HYDROGEOLOGICAL INVESTIGATION REPORT

LIVERPOOL ROAD LIMITED PARTNERSHIP

PROPOSED RESIDENTIAL DEVELOPMENT

640 Liverpool Road,
Pickering, Ontario

December 16, 2022

Terrapex Environmental Ltd.
90 Scarsdale Road
Toronto, Ontario, M3B 2R7
Telephone: (416) 245-0011
Website: www.terrapex.com

DISTRIBUTION: **Liverpool Road Limited Partnership** **PROJECT # CT3414.00**

TABLE OF CONTENTS

FIGURES

TABLES

APPENDICES

1.0 INTRODUCTION

Terrapex Environmental Ltd. (**Terrapex**) has been retained by Liverpool Road Limited Partnership to carry out a hydrogeological investigation for the proposed residential development located at 640 Liverpool Road, Pickering, Ontario (hereafter, also referred to as the “subject property”). Authorization to proceed with this study was given by Greg Silas (December 2, 2021). The purpose of this interim report is to provide early characterization of the subsurface groundwater conditions for the purposes of planning and design.

This report is intended for the guidance of the client to and the design architects or engineers only. It is assumed that the design will be in accordance with the applicable codes and standards.

2.0 SUBJECT AREA

2.1 CONTEXT

The Site is located to the west of Liverpool Road, in an area bracketed to the north and south by Annland Street and Wharf Street, respectively. The subject property is approximately rectangular in shape, and is approximately 3 acres in area. A smaller parcel is additional to this, just west of the main subject property. As shown on **Figure 1**, the subject property is currently occupied by residential buildings and parking areas.

Frenchman’s Bay lies approximately 85 metres to the west of the property boundary. It is understood that the subject property is located within the general jurisdiction of the Toronto and Region Conservation Authority, the Toronto Source Protection Area (SPA), and the Regional Municipality of Durham.

It is our understanding that the redevelopment would consist of twenty-seven residential blocks. It is not understood if the proposed building structures will contain basement levels. Planning for this investigation relied on the assumption that the concept would be slab-on-grade, or up to one level of underground.

Conservation Authority (TRCA), and within the Toronto Source Protection Authority (SPA).

2.2 PHYSIOGRAPHY AND GEOLOGY

Available mapping indicates that the subject property is located in a region of glaciolacustrine clay plains deposits, primarily characterized as silt and clay, with minor sand a gravel (MRD128, 2017;

MRD228, 2019).

The bedrock beneath the reported overburden is reported to be composed of carbonates (limestone/dolostone), shales and sandstones (MRD126, 2011). Bedrock units were not encountered during this investigation or during drilling operations required to install the groundwater monitoring wells.

The encountered subsurface package is consistent with the information reported in the available mapping.

2.3 AVAILABLE BACKGROUND GROUNDWATER INFORMATION

A review of the available well records shows that there are 25 reported wells within approximately 500 metres of the subject property. Of the known wells, none are reported to be purposed for water supply use. The subject area within 500 m is shown in **Figure 2**, and MECP Well Record reports are provided in **Appendix 1**.

It is noted that older wells may no longer be operational, and that historically there was not a requirement to register dug wells with the MECP; as such, they can be under-represented in the water well record database.

3.0 METHODOLOGY

3.1 GROUNDWATER MONITORING WELL CONSTRUCTION

Drilling operations was carried out by Pontil Drilling between February 24 to March 2 of 2022, which included advancing thirteen (13) boreholes, designated BH/MW101 through BH/MW113. Borehole reports indicate that groundwater monitoring wells were installed at six (6) locations, designated MW101, MW104, MW107, MW109, MW112, and MW113. Reported construction conditions are summarized in **Table 1**, below, and detailed borehole reports are provided in **Appendix II**. The location of the completed groundwater monitoring wells are provided in **Figure 3**.

Table 1. Summary of Groundwater Monitoring Well Conditions

Well ID	Reported Date of Construction	Approximate Location[1] (UTM Zone 17T)		Approximate Ground Surface Elevation	Reported Screened Interval	Soils Reported at Screened Interval	Reported SPT N-Value at Screened Interval
		metres east	metres north	masl	mbg		
MW101	March 1, 2022	654122.840	4853251.116	79.135	1.8 to 5.3 (77.33 to 73.83)	Sandy Silt Till	>50
MW104	February 25, 2022	654227.194	4853285.819	80.156	1.5 to 4.9 (78.65 to 75.25)	Sandy Silt Till	>50
MW107	February 28, 2022	654205.808	4853247.933	79.700	1.9 to 5.2 (77.8 to 74.5)	Sandy Silt Till	>50
MW109	March 2, 2022	654136.905	4853187.111	77.734	1.8 to 5.2 (75.93 to 72.53)	Sandy Silt Till	>50
MW112	February 28, 2022	654235.941	4853236.134	79.747	1.8 to 5.3 (77.94 to 74.44)	Sandy Silt Till	>50
MW113	March 1, 2022	654212.318	4853252.716	80.126	1.3 to 4.6 (78.82 to 75.52)	Sandy Silt Till	>50

Information taken from Borehole logs released by BluMetric Environmental, 2022
mbg = metres below ground
[1] locations estimated from provided mapping.

As indicated in **Table 1**, environmental groundwater monitoring wells are reported to have been screened from depths of 1.3 mbg to 5.3 mbg, generally adjacent to sandy silt till materials.

It is noted that the boundaries between the strata have been inferred from drilling observations carried out by others and non-continuous samples. They generally represent a transition from one soil type to another and should not be inferred to represent an exact plane of geological change. Further, conditions will vary between and beyond the boreholes.

3.2 WATER LEVEL MONITORING

Groundwater depths have been measured manually at all accessible monitoring locations (six

monitoring wells) over the course of three biweekly monitoring events in March of 2022. The recorded water levels for these wells are provided in **Table 2**, below. These water levels reflect the groundwater conditions on the dates they were measured.

Table 2. Measured Groundwater Levels

Location ID	Approximate Top of Pipe	Approximate Ground Surface Elevation	Groundwater Measurements		
			2022		
			March 4	March 10	March 18
	masl (mbgl)	masl	masl (mbgl)	masl (mbgl)	masl (mbgl)
MW101	0.101 (79.236)	79.135	1.240 (77.895)	0.810 (78.325)	0.649 (78.486)
MW104	0.095 (80.251)	80.156	0.610 (79.546)	0.290 (79.866)	0.203 (79.953)
MW107	0.100 (79.800)	79.700	4.010 (75.690)	3.825 (75.875)	3.68 (76.020)
MW109	0.100 (77.834)	77.734	2.340 (75.394)	2.285 (75.449)	2.08 (75.654)
MW112	0.090 (79.837)	79.747	1.195 (78.552)	1.235 (78.512)	0.734 (79.013)
MW113	0.000 (80.126)	80.126	1.480 (78.646)	1.08 (79.046)	0.945 (79.181)

Notes
Elevations measured by Topcon GNSS device
masl = metres above sea level
mbmp = metres below measurement point (top of pipe)
mbg = metres below ground
nm = not monitored
shaded = highest and lowest groundwater levels

As summarized in **Table 2,** groundwater depths ranged from approximately 75.395 metres above sea level (masl) to 79.953 masl. Groundwater levels measured across the property generally show an average of 4.3 metres between the lowest and highest water levels at any one time. It is noted that the 'highest' groundwater levels are found at location MW104 (northeast corner), and the lowest groundwater levels are found at location MW109 (southwest corner).

4.0 HYDRAULIC TESTING

4.1 HYDRAULIC CONDUCTIVITY

To estimate the hydraulic conductivity (K) of the soil materials adjacent to the screened intervals of the tested monitoring wells, a single well response tests was carried out on the at location MW107, corresponding to screens adjacent to sandy silt till materials.

The Bouwer and Rice method was applied to the falling head test data, and hydraulic conductivities were calculated using AQTESOLV software (v4.5). Based on the calculations, hydraulic conductivity of the sandy silt material is estimated to be 7.22×10^{-7} m/sec in the location tested. These results indicate relatively semi-pervious materials and are consistent with values expected for layered very fine sand and silts (Bear, 1972; Freeze and Cherry, 1979).

4.2 INTERPRETED GROUNDWATER FLOW DIRECTION

Groundwater flow directions were estimated using manual piezometric head measurements reported at the well locations on March 10, 2022. Groundwater within the area of interest is estimated to flow in a general south-to-southwest heading, as shown visible in **Figure 4.**

A groundwater ‘shadow’ is noted in the area of MW107, which results in the ‘pinched’ contour intervals at that location. The reason for this is not fully understood, but is consistent over the three monitoring events.

5.0 DEWATERING ESTIMATES

5.1 TEMPORARY CONSTRUCTION DEWATERING

The hydraulic conductivities derived from neighbouring soils were used to estimate a worst-case scenario for temporary construction dewatering rates, using a conceptual excavation size approximately equivalent to 45 m x 15 m. This concept excavation size represents the approximate footprint of the 6-unit group defined as '7.0 CONV 7 Units' on drawing A101 (Cassidy & Co., November 2022). Excavation of unit groups are assumed to be self-contained, and '7.0 CONV 7 Units' represents the largest apparent excavation footprint. Should more unit group excavations be carried out at the same time, dewatering volumes would be multiplied accordingly. A single level of underground was considered.

The following summarized the assumptions made as part of the dewatering calculations:

- Excavation Footprint: 45 m x 15 m
- Target dewatering depth: 4 mbg = (~79.5 masl – 4 m) = 75.5 masl
- Hydraulic conductivity: 7.22×10^{-7} m/sec
- Static groundwater depth: 77.8 masl
- Required Drawdown: (77.8 – 75 masl) = 2.8 metres

Table 3 summarizes the anticipated steady state dewatering rate estimates.

Table 3. Summary of Estimated Dewatering Volumes for Concept Development

		(A)	(B)	(C)	(D)	
Excavation Concept	**Drawdown Dimensions [1]**	**Estimated Dewatering Volume**	**Incident Precipitation [2]**	**Total Dewatering Volume (A+B)**	**Design Dewatering Volume (A x 2) + B**	**Zone of Influence (ZOI)**
	(length / width / depth)	(L/day)	(L/day)	(L/day)	(L/day)	(m radius)
Provided footprint [1]	45 m / 15 m / 2.8 m	99,200	16,875	116,075	215,275	7

[1] 7.0 CONV 7 Units – Drawing A101 (Cassidy & Co., November 2022)

[2] Based on a 100-year storm, with a precipitation of 25 mm

Based on the worst-case assumptions provided above, and applying a Factor of Safety of 2x to estimated dewatering volumes, steady state temporary dewatering volumes are estimated to be approximately 107,452 L/day.

5.2 DEWATERING ZONE OF INFLUENCE (ZOI)

Based on the hydraulic conductivity, and proposed excavation dimensions with consideration for two levels of underground parking, the dewatering operations are estimated to have a Zone of Influence (ZOI) equivalent to a 7 metre radius from the dewatering locations. The estimated Zone of Influence is provided in **Table 3**, above.

5.3 ANTICIPATED PERMITTING NEEDS

Water takings in excess of 50,000 L/day are regulated by the Ministry of Environment, Conservation and Parks (MECP). Certain construction dewatering activities up to 400,000 L/day may qualify for a self-registration process under the Environmental Activity Sector Registry ("EASR"). A Category 3 PTTW is required where the proposed water taking is greater than 400,000 L/day.

