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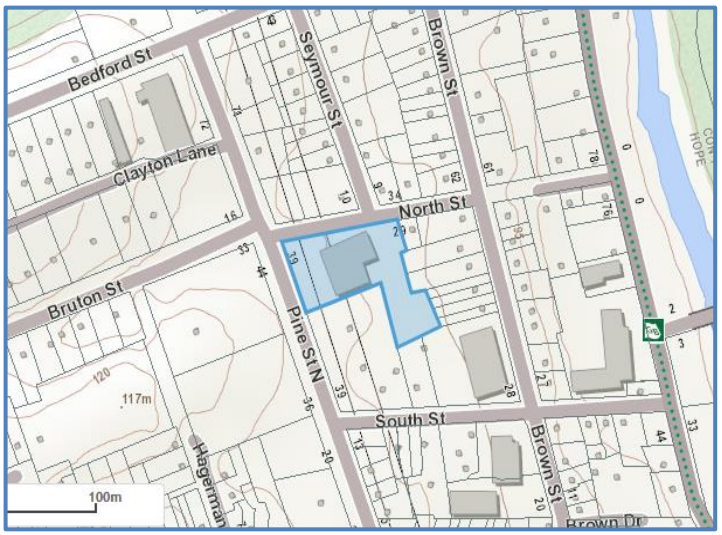
HYDROGEOLOGICAL INVESTIGATION



PROPOSED DORMITORY BUILDING, 39 PINE STREET NORTH, PORT HOPE, ONTARIO, L1A 3G5

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Markham, ON
L3R 3K2

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Prepared for:

2640573 Ontario Corp.

Project No. FH23-13247_V1

February 10, 2024

Issued to:	2640573 Ontario Corp.
Contact:	Janus Xu janusxu@globeschool.com
Project Name:	Hydrogeological Investigation for Proposed Development
Project Address:	39 Pine Street North, Port Hope, Ontario, L1A 3G5
Project Number:	FH23-13247_V1
Issued on:	February 10, 2024
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 2640573 Ontario Corp. to carry out a Hydrogeological Investigation for the proposed dormitory building at 39 Pine Street North, Port Hope, hereinafter referred to as the 'Site'.

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

The Hydrogeological Review has been prepared in accordance with the Ontario Water Resources Act, Ontario Regulation 387/04 and Port Hope Sanitary and Storm Sewers discharge bylaws.

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

2. SITE AND PROJECT DESCRIPTIONS

Site Settings

The site is located on the east side of Pine Street North, approximately 1.5km south of HWY401 in Port Hope, and is bounded by Pine Street North to the west, North Street to the north, houses to the east, beyond which is Brown Street, and St John's Anglican Church and Port Hope United Church generally to the southwest and south respectively.

At the time of the investigation the subject property was occupied by a two-storey brick school building, paved parking with some landscaped areas.

Topography

The site is generally flat with elevations changing from 102.80 at MW3 located at the north of the proposed building to 102.48m asl at MW6 located at the southeast corner.

Proposed Development

It was understood that the development will consist of the construction of a five-storey dormitory building with one basement level along with associated infrastructure. Finished floor elevation (FFE) for the ground

floor is 103.70m asl, as per Servicing Plan by WPE Engineering Ltd. Top of basement slab is 3.05m below FFE.

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 construction and permanent drainage and
3) Conduct calculations/analyses of the groundwater quantity and quality to be used for the necessary application 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 in three (3) monitoring wells and record groundwater level drawdown and recovery to model/calculate hydraulic conductivity.
- **Groundwater Quality Analysis.** Carry out laboratory analyses on soil and groundwater to determine compliance with the Port Hope Sanitary Sewer By-Law (30/94) and Port Hope Storm Sewer By-Law (30/94).
- **Groundwater Level Monitoring.** Conduct long-term monitoring of the groundwater levels to determine seasonal highwater levels.
- **Hydrogeological Report.** Prepare and submit a report detailing the findings and recommendations of the Hydrogeological Investigation.

4. FIELD AND LABORATORY INVESTIGATION

Public and private utilities clearances were carried out by Ontario One-Call and Utility Marx, on behalf of Fisher, prior to drilling.

Subsurface Investigation

Subsurface exploration for the hydrogeological investigation was carried out concurrent with drilling for the Geotechnical Investigation on August 25, 2023, in which a total of six (6) boreholes (BH1 – BH6) were advanced to approximate depths varying from 3.51m to 9.60m below prevailing grades. Monitoring wells were installed in the five boreholes (MW1 to MW5) and used for groundwater level monitoring and sampling. The monitoring wells were constructed using 50mm diameter PVC pipes with 3.05m (10') long screens.

A D-50 track mounted drill rig equipped with solid stem augers, supplied by Terra Firma Services, was used for drilling under direct supervision of Fisher Engineering personnel. Soil samples 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. All recovered soil samples were placed in clear, sealable plastic bags in the field and transported to Fisher Engineering laboratory for further examination, characterization and laboratory analyses.

A description of the subsurface conditions encountered at each borehole location is presented in Appendix B - Log of Boreholes.

Laboratory Analyses

The soil samples were taken to the Fisher Engineering laboratory for final visual assessment and classification. The 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.

Representative soil samples, from BH3, BH4 and BH6 were submitted to the laboratory for analyses as follows:

- Eighteen (18) soil samples for moisture content analyses.
- Seven (7) samples for grain size tests and
- Three (3) samples for hydrometer tests.

The laboratory results, which are presented in Appendix C, are consistent with the field description for subsurface soils discussed in Section 5.0.

The soil samples recovered during the current investigation will be stored in the Fisher Engineering laboratory for a period of 30 days after submitting this report and will be discarded thereafter unless instructed otherwise by the client

Site Survey

Elevations at borehole/monitoring well locations were interpolated from a topography/survey plan, prepared by Elliot and Parr (Peterborough), dated September 19, 2023, which was provided to Fisher during the investigation.

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 records include 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.

Asphalt/Topsoil/Fill – Asphalt was found at the surface of BH1 while topsoil was encountered at the surface of boreholes BH2 & BH4 to BH6. Fill soils were encountered below the surficial layers and at the surface of BH3. The fill consisted of dark brown to brown silty sand with some to trace of roots/topsoil/slag with occasional pieces of porcelain and extended to approximate depths below prevailing grades/elevations as shown in Table 1.

Brown Sand/ Silty Sand/Sandy Silt – Brown to light brown, moist, compact to very dense, sand/silty sand to sandy silt were encountered below the fill extending to 4.88m bgs in BH3 and termination depths of 3.51m (BH1 & BH2), 6.55m (BH6), 9.60m (BH4) and 5.03m (BH5).

Brown Silt – A layer of brown, wet, dense silt was encountered below the brown sand/silty sand of BH3 extending to termination depth of 6.55m.

Table 1: Fill Depths and Elevations

Borehole No.	Surface Elevation (m asl)	Depth of Borehole (m)	Elevation at Bottom of Borehole (m asl)	Depth of Fill (m)	Elevation at Bottom of Fill (m asl)
BH1(MW)	102.69	3.51	99.18	3.10	99.59
BH2(MW)	102.97	5.03	97.94	0.76	102.21
BH3(MW)	102.80	6.55	96.25	2.28	100.52
BH4(MW)	102.67	9.60	93.07	1.68	100.99
BH5(MW)	102.70	5.03	97.67	1.52	101.18
BH6(MW)	102.48	6.55	95.93	2.28	100.20

6. HYDROGEOLOGICAL STUDY

A hydrogeological study for the subject site was conducted based on the boreholes/wells' exploration, observation and site/laboratory tests. Groundwater details from the six (6) monitoring wells were used in the Hydrogeological Study. The monitoring wells were constructed with 1.52 - 3.05m (5 - 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.

The open boreholes were observed to be dry on completion of drilling. No caving in of soils was observed during drilling.

6.1 Hydrogeological Conditions

Review of the available surficial geological and hydrogeological information for the area shows that the site is underlain generally with Stone-poor, sandy silt to silty sand-textured till on Paleozoic terrain (Ontario Geological Survey Map). Underlying bedrock is represented by limestone, dolostone, shale, arkose and sandstone of the Ottawa Group; Simcoe Group and Shadow Lake Formation. Depth to bedrock in the area is generally more than 30m.

The subsoils and hydrogeological conditions were observed and recorded during both the Geotechnical and Hydrogeological Investigations. Based on the boreholes/wells' exploration, the saturated soil layers

on the site, below the fill material, are dominated by brown sandy sand to silty sand/ sandy silt with silt at further depths.

All monitoring wells were purged/developed and allowed to fully recover prior to carrying out groundwater level measurements and sampling. Groundwater levels were monitored biweekly over the period September 2023 to February 2024 to determine seasonal highwater levels. Measured groundwater depths and elevations are summarized in Table 2.

Table 2: Groundwater Depths and Elevations

Monitoring Well No.		BH1(MW)	BH2(MW)	BH3(MW)	BH4(MW)	BH5(MW)	BH6(MW)
Surface Elevation (m asl)		102.69	102.97	102.80	102.67	102.70	102.48
Depth of Well/BH, m bgs		3.05	4.59	4.76	6.21	4.55	4.76
Elevation at well/BH base, m asl		99.64	98.38	98.04	96.46	98.15	97.72
On Completion	GW level, m bgs	dry	dry	dry	dry	dry	dry
	GW Ele, m asl						
6-Sep-23	GW level, m bgs	dry	3.86	3.67	3.58	3.41	3.77
	GW Ele, m asl		99.11	99.13	99.09	99.29	98.71
22-Sep-23	GW level, m bgs	dry	3.93	3.73	3.64	3.48	3.82
	GW Ele, m asl		99.04	99.07	99.03	99.22	98.66
4-Oct-23	GW level, m bgs	dry	3.82	3.65	3.61	3.45	3.75
	GW Ele, m asl		99.15	99.15	99.06	99.25	98.73
18-Oct-23	GW level, m bgs	dry	3.80	3.61	3.60	3.43	3.71
	GW Ele, m asl		99.17	99.19	99.07	99.27	98.77
1-Nov-23	GW level, m bgs	dry	3.83	3.66	3.62	3.46	3.77
	GW Ele, m asl		99.14	99.14	99.05	99.24	98.71
15-Nov-23	GW level, m bgs	dry	3.85	3.68	3.64	3.47	3.79
	GW Ele, m asl		99.12	99.12	99.03	99.23	98.69
1-Dec-23	GW level, m bgs	dry	3.87	3.69	3.66	3.49	3.81
	GW Ele, m asl		99.10	99.11	99.01	99.21	98.67

Monitoring Well No.		BH1(MW)	BH2(MW)	BH3(MW)	BH4(MW)	BH5(MW)	BH6(MW)
13-Dec-23	GW level, m bgs	dry	3.87	3.70	3.68	3.51	3.82
	GW Ele, m asl		99.10	99.10	98.99	99.19	98.66
3-Jan-24	GW level, m bgs	dry	3.89	3.73	3.67	3.58	3.88
	GW Ele, m asl		99.08	99.07	99.00	99.12	98.60
17-Jan-24	GW level, m bgs	dry	3.90	3.75	3.73	3.63	3.89
	GW Ele, m asl		99.07	99.05	98.94	99.07	98.59
1-Feb-24	GW level, m bgs	dry	3.93	3.78	3.77	3.69	3.95
	GW Ele, m asl		99.04	99.02	98.90	99.01	98.53

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 measured at depths of 3.41m to 3.95m bgs (elevations vary from 98.53m to 99.29m asl) in the MW2 to MW6. Monitoring well MW1 was observed to be dry throughout the investigation.
- Groundwater flow is towards northeast with an approximate gradient of 1.8%.
- The nearest body of surface water is the Ganaraska River located approximately 200m east of the site. Lake Ontario is located 1.3km south of the site.
- Groundwater levels on the site were monitored biweekly to determine seasonal highwater levels.

6.2 Hydraulic Conductivity K Modeling Results

Single Well Response Tests

Single well response tests (SWRT) were conducted in MW3, MW5 and MW6 on September 6, 2023. The upper water bearing soils consist mainly of layers of brown sand/silty sand/sandy silt to silt and were assumed to be unconfined, homogenous, isotropic and of uniform thickness. It was also assumed that the wells fully penetrated the water bearing layers. Data from the single well response tests were used to calculate the hydraulic conductivity values using Luthin's method.

Details of the hydraulic conductivity analyses are presented in Appendix C and summarized in Table 3.

Table 3: Summary of Single Well Response 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/	Hydraulic Conductivity, K (Luthin's Method)	
					Recovery Percentage	m/s	m/day
MW3	86.63	3.67	98.04 – 101.09	0.78	16 mins / 99%	2.42×10^{-5}	2.092
MW5	86.60	3.41	98.15 – 101.20	0.94	26 mins / 99%	1.82×10^{-5}	1.569
MW6	83.20	3.77	97.72 – 100.77	1.01	31 mins / 99%	1.21×10^{-5}	1.046

6.3 Grain Size Analysis for Hydraulic Conductivity K

Representative samples from BH3, BH4 and BH6 were selected from depths associated with the footing/slab on grade locations for the underground levels or change in soil stratigraphy and submitted to Fisher Engineering laboratory for grain size distribution and hydrometer analyses. The results for the grain size distribution and hydrometer analyses are presented in Appendix C.

The effective D_{10} sizes obtained from the Grain Size Distribution Graph were used to estimate the hydraulic conductivity (K) of the overburden soils using Hazen's expression, Equation 1:

$$K=10^{-2} D^2_{10} (m/s) \qquad \text{Equation 1}$$

The hydraulic conductivity values at various depths, based on grain size, are summarized in Table 4. The estimated k values are consistent with those obtained during the single well response tests.

Table 4: Hydraulic Conductivity Estimated from Grain Size Analyses

Location	Depth of soil sample (m)	Soil Classification	Estimated Hydraulic Conductivity (Hazen Number)	
			m/s	m/day
BH3	2.29 – 2.75	Silt, some Sand, some Clay, trace Gravel	2.50×10^{-9}	0.000216
BH4	2.29 – 2.75	Sand, some Clay, trace Gravel	5.18×10^{-5}	4.479
	4.58 – 5.04	Silt and Sand, trace Clay	2.03×10^{-9}	0.000175
BH6	0.76 – 1.22	Gravelly Sand, some Clay	3.48×10^{-9}	3.0076
	2.29 – 2.75	Sandy Silt, trace Clay, trace Gravel	1.44×10^{-5}	0.0125

7. CONSTRUCTION DEWATERING & PERMANENT DRAINAGE

7.1 Construction Dewatering

It was understood that the proposed development will have one basement level with top of slab at 3.05m below FFE. Based on the geotechnical engineering report, conventional shallow footings would typically be located at depths of 1.2m below basement TOS. The following assumptions were made in estimating construction dewatering rates:

a. Finished ground floor elevation: 103.70m asl.
b. Basement floor elevation of 100.65m asl.
c. Average footing elevation at 99.45m asl.
d. Assumed groundwater level of 99.53m asl.
e. Gross floor /excavation area of 318.16m^2.
f. Average hydraulic conductivity 1.82×10^{-5}m/s based on single well response tests.

Construction groundwater dewatering flowrate of **13.74m^3/day (13,740 L/day)** was calculated for excavation of one underground level as shown in Appendix F. Factored construction groundwater dewatering flowrate is **20.60 m^3/day (20,060 L/day)** with FS=1.5.

Seasonal High Groundwater Levels

Groundwater levels were monitored over the period September 2023 to February 2024 to determine seasonal highwater levels at the site. The average groundwater level was increased by 0.5m (to 99.53m

asl) and used to calculate construction dewatering rates. The average groundwater level was increased by 1.5m (to 100.53m asl) and used to calculate 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 7.95m^3 in the excavated area dominated by sand/silty sand/sandy silt with silt at greater depths. Some of this water is expected to pond based on the saturation level in the excavation area although some will be lost otherwise. A conservative accumulated volume of **3.2 m^3/day** may be assumed. Accumulated precipitation may be stored on site for subsequent disposal to an MECP-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 the Municipality. The water quality, at the time of the application, will need to be ascertained to ensure compliance with the Port Hope Sanitary Sewer By-Law (30/94) and Port Hope Storm Sewer By-Law (30/94).

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

Unfactored: **16.94 m^3/day (16,940 L/day).**
Factored: **23.80 m^3/day (23,800 L/day).**

7.2 Permanent Drainage

Total permanent groundwater discharge rate of **4.16 m^3/day (4,160 L/day)** was estimated for the building with one basement level. Factored discharge rates of **6.24 m^3/day (6,240 L/day)** using a FS of 1.5 are applicable.

An application for permission to discharge to the municipal/regional sewer will be required unless the subsurface structure of the building is designed as watertight.

It is recommended that the portion of the elevator shaft, below the basement level, be designed as watertight.

7.3 Permit to Take Water (PTTW) and EASR

As the calculated construction dewatering flowrate (including accumulated precipitation) is less than 50 m^3/day, registration on the MECP Environmental Activity and Sector Registry (EASR) for Water Taking will not be required. An application for permission to take water (PTTW) is not required for construction dewatering as the daily discharge rate is less than 400,000 litres.

An application for PTTW will not be required for permanent drainage as the daily flowrate is less than 50,000L/day.

7.4 Groundwater Quality

The results of analyses for groundwater quality under the Port Hope Sanitary Sewer By-Law (30/94) and Port Hope Storm Sewer By-Law (30/94) show compliance with all parameters as shown in Appendix D.

Based on the results, presented in Appendix D, the groundwater, in its present form, may be discharged to the public sanitary and storm 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 9.18m from the edge of the dewatering point for the building with one underground level.

Based on the field investigation, the soils to the proposed excavation depths are dominated by sand/silty sand to sandy silt. Based on the amount of groundwater for construction dewatering and the flowrates encountered during the field work, an active dewatering system may not be required as localized dewatering should be possible by pumping from sump pit. Consequently, dewatering influence zones will be less than calculated.

Notwithstanding the preceding, it is recommended that a pre-construction survey of adjacent structures/roads be carried out prior to dewatering/shoring construction stage. Potential adverse impact

on adjacent structures, due to dewatering/shoring construction, must be assessed, quantified and reviewed during construction.

7.6 Hydrogeological Impact

The calculated dewatering influence zone will not extend beyond the property boundaries. Review of the soils show that the saturated soils for dewatering are dominated by compact to very dense sand/silty sand to sandy silt in which significant groundwater induced settlement is not expected. A shoring system may be required if sufficient space is not available for safe slopes to be constructed. Dewatering, where required, will take place within the shoring enclosure. It is therefore determined that there will not be any negative impact to the natural environment, Port Hope Sewer works nor surrounding properties due to construction dewatering, assuming the same soil profile in the vicinity of the subject site.

8. PRIVATE WELL SURVEY

A query of the MECP water well records shows that there are 43 wells within an approximate radius of 500m of the site as shown in Appendix G. No water supply well was observed.

The type of material encountered at the expected excavation depths, below the surficial soils, are mainly sand/silty sand to sandy silt. The shallow aquifer was encountered at about 3m bgs during the field investigation. Conventional pumping methods, pumping from sump pits, are recommended at typical depths of up to 3-4m bgs for localized dewatering of the excavation area with one basement level.

Shoring will generally be required based on the depth of excavation and construction excavation is therefore expected to enter the shallow aquifer. Supply wells, if present, would not usually be pumping from the shallow aquifer.

It is therefore not anticipated that construction dewatering will impact the quality or quantity of any supply wells in proximity to the site.

9. DISCUSSION

- Hydraulic conductivity values (k) calculated from onsite single well response tests are 1.21 x 10^{-5} to 2.42 x 10^{-5} m/s (1.046 and 2.092 m/day). These are representative of the water bearing soils consisting of sand/silty sand to sandy silt at the expected excavation depths.
- Total construction groundwater dewatering and permanent drainage flowrates of 13.74 m^3/day and 4.16 m^3/day were estimated for the proposed building with one underground level. An additional discharge volume of 3.2m^3/day of accumulated precipitation should be accounted for during construction dewatering.
- Factors of safety of 1.5 should be applied to both construction groundwater dewatering and permanent drainage rates.
- Registration on the MECP's EASR Website for water taking will not be required for neither construction dewatering nor permanent drainage. An application for PTTW is not required.
- The groundwater quality determined by laboratory analyses revealed compliance with storm and sanitary sewer discharge limits. Consequently, the groundwater, in its present form, may be discharged to the sanitary or storm sewer systems without treatment.
- 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 Port Hope Sewer Use Bylaws.
- Construction groundwater dewatering and permanent drainage rates, given in the preceding, are based on the current site plans provided to Fisher during the investigation and common practice and our reasonable assumption for the underground level grades. The calculations may be subject to further modification when final building details and, or footing/foundation depth/elevations become available.

