

Hydrogeological Study Report

Wallace Point Road Subdivision

3491 Wallace Point Road
Otonabee-South Monaghan,
Peterborough, Ontario

D.M. Wills Project Number 21-85162



D.M. Wills Associates Limited

Partners in Engineering, Planning and
Environmental Services
Peterborough

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Prepared for:
Life at Wallace Point Inc. c/o Rubal
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Submissions Summary

Submission No.	Submission Title	Date of Release	Submissions Summary
1	Final Hydrogeological Study Report	May 25, 2023	Final Submission to Client
2	Updated Hydrogeological Study Report	March 10, 2026	Final Submission to Client

This report / proposal has been formatted considering the requirements of the Accessibility for Ontarians with Disabilities Act.

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1.0 Introduction

D.M. Wills Associates Limited (Wills) was retained by Life at Wallace Point Inc. c/o Rubal Kundra (Client) to complete a Hydrogeological Study (Study) for the property identified as 3491 Wallace Point Road in Otonabee-South Monaghan, Ontario (Subject Property). The Subject Property is approximately 24.5 hectares (ha) and currently consists of agricultural fields with a residential building and barn located in the northwestern portion along Wallace Point Road. The Subject Property is shown on **Figure 1**.

Wills understands that the Client wishes to develop the Subject Property to include 50 residential lots and a commercial center (Proposed Development). Domestic water supply for the Proposed Development will be provided by the Stewart Hall municipal water system. Wills' Study was conducted to confirm the sewage servicing capacity and to provide subsurface design requirements for proposed Low Impact Development (LID) features on the Subject Property.

This Study was conducted in conjunction with the Preliminary Stormwater Management Report (SWM Report) and Geotechnical Report, submitted under separate cover.

On behalf of the Client, Wills submitted an application for a Plan of Subdivision to the County of Peterborough in August 2023. Peer review comments were received for Wills' Hydrogeological Study Report (May 2023), as detailed in Stantec's letter titled *Wallace Point Road Subdivision, 3491 Wallace Point Road, Otonabee-South Monaghan, Peterborough, ON Peer Review of Hydrogeological Study Report County File No.: 15T23-003*, dated August 4, 2023 (Peer Review). The Peer Review comments were addressed by Wills through additional investigations on the Subject Property, which were conducted from 2023 – 2025.

This update to the 2023 Hydrogeological Study Report presents the findings of Wills' additional investigations based on Stantec's Peer Review and Wills' 2026 Draft Plan, which is included in **Appendix A**.

2.0 Scope of Work

Wills' original approved Scope of Work for the Study included the following:

- Public and private utility service locates were obtained prior to initiating field investigations.
- A Site-Specific Health and Safety Plan (HASP) and Fieldwork Plan were prepared.
- Steenburgh Sand and Gravel (Steenburgh) was retained to excavate 10 test pits to a depth of 3.0 metres below ground (mbg) on the Subject Property on June 20, 2022.
- Four single ring infiltrometers were installed in shallow auger holes to determine representative infiltration rates for LID design on the Subject Property on June 20, 2022. Infiltration tests were conducted on June 21, 2022. Water levels in the infiltrometers were monitored manually using a Solinst Water Level Meter.

- Canadian Environmental Drilling and Contractors Inc. (CANEDC) was retained to advance 12 boreholes on the Subject Property from July 11 to July 13, 2022. Boreholes were advanced to an approximate depth of 6.55 mbg or until practical refusal. Four boreholes were completed as monitor wells.
- Standard Penetration Tests (SPT) and split spoon sampling was used to collect soil samples at 0.75 m intervals for the top 3.0 m, and 1.5 m intervals below 3.0 m to refusal or borehole termination depth.
- Retained soil samples were submitted to WSP Canada (WSP), a Canadian Certified Independent Laboratory (CCIL) for analysis of Natural Moisture Content, Particle Size Distribution, and percolation testing.
- Three groundwater samples were submitted to SGS Canada (SGS), a Canadian Association for Laboratory Accreditation Inc. (CALA) accredited laboratory for nitrate analysis to support the Groundwater Impact Assessment.
- The findings of Wills' field investigation were summarized in this Hydrogeological Study Report.

Wills' approved Scope of Work required to address comments in Stantec's Peer Review included the following:

- Public and private utility service locates were obtained prior to initiating field investigations.
- A HASP and Fieldwork Plan were prepared.
- Steenburgh was retained to excavate 12 test pits to depths ranging from 2.8 to 3.3 mbg on the Subject Property on December 13, 2023.
- A Guelph Permeameter was installed in shallow hand-auger holes (13 test locations) in proximity to the test pit locations to evaluate the field-saturated hydraulic conductivity as input to the LID and sewage system designs from November 30 to December 1, 2023.
 - Testing was completed on the basis of the Credit Valley Conservation – Toronto Region Conservation Authority guidance document Low Impact Development Stormwater Management Planning and Design Guide – Version 1.0, Appendix C – Site Evaluation and Soil Testing Protocol for Stormwater Infiltration.
- CANEDC was retained to advance 13 boreholes on the Subject Property from January 3 to January 4, 2024.
 - Boreholes were advanced to depths ranging from 2.15 to 6.55 mbg.
 - All boreholes were completed as monitor wells, including four nested locations. Nested monitor wells include one shallow overburden well (identified as "A") and one deep overburden well (identified as "B").
- SPT and split spoon sampling were used to collect soil samples at 0.75 m intervals for the top 3.0 m, and 1.5 m intervals below 3.0 m to borehole termination depth.

- Retained soil samples from the test pit program were submitted to PRI Engineering (PRI), a CCIL, for analysis of Particle Size Distribution and percolation testing.
- Solinst Level Loggers were installed in five monitor wells (MW24-02A&B, MW24-06, MW24-08, and MW24-09B) to digitally record seasonal fluctuations of the water table over the period of 1 year. Confirmatory static groundwater levels were manually measured in all on-site monitor wells five times from January 2024 to April 2025.
 - One barologger was installed in MW23-07 to record atmospheric pressure changes throughout the 1-year period.
- Ground surface and top of pipe elevations were surveyed at all monitor well and test pit locations.
- The Groundwater Impact Assessment was updated to reflect Wills' 2026 Draft Plan and infiltration capacity of the LID features (as defined in Wills' SWM Report).
- Wills' investigative findings were summarized in this Hydrogeological Assessment Report.

3.0 Subsurface Investigation

Representative soil samples collected by Wills staff during the field program were classified based on grain size, stratigraphy, and relative soil compactness. Select soil samples were submitted to WSP (2022) and PRI (2023) for analysis of Natural Moisture Content, Particle Size Distribution (including sieve and hydrometer analysis), and percolation testing. Laboratory testing results were compared to the Ministry of Municipal Affairs and Housing, Building and Development Branch (MMAH) Supplementary Standard SB-6 – Percolation Time and Soil Descriptions Table 2 and Table 3 values (Ontario Building Code [OBC], 2012) (OBC Table 2/3).

The auger holes advanced to facilitate the infiltration tests were sited adjacent to existing test pits and were not logged or sampled.

Borehole, monitor well, test pit, and infiltration test locations are shown on **Figure 2**. Borehole and test pit logs detailing the encountered subsurface conditions and monitor well construction details are included in **Appendix B**.

3.1 Soil Profile Summary

3.1.1 Ontario Geological Survey Mapping

Physiographic Region	The Peterborough Drumlin Field.
Surficial Geology	Older alluvial deposits consisting of clay, silt, sand, gravel, and potential organic remains.
Bedrock Geology	Limestone, dolostone, shale, arkose and sandstone from the Shadow Lake Formation.

OGS mapping of the Subject Property is included in **Appendix C**.

3.1.2 Overburden Description

The results of the drilling and test pit programs indicate the overburden is generally aligned with the complex alluvial deposits suggested by the OGS mapping.

The subsurface profile consists of a surficial layer of silty sand topsoil that is generally underlain by silty sand to sandy silt material. This layer is variably interbedded with silt that includes varying amounts of sand and clay. A basal layer of sand and gravel material was encountered in BH22-06, BH22-11, and BH22-12. A basal layer of sand to gravelly sand material was encountered in BH24-04, BH24-06B, BH24-07, BH24-08, and BH24-09B. Occasional cobbles were generally observed towards the bottom of the boreholes and were encountered in both the sand and silt dominated strata. The subsurface stratigraphy is detailed on the test pit and boreholes logs included in **Appendix B**.

Twelve laboratory particle size distribution analyses were completed on the collected soil samples. The analytical results are summarized in **Table 1** on the basis of the Unified Soil Classification System (USCS). Certificates of Analysis for the physical soil analysis are included in **Appendix D**.

Table 1 – Summary of Particle Size Distribution

Location ID	Sample No.	Soil Unit	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
BH22-04	SS5	Silty sand	14	47	24	15
BH22-06	SS6	Silt	9	15	71	5
BH22-10	SS7	Sand	0	90	10	
BH22-11	SS7	Sandy gravel	66	28	6	
TP22-02	GS2	Silty sand	0	64	24	12
TP22-03	GS3	Sandy silt	2	29	49	20
TP22-06	GS2	Sand and silt	16	36	35	13
TP23-01	GS2	Gravelly silty sand	22	37	30	11
TP23-03	GS2	Sand and silt	13	40	37	10
TP23-05	GS3	Silty sandy gravel	33	31	28	8
TP23-07	GS2	Sandy silt	0	23	65	12
TP23-09	GS3	Sand and gravel	57	35	8	
TP23-11	GS2	Silt and sand	16	35	36	13

3.1.3 Bedrock

Bedrock was not encountered at any of the borehole or test pit locations. Although bedrock classification was beyond the scope of the Study, OGS Mapping (2007) indicates the local underlying bedrock geology includes limestone, dolostone, shale, arkose, and/or sandstone from the Shadow Lake Formation.

3.2 Groundwater

Static groundwater levels were measured between July 28, 2022, and April 23, 2025, in the monitor wells installed on the Subject Property. Groundwater elevations were calculated using Wills' topographic survey data collected in November 2021 and January 2024 and are summarized in **Table 2**. Well construction details and groundwater observations are provided on the borehole logs in **Appendix B**.

Table 2 – Manual Measurements – Groundwater Level Summary

Monitor Well ID	July 28, 2022	January 12, 2024	February 12, 2024	March 25, 2024	April 29, 2024	April 23, 2025
	Static Water Level (mbg/masl)	Static Water Level (mbg/masl)	Static Water Level (mbg/masl)	Static Water Level (mbg/masl)	Static Water Level (mbg/masl)	Static Water Level (mbg/masl)
MW22-01	5.93/199.60	6.03/199.50	5.69/199.84	5.49/200.04	5.15/200.38	4.81/200.72
MW22-02	Flowing artesian conditions/ 195.00	Flowing artesian conditions/ 195.00	Flowing artesian conditions/ 195.00	Flowing artesian conditions/ 195.00	Flowing artesian conditions/ 195.00	Flowing artesian conditions/ 195.00
MW22-03	3.55/194.00	1.46/196.09	1.49/196.06	1.82/195.73	1.40/196.15	1.42/196.13
MW22-04	2.78/195.50	0.35/197.93	0.23/198.05	0.65/197.63	0.45/197.83	0.33/197.95
MW24-01	-	3.10/198.53	2.93/198.70	3.03/198.60	2.69/198.94	2.47/199.16
MW24-02A	-	0.20/195.94	0.20/195.94	0.68/195.46	0.19/195.95	0.54/195.60
MW24-02B	-	0.20/195.97	0.13/196.04	0.57/195.60	0.22/195.95	0.38/195.79
MW24-03A	-	0.19/195.54	Flowing artesian conditions/ -0.11/195.84	Flowing artesian conditions/ -0.03/195.76	Flowing artesian conditions/ -0.07/195.80	0.18/195.55
MW24-03B	-	J-Plug Frozen	Flowing artesian conditions/ 195.85	Flowing artesian conditions/ 195.85	Flowing artesian conditions/ 195.85	Flowing artesian conditions/ 195.85
MW24-04	-	0.64/195.73	0.49/195.88	0.94/195.43	0.56/195.81	0.70/195.67
MW24-05	-	Flowing artesian conditions/ -0.31/195.66	Flowing artesian conditions/ -0.32/195.67	0.12/195.23	Flowing artesian conditions/ -0.38/195.73	Flowing artesian conditions/ -0.14/195.49
MW24-06A	-	0.52/196.30	0.45/196.37	0.86/195.96	0.39/196.43	0.62/196.20
MW24-06B	-	1.06/195.81	0.98/195.89	1.24/195.63	0.93/195.94	0.97/195.90
MW24-07	-	0.52/197.74	0.38/197.88	0.76/197.5	0.29/197.97	0.40/197.86
MW24-08	-	1.59/197.22	1.17/197.64	1.81/197.00	1.20/197.61	1.17/197.64
MW24-09A	-	Dry	Dry	Dry	Dry	1.95/200.99
MW24-09B	-	5.37/197.62	4.98/198.01	4.87/198.12	4.49/198.50	4.38/198.61

*mbg – metres below ground, masl – metres above sea level
Bold – highest observed groundwater level

In addition to the manual water level measurements, Solinst level loggers were installed in five monitor wells (MW24-02A/B, MW24-06A, MW24-08, and MW24-09B) to digitally record water levels every 48 hours over a one-year period (January 12, 2024, to January 12, 2025). The raw pressure reading data recorded by the level loggers were compensated using the barologger data to account for atmospheric pressure changes during the monitoring period.