The volumes summarized in **Table 3** indicate that a Permit to Take Water (PTTW) will likely not be required for the concept excavation dimensions, and that an Environmental Activity and Sector Registry (EASR) will be sufficient for temporary dewatering needs.

6.0 LOW IMPACT DEVELOPMENT (LID) MEASURES

In general principles, precipitation incident to a pervious soil surface may infiltrate downward to move through the unsaturated zone, to then recharge the shallow groundwater aquifer. From there, shallow groundwater moves toward a watercourse to contribute to baseflow or percolates downward to replenish deeper aquifers. Impervious surfaces, such as buildings or paving, prevent infiltration and so precipitation instead becomes runoff directed to storm water sewers.

Low impact development (LID) measures promote infiltration, and generally requires there to be at least one metre of soil above the seasonal high groundwater level, and should generally reside lower than the understood frost depth (OPSD3090.101 Rev#1 Nov2010).

As outlined in **Table 2**, above, groundwater at the subject property is likely located at depths of approximately 0.73 mbg to 4.01 mbg. Based on these estimates, conditions are considered challenging for the design of LID measures.

7.0 SUMMARY AND DISCUSSION

The following summarizes the information above, obtained during the review of the Site and nearby investigations carried out by others:

- Groundwater is estimated to exist at approximately 0.73 mbg to 4.01 mbg, equivalent to approximately 75.395 metres above sea level (masl) to 79.953 masl, and to flow in a generally south-to-southwest direction.
- The maximum measured hydraulic conductivities for the soils is estimated to be approximately 7.22×10^{-7} m/sec.
- Based on a worst-case scenario, the excavation footprint for the 6-unit group designated '7.0 CONV 7 Units' will have a steady-state temporary dewatering volume of approximately 215,275 L/day (FOS=2), and a Zone of Influence (ZOI) equivalent to a 7 metre radius from the dewatering locations.
- A Permit to Take Water (PTTW) will likely not be required for the concept excavation dimensions, and that an Environmental Activity and Sector Registry (EASR) will be sufficient for temporary dewatering needs.
- Conditions are considered challenging for the design of LID measures.

8.0 CLOSURE

This report was prepared for Liverpool Road Limited Partnership by Terrapex Environmental Ltd. The material in it reflects Terrapex Environmental Ltd. judgement in light of the information available to it at the time of preparation. Terrapex cannot guarantee the accuracy of work carried out by others. Any comment based on work carried out by others is subject to the accuracy of the information supplied to Terrapex. Any use of the proposed comments by parties, or any reliance on or decisions to be made based on work not carried out by Terrapex is the responsibility of those parties.

The subsurface conditions characterized in this report are based on information determined at the inspection locations. Soil and groundwater conditions between and beyond the test holes may differ from those encountered at the test hole locations, and conditions may become apparent during construction which could not be detected or anticipated at the time of the soil investigation.

The comments given in this report comment on potential groundwater conditions and dewatering conditions, and are intended for the guidance of the design engineer, only.

Respectfully submitted,

TERRAPEX ENVIRONMENTAL LTD.

Zen Keizars, P.Geo., FGC
Senior Hydrogeologist

FIGURES

TERRAPEX

SITE LOCATION

640 LIVERPOOL ROAD
PICKERING, ONTARIO

CLIENT

0 0.25 0.5 1
Kilometers

DATA SOURCE: ESRI

PROJECT #	CT3414.00
DATE	FEBRUARY 2022
DRAWN	JS/SW
CHECKED	
DRAWING #	**FIGURE 1**

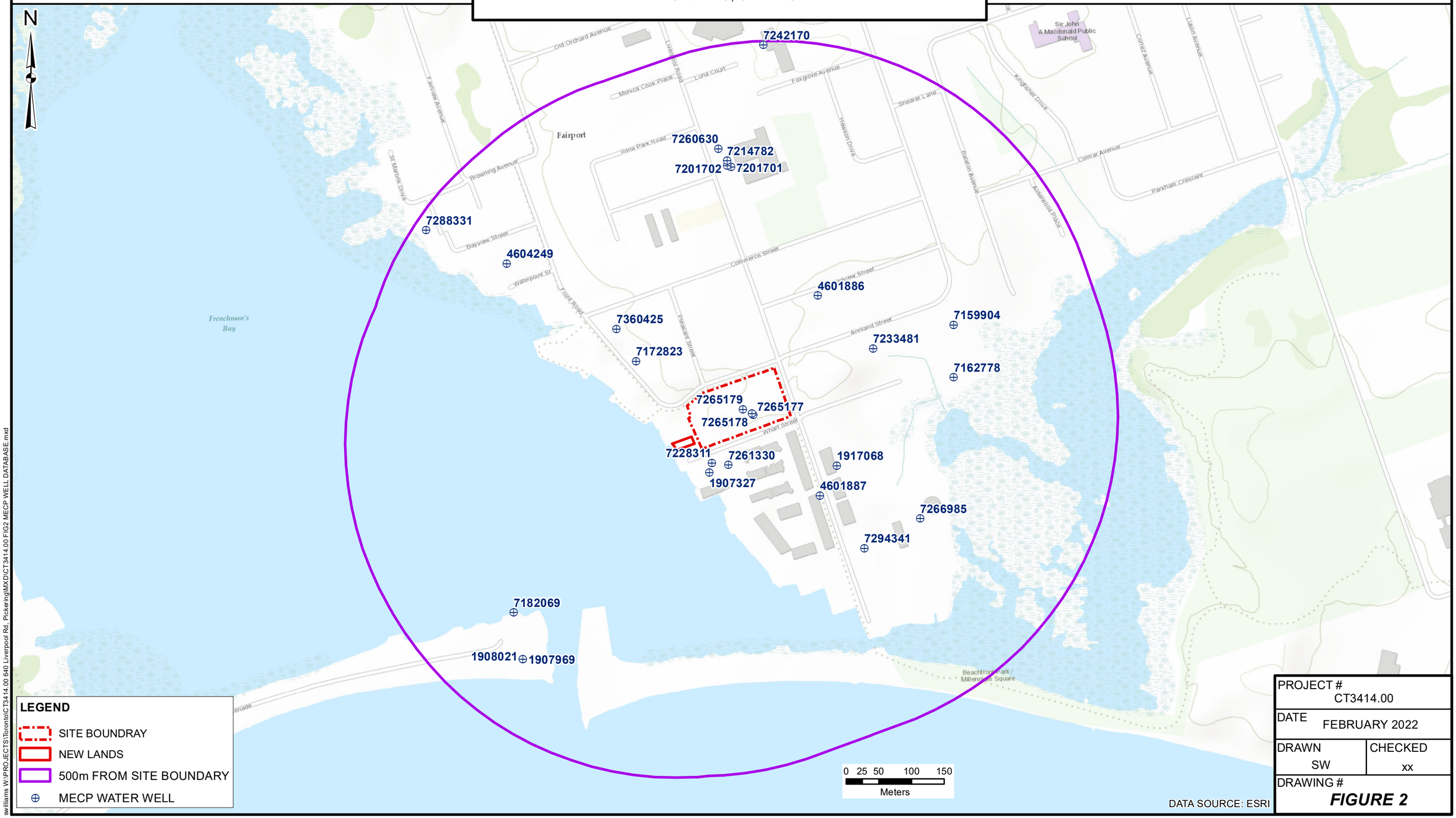
swilliams W:\PROJECTS\Toronto\CT3414.00 640 Liverpool Rd, Pickering\MXD\CT3414.00 FIG1 SITE LOCATION.mxd

TERRAPEX

MECP WELL DATABASE

640 LIVERPOOL ROAD
PICKERING, ONTARIO

CLIENT



PROJECT #	CT3414.00
DATE	FEBRUARY 2022
DRAWN	SW
CHECKED	xx
DRAWING #	***FIGURE 2***

swilliams W:\PROJECTS\Toronto\CT3414.00 640 Liverpool Rd, Pickering\MXD\CT3414.00 FIG2 MECP WELL DATABASE.mxd

TERRAPEX

WELL LOCATION PLAN

640 LIVERPOOL ROAD
PICKERING, ONTARIO

CLIENT

LIVERPOOL LIMITED PARTNERSHIP

LEGEND

- SITE BOUNDARY
- BOREHOLE (TERRAPEX)
- MONITORING WELL (TERRAPEX)
- MONITORING WELL (EDWARD WONG)
- MONITORING WELL (PINCHIN)

DATA SOURCE: MAPCAST, 2020

PROJECT #	CT3414.00
DATE	APRIL 2022
DRAWN: JS	CHECKED:
DRAWING #	***FIGURE 2***

swilliams W:\PROJECTS\Toronto\CT3414.00 640 Liverpool Rd, Pickering\MXD\CT3414.00 FIG2 WELL LOCATION PLAN.mxd

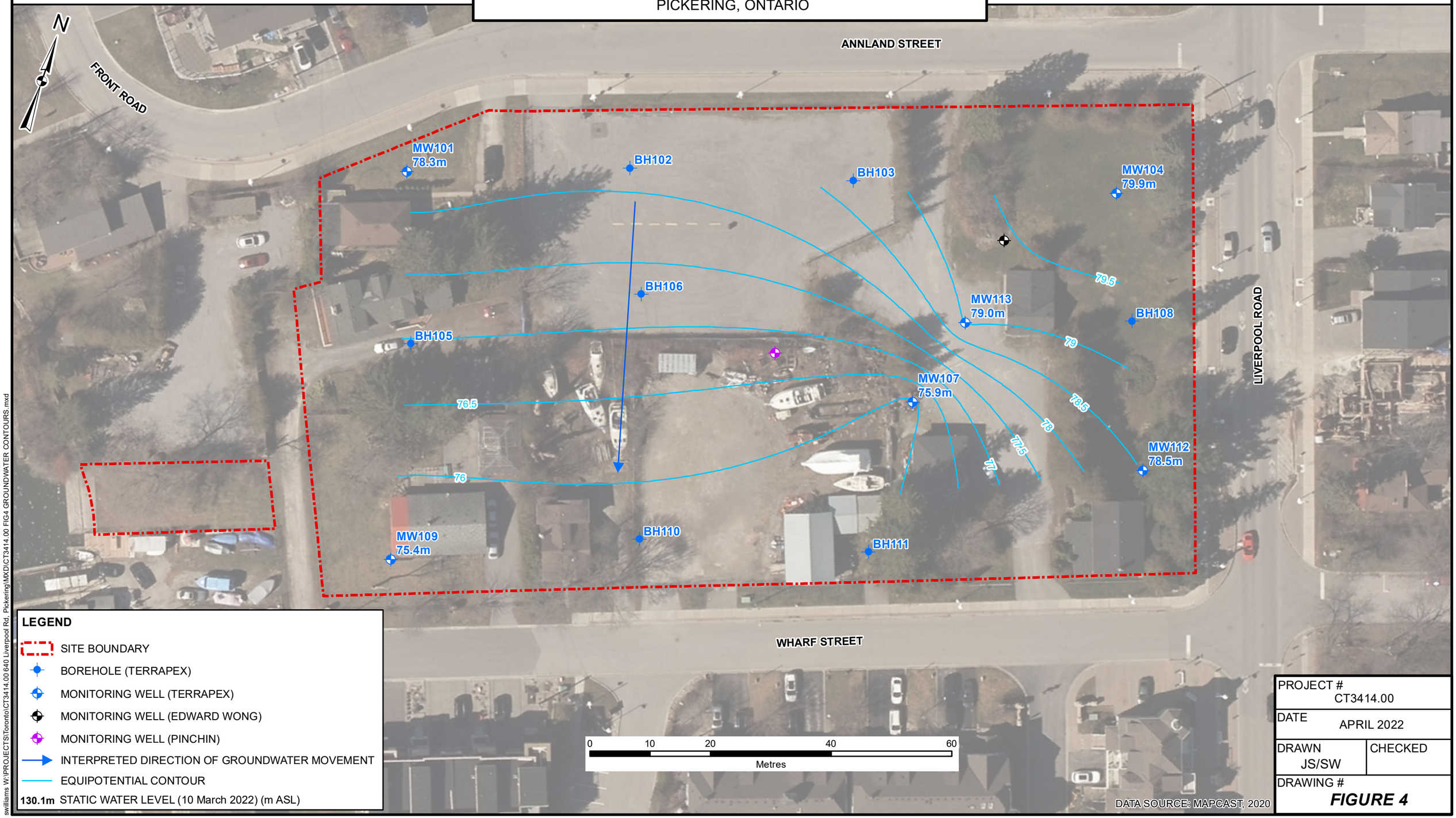
TERRAPEX

GROUNDWATER CONTOURS (AS OF MARCH 10, 2022)