10.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 the implementation 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 LOCATION MAP AND PLAN

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NORTH

N

LEGEND

PROJECT NAME AND ADDRESS

GEOTECHNICAL AND HYDROGEOLOGICAL INVESTIGATION

39 Pine Street North,
Port Hope, ON

FIGURE A1:

SITE LOCATION PLAN

PROJECT NO.	SHEET NO.
FE- 23-13246/47	A1
DATE: 11 September 2023	
SCALE: AS SHOWN	

FISHER ENGINEERING

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

Tel: 905 475-7755

NORTH

LEGEND

- SITE BOUNDARY
- BUILDING FOOTPRINT
- BOREHOLE WITH MONITORING WELL LOCATION
- BOREHOLE LOCATION
- METHANE PROBE LOCATION

PROJECT NAME AND ADDRESS

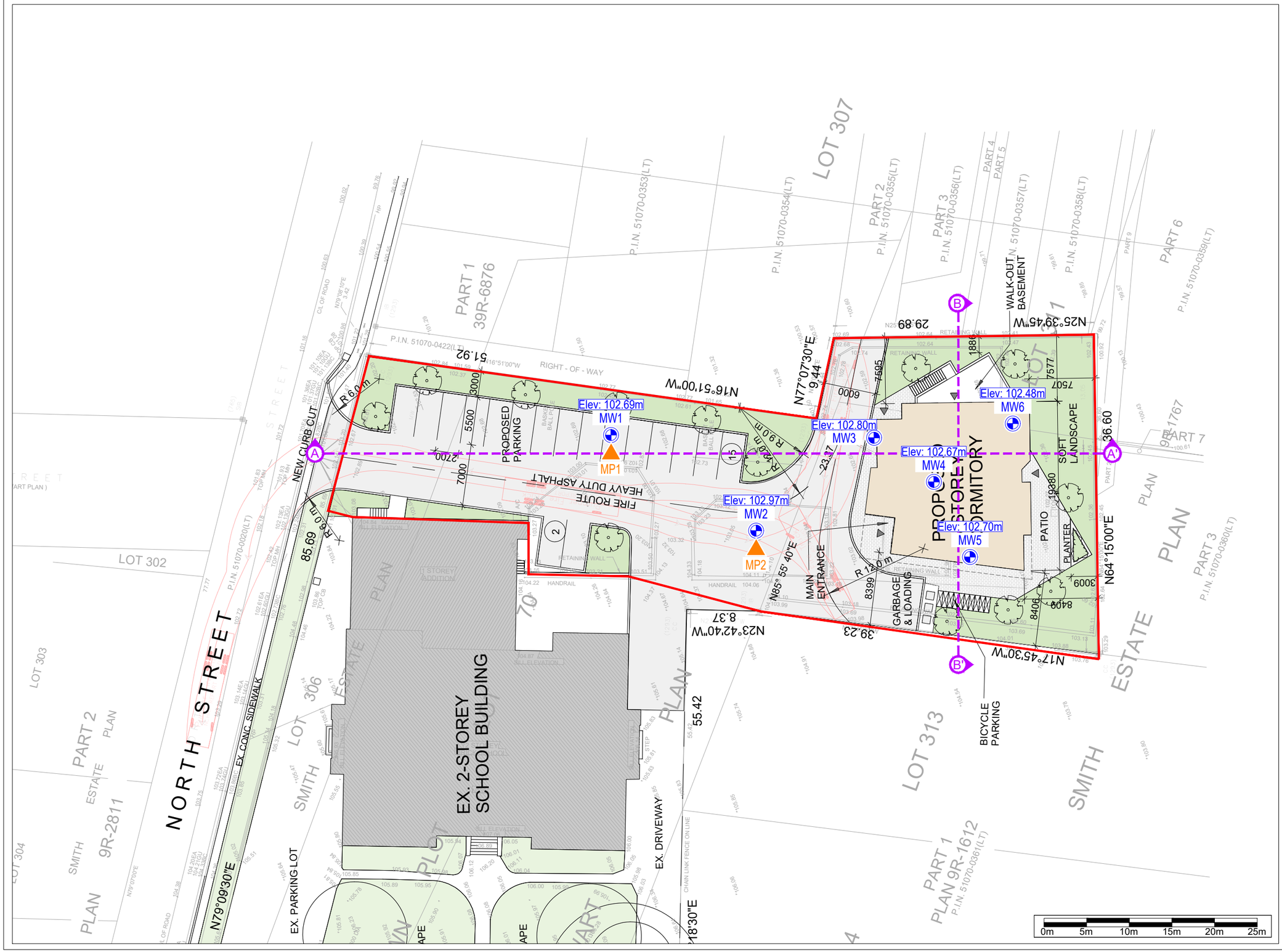
GEOTECHNICAL AND HYDROGEOLOGICAL INVESTIGATION

39 Pine Street North,
Port Hope, ON

FIGURE A2:

SITE PLAN WITH BOREHOLES / MONITORING WELL LOCATIONS

PROJECT NO.	SHEET NO.
FE- 23-13246/47	A2
DATE: 11 September 2023	
SCALE: AS SHOWN	



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NORTH

LEGEND

- SITE BOUNDARY
- BUILDING FOOTPRINT
- BOREHOLE WITH MONITORING WELL LOCATION
- BOREHOLE LOCATION
- METHANE PROBE LOCATION
- CROSS SECTION MARK (A - A')

PROJECT NAME AND ADDRESS

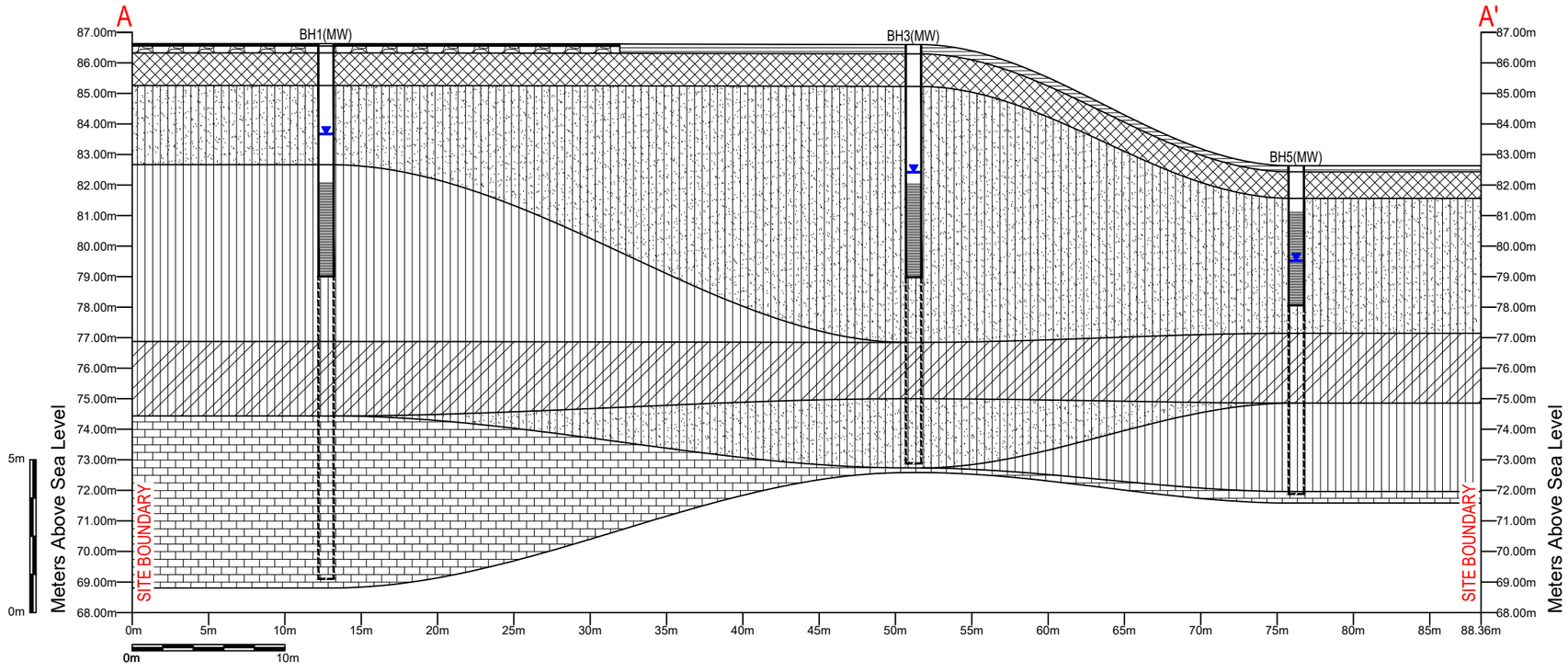
GEOTECHNICAL AND HYDROGEOLOGICAL INVESTIGATION

39 Pine Street North,
Port Hope, ON

FIGURE A3:

SITE PLAN WITH BOREHOLES / MONITORING WELL LOCATIONS

PROJECT NO.	SHEET NO.
FE- 23-13246/47	A3
DATE: 11 September 2023	
SCALE: AS SHOWN	



FISHER ENGINEERING
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NORTH

LEGEND

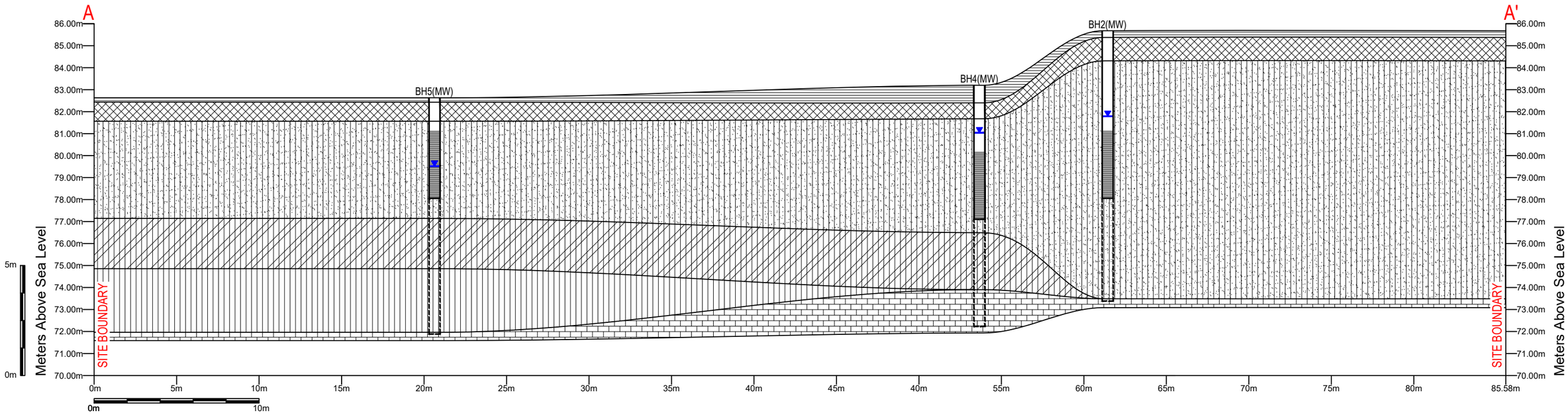
- ASPHALT
- FILL
- TOPSOIL
- GRANULAR
- SAND
- SILT
- CLAY
- BEDROCK
- GROUNDWATER POTENTIOMETRIC LEVEL

PROJECT NAME AND ADDRESS

GEOTECHNICAL & HYDROGEOLOGICAL INVESTIGATIONS

900 Lakeshore Road West, Mississauga, Ontario

PROJECT NO.	FE-23-13329/30
DATE.	19 October 2023
SCALE.	AS SHOWN
FIGURE A4.1:	**CROSS-SECTION A - A'**
SHEET NO.	A4.1



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

NORTH

LEGEND

- FILL
- TOPSOIL
- GRANULAR
- SAND
- SILT
- CLAY
- BEDROCK
- GROUNDWATER POTENTIOMETRIC LEVEL

PROJECT NAME AND ADDRESS

GEOTECHNICAL & HYDROGEOLOGICAL INVESTIGATIONS

900 Lakeshore Road West, Mississauga, Ontario

PROJECT NO.
FE-23-13329/30

DATE.
19 October 2023

SCALE.
AS SHOWN

FIGURE A4.2:
CROSS-SECTION B - B'

SHEET NO.
A4.2

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

KEY PLAN

LEGEND

Glacial Lake Deposits: Lake Iroquois, shallow water deposits sand, silty sand

PROJECT NAME AND ADDRESS
HYDROGEOLOGICAL INVESTIGATION
39 Pine Street North,
PORT HOPE, ON

PROJECT NO. FH 23 - 13247
DATE JANUARY 2024
SCALE As shown

FIGURE: 5
Surficial Geology Map.

Ontario

Ministry of Natural Resources and Forestry

Make-a-Map: Natural Heritage Areas

39 Pine St N, Port Hope: Natural Heritage Map

Map created:2/6/2024

Legend

- Assessment Parcel
- ANSI
- Earth Science Provincially Significant/sciences de la terre d'importance provinciale
- Earth Science Regionally Significant/sciences de la terre d'importance régionale
- Life Science Provincially Significant/sciences de la vie d'importance provinciale
- Life Science Regionally Significant/sciences de la vie d'importance régionale
- Conservation Reserve
- Provincial Park
- Natural Heritage System

0.3 0 0.17 0.3 Kilometres

Absence of a feature in the map does not mean they do not exist in this area.

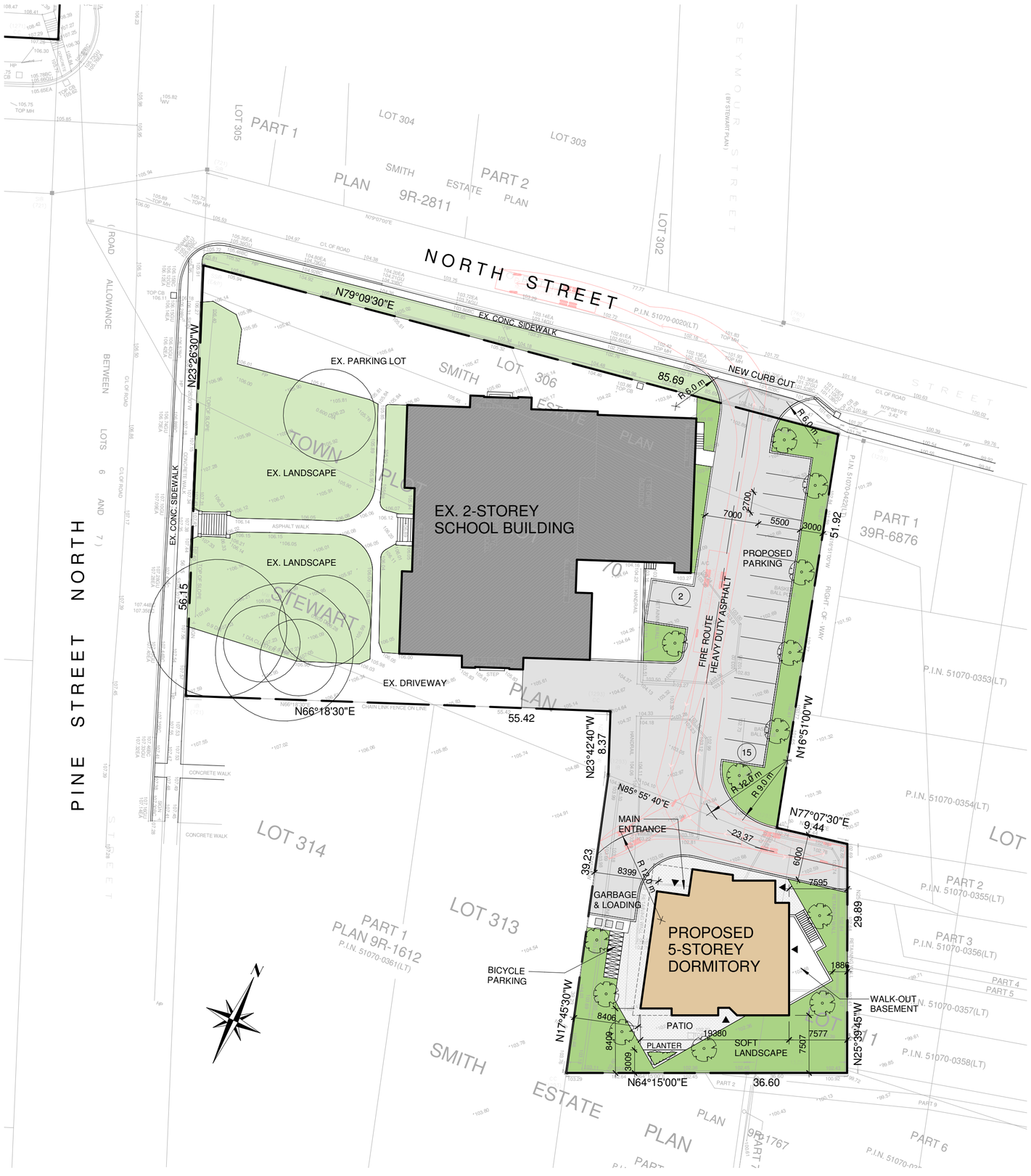
This map should not be relied on as a precise indicator of routes or locations, nor as a guide to navigation. The Ontario Ministry of Natural Resources and Forestry(OMNRF) shall not be liable in any way for the use of, or reliance upon, this map or any information on this map.

PROPOSED SCHOOL DORMITORY BUILDING

39 PINE ST N PORT HOPE ONTARIO

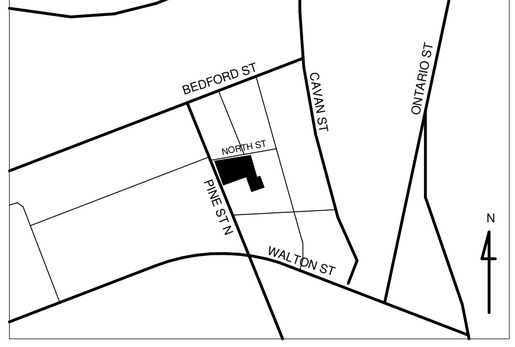
LEGEND & ABBREVIATION

- FS — FIRE ROUTE SIGN
- MAN DOOR (ENTRANCES & EXITS)
- FH — FIRE HYDRANT
- M.B. — MAIL BOX
- LS — LIGHT POLES
- CB — CATCH BASIN
- MH — MANHOLES
- ACCESSIBLE PARKING SPACES



1 SITE PLAN

1 : 400



LOCATION MAP

SITE STATISTIC

ZONE CATEGORY: IU - URBAN INSTITUTIONAL			
LOT AREA: 5,258.05 m²			
BUILDING AREA	EX. SCHOOL	PROP. DORM	TOTAL
	±1,040 m²	309 m²	1,349 m²
LOT COVERAGE: 26.78%			
GROSS AREA	EX. SCHOOL	PROP. DORM	TOTAL
	±1,822 m²	1,716 m²	3,538 m²
NUMBER OF ROOMS: 28 * (2ND - 5TH FLOORS)			
OCCUPANT LOAD: 80 PERSONS			

HEIGHT ±19.35 m	ABOVE GRADE	BELOW GRADE	
	5 STOREYS	1 STOREY	
SETBACKS	FRONT YARD	SIDE YARDS	YEAR YARD
		7.5 m	7.5 m
PARKING SPACE PROVIDED: 17 SPACES			
BICYCLE PARKING PROVIDED: 10 SPACES			

*NO COOKING IN THE ROOMS

No.	Date:	Issued/Revision:	By
7	2023-09-28	ISSUED FOR COORDINATION	HW
6	2023-08-15	ISSUED FOR REVIEW	HW
5	2023-06-15	ISSUED FOR REVIEW	HW
4	2023-06-08	ISSUED FOR REVIEW	HW
3	2022-12-07	ISSUED FOR PRE-CONSULT	HW
2	2022-11-30	ISSUED FOR REVIEW	HW
1	2022-11-28	ISSUED FOR REVIEW	HW

WANG ARCHITECTS INC.
3950 14th Ave, Unit 609
Markham, ON L3R 0A9
T: 905-604-6960
E: info@wangarchitects.ca
www.wangarchitects.ca

Project :

SCHOOL DORMITORY BUILDING

39 PINE STREET NORTH
PORT HOPE ONTARIO

Drawing Name :

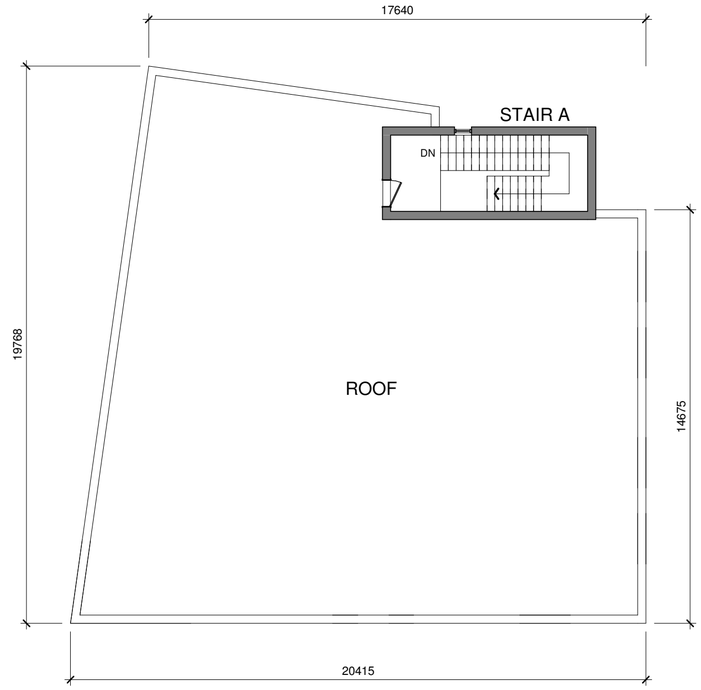
SITE PLAN

Date	AUGUST 2022	Project No :	W00018
Scale :	As indicated		
Drawn by :	Author	Drawing No :	A1
Checked by :	Checker		