The highest groundwater levels as determined using the level logger data and are summarized in **Table 3**. A graph showing the groundwater level fluctuations is included in **Appendix E**.

Table 3 – Level Logger Data – Highest Groundwater Level

Monitor Well	Measurement Data	Groundwater Level (mbg/masl)
MW24-02A	February 3, 2024	Flowing artesian conditions -0.02/196.16
MW24-02B	February 3, 2024	Flowing artesian conditions -0.05/196.22
MW24-06A	April 15, 2025	Flowing artesian conditions -0.09/196.91
MW24-08	April 15, 2025	0.69/198.12
MW24-09B	April 25, 2025	3.99/199.00

A summary of soil moisture observations, groundwater levels, and seepage in the open boreholes and test pits is included in **Table 4** and **Table 5**. Note that boreholes and test pits were backfilled shortly after completion, and water levels in the open test holes may underestimate static conditions (i.e., static water levels may be at higher elevations)

Table 4 – Groundwater Observations in Open Boreholes

Borehole/Test Pit ID	Date	Soil Moisture Observations	Water Level in Open Borehole (mbg/masl)
BH22-01	07/13/2022	Wet at 6.10 mbg	3.70/195.98
BH22-02	07/14/2022	Wet at 3.10 mbg, saturated at 4.80 mbg	Artesian conditions 0.00/194.91
BH22-03	07/11/2022	Saturated at 4.55 mbg	4.55/193.02
BH22-04	07/12/2022	Moist to wet to 6.55 mbg	5.80/191.74
BH22-05	07/12/2022	Wet at 2.30 mbg	3.65/196.03
BH22-06	07/11/2022	Wet at 4.55 mbg	3.65/192.53
BH22-07	07/11/2022	Wet at 1.70 mbg	2.45/192.79
BH22-08	07/13/2022	Wet at 4.55 mbg	5.00/193.32
BH22-09	07/12/2022	Saturated at 6.20 mbg	Dry
BH22-10	07/12/2022	Wet at 3.00 mbg	2.15/198.54
BH22-11	07/11/2022	Saturated at 3.10 mbg	Artesian conditions 0.00/ 195.56
BH22-12	07/12/2022	Wet at 4.55 mbg	Dry
BH24-01	01/04/2024	Saturated at 6.10 mbg	3.95/197.68
BH24-02	01/03/2024	Saturated at 2.59 mbg	3.00/193.14
BH24-03B	01/04/2024	Wet at 4.60 mbg, saturated at 6.10 mbg	3.20/192.65
BH24-04	01/03/2024	Saturated at 4.60 mbg.	3.60/192.77
BH24-05	01/03/2024	Wet at 2.30 mbg, saturated at 3.10 mbg.	3.35/192.00
BH24-06B	01/03/2024	Wet at 1.90 mbg. Saturated at 3.80 mbg.	1.80/195.07
BH24-07	01/04/2024	Saturated at 1.55 mbg.	1.75/196.51
BH24-08	01/04/2024	Wet at 1.60 mbg.	Dry
BH24-09B	01/04/2024	Wet at 4.55 mbg. Saturated at 6.10 mbg.	6.40/196.59

Table 5 – Test Pit Groundwater Observations

Test Pit ID	Date	Groundwater Seepage (mbg/masl)	Soil Moisture Observations	Water Level in Open Test Pit (mbg/masl)
TP22-01	06/20/2022	1.0/196.5	Moist to wet below 1.0 mbg	2.8/194.7
TP22-02	06/20/2022	2.2/199.7	Moist to wet below 1.8 mbg	2.7/199.2
TP22-03	06/20/2022	None	Moist to 2.7 mbg	Dry
TP22-04	06/20/2022	2.1/199.1	Moist to wet below 2.1 mbg	2.8/198.4
TP22-05	06/20/2022	1.4/194.3	Wet soils at 1.4 mbg	Dry
TP22-06	06/20/2022	1.1/193.9	Moist to wet below 1.1 mbg.	Dry
TP22-07	06/20/2022	None	Moist to 1.8 mbg	Dry
TP22-08	06/20/2022	None	Moist to 2.7 mbg	Dry
TP22-09	06/20/2022	None	Moist to 2.4 mbg	Dry
TP22-10	06/20/2022	None	Drier than plastic limit to 2.9 mbg	Dry
TP23-01	12/13/2023	None	Wet soils below 1.8 mbg	Dry
TP23-02	12/13/2023	None	Wet soils below 1.5 mbg	Dry
TP23-03	12/13/2023	None	Wet soils below 2.8 mbg	Dry
TP23-04	12/13/2023	1.0/195.25	Saturated soils below 2.5 mbg	Dry
TP23-05	12/13/2023	None	Wet soils below 1.0 mbg.	Dry
TP23-06	12/13/2023	1.8/197.21	Wet to saturated soils below 1.8 mbg	Dry
TP23-07	12/13/2023	None	Moist soils to 3.3 mbg	Dry
TP23-08	12/13/2023	None	Moist soils to 3.1 mbg	Dry
TP23-09	12/13/2023	None	Moist soils to 3.1 mbg	Dry
TP23-10	12/13/2023	2.0/198.85	Saturated soils below 2.0 mbg	2.6/198.25
TP23-11	12/13/2023	None	Wet soils below 0.5 mbg	Dry
TP23-12	12/13/2023	None	Moist to 3.1 mbg	Dry

Observations with respect to the groundwater on the Subject Property include:

- The highest groundwater levels were typically recorded in February and April.
- Flowing artesian conditions (above ground surface) were observed in monitor well MW22-02, MW24-03A/B, and MW24-05. These conditions were found to be generally isolated to the northeastern portion of the Subject Property.
 - Flowing artesian conditions were observed during the drilling of BH22-02 (MW22-02) and BH22-11.
 - Flowing artesian conditions were recorded by the level logger in MW24-06A; however, manual groundwater level measurements at this location did not confirm flowing conditions.
- Excluding the observed artesian conditions, the highest groundwater levels in the monitor wells ranged from 0.13 to 4.81 mbg based on the manual groundwater level measurements.
- Groundwater observations in the open test pits included:
 - Wet to saturated soils were encountered in five test pits excavated in June 2022 (10 test pits excavated in total). These conditions were encountered at depths ranging from approximately 1.0 to 2.1 mbg.
 - Wet to saturated soils were encountered in eight test pits excavated in December 2023 (12 test pits excavated in total). These conditions were encountered at depths ranging from approximately 1.0 to 2.8 mbg.
 - Shallow groundwater was observed in test pits across various locations on the Subject Property, with no apparent spatial relationship or consistent pattern tied to these conditions.
- Groundwater observations in the open boreholes included:
 - Wet to saturated soils were observed in all 12 boreholes advanced in July 2022. These conditions were encountered at depths ranging from approximately 1.70 to 6.20 mbg.
 - Wet to saturated soils were observed in nine boreholes advanced in January 2024 (13 boreholes advanced in total). These conditions were encountered at depths ranging from approximately 1.55 to 4.60 mbg.
- Wet to saturated sand lenses were observed throughout the investigated depths in both the borehole and test pits.
 - It is likely that these sand lenses are discontinuous and may preferentially store infiltrating water as it migrates downwards through the surrounding lower K-value materials.
- Given the large number of borehole, monitor well, and test pit locations across the Subject Property, Wills recommends referring to the individual subsurface logs and groundwater summaries provided in this report for location-specific groundwater conditions.

3.2.1 Horizontal Hydraulic Gradient

Horizontal hydraulic gradient, including magnitude and direction, was calculated for the Subject Property using the United States Environmental Protection Agency (EPA) *On-Line Tools for Site Assessment Calculation – Hydraulic Gradient – Magnitude and Direction*.

The hydraulic gradient was calculated using Wills' field measurements collected on July 28, 2022, and monitor well elevations inferred from Wills' topographic survey. The inputs and outputs of the EPA's model are summarized in **Table 6**.

Table 6 – July 28, 2022, Hydraulic Gradients

Monitor Well	UTM Easting (m)	UTM Northing (m)	Groundwater Elevation (masl)
MW22-01	714171	4900635	199.58
MW22-02	714306	4901128	194.91
MW22-03	714010	4900799	194.02
MW22-04	714425	4901049	194.77
Hydraulic Gradient Magnitude			0.0174
Flow Direction from North (positive y axis)			321.2°

Based on the 2022 static groundwater level measurements, the horizontal hydraulic gradient was calculated to be 0.0174 with an approximately northwest flow direction (321.2° azimuth). The inferred groundwater flow direction is shown on **Figure 2**.

3.2.2 Vertical Hydraulic Gradient

Based on groundwater levels measured on April 23, 2025, vertical hydraulic gradients were calculated for nested monitor wells MW24-02A&B, MW24-03A&B and MW24-06A&B, and MW24-09A&B. The results are provided in **Table 7**.

Table 7 – April 23, 2025, Vertical Hydraulic Gradients

Monitor Well Locations	Static Water Level (masl)	Mid Point of the Screened Interval (masl)	Vertical Gradient
MW24-02A	195.60	194.74	0.08
MW24-02B	195.79	192.37	
MW24-03A	195.55	194.33	Assumed upward due to flowing artesian conditions at MW24-03B.
MW24-03B	Flowing Artesian	190.50	
MW24-06A	196.20	195.45	-0.10
MW24-06B	195.9	192.3	
MW24-09A	200.99	201.54	-1.25
MW24-09B	198.61	199.64	

The following observations are provided based on the calculated vertical hydraulic gradients at the nested monitor wells:

- Upward gradients were identified at MW24-02A&B and MW24-03A&B, which are located on the northern portion of the Subject Property.
- Flowing artesian conditions in deep monitor well MW24-03B prevented calculation of an exact vertical gradient, however, clearly indicates an upward gradient.
- Downward vertical gradients were identified at MW24-06A&B and MW24-09A&B.

4.0 In-Situ Infiltration Testing

In-situ Infiltration tests were conducted at select locations on the Subject Property to determine representative shallow infiltration rates for stormwater management and sewage disposal system design. The 2022 and 2023 Infiltration test locations are shown on **Figure 2** and were conducted at depths ranging from 0.6 to 1.4 mbg.

During the 2022 infiltration tests, water levels within a single-ring infiltrometer casings were manually monitored using a Solinst water level tape at each location. The infiltration tests were conducted for a maximum of 105 minutes, with water levels measured at 30 second intervals for the first 5 minutes and increasing intervals as the tests progressed.

The infiltration tests conducted in 2023 were completed using a Guelph Permeameter.

Detailed calculations and supporting infiltration graphs are included in **Appendix F**.

4.1 Permeability and Percolation Time

The 2022 and 2023 permeability and percolation times determined through in-situ testing and laboratory results were compared to OBC Table 2 & Table 3 and are summarized in **Table 8** and **Table 9** respectively.

Table 8 – Permeability and Percolation Time Summary 2022

ID	Soil Description	Soil Envelope	Laboratory Estimated Percolation (T)	Percolation Range (OBC Table 2 & 3)	Permeability	In-situ Testing
INF22-01	Silty sand	SM	T = 20 min/cm	T = 8 – 20min/cm or 30 – 75 mm/hr	Medium to low	T= 0.15 min/cm or 4125 mm/hr
		ML		T = 20 – 50 min/cm or 12 – 30 mm/hr		
INF22-02	Sandy silt	SM	T = 40 min/cm	T = 8 – 20min/cm or 30 – 75 mm/hr	Medium to low	T= 7 min/cm or 86 mm/hr
		ML		T = 20 – 50 min/cm or 12 – 30 mm/hr		
INF22-03	Silty sand	SM	NA	T = 8 – 20min/cm or 30 – 75 mm/hr	Medium to low	T= 900 min/cm or 1 mm/hr
		ML		T = 20 – 50 min/cm or 12 – 30 mm/hr		
INF22-04	Sand and silt	SM	T = 30 min/cm	T = 8 – 20min/cm or 30 – 75 mm/hr	Medium to low	T= 0 min/cm or 0.00 mm/hr (No infiltration during test period)
		ML		T = 20 – 50 min/cm or 12 – 30 mm/hr		

Notes: 1. SM envelope –silty sands, sand-silt mixtures
 ML envelope – Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, clayey silts, with slight plasticity

Table 9 – Permeability and Percolation Time Summary 2023

ID	Soil Description	Soil Envelope	Laboratory Estimated Percolation (T)	Percolation Range (OBC Table 2 & 3)	Permeability	T-time Estimate (In-situ)
INF23-01	Gravelly silty sand	SC	20 min/cm	T = 20 – 50 min/cm or 12 – 30 mm/hr	Medium to low	Test 1: 20 min/cm 30 mm/hr Test 2: 12 min/cm 50 mm/hr
INF23-02	Silt and Sand	SC	20 min/cm	T = 12 – 50 min/cm or 12 – 50 mm/hr	Medium to low	Test 1: No infiltration Test 2: 50 min/cm 12 mm/hr
INF23-03	Silt and Sand	SC	20 min/cm	ML T = 20 – 50 min/cm or 12 – 30 mm/hr SC T = 12 – 50 min/cm or 12 – 50 mm/hr	Medium to low	Test 1: 12 min/cm 50 mm/hr Test 2: 20 min/cm 30 mm/hr
INF23-04	Silt and Sand	SC	20 min/cm	T = 20 – 50 min/cm or 12 – 30 mm/hr	Medium to low	Groundwater level at 0.35 mbg could not complete test.
INF23-05	Silty sand and gravel	SC	18 min/cm	T = 12 – 50 min/cm or 12 – 50 mm/hr	Medium to low	Test 1 & 2: 12 min/cm

						50 mm/hr
INF23-06	Silty sand and gravel	SC	18 min/cm	T = 12 – 50 min/cm or 12 – 50 mm/hr	Medium to low	Test 1 & 2: 12 min/cm 50 mm/hr
INF23-07	Sandy silt	OL	25 min/cm	T = 20 – 50 min/cm or 12 – 30 mm/hr	Acceptable due to moderate clay content	Test 1 & 2: 12 min/cm 50 mm/hr
INF23-08	Silty sand and gravel	SC	18 min/cm	T = 20 – 50 min/cm or 12 – 30 mm/hr	Medium to low	Test 1: 20 min/cm 30 mm/hr Test 2: 12 min/cm 50 mm/hr
INF23-09	Sand and gravel	GM	4 min-cm	T = 4 – 12 min/cm or 50 -150 mm/hr	Permeable to medium permeability	Test 1 & 2: 12 min/cm 50 mm/hr
INF23-10	Silty sand	ML	20 min/cm	T = 20 – 50 min/cm or 12 – 30 mm/hr	Medium to low	Test 1: 50 min/cm 12 mm/hr
INF23-11	Silt and sand	SC	20 min/cm	T = 12 – 50 min/cm or 12 – 50 mm/hr	Medium to low	Test 1: 20 min/cm 30 mm/hr Test 2: 12 min/cm 50 mm/hr

INF23-12	Silty sand	ML	20 min/cm	T = 20 – 50 min/cm or 12 – 30 mm/hr	Medium to low	Test 1 & 2: 12 min/cm 50 mm/hr
INF23-13	Silt and Sand	SC	20 min/cm	T = 12 – 50 min/cm or 12 – 50 mm/hr	Medium to low	Test 1 & 2: 20 min/cm 30 mm/hr

Wills provides the following with respect to the permeability and percolation of the encountered shallow subsurface soils.