640 LIVERPOOL ROAD
PICKERING, ONTARIO

CLIENT

LIVERPOOL LIMITED PARTNERSHIP



LEGEND

- SITE BOUNDARY
- BOREHOLE (TERRAPEX)
- MONITORING WELL (TERRAPEX)
- MONITORING WELL (EDWARD WONG)
- MONITORING WELL (PINCHIN)
- INTERPRETED DIRECTION OF GROUNDWATER MOVEMENT
- EQUIPOTENTIAL CONTOUR
- **130.1m** STATIC WATER LEVEL (10 March 2022) (m ASL)

PROJECT #	CT3414.00
DATE	APRIL 2022
DRAWN	JS/SW
CHECKED	
DRAWING #	***FIGURE 4***

swilliams W:\PROJECTS\Toronto\CT3414.00 640 Liverpool Rd, Pickering\MXD\CT3414.00 FIG4 GROUNDWATER CONTOURS.mxd

APPENDIX I

MECP WELL RECORD REPORTS

MECP Water Well Records

Well Record #

1907327 **Lot** 023 **Conc** 03 PICKERING TOWN / DURHAM

Date 1985-05-14 **DD/MM/YYYY**

Elev 75.9 (masl) **Easting** 654135 **Northing** 4853143
/ Domestic Water Supply **UTM RC** 4 **margin of error : 30 m - 100 m**
Water Found 2.4 (mbgs) 73.5 (masl) FRESH
Casing Diameter 30 inch **Casing Material:** CONCRETE
Top of Screen (mbgs) **Bottom of Screen** (mbgs)
Screen Interval (m)

Flowing? N
SWL 2.4 (mbgs) 73.5 (masl)
Pumping WL 3.7 (mbgs) 72.2 (masl)
Pump Rate 31.8 (LPM) 0 / 30
Spec. Cap. 26.10 (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	75.9		
0.6	75.3		FILL / /
2.4	73.5	GREY	CLAY / STONES / PACKED
3.0	72.9	BROWN	SAND / /
4.3	71.6	GREY	CLAY / STONES / CEMENTED
6.1	69.8	GREY	CLAY / SAND / LAYERED
6.7	69.2	GREY	CLAY / PACKED /
8.2	67.7	GREY	CLAY / SAND / LAYERED

1907969 **Lot** 024 **Conc** 03 PICKERING TOWN / DURHAM

Date 1986-10-29 **DD/MM/YYYY**

Elev 75.6 (masl) **Easting** 653850 **Northing** 4852858
/ Domestic Water Supply **UTM RC** 5 **margin of error : 100 m - 300 m**
Water Found 15.8 (mbgs) 59.8 (masl) Not stated
Casing Diameter 6 inch **Casing Material:** STEEL
Top of Screen (mbgs) **Bottom of Screen** (mbgs)
Screen Interval (m)

Flowing? N
SWL 4.6 (mbgs) 71.1 (masl)
Pumping WL 29.0 (mbgs) 46.7 (masl)
Pump Rate 13.6 (LPM) 5 / 0
Spec. Cap. 0.56 (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	75.6		
4.6	71.1	BROWN	CLAY / /
9.1	66.5	GREY	CLAY / SAND / MEDIUM SAND
15.8	59.8	GREY	CLAY / STONES / HARD
30.2	45.5	BLACK	SHALE / LAYERED /

1908021 **Lot** 024 **Conc** 03 PICKERING TOWN / DURHAM

Date 1986-11-24 **DD/MM/YYYY**

Elev 75.6 (masl) **Easting** 653850 **Northing** 4852858
/ Domestic Water Supply **UTM RC** 5 **margin of error : 100 m - 300 m**
Water Found 8.2 (mbgs) 67.4 (masl) Not stated
Casing Diameter 6 inch **Casing Material:** STEEL
Top of Screen 6.4 (mbgs) **Bottom of Screen** 7.6 (mbgs)
Screen Interval 1.2 (m)

Flowing? N
SWL 1.8 (mbgs) 73.8 (masl)
Pumping WL 6.1 (mbgs) 69.5 (masl)
Pump Rate 45.5 (LPM) 3 / 0
Spec. Cap. 10.65 (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	75.6		
30.2	45.5		PREV. DRILLED / /

1917068 **Lot** **Conc** PICKERING TOWN / DURHAM

Date 2004-04-28 **DD/MM/YYYY**

Elev 78.3 (masl) **Easting** 654330 **Northing** 4853154
/ Not Used Abandoned-Quality **UTM RC** 5 **margin of error : 100 m - 300 m**
Water Found (mbgs) (masl)
Casing Diameter **Casing Material:**
Top of Screen (mbgs) **Bottom of Screen** (mbgs)
Screen Interval (m)

Flowing?
SWL (mbgs) (masl)
Pumping WL (mbgs) (masl)
Pump Rate (LPM) /
Spec. Cap. (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	78.3		

/ /

Well Record #

4601886 **Lot** 022 **Conc** 03 PICKERING TOWN / DURHAM

Date 1961-11-17 **DD/MM/YYYY**

Elev 79.2 (masl) **Easting** 654301 **Northing** 4853414
/ Domestic Water Supply **UTM RC** 5 **margin of error : 100 m - 300 m**
Water Found 6.1 (mbgs) 73.1 (masl) FRESH
Casing Diameter 30 inch **Casing Material:** CONCRETE
Top of Screen (mbgs) **Bottom of Screen** (mbgs)
Screen Interval (m)

Flowing? N
SWL 4.0 (mbgs) 75.2 (masl)
Pumping WL (mbgs) (masl)
Pump Rate (LPM) /
Spec. Cap. (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	79.2		
2.4	76.7	BROWN	CLAY / STONES /
6.1	73.1	BROWN	CLAY / SHALE /
6.4	72.8		SHALE / /

4601887 **Lot** 023 **Conc** 03 PICKERING TOWN / DURHAM

Date 1963-06-04 **DD/MM/YYYY**

Elev 77.9 (masl) **Easting** 654304 **Northing** 4853108
/ Domestic Water Supply **UTM RC** 5 **margin of error : 100 m - 300 m**
Water Found 4.0 (mbgs) 73.9 (masl) FRESH
Casing Diameter 30 inch **Casing Material:** CONCRETE
Top of Screen (mbgs) **Bottom of Screen** (mbgs)
Screen Interval (m)

Flowing? N
SWL 2.4 (mbgs) 75.4 (masl)
Pumping WL (mbgs) (masl)
Pump Rate (LPM) 1 / 0
Spec. Cap. (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	77.9		
1.5	76.4	BROWN	CLAY / STONES /
4.0	73.9	BLUE	CLAY / STONES /
4.6	73.3		MEDIUM SAND / /
6.1	71.8	BLUE	CLAY / MEDIUM SAND /

4604249 **Lot** 023 **Conc** 03 PICKERING TOWN / DURHAM

Date 1969-11-20 **DD/MM/YYYY**

Elev 76.3 (masl) **Easting** 653825 **Northing** 4853463
/ Domestic Water Supply **UTM RC** 4 **margin of error : 30 m - 100 m**
Water Found 9.4 (mbgs) 66.9 (masl) FRESH
Casing Diameter 6 inch **Casing Material:** STEEL
Top of Screen (mbgs) **Bottom of Screen** (mbgs)
Screen Interval (m)

Flowing? N
SWL 1.2 (mbgs) 75.1 (masl)
Pumping WL 8.5 (mbgs) 67.8 (masl)
Pump Rate 22.7 (LPM) 2 / 30
Spec. Cap. 3.11 (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	76.3		
1.5	74.8	BROWN	TOPSOIL / /
3.0	73.3	WHITE	CLAY / STONES /
7.3	69.0	BLUE	CLAY / /
9.8	66.6	BLACK	ROCK / /

7159904 **Lot** **Conc** PICKERING TOWN / DURHAM

Date 2011-02-04 **DD/MM/YYYY**

Elev 77.6 (masl) **Easting** 654508 **Northing** 4853369
/ Test Hole Test Hole **UTM RC** 3 **margin of error : 10 - 30 m**
Water Found 4.0 (mbgs) 73.7 (masl) FRESH
Casing Diameter 6.3 inch **Casing Material:** STEEL
Top of Screen 4.0 (mbgs) **Bottom of Screen** 13.1 (mbgs)
Screen Interval 9.1 (m)

Flowing?
SWL (mbgs) (masl)
Pumping WL (mbgs) (masl)
Pump Rate (LPM) /
Spec. Cap. (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	77.6		
4.0	73.7	BROWN	CLAY / STONES /
13.1	64.5	BLACK	SHALE / /

Well Record #

7162778 | **Lot** | **Conc** | PICKERING TOWN / DURHAM

Date 2011-01-28 (DD/MM/YYYY) | **Elev** 75.1 (masl) | **Easting** 654508 | **Northing** 4853289 | **UTM RC** 3 | **margin of error : 10 - 30 m**

Water Found (mbgs) (masl) | **Casing Diameter** | **Casing Material:** | **Top of Screen** (mbgs) | **Bottom of Screen** (mbgs) | **Screen Interval** (m)

Flowing? | **SWL** (mbgs) (masl) | **Pumping WL** (mbgs) (masl) | **Pump Rate** (LPM) / | **Spec. Cap.** (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	75.1		

/ /

7172823 | **Lot** | **Conc** | PICKERING TOWN / DURHAM

Date 2011-04-08 (DD/MM/YYYY) | **Elev** 77.6 (masl) | **Easting** 654023 | **Northing** 4853314 | **UTM RC** 3 | **margin of error : 10 - 30 m**

Water Found (mbgs) (masl) | **Casing Diameter** 4 ft | **Casing Material:** CONCRETE | **Top of Screen** (mbgs) | **Bottom of Screen** (mbgs) | **Screen Interval** (m)

Flowing? | **SWL** (mbgs) (masl) | **Pumping WL** (mbgs) (masl) | **Pump Rate** (LPM) / | **Spec. Cap.** (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	77.6		