C:\Users\AND\Documents\39 Pine St N - SPA REV1_AND.rvt

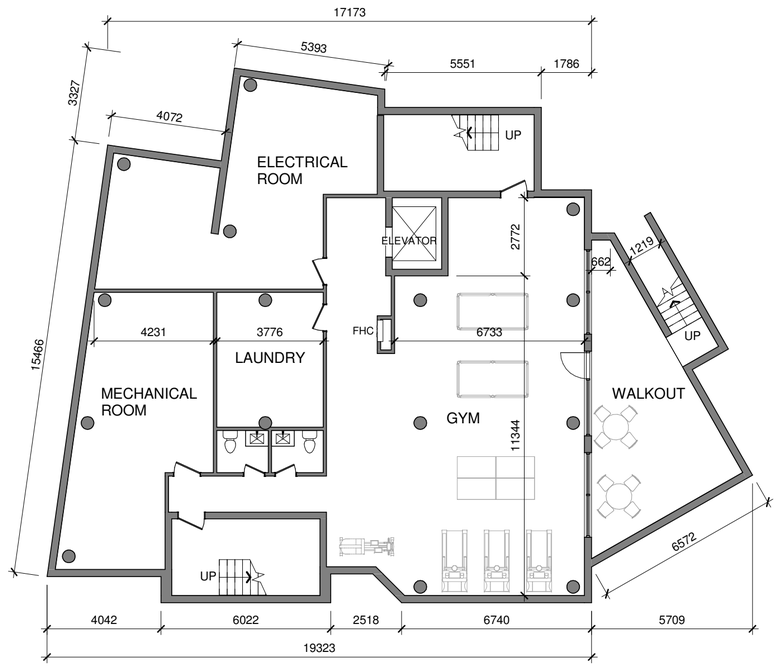
2 GROUND FLOOR PLAN

1 : 150



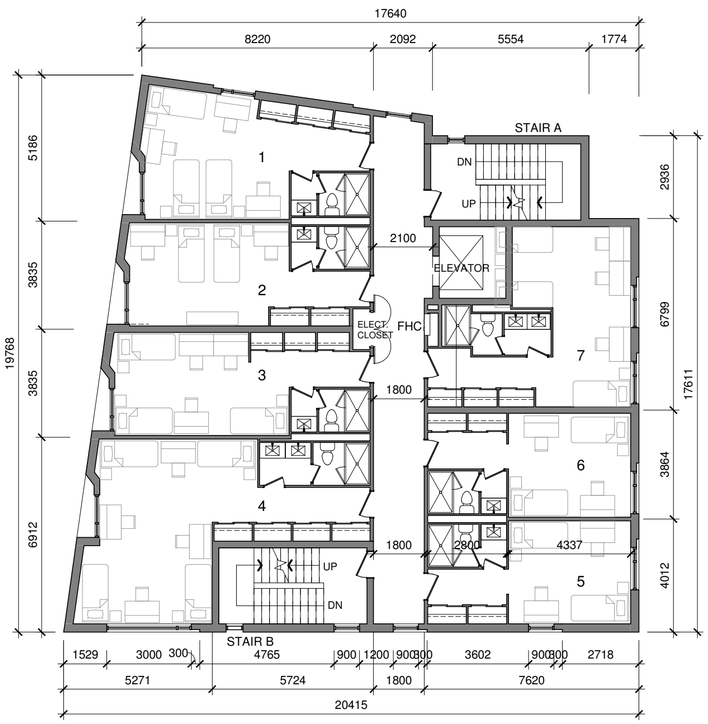
4 ROOF PLAN

1 : 150



1 BASEMENT PLAN

1 : 150



3 2ND-5TH FLOOR PLAN

1 : 150

No.	Date:	Issued/Revision:	By
4	2023-08-15	ISSUED FOR REVIEW	HW
3	2023-06-15	ISSUED FOR REVIEW	HW
2	2023-06-08	ISSUED FOR REVIEW	HW
1	2022-11-28	ISSUED FOR REVIEW	HW

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Project :

SCHOOL DORMITORY BUILDING

39 PINE STREET NORTH
PORT HOPE ONTARIO

Drawing Name :

FLOOR PLANS

Date	AUGUST 2022	Project No :	W00018
Scale :	1 : 150		
Drawn by :	JW	Drawing No :	A2
Checked by :	HW		

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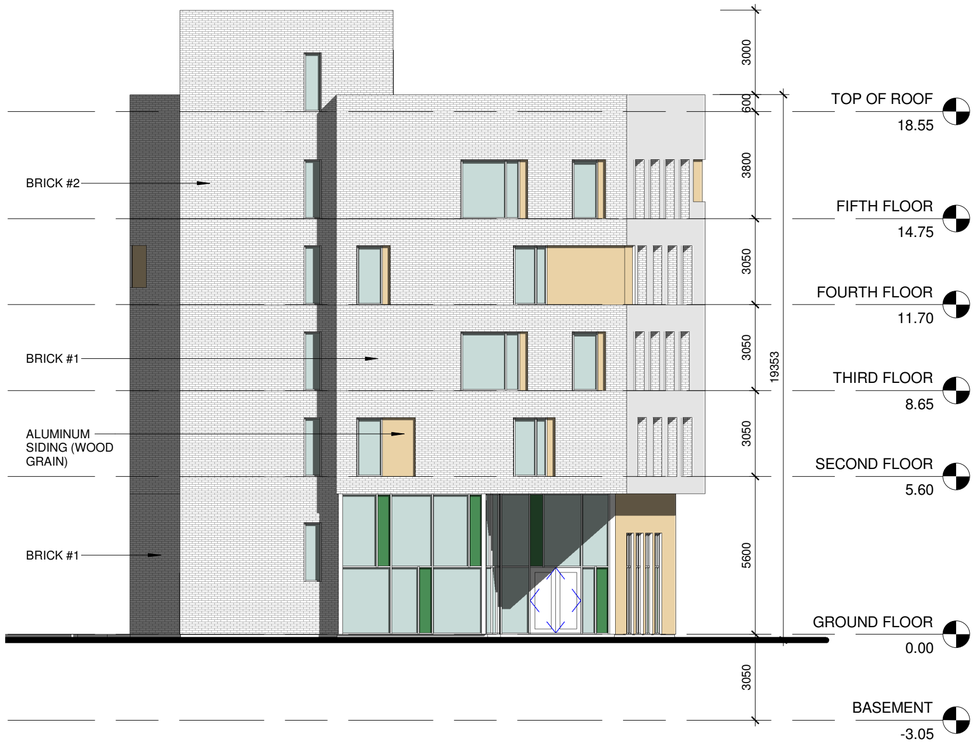
2 WEST ELEVATION

1 : 150

4 EAST ELEVATION

1 : 150



1 NORTH ELEVATION

1 : 150

3 SOUTH ELEVATION

1 : 150

No.	Date:	Issued/Revision:	By
3	2023-08-15	ISSUED FOR REVIEW	HW
2	2023-06-15	ISSUED FOR REVIEW	HW
1	2023-06-08	ISSUED FOR REVIEW	HW

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Project :

SCHOOL DORMITORY BUILDING

39 PINE STREET NORTH
PORT HOPE ONTARIO

Drawing Name :

ELEVATIONS

Date	AUGUST 2022	Project No :	W00018
Scale :	1 : 150		
Drawn by :	Author	Drawing No :	A3
Checked by :	Checker		

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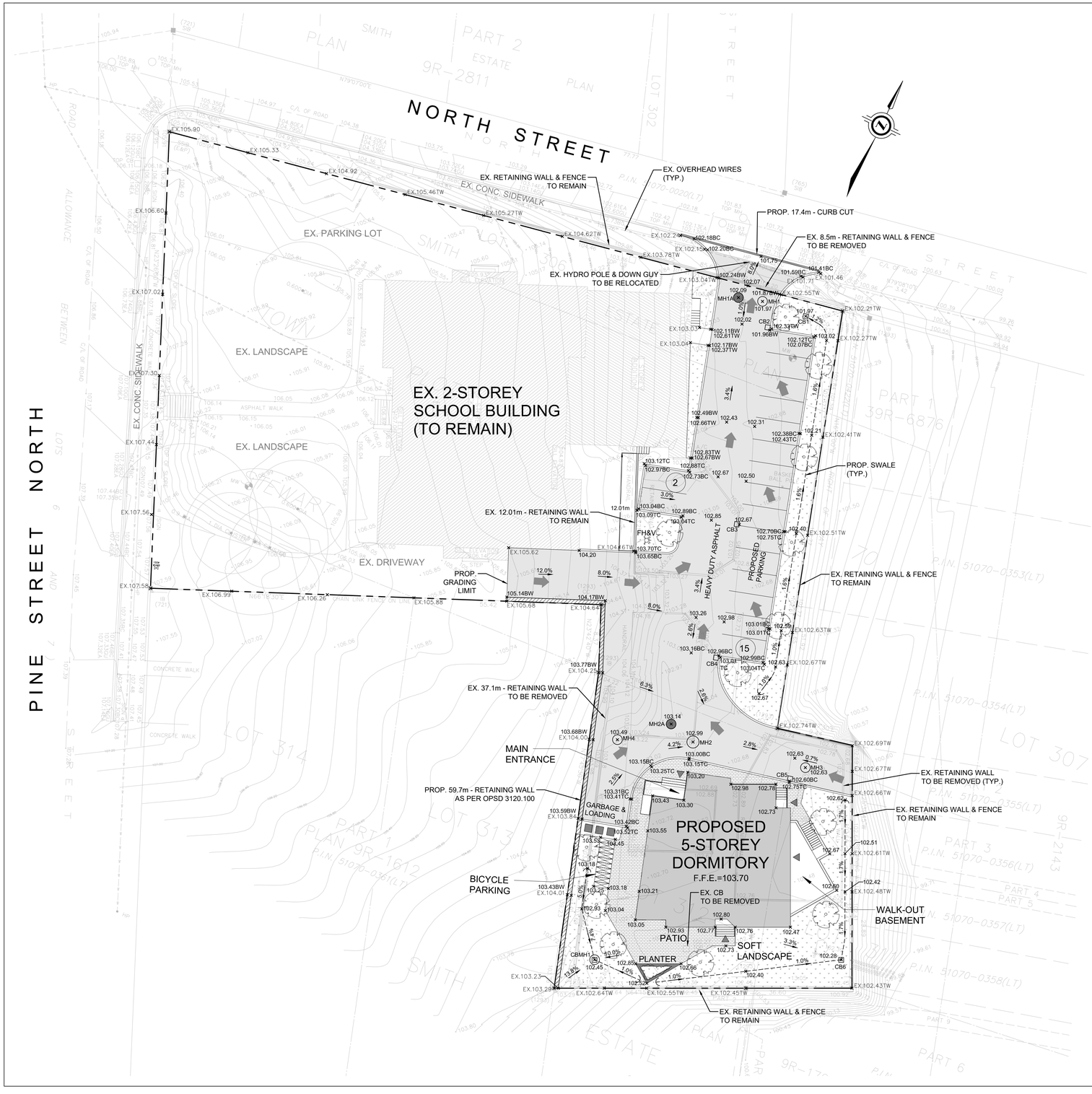

PLAN SHOWING TOPOGRAPHIC DETAIL OF
PART OF TOWN PLOT LOT 70 AND 73
STEWART PLAN
PART OF LOTS 306 AND 314 AND
ALL OF LOTS 522, 523 AND 524
SMITH ESTATE PLAN
TOWN OF PORT HOPE
MUNICIPALITY OF PORT HOPE
COUNTY OF NORTHUMBERLAND

BENCHMARK NOTES:
ELEVATIONS SHOWN HEREON ARE GEODETIC AND ARE REFERRED TO COSINE BENCHMARK 0011910U172, BEING A BOLT IN SOUTH STONE FOUNDATION OF PORT HOPE TOWN HALL. 25cm FROM SOUTHWEST CORNER, 48cm ABOVE SIDEWALK. ELEVATION=78.253(CGVD)(1928: 78)

LEGEND

- PROPERTY LINE
- PROP. SWALE
- EX. OVERHEAD WIRES
- 226.80 — PROP. ELEVATION
- 226.80TC — PROP. TOP OF CURB ELEVATION
- 226.80BC — PROP. BOTTOM OF CURB ELEVATION
- 226.80TW — PROP. TOP OF RETAINING WALL ELEVATION
- 226.80BW — PROP. BOTTOM OF RETAINING WALL ELEVATION
- EX.226.80 — EX. ELEVATION
- EX.226.80TW — EX. TOP OF RETAINING WALL ELEVATION
- 101.36BC — EX. BACK OF CURB ELEVATION
- 101.36GU — EX. EDGE OF GUTTER ELEVATION
- 101.36EA — EX. EDGE OF ASPHALT ELEVATION
- CPED — EX. CABLE TV PEDESTAL
- HP — EX. HYDRO POLE
- FP — EX. FLAG POLE
- FH — EX. FIRE HYDRANT TO BE REMAINED
- WV — EX. WATER VALVE TO BE REMAINED
- MW — EX. MONITORING WELL
- CB — EX. CATCH BASIN
- MH — EX. MANHOLE
- MH1A — PROP. SANITARY MANHOLE
- MH1 — PROP. STORM MANHOLE
- CBMH — PROP. CATCH BASIN MANHOLE
- CB — PROP. CATCH BASIN
- FH&V — PROP. FIRE HYDRANT & VALVE
- PROP. WATER VALVE & BOX
- EX. TREE
- PROP. TREE
- 2.17% — DRAINAGE FLOW DIRECTION AND SLOPE
- OVERLAND FLOW ARROW
- PROP. HEAVY DUTY ASPHALT AREA
- PROP. LANDSCAPE AREA

NOTES:

THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS AND UNDERGROUND AND ABOVE GROUND UTILITIES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARING THE WORK THE CONTRACTOR SHALL CONFIRM OF THE EXACT LOCATION OF ALL UTILITIES AND STRUCTURES, AND SHALL ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

THE CONTRACTOR MUST CHECK AND VERIFY ALL DIMENSIONS ON THE JOB AND REPORT ANY DISCREPANCY TO THE ARCHITECTS/ENGINEERS BEFORE PROCEEDING WITH THE WORKS.

ALL DRAWINGS AND SPECIFICATIONS ARE INSTRUMENTS OF SERVICE AND THE PROPERTY OF THE ENGINEER WHICH MUST BE RETURNED AT THE COMPLETION OF WORK.

THIS DRAWINGS IS NOT TO BE SCALED. CONTRACTOR TO USE DIGITAL FILES FOR LAYOUT PROVIDED BY ENGINEER. THIS PLAN MUST NOT BE USED TO SITE THE PROPOSED BUILDINGS.

THE APPROVAL OF THIS PLAN DOES NOT EXEMPT THE OWNER'S CONTRACTOR FROM OBTAINING, BUT NOT LIMITED TO THE FOLLOWING PERMITS: ROAD CUT, SEWER PERMITS, RELOCATION OF SERVICES, ENCROACHMENT AGREEMENTS, APPROACH APPROVAL PERMITS, ETC..

EXISTING TOPOGRAPHICAL INFORMATION SUPPLIED BY ELLIOTT & PARR SURVEYORS LTD. DATED SEPTEMBER 19, 2023.

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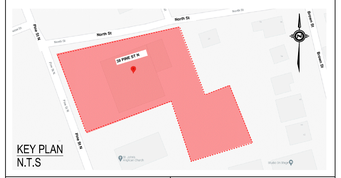
THIS DRAWING IS NOT TO BE USED FOR CONSTRUCTION.

No.	Issued	Date	By
1	UPDATED AS PER SITE PLAN	2023-11-20	



KEY PLAN
N.T.S

WPE ENGINEERING LTD.
222 - 7250 KEELE STREET
VAUGHAN, ONTARIO
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T: 416 578 8682
MDU@WPEENGINEERING.COM

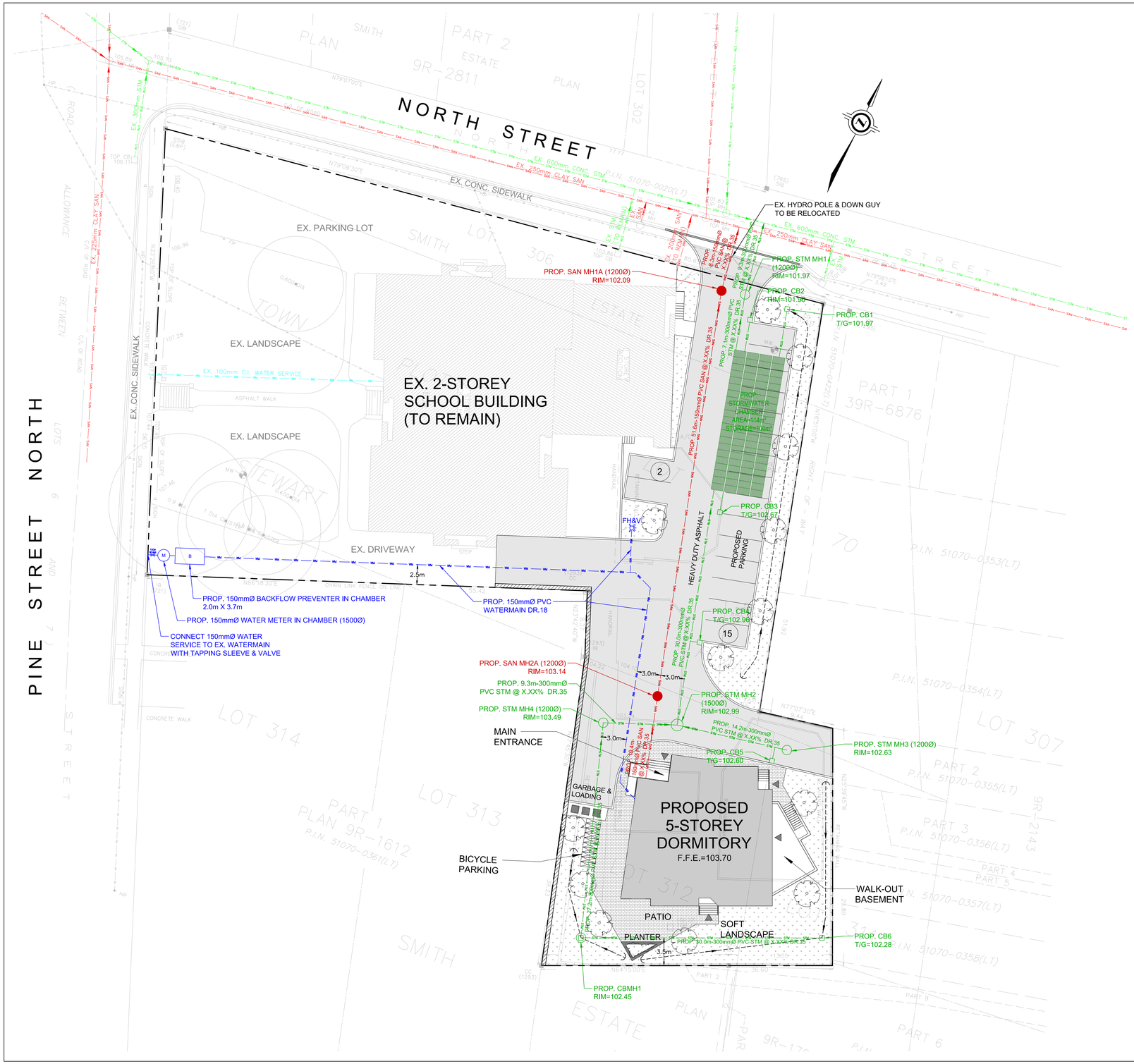
SCHOOL DORMITORY BUILDING

39 PINE STREET NORTH,
PORT HOPE, ON.

Project Number			2021
Drawn	J.W	Scale	1:250
Checked	M.D	Date	2023-10-04

GRADING PLAN

Drawing No. C-01



PLAN SHOWING TOPOGRAPHIC DETAIL OF
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STEWART PLAN
PART OF LOTS 306 AND 314 AND
ALL OF LOTS 522, 523 AND 524
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LEGEND

- PROPERTY LINE
- PROP. SWALE
- EX. OVERHEAD WIRES
- EX. SANITARY PIPE
- EX. STORM PIPE
- EX. WATERMAIN
- PROP. SANITARY PIPE
- PROP. STORM PIPE
- PROP. WATERMAIN
- EX. CABLE TV PEDESTAL
- EX. HYDRO POLE
- EX. FLAG POLE
- EX. FIRE HYDRANT TO REMAIN
- EX. WATER VALVE TO REMAIN
- EX. MONITORING WELL
- EX. CATCH BASIN
- EX. MANHOLE
- PROP. SANITARY MANHOLE
- PROP. STORM MANHOLE
- PROP. CATCH BASIN MANHOLE
- PROP. CATCH BASIN
- PROP. FIRE HYDRANT & VALVE
- PROP. WATER VALVE & BOX
- EX. TREE
- PROP. TREE
- PROP. HEAVY DUTY ASPHALT AREA
- PROP. LANDSCAPE AREA

NOTES:

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DATED SEPTEMBER 19, 2023.

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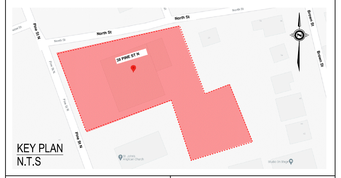
No.	Issued	Date	By
1	UPDATED AS PER SITE PLAN	2023-11-20	



KEY PLAN
N.T.S

WPE ENGINEERING LTD.
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VAUGHAN, ONTARIO
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T: 416 578 8682
MDU@WPEENGINEERING.COM

SCHOOL DORMITORY BUILDING

39 PINE STREET NORTH,
PORT HOPE, ON.

Project Number			2021
Drawn	J.W	Scale	1:250
Checked	M.D	Date	2023-10-06

SERVICING PLAN

Drawing No. C-02

APPENDIX B – LOG OF BOREHOLES

FISHER ENGINEERING

LOG OF BOREHOLE

NO. MW1 SHEET. 1 of 1

PROJECT NO.: FE-P# 23-13246/47

PROJECT NAME: GEOTECHNICAL & HYDROGEOLOGICAL INVESTIGATIONS

LOCATION: 39 Pine Street North., Port Hope, ON

DRILLING METHOD: CME-75 Solid Stem

DRILLING DATE: 25 August, 2023

DEPTH (feet)	DEPTH (meters)	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	LAB ID	Type NO.	"N" VALUE
				102.69			
0	0	ASPHALT ~76mm		0.20 / 102.49		SS-1	16
2		FILL: Black foundry slag, occ. pieces of porcelain, moist					
4	1	FILL: Dark brown to brown silty sand, trace to some slag, pockets of sandy silt, trace roots/topsoil, moist				SS-2	2
6	2					SS-3	5
8						SS-4	17
10	3	SAND/SILTY SAND: Brown, occ. trace of gravel, moist, compact		3.10 / 99.59		SS-5	25
12		End of borehole at 3.51m		3.51 / 99.18			
14	4						
16	5						
18							
20	6						
22	7						
24							
26	8						
28							
30	9						
32							
34	10						

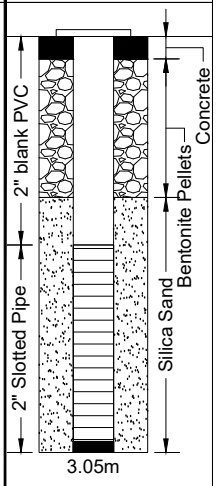
PENETRATION TESTING (SPT) ▲ 20 40 60 80

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 (m): on completion: Dry/ On September 6, 2023: Dry

DRAWN: A.M | LOGGED: D.G. | CHECKED: C.W.

