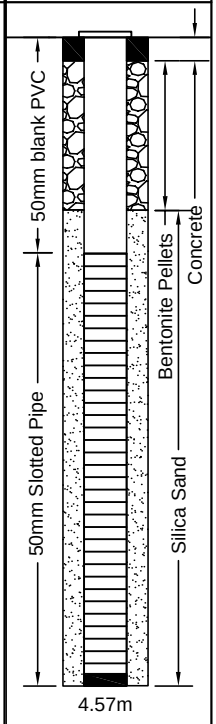
PENETRATION TESTING (SPT) ▲ 20 40 60 80

SHEAR STRENGTH (Kpa) ✚ 40 80 120 160

VAPOUR READING (ppm) □ 20 40 60 80

MOISTURE CONTENT (%) ● 10 20 30 40

PIEZOMETER OR WELL CONSTRUCTION



Groundwater Depth: on completion: dry; on Nov. 30, 2021: n/a; on Dec. 15, 2021: dry

DRAWN: BL LOGGED: CW CHECKED: RC

FISHER ENGINEERING

LOG OF BOREHOLE NO. BH4 SHEET. 1 of 2

PROJECT NO.: FE-P 21-11713/14/15

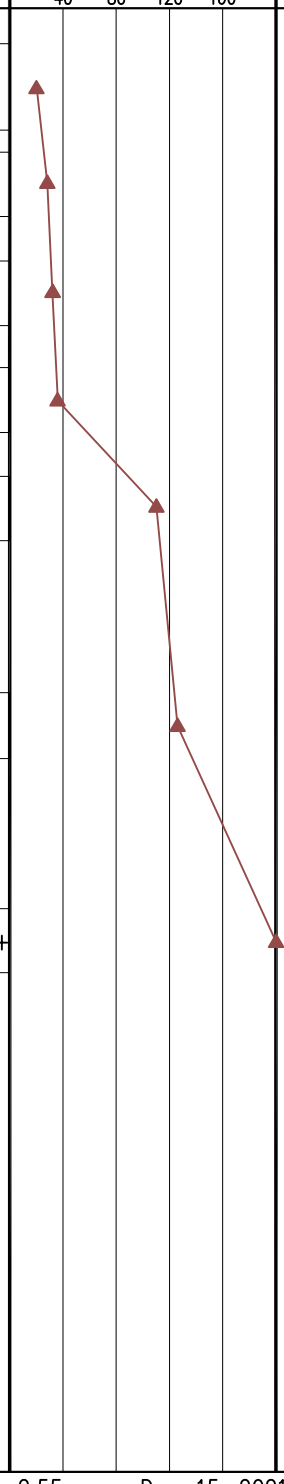
PROJECT NAME: Phase II ESA, Geotechnical & Hydrogeological Investigations

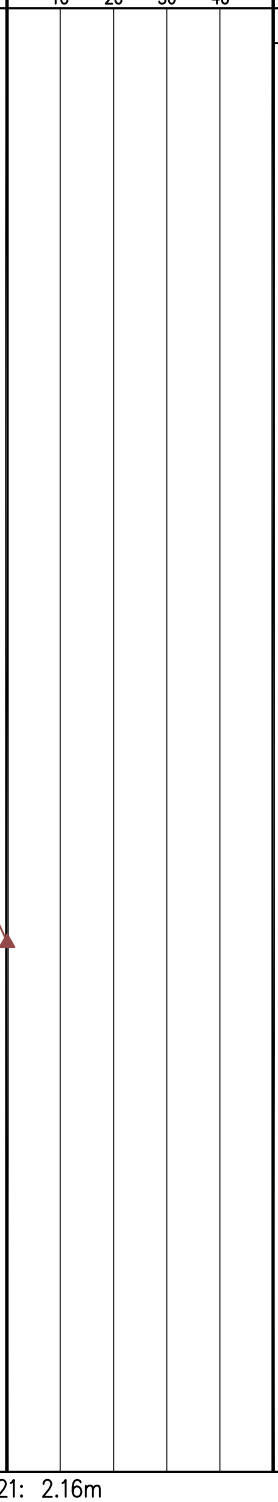
LOCATION: 3005 Dundas Street W., Oakville, Ontario

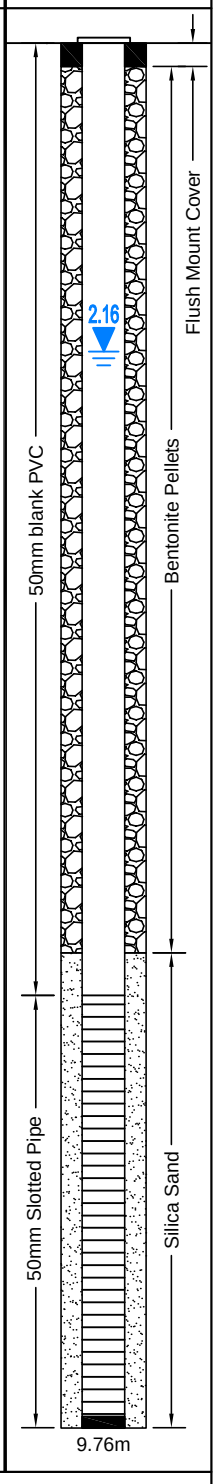
DRILLING METHOD: CME-75, Solid Stem

DRILLING DATE: November 26, 2021

DEPTH (feet)	DEPTH (metres)	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	LAB ID:	TYPE NUMBER	"N" VALUE
0	0	GROUND SURFACE (m asl)		154.50			
		FILL: sand & gravel with silt and roots, brown, moist, compact.				SS-1	10
2	1					SS-2	14
4							
6	2			1.98/ 152.52		SS-3	16
		GREY SILT TILL: some clay/sand, trace of gravel, stains, moist, compact to very dense.				SS-4	18
8							
10	3					SS-5	55
12	4			3.66/ 150.84			
		REDDISH BROWN SILT TILL: some clay/sand, trace of gravel, occasional pieces of shale, dry to moist, very dense.				SS-6	63
14							
16	5						
18							
20	6			6.40/ 148.10		SS-7	100+
22	7	REDDISH BROWN WEATHERED SHALE: dry, hard.					
24							
26	8						
28							
30	9						
32	10						