- The shallow soils fall within GW, SM, ML, SC, and OL envelopes based on the laboratory testing results.
 - Shallow subsurface strata generally included trace to some clay, which is expected to bias the infiltration rates towards that of the SC soil envelope.
 - Shallow soils on the Subject Property showed significant variability in silt, gravel, and clay sized fractions, which resulted in variable infiltration rates.
- The 2023 in-situ infiltration rates were generally consistent with the laboratory estimates, whereas the 2022 in-situ results suggested infiltration rates that were either drastically higher or lower than the laboratory estimates for similar materials.
 - This discrepancy to the in-situ testing results may be attributed to the varying test methods employed (single-ring infiltrometer vs. Guelph Permeameter).
 - The 2023 in-situ testing results are considered more reliable based on their consistency with the laboratory provided T-times.
- In view of the in-situ results, physical soils testing, and Wills' review of the encountered materials, Wills recommends using the conservative laboratory T-time estimate range of 20 – 50 min/cm (12 – 30 mm/hr) as input into the design of proposed stormwater management features and sewage disposal systems on the Subject Property.
 - Wills recommends that lot specific testing/confirmation be completed to inform the design of any proposed sewage disposal system once final locations are identified.

5.0 Groundwater Impact Assessment

A Groundwater Impact Assessment was conducted on the basis of the Ministry of Environment Conservation and Parks (MECP) *Guideline D-5-4* to determine the carrying capacity of the Subject Property with respect to on-site sewage disposal systems. For the purpose of the Groundwater Impact Assessment, the Subject Property was divided into two sections including lands designated for commercial use and those designated for residential use. Separate Groundwater Impact Assessments were conducted for each section. The Groundwater Impact Assessment considered the following:

- Based on Wills' SWM Report, the Proposed Development can support 50 residential lots and a 1.72 ha commercial lot. Wills' SWM Report provides the following infiltration system requirements to support the Proposed Development:
 - Each residential lot will require two infiltration systems – one will capture runoff generated from the roof of each dwelling in a subsurface system (minimum required volume of 4.3 m³). The second infiltration system will

- capture the remainder of the lot's runoff in an aboveground system (minimum required volume of 9 m³).
- The commercial lot will require an aboveground infiltration facility with a volume of approximately 120 m³.
 - Wills understands that each lot (50 residential and one commercial) is proposed to be serviced with a private on-site sewage disposal system.
- At the time of preparing this report, dwelling sizes and anticipated sewage flows were not available, however, 1,000 L/day is considered to be an acceptable sewage effluent loading rate for the residential lots.
 - The sewage effluent loading rate from the commercial lot will not exceed 4,495 L/day.
 - Nitrate was used to assess the impact of sewage effluent on the groundwater environment. *Guideline D-5-4* requires that the effluent plume at the boundary of the Subject Property cannot exceed the ODWQS limit of 10 mg/L for nitrate to prevent off-site groundwater impacts.
 - Wills' inputs to the Groundwater Assessment mass balance equations considered a standard nitrate loading of 40 mg/lot/day (*Guideline D-5-4*) for a conventional sewage disposal system.
 - A background nitrate concentration of 3.04 mg/L was used for the Groundwater Impact Assessments. The background concentration was taken as the average nitrate concentration of three groundwater samples collected from monitor wells MW22-01, MW22-02, and MW22-03. The Certificate of Analysis for the nitrate samples is included in **Appendix G**.
 - Available post-development dilution/recharge water for the Subject Property was estimated through a water balance analysis. A summary of the water balance calculations, including the Groundwater Impact Assessments, are included in **Appendix H**. The water balance analysis considered the following elements:
 - Historical Daily Climate Data – Peterborough A (Climate ID 6166415).
 - The total monthly water surplus available for dilution was calculated using model derived calculations through Visual Otthymo, version 6.2.
 - Infiltration factors for topography, soils, and cover were applied based on the MOEE document, *Hydrogeological Technical Information Requirements For Land Development Applications*, April 1995.
 - The mass balance equation used in Wills' Groundwater Impact Assessments is included in **Appendix I**.

5.1 Predictive Assessment

The results from the Predictive Assessments are summarized in **Table 10** and **Table 11**. An overlay of the Proposed Development on the Subject Property is shown on **Figure 3**.

Table 10 – Predictive Assessment of Nitrate Concentration for Residential Lots

Parameter	Value
Number of Lots	50
Volume of Effluent (Q_e)	50 lots x 1,000 L/day = 50,000 L/day
Effluent nitrate concentration (C_e)	40 mg/L
Available dilution water (Q_i)	231,668 L/day
Dilution water nitrate concentration (C_i)	3.04 mg/L
Total Volume (Q_t)	281,668 L/day
Total nitrate concentration at property boundary	9.10 mg/L

Table 11 – Predictive Assessment of Nitrate Concentration for Commercial Lot

Parameter	Value
Number of Lots	1
Volume of Effluent (Q_e)	1 lots x 4,495 L/day = 4,495 L/day
Effluent nitrate concentration (C_e)	40 mg/L
Available dilution water (Q_i)	17,267 L/day
Dilution water nitrate concentration (C_i)	3.04 mg/L
Total Volume (Q_t)	21,762 L/day
Total nitrate concentration at property boundary (C_t)	9.21 mg/L

In view of the results presented in Error! Reference source not found.10 and **Table 11**, Wills concludes that the current configuration of the Proposed Development, including the proposed infiltration features (as detailed in the SWM Report) would result in acceptable levels of nitrate at the property boundary.

6.0 Conclusions and Recommendations

The following conclusions and recommendations are provided with respect to Wills' Study.

- The subsurface profile on the Subject Property is consistent with alluvial deposition and includes interbedded silty sand, silt, and coarser grained materials at depth. Varying proportions of sand, silt, and clay were observed within the individual soil layers, which varied both horizontally and vertically across the Subject Property.
 - The variable/interbedded nature of the subsurface soils provides poor predictive capability at any specific location on the Subject Property.
- Thirteen monitor well locations, including nine single and four nested monitor well locations were installed on the Subject Property to depths ranging from 2.15 to 6.55 mbg. Nested monitor wells include a shallow overburden well identified as "A" and a deep overburden well identified as "B".
 - Manual static groundwater levels measured between July 28, 2022, and April 23, 2025, ranged from 4.81 mbg (200.72 masl) at MW22-01 to flowing artesian conditions (195.00 masl) at MW22-02.
 - Continuous groundwater level monitoring was conducted in monitor wells MW24-02A/B, MW24-06A, MW24-08, and MW24-09B using Solinst Leveloggers. The monitoring period was January 12, 2024, through January 12, 2025.
 - Groundwater levels ranged from -0.02 (196.16 masl) at MW24-02A to 3.99 (199.00 masl) at MW24-09B and were observed to be highest during late winter and early spring (February and April).
 - Flowing artesian groundwater conditions were observed in the northeastern portion of the Subject Property, as indicated by field measurements at MW22-02, MW24-03A/B, MW24-05, and BH22-11.
 - Upward vertical gradients were calculated at MW24-02A&B and MW24-03A&B, and were inferred at MW22-02, MW24-05 and BH22-11 based on the observed artesian conditions. Upward vertical gradients were isolated to the northern portion of the site.
 - Downward vertical gradients were calculated at MW24-06A&B and MW24-09A&B.
- Groundwater observations in the open test pits included:
 - Wet to saturated soils were encountered in five test pits excavated in June 2022 (10 test pits excavated in total). These conditions were encountered at depths ranging from approximately 1.0 to 2.1 mbg.
 - Wet to saturated soils were encountered in eight test pits excavated in December 2023 (12 test pits excavated in total). These conditions were encountered at depths ranging from approximately 1.0 to 2.8 mbg.

- Shallow groundwater was observed in test pits across various locations on the Subject Property, with no apparent spatial relationship or consistent pattern tied to these conditions.
- Groundwater observations in the open boreholes included:
 - Wet to saturated soils were observed in all 12 boreholes advanced in July 2022. These conditions were encountered at depths ranging from approximately 1.70 to 6.20 mbg.
 - Wet to saturated soils were observed in nine boreholes advanced in January 2024 (13 boreholes advanced in total). These conditions were encountered at depths ranging from approximately 1.55 to 4.60 mbg.
- Shallow wet to saturated sand lenses were observed throughout the investigated depths in both the borehole and test pits.
 - It is likely that these sand lenses are discontinuous and may preferentially store infiltrating water as it migrates downwards through the surrounding lower K-value materials.
- Given the large number of borehole, monitor well, and test pit locations across the Subject Property, Wills recommends referring to the individual subsurface logs and groundwater summaries provided in this report for location-specific groundwater conditions.
- Three groundwater samples were submitted for nitrate analysis to support the Groundwater Impact Assessment.
 - Due to the existing agricultural land use and proposed residential/commercial land use, background nitrate concentrations are anticipated to decrease once agricultural operations cease on the Subject Property.
- Twelve laboratory particle size distribution analyses and laboratory percolation time estimates were completed on representative samples of the shallow subsurface soils.
- Four in-situ infiltration tests were conducted on the Subject Property in 2022, and 13 tests were conducted on the Subject Property in 2023. Infiltration test results from 2023 (Guelph Permeameter) are considered to better represent the in-situ infiltration rates on the Subject Property based on their alignment with laboratory estimates.
- Wills recommends using the conservative in-situ infiltration range of 20 – 50 min/cm (12 – 30 mm/hr) for LID and sewage disposal system design.
 - Infiltration rates and percolation times may vary across the Subject Property, as topography, moisture content, soil gradation, and relative compactness will affect in-situ infiltration rates.
 - Wills recommends that lot specific testing/confirmation be completed to inform the design of any proposed sewage disposal system once final locations are identified.

- Any proposed LID and sewage disposal system design should consider the shallow groundwater and artesian conditions present on the Subject Property.
- Additional testing may be required to inform dewatering activities for any proposed excavation, as well as input to geotechnical analysis of any subsurface structures or utilities.
- A Groundwater Impact Assessment was conducted by Wills to determine the suitability of the Subject Property to accommodate private on-site sewage disposal systems.
- The Groundwater Impact Assessments considered 50 residential lots with anticipated flows to the sewage disposal systems of 1,000 L/day, and one commercial lot with anticipated flows to the sewage disposal systems of 4,495 L/day. Nitrate loading of 40 mg/lot/day was used on the basis of *Guideline D-5-4*.
- The Groundwater Impact Assessment concludes that a groundwater nitrate concentration of 9.10 mg/L (residential lots) and 9.21 mg/L (commercial lot) can be achieved at the downgradient property boundary with the incorporation of aboveground and subsurface infiltration features (detailed in Wills' SWM Report).
 - Both downgradient nitrate concentrations for the residential and commercial lots satisfy the requirements of *Guideline D-5-4*.

We trust that the information contained in and attached to this report meets your needs at this time. The following Statement of Limitations should be read carefully and is an integral part of this report. Do not hesitate to contact the undersigned if you have any questions or concerns.

Respectfully submitted,



Prepared by: _____
Lynsey Tutters, B.A., Dipl Et., C.Tech.
Senior Environmental Technologist



Reviewed by: _____
Ian Ames, M.Sc., P.Geo.
Environmental Monitoring and
Management Group Lead

LT/IA/jh

Statement of Limitations

This report is intended solely for Life at Wallace Point Inc. c/o Rubal Kundra (Client) for the Proposed Development in the property defined as 3491 Wallace Point Road in Otonabee-South Monaghan, Ontario (Subject Property) and is prohibited for use by others without D.M. Wills Associates Limited's (Wills) prior written consent. This report is considered Wills' professional work product and shall remain the sole property of Wills. Any unauthorized reuse, redistribution of or reliance on this report shall be at the Client and recipient's sole risk, without liability to Wills. The Client shall defend, indemnify and hold Wills harmless from any liability arising from or related to the Client's unauthorized distribution of the report. No portion of this report may be used as a separate entity; it is to be read in its entirety and shall include supporting drawings and appendices.