FISHER ENGINEERING

LOG OF BOREHOLE

NO. MW2 SHEET. 1 of 1

PROJECT NO.: FE-P# 23-13246/47

PROJECT NAME: GEOTECHNICAL & HYDROGEOLOGICAL INVESTIGATIONS

LOCATION: 39 Pine Street North., Port Hope, ON

DRILLING METHOD: CME-75 Solid Stem

DRILLING DATE: 25 August, 2023

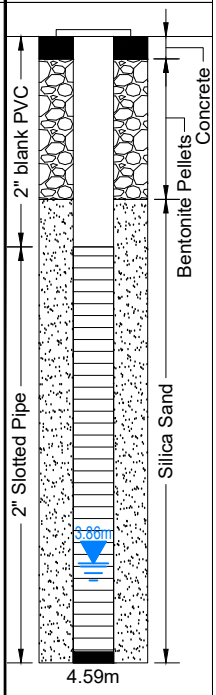
DEPTH (feet)	DEPTH (meters)	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	LAB ID	Type NO.	"N" VALUE
				102.97			
0	0	TOPSOIL ~150mm		0.15 / 102.82		SS-1	5
2		FILL: Dark brown to brown silty sand, trace to some topsoil/roots, moist		0.76 / 102.21			
4	1	SILTY SAND/SANDY SILT: Brown, moist to very moist, compact to very dense				SS-2	19
6	2					SS-3	26
8						SS-4	40
10	3					SS-5	100+
12		SAND: Brown, some silt, seam of silt/silty sand, occ. trace of gravel, wet, dense		3.51 / 99.46			
14	4						
16	5			5.03 / 97.94		SS-6	38
18		End of borehole at 5.03m					
20	6						
22	7						
24							
26	8						
28							
30	9						
32	10						
34							

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



Groundwater Depth (m): on completion: Dry/ On September 6, 2023: 3.86m

DRAWN: A.M LOGGED: D.G. CHECKED: C.W.

FISHER ENGINEERING

LOG OF BOREHOLE

NO. MW3 SHEET. 1 of 1

PROJECT NO.: FE-P# 23-13246/47

PROJECT NAME: GEOTECHNICAL & HYDROGEOLOGICAL INVESTIGATIONS

LOCATION: 39 Pine Street North., Port Hope, ON

DRILLING METHOD: CME-75 Solid Stem

DRILLING DATE: 25 August, 2023

DEPTH (feet)	DEPTH (meters)	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	LAB ID	Type NO.	"N" VALUE
				102.80			
0	0	FILL: Brown to greyish brown silty sand, some slag/pieces of porcelain, moist				SS-1	8
2				0.76 / 102.04			
4	1	FILL: Dark brown to grey sandy to clayey silt, pockets of topsoil/topsoil mixed soil, trace to some roots, trace of gravel, moist				SS-2	6
6	2					SS-3	9
8		SAND/SILTY SAND: Brown, seam/pockets of silt, very moist to wet, compact to very dense		2.28 / 100.52		SS-4	21
10	3					SS-5	58
12							
14	4						
16	5	SILT: Brown, seams/layers of sand/silty sand, wet, dense		4.88 / 97.92		SS-6	48
18							
20	6					SS-7	30
22		End of borehole at 6.55m		6.55 / 96.25			
24	7						
26	8						
28							
30	9						
32							
34	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

19.9%

16.3%

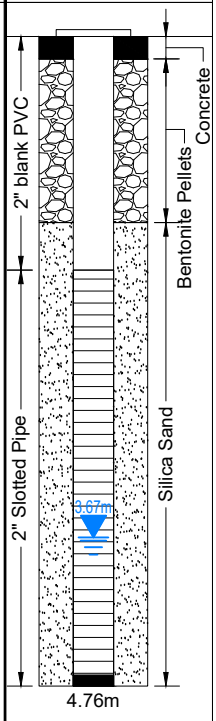
18.6%

18.4%

18.4%

17.1%

PIEZOMETER OR WELL CONSTRUCTION



Groundwater Depth (m): on completion: Dry/ On September 6, 2023: 3.67

DRAWN: A.M | LOGGED: D.G. | CHECKED: C.W.

FISHER ENGINEERING

LOG OF BOREHOLE

NO. MW4 SHEET. 1 of 1

PROJECT NO.: FE-P# 23-13246/47

PROJECT NAME: GEOTECHNICAL & HYDROGEOLOGICAL INVESTIGATIONS

LOCATION: 39 Pine Street North., Port Hope, ON

DRILLING METHOD: CME-75 Solid Stem

DRILLING DATE: 25 August, 2023

DEPTH (feet)	DEPTH (meters)	DESCRIPTION	ELEV. DEPTH (m)	LAB ID	Type NO.	"N" VALUE
			102.67			
0	0	TOPSOIL ~102mm				
		FILL: Dark brown to brown silty sand, trace of topsoil/roots/slag/gravel, moist			SS-1	5
4	1				SS-2	5
			1.68 / 100.99			
6	2	SAND/SILTY SAND: Brown to light brown, trace of gravel, moist, compact			SS-3	24
8					SS-4	27
	3		3.05 / 99.62			
10		SANDY SILT: Light brown, trace of clay/gravel, moist, very dense			SS-5	100+
12			3.96 / 98.71			
	4	SAND/SILTY SAND: Brown, very moist to wet, very dense to dense				
14						
16	5				SS-6	100+
18						
20	6				SS-7	37
22						
	7					
24						
26	8				SS-8	42
28			8.53 / 94.14			
		SAND: Grey, some silt, wet, dense				
30	9				SS-9	34
32			9.60 / 93.07			
	10	End of borehole at 9.60m				
34						

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

14.0%

4.3%

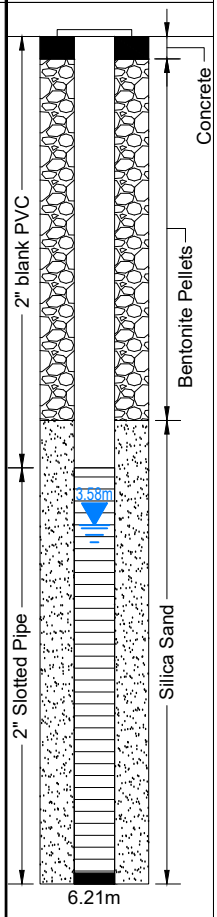
5.1%

12.6%

17.4%

19.3%

PIEZOMETER OR WELL CONSTRUCTION



Groundwater Depth (m): on completion: Dry/ On September 6, 2023: 3.58m

DRAWN: A.M LOGGED: D.G. CHECKED: C.W.

FISHER ENGINEERING

LOG OF BOREHOLE

NO. MW5 SHEET. 1 of 1

PROJECT NO.: FE-P# 23-13246/47

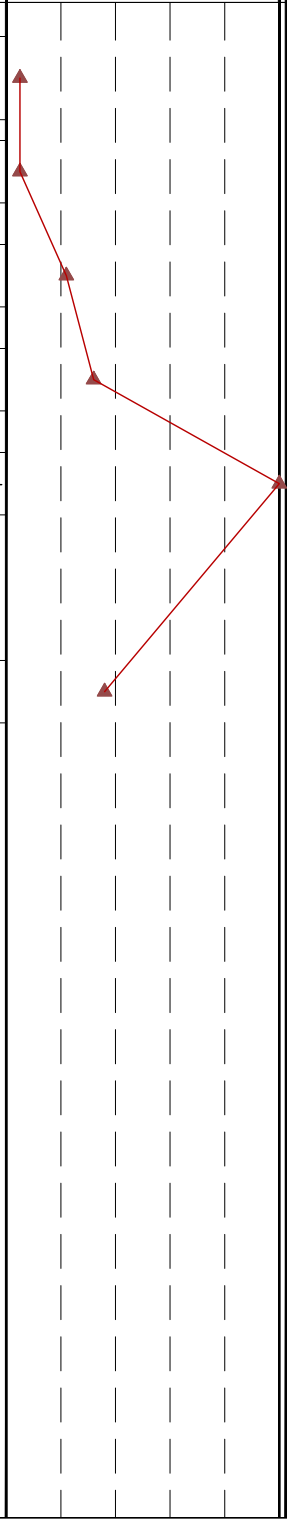
PROJECT NAME: GEOTECHNICAL & HYDROGEOLOGICAL INVESTIGATIONS

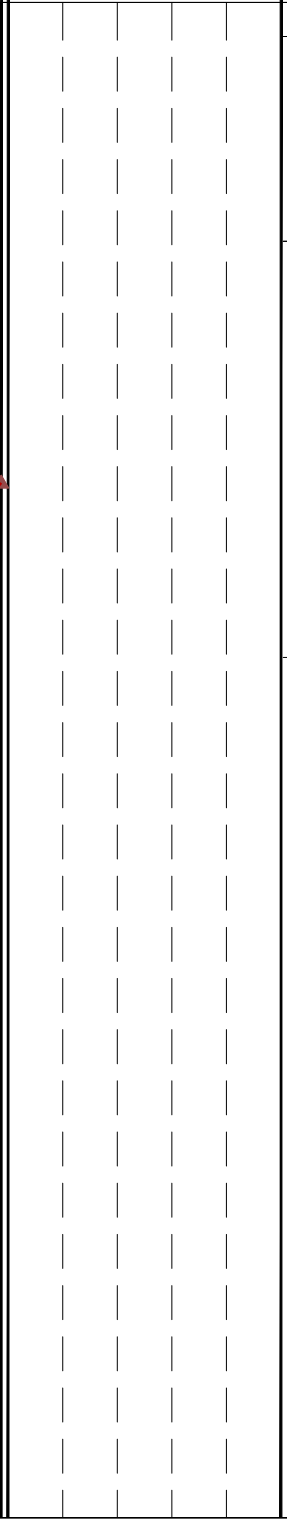
LOCATION: 39 Pine Street North., Port Hope, ON

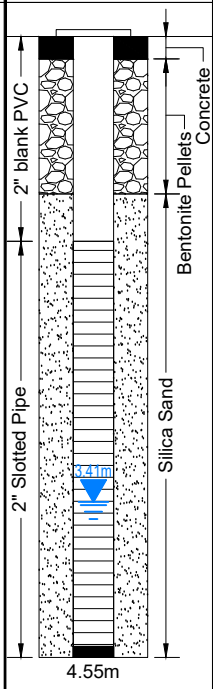
DRILLING METHOD: CME-75 Solid Stem

DRILLING DATE: 25 August, 2023

DEPTH (feet)	DEPTH (meters)	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	LAB ID	Type NO.	"N" VALUE
				102.70			
0	0	TOPSOIL ~102mm				SS-1	5
2	1	FILL: Dark brown to brown silty sand, trace of roots/topsoil/slag, moist				SS-2	5
4				1.52 / 101.18			
6	2	SANDY SILT: Light brown, trace of clay/gravel, moist, compact to dense				SS-3	22
8						SS-4	32
10	3	SAND/SILTY SAND: Brown, seam/pockets of silt/sandy silt, moist to very moist, very dense to dense		2.79 / 99.91		SS-5	100+
12	4						
14							
16	5	End of borehole at 5.03m		5.03 / 97.67		SS-6	36
18							
20	6						
22	7						
24							
26	8						
28							
30	9						
32	10						
34							







Groundwater Depth (m): on completion: Dry/ On September 6, 2023: 3.41m

DRAWN: A.M | LOGGED: D.G. | CHECKED: C.W.

FISHER ENGINEERING

LOG OF BOREHOLE

NO. MW6 SHEET. 1 of 1

PROJECT NO.: FE-P# 23-13246/47

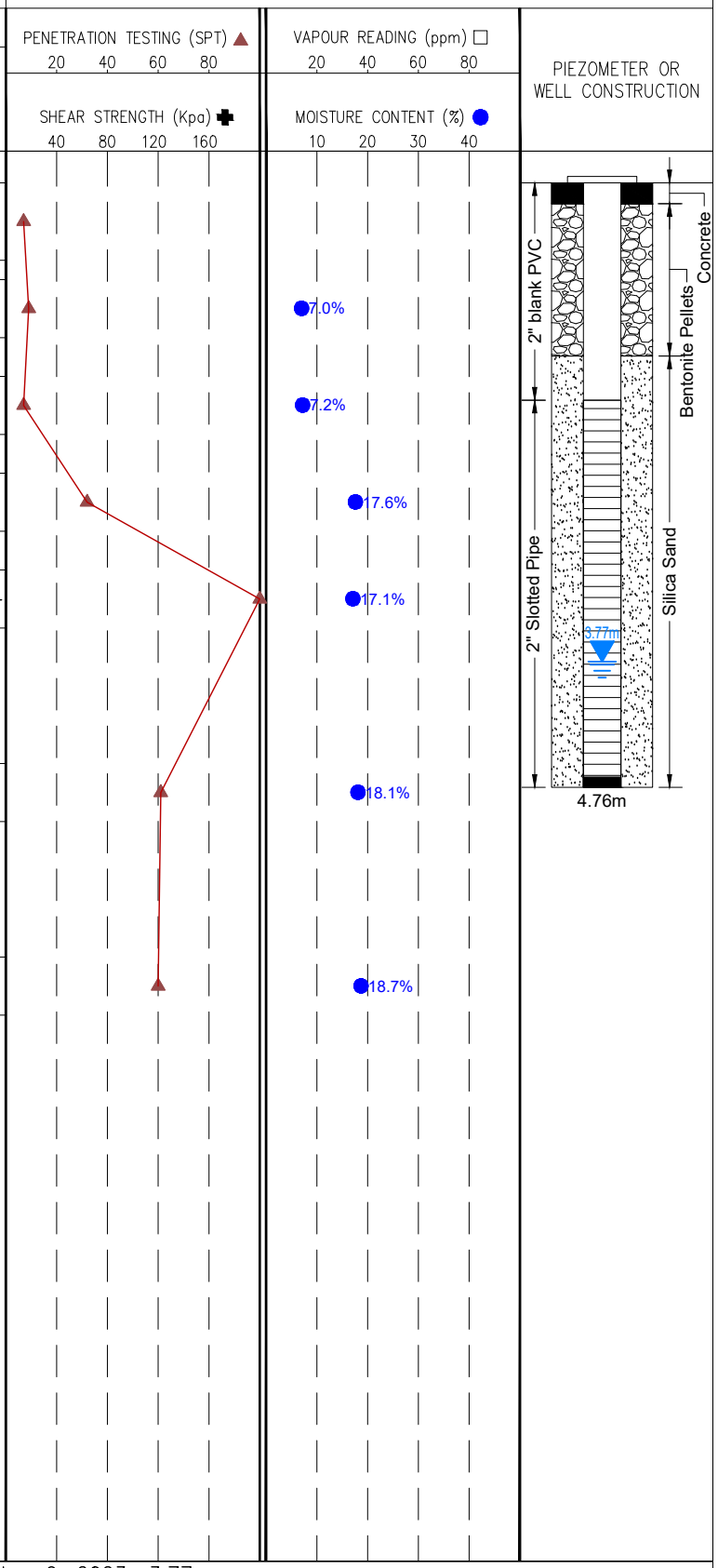
PROJECT NAME: GEOTECHNICAL & HYDROGEOLOGICAL INVESTIGATIONS

LOCATION: 39 Pine Street North., Port Hope, ON

DRILLING METHOD: CME-75 Solid Stem

DRILLING DATE: 25 August, 2023

DEPTH (feet)	DEPTH (meters)	DESCRIPTION	ELEV. DEPTH (m)	LAB ID	Type NO.	"N" VALUE
			102.48			
0	0	TOPSOIL ~102mm				
		FILL: Dark brown to brown silty sand, trace to some topsoil/slag, occ. pieces of porcelain, trace of gravel, moist			SS-1	7
2	1				SS-2	9
4						
6	2				SS-3	7
			2.28 / 100.20			
8		SAND/SILTY SAND: Brown, seam/pockets of silt/sandy silt, moist, dense to very dense			SS-4	32
10	3				SS-5	100+
12						
	4	Wet below 4m				
14						
16	5				SS-6	61
18						
20	6				SS-7	60
			6.55 / 95.93			
22	7	End of borehole at 6.55m				
24						
26	8					
28						
30	9					
32	10					
34						



Groundwater Depth (m): on completion: Dry/ On September 6, 2023: 3.77m

DRAWN: A.M | LOGGED: D.G. | CHECKED: C.W.

APPENDIX C – MOISTURE CONTENT AND GRAIN SIZE DISTRIBUTION ANALYSES

Project Name:	Geotechnical Investigation	***F.E. Lab #:***	23-754
Client:	2640573 Ontario Inc.	***Date Sampled:***	25-Aug-2023
Project ID:	23-13246	***Date Received:***	28-Aug-2023
Location:	39 Pine Street North, Port Hope, Ontario	***Date Reported:***	12-Sep-2023

Certificate of Analysis

Analyses	Matrix	Quantity	Testing Date	Method Reference
Moisture Content	Soil	18	28-Sep-23	ASTM D2216
Grain Size (Sieve Analysis)	Soil	7	05-Sep-23	LS-602
Grain Size (Hydrometer)	Soil	3	11-Sep-23	LS-702
Atterberg test	Soil	0	N.A.	LS-703/704

Authorized by: Behnam Sayad-Pour

Behnam Sayad Pour Zanjani
Geo-Lab Supervisor

400 Esna Park Drive, Unit 15, Markham, ON L3R 3K2
Tel:(905) 475-7755 www.fishereng.com

Certificate of Analysis

Analysis Requested:	Moisture Content	***Sample Description:***	18 Soil Sample(s)

Sample Info	BH3 SS2	BH3 SS3	BH3 SS4	BH3 SS5	BH3 SS6 A	BH3 SS6 B
Sample Depth (m)	0.76-1.22	1.53-1.98	2.29-2.75	3.05-3.51	4.58-4.88	4.88-5.03
Moisture Content (%)	19.9	16.3	18.6	18.4	18.4	17.1

Sample Info	BH4 SS2	BH4 SS3	BH4 SS4	BH4 SS5	BH4 SS6	BH4 SS7
Sample Depth (m)	0.76-1.22	1.53-1.98	2.29-2.75	3.05-3.51	4.58-5.03	6.1-6.56
Moisture Content (%)	14.0	4.3	5.1	12.6	17.4	19.3

Sample Info	BH6 SS2	BH6 SS3	BH6 SS4	BH6 SS5	BH6 SS6	BH6 SS7
Sample Depth (m)	0.76-1.22	1.53-1.98	2.29-2.75	3.05-3.51	4.58-5.03	6.1-6.56
Moisture Content (%)	7.0	7.2	17.6	17.1	18.1	18.7

Certificate of Analysis

Analysis Requested:	Grain Size (Sieve Analysis)	***Sample Quantity:***	7	Soil Sample(s)

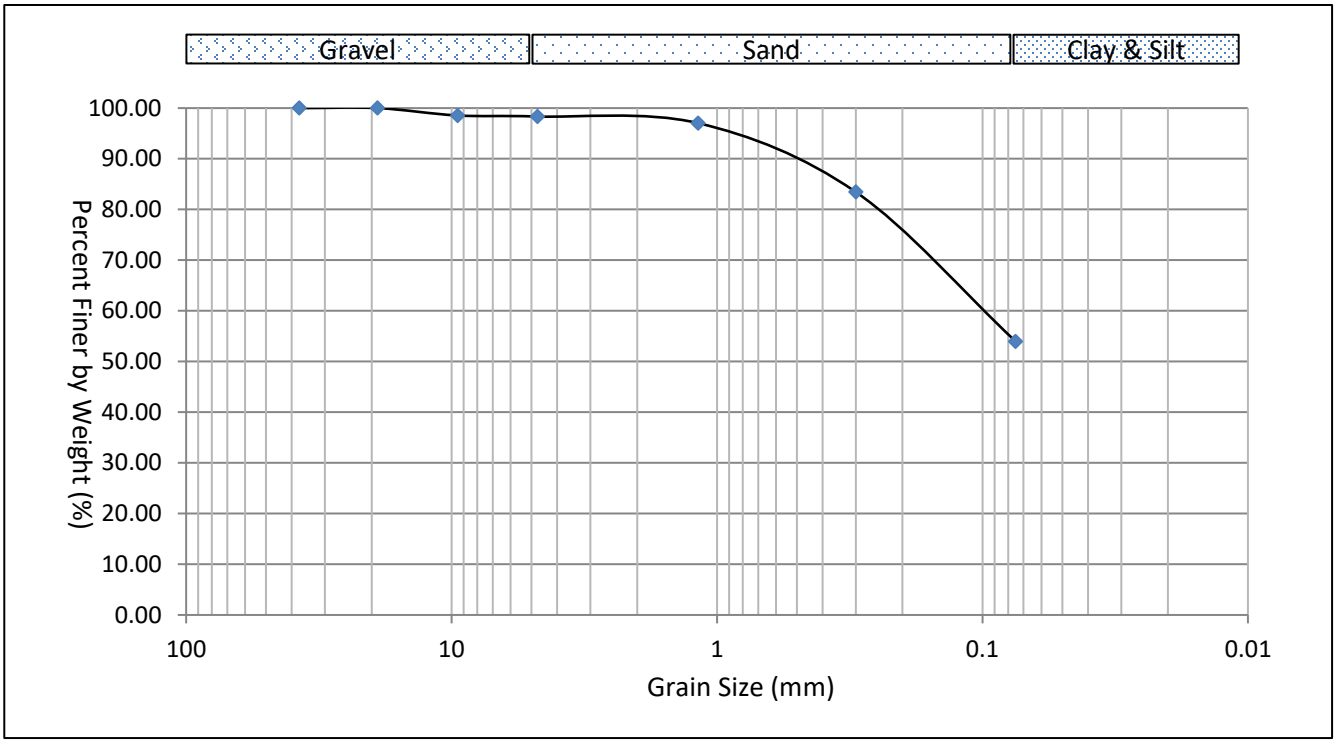
Sample Info	***23-755 BH3 SS2***	***23-757 BH3 SS6 A***	***23-758 BH3 SS6 B***	***23-759 BH4 SS2***	***23-760 BH4 SS4***	***23-762 BH6 SS2***
Sample Depth (m)	***0.76-1.22***	***4.58-4.88***	***4.88-5.03***	***0.76-1.22***	***2.29-2.75***	***0.76-1.22***
Grain Size (%)						
>19mm	0.0	0.0	0.0	0.0	0.0	0.0
9.5mm-19mm	1.5	0.0	0.0	2.0	1.3	12.4
4.75mm-9.5mm	0.2	0.2	0.0	2.2	2.6	15.0
1.18mm-4.75mm	1.3	0.1	0.2	1.7	1.7	15.7
300um-1.18mm	13.6	1.1	0.9	21.6	35.2	12.6
75um-300um	29.5	64.4	8.9	43.8	47.0	27.2
<75um	54.0	34.3	90.0	28.7	12.2	17.1
Clay and Silt	**54.0**	**34.3**	**90.0**	**28.7**	**12.2**	**17.1**
Sand	**44.4**	**65.6**	**10.0**	**67.1**	**83.9**	**55.5**
Gravel	**1.7**	**0.2**	**0.0**	**4.2**	**3.9**	**27.4**