Groundwater Depth: on completion: n/a; on Nov. 30, 2021: 2.55m; on Dec. 15, 2021: 2.16m

DRAWN: BL LOGGED: CW CHECKED: RC

FISHER ENGINEERING

LOG OF BOREHOLE NO. BH4(MW) SHEET. 2 of 2

PROJECT NO.: FE-P 21-11713/14/15

PROJECT NAME: Phase II ESA, Geotechnical & Hydrogeological Investigations

LOCATION: 3005 Dundas Street W., Oakville, Ontario

DRILLING METHOD: CME-75, Solid Stem

DRILLING DATE: November 22, 2021

DEPTH (feet)	DEPTH (metres)	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: LAB ID:	SAMPLES: TYPE NUMBER	SAMPLES: "N" VALUE	PENETRATION TESTING (SPT) ▲ 20 40 60 80 / SHEAR STRENGTH (Kpa) ✚ 40 80 120 160	VAPOUR READING (ppm) □ 20 40 60 80 / MOISTURE CONTENT (%) ● 10 20 30 40	PIEZOMETER OR WELL CONSTRUCTION
		GROUND SURFACE (m asl)								
32	10	REDDISH BROWN WEATHERED SHALE: dry, hard.								
34										
36	11					RC-8	Run = 1.52m Rec = 1.51m = 99% RQD = 89%			
38										
40	12									
42	13					RC-9	Run = 1.52m Rec = 1.47m = 97% RQD = 93%			
44				13.72/ 140.78						
46	14	End of Borehole								
48										
50	15	Rock coring to 13.72m.								
52	16									
54										
56	17									
58										
60	18									
62	19									
64										
66										

Groundwater Depth: on completion: n/a; on Nov. 30, 2021: 2.55m; on Dec. 15, 2021: 2.16m

DRAWN: BL LOGGED: CW CHECKED: RC

FISHER ENGINEERING

LOG OF BOREHOLE NO. BH5 SHEET. 1 of 2

PROJECT NO.: FE-P 21-11713/14/15

PROJECT NAME: Phase II ESA, Geotechnical & Hydrogeological Investigations

LOCATION: 3005 Dundas Street W., Oakville, Ontario

DRILLING METHOD: CME-75, Solid Stem

DRILLING DATE: November 23, 2021

DEPTH (feet)	DEPTH (metres)	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	LAB ID:	TYPE NUMBER	"N" VALUE
		GROUND SURFACE (m asl)		154.52			
0	0	FILL: dark brown/grey clayey silt, some to trace of topsoil/ roots, trace of gravel, occasional pieces of brick/ plastic, moist.				SS-1	17
4	1			1.22/ 153.30			
6	2	REDDISH BROWN SILT TILL: some clay/sand, trace of gravel, moist, compact to dense.				SS-2	26
10	3					SS-3	47
14	4			4.65/ 149.87			
16	5	REDDISH BROWN SAND: trace of gravel, occasional cobbles, moist, very dense.				SS-4	69
18				5.79/ 148.73			
20	6	REDDISH BROWN WEATHERED SHALE: moist to dry, hard.				SS-5	100+
22	7						
24							
26	8						
28							
30	9			9.14/ 145.38			
32	10	Refusal to augering at 9.14m.				RC-6	Run = 1.52m Rec = 1.49m = 98% RQD = 90%

PENETRATION TESTING (SPT) ▲ 20 40 60 80

SHEAR STRENGTH (Kpa) ✚ 40 80 120 160

VAPOUR READING (ppm) □ 20 40 60 80

MOISTURE CONTENT (%) ● 10 20 30 40

● 13%

PIEZOMETER OR WELL CONSTRUCTION

Flush Mount Cover

50mm blank PVC

Bentonite Pellets

6.23

Groundwater Depth: on completion: n/a; on Nov. 30, 2021: 5.10m; on Dec. 15, 2021: 6.23m

DRAWN: BL LOGGED: PKS CHECKED: RC

FISHER ENGINEERING

LOG OF BOREHOLE NO. BH5(MW) SHEET. 2 of 2

PROJECT NO.: FE-P 21-11713/14/15

PROJECT NAME: Phase II ESA, Geotechnical & Hydrogeological Investigations

LOCATION: 3005 Dundas Street W., Oakville, Ontario

DRILLING METHOD: CME-75, Solid Stem

DRILLING DATE: November 23, 2021

DEPTH (feet)	DEPTH (metres)	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	LAB ID:	TYPE NUMBER	"N" VALUE
		GROUND SURFACE (m asl)					
32	10	REDDISH BROWN WEATHERED SHALE: moist to dry, hard.				RC-6	Run = 1.52m Rec = 1.49m = 98% RQD = 90%
36	11					RC-7	Run = 1.52m Rec = 1.5m = 99% RQD = 99%
40	12					RC-8	Run = 1.52m Rec = 1.47m = 97% RQD = 93%
44	13					RC-9	Run = 1.52m Rec = 1.49m = 98% RQD = 84%
48	14					RC-10	Run = 1.52m Rec = 1.38m = 91% RQD = 86%
52	15					RC-11	Run = 1.52m Rec = 1.42m = 93% RQD = 88%
56	16						
58	17						
60	18	End of Borehole		15.24/ 139.28			
62	19						
64							
66							

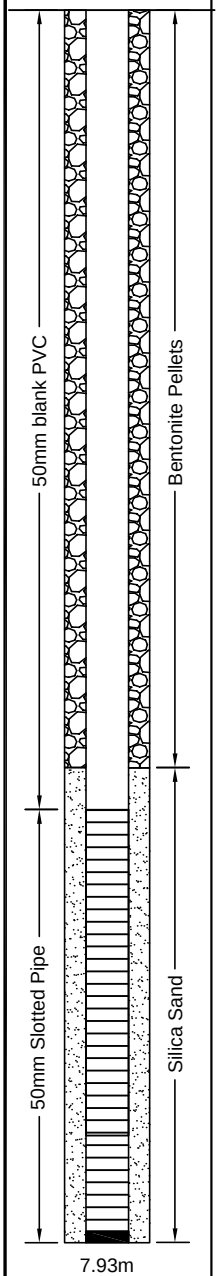
PENETRATION TESTING (SPT) ▲ 20 40 60 80

SHEAR STRENGTH (Kpa) ✚ 40 80 120 160

VAPOUR READING (ppm) □ 20 40 60 80

MOISTURE CONTENT (%) ● 10 20 30 40

PIEZOMETER OR WELL CONSTRUCTION



Groundwater Depth: on completion: n/a; on Nov. 30, 2021: 5.10m; on Dec. 15, 2021: 6.23m