/ /

7182069 | **Lot** | **Conc** | PICKERING TOWN / DURHAM

Date 2012-04-26 (DD/MM/YYYY) | **Elev** 74.6 (masl) | **Easting** 653836 | **Northing** 4852930 | **UTM RC** 4 | **margin of error : 30 m - 100 m**

Water Found (mbgs) (masl) | **Casing Diameter** | **Casing Material:** | **Top of Screen** (mbgs) | **Bottom of Screen** (mbgs) | **Screen Interval** (m)

Flowing? | **SWL** (mbgs) (masl) | **Pumping WL** (mbgs) (masl) | **Pump Rate** (LPM) / | **Spec. Cap.** (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	74.6		

/ /

7201701 | **Lot** | **Conc** | PICKERING TOWN / DURHAM

Date 2013-04-13 (DD/MM/YYYY) | **Elev** 82.8 (masl) / Monitoring and Te | **Easting** 654168 | **Northing** 4853611 | **UTM RC** 4 | **margin of error : 30 m - 100 m**

Water Found (mbgs) (masl) | **Casing Diameter** 2 inch | **Casing Material:** PLASTIC | **Top of Screen** 4.6 (mbgs) | **Bottom of Screen** 7.6 (mbgs) | **Screen Interval** 3.0 (m)

Flowing? | **SWL** (mbgs) (masl) | **Pumping WL** (mbgs) (masl) | **Pump Rate** (LPM) / | **Spec. Cap.** (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	82.8		
3.7	79.1	BROWN	SAND / /
7.6	75.2	GREY	SAND / SILT / DENSE

7201702 | **Lot** | **Conc** | PICKERING TOWN / DURHAM

Date 2013-04-13 (DD/MM/YYYY) | **Elev** 82.8 (masl) / Monitoring and Te | **Easting** 654162 | **Northing** 4853613 | **UTM RC** 4 | **margin of error : 30 m - 100 m**

Water Found (mbgs) (masl) | **Casing Diameter** 2 inch | **Casing Material:** PLASTIC | **Top of Screen** 3.7 (mbgs) | **Bottom of Screen** 6.7 (mbgs) | **Screen Interval** 3.0 (m)

Flowing? | **SWL** (mbgs) (masl) | **Pumping WL** (mbgs) (masl) | **Pump Rate** (LPM) / | **Spec. Cap.** (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	82.8		
3.0	79.8	BROWN	SAND / /
6.7	76.1	GREY	GRAVEL / / WATER-BEARING

Well Record #

7214782 **Lot** **Conc** PICKERING TOWN / DURHAM

Date 2013-04-13 **DD/MM/YYYY**

Elev 83.1 (masl) **Easting** 654162 **Northing** 4853620
/ Monitoring and Te Test Hole **UTM RC** 4 **margin of error : 30 m - 100 m**
Water Found (mbgs) (masl)
Casing Diameter 2 inch **Casing Material:** PLASTIC
Top of Screen 4.6 (mbgs) **Bottom of Screen** 7.6 (mbgs)
Screen Interval 3.0 (m)

Flowing?
SWL (mbgs) (masl)
Pumping WL (mbgs) (masl)
Pump Rate (LPM) /
Spec. Cap. (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	83.1		
3.7	79.4	BROWN	SAND / /
7.6	75.4	GREY	SAND / SILT /

7228311 **Lot** **Conc** PICKERING TOWN / DURHAM

Date 2014-09-03 **DD/MM/YYYY**

Elev 76.4 (masl) **Easting** 654139 **Northing** 4853158
/ **UTM RC** 4 **margin of error : 30 m - 100 m**
Water Found (mbgs) (masl)
Casing Diameter **Casing Material:**
Top of Screen (mbgs) **Bottom of Screen** (mbgs)
Screen Interval (m)

Flowing?
SWL (mbgs) (masl)
Pumping WL (mbgs) (masl)
Pump Rate (LPM) /
Spec. Cap. (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	76.4		
			/ /

7233481 **Lot** **Conc** PICKERING TOWN / DURHAM

Date 2014-11-02 **DD/MM/YYYY**

Elev 76.4 (masl) **Easting** 654385 **Northing** 4853333
/ Abandoned-Other **UTM RC** 4 **margin of error : 30 m - 100 m**
Water Found (mbgs) (masl)
Casing Diameter **Casing Material:**
Top of Screen (mbgs) **Bottom of Screen** (mbgs)
Screen Interval (m)

Flowing?
SWL (mbgs) (masl)
Pumping WL (mbgs) (masl)
Pump Rate (LPM) /
Spec. Cap. (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	76.4		
			/ /

7242170 **Lot** 022 **Conc** 03 PICKERING TOWN / DURHAM

Date **DD/MM/YYYY**

Elev 85.3 (masl) **Easting** 654217 **Northing** 4853797
/ Abandoned-Other **UTM RC** 4 **margin of error : 30 m - 100 m**
Water Found (mbgs) (masl)
Casing Diameter **Casing Material:**
Top of Screen (mbgs) **Bottom of Screen** (mbgs)
Screen Interval (m)

Flowing?
SWL (mbgs) (masl)
Pumping WL (mbgs) (masl)
Pump Rate (LPM) /
Spec. Cap. (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	85.3		
			/ /

7260630 **Lot** **Conc** PICKERING TOWN / DURHAM

Date 2016-02-17 **DD/MM/YYYY**

Elev 83.1 (masl) **Easting** 654149 **Northing** 4853638
/ **UTM RC** 4 **margin of error : 30 m - 100 m**
Water Found (mbgs) (masl)
Casing Diameter **Casing Material:**
Top of Screen (mbgs) **Bottom of Screen** (mbgs)
Screen Interval (m)

Flowing?
SWL (mbgs) (masl)
Pumping WL (mbgs) (masl)
Pump Rate (LPM) /
Spec. Cap. (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	83.1		
			/ /

Well Record #

7261330 **Lot** **Conc** PICKERING TOWN / DURHAM

Date 2015-04-13 **DD/MM/YYYY**

Elev 78.0 (masl) **Easting** 654164 **Northing** 4853155
/ Abandoned-Other **UTM RC** 4 **margin of error : 30 m - 100 m**
Water Found (mbgs) (masl)
Casing Diameter 2 inch **Casing Material:** PLASTIC
Top of Screen (mbgs) **Bottom of Screen** (mbgs)
Screen Interval (m)

Flowing?
SWL (mbgs) (masl)
Pumping WL (mbgs) (masl)
Pump Rate (LPM) /
Spec. Cap. (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	78.0		

/ /

7265177 **Lot** **Conc** PICKERING TOWN / DURHAM

Date 2016-05-20 **DD/MM/YYYY**

Elev 80.0 (masl) **Easting** 654202 **Northing** 4853232
/ Monitoring and Te Monitoring and Test Hole **UTM RC** 4 **margin of error : 30 m - 100 m**
Water Found (mbgs) (masl)
Casing Diameter 2 inch **Casing Material:** PLASTIC
Top of Screen 3.0 (mbgs) **Bottom of Screen** 6.1 (mbgs)
Screen Interval 3.0 (m)

Flowing?
SWL (mbgs) (masl)
Pumping WL (mbgs) (masl)
Pump Rate (LPM) /
Spec. Cap. (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	80.0		
0.6	79.4	BROWN	SAND / GRAVEL /
3.4	76.7	BROWN	CLAY / SILT / TILL
6.1	74.0	GREY	SILT / SAND / TILL

7265178 **Lot** **Conc** PICKERING TOWN / DURHAM

Date 2016-05-20 **DD/MM/YYYY**

Elev 80.1 (masl) **Easting** 654200 **Northing** 4853234
/ Monitoring and Te Monitoring and Test Hole **UTM RC** 4 **margin of error : 30 m - 100 m**
Water Found (mbgs) (masl)
Casing Diameter 2 inch **Casing Material:** PLASTIC
Top of Screen 3.0 (mbgs) **Bottom of Screen** 6.1 (mbgs)
Screen Interval 3.0 (m)

Flowing?
SWL (mbgs) (masl)
Pumping WL (mbgs) (masl)
Pump Rate (LPM) /
Spec. Cap. (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	80.1		
0.6	79.5	BROWN	SAND / GRAVEL /
3.4	76.8	BROWN	CLAY / SILT / TILL
6.1	74.0	GREY	SILT / SAND / TILL

7265179 **Lot** **Conc** PICKERING TOWN / DURHAM

Date 2016-05-20 **DD/MM/YYYY**

Elev 80.3 (masl) **Easting** 654186 **Northing** 4853240
/ Monitoring and Te Monitoring and Test Hole **UTM RC** 4 **margin of error : 30 m - 100 m**
Water Found (mbgs) (masl)
Casing Diameter 2 inch **Casing Material:** PLASTIC
Top of Screen 3.0 (mbgs) **Bottom of Screen** 6.1 (mbgs)
Screen Interval 3.0 (m)

Flowing?
SWL (mbgs) (masl)
Pumping WL (mbgs) (masl)
Pump Rate (LPM) /
Spec. Cap. (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	80.3		
0.6	79.7	BROWN	SAND / GRAVEL /
3.7	76.7	BROWN	SILT / SAND / CLAY
6.1	74.2	GREY	SILT / SAND / CLAY

Well Record #

7266985 **Lot** **Conc** PICKERING TOWN / DURHAM

Date 2016-02-25 **DD/MM/YYYY**

Elev 76.0 (masl) **Easting** 654457 **Northing** 4853073
/ Test Hole Test Hole **UTM RC** 4 **margin of error : 30 m - 100 m**
Water Found (mbgs) (masl) Untested

Casing Diameter 2 inch **Casing Material:** OPEN HOLE
Top of Screen 1.4 (mbgs) **Bottom of Screen** 4.4 (mbgs)
Screen Interval 3.0 (m)

Flowing?
SWL (mbgs) (masl)
Pumping WL (mbgs) (masl)
Pump Rate (LPM) /
Spec. Cap. (LPM/m) Hour / Minute

Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	76.0		
1.5	74.5	BROWN	SILT / CLAY /
3.4	72.7	BROWN	CLAY / SILT /
4.4	71.6	GREY	SAND / SILT /

7294341 **Lot** **Conc** PICKERING TOWN / DURHAM

Date 2017-02-04 **DD/MM/YYYY**

Elev 75.8 (masl) **Easting** 654372 **Northing** 4853028
Monitoring / Test Hole Test Hole **UTM RC** 4 **margin of error : 30 m - 100 m**
Water Found 5.2 (mbgs) 70.6 (masl) Untested

Casing Diameter 2 inch **Casing Material:** PLASTIC
Top of Screen 3.0 (mbgs) **Bottom of Screen** 6.1 (mbgs)
Screen Interval 3.0 (m)

Flowing?
SWL (mbgs) (masl)
Pumping WL (mbgs) (masl)
Pump Rate (LPM) /
Spec. Cap. (LPM/m) Hour / Minute