The recommendations made in this report are based on Wills' present understanding of the Project, the current and proposed site use, ground and subsurface conditions, and are based on the work scope approved by the Client and described in the report. The services were performed in a manner consistent with the level of care and skill ordinarily exercised by members of geoscience or engineering professions currently practicing under similar conditions in the same locality. No other representations, and no warranties or representations of any kind, either expressed or implied, are made. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the sole responsibility of such third parties.

The recommendations and comments made in this report are based on Wills' investigations and resulting understanding of the Project, as defined at the time of the assignment. Wills should be retained to review our recommendations when the final or any modified design drawings and specifications are complete. Without this review, Wills shall not be liable for any misunderstanding of our recommendations or their application and adaptation.

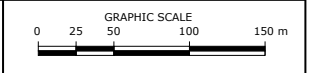
Soil, bedrock, and groundwater conditions between and beyond the test locations may differ both horizontally and vertically from those encountered at the test locations. Should any conditions at the Subject Property be encountered which differ from those found at the test locations, Wills must be notified immediately in order to permit a reassessment of our recommendations. If different conditions are identified, no matter how minor, the recommendations in this report shall be considered invalid until sufficient review and written assessment of said conditions by Wills is completed.


Figures





Source(s):
 - Ontario Ministry of Natural Resources and Forestry, Make A Topographic Map



Legend
 Subject Property Limits

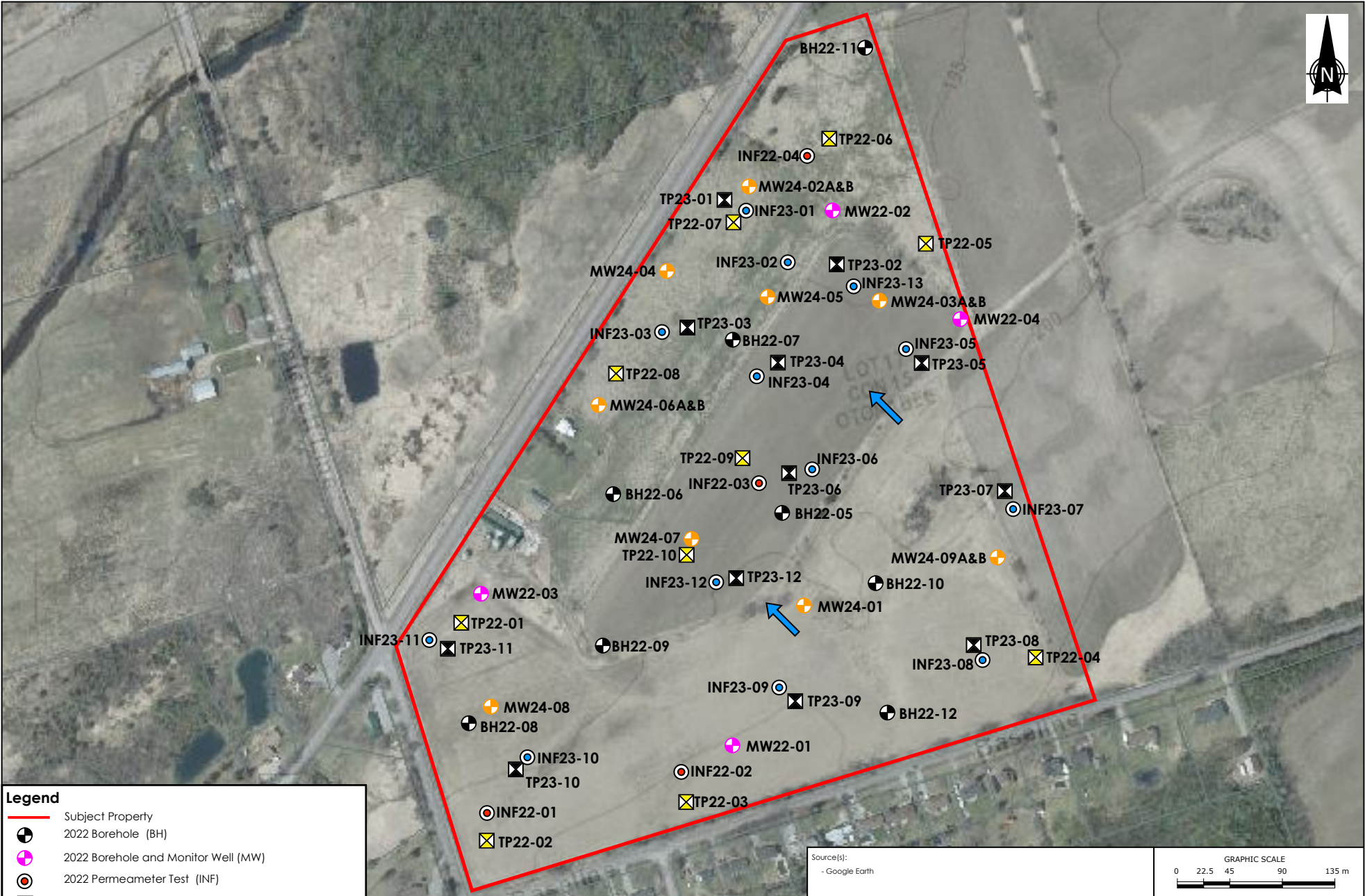
Subject Property Plan
 3491 Wallace Point Road
 Otonabee-South Monaghan











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 Peterborough, Ontario
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 P. 705.742.2297
 F. 705.748.9944
 E. wills@dmwills.com

Drawn by:	L. Tuters
Checked:	I. Ames
Project No.:	21-85162

Scale:	1:5 000 on 8.5"x11" (US Letter)
Date:	March 13, 2026
Drawing file No.:	Figure 1



Legend

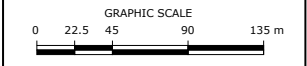
-  Subject Property
-  2022 Borehole (BH)
-  2022 Borehole and Monitor Well (MW)
-  2022 Permeameter Test (INF)
-  2022 Test Pit (TP)
-  2023 Permeameter Test (INF)
-  2023 Test Pit (TP)
-  2024 Borehole and Monitor Well (MW)
-  Groundwater Flow Direction

**Subsurface Investigation
Plan**

3491 Wallace Point Road,
Otonabee South-Monaghan,
County of Peterborough Ontario



Source(s):
- Google Earth




D.M. Wills Associates Limited 150 Jameson Drive Peterborough, Ontario K9J 0B9 P. 705.742.2297 F. 705.748.9944 E. wills@dmwills.com	Drawn by: L. TUTERS	Scale: 1:4 500 on 8.5"x11" (US Letter)
	Checked: I. AMES	Date: January 12, 2026
Project No.: 21-85162	Drawing file No.: Figure 2	



Legend	
	Subject Property
	2022 Borehole (BH)
	2022 Borehole and Monitor Well (MW)
	2022 Permeameter Test (INF)
	2022 Test Pit (TP)
	2023 Permeameter Test (INF)
	2023 Test Pit (TP)
	2023 Borehole and Monitor Well (MW)

Proposed Conditions
 3491 Wallace Point Road,
 Otonabee South-Monaghan,
 County of Peterborough Ontario



WILLS

Source(s): - Google Earth - Overlay - Wills' 2026 Draft Plan		GRAPHIC SCALE 0 22.5 45 90 135 m	
Drawn by:	L. TUTERS	Scale:	1:4 500 on 8.5"x11" (US Letter)
Checked:	I. AMES	Date:	January 12, 2026
Project No.:	21-85162	Drawing file No.:	Figure 3

Appendix A

Wills' 2026 Draft Plan



**SUMMARY CHART
SECTION 51(17) PLANNING ACT**

(a) THE BOUNDARIES OF THE LAND PROPOSED TO BE SUBDIVIDED, CERTIFIED BY AN ONTARIO LAND SURVEYOR;	AS REFERENCED ON DRAFT PLAN
(b) THE LOCATIONS, WIDTHS AND NAMES OF THE PROPOSED HIGHWAYS WITHIN THE PROPOSED SUBDIVISION AND OF EXISTING HIGHWAYS ON WHICH THE PROPOSED SUBDIVISION ADJUTS;	AS REFERENCED ON DRAFT PLAN
(c) ON A SMALL KEY PLAN, ON A SCALE OF NOT LESS THAN ONE CENTIMETRE TO 100 METRES, ALL OF THE LAND ADJACENT TO THE PROPOSED SUBDIVISION THAT IS OWNED BY THE APPLICANT OR IN WHICH THE APPLICANT HAS AN INTEREST, EVERY SUBDIVISION ADJACENT TO THE PROPOSED SUBDIVISION AND THE RELATIONSHIP OF THE BOUNDARIES OF THE LAND TO BE SUBDIVIDED TO THE BOUNDARIES OF THE TOWNSHIP LOT OR OTHER ORIGINAL GRANT OF WHICH THE LAND FORMS THE WHOLE PART;	AS REFERENCED ON DRAFT PLAN
(d) THE PURPOSE FOR WHICH THE PROPOSED LOTS ARE TO BE USED;	AS REFERENCED ON DRAFT PLAN
(e) THE EXISTING USES OF ALL ADJOINING LANDS;	AS REFERENCED ON DRAFT PLAN
(f) THE APPROXIMATE DIMENSIONS AND LAYOUT OF THE PROPOSED LOTS;	AS REFERENCED ON DRAFT PLAN
(h) IF ANY AFFORDABLE HOUSING UNITS ARE BEING PROPOSED, THE SHAPE AND DIMENSIONS OF EACH PROPOSED AFFORDABLE HOUSING UNIT AND THE APPROXIMATE LOCATION OF EACH PROPOSED AFFORDABLE HOUSING UNIT IN RELATION TO OTHER PROPOSED RESIDENTIAL UNITS;	REFER TO PLANNING JUSTIFICATION REPORT
(g) NATURAL AND ARTIFICIAL FEATURES SUCH AS BUILDINGS OR OTHER STRUCTURES OR INSTALLATIONS, RAILWAYS, HIGHWAYS, WATERCOURSES, DRAINAGE DITCHES, WETLANDS AND WOODED AREAS WITHIN OR ADJACENT TO THE LAND PROPOSED TO BE SUBDIVIDED;	AS REFERENCED ON DRAFT PLAN
(h) THE AVAILABILITY AND NATURE OF DOMESTIC WATER SUPPLIES;	REFER TO FUNCTIONAL SERVICING REPORT
(i) THE NATURE AND POROSITY OF THE SOIL;	REFER TO SUBSURFACE SOIL AND INFILTRATION INVESTIGATION REPORT
(j) EXISTING CONTOURS OR ELEVATIONS AS MAY BE REQUIRED TO DETERMINE THE GRADE OF THE HIGHWAYS AND THE DRAINAGE OF THE LAND PROPOSED TO BE SUBDIVIDED;	AS REFERENCED ON DRAFT PLAN
(k) THE MUNICIPAL SERVICES AVAILABLE OR TO BE AVAILABLE TO THE LAND PROPOSED TO BE SUBDIVIDED; AND	REFER TO FUNCTIONAL SERVICING REPORT
(l) THE NATURE AND EXTENT OF ANY RESTRICTIONS AFFECTING THE LAND PROPOSED TO BE SUBDIVIDED, INCLUDING RESTRICTIVE COVENANTS OR EASEMENTS. 1994, c. 23, s. 30; 1996, c. 4, s. 28 (3); 2016, c. 25, Sched. 4, s. 8 (1).	NO RESTRICTIONS ON SITE

LEGAL DESCRIPTION

LOT 17 & 18
CONCESSION 15
GEOGRAPHIC TOWNSHIP OF OTONABEE
TOWNSHIP OF OTONABEE-SOUTH MONAGHAN

OWNER'S CERTIFICATE

I AUTHORIZE D.M. WILLS ASSOCIATES LIMITED TO PREPARE AND SUBMIT THIS DRAFT PLAN OF SUBDIVISION TO THE COUNTY OF PETERBOROUGH FOR APPROVAL CERTIFY THAT:

DATED THIS _____ DAY OF _____ 2023

SURVEYOR'S CERTIFICATE

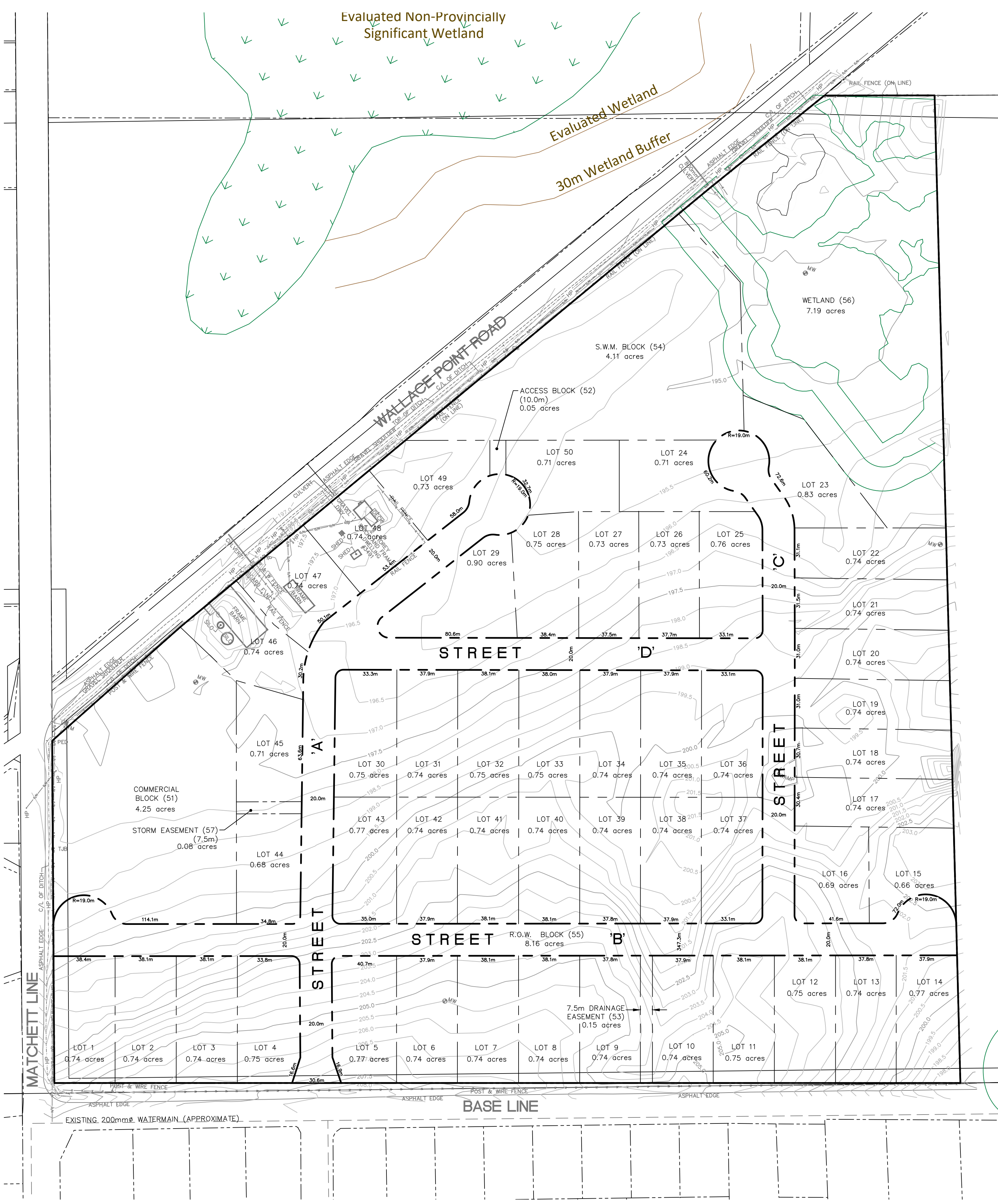
I HEREBY CERTIFY THAT THE BOUNDARIES OF THE LAND TO BE SUBDIVIDED AS SHOWN ON THIS PLAN, AND THEIR RELATIONSHIP TO THE ADJACENT LAND ARE ACCURATELY AND CORRECTLY SHOWN.

DATE _____ SHAWN M. O'CONNOR
ONTARIO LAND SURVEYOR

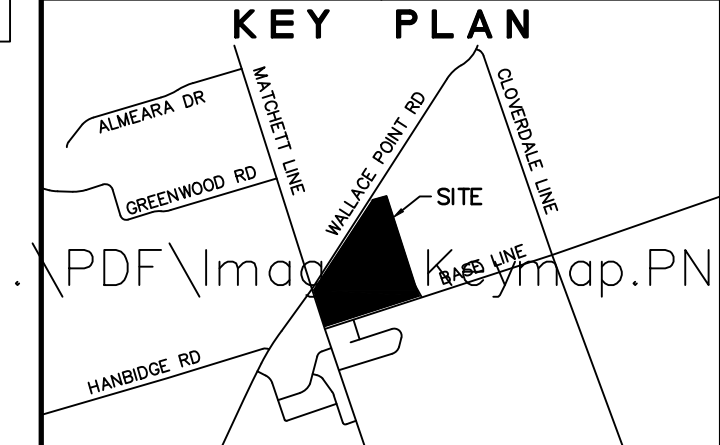
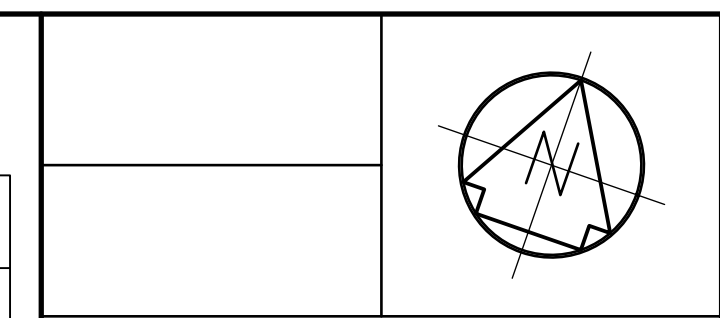
BUILDING SETBACKS

FRONT YARD	TBD
SIDE YARD	TBD
REAR YARD	TBD

SUMMARY TABLE	
85162 - WALLACE POINT ROAD, OTONABEE-SOUTH MONAGHAN	
REGULATIONS	PROPOSED
NUMBER OF LOTS	50 RESIDENTIAL LOTS 1 COMMERCIAL BLOCK 1 SWM BLOCK 1 WETLAND BLOCK 3 ACCESS BLOCKS 1 RIGHT-OF-WAY BLOCK
LOT AREA (AVG.)	0.74 ACRE (3000m ²)
LOT AREA (MIN.)	0.66 ACRE (2660m ²)
LOT FRONTAGE (MIN.)	30.2m
AVERAGE LOT DEPTH	79-95m
ROAD AREA	3.30ha
TOTAL SITE AREA	24.79ha

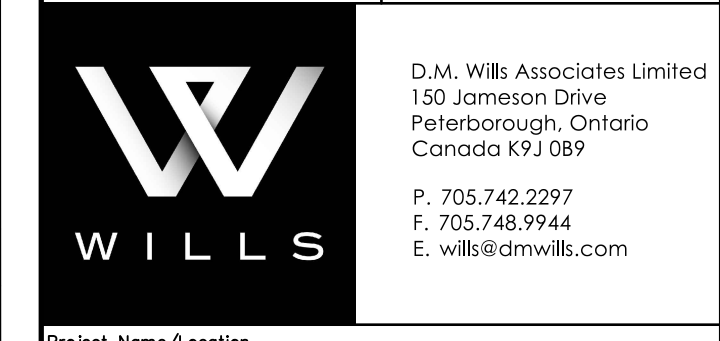


Parcel Area Table			
LOT #	Area (ha/acres)	Frontage (m)	Intended Use
1	0.30/0.74	38.4	SINGLE DETACHED DWELLING
2	0.30/0.74	38.1	SINGLE DETACHED DWELLING
3	0.30/0.74	38.1	SINGLE DETACHED DWELLING
4	0.30/0.75	33.8	SINGLE DETACHED DWELLING
5	0.31/0.77	35.4	SINGLE DETACHED DWELLING
6	0.30/0.74	37.9	SINGLE DETACHED DWELLING
7	0.30/0.74	38.1	SINGLE DETACHED DWELLING
8	0.30/0.74	38.1	SINGLE DETACHED DWELLING
9	0.30/0.74	37.8	SINGLE DETACHED DWELLING
10	0.30/0.74	37.9	SINGLE DETACHED DWELLING
11	0.30/0.75	38.1	SINGLE DETACHED DWELLING
12	0.30/0.75	38.1	SINGLE DETACHED DWELLING
13	0.30/0.74	37.8	SINGLE DETACHED DWELLING
14	0.31/0.77	37.9	SINGLE DETACHED DWELLING
15	0.26/0.66	72.0	SINGLE DETACHED DWELLING
16	0.28/0.69	41.6	SINGLE DETACHED DWELLING
17	0.30/0.74	30.4	SINGLE DETACHED DWELLING
18	0.30/0.74	30.7	SINGLE DETACHED DWELLING
19	0.30/0.74	31.0	SINGLE DETACHED DWELLING
20	0.30/0.74	31.0	SINGLE DETACHED DWELLING
21	0.30/0.74	31.5	SINGLE DETACHED DWELLING
22	0.30/0.74	31.1	SINGLE DETACHED DWELLING
23	0.33/0.83	72.6	SINGLE DETACHED DWELLING
24	0.28/0.71	60.2	SINGLE DETACHED DWELLING
25	0.31/0.76	33.1	SINGLE DETACHED DWELLING
26	0.30/0.73	37.7	SINGLE DETACHED DWELLING
27	0.30/0.73	37.5	SINGLE DETACHED DWELLING
28	0.30/0.75	38.4	SINGLE DETACHED DWELLING
29	0.36/0.90	80.6	SINGLE DETACHED DWELLING
30	0.30/0.75	33.3	SINGLE DETACHED DWELLING
31	0.30/0.74	37.9	SINGLE DETACHED DWELLING
32	0.30/0.75	38.0	SINGLE DETACHED DWELLING
33	0.30/0.75	37.9	SINGLE DETACHED DWELLING
34	0.30/0.74	37.9	SINGLE DETACHED DWELLING
35	0.30/0.74	33.1	SINGLE DETACHED DWELLING
36	0.30/0.74	33.1	SINGLE DETACHED DWELLING
37	0.30/0.74	37.9	SINGLE DETACHED DWELLING
38	0.30/0.74	37.8	SINGLE DETACHED DWELLING
39	0.30/0.74	38.1	SINGLE DETACHED DWELLING
40	0.30/0.74	37.9	SINGLE DETACHED DWELLING
41	0.30/0.74	37.9	SINGLE DETACHED DWELLING
42	0.30/0.74	35.0	SINGLE DETACHED DWELLING
43	0.31/0.77	34.8	SINGLE DETACHED DWELLING
44	0.28/0.68	63.6	SINGLE DETACHED DWELLING
45	0.28/0.71	30.2	SINGLE DETACHED DWELLING
46	0.30/0.74	50.1	SINGLE DETACHED DWELLING
47	0.30/0.74	53.4	SINGLE DETACHED DWELLING
48	0.30/0.74	58.0	SINGLE DETACHED DWELLING
49	0.30/0.73	32.7	SINGLE DETACHED DWELLING
50	0.29/0.71	-	SINGLE DETACHED DWELLING
51	1.72/4.25	-	COMMERCIAL BLOCK
52	0.02/0.05	-	SWM POND ACCESS BLOCK
53	0.06/0.15	-	7.5m DRAINAGE EASEMENT
54	1.66/4.11	-	SWM POND BLOCK
55	3.31/8.18	-	RIGHT-OF-WAY BLOCK
56	2.91/7.19	-	WETLAND
57	0.03/0.08	-	7.5m DRAINAGE EASEMENT



REVISIONS		
No.	Description	Date
2	SECOND SUBMISSION	29/01/26
1	FIRST SUBMISSION	04/21/23

METRIC Dimensions are in METRES and/or MILLIMETRES unless otherwise shown
LEGEND TO BE READ IN CONJUNCTION WITH OPSD 100 SERIES



Project Name/Location
PROPOSED RESIDENTIAL DEVELOPMENT
3491 WALLACE POINT ROAD, PETERBOROUGH

Drawing Title
DRAFT PLAN

Drawn By: M.B./M.B.J. SCALE: Horiz. 1:1500 Vert. -
Designed By: M.B. Issue Date: JANUARY 22, 2026.
Checked By: M.S. Project No.: 21-85162 Sht. No.:
Engineer: --- Dwg File No.: 85162 - DP 100

NOT FOR CONSTRUCTION

Plotted By: mblj@wills.com, Plotted On: January 22, 2026, c:\b5000 - private\85100-85199\85162 - 3491 wallace point rd\02_drawing\02_current_drawing\cadd\85162 - dp.dwg

Appendix B

Borehole and Test Pit Logs





D. M. Wills Associates Limited
 150 Jameson Drive
 Peterborough, Ontario K9J 0B9

WELL NUMBER MW22-01

CLIENT Nirvana Homes
PROJECT NUMBER 21-85162
DATE STARTED 7/13/22 **COMPLETED** 7/13/22
DRILLING CONTRACTOR Canadian Environmental Drilling & Contractors Inc.
DRILLING METHOD 6" Solid Stem Auger with Split Spoons
LOGGED BY LT **CHECKED BY** IA
NOTES BH22-01

PROJECT NAME Geotechnical and Hydrogeological Investigation
PROJECT LOCATION 3491 Wallace Point Rd, Township of Otonabee
UTM EASTING 714226 **NORTHING** 4900667
GROUND ELEVATION 205.530 masl
GROUNDWATER LEVELS:
AT END OF DRILLING No measurable groundwater
AFTER DRILLING 5.93 m / Elev 199.60 m

BH LOGS WITH TERMINATION NOTES 85162 BOREHOLE LOGS.GPJ USETHISONEVERBURENHBHLOGVALUE.GDT 4/19/23

DEPTH (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0.20	SS 1	23	3-3-4-7 (7)	MC: 11 %		TOPSOIL: Brown silty sand topsoil, trace clay, moist, loose	Casing Top Elev: 0.82 (m) Casing Type: Monument
1.00	SS 2	33	7-7-10 (17)	MC: 9 %		SILTY SAND: Brown silty sand to sand and silt, trace clay, trace gravel, occasional cobble, moist, compact	
2.00	SS 3	87	5-10-8 (18)	MC: 9 %			Bentonite seal from 0 to 2.75 mbg.
3.00	SS 4	98	12-25-15 (40)	MC: 9 %		- dense	
4.00	SS 5	54	8-7-9 (16)	MC: 7 %		- compact	
5.00	SS 6	109	27-50-50 (100)	MC: 8 %		-wet cm-scale sand stringer SILT: Light brown silt, some sand, trace clay, trace gravel, moist, very dense	Quartz sand pack filter from 2.75 to 6.10 mbg. Point 10 slotted screen from 3.05 to 6.10 mbg.
6.00	SS 7	65	6-25-30 (55)	MC: 12 %		SILTY SAND: Grey silty sand, trace clay, trace gravel, wet, very dense	
6.55							

WL July 28/22:
5.93 mbg



Borehole terminated in silty sand at 6.55 mbg.