DRAWN: BL LOGGED: PKS CHECKED: RC

FISHER ENGINEERING

LOG OF BOREHOLE NO. BH6 SHEET. 1 of 1

PROJECT NO.: FE-P 21-11713/14/15

PROJECT NAME: Phase II ESA, Geotechnical & Hydrogeological Investigations

LOCATION: 3005 Dundas Street W., Oakville, Ontario

DRILLING METHOD: CME-75, Solid Stem

DRILLING DATE: November 22, 2021

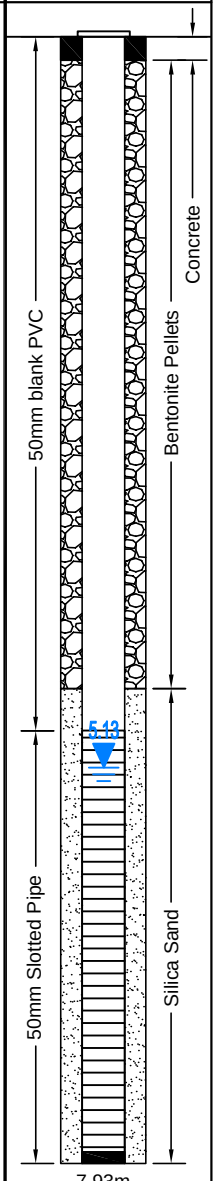
DEPTH (feet)	DEPTH (metres)	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	LAB ID:	SAMPLES TYPE NUMBER	SAMPLES "N" VALUE
0	0	GROUND SURFACE (m asl)		153.81			
0	0	FILL: brown sandy silt, some gravel, trace roots, pieces of bricks, moist.				SS-1	12
2	1					SS-2	12
4	1			1.37/ 152.44			
6	2	GREY SILT TILL: some clay/sand, trace of gravel, moist, compact to very dense.				SS-3	27
8	2					SS-4	33
10	3					SS-5	58
12	4						
14	4						
16	5					SS-6	82
18	5			5.49/ 148.32			
20	6	REDDISH BROWN SILT TILL: some clay/sand, trace of gravel, moist to dry, very dense.				SS-7	100+
22	7						
24	7						
26	8			7.93/ 145.88		SS-8	100+
26	8	REDDISH BROWN WEATHERED SHALE: dry, hard.		8.38/ 145.43			
28	9	End of Borehole					
30	9	Refusal to augering at 8.38m.					
32	10						

PENETRATION TESTING (SPT) ▲ 20 40 60 80
SHEAR STRENGTH (Kpa) ✚ 40 80 120 160

VAPOUR READING (ppm) □ 20 40 60 80
MOISTURE CONTENT (%) ● 10 20 30 40

13%
11%
9%

PIEZOMETER OR WELL CONSTRUCTION



Groundwater Depth: on completion: dry; on Nov. 30, 2021: 1.67m; on Dec. 15, 2021: 5.13m

DRAWN: BL LOGGED: CW CHECKED: RC

FISHER ENGINEERING

LOG OF BOREHOLE NO. BH7 SHEET. 1 of 1

PROJECT NO.: FE-P 21-11713/14/15

PROJECT NAME: Phase II ESA, Geotechnical & Hydrogeological Investigations

LOCATION: 3005 Dundas Street W., Oakville, Ontario

DRILLING METHOD: CME-75, Solid Stem

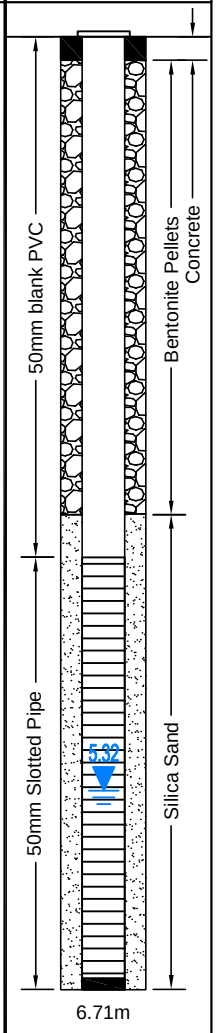
DRILLING DATE: November 23, 2021

DEPTH (feet)	DEPTH (metres)	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	LAB ID:	SAMPLES TYPE NUMBER	SAMPLES "N" VALUE
0	0	GROUND SURFACE (m asl)		153.90			
		FILL: dark brown sandy silt/silty sand, trace of clay, gravel, asphalt, roots & topsoil, moist.		0.46/ 153.44		SS-1	8
2						SS-2	28
4	1						
6		REDDISH BROWN SILT TILL: some clay/sand, trace of gravel, moist, compact to very dense.				SS-3	57
8	2					SS-4	100+
10						SS-5	100+
12	3						
14	4						
16				4.88/ 149.02		SS-6	100+
	5	REDDISH BROWN WEATHERED SHALE: dry, hard.					
18							
20	6					SS-7	100+
22				6.71/ 147.19			
	7	End of Borehole					
24		Refusal to augering at 6.71m.					
26	8						
28							
30	9						
32	10						

PENETRATION TESTING (SPT) ▲ 20 40 60 80
SHEAR STRENGTH (Kpa) ✚ 40 80 120 160

VAPOUR READING (ppm) □ 20 40 60 80
MOISTURE CONTENT (%) ● 10 20 30 40

PIEZOMETER OR WELL CONSTRUCTION



Groundwater Depth: on completion: dry; on Nov. 30, 2021: 5.10m; on Dec. 15, 2021: 5.32m