Sample Info	***23-764 BH6 SS6***					
Sample Depth (m)	***4.58-5.03***					
Grain Size (%)						
>19mm	0.0					
9.5mm-19mm	0.8					
4.75mm-9.5mm	0.9					
1.18mm-4.75mm	0.7					
300um-1.18mm	1.1					
75um-300um	38.0					
<75um	58.6					
Clay and Silt	**58.6**					
Sand	**39.8**					
Gravel	**1.6**					

Grain Size Distribution

Sample ID: 23-755 BH3 SS2 (0.76-1.22m)

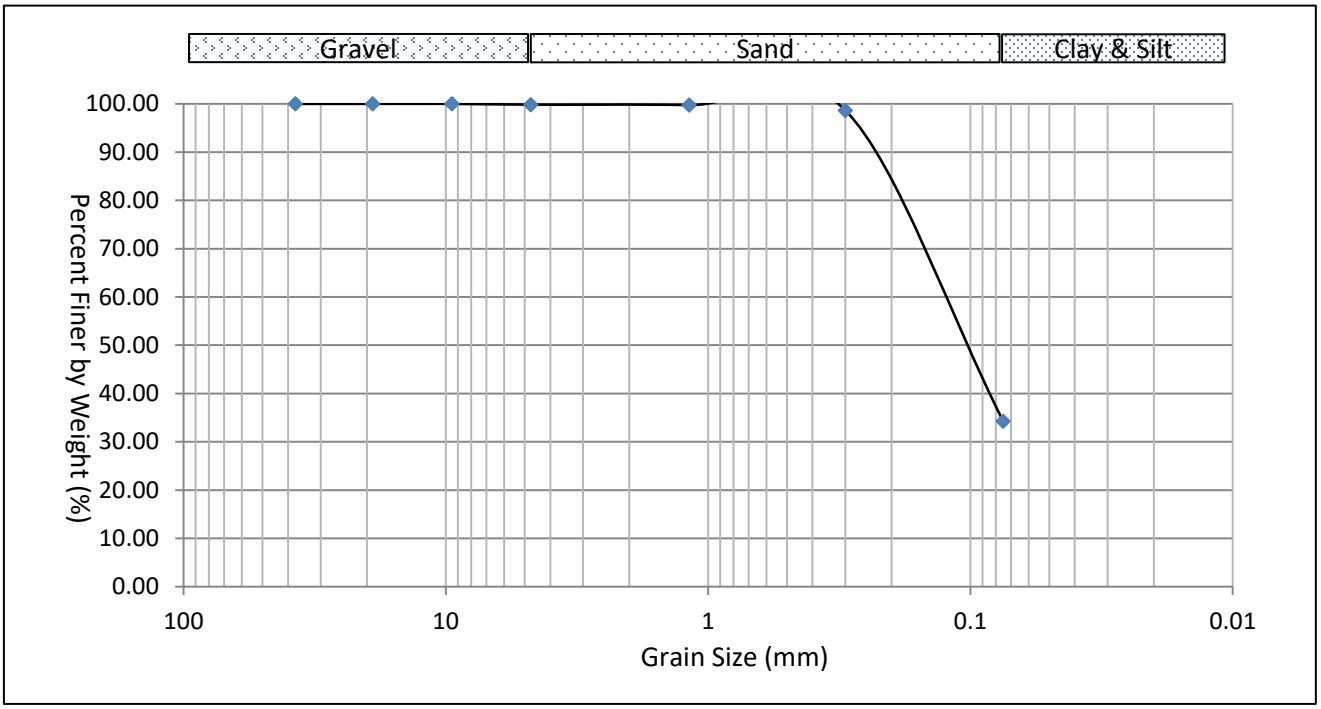
Gravel: 1.7% Sand: 44.4% Clay and Silt 54%



Grain Size Distribution

Sample ID: 23-757 BH3 SS6 A (4.58-4.88m)

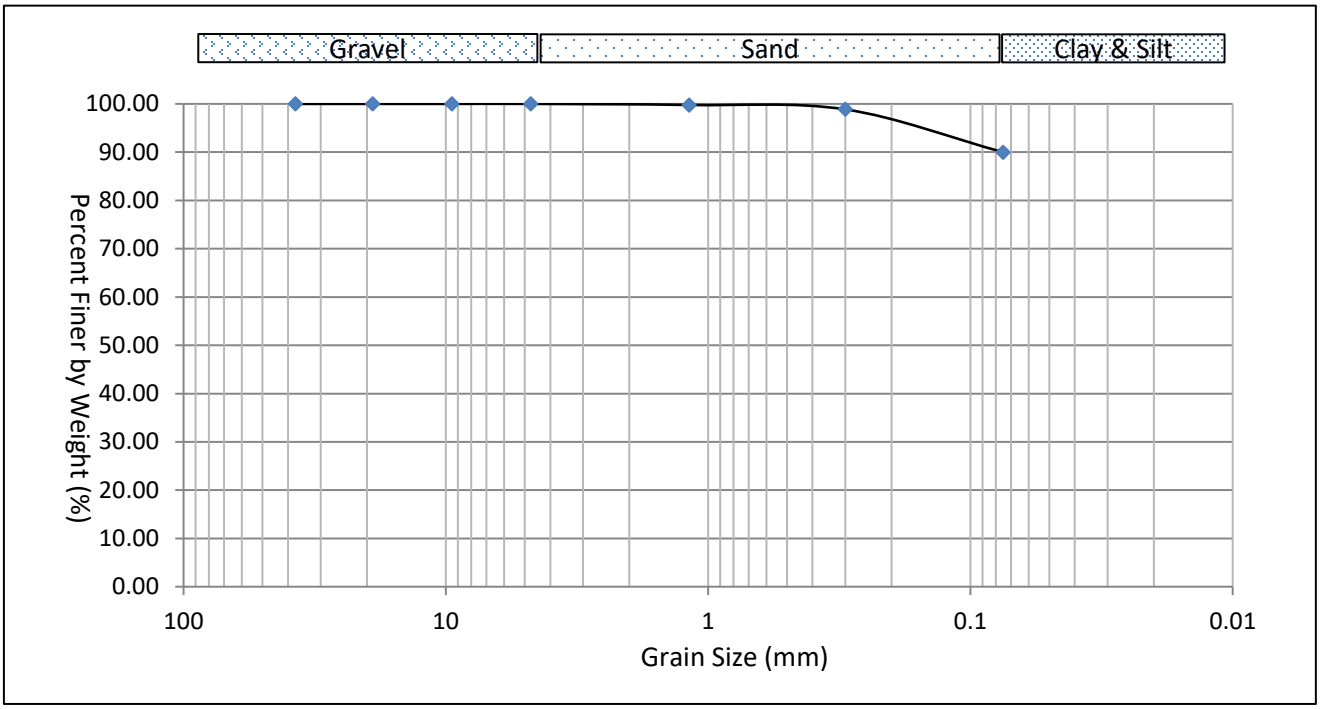
Gravel: 0.2% Sand: 65.6% Clay and Silt 34.3%



Grain Size Distribution

Sample ID: 23-758 BH3 SS6 B (4.88-5.03m)

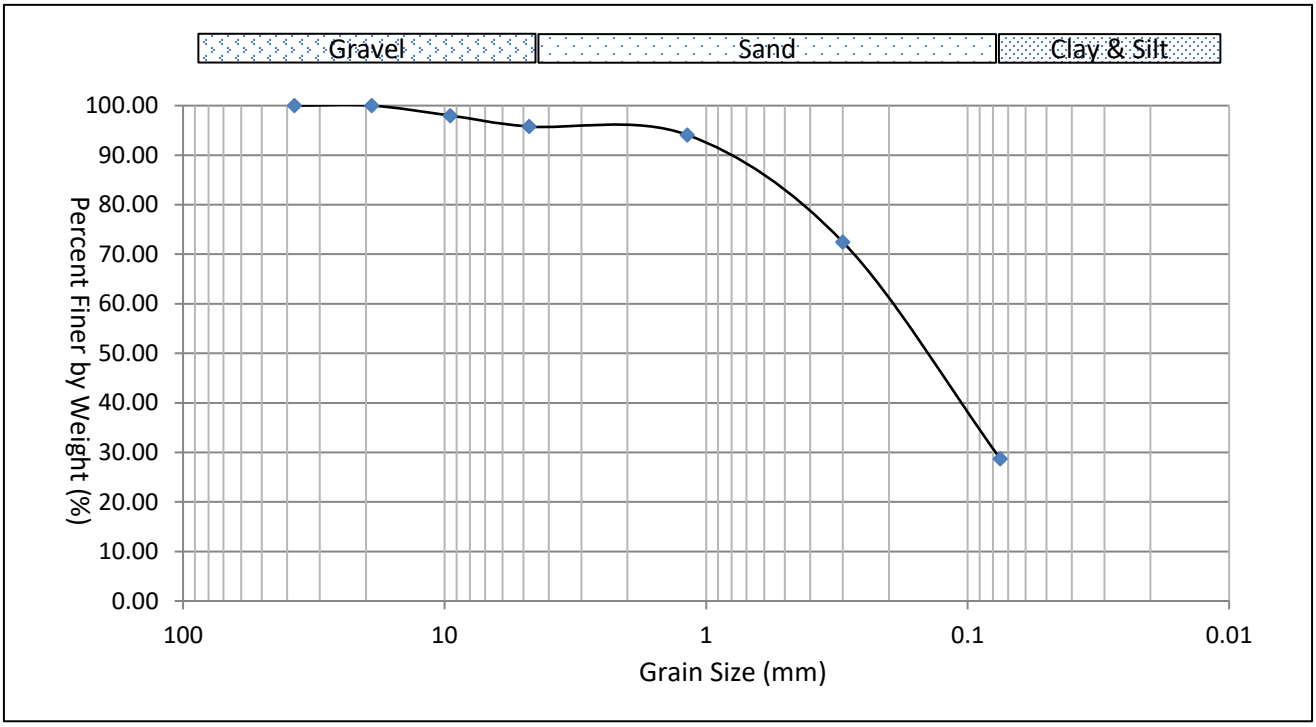
Gravel: 0% Sand: 10% Clay and Silt 90%



Grain Size Distribution

Sample ID: 23-759 BH4 SS2 (0.76-1.22m)

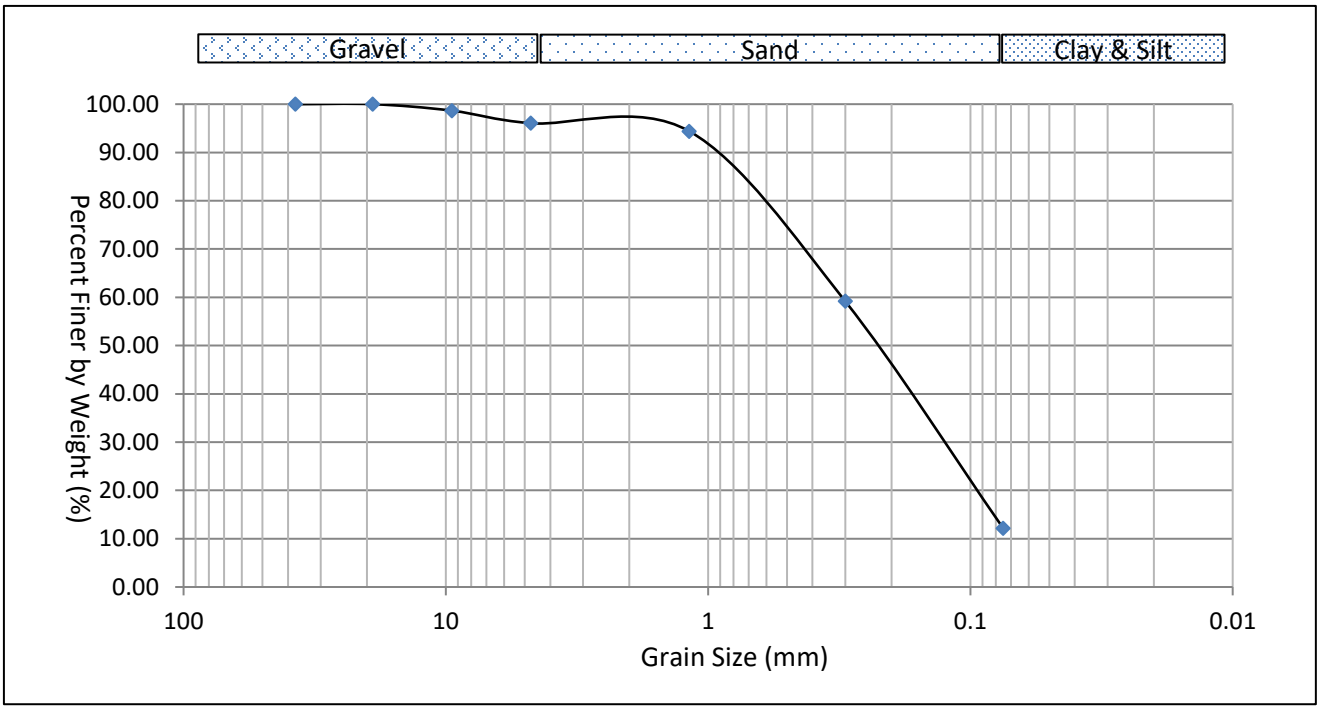
Gravel: 4.2% Sand: 67.1% Clay and Silt 28.7%



Grain Size Distribution

Sample ID: 23-760 BH4 SS4 (2.29-2.75m)

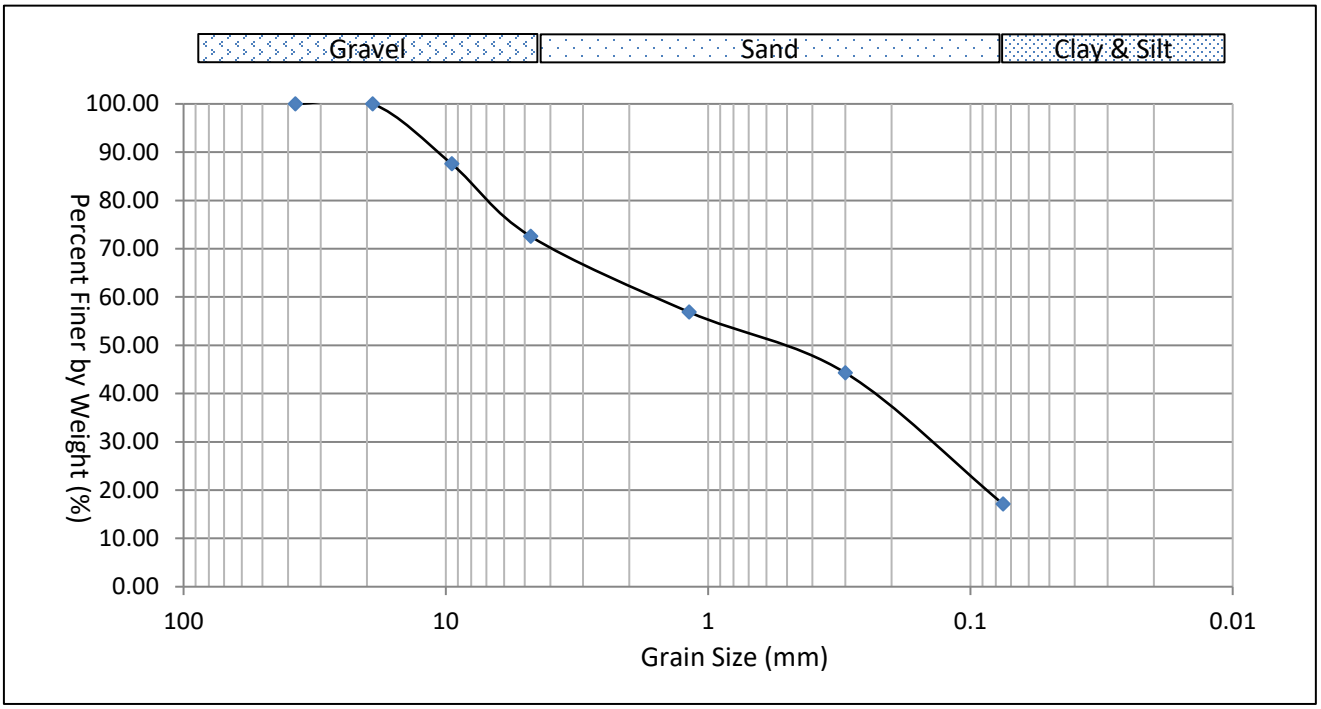
Gravel: 3.9% Sand: 83.9% Clay and Silt 12.2%



Grain Size Distribution

Sample ID: 23-762 BH6 SS2 (0.76-1.22m)

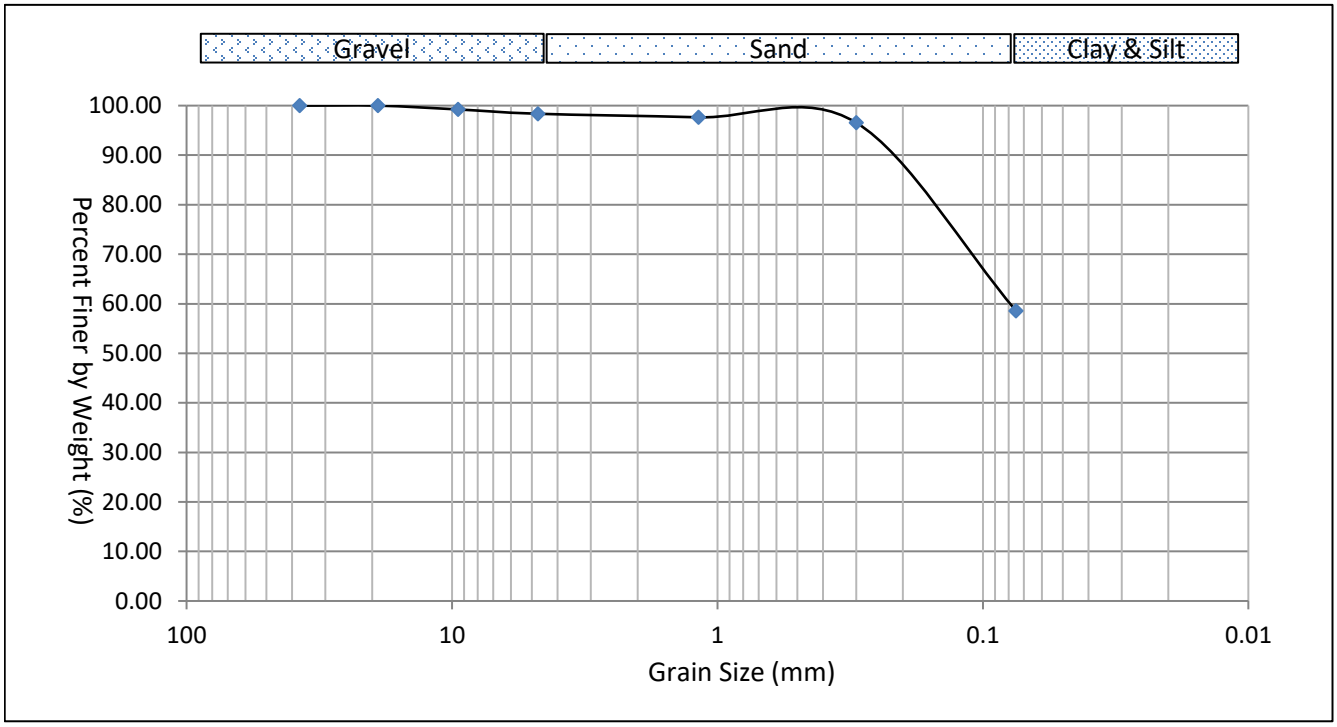
Gravel: 27.4% Sand: 55.5% Clay and Silt 17.1%



Grain Size Distribution

Sample ID: 23-764 BH6 SS6 (4.58-5.03m)

Gravel: 1.6% Sand: 39.8% Clay and Silt 58.6%



F.E. Job #: 23-754

Certificate of Analysis

Analysis Requested:	Grain Size (Hydrometer)
Sample Description:	3 Soil Sample(s)