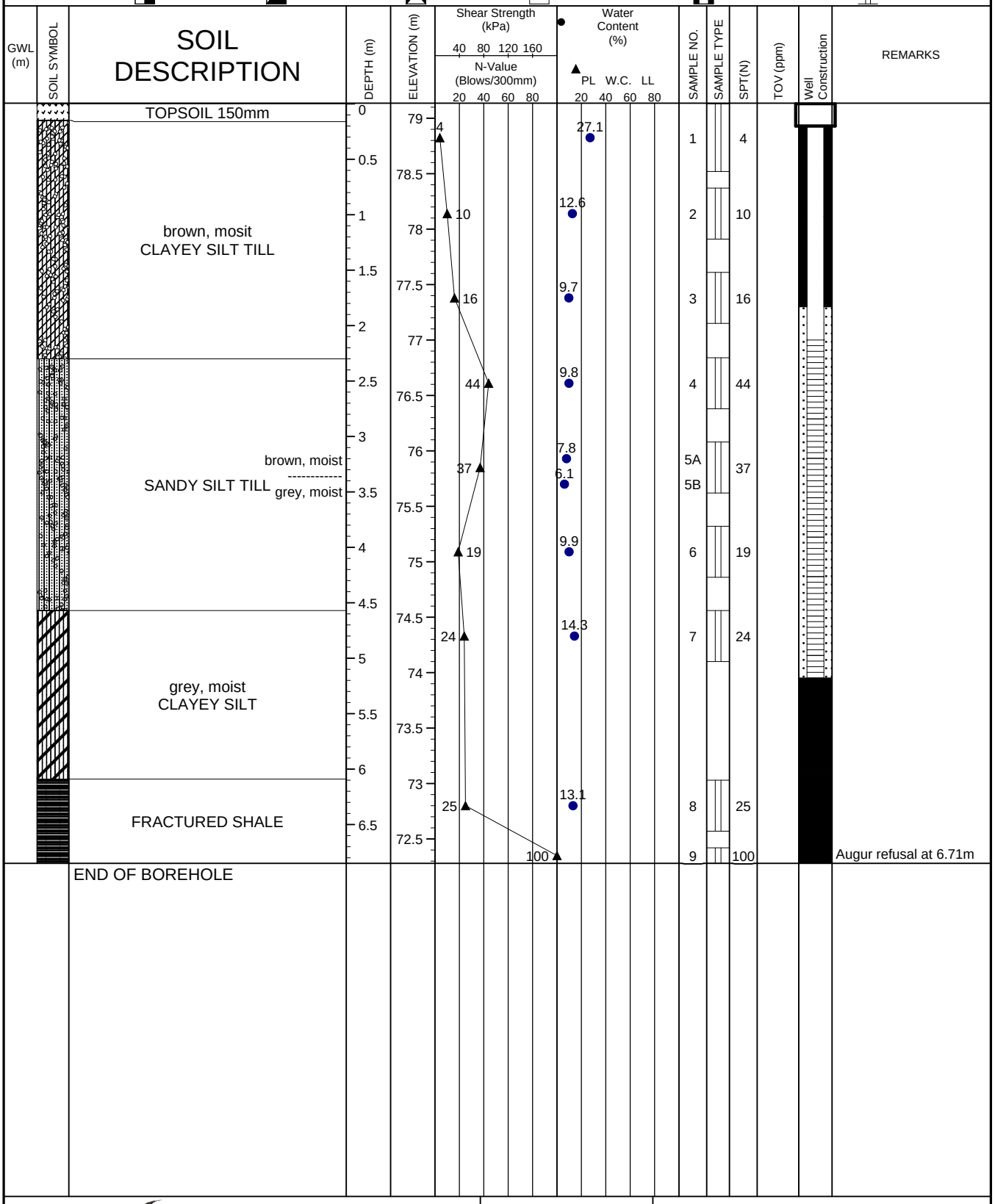
Depth (m)	Elev (masl)	Color	Soil Descriptions
0.0	75.8		
2.7	73.1	BROWN	SILT / SAND / FILL
4.6	71.2	BROWN	CLAY / SILT / GRAVEL
6.1	69.7	BROWN	SILT / SAND / TILL

APPENDIX II

BOREHOLE LOG SHEETS

CLIENT:	METHOD: 0.2m hollow stem augur with split spoon		**BH No.: MW101**
PROJECT: 640 Liverpool Road	PROJECT ENGINEER: VN	ELEV. (m) 79.13	
LOCATION: Pickering, Ontario	NORTHING: 4853251.12	EASTING: 654122.84	PROJECT NO.: CT3414.00

SAMPLE TYPE: AUGER | DRIVEN | CORING | DYNAMIC CONE | SHELBY | SPLIT SPOON



TERRAPEX

LOGGED BY: AD	DRILLING DATE: MARCH 1, 2022
REVIEWED BY: VN	Page 1 of 1

CLIENT:	METHOD: 0.2m hollow stem augur with split spoon		**BH No.: BH102**
PROJECT: 640 Liverpool Road	PROJECT ENGINEER: VN	ELEV. (m) 79.62	
LOCATION: Pickering, Ontario	NORTHING: 4853261.43	EASTING: 654154.09	PROJECT NO.: CT3414.00

SAMPLE TYPE: AUGER | DRIVEN | CORING | DYNAMIC CONE | SHELBY | SPLIT SPOON

GWL (m)	SOIL SYMBOL	SOIL DESCRIPTION	DEPTH (m)	ELEVATION (m)	Shear Strength (kPa) 40 80 120 160 / N-Value (Blows/300mm) 20 40 60 80	Water Content (%) PL W.C. LL 20 40 60 80	SAMPLE NO.	SAMPLE TYPE	SPT(N)	TOV (ppm)	Well Construction	REMARKS
		crusher run limestone 150mm dark brown, moist gravelly sand fill 150mm some recycled asphalt	0	79.5	15		1A 1B 1C		15			
		brown, moist CLAYEY SILT TILL	0.5 1 1.5	79 78.5	13		2		13			
			2	78	16		3		16			
			2.5	77.5	64		4		64			
		brown, moist --- grey, moist	3	77								
		moist SANDY SILT TILL	3.5 4 4.5	76.5 76	29		5		29			
			5	75.5	39		6		39			
			5.5	75	26		7		26			
			6	74.5								
		grey, wet CLAYEY SILT	6.5	74 73.5	21		8		21			
			7	73								
		FRACTURED SHALE	7.5	72.5 72	100		9		100			
		END OF BOREHOLE										

TERRAPEX

LOGGED BY: AD	DRILLING DATE: February 24, 2022
REVIEWED BY: VN	Page 1 of 1

CLIENT:	METHOD: 0.2m hollow stem augur with split spoon		**BH No.: BH103**
PROJECT: 640 Liverpool Road	PROJECT ENGINEER: VN	ELEV. (m) 80.12	
LOCATION: Pickering, Ontario	NORTHING: 4853270.50	EASTING: 654184.67	PROJECT NO.: CT3414.00

SAMPLE TYPE: AUGER | DRIVEN | CORING | DYNAMIC CONE | SHELBY | SPLIT SPOON

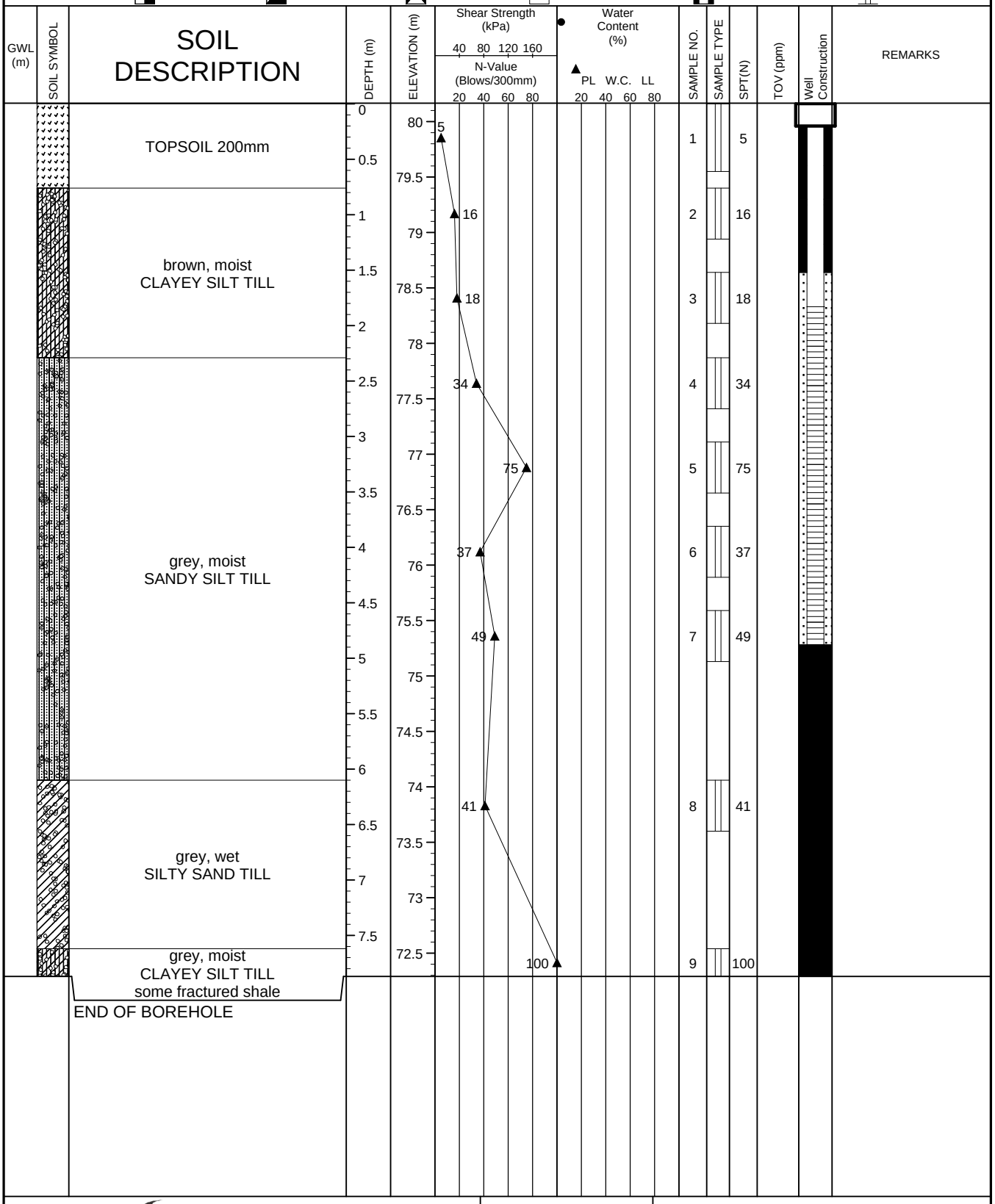
GWL (m)	SOIL SYMBOL	SOIL DESCRIPTION	DEPTH (m)	ELEVATION (m)	Shear Strength (kPa) 40 80 120 160 / N-Value (Blows/300mm) 20 40 60 80	Water Content (%) PL W.C. LL 20 40 60 80	SAMPLE NO.	SAMPLE TYPE	SPT(N)	TOV (ppm)	Well Construction	REMARKS
		reclaimed granular	0	80	8	5.4	1		8			
		brown, moist CLAYEY SILT TILL	0.5	79.5	15	15.1	2		15			
			1	79								
			1.5	78.5	18	15.6	3		18			
			2	78								
			2.5	77.5	100	7.2	4		100			
		brown, moist ---------- grey, moist	3	77	42	5.5	5		42			
		SANDY SILT TILL	3.5	76.5								
			4	76								
			4.5	75.5	43	5.4	6		43			
			5	75								
			5.5	74.5								
			6	74	100	8.7	7		100			
		grey, moist CLAYEY SILT some fractured shale	6.5	73.5								
			7	73								
			7.5	72.5	100	10.1	8		100			
		END OF BOREHOLE										