DRAWN: BL LOGGED: PKS CHECKED: RC

FISHER ENGINEERING

LOG OF BOREHOLE NO. BH8 SHEET. 1 of 1

PROJECT NO.: FE-P 21-11713/14/15

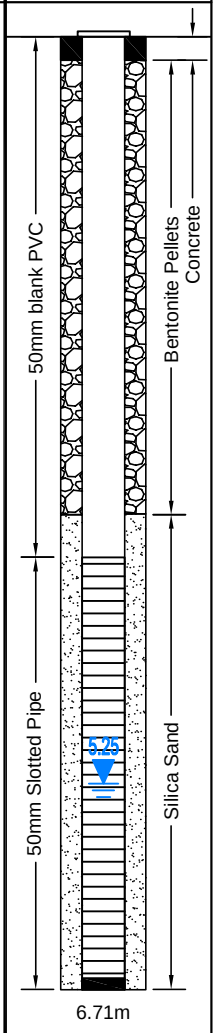
PROJECT NAME: Phase II ESA, Geotechnical & Hydrogeological Investigations

LOCATION: 3005 Dundas Street W., Oakville, Ontario

DRILLING METHOD: CME-75, Solid Stem

DRILLING DATE: November 23, 2021

DEPTH (feet)	DEPTH (metres)	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	LAB ID:	SAMPLES TYPE NUMBER	SAMPLES "N" VALUE	PENETRATION TESTING (SPT) ▲ / SHEAR STRENGTH (Kpa) ✚	VAPOUR READING (ppm) □ / MOISTURE CONTENT (%) ●	PIEZOMETER OR WELL CONSTRUCTION
		GROUND SURFACE (m asl)		154.37				20 40 60 80 / 40 80 120 160	20 40 60 80 / 10 20 30 40	
0	0	FILL: dark brown/grey silty sand, trace of clay/gravel, occasional pieces of asphalt/metal, moist.				SS-1	7			
2										
4	1					SS-2	28			
				1.60/ 152.77						
6	2	REDDISH BROWN SILT TILL: some clay/sand, trace of gravel, moist, dense to very dense.				SS-3	32		14%	
8						SS-4	100+			
10	3					SS-5	100+		12%	
12	4									
14										
16	5					SS-6	100+		6%	
18										
				5.94/ 148.43						
20	6	REDDISH BROWN WEATHERED SHALE: dry, hard.				SS-7	100+			
				6.71/ 147.66						
22	7	End of Borehole								
24		Refusal to augering at 6.71m.								
26	8									
28										
30	9									
32	10									



Groundwater Depth: on completion: dry; on Nov. 30, 2021: 1.67m; on Dec. 15, 2021: 5.25m

DRAWN: BL LOGGED: PKS CHECKED: RC

FISHER ENGINEERING
400 Esna Park Dr., #15
Markham, Ontario
L3R 3K2
Tel: 905 475-7755
Fax: 905 475-7718