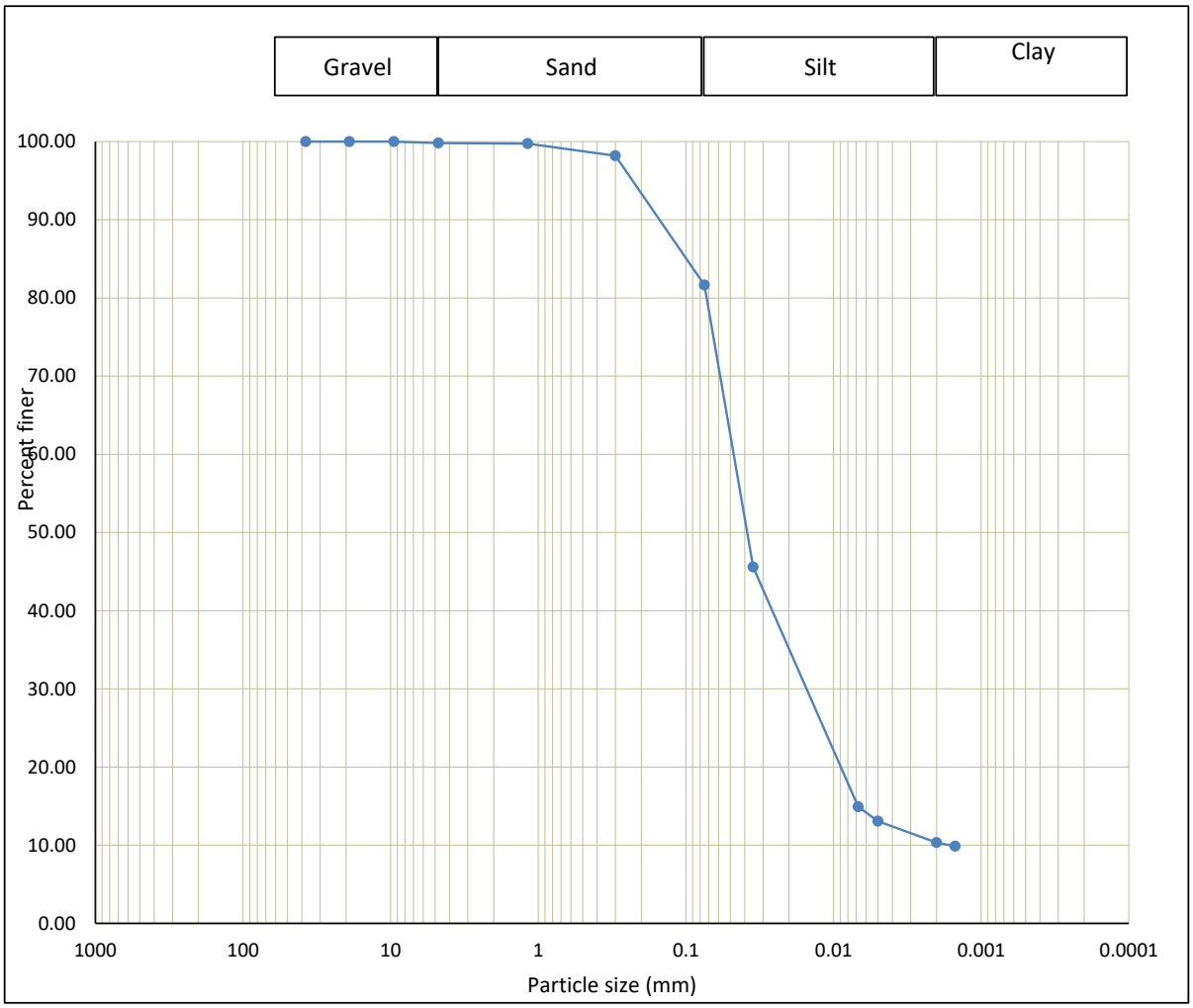
Sample Info	***23-756 BH3 SS4***	***23-761 BH4 SS6***	***23-763 BH6 SS4***			
Sample Depth (m)	***2.29-2.75***	***4.58-5.03***	***2.29-2.75***			
Grain Size (%)						
>19mm	0.0	0.0	0.0			
9.5mm-19mm	0.0	0.0	0.0			
4.75mm-9.5mm	0.2	0.0	0.3			
1.18mm-4.75mm	0.1	0.4	0.1			
300um-1.18mm	1.5	0.4	0.5			
75um-300um	16.5	42.5	24.6			
5um-75um	68.6	48.4	63.9			
2um-5um	2.8	1.7	1.0			
<2um	10.3	6.6	9.5			
Clay	**10.3**	**6.6**	**9.5**			
Silt	**71.3**	**50.1**	**64.9**			
Sand	**18.2**	**43.3**	**25.3**			
Gravel	**0.2**	**0.0**	**0.3**			

F.E. Job #: 23-754

Grain Size Distribution

Sample ID: 23-756 BH3 SS4 (2.29-2.75m)

Gravel: 0.2% Sand: 18.2% Silt: 71.3% Clay: 10.3%

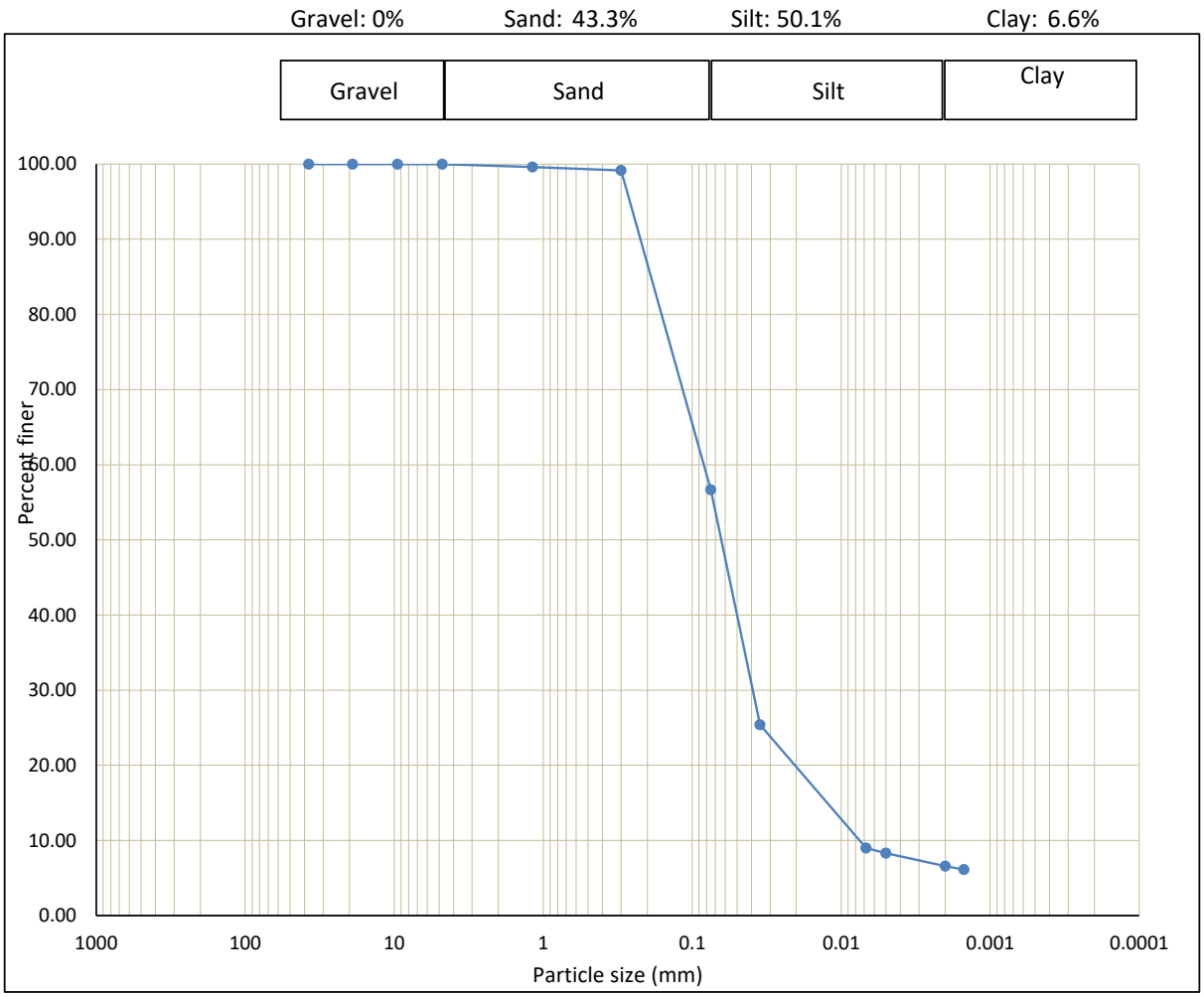


Sample ID: 23-756 BH3 SS4 (2.29-2.75m)		
Diameter	***Weight (%)***	***Grain Size***
>4.75mm	0.2	Gravel
1.18mm-4.75mm	0.1	Coarse Sand
300um-1.18mm	1.5	Medium Sand
75um-300um	16.5	Fine Sand
5um-75um	68.6	Silt
2um-5um	2.8	
<2um	10.3	Clay

F.E. Job #: 23-754

Grain Size Distribution

Sample ID: 23-761 BH4 SS6 (4.58-5.03m)



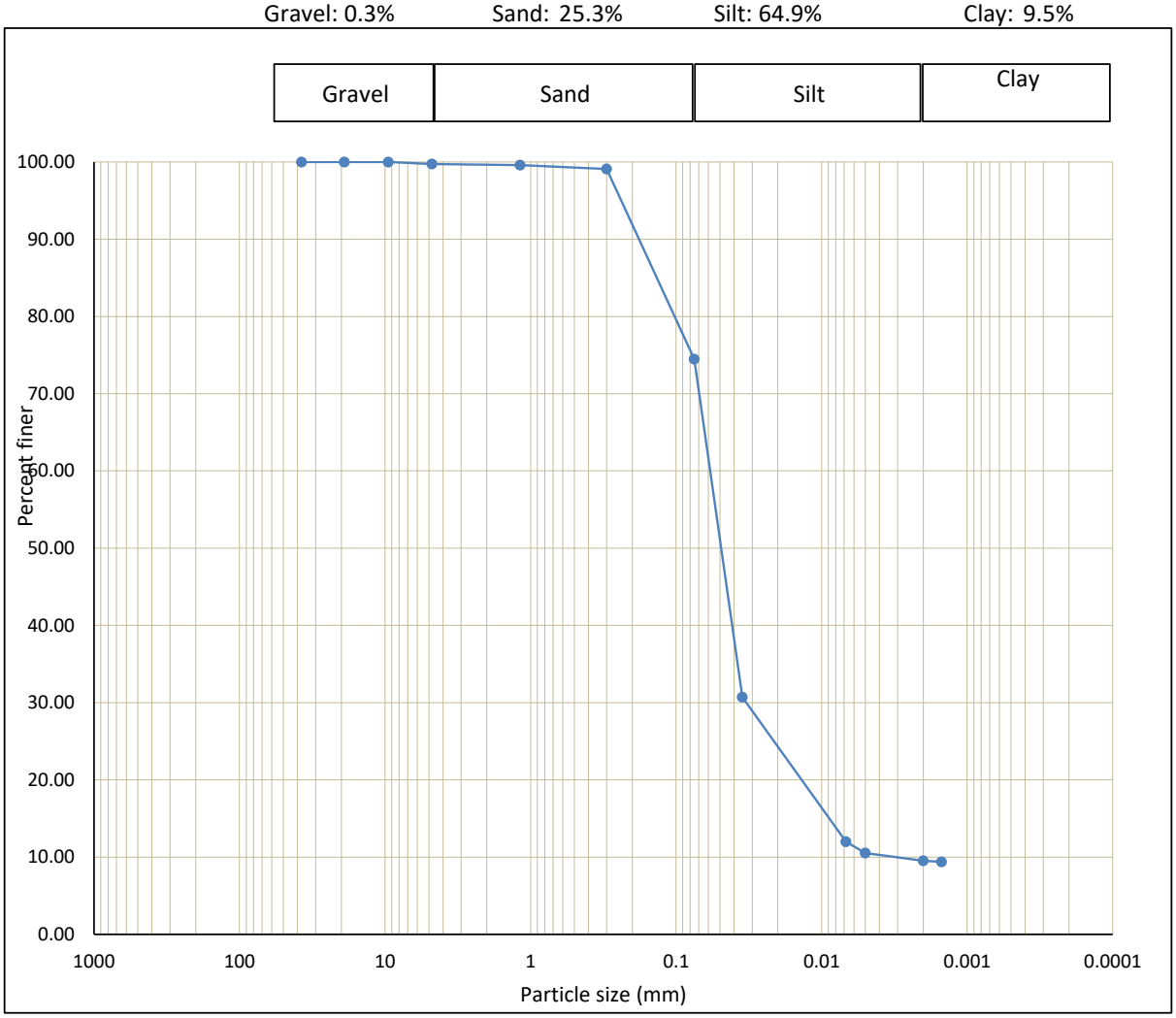
Sample ID: 23-761 BH4 SS6 (4.58-5.03m)		
Diameter	***Weight (%)***	***Grain Size***
>4.75mm	0.0	Gravel
1.18mm-4.75mm	0.4	Coarse Sand
300um-1.18mm	0.4	Medium Sand
75um-300um	42.5	Fine Sand
5um-75um	48.4	Silt
2um-5um	1.7	
<2um	6.6	Clay

F.E. Job #: 23-754

Grain Size Distribution

Sample ID: 23-763 BH6 SS4 (2.29-2.75m)

Gravel: 0.3% Sand: 25.3% Silt: 64.9% Clay: 9.5%



Sample ID: 23-763 BH6 SS4 (2.29-2.75m)		
Diameter	***Weight (%)***	***Grain Size***
>4.75mm	0.3	Gravel
1.18mm-4.75mm	0.1	Coarse Sand
300um-1.18mm	0.5	Medium Sand
75um-300um	24.6	Fine Sand
5um-75um	63.9	Silt
2um-5um	1.0	
<2um	9.5	Clay

FISHER ENGINEERING

GEOTECHNICAL-LABORATORY

T. 905 475-7755 fisher@fishereng.com
15-400 Esna Park Drive • Markham, ON • L3R 3K2
Hours: 9AM - 5PM M-F
Call for Emergency Response

LAB JOB No: 23-754

Standard Laboratory Request Form: Chain of Custody

CLIENT INFORMATION
Name:
Contact:
Address: 39 Pine Street N
Port Hope
Email:
Fax: Fax results ☐
Phone: Email results ☑

PROJECT INFORMATION
Project Name: Geotechnical Investigation
Project ID: 23-132-1E
Sampled By: David

BILLING INFORMATION
Purchase Order No:
Verbal Authorization:
Credit Card Type (e.g. MC/Visa/AMEX...):
Credit Card #:
Expiry Date:

TURNAROUND TIME (TAT): Check ONE if all samples are the same/or see below.

STD - Standard (5-7 bus. days)	✓	Standard Charge	Reg. Business Hrs. 9am to 5pm Samples received after 2pm are considered next day orders.
3D - Three-Day (72 hrs.)		+25% SURCHARGES MAY APPLY Custom quotations (if applicable) will be reflected on final billing. CALL for: Emergencies, Bulk Quotes, or other Questions.	

LAB SAMPLE ID	CLIENT'S SAMPLE ID AND DESCRIPTION	SAMPLING DATE/TIME	SAMPLE MATRIX	CONTAINER NO. and TYPE	TAT (Above)	ANALYSIS REQUESTED (Check or Specify)										NOTES
						Moisture Content	Sieve Analysis	Hydrometer	Atterberg Limits	Proctor						
	BH3, BH4, BH6	Aug 25	Soil	Bag	STD	✓		One								
	(2.5-4')						✓	In								
	(5-6.5')							each								
	(7-7.5')						✓									
	(10-11.5')							BH								
	(15-16.5')						✓									
	(20-21.5')															

Relinquished by:
Name: (print)
Signature: Clive
Date & Time:
Method of Shipment: Aug 28, 2023

Client's Comments:

Regulatory Requirements:
OPSS Reg.

Purpose for sampling:
Road Base
Road Subbase
Subgrade
Backfill
Engineering Fill
Soil Classification
Other

Received by (Internal):
Name:
Date & Time:

Arrival Temperature °C:
Laboratory Remarks:

APPENDIX D – SEWER BYLAW RESULTS

ALS Canada Ltd.

right solutions.
right partner.

CERTIFICATE OF ANALYSIS (GUIDELINE EVALUATION)

Work Order	: **WT2328290**	Page	: 1 of 4
Client	: **Fisher Engineering Limited**	Laboratory	: ALS Environmental - Waterloo
Contact	: Clive Wiggan	Account Manager	: Emily Hansen
Address	: 15-400 Esna Park Drive Markham ON Canada L3R 3K2	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	: 905 475 7755, Ext. 29	Telephone	: +1 519 886 6910
Project	: 23-13246	Date Samples Received	: 06-Sep-2023 16:05
PO	: ----	Date Analysis Commenced	: 06-Sep-2023
C-O-C number	: ----	Issue Date	: 13-Sep-2023 15:05
Sampler	: N. Namdi		
Site	: ----		
Quote number	: FISHER ENVIRONMENTAL - ALS 2022 STANDING OFFER		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Guideline Comparison

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Hannah Lewis	Inorganics Analyst	Inorganics, Waterloo, Ontario
Manuel TavaraTello	Supervisor - Semi-Volatile Extractions	Organics, Waterloo, Ontario
Walt Kippenhuck	Supervisor - Inorganic	Inorganics, Waterloo, Ontario
Walt Kippenhuck	Supervisor - Inorganic	Metals, Waterloo, Ontario
Zeba Patel		Microbiology, Waterloo, Ontario

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.
Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

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. Guidelines 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.

Key : LOR: Limit of Reporting (detection limit).

Unit	*Description*
CFU/100mL	colony forming units per hundred millilitres
mg/L	milligrams per litre
pH units	pH units

>: greater than.
<: less than.
Red shading is applied where the result or the LOR is greater than the Guideline Upper Limit (or lower than the Guideline Lower Limit, if applicable).
For drinking water samples, Red shading is applied where the result for E.coli, fecal or total coliforms is greater than or equal to the Guideline Upper Limit .

Qualifiers

Qualifier	*Description*
BODL	*Limit of Reporting for BOD was increased to account for the largest volume of sample tested.*
DLDS	*Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.*
NDOGN	*No Data-Total Coliform and/or E.Coli plate overgrown with non-target.*

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

	Client sample ID	39 PINE STREET NORTH PORT HOPE								
	Sampling date/time	06-Sep-2023 00:00								
Analyte	*Method/Lab*	*LOR*	*Unit*	WT2328290-001	**PORSUB SAN**	**PORSUB STM**	--	--	--	--
Physical Tests										
pH	E108/WT	0.10	pH units	7.88	6 - 9.5 pH units	6 - 9.5 pH units	--	--	--	--
Solids, total suspended [TSS]	E160/WT	3.0	mg/L	<3.0	350 mg/L	15 mg/L	--	--	--	--
Anions and Nutrients										
Chloride	E235.Cl/WT	0.50	mg/L	165 DLDS	1500 mg/L	1500 mg/L	--	--	--	--
Sulfate (as SO4)	E235.SO4/WT	0.30	mg/L	12.0 DLDS	1500 mg/L	1500 mg/L	--	--	--	--
Cyanides										
Cyanide, strong acid dissociable (Total)	E333/WT	0.0020	mg/L	<0.0020	2 mg/L	0.1 mg/L	--	--	--	--
Microbiological Tests										
Coliforms, total	E012.TC/WT	1	CFU/100mL	NR NDOGN	--	2400 CFU/100mL	--	--	--	--
Total Metals										
Cadmium, total	E420/WT	0.0000050	mg/L	<0.0000050	3 mg/L	1 mg/L	--	--	--	--
Chromium, total	E420/WT	0.00050	mg/L	0.00092	3 mg/L	1 mg/L	--	--	--	--
Copper, total	E420/WT	0.00050	mg/L	<0.00050	3 mg/L	1 mg/L	--	--	--	--
Iron, total	E420/WT	0.010	mg/L	0.032	50 mg/L	17 mg/L	--	--	--	--
Lead, total	E420/WT	0.000050	mg/L	0.000072	3 mg/L	--	--	--	--	--
Mercury, total	E508/WT	0.0000050	mg/L	<0.0000050	--	0.1 mg/L	--	--	--	--
Nickel, total	E420/WT	0.00050	mg/L	<0.00050	3 mg/L	1 mg/L	--	--	--	--
Zinc, total	E420/WT	0.0030	mg/L	<0.0030	3 mg/L	1 mg/L	--	--	--	--
Aggregate Organics										
Biochemical oxygen demand [BOD]	E550/WT	2.0	mg/L	<3.0 BODL	300 mg/L	15 mg/L	--	--	--	--
Oil & grease (gravimetric)	E567/WT	5.0	mg/L	<5.0	--	--	--	--	--	--
Oil & grease, animal/vegetable (gravimetric)	EC567A.SG/WT	5.0	mg/L	<5.0	100 mg/L	10 mg/L	--	--	--	--
Oil & grease, mineral (gravimetric)	E567SG/WT	5.0	mg/L	<5.0	15 mg/L	10 mg/L	--	--	--	--
Phenols, total (4AAP)	E562/WT	0.0010	mg/L	<0.0010	0.1 mg/L	0.02 mg/L	--	--	--	--

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

No Breaches Found

Key:

PORSUB	Port Hope Sanitary Sewer By-Law (30/94)
SAN	Port Hope Sanitary Sewer By-Law (30/94)
STM	Port Hope Storm Sewer By-Law (30/94)

ALS Canada Ltd.