TERRAPEX

LOGGED BY: AD	DRILLING DATE: February 24, 2022
REVIEWED BY: VN	Page 1 of 1

CLIENT:	METHOD: 0.2m hollow stem augur with split spoon		**BH No.: MW104**
PROJECT: 640 Liverpool Road	PROJECT ENGINEER: VN	ELEV. (m) 80.16	
LOCATION: Pickering, Ontario	NORTHING: 4853285.82	EASTING: 654227.19	PROJECT NO.: CT3414.00

SAMPLE TYPE: AUGER | DRIVEN | CORING | DYNAMIC CONE | SHELBY | SPLIT SPOON

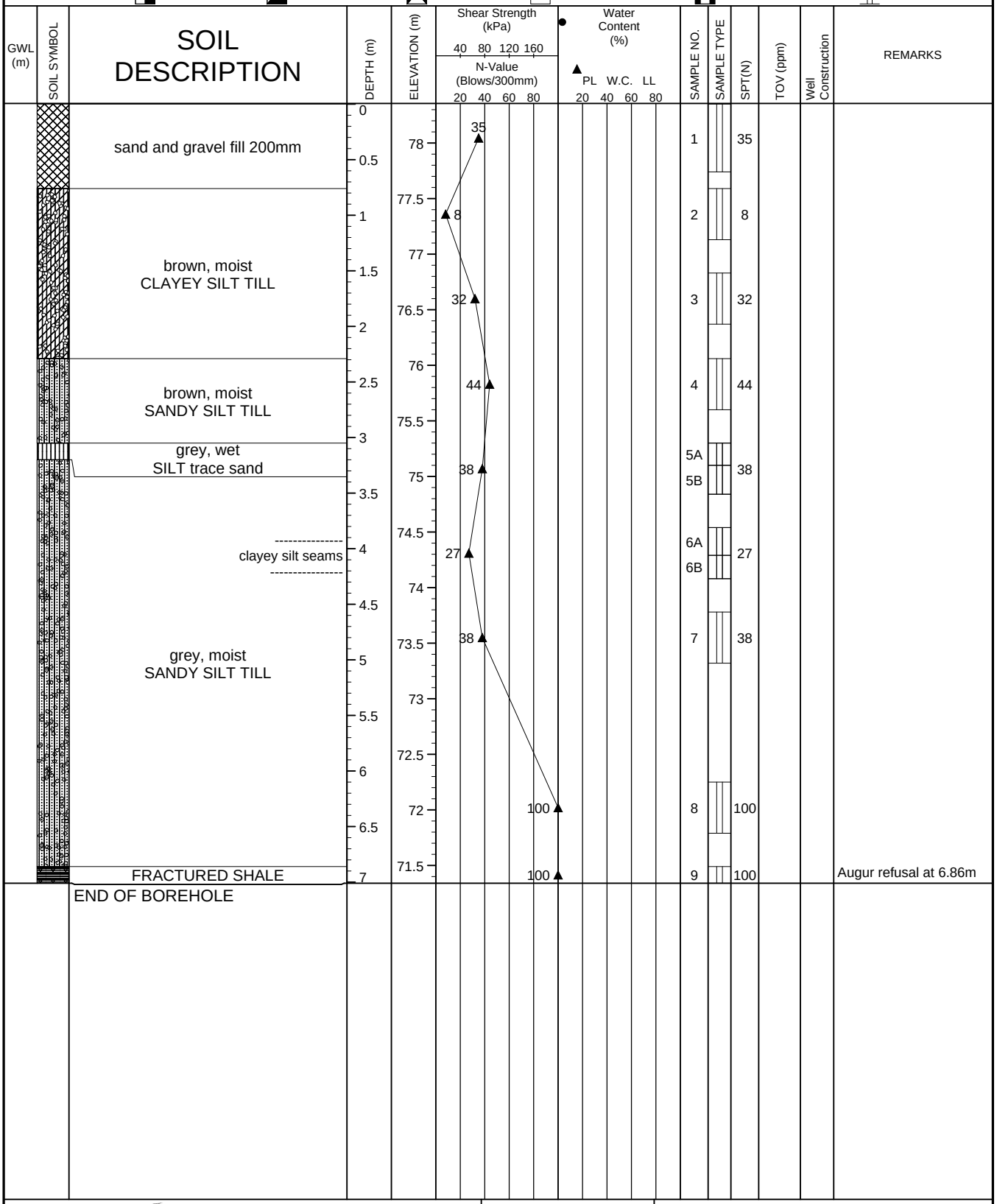


TERRAPEX

LOGGED BY: AD	DRILLING DATE: February 25, 2022
REVIEWED BY: VN	Page 1 of 1

CLIENT:	METHOD: 0.2m hollow stem augur with split spoon		**BH No.: BH105**
PROJECT: 640 Liverpool Road	PROJECT ENGINEER: VN	ELEV. (m) 78.35	
LOCATION: Pickering, Ontario	NORTHING: 4853224.05	EASTING: 654127.30	PROJECT NO.: CT3414.00

SAMPLE TYPE: AUGER | DRIVEN | CORING | DYNAMIC CONE | SHELBY | SPLIT SPOON



TERRAPEX	LOGGED BY: AD
	REVIEWED BY: VN
DRILLING DATE: MARCH 1, 2022	
Page 1 of 1	

CLIENT:	METHOD: 0.2m hollow stem augur with split spoon		**BH No.: BH106**
PROJECT: 640 Liverpool Road	PROJECT ENGINEER: VN	ELEV. (m) 79.60	
LOCATION: Pickering, Ontario	NORTHING: 4853240.36	EASTING: 654161.78	PROJECT NO.: CT3414.00

SAMPLE TYPE: AUGER | DRIVEN | CORING | DYNAMIC CONE | SHELBY | SPLIT SPOON

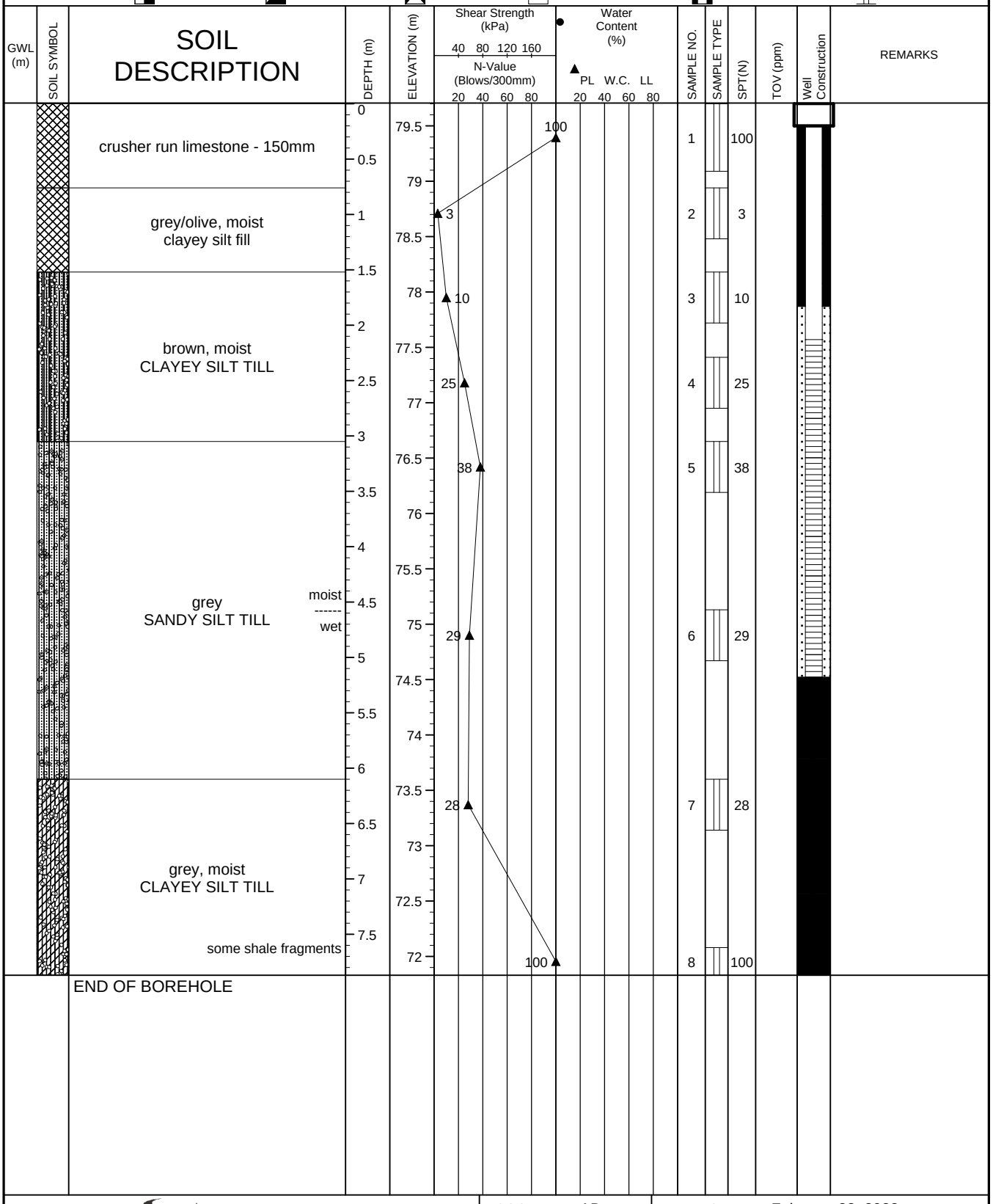
GWL (m)	SOIL SYMBOL	SOIL DESCRIPTION	DEPTH (m)	ELEVATION (m)	Shear Strength (kPa) 40 80 120 160 / N-Value (Blows/300mm) 20 40 60 80	Water Content (%) PL W.C. LL 20 40 60 80	SAMPLE NO.	SAMPLE TYPE	SPT(N)	TOV (ppm)	Well Construction	REMARKS
		sand and gravel fill 200mm	0	79.5	33		1		33			
		olive, moist clayey silt fill	0.5	79								
			1	78.5	7		2		7			
		brown, moist CLAYEY SILT TILL	1.5	78	22	H	3		22			
			2	77.5								
			2.5	77	90		4		90			
		SANDY SILT TILL brown, moist ---------- grey, moist	3	76.5								
			3.5	76	41		5		41			
			4	75.5	28		6		28			
			4.5	75								
			5	74.5	21		7		21			
			5.5	74								
			6	73.5								
			6.5	73	23		8		23			
		grey, moist CLAYEY SILT	7	72.5								
			7.5	72	100		9		100			
		FRACTURED SHALE										
		END OF BOREHOLE										

TERRAPEX

LOGGED BY: AD	DRILLING DATE: February 25, 2022
REVIEWED BY: VN	Page 1 of 1

CLIENT:	METHOD: 0.2m hollow stem augur with split spoon		**BH No.: MW107**
PROJECT: 640 Liverpool Road	PROJECT ENGINEER: VN	ELEV. (m) 79.70	
LOCATION: Pickering, Ontario	NORTHING: 4853247.93	EASTING: 654205.81	PROJECT NO.: CT3414.00