D. M. Wills Associates Limited
 150 Jameson Drive
 Peterborough, Ontario K9J 0B9

WELL NUMBER MW22-02

CLIENT Nirvana Homes
PROJECT NUMBER 21-85162
DATE STARTED 7/11/22 **COMPLETED** 7/11/22
DRILLING CONTRACTOR Canadian Environmental Drilling & Contractors Inc.
DRILLING METHOD 6" Solid Stem Auger with Split Spoons
LOGGED BY LT **CHECKED BY** IA
NOTES BH22-02

PROJECT NAME Geotechnical and Hydrogeological Investigation
PROJECT LOCATION 3491 Wallace Point Rd, Township of Otonabee
UTM EASTING 714289 **NORTHING** 4901170
GROUND ELEVATION 195.00 masl
GROUNDWATER LEVELS:
AT END OF DRILLING Groundwater at surface
AFTER DRILLING -0.70 m / Elev 195.70 m

BH LOGS WITH TERMINATION NOTES 85162 BOREHOLE LOGS.GPJ USE THIS ONE OVER BURDEN.BHLOG.NVALUE.GDT 4/19/23

DEPTH (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0.30	SS 1	4	1-1-1-2 (2)	MC: 21 %		TOPSOIL: Brown silty sand topsoil, trace clay, rootlets, moist, loose	Casing Top Elev: 0.90 (m) Casing Type: Monument Bentonite seal from 0 to 2.75 mbg. Quartz sand pack filter from 2.75 to 6.10 mbg. Point 10 slotted screen from 3.05 to 6.10 mbg.
1.00	SS 2	100	4-2-4 (6)	MC: 24 %		SILTY SAND: Brown-grey silty sand, some clay, moist, loose	
2.00	SS 3	100	2-6-8 (14)	MC: 10 %		- compact	
2.30	SS 4	65	10-12-11 (23)	MC: 8 %		SANDY SILT: Grey sandy silt, trace clay, trace gravel, occasional cobble, moist, compact	
3.00	SS 5	61	10-9-10 (19)	MC: 9 %		-wet	
5.00	SS 6	65	8-9-13 (22)	MC: 6 %		-some gravel, saturated	
6.55	SS 7	65	10-26-22 (48)	MC: 17 %		- cm scale sand stringer, dense	

Borehole terminated in sandy silt at 6.55 mbg. Artesian conditions encountered. Piezometric level at 0.72 meters above grade on July 28, 2022.



D. M. Wills Associates Limited
 150 Jameson Drive
 Peterborough, Ontario K9J 0B9

WELL NUMBER MW22-03

CLIENT Nirvana Homes
PROJECT NUMBER 21-85162
DATE STARTED 7/11/22 **COMPLETED** 7/11/22
DRILLING CONTRACTOR Canadian Environmental Drilling & Contractors Inc.
DRILLING METHOD 6" Solid Stem Auger with Split Spoons
LOGGED BY LT **CHECKED BY** IA
NOTES BH22-03

PROJECT NAME Geotechnical and Hydrogeological Investigation
PROJECT LOCATION 3491 Wallace Point Rd, Township of Otonabee
UTM EASTING 714014 **NORTHING** 4900804
GROUND ELEVATION 197.55 masl
GROUNDWATER LEVELS:
 ▼ **AT END OF DRILLING** 4.55 m / Elev 193.00 m
 ▼ **AFTER DRILLING** 3.55 m / Elev 194.02 m

BH LOGS WITH TERMINATION NOTES 85162 BOREHOLE LOGS.GPJ USETHISONEVERBURENHBHLOGNVALUE.GDT 4/19/23

DEPTH (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
							Casing Top Elev: 0.90 (m) Casing Type: Monument
0.60	SS 1	25	3-4-6-8 (10)	MC: 20 %		TOPSOIL: Brown silty sand topsoil, trace clay, moist, loose	
1.96	SS 2	89	2-3-3 (6)	MC: 19 %		SILTY SAND: Brown silty sand to sand and silt, some clay, trace gravel, moist, loose - orange-brown mottling	
2.75	SS 3	65	6-5-3 (8)	MC: 10 %		- compact	Bentonite seal from 0 to 2.75 mbg.
3.55	SS 4	100	5-5-5 (10)	MC: 13 %			
4.55	SS 5	100	5-4-6 (10)	MC: 11 % WL July 28/22: 3.55 mbg			
4.55	SS 6	65	40-18-15 (33)	MC: 18 % WL in open borehole July 11th, 2022		SILT: Grey silt, some sand, trace clay, trace gravel, occasional cobble, saturated, dense	Quartz sand pack filter from 2.75 to 6.10 mbg. Point 10 slotted screen from 3.05 to 6.10 mbg.
6.55	SS 7	65	10-18-24 (42)	MC: 15 %			
Borehole terminated in silt at 6.55 mbg.							



D. M. Wills Associates Limited
 150 Jameson Drive
 Peterborough, Ontario K9J 0B9

WELL NUMBER MW22-04

CLIENT Nirvana Homes
PROJECT NUMBER 21-85162
DATE STARTED 7/12/22 **COMPLETED** 7/12/22
DRILLING CONTRACTOR Canadian Environmental Drilling & Contractors Inc.
DRILLING METHOD 6" Solid Stem Auger with Split Spoons
LOGGED BY LT **CHECKED BY** IA
NOTES BH22-04

PROJECT NAME Geotechnical and Hydrogeological Investigation
PROJECT LOCATION 3491 Wallace Point Rd, Township of Otonabee
UTM EASTING 714424 **NORTHING** 4901037
GROUND ELEVATION 198.280 masl
GROUNDWATER LEVELS:
 ▼ **AT END OF DRILLING** 5.80 m / Elev 192.48 m
 ▼ **AFTER DRILLING** 2.78 m / Elev 195.50 m

BH LOGS WITH TERMINATION NOTES 85162 BOREHOLE LOGS.GPJ USETHISONEVERBURENBNHLOGVALUE.GDT 4/19/23

DEPTH (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
							Casing Top Elev: 0.86 (m) Casing Type: Monument
1	SS 1	41	1-3-1-4 (4)	MC: 14 %		TOPSOIL: Brown silty sand topsoil, trace clay, moist, loose	
						0.60	197.68
1	SS 2	65	4-5-6 (11)	MCt: 10 %		SILTY SAND: Brown silty sand, trace to some clay, trace gravel, moist to wet, compact	
2	SS 3	65	7-6-6 (12)	MC: 10 %			
3	SS 4	91	4-14-7 (21)	MC: 8 % <u>WL July 28/22:</u> 2.77 mbg			
4	SS 5	100	6-8-12 (20)	MC: 8 % <u>GSA SS-5:</u> Gravel 14% Sand 47% Silt 24% Clay 15%		-some clay, some gravel	
5	SS 6	65	8-13-16 (29)	MC: 7 %		-grey-brown	
6				WL in open borehole July 12th, 2022			
	SS 7	65	11-13-13 (26)	MC: 7 %			
						6.55	191.73

← Bentonite seal from 0 to 2.75 mbg.

← Quartz sand pack filter from 2.75 to 6.10 mbg.
 ← Point 10 slotted screen from 3.05 to 6.10 mbg.

Borehole terminated in silty sand at 6.55 mbg.



D. M. Wills Associates Limited
 150 Jameson Drive
 Peterborough, Ontario K9J 0B9

BORING NUMBER BH22-05

CLIENT Nirvana Homes
PROJECT NUMBER 21-85162
DATE STARTED 7/12/22 **COMPLETED** 7/12/22
DRILLING CONTRACTOR Canadian Environmental Drilling & Contractors Inc.
DRILLING METHOD 6" Solid Stem Auger with Split Spoons
LOGGED BY LT **CHECKED BY** IA
NOTES _____

PROJECT NAME Geotechnical and Hydrogeological Investigation
PROJECT LOCATION 3491 Wallace Point Rd, Township of Otonabee
UTM EASTING 714262 **NORTHING** 4900865
GROUND ELEVATION 199.679 masl
GROUNDWATER LEVELS:
 ▼ **AT END OF DRILLING** 3.65 m / Elev 196.03 m
AFTER DRILLING -No monitor well installed

BH LOGS WITH TERMINATION NOTES 85162 BOREHOLE LOGS.GPJ USETHISONEOVERBURDENBHLGNVALUE.GDT 4/19/23

DEPTH (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION
	SS 1	30	1-2-6-13 (8)	MC: 14 %		<u>TOPSOIL:</u> Brown silty sand topsoil, trace clay, moist, loose
1	SS 2	65	9-8-7 (15)	MC: 8 %		<u>SILTY SAND:</u> Brown-grey silty sand to sandy silt, some clay, trace to some gravel, moist, compact
2	SS 3	100	5-6-7 (13)	MC: 9 %		
3	SS 4	111	6-5-7 (12)	MC: 9 %		-cm-scale sand stringer, wet
4	SS 5	115	7-9-13 (22)	MC: 12 % WL in open borehole July 12th, 2022		▼
5	SS 6	115	6-12-19 (31)	MC: 17 %		<u>SILT:</u> Grey silt, some sand to sandy, trace silt, wet, dense -cm-scale coarse sand stringer
6	SS 7	100	8-15-16 (31)	MC: 18 %		-trace gravel

Borehole terminated in silt at 6.55 mbg. Borehole caved to 5.1 mbg following completion.



D. M. Wills Associates Limited
 150 Jameson Drive
 Peterborough, Ontario K9J 0B9

BORING NUMBER BH22-06

CLIENT Nirvana Homes
PROJECT NUMBER 21-85162
DATE STARTED 7/11/22 **COMPLETED** 7/11/22
DRILLING CONTRACTOR Canadian Environmental Drilling & Contractors Inc.
DRILLING METHOD 6" Solid Stem Auger with Split Spoons
LOGGED BY LT **CHECKED BY** IA
NOTES _____

PROJECT NAME Geotechnical and Hydrogeological Investigation
PROJECT LOCATION 3491 Wallace Point Rd, Township of Otonabee
UTM EASTING 714120 **NORTHING** 4900877
GROUND ELEVATION 196.176 masl
GROUNDWATER LEVELS:
 ▼ **AT END OF DRILLING** 3.65 m / Elev 192.53 m
AFTER DRILLING -No monitor well installed

BH LOGS WITH TERMINATION NOTES 85162 BOREHOLE LOGS.GPJ USETHISONEOVERBURDENBHLGNVALUE.GDT 4/19/23

DEPTH (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION
	SS 1	25	1-1-2-5 (3)	MC: 12 %		<u>TOPSOIL:</u> Brown silty sand topsoil, trace clay, moist, very loose
1	SS 2	65	3-2-4 (6)	MC: 11 %		<u>SILTY SAND:</u> Brown-grey silty sand, some clay, trace to some gravel, moist to wet, loose - orange-brown mottling
2	SS 3	78	2-1-2 (3)	MC: 11 %		- very loose
3	SS 4	100	5-7-13 (20)	MC: 8 %		- moist, compact
4	SS 5	72	10-19-25 (44)	MC: 6 % WL in open borehole July 11th, 2022		- dense
5	SS 6	78	8-18-32 (50)	MC: 13 % GSA SS-6: Gravel 8% Sand 16% Silt 71% Clay 5%		<u>SILT:</u> Grey silt, some sand, trace clay, trace gravel, occasional cobble, wet, dense
6	SS 7	43	16-20-29 (49)	MC: 8 %		<u>SAND AND GRAVEL:</u> Grey sand and gravel, some silt, wet, dense
						Borehole terminated in sand and gravel at 6.55 mbg. Borehole caved to 4.9 mbg following completion.