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QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **WT2328290**	Page	: 1 of 8
Client	: **Fisher Engineering Limited**	Laboratory	: ALS Environmental - Waterloo
Contact	: Clive Wiggan	Account Manager	: Emily Hansen
Address	: 15-400 Esna Park Drive Markham ON Canada L3R 3K2	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	: 905 475 7755, Ext. 29	Telephone	: +1 519 886 6910
Project	: 23-13246	Date Samples Received	: 06-Sep-2023 16:05
PO	: ----	Issue Date	: 13-Sep-2023 15:05
C-O-C number	: ----		
Sampler	: N. Namdi		
Site	: ----		
Quote number	: FISHER ENVIRONMENTAL - ALS 2022 STANDING OFFER		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers occur - please see following pages for full details.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT-4d] 39 PINE STREET NORTH PORT HOPE	E550	06-Sep-2023	----	----	----		07-Sep-2023	4 days	1 days	✓
Aggregate Organics : Mineral Oil & Grease by Gravimetry										
Amber glass (hydrochloric acid) 39 PINE STREET NORTH PORT HOPE	E567SG	06-Sep-2023	08-Sep-2023	28 days	3 days	✓	08-Sep-2023	40 days	0 days	✓
Aggregate Organics : Oil & Grease by Gravimetry										
Amber glass (hydrochloric acid) 39 PINE STREET NORTH PORT HOPE	E567	06-Sep-2023	08-Sep-2023	28 days	3 days	✓	08-Sep-2023	40 days	0 days	✓
Aggregate Organics : Phenols (4AAP) in Water by Colorimetry										
Amber glass total (sulfuric acid) [ON MECP] 39 PINE STREET NORTH PORT HOPE	E562	06-Sep-2023	07-Sep-2023	28 days	2 days	✓	07-Sep-2023	28 days	2 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE [ON MECP] 39 PINE STREET NORTH PORT HOPE	E235.Cl	06-Sep-2023	09-Sep-2023	28 days	4 days	✓	11-Sep-2023	28 days	5 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE [ON MECP] 39 PINE STREET NORTH PORT HOPE	E235.SO4	06-Sep-2023	09-Sep-2023	28 days	4 days	✓	11-Sep-2023	28 days	5 days	✓
Cyanides : Total Cyanide										
UV-inhibited HDPE - total (sodium hydroxide) 39 PINE STREET NORTH PORT HOPE	E333	06-Sep-2023	07-Sep-2023	14 days	2 days	✓	07-Sep-2023	14 days	2 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Microbiological Tests : Total Coliforms (MF-mEndo)										
Sterile HDPE (Sodium thiosulphate) [ON MECP]										
39 PINE STREET NORTH PORT HOPE	E012.TC	06-Sep-2023	----	----	----		07-Sep-2023	48 hrs	34 hrs	✓
Physical Tests : pH by Meter										
HDPE [ON MECP]										
39 PINE STREET NORTH PORT HOPE	E108	06-Sep-2023	09-Sep-2023	14 days	4 days	✓	12-Sep-2023	14 days	6 days	✓
Physical Tests : TSS by Gravimetry										
HDPE [ON MECP]										
39 PINE STREET NORTH PORT HOPE	E160	06-Sep-2023	----	----	----		07-Sep-2023	7 days	2 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) [ON MECP]										
39 PINE STREET NORTH PORT HOPE	E508	06-Sep-2023	07-Sep-2023	28 days	1 days	✓	07-Sep-2023	28 days	1 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
39 PINE STREET NORTH PORT HOPE	E420	06-Sep-2023	06-Sep-2023	180 days	1 days	✓	07-Sep-2023	180 days	1 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: ✗ = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Biochemical Oxygen Demand - 5 day	E550	1122723	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	1126542	1	8	12.5	5.0	✓
pH by Meter	E108	1126539	1	17	5.8	5.0	✓
Phenols (4AAP) in Water by Colorimetry	E562	1122317	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	1126541	1	14	7.1	5.0	✓
Total Coliforms (MF-mEndo)	E012.TC	1122450	0	7	0.0	5.0	✗
Total Cyanide	E333	1123317	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	1122126	1	10	10.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	1121903	1	7	14.2	5.0	✓
TSS by Gravimetry	E160	1122776	1	19	5.2	4.7	✓
Laboratory Control Samples (LCS)							
Biochemical Oxygen Demand - 5 day	E550	1122723	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	1126542	1	8	12.5	5.0	✓
Mineral Oil & Grease by Gravimetry	E567SG	1121807	1	10	10.0	5.0	✓
Oil & Grease by Gravimetry	E567	1121806	1	15	6.6	5.0	✓
pH by Meter	E108	1126539	1	17	5.8	5.0	✓
Phenols (4AAP) in Water by Colorimetry	E562	1122317	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	1126541	1	14	7.1	5.0	✓
Total Cyanide	E333	1123317	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	1122126	1	10	10.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	1121903	1	7	14.2	5.0	✓
TSS by Gravimetry	E160	1122776	1	19	5.2	4.7	✓
Method Blanks (MB)							
Biochemical Oxygen Demand - 5 day	E550	1122723	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	1126542	1	8	12.5	5.0	✓
Mineral Oil & Grease by Gravimetry	E567SG	1121807	1	10	10.0	5.0	✓
Oil & Grease by Gravimetry	E567	1121806	1	15	6.6	5.0	✓
Phenols (4AAP) in Water by Colorimetry	E562	1122317	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	1126541	1	14	7.1	5.0	✓
Total Coliforms (MF-mEndo)	E012.TC	1122450	1	7	14.2	5.0	✓
Total Cyanide	E333	1123317	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	1122126	1	10	10.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	1121903	1	7	14.2	5.0	✓
TSS by Gravimetry	E160	1122776	1	19	5.2	4.7	✓
Matrix Spikes (MS)							

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Matrix Spikes (MS) - Continued							
Chloride in Water by IC	E235.Cl	1126542	1	8	12.5	5.0	✓
Phenols (4AAP) in Water by Colorimetry	E562	1122317	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	1126541	1	14	7.1	5.0	✓
Total Cyanide	E333	1123317	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	1122126	1	10	10.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	1121903	1	7	14.2	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Total Coliforms (MF-mEndo)	E012.TC ALS Environmental - Waterloo	Water	APHA 9222B (mod)	Following filtration (0.45 µm), and incubation at 35.0 ±0.5°C for 24 hours, colonies exhibiting characteristic morphology of the target organism are enumerated and confirmed.
pH by Meter	E108 ALS Environmental - Waterloo	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
TSS by Gravimetry	E160 ALS Environmental - Waterloo	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
Chloride in Water by IC	E235.Cl ALS Environmental - Waterloo	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 ALS Environmental - Waterloo	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Total Cyanide	E333 ALS Environmental - Waterloo	Water	ISO 14403 (mod)	Total or Strong Acid Dissociable (SAD) Cyanide is determined by Continuous Flow Analyzer (CFA) with in-line UV digestion followed by colourmetric analysis. Method Limitation: High levels of thiocyanate (SCN) may cause positive interference (up to 0.5% of SCN concentration).
Total Metals in Water by CRC ICPMS	E420 ALS Environmental - Waterloo	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Mercury in Water by CVAAS	E508 ALS Environmental - Waterloo	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Biochemical Oxygen Demand - 5 day	E550 ALS Environmental - Waterloo	Water	APHA 5210 B (mod)	Samples are diluted and incubated for a specified time period, after which the oxygen depletion is measured using a dissolved oxygen meter. Free chlorine is a negative interference in the BOD method; please advise ALS when free chlorine is present in samples.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Phenols (4AAP) in Water by Colorimetry	E562 ALS Environmental - Waterloo	Water	EPA 9066	This automated method is based on the distillation of phenol and subsequent reaction of the distillate with alkaline ferricyanide (K3Fe(CN)6) and 4-amino-antipyrine (4-AAP) to form a red complex which is measured colorimetrically.
Oil & Grease by Gravimetry	E567 ALS Environmental - Waterloo	Water	BC MOE Lab Manual (Oil & Grease) (mod)	The entire water sample is extracted with hexane and the extract is evaporated to dryness. The residue is then weighed to determine Oil and Grease.
Mineral Oil & Grease by Gravimetry	E567SG ALS Environmental - Waterloo	Water	BC MOE Lab Manual (Oil & Grease) (mod)	The entire water sample is extracted with hexane, followed by silica gel treatment after which the extract is evaporated to dryness. The residue is then weighed to determine Mineral Oil and Grease.
Animal & Vegetable Oil & Grease by Gravimetry	EC567A.SG ALS Environmental - Waterloo	Water	APHA 5520 (mod)	Animal & vegetable oil and grease is calculated as follows: Oil & Grease (gravimetric) minus Mineral Oil & Grease (gravimetric)

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Oil & Grease Extraction for Gravimetry	EP567 ALS Environmental - Waterloo	Water	BC MOE Lab Manual (Oil & Grease) (mod)	The entire water sample is extracted with hexane by liquid-liquid extraction.

QUALITY CONTROL REPORT

Work Order	: **WT2328290**	Page	: 1 of 6
Client	: Fisher Engineering Limited	Laboratory	: ALS Environmental - Waterloo
Contact	: Clive Wiggan	Account Manager	: Emily Hansen
Address	: 15-400 Esna Park Drive Markham ON Canada L3R 3K2	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	:	Telephone	: +1 519 886 6910
Project	: 23-13246	Date Samples Received	: 06-Sep-2023 16:05
PO	: ----	Date Analysis Commenced	: 06-Sep-2023
C-O-C number	: ----	Issue Date	: 13-Sep-2023 15:05
Sampler	: N. Namdi 905 475 7755, Ext. 29		
Site	: ----		
Quote number	: FISHER ENVIRONMENTAL - ALS 2022 STANDING OFFER		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Hannah Lewis	Inorganics Analyst	Waterloo Inorganics, Waterloo, Ontario
Manuel TavaraTello	Supervisor - Semi-Volatile Extractions	Waterloo Organics, Waterloo, Ontario
Walt Kippenhuck	Supervisor - Inorganic	Waterloo Inorganics, Waterloo, Ontario
Walt Kippenhuck	Supervisor - Inorganic	Waterloo Metals, Waterloo, Ontario
Zeba Patel		Waterloo Microbiology, Waterloo, Ontario

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include 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 predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 1122776)											
WT2328387-001	Anonymous	Solids, total suspended [TSS]	----	E160	3.0	mg/L	12.3	11.9	0.4	Diff <2x LOR	----
Physical Tests (QC Lot: 1126539)											
WT2328335-001	Anonymous	pH	----	E108	0.10	pH units	7.31	7.18	1.79%	4%	----
Anions and Nutrients (QC Lot: 1126541)											
WT2328456-001	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	209	211	0.563%	20%	----
Anions and Nutrients (QC Lot: 1126542)											
WT2328456-001	Anonymous	Chloride	16887-00-6	E235.Cl	0.50	mg/L	46.8	46.5	0.671%	20%	----
Cyanides (QC Lot: 1123317)											
TY2308798-001	Anonymous	Cyanide, strong acid dissociable (Total)	----	E333	0.0020	mg/L	<0.0020	<0.0020	0	Diff <2x LOR	----
Total Metals (QC Lot: 1121903)											
WT2328232-001	Anonymous	Cadmium, total	7440-43-9	E420	0.0000500	mg/L	0.000188	0.000177	0.0000109	Diff <2x LOR	----
		Chromium, total	7440-47-3	E420	0.00500	mg/L	0.0132	0.0134	0.00025	Diff <2x LOR	----
		Copper, total	7440-50-8	E420	0.00500	mg/L	0.0149	0.0152	0.00030	Diff <2x LOR	----
		Iron, total	7439-89-6	E420	0.100	mg/L	33.0	33.2	0.488%	20%	----
		Lead, total	7439-92-1	E420	0.000500	mg/L	0.00840	0.00855	1.77%	20%	----
		Nickel, total	7440-02-0	E420	0.00500	mg/L	0.0136	0.0129	0.00071	Diff <2x LOR	----
		Zinc, total	7440-66-6	E420	0.0300	mg/L	0.0579	0.0572	0.0007	Diff <2x LOR	----
Total Metals (QC Lot: 1122126)											
TY2308715-001	Anonymous	Mercury, total	7439-97-6	E508	0.000100	mg/L	<0.100 µg/L	<0.000100	0	Diff <2x LOR	----
Aggregate Organics (QC Lot: 1122317)											
TY2308714-012	Anonymous	Phenols, total (4AAP)	----	E562	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Aggregate Organics (QC Lot: 1122723)											
WT2328322-001	Anonymous	Biochemical oxygen demand [BOD]	----	E550	2.0	mg/L	2.0	<2.0	0.0%	30%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 1122776)						
Solids, total suspended [TSS]	----	E160	3	mg/L	<3.0	----
Anions and Nutrients (QCLot: 1126541)						
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 1126542)						
Chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Cyanides (QCLot: 1123317)						
Cyanide, strong acid dissociable (Total)	----	E333	0.002	mg/L	<0.0020	----
Microbiological Tests (QCLot: 1122450)						
Coliforms, total	----	E012.TC	1	CFU/100mL	<1	----
Total Metals (QCLot: 1121903)						
Cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
Copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
Iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
Lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
Zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
Total Metals (QCLot: 1122126)						
Mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Aggregate Organics (QCLot: 1121806)						
Oil & grease (gravimetric)	----	E567	5	mg/L	<5.0	----
Aggregate Organics (QCLot: 1121807)						
Oil & grease, mineral (gravimetric)	----	E567SG	5	mg/L	<5.0	----
Aggregate Organics (QCLot: 1122317)						
Phenols, total (4AAP)	----	E562	0.001	mg/L	<0.0010	----
Aggregate Organics (QCLot: 1122723)						
Biochemical oxygen demand [BOD]	----	E550	2	mg/L	<2.0	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1122776)									
Solids, total suspended [TSS]	----	E160	3	mg/L	150 mg/L	95.5	85.0	115	----
Physical Tests (QCLot: 1126539)									
pH	----	E108	----	pH units	7 pH units	101	98.0	102	----
Anions and Nutrients (QCLot: 1126541)									
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 1126542)									
Chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	99.6	90.0	110	----
Cyanides (QCLot: 1123317)									
Cyanide, strong acid dissociable (Total)	----	E333	0.002	mg/L	0.25 mg/L	96.7	80.0	120	----
Total Metals (QCLot: 1121903)									
Cadmium, total	7440-43-9	E420	0.000005	mg/L	0.005 mg/L	105	80.0	120	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	0.0125 mg/L	105	80.0	120	----
Copper, total	7440-50-8	E420	0.0005	mg/L	0.0125 mg/L	106	80.0	120	----
Iron, total	7439-89-6	E420	0.01	mg/L	0.05 mg/L	106	80.0	120	----
Lead, total	7439-92-1	E420	0.00005	mg/L	0.025 mg/L	104	80.0	120	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	0.025 mg/L	105	80.0	120	----
Zinc, total	7440-66-6	E420	0.003	mg/L	0.025 mg/L	106	80.0	120	----
Total Metals (QCLot: 1122126)									
Mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	91.6	80.0	120	----
Aggregate Organics (QCLot: 1121806)									
Oil & grease (gravimetric)	----	E567	5	mg/L	200 mg/L	99.4	70.0	130	----
Aggregate Organics (QCLot: 1121807)									
Oil & grease, mineral (gravimetric)	----	E567SG	5	mg/L	100 mg/L	93.1	70.0	130	----
Aggregate Organics (QCLot: 1122317)									
Phenols, total (4AAP)	----	E562	0.001	mg/L	0.02 mg/L	100	85.0	115	----
Aggregate Organics (QCLot: 1122723)									
Biochemical oxygen demand [BOD]	----	E550	2	mg/L	198 mg/L	107	85.0	115	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 1126541)										
WT2328456-001	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	ND mg/L	100 mg/L	ND	75.0	125	----
Anions and Nutrients (QCLot: 1126542)										
WT2328456-001	Anonymous	Chloride	16887-00-6	E235.Cl	96.7 mg/L	100 mg/L	96.7	75.0	125	----
Cyanides (QCLot: 1123317)										
TY2308798-001	Anonymous	Cyanide, strong acid dissociable (Total)	----	E333	0.224 mg/L	0.25 mg/L	89.7	75.0	125	----
Total Metals (QCLot: 1121903)										
WT2328241-001	Anonymous	Cadmium, total	7440-43-9	E420	0.00520 mg/L	0.005 mg/L	104	70.0	130	----
		Chromium, total	7440-47-3	E420	0.0136 mg/L	0.0125 mg/L	109	70.0	130	----
		Copper, total	7440-50-8	E420	0.0133 mg/L	0.0125 mg/L	107	70.0	130	----
		Iron, total	7439-89-6	E420	ND mg/L	0.05 mg/L	ND	70.0	130	----
		Lead, total	7439-92-1	E420	0.0256 mg/L	0.025 mg/L	102	70.0	130	----
		Nickel, total	7440-02-0	E420	0.0261 mg/L	0.025 mg/L	104	70.0	130	----
		Zinc, total	7440-66-6	E420	0.0270 mg/L	0.025 mg/L	108	70.0	130	----
Total Metals (QCLot: 1122126)										
WT2328279-001	Anonymous	Mercury, total	7439-97-6	E508	0.0000928 mg/L	0.0001 mg/L	92.8	70.0	130	----
Aggregate Organics (QCLot: 1122317)										
TY2308714-012	Anonymous	Phenols, total (4AAP)	----	E562	0.0204 mg/L	0.02 mg/L	102	75.0	125	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 22 -

Page of

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

Environmental Division Waterloo
Work Order Reference
WT2328290

Telephone : +1 519 886 6910

Report To	Contact and company name below will appear on the final report
Company:	Fisher Engineering Limited
Contact:	Clive Wiggan
Phone:	905-475-7755
	Company address below will appear on the final report
Street:	15-400 Esna Park Drive
City/Province:	Markham, ON
Postal Code:	L3R 3K2
Invoice To	Same as Report To ☐ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Reports / Recipients

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@fishereng.com
Email 2
Email 3

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax Elena@fishereng.com
Email 2

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 minim
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minin
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minin
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minin
☐ Same day [E2] if received by 10am M-S - 200% rush surcharg
Additional fees may apply to rush requests on weeken
Date and Time Required for all E&P TATs:
For all tests with rush TATs requested, please c

Project Information

ALS Account # / Quote #: FISH100 / WT2022FISH1000002
Job #: 23-13246
PO / AFE:
LSD:

Oil and Gas Required Fields (client use)

AFE/Cost Center: PO#
Major/Minor Code: Routing Code:
Requisitioner:
Location:

ALS Lab Work Order # (ALS use only): WT2328290
ALS Contact: Emily Hansen Sampler: Nramdi

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

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	Durham Sanitary and Storm	Port Hope (Northumberland County) Sewer discharge bylaws (Sanitary/Storm) MW3 (Unfiltered)	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	39 Pine Street North Port Hope (Northumberland County) Port Hope sewer discharge by law (Sanitary/Storm) MW 3 (Unfiltered)	06-09-23		GW						

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☒ NO
Are samples for human consumption/ use? ☐ YES ☒ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

Port Hope (Northumberland County)
Durham Sanitary and Storm

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
	14.1

SHIPMENT RELEASE (client use)

Released by: Nramdi Date: 06/09/23 Time:

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by: Date: Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by: CJ Date: Sep 6/23 Time: 8:05

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

FEB 2022 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**.

NW-233.

N-193 MM-461 GC-664

CGG-464

APPENDIX E – HYDRAULIC CONDUCTIVITY ANALYSES

FISHER ENGINEERING

HYDRAULIC CONDUCTIVITY ANALYSIS

Location: *39 Pine Street North, Port Hope*
Project: *FH 23-13247*
Test Date: *9/6/2023*
Tested by: *CAW*
Well No: *MW3*

Equilibrium Water level (from top of pipe) HE	*367*	*cm*
Initial Water level (from top of pipe) Ho	*445*	*cm*
Monitoring well inner Dia D	*0.05*	*m*
Initial Time offset To	*1*	*second*
Reverse of Luthin's reference system Ru = Ho - HE	*78.00*	*cm*
Slope of Log((ho-he)/(ht-he)) / T	*1.60E-03*	

G = Ru / (HT - HE)

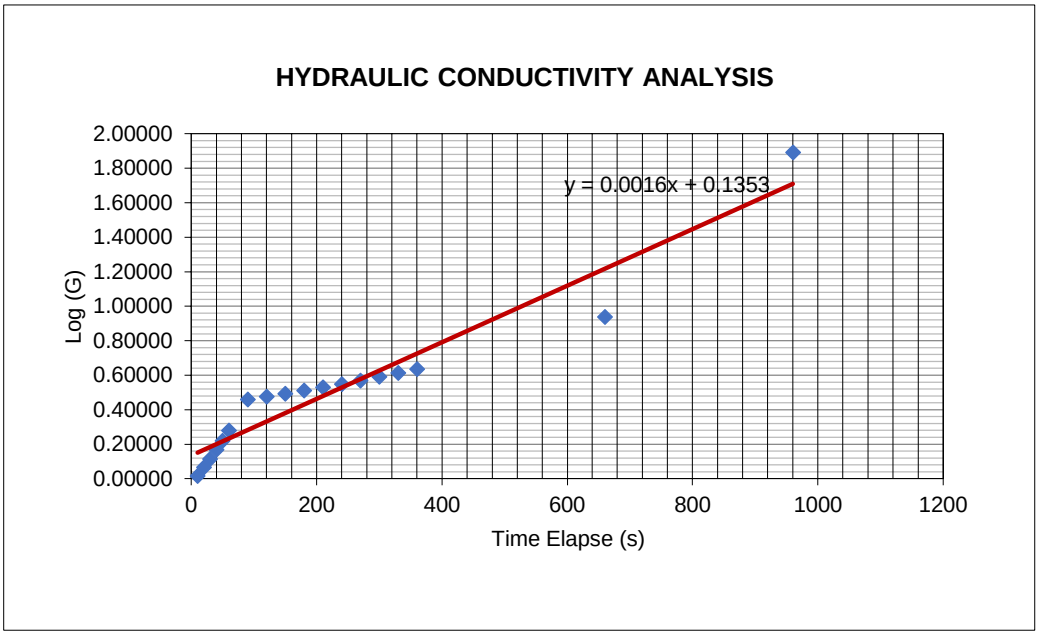
Hydraulic conductivity computed k = **0.0024213 cm/s**
2.42E-05 m/s
2.092 m/day

Time	HT (Water Drop)			G	LOG (G)
(Interval s)	(Elapsed s)	(m)	(cm)		
0	0	4.450			
10	10	4.420	442.0	1.04000	0.01703
10	20	4.340	434.0	1.16418	0.06602
10	30	4.270	427.0	1.30000	0.11394
10	40	4.200	420.0	1.47170	0.16782
10	50	4.140	414.0	1.65957	0.22000
10	60	4.080	408.0	1.90244	0.27931
30	90	3.940	394.0	2.88889	0.46073
30	120	3.930	393.0	3.00000	0.47712
30	150	3.920	392.0	3.12000	0.49415
30	180	3.910	391.0	3.25000	0.51188
30	210	3.900	390.0	3.39130	0.53037
30	240	3.890	389.0	3.54545	0.54967
30	270	3.880	388.0	3.71429	0.56988
30	300	3.870	387.0	3.90000	0.59106
30	330	3.860	386.0	4.10526	0.61334
30	360	3.850	385.0	4.33333	0.63682
300	660	3.760	376.0	8.66667	0.93785
300	960	3.68	368.0	78.00000	1.89209

FISHER ENGINEERING

HYDRAULIC CONDUCTIVITY ANALYSIS

Location: *39 Pine Street North, Port Hope*
Project: *FH 23-13247*
Test Date: *9/6/2023*
Tested by: *CAW*
Well No: *MW3*



FISHER ENGINEERING

HYDRAULIC CONDUCTIVITY ANALYSIS

Location: 39 Pine Street North, Port Hope
Project: FH 23-13247
Test Date: 9/6/2023
Tested by: CAW
Well No: MW5