SAMPLE TYPE: AUGER | DRIVEN | CORING | DYNAMIC CONE | SHELBY | SPLIT SPOON



TERRAPEX	LOGGED BY: AD	DRILLING DATE: February 28, 2022
	REVIEWED BY: VN	Page 1 of 1

CLIENT:	METHOD: 0.2m hollow stem augur with split spoon		**BH No.: BH108**
PROJECT: 640 Liverpool Road	PROJECT ENGINEER: VN	ELEV. (m) 80.08	
LOCATION: Pickering, Ontario	NORTHING: 4853264.81	EASTING: 654235.33	PROJECT NO.: CT3414.00

SAMPLE TYPE: AUGER | DRIVEN | CORING | DYNAMIC CONE | SHELBY | SPLIT SPOON

GWL (m)	SOIL SYMBOL	SOIL DESCRIPTION	DEPTH (m)	ELEVATION (m)	Shear Strength (kPa) / N-Value (Blows/300mm)	Water Content (%)	SAMPLE NO.	SAMPLE TYPE	SPT(N)	TOV (ppm)	Well Construction	REMARKS
		TOPSOIL 150mm	0	80	3		1		3			
		brown, moist CLAYEY SILT TILL	0.5	79.5								
			1	79	10		2		10			
			1.5	78.5								
			2	78	5		3		5			
			2.5	77.5	43		4		43			
			3	77								
			3.5	76.5	50		5		50			
			4	76	76		6		76			
			4.5	75.5								
		grey, moist SANDY SILT TILL	5	75	28		7		28			
			5.5	74.5								
			6	74								
			6.5	73.5	51		8		51			
			7	73								
		some shale fragments	7.5	72.5	100		9		100			
		END OF BOREHOLE										

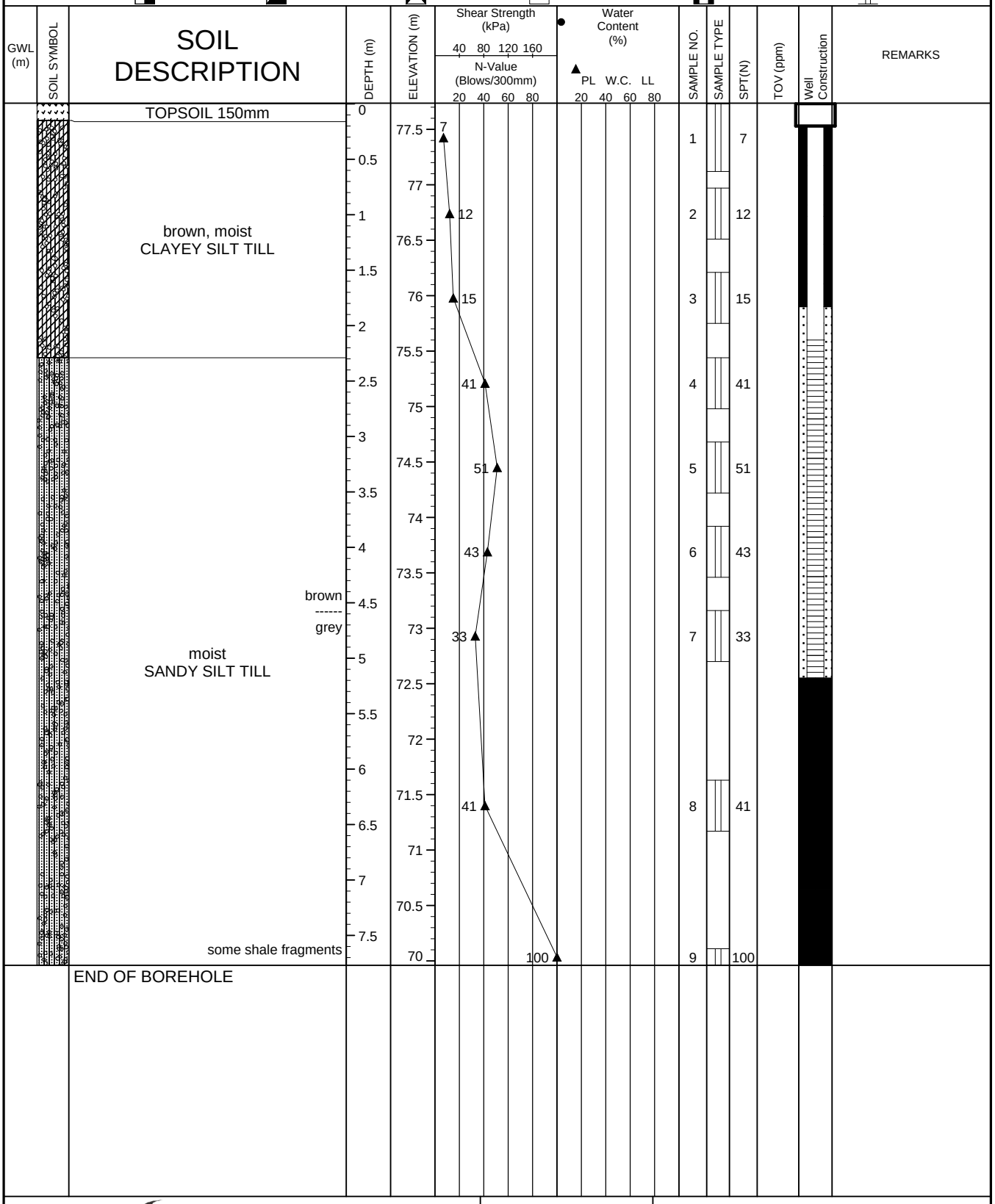
TERRAPEX

LOGGED BY: AD | DRILLING DATE: February 25, 2022

REVIEWED BY: VN |

CLIENT:	METHOD: 0.2m hollow stem augur with split spoon		**BH No.: MW109**
PROJECT: 640 Liverpool Road	PROJECT ENGINEER: VN	ELEV. (m) 77.73	
LOCATION: Pickering, Ontario	NORTHING: 4853187.11	EASTING: 654136.90	PROJECT NO.: CT3414.00

SAMPLE TYPE: AUGER | DRIVEN | CORING | DYNAMIC CONE | SHELBY | SPLIT SPOON



TERRAPEX

LOGGED BY: AD	DRILLING DATE: MARCH 2, 2022
REVIEWED BY: VN	Page 1 of 1

CLIENT:	METHOD: 0.2m hollow stem augur with split spoon		**BH No.: BH110**
PROJECT: 640 Liverpool Road	PROJECT ENGINEER: VN	ELEV. (m) 78.86	
LOCATION: Pickering, Ontario	NORTHING: 4853204.42	EASTING: 654174.27	PROJECT NO.: CT3414.00

SAMPLE TYPE: AUGER | DRIVEN | CORING | DYNAMIC CONE | SHELBY | SPLIT SPOON

GWL (m)	SOIL SYMBOL	SOIL DESCRIPTION	DEPTH (m)	ELEVATION (m)	Shear Strength (kPa) / N-Value (Blows/300mm)	Water Content (%) PL W.C. LL	SAMPLE NO.	SAMPLE TYPE	SPT(N)	TOV (ppm)	Well Construction	REMARKS
		gravelly sand - 300mm	0	78.5		101 11.4	1		100			
		brown, moist CLAYEY SILT TILL	0.5	78		11 14.3	2		11			
			1	77.5		37 7.3	3		37			
			1.5	77		100 7.2	4		100			
			2	76.5		35 5.6	5		35			
		SANDY SILT TILL brown ------ grey moist ------ wet	2.5	76		31 10.6	6		31			
			3	75.5		18 17.2	7		18			
			3.5	75		100	8		100			
			4	74.5								
			4.5	74								
			5	73.5								
			5.5	73								
			6	72.5								
		grey, moist CLAYEY SILT	6.5	72								
			7	71.5								
		INFERRED BEDROCK	7.5									
		END OF BOREHOLE										

TERRAPEX

LOGGED BY: AD	DRILLING DATE: February 28, 2022
REVIEWED BY: VN	Page 1 of 1

CLIENT:	METHOD: 0.2m hollow stem augur with split spoon		**BH No.: BH111**
PROJECT: 640 Liverpool Road	PROJECT ENGINEER: VN	ELEV. (m) 79.19	
LOCATION: Pickering, Ontario	NORTHING: 4853215.82	EASTING: 654208.51	PROJECT NO.: CT3414.00

SAMPLE TYPE: AUGER | DRIVEN | CORING | DYNAMIC CONE | SHELBY | SPLIT SPOON

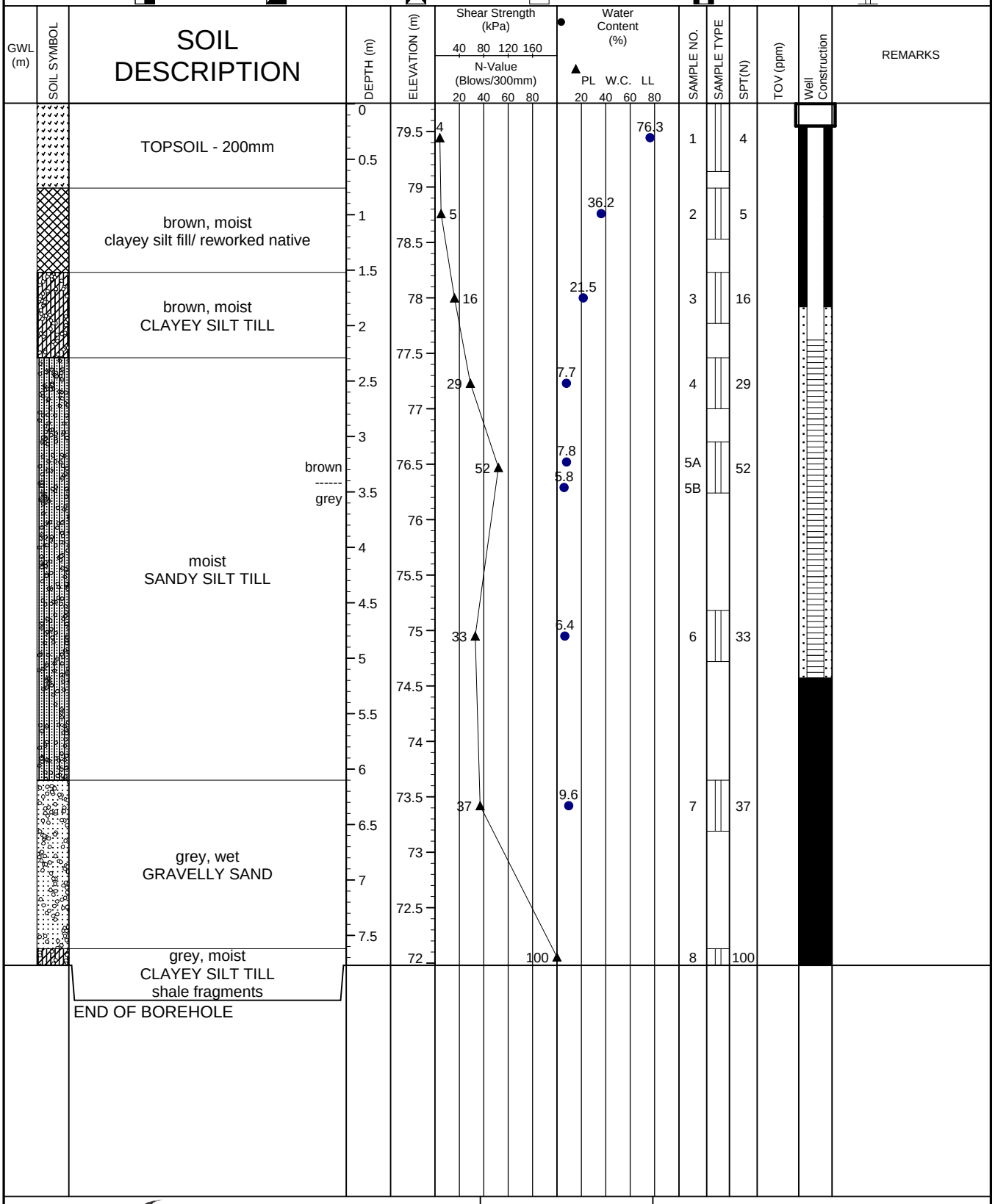
GWL (m)	SOIL SYMBOL	SOIL DESCRIPTION	DEPTH (m)	ELEVATION (m)	Shear Strength (kPa) / N-Value (Blows/300mm)	Water Content (%)	SAMPLE NO.	SAMPLE TYPE	SPT(N)	TOV (ppm)	Well Construction	REMARKS
		gravelly sand fill 250mm	0 – 0.5	79 – 78.5	12		1		12			
		brown, moist CLAYEY SILT TILL	0.5 – 2	78.5 – 77	11, 8		2, 3		11, 8			
		moist SANDY SILT TILL brown ------ grey	2 – 3.5	77 – 75.5	39, 52		4, 5A, 5B		39, 52			
		brown, wet SAND trace silt	3.5 – 4.5	75.5 – 74.5	32, 29		6, 7		32, 29			
		grey, moist CLAYEY SILT TILL	4.5 – 7.5	74.5 – 71.5	100		8		100			
		WEATHERED SHALE	7.5	71.5			9					
		END OF BOREHOLE										