NORTH

LEGEND

SITE BOUNDARY

BOREHOLE WITH MONITORING WELL LOCATION

PROJECT NAME AND ADDRESS

HYDROGEOLOGICAL & GEOTECHNICAL INVESTIGATIONS

3005 Dundas Sreet West
Oakville, ON.

PROJECT NO.
FE-P 21-11714

DATE.
1 December 2021

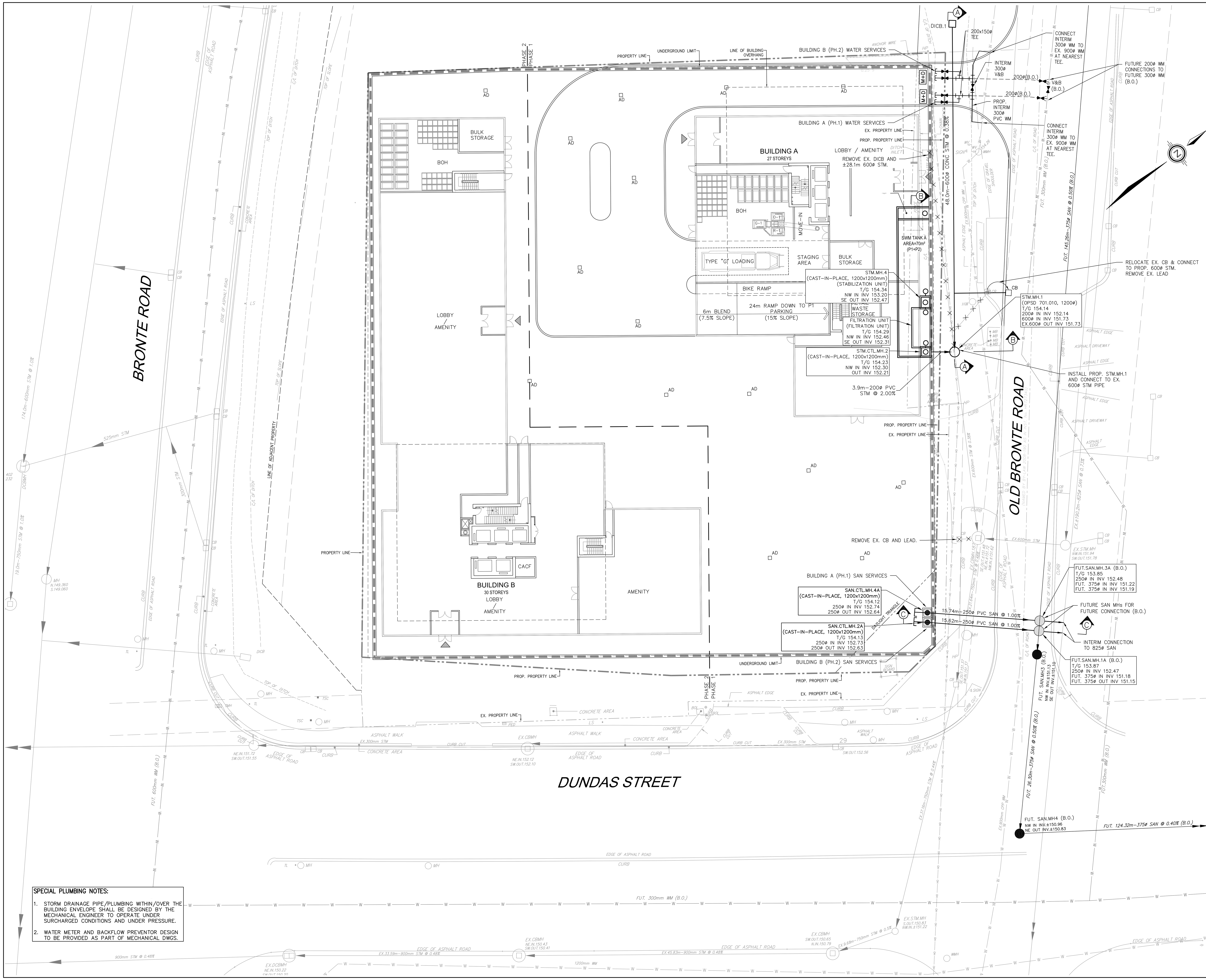
SCALE.
AS SHOWN

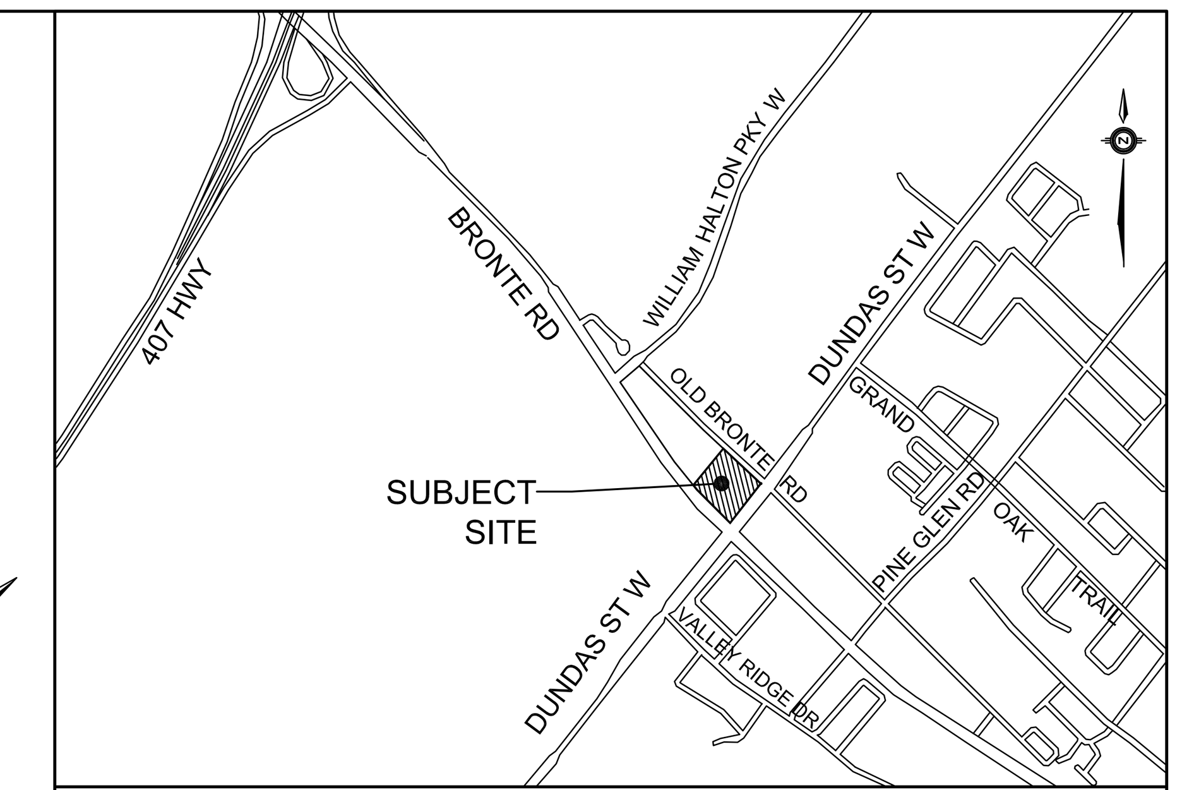
FIGURE 1.1:
SITE PLAN WITH TEST HOLE AND MONITORING WELL LOCATIONS

SHEET NO.
1.1

APPENDIX E - ENGINEERING DRAWINGS

(See Submission Package)





KEY PLAN
N.T.S.

NOTES:

1. THE LOCATION OF ALL UNDERGROUND AND ABOVEGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON CONTRACT DWGS., AND WHERE SHOWN THE ACCURACY OF THE LOCATION & ELEVATION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. THE CONTRACTOR SHALL INTERPRET THIS INFORMATION AS HE SEES FIT WITH THE UNDERSTANDING THAT THE OWNER, ENGINEER AND REGION/CITY DISCLAIM ALL RESPONSIBILITY FOR ITS ACCURACY AND/OR SUFFICIENCY. PRIOR TO COMMENCING CONSTRUCTION, THE CONTRACTOR SHALL VERIFY EXACT LOCATION & ELEVATION OF SUCH UTILITIES & STRUCTURES AND SHALL ASSUME ALL LIABILITIES OF DAMAGE.
2. ANY CONFLICTS WITH EX. SERVICES AND/OR UTILITIES SHALL BE REPORTED TO THE ENGINEER FOR REVIEW & ADVICE PRIOR TO COMMENCEMENT OF CONSTRUCTION.
3. INFORMATION ON THESE DWGS. SHALL BE USED IN CONJUNCTION WITH ARCHITECTURAL, MECHANICAL, STRUCTURAL, & LANDSCAPE ARCHITECT DWGS.

LEGEND

- DENOTES VALVE AND BOX
- DENOTES Ex. HYDRANT
- DENOTES SINGLE CATCHBASIN
- DENOTES DOUBLE CATCHBASIN
- DENOTES Ex. CATCHBASIN
- DENOTES PROPOSED SANITARY MANHOLE
- DENOTES PROPOSED STORM MANHOLE
- DENOTES EXISTING SANITARY MANHOLE
- DENOTES EXISTING STORM MANHOLE
- AD DENOTES AREA DRAIN
- DENOTES WATERMAIN
- DENOTES STORM SEWER
- DENOTES SANITARY SEWER
- DENOTES ROOF OUTLINE
- DENOTES UNDERGROUND LIMIT
- DENOTES PROPERTY LINE

BENCHMARK

ELEVATIONS ARE REFERRED TO THE TOWN OF OAKVILLE BENCHMARK NO. 273, HAVING AN ELEVATION OF 154.275M

No.	Date	By	Revisions
1.	APR.20/23	H.S.	ISSUED FOR OPA

Design	M.S.	Checked	H.S.
Drawn	M.S.	Checked	H.S.