Equilibrium Water level (from top of pipe) HE	*341*	*cm*
Initial Water level (from top of pipe) Ho	*435*	*cm*
Monitoring well inner Dia D	*0.05*	*m*
Initial Time offset To	*1*	*second*
Reverse of Luthin's reference system Ru = Ho - HE	*94.00*	*cm*
Slope of Log((ho-he)/(ht-he)) / T	*1.20E-03*	

G = Ru / (HT - HE)

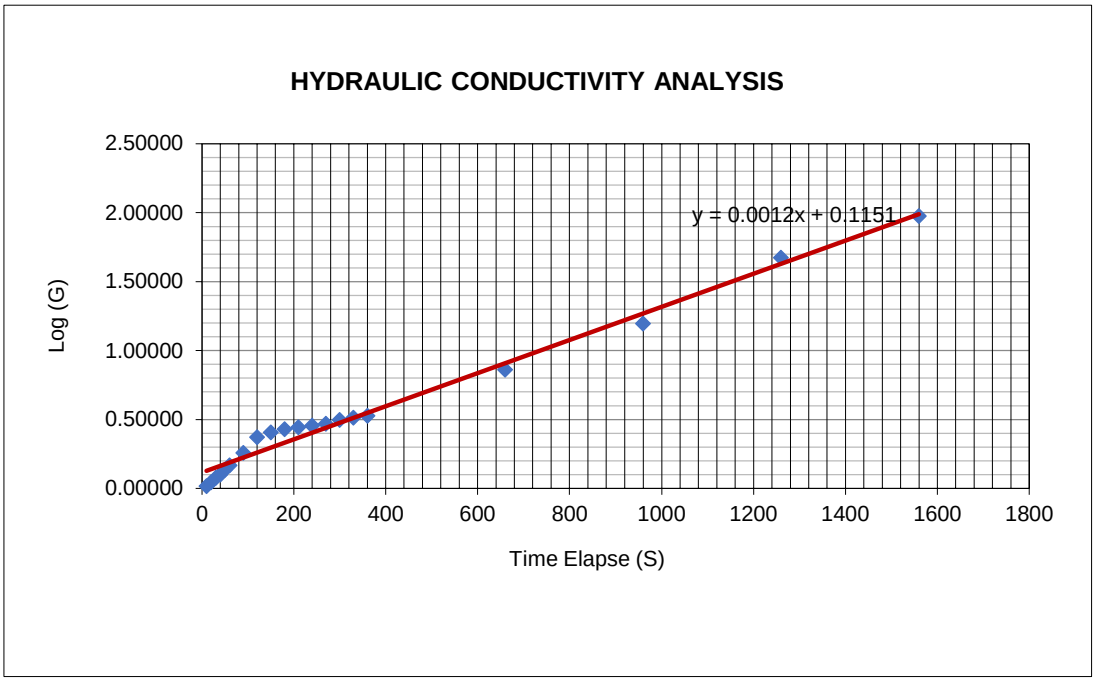
Hydraulic conductivity computed k = 0.0018160 cm/s
1.82E-05 m/s
1.569 m/day

Time	HT (Water Drop)			G	LOG (G)
(Interval s)	(Elapsed s)	(m)	(cm)		
0	0	4.350			
10	10	4.320	432.0	1.03297	0.01409
10	20	4.260	426.0	1.10588	0.04371
10	30	4.200	420.0	1.18987	0.07550
10	40	4.160	416.0	1.25333	0.09807
10	50	4.100	410.0	1.36232	0.13428
10	60	4.050	405.0	1.46875	0.16695
30	90	3.930	393.0	1.80769	0.25712
30	120	3.810	381.0	2.35000	0.37107
30	150	3.780	378.0	2.54054	0.40493
30	180	3.760	376.0	2.68571	0.42906
30	210	3.750	375.0	2.76471	0.44165
30	240	3.740	374.0	2.84848	0.45461
30	270	3.730	373.0	2.93750	0.46798
30	300	3.710	371.0	3.13333	0.49601
30	330	3.700	370.0	3.24138	0.51073
30	360	3.690	369.0	3.35714	0.52597
300	660	3.540	354.0	7.23077	0.85918
300	960	3.470	347.0	15.66667	1.19498
300	1260	3.430	343	47.00000	1.67210
300	1560	3.42	342	94.00000	1.97313

FISHER ENGINEERING

HYDRAULIC CONDUCTIVITY ANALYSIS

Location: *39 Pine Street North, Port Hope*
Project: *FH 23-13247*
Test Date: *9/6/2023*
Tested by: *CAW*
Well No: *MW5*



FISHER ENGINEERING

HYDRAULIC CONDUCTIVITY ANALYSIS

Location: ***39 Pine Street North, Port Hope***
Project: ***FH 23-13247***
Test Date: ***9/6/2023***
Tested by: ***CAW***
Well No: ***MW6***

Equilibrium Water level (from top of pipe) HE	***377***	***cm***
Initial Water level (from top of pipe) Ho	***478***	***cm***
Monitoring well inner Dia D	***0.05***	***m***
Initial Time offset To	***1***	***second***
Reverse of Luthin's reference system Ru = Ho - HE	***101.00***	***cm***
Slope of Log((ho-he)/(ht-he)) / T	***8.00E-04***	

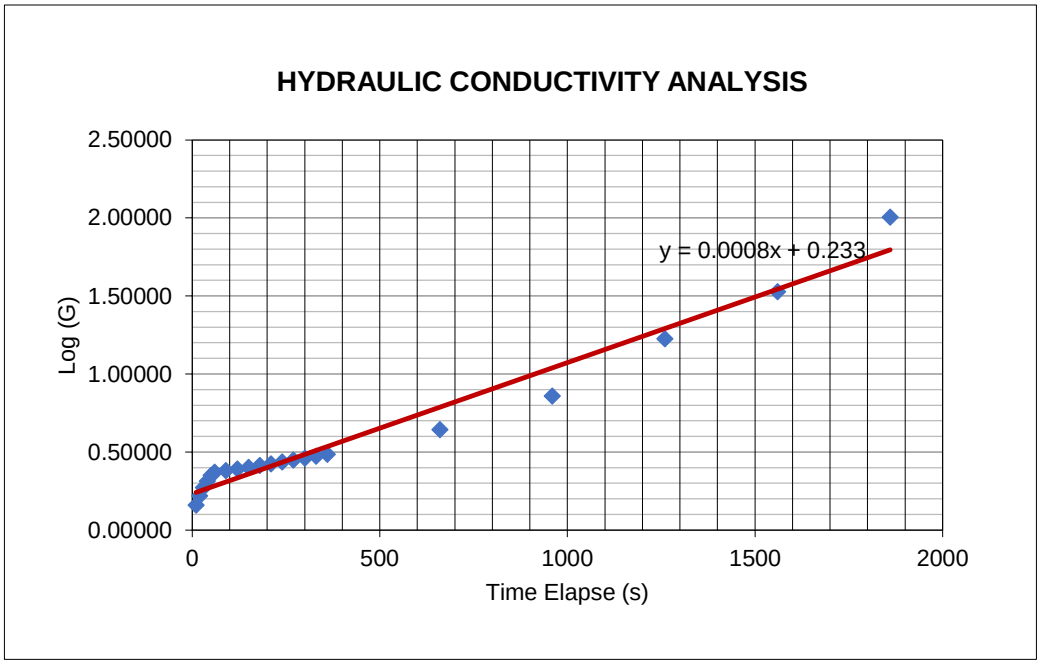
G = Ru / (HT - HE)

Hydraulic conductivity computed k = 0.0012106 cm/s
1.21E-05 m/s
1.046 m/day

Time	HT (Water Drop)			G	LOG (G)
(Interval s)	(Elapsed s)	(m)	(cm)		
0	0	4.780			
10	10	4.470	447.0	1.44286	0.15922
10	20	4.380	438.0	1.65574	0.21899
10	30	4.310	431.0	1.87037	0.27193
10	40	4.260	426.0	2.06122	0.31413
10	50	4.220	422.0	2.24444	0.35111
10	60	4.200	420.0	2.34884	0.37085
30	90	4.190	419.0	2.40476	0.38107
30	120	4.180	418.0	2.46341	0.39154
30	150	4.170	417.0	2.52500	0.40226
30	180	4.160	416.0	2.58974	0.41326
30	210	4.150	415.0	2.65789	0.42454
30	240	4.140	414.0	2.72973	0.43612
30	270	4.130	413.0	2.80556	0.44802
30	300	4.120	412.0	2.88571	0.46025
30	330	4.110	411.0	2.97059	0.47284
30	360	4.100	410.0	3.06061	0.48581
300	660	4.000	400.0	4.39130	0.64259
300	960	3.910	391.0	7.21429	0.85819
300	1260	3.830	383.0	16.83333	1.22617
300	1560	3.800	380.0	33.66667	1.52720
300	1860	3.780	378.0	101.00000	2.00432

HYDRAULIC CONDUCTIVITY ANALYSIS

Location: ***39 Pine Street North, Port Hope***
Project: ***FH 23-13247***
Test Date: ***9/6/2023***
Tested by: ***CAW***
Well No: ***MW6***



APPENDIX F – CONSTRUCTION DEWATERING RATES AND PERMANENT DRAINAGE

Construction Dewatering Calculation

Location: *39 Pine Street North, Port Hope*
Project: *FH 23-13247*
Date: *2/5/2024*

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

Construction Units	Finished basement floor elevation (m asl)	Finished Ground Floor (m asl)	Lowest Footing Elevation (m asl)	Required Dewatering Elevation (m asl)	Average 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 one UG level	100.65	103.70	99.45	98.45	3.17	99.53	98.15	1.38	0.3	1.08	9.18	19.24	10.06	318.16	1.82E-05	1.81	2.96	2.31	1.59E-04	13.74

Dupuit Forcheimer Equation

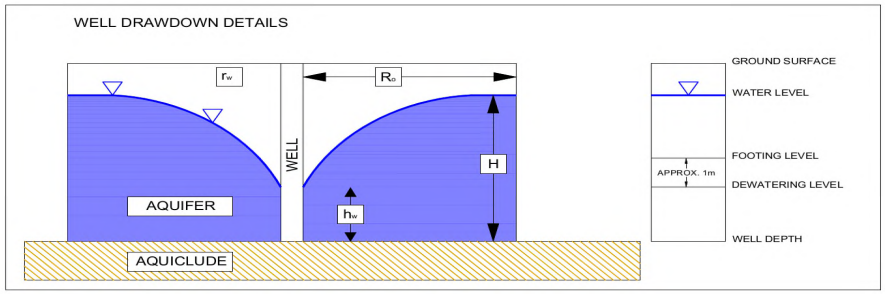
$$Q = \frac{\pi K(H^2 - h_w{}^2)}{lnR_0 - lnr_w}$$

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

Location: *39 Pine Street North, Port Hope*
Project: *FH 23-13247*
Date: *2/5/2024*

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

Construction Units	Finished basement floor elevation (m asl)	Finished Ground Floor (m asl)	Lowest 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 one UG level	100.65	103.70	99.45	100.40	2.17	100.53	100.15	0.38	0.3	0.13	1.17	11.23	10.06	318.16	2.11E-05	0.08	2.42	2.31	4.82E-05	4.16

Dupuit Forcheimer Equation

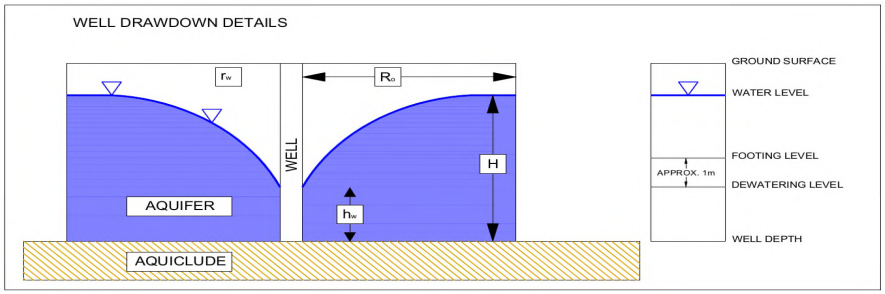
$$Q = \frac{\pi K(H^2 - h_w{}^2)}{lnR_0 - lnr_w}$$

Equivalent radius of well, r_w

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

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

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

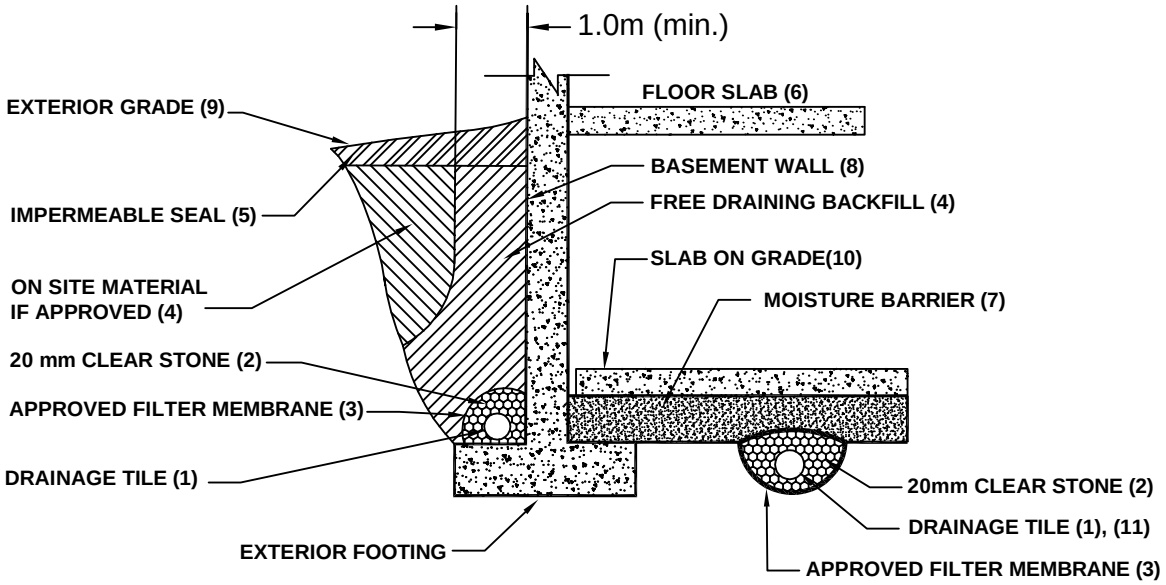


Where:

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 – 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.

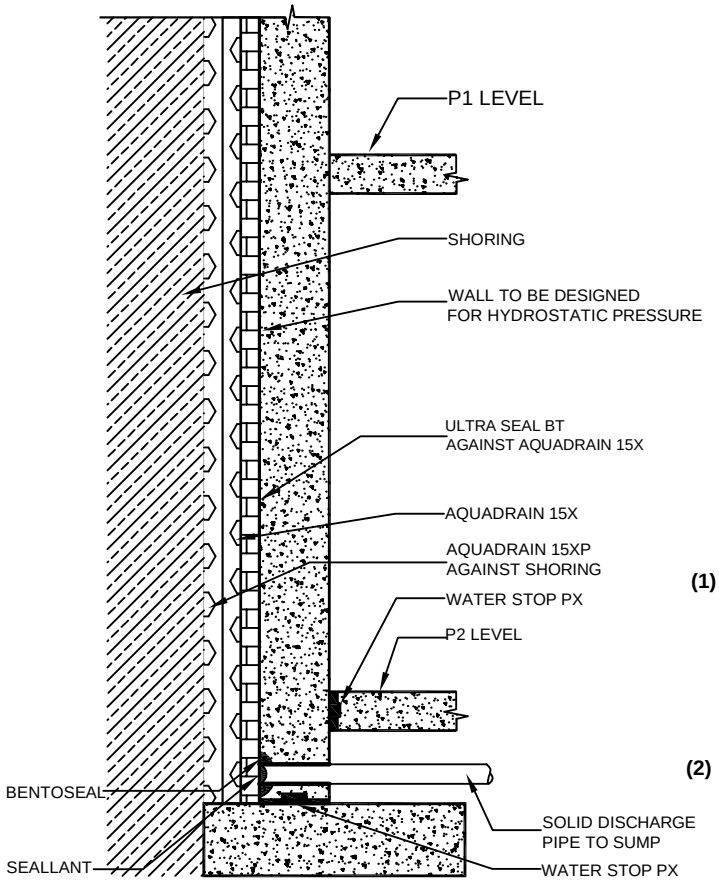
(13) DO NOT CONNECT THE UNDERFLOOR DRAINS TO PERIMETER DRAINS.

(14) REVIEW THE GEOTECHNICAL REPORT FOR SPECIFIC DETAILS.

DRAINAGE AND BACKFILL RECOMMENDATIONS

BASEMENT WITH UNDERFLOOR DRAINAGE

(NOT TO SCALE)



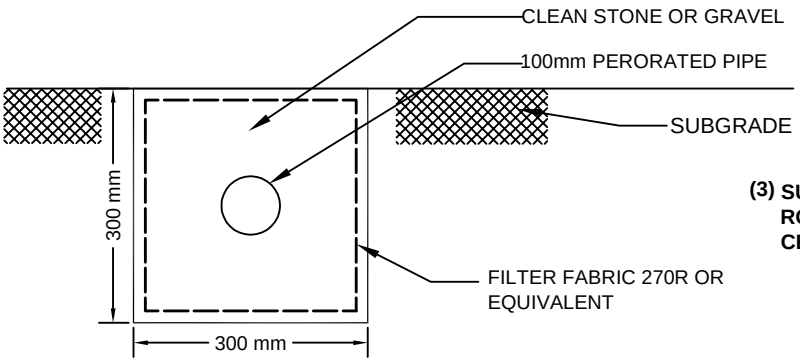
NOTES:

(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)

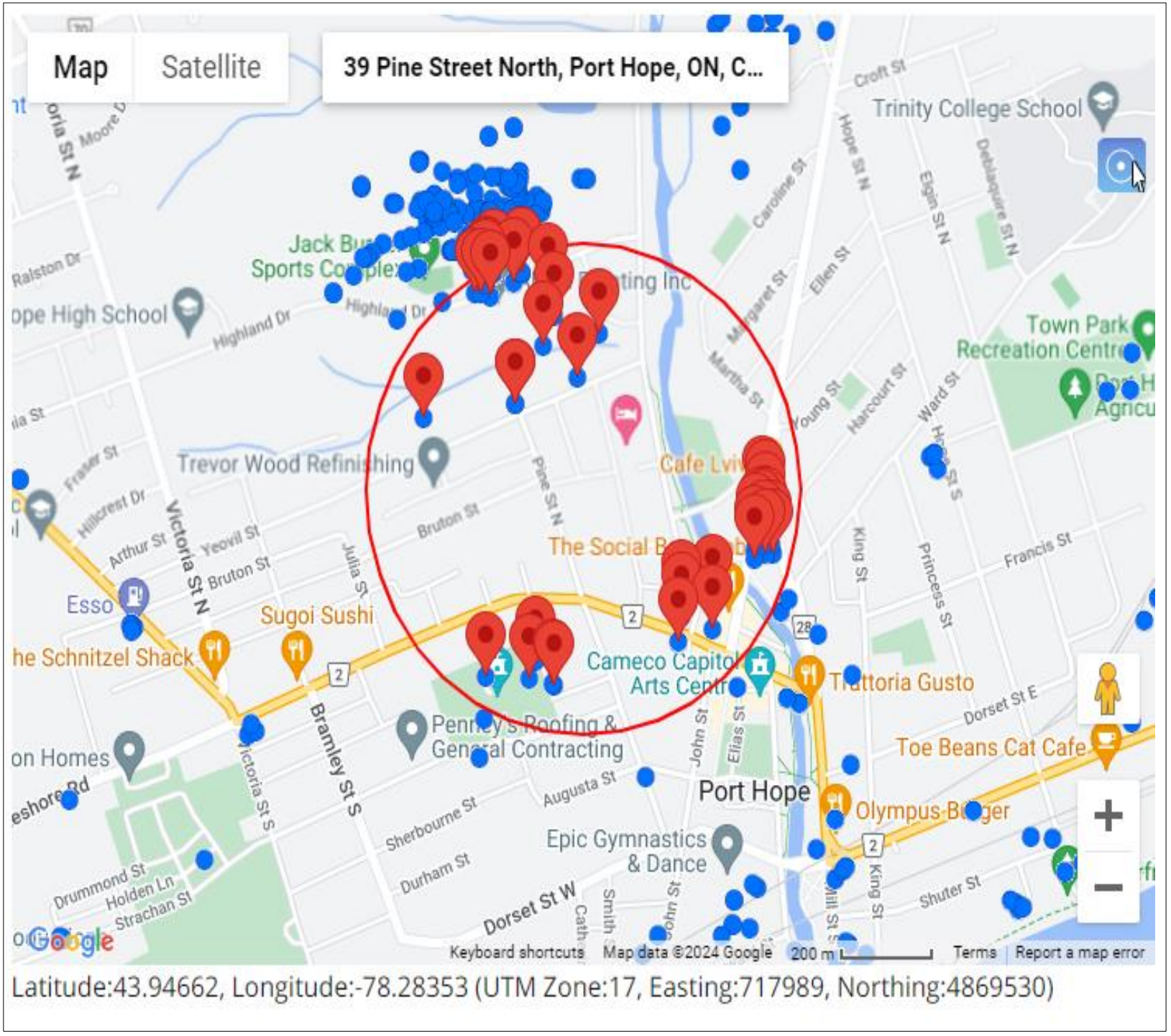


(3) SUBGRADE DRAIN TO BE PLACED IN PARALLEL ROWS 6-8 m (20'-25'), FROM CENTERLINE TO CENTERLINE.

DETAIL OF SUBGRADE DRAIN

(NOT TO SCALE)

APPENDIX H – WELL SURVEY



FISHER ENGINEERING
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L3R 3K2
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NORTH

N

LEGEND

SITE BOUNDARY

PROJECT NAME AND ADDRESS

HYDROGEOLOGICAL INVESTIGATION

39 Pine Street North, PORT HOPE
ONTARIO

FIGURE H 1:

WELLS WITHIN 500M RADIUS

SHEET NO.

H1

PROJECT NO.

FH23-13247

DATE

JANUARY 2024

SCALE

AS SHOWN