0.60

195.58

4.55

191.63

6.10

190.08

6.55

189.63



D. M. Wills Associates Limited
 150 Jameson Drive
 Peterborough, Ontario K9J 0B9

BORING NUMBER BH22-07

CLIENT Nirvana Homes
PROJECT NUMBER 21-85162
DATE STARTED 7/11/22 **COMPLETED** 7/11/22
DRILLING CONTRACTOR Canadian Environmental Drilling & Contractors Inc.
DRILLING METHOD 6" Solid Stem Auger with Split Spoons
LOGGED BY LT **CHECKED BY** IA
NOTES _____

PROJECT NAME Geotechnical and Hydrogeological Investigation
PROJECT LOCATION 3491 Wallace Point Rd, Township of Otonabee
UTM EASTING 714216 **NORTHING** 4901018
GROUND ELEVATION 195.24 masl
GROUNDWATER LEVELS:
 ▼ **AT END OF DRILLING** 2.45 m / Elev 192.79 m
AFTER DRILLING -No monitor well installed

BH LOGS WITH TERMINATION NOTES 85162 BOREHOLE LOGS.GPJ USETHISONEVERBURENHBHLOGVALUE.GDT 4/19/23

DEPTH (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION
						<u>TOPSOIL:</u> Loose, no recovery
	SS 1	0	1-2-4-4 (6)			0.45 194.79
1	SS 2	100	4-4-5 (9)	MC: 28 %		<u>SILTY SAND:</u> Brown-grey silty sand to sand and silt, some clay, trace to some gravel, moist, loose
2	SS 3	65	2-3-2 (5)	MC: 14 %		- wet
				WL in open borehole July 11th, 2022 MC: 12 %		▼ - compact
3	SS 4	65	7-7-10 (17)			3.00 192.24
	SS 5	65	5-8-10 (18)	MC: 17 %		<u>SILT:</u> Grey silt, some sand, trace gravel, trace clay, wet, compact
4						
5	SS 6	100	25-40-50 (90)	MC: 9 %		4.55 190.69
6						
	SS 7	100	25-49-50 (99)	MC: 12 %		6.55 188.69
Borehole terminated in silty sand at 6.55 mbg. Borehole caved to 4.6 mbg following completion.						



D. M. Wills Associates Limited
 150 Jameson Drive
 Peterborough, Ontario K9J 0B9

BORING NUMBER BH22-08

CLIENT Nirvana Homes

PROJECT NAME Geotechnical and Hydrogeological Investigation

PROJECT NUMBER 21-85162

PROJECT LOCATION 3491 Wallace Point Rd, Township of Otonabee

DATE STARTED 7/13/22 COMPLETED 7/13/22

UTM EASTING 714005 NORTHING 4900686

DRILLING CONTRACTOR Canadian Environmental Drilling & Contractors Inc.

GROUND ELEVATION 198.316 masl

DRILLING METHOD 6" Solid Stem Auger with Split Spoons

GROUNDWATER LEVELS:

LOGGED BY LT CHECKED BY IA

▼ AT END OF DRILLING 5.00 m / Elev 193.32 m

NOTES _____

AFTER DRILLING -No monitor well installed

BH LOGS WITH TERMINATION NOTES 85162 BOREHOLE LOGS.GPJ USETHISONEOVERBURDENBHLGNVALUE.GDT 4/19/23

DEPTH (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION	
1	SS 1	23	1-2-3-4 (5)	MC: 20 %		<u>TOPSOIL:</u> Brown sandy silt topsoil, trace clay, moist, loose	
	SS 2	33	4-3-5 (8)			0.60	<u>SILTY SAND:</u> Brown silty sand, some clay, moist to wet, loose
2	SS 3	87	2-2-3 (5)			- dense	
	SS 4	98	4-10-23 (33)				
3	SS 5	54	10-20-20 (40)			4.55	<u>SAND:</u> Brown sand, trace silt, trace clay, trace gravel, occasional cobble, wet, dense
	SS 6	109	25-21-21 (42)			▼ - wet	
4				WL in open borehole July 13th, 2022			
5							
6							
					6.10	192.22	

Borehole terminated in sand material at 6.10 mbg due to refusal on presumed cobble/boulder.



D. M. Wills Associates Limited
 150 Jameson Drive
 Peterborough, Ontario K9J 0B9

BORING NUMBER BH22-09

CLIENT Nirvana Homes
PROJECT NUMBER 21-85162
DATE STARTED 7/12/22 **COMPLETED** 7/12/22
DRILLING CONTRACTOR Canadian Environmental Drilling & Contractors Inc.
DRILLING METHOD 6" Solid Stem Auger with Split Spoons
LOGGED BY LT **CHECKED BY** IA
NOTES _____

PROJECT NAME Geotechnical and Hydrogeological Investigation
PROJECT LOCATION 3491 Wallace Point Rd, Township of Otonabee
UTM EASTING 714120 **NORTHING** 4900755
GROUND ELEVATION 198.543 masl
GROUNDWATER LEVELS:
AT END OF DRILLING No measurable groundwater
AFTER DRILLING -No monitor well installed

BH LOGS WITH TERMINATION NOTES 85162 BOREHOLE LOGS.GPJ USE THIS ONE OVER BURDEN.BHLOG.NVALUE.GDT 4/19/23

DEPTH (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION	
1	SS 1	30	1-3-5-6 (8)	MC: 13 %		<u>TOPSOIL:</u> Brown silty sand topsoil, trace clay, moist, loose 0.60 197.94	
	SS 2	22	5-8-5 (13)	MC: 10 %		<u>SILTY SAND:</u> Brown silty sand to sand and silt, trace clay, trace gravel, moist, compact	
2	SS 3	89	2-14-14 (28)	MC: 18 %		1.75 196.79	<u>SILT:</u> Grey-brown silt, some sand, trace gravel, trace clay, wet, compact
	SS 4	89	16-14-10 (24)	MC: 20 %		3.20 195.34	<u>SILTY SAND:</u> Grey silty sand, some clay, trace clay, wet, compact
3	SS 5	72	15-9-16 (25)	MC: 11 %			4.57 193.97
	SS 6	100	12-15-8 (23)	MC: 15 %		- saturated	
6	SS 7	100	4-4-13 (17)	MC: 14 %		6.55 191.99	

Borehole terminated in sand and silt at 6.55 mbg. Borehole caved to 2.4 mbg following completion.



D. M. Wills Associates Limited
 150 Jameson Drive
 Peterborough, Ontario K9J 0B9

BORING NUMBER BH22-10

CLIENT Nirvana Homes
PROJECT NUMBER 21-85162
DATE STARTED 7/12/22 **COMPLETED** 7/12/22
DRILLING CONTRACTOR Canadian Environmental Drilling & Contractors Inc.
DRILLING METHOD 6" Solid Stem Auger with Split Spoons
LOGGED BY LT **CHECKED BY** IA
NOTES _____

PROJECT NAME Geotechnical and Hydrogeological Investigation
PROJECT LOCATION 3491 Wallace Point Rd, Township of Otonabee
UTM EASTING 714334 **NORTHING** 4900807
GROUND ELEVATION 200.694 masl
GROUNDWATER LEVELS:
 ▼ **AT END OF DRILLING** 2.15 m / Elev 198.54 m
AFTER DRILLING -No monitor well installed

BH LOGS WITH TERMINATION NOTES 85162 BOREHOLE LOGS.GPJ USETHISONEOVERBURDENBHLGNVALUE.GDT 4/19/23

DEPTH (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION
1	SS 1	41	2-1-2-3 (3)	MC: 17 %		<u>TOPSOIL:</u> Brown silty sand topsoil, some clay, moist, very loose 200.19
	SS 2	65	6-6-7 (13)	MC: 10 %		<u>SILTY SAND:</u> Brown silty sand to sandy silt, trace to some clay, trace gravel, moist, compact
2	SS 3	65	14-9-12 (21)	MC: 9 %		WL in open borehole July 12th, 2022 ▼ 2.30 198.39 <u>SAND:</u> brown sand, some silt, trace gravel, trace clay, moist, very dense
	SS 4	54	8-21-37 (58)	MC: 6 %		3.00 197.69
3	SS 5	93	24-24-32 (56)	MC: 10 %		<u>SANDY SILT:</u> Grey sandy silt, trace gravel, trace clay, wet, dense 197.19
	SS 6	43	3-4-17 (21)	MC: 15 %		3.50
4	SS 7	65	18-23-20 (43)	MC: 15 %		<u>SAND:</u> Brown sand, trace silt, trace clay, wet, dense
	SS 7	65	18-23-20 (43)	MC: 15 %		6.55 194.14

Borehole terminated in sand at 6.55 mbg. Borehole caved to 4.6 mbg following completion.



D. M. Wills Associates Limited
 150 Jameson Drive
 Peterborough, Ontario K9J 0B9

BORING NUMBER BH22-11

CLIENT Nirvana Homes
PROJECT NUMBER 21-85162
DATE STARTED 7/11/22 **COMPLETED** 7/11/22
DRILLING CONTRACTOR Canadian Environmental Drilling & Contractors Inc.
DRILLING METHOD 6" Solid Stem Auger with Split Spoons
LOGGED BY LT **CHECKED BY** IA
NOTES _____

PROJECT NAME Geotechnical and Hydrogeological Investigation
PROJECT LOCATION 3491 Wallace Point Rd, Township of Otonabee
UTM EASTING 714320 **NORTHING** 4901258
GROUND ELEVATION 195.565 masl
GROUNDWATER LEVELS:
 ▼ **AT END OF DRILLING** 0.00 m / Elev 195.57 m
AFTER DRILLING -No monitor well installed

BH LOGS WITH TERMINATION NOTES 85162 BOREHOLE LOGS.GPJ USETHISONEVERBURENHBHLOGNVALUE.GDT 4/19/23

DEPTH (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION
0.60	SS 1	0	2-2-0-3 (2)			TOPSOIL: Brown silty sand topsoil, moist, very loose 194.97
1.50	SS 2	8	1-1-2-4 (3)	MC: 31 %		CLAYEY SILT: Grey-brown clayey silt, trace to some sand, trace gravel, moist, very loose 194.07
3.10	SS 3	75	4-5-6-4 (11)	MC: 10 %		SILTY SAND: Brown silty sand, some clay, trace gravel, orange brown mottling, moist, compact - grey, moist to wet, loose 192.47
3.35	SS 4	75	2-3-4-4 (7)	MC: 9 %		SAND: Grey sand, trace silt, trace clay, trace gravel, occasional cobble, saturated, compact 192.22
5.65	SS 5	43	2-2-3 (5)	MC: 11 %		SANDY GRAVEL: Grey sandy gravel, trace silt, trace clay, occasional cobble, saturated, very dense
	SS 6	43	24-18-25 (43)	MC: 5 %		- dense
	SS 7	75	20-30-27-19 (57)	MC: 9 % GSA SS-7: Gravel 66% Sand 28% Silt and Clay 6%		189.92

Borehole terminated in sand material at 5.65 mbg due to refusal on presumed cobble/boulder. Borehole caved to 4.0 mbg following completion. Artesian conditions encountered at SS-5 (groundwater flowing out of borehole) - borehole sealed with bentonite.



D. M. Wills Associates Limited
 150 Jameson Drive
 Peterborough, Ontario K9J 0B9

BORING NUMBER BH22-12

CLIENT Nirvana Homes
PROJECT NUMBER 21-85162
DATE STARTED 7/12/22 **COMPLETED** 7/12/22
DRILLING CONTRACTOR Canadian Environmental Drilling & Contractors Inc.
DRILLING METHOD 6" Solid Stem Auger with Split Spoons
LOGGED BY LT **CHECKED BY** IA
NOTES _____

PROJECT NAME Geotechnical and Hydrogeological Investigation
PROJECT LOCATION 3491 Wallace Point Rd, Township of Otonabee
UTM EASTING 714364 **NORTHING** 4900698
GROUND ELEVATION 203.745 masl
GROUNDWATER LEVELS:
AT END OF DRILLING No measurable groundwater
AFTER DRILLING -No monitor well installed

BH LOGS WITH TERMINATION NOTES 85162 BOREHOLE LOGS.GPJ USETHISONEVERBURDENBHLGNVALUE.GDT 4/19/23

DEPTH (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION
1	SS 1	49	1-2-3-4 (5)	MC: 17 %		<u>TOPSOIL:</u> Brown silty sand topsoil, trace clay, moist, loose
	SS 2	0	2-4-5 (9)			<u>SAND:</u> Brown sand, trace silt, trace gravel, occasional cobble, moist, loose
2	SS 3	33	6-15-25 (40)	MC: 6 %		-dense
	SS 4	72	13-21-45 (66)			- very dense
3	SS 5	70	17-36-42 (78)	MC: 3 %		
	SS 6	65	27-25-31 (56)			
5				MC: 9 %		<u>SANDY GRAVEL:</u> Brown sandy gravel, trace silt, trace clay, occasional cobble, wet, very dense
6						

Borehole terminated in sandy gravel material at 6.1 mbg. Borehole caved to 2.4 mbg following completion.



D.M. Wills Associates Limited
 150 Jameson Drive
 Peterborough, Ontario K9J 0B9

WELL NUMBER MW24-01

CLIENT Nirvana Homes
PROJECT NUMBER 21-85162
DATE STARTED 2024-01-04 **COMPLETED** 2024-01-04
DRILLING CONTRACTOR Canadian Environmental Drilling & Contractors Inc.
DRILLING METHOD 6" Solid Stem Auger with Split Spoons
LOGGED BY CO **CHECKED BY** LT
NOTES BH24-01

PROJECT NAME 3491 Wallace Point Road
PROJECT LOCATION 3491 Wallace Point Road, Peterborough, ON
UTM EASTING 714288 **NORTHING** 4900782
GROUND ELEVATION 201.63 masl
GROUNDWATER LEVELS:
 ▼ **AT END OF DRILLING** 3.95 m / Elev 197.68 m
 ▼ **AFTER DRILLING** 2.47 m / Elev 199.16 m

BH LOGS WITH TERMINATION NOTES 85162 BOREHOLE LOGS.GPJ WILL BH LOGS WITH NVALUE.GDT 25-9-16

DEPTH (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0.20						TOPSOIL: Brown silty sand topsoil, trace clay, moist, loose	Casing Top Elev: 202.51 (m) Casing Type: Monument
0.20						SILTY SAND: Brown silty sand, some gravel, trace clay, moist to wet, loose	← Cement seal at surface
1.0	SS-1	38	4-3-3-3 (6)				
1.5	SS-2	60	2-2-5 (7)				← PVC pipe from 0.88 mag to 3.05 mbg
2.0	SS-3	53	2-4-5 (9)				← Bentonite from 0.20 to 2.75 mbg
2.5							
3.0	SS-4	67	2-7-11 (18)	WL Apr 23, 2025 - 2.47 mbg	▼ - compact		
3.5							
4.0	SS-5	89	5-5-10 (15)		▼		← Quartz sand from 2.75 to 6.10 mbg
4.5							
5.0	SS-6	100	5-5-8 (13)			SANDY SILT: Grey sandy silt, trace gravel, some clay, moist, compact	← 10-point slotted screen from 3.05 to 6.10 mbg
5.5							
6.0	SS-7	69	2-3-9 (12)			SAND: Brown sand, trace silt, occasional cobble/boulder, saturated, compact	
6.5							

Borehole terminated in sand at 6.55 mbg. Borehole caved to 5.80 mbg. Groundwater at 3.95 mbg upon completion.