Date: JANUARY 2023

Scale: 1:250 (0 5 10 15 20m)

References

Field Notes

Bell ☐ Hydro ☐ Gas ☐ Cable ☐

Approvals

Municipal
APPROVED IN PRINCIPLE SUBJECT TO DETAIL CONSTRUCTION CONFORMING TO TOWN OF OAKVILLE STANDARDS AND SPECIFICATIONS.

SIGNED:________ DATE:________
Manager of Development Engineering –TOWN OF OAKVILLE

Regional
DESIGN OF SANITARY AND WATER SERVICES APPROVED SUBJECT TO DETAIL CONSTRUCTION CONFORMING TO HALTON REGION STANDARDS AND SPECIFICATIONS AND LOCATION APPROVAL FROM AREA MUNICIPALITY.

Legislative and Planning Services Dept.–Region of Halton DATE:

REGISTERED PROFESSIONAL ENGINEER H.SARKISSIAN APR.20,2023 PROVINCE OF ONTARIO

SCHAEFFERS
CONSULTING ENGINEERS
SCHAEFFER & ASSOCIATES LTD.
6 Ronrose Drive, Concord, Ontario L4K 4R3
Tel: (905) 738-6100
Fax: (905) 738-6875
E-mail: design@schaeffers.com

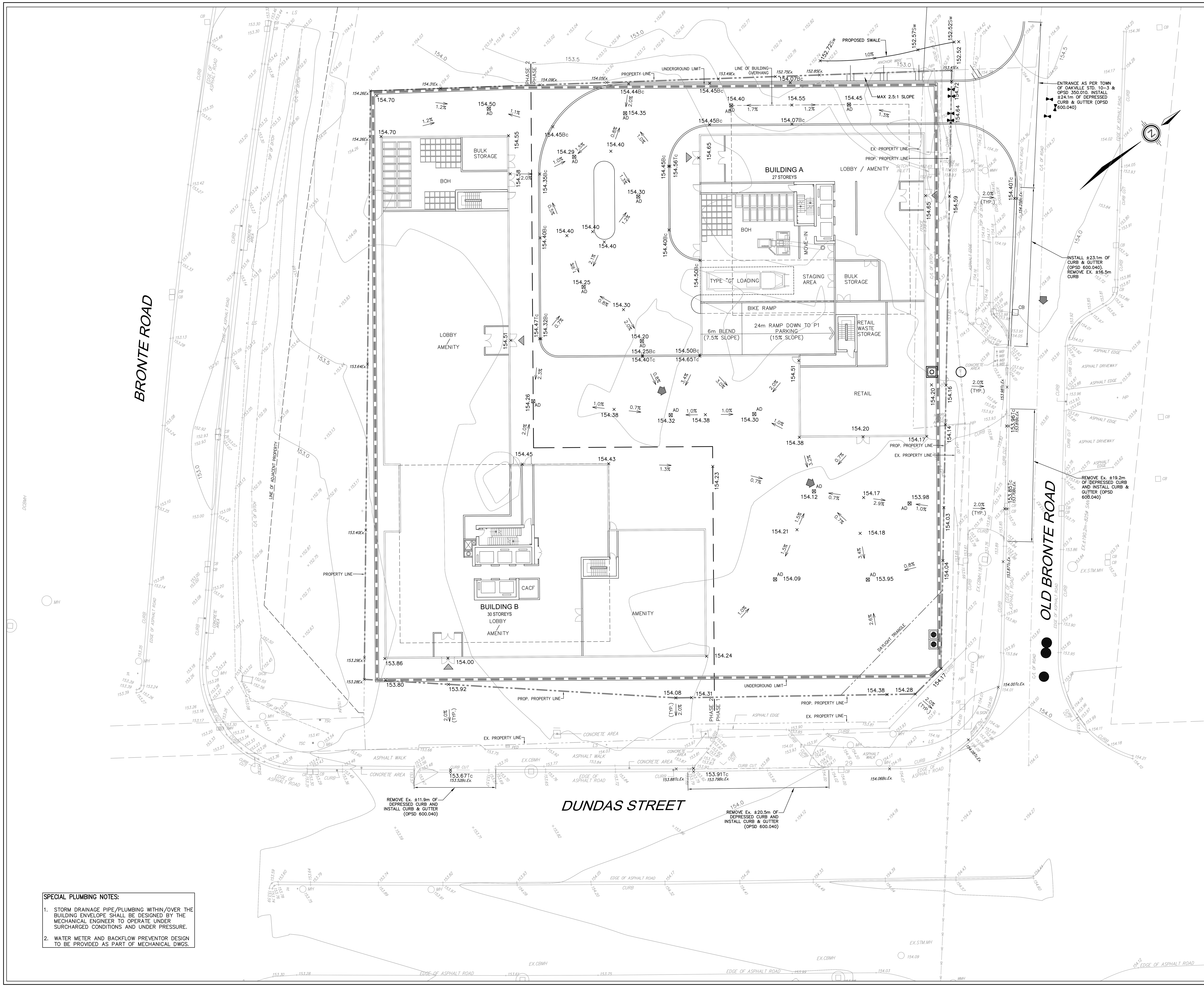
Halton REGION

Municipality
TOWN OF OAKVILLE
DEPARTMENT OF PUBLIC WORKS

Title
3005 DUNDAS STREET WEST

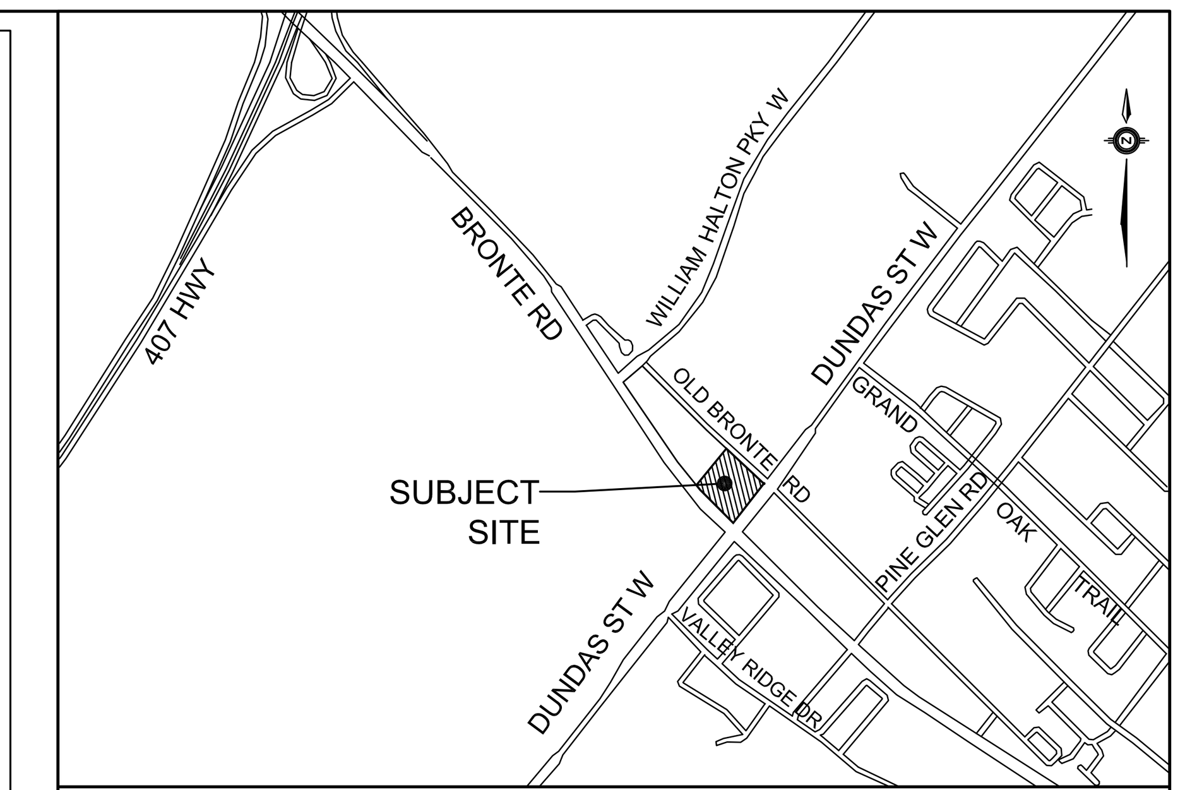
PRELIMINARY SITE SERVICING PLAN

Municipal File No.	Regional File No.
TBD	TBD
Contract No.	Drawing No.
2022 - 5281	SS-1



SPECIAL PLUMBING NOTES:

1. STORM DRAINAGE PIPE/PLUMBING WITHIN/OVER THE BUILDING ENVELOPE SHALL BE DESIGNED BY THE MECHANICAL ENGINEER TO OPERATE UNDER SURCHARGED CONDITIONS AND UNDER PRESSURE.
2. WATER METER AND BACKFLOW PREVENTOR DESIGN TO BE PROVIDED AS PART OF MECHANICAL DWGS.



KEY PLAN
N.T.S.

NOTES:

1. THE LOCATION OF ALL UNDERGROUND AND ABOVEGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON CONTRACT DWGS., AND WHERE SHOWN THE ACCURACY OF THE LOCATION & ELEVATION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. THE CONTRACTOR SHALL INTERPRET THIS INFORMATION AS HE SEES FIT WITH THE UNDERSTANDING THAT THE OWNER, ENGINEER AND REGION/CITY DISCLAIM ALL RESPONSIBILITY FOR ITS ACCURACY AND/OR SUFFICIENCY. PRIOR TO COMMENCING CONSTRUCTION, THE CONTRACTOR SHALL VERIFY EXACT LOCATION & ELEVATION OF SUCH UTILITIES & STRUCTURES AND SHALL ASSUME ALL LIABILITIES OF DAMAGE.
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LEGEND

- AD/CB DENOTES AREA DRAINS / CATCHBASIN
- 131.48 TC DENOTES PROPOSED TOP OF CURB ELEVATION
- 131.48 BC DENOTES PROPOSED BOTTOM OF CURB ELEVATION
- *130.29EX* DENOTES EXISTING ELEVATION
- DENOTES OVERLAND FLOW ROUTE
- DENOTES PROPOSED STORM MANHOLE
- DENOTES EXISTING SANITARY MANHOLE
- DENOTES EXISTING STORM MANHOLE
- DENOTES VALVE AND BOX
- DENOTES ROOF OUTLINE
- DENOTES UNDERGROUND LIMIT
- DENOTES PROPERTY LINE

BENCHMARK

ELEVATIONS ARE REFERRED TO THE TOWN OF OAKVILLE BENCHMARK NO. 273, HAVING AN ELEVATION OF 154.275M

No.	Date	By	Revisions
1.	APR.20/23	H.S.	ISSUED FOR OPA

Design	M.S.	Checked	H.S.
Drawn	M.S.	Checked	H.S.

Date: JANUARY 2023

Scale: 1:250 (0, 5, 10, 15, 20m)

References

Field Notes

Bell / Hydro / Gas / Cable

Approvals

Municipal
APPROVED IN PRINCIPLE SUBJECT TO DETAIL CONSTRUCTION CONFORMING TO TOWN OF OAKVILLE STANDARDS AND SPECIFICATIONS.

SIGNED:______________ DATE:______________

Manager of Development Engineering –TOWN OF OAKVILLE

Regional
DESIGN OF SANITARY AND WATER SERVICES APPROVED SUBJECT TO DETAIL CONSTRUCTION CONFORMING TO HALTON REGION STANDARDS AND SPECIFICATIONS AND LOCATION APPROVAL FROM AREA MUNICIPALITY.