TERRAPEX

LOGGED BY: AD	DRILLING DATE: MARCH 1, 2022
REVIEWED BY: VN	Page 1 of 1

CLIENT:	METHOD: 0.2m hollow stem augur with split spoon		**BH No.: MW112**
PROJECT: 640 Liverpool Road	PROJECT ENGINEER: VN	ELEV. (m) 79.75	
LOCATION: Pickering, Ontario	NORTHING: 4853236.13	EASTING: 654235.94	PROJECT NO.: CT3414.00

SAMPLE TYPE: AUGER | DRIVEN | CORING | DYNAMIC CONE | SHELBY | SPLIT SPOON



TERRAPEX	LOGGED BY: AD	DRILLING DATE: February 28, 2022
	REVIEWED BY: VN	Page 1 of 1

CLIENT:	METHOD: 0.2m hollow stem augur with split spoon		**BH No.: MW113**
PROJECT: 640 Liverpool Road	PROJECT ENGINEER: VN	ELEV. (m) 80.13	
LOCATION: Pickering, Ontario	NORTHING: 4853252.72	EASTING: 654212.318	PROJECT NO.: CT3414.00

SAMPLE TYPE: AUGER | DRIVEN | CORING | DYNAMIC CONE | SHELBY | SPLIT SPOON

GWL (m)	SOIL SYMBOL	SOIL DESCRIPTION	DEPTH (m)	ELEVATION (m)	Shear Strength (kPa) 40 80 120 160 / N-Value (Blows/300mm) 20 40 60 80	Water Content (%) PL W.C. LL 20 40 60 80	SAMPLE NO.	SAMPLE TYPE	SPT(N)	TOV (ppm)	Well Construction	REMARKS
		brown, moist gravelly clayey silt fill	0 – 1.5	80 – 78.5	16, 2		1, 2		16, 2			
		brown, moist CLAYEY SILT TILL	1.5 – 2	78.5 – 78	9		3		9			
		brown ----- grey moist SANDY SILT TILL	2 – 5	78 – 75	63, 66, 27		4, 6		63, 66, 27			
		END OF BOREHOLE										

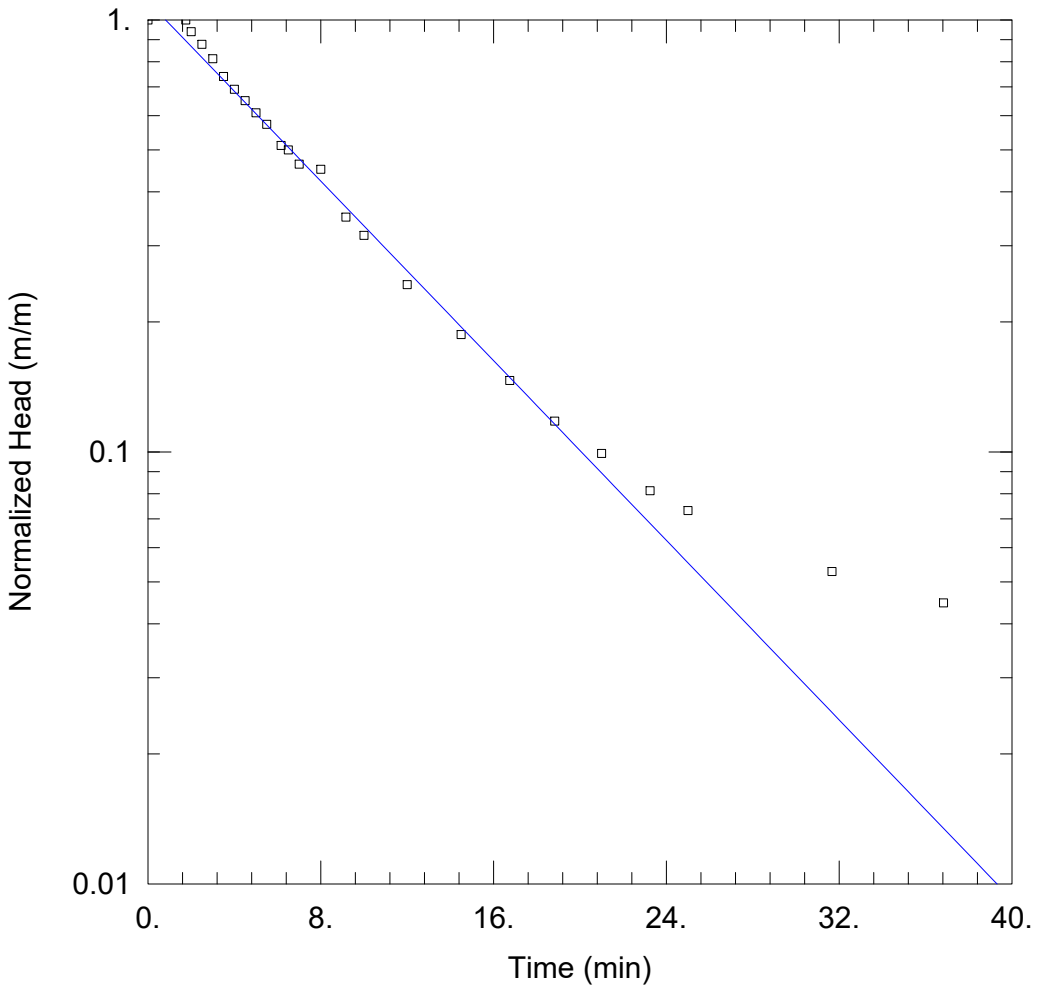
TERRAPEX

LOGGED BY: AD | DRILLING DATE: MARCH 1, 2022

REVIEWED BY: VN | Page 1 of 1

APPENDIX III

HYDRAULIC ANALYSES



HYDROGEOLOGICAL ASSESSMENT

Data Set: \...\MW107-Manual test.aqt
Date: 03/20/22 Time: 16:34:38

PROJECT INFORMATION

Company: Terrapex Environmental Ltd.
Client: Liverpool Road Ltd.
Project: CT3414.00
Location: 640 Liverpool Road, Pickering
Test Well: MW107
Test Date: March 18, 2022

AQUIFER DATA

Saturated Thickness: 3.2 m Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (MW107)

Initial Displacement: 1.23 m Static Water Column Height: 1.2 m
Total Well Penetration Depth: 3.05 m Screen Length: 3.05 m
Casing Radius: 0.022 m Well Radius: 0.0254 m

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

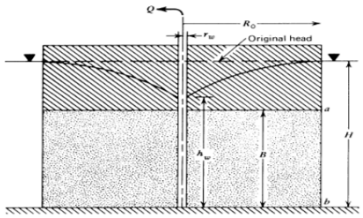
K = 7.225E-7 m/sec y0 = 1.357 m

Construction Dewatering Worksheet

TERRAPEX

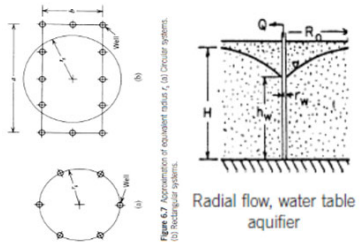
Project:	640 Liverpool Road Pickering, Ontario
Project Number:	CT3414
Location:	A101 - 7.0m CONV. 7 Units
Date:	December 16, 2022

Input Parameters



	Input Parameters			
(1)	Aquifer Thickness	(H)	15	m
(2)	Target Depth	(h)	12.2	m
(3)	Effective Drawdown	(Δh)	2.8	m
(4)	Hydraulic Conductivity	(K)	7.2E-07	m/s
(5)	Hydraulic Conductivity	(K)	6.2E-02	m/d
(6)	Excavation length	(a)	45	m
(7)	Excavation width	(b)	15	m
(8)	Excavation Length/Width Ratio	(a/b)	3.0	

Distance Calculations



(9)	**Width of Dewatering**	(L)	4	m
(10)	**Radius/Zone of Influence (ZOI)**	(R_o)	7	m
(11)	**Equivalent Radius of Well** (where a/b ≤ 1.5)	(R_s)		m
(12)	**Equivalent Radius of Well** (where a/b > 1.5)	(R_s)	19	m

Volume Calculations

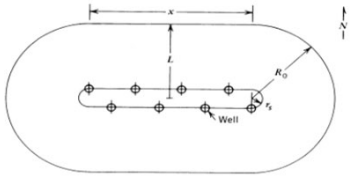


Figure 6.8 Approximate analysis of long, narrow systems.

(13)	**Trench Calculation** (where a/b ≤ 1.5)	(Q) (Q)		m3/day L/day
(14)	**Trench Calculation** (where a/b > 1.5)	(Q) (Q)	99 99,163	m3/day L/day
(15)	**Anticipated Incident Precipitation**		16,875	L/day @ 25mm storm

Relevant Formulae (Powers, 2007)

(9)	R_o / 2	(eq. 6.15, p. 105)	
(10)	3000 (H - h) x sqrt (K)	(eq. 6.12, p. 71)	
(11)	sqrt ((a x b)/ pi)	(eq. 6.9, p. 70)	(eq. 6.10, p.102)
(12)	(a+b)/pi)		
(13)	(pi x K x (H^2 - h^2)) / ln ((Ro+Rs) / Rs) + 2 x (X x K x (H^2 - h^2)) /(2 x L)	(pg. 66,67,68; eq. 6.1 and 6.2)	
(14)	(pi x K x (H^2 - h^2)) / ln ((Ro+Rs)/ Rs) + 2 x (X x K x (H^2 - h^2)) / (2 x L)	(pg. 66,67,68; eq. 6.1 and 6.2)	
(15)	a x b x 25		(zk 1Sept2022)