Legislative and Planning Services Dept.–Region of Halton DATE:

REGISTERED PROFESSIONAL ENGINEER
H.SARKISSIAN
APR.20.2023
PROVINCE OF ONTARIO

SCHAEFFERS
CONSULTING ENGINEERS
SCHAEFFER & ASSOCIATES LTD.
6 Ronrose Drive, Concord, Ontario L4K 4R3
Tel: (905) 738-6100
Fax: (905) 738-6875
E-mail: design@schaeffers.com

Halton REGION

Municipality

OAKVILLE
TOWN OF OAKVILLE
DEPARTMENT OF PUBLIC WORKS

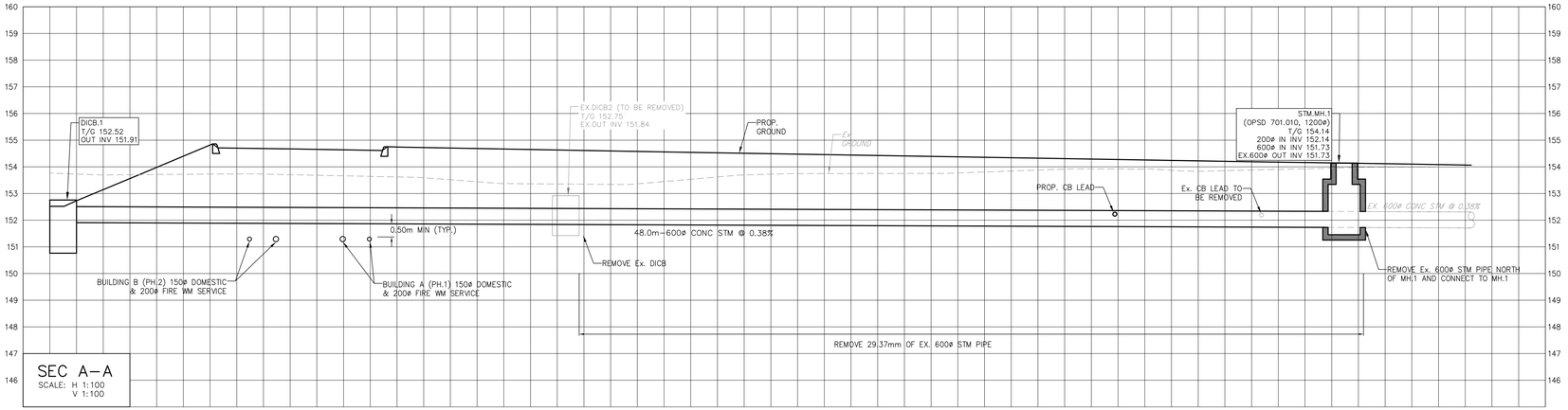
Title

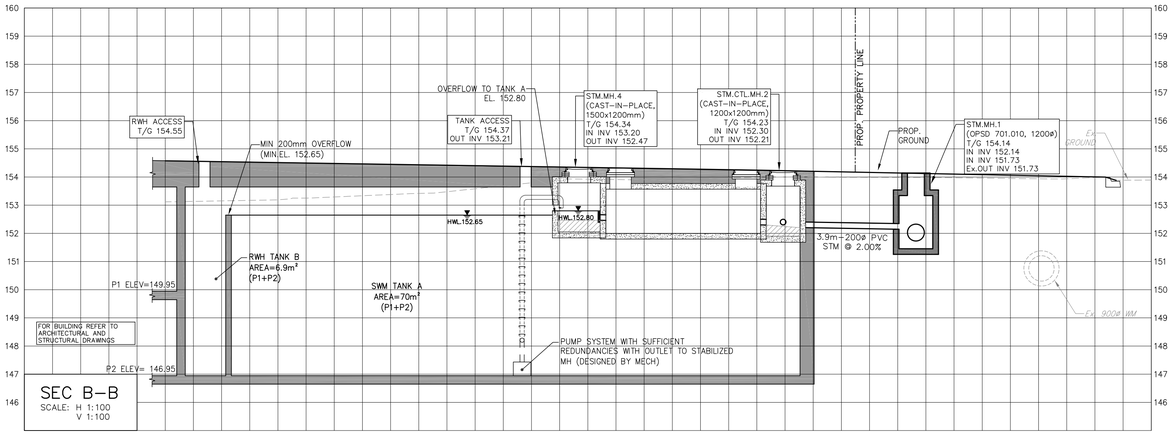
3005 DUNDAS STREET WEST

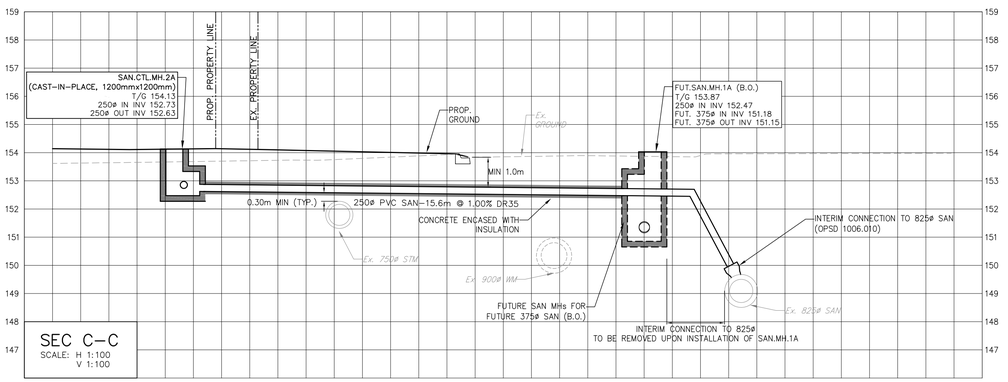
PRELIMINARY SITE GRADING PLAN

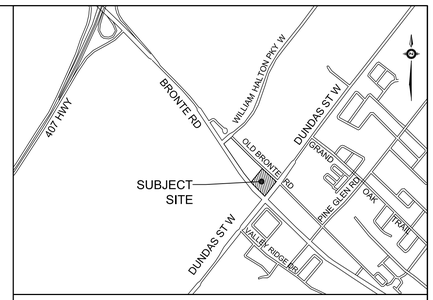
Municipal File No.	Regional File No.
TBD	TBD

Contract No.	Drawing No.
2022 - 5281	SG-1









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SIGNED: _____ DATE: _____

Manager of Development Engineering -TOWN OF OAKVILLE

Regional

DESIGN OF SANITARY AND WATER SERVICES APPROVED SUBJECT TO DETAIL CONSTRUCTION CONFORMING TO HALTON REGION STANDARDS AND SPECIFICATIONS AND LOCATION APPROVAL FROM AREA MUNICIPALITY.

Legislative and Planning Services Dept.-Region of Halton DATE:

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Halton REGION

Municipality

OAKVILLE
TOWN OF OAKVILLE
DEPARTMENT OF PUBLIC WORKS

Title

3005 DUNDAS STREET WEST

PRELIMINARY SECTIONS

Municipal File No.	Regional File No.
TBD	TBD
Contract No.	Drawing No.
2022 - 5281	SEC-1

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