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WELL NUMBER MW24-02A

CLIENT Nirvana Homes
PROJECT NUMBER 21-85162
DATE STARTED 2024-01-03 **COMPLETED** 2024-01-03
DRILLING CONTRACTOR Canadian Environmental Drilling & Contractors Inc.
DRILLING METHOD 6" Solid Stem Auger with Split Spoons
LOGGED BY CO **CHECKED BY** LT
NOTES BH24-02A (nested well location)

PROJECT NAME 3491 Wallace Point Road
PROJECT LOCATION 3491 Wallace Point Road, Peterborough, ON
UTM EASTING 714223 **NORTHING** 4901129
GROUND ELEVATION 196.14 masl
GROUNDWATER LEVELS:
 ▼ **AT END OF DRILLING** 3.00 m / Elev 193.14 m
 ▼ **AFTER DRILLING** 0.19 m / Elev 195.95 m

BH LOGS WITH TERMINATION NOTES 851622 BOREHOLE LOGS.GPJ WILLS BH LOGS WITH NVALUE.GDT 25-9-16

DEPTH (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
1	SS-1	55	2-3-6-3 (9)	WL Apr 29, 2024 - 0.19 mbg		0.20 ▼ TOPSOIL: Brown silty sand topsoil, trace clay, moist, loose	<p>Casing Top Elev: 196.98 (m) Casing Type: Monument Cement seal at surface Bentonite from 0.20 to 0.30 mbg PVC pipe from 0.84 mag to 0.65 mbg Quartz sand from 0.30 to 2.15 mbg 10-point slotted screen from 0.65 to 2.15 mbg</p>
	SS-2	64	3-3-4 (7)			195.94	
2	SS-3	89	1-2-2 (4)	- brown, saturated, very loose			
	SS-4	40	2-1-11 (12)	- occasional cobble/boulder, compact			
3	SS-5	87	3-4-4 (8)	3.05 ▼		193.09	
	SS-6	84	5-5-3 (8)			- grey-brown, saturated	
4	SS-7	76	24-17-32 (49)	- grey, some gravel, occasional cobble/boulder, moist, dense			
				- occasional cobble/boulder			
6				6.10		190.04	

Borehole terminated in sandy silt at 6.10 mbg.
 Borehole caved to 3.05 mbg. Groundwater at 3.00 mbg upon completion.



D.M. Wills Associates Limited
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WELL NUMBER MW24-02B

CLIENT Nirvana Homes
PROJECT NUMBER 21-85162
DATE STARTED 2024-01-03 **COMPLETED** 2024-01-03
DRILLING CONTRACTOR Canadian Environmental Drilling & Contractors Inc.
DRILLING METHOD 6" Solid Stem Auger with Split Spoons
LOGGED BY CO **CHECKED BY** LT
NOTES BH24-02B (nested well location)

PROJECT NAME 3491 Wallace Point Road
PROJECT LOCATION 3491 Wallace Point Road, Peterborough, ON
UTM EASTING 714221 **NORTHING** 4901129
GROUND ELEVATION 196.17 masl
GROUNDWATER LEVELS:
AT END OF DRILLING -Dry
▼ AFTER DRILLING 0.13 m / Elev 196.04 m

DEPTH (m)	SAMPLE TYPE NUMBER	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
1		WL Feb 12, 2024 - 0.13 mbg		TOPSOIL: Brown silty sand topsoil, trace clay, moist, loose 195.97 SILTY SAND: Brown silty sand, some gravel, trace clay, occasional cobble/boulder, wet, loose - brown, saturated, very loose	Casing Top Elev: 197.01 (m) Casing Type: Monument Cement seal at surface PVC pipe from 0.84 mag to 3.05 mbg Bentonite from 0.20 to 2.75 mbg Quartz sand from 2.75 to 4.55 mbg 10-point slotted screen from 3.05 to 4.55 mbg
2				- occasional cobble/boulder, compact 3.05	
3				SANDY SILT: Grey sandy silt, some clay, trace gravel, orange mottling, abundant cobble/boulder, loose, moist - grey-brown, saturated 193.12	
4				4.55 191.62	

Borehole terminated in sandy silt at 4.55 mbg.

BH LOGS WITH TERMINATION NOTES 85162.BOREHOLE LOGS.GPJ WILL BH LOGS WITH NVALUE.GDT 25-9-16



D.M. Wills Associates Limited
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WELL NUMBER MW24-03A

CLIENT Nirvana Homes
PROJECT NUMBER 21-85162
DATE STARTED 2024-01-04 **COMPLETED** 2024-01-04
DRILLING CONTRACTOR Canadian Environmental Drilling & Contractors Inc.
DRILLING METHOD 6" Solid Stem Auger with Split Spoons
LOGGED BY CO **CHECKED BY** LT
NOTES BH24-03A (nested well location)

PROJECT NAME 3491 Wallace Point Road
PROJECT LOCATION 3491 Wallace Point Road, Peterborough, ON
UTM EASTING 714334 **NORTHING** 4901057
GROUND ELEVATION 195.73 masl
GROUNDWATER LEVELS:
AT END OF DRILLING -Dry
▼ AFTER DRILLING -0.11 m / Elev 195.84 m

DEPTH (m)	SAMPLE TYPE NUMBER	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
		WL Feb 12, 2024 - 0.11 mag		▼	Casing Top Elev: 196.72 (m) Casing Type: Monument
1			0.30	TOPSOIL: Brown silty sand topsoil, trace clay, moist, loose	← Cement seal at surface
				SANDY SILT: Brown sandy silt, some gravel, trace clay, moist, compact	← Bentonite from 0.20 to 0.30 mbg
				- occasional cobble/boulder, moist to wet, compact	← PVC pipe from 0.99 mag to 0.65 mbg
2			2.15		← Quartz sand from 0.30 to 2.15 mbg
					← 10-point slotted screen from 0.65 to 2.15 mbg
					193.58

Borehole terminated in sandy silt at 2.15 mbg.

BH LOGS WITH TERMINATION NOTES 85162.BOREHOLE LOGS.GPJ WILL BH LOGS WITH NVALUE.GDT 25-9-16



D.M. Wills Associates Limited
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WELL NUMBER MW24-03B

CLIENT Nirvana Homes
PROJECT NUMBER 21-85162
DATE STARTED 2024-01-04 **COMPLETED** 2024-01-04
DRILLING CONTRACTOR Canadian Environmental Drilling & Contractors Inc.
DRILLING METHOD 6" Solid Stem Auger with Split Spoons
LOGGED BY CO **CHECKED BY** LT
NOTES BH24-03B (nested well location)

PROJECT NAME 3491 Wallace Point Road
PROJECT LOCATION 3491 Wallace Point Road, Peterborough, ON
UTM EASTING 714333 **NORTHING** 4901057
GROUND ELEVATION 195.85 masl
GROUNDWATER LEVELS:
 ▼ **AT END OF DRILLING** 3.20 m / Elev 192.65 m
AFTER DRILLING - Flowing Artesian

BH LOGS WITH TERMINATION NOTES 85162.BOREHOLE LOGS.GPJ WILLS BH LOGS WITH NVALUE.GDT 25-9-16

DEPTH (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
1	SS-1	80	3-2-4-6 (6)	WL Jan 12-2024 - Flowing artesian conditions	0.30	TOPSOIL: Brown silty sand topsoil, trace clay, moist, loose	Casing Top Elev: 196.78 (m) Casing Type: Monument ← Cement seal at surface ← PVC pipe from 0.93 mbg to 4.60 mbg ← Bentonite from 0.20 to 4.30 mbg
	SS-2	89	3-7-7 (14)		195.55	SANDY SILT: Brown sandy silt, some gravel, trace clay, moist, loose - compact	
2	SS-3	56	3-8-10 (18)		2.30	- occasional cobble/boulder, moist to wet	193.55
	SS-4	96	6-6-10 (16)		3.80	SILT AND SAND: Grey silt and sand, trace to some gravel, trace clay, abundant cobble/boulder, moist, compact ▼ - some gravel to gravelly, occasional cobble/boulder	
4	SS-6	53	8-8-8 (16)		4.60	GRAVELLY SAND: Grey gravelly sand, some silt, trace clay, abundant cobble/boulders, moist, compact	191.25
	SS-7	91	12-8-7 (15)		6.55	SILTY SAND: Grey silty sand, some gravel, trace clay, abundant cobble/boulders, wet, compact - saturated, very loose	
6	SS-8	0	0-0-0 (0)		6.55		189.30

Borehole terminated in sandy silt at 6.55 mbg.
 Groundwater at 3.20 mbg in open borehole upon completion.



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WELL NUMBER MW24-04

CLIENT Nirvana Homes
PROJECT NUMBER 21-85162
DATE STARTED 2024-01-03 **COMPLETED** 2024-01-03
DRILLING CONTRACTOR Canadian Environmental Drilling & Contractors Inc.
DRILLING METHOD 6" Solid Stem Auger with Split Spoons
LOGGED BY CO **CHECKED BY** LT
NOTES BH24-04

PROJECT NAME 3491 Wallace Point Road
PROJECT LOCATION 3491 Wallace Point Road, Peterborough, ON
UTM EASTING 714150 **NORTHING** 4901068
GROUND ELEVATION 196.37 masl
GROUNDWATER LEVELS:
 ▼ **AT END OF DRILLING** 3.60 m / Elev 192.77 m
 ▼ **AFTER DRILLING** 0.49 m / Elev 195.88 m

BH LOGS WITH TERMINATION NOTES: 85162:BOREHOLE LOGS.GPJ WILL BH LOGS WITH NVALUE.GDT 25-9-16

DEPTH (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0.40	SS-1	42	3-2-2-2 (4)	WL Feb 12, 2024 - 0.49 mbg		TOPSOIL: Brown silty sand topsoil, trace clay, moist, very loose	
1.00	SS-2	44	3-3-5 (8)			SILT & SAND: Brown silt and sand, some gravel, some clay, occasional cobble/boulder, moist, loose	
2.30	SS-3	76	2-4-5 (9)			- abundant cobble/boulders, orange mottling	
4.60	SS-4	78	2-2-3 (5)	SANDY SILT: Grey-brown sandy silt, trace gravel, trace clay, wet, loose			
4.60	SS-5	49	2-4-5 (9)			- grey, occasional cobble/boulder	
6.55	SS-6	73	1-2-5 (7)	SAND: Grey sand, some silt, some clay, trace gravel, occasional cobble/boulder, saturated, very loose			
6.55	SS-7	84	1-1-2 (3)			- some gravel, loose	
6.55	SS-8	96	1-2-3 (5)				

Borehole terminated in sand at 6.55 mbg. Borehole caved to 3.65 mbg. Groundwater at 3.60 mbg upon completion.



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Peterborough, Ontario K9J 0B9

WELL NUMBER MW24-05

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CLIENT Nirvana Homes
PROJECT NUMBER 21-85162
DATE STARTED 2024-01-03 **COMPLETED** 2024-01-03
DRILLING CONTRACTOR Canadian Environmental Drilling & Contractors Inc.
DRILLING METHOD 6" Solid Stem Auger with Split Spoons
LOGGED BY CO **CHECKED BY** LT
NOTES BH24-05

PROJECT NAME 3491 Wallace Point Road
PROJECT LOCATION 3491 Wallace Point Road, Peterborough, ON
UTM EASTING 714241 **NORTHING** 4901046
GROUND ELEVATION 195.35 masl
GROUNDWATER LEVELS:
AT END OF DRILLING 3.35 m / Elev 192.00 m
AFTER DRILLING -0.31 m / Elev 195.66 m

BH LOGS WITH TERMINATION NOTES 85162 BOREHOLE LOGS.GPJ WILL BH LOGS WITH NVALUE.GDT 25-9-16

DEPTH (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
				WL Jan 12, /2024 - 0.31 mag			Casing Top Elev: 196.28 (m) Casing Type: Monument
1	SS-1	72	3-3-2-3 (5)			TOPSOIL: Brown silty sand topsoil, trace clay, moist, loose	← Cement seal at surface
						0.50	194.85
	SS-2	93	3-4-5 (9)			SILTY SAND: Brown silt and sand, trace gravel, trace clay, moist, loose	← PVC pipe from 0.93 mag to 2.15 mbg
						1.50	193.85
2	SS-3	91	3-2-4 (6)			SANDY SILT: Grey sandy silt, trace gravel, trace clay, moist, loose - occasional cobble/boulder	← Bentonite from 0.20 to 1.85 mbg
						- some gravel, wet	
3	SS-4	87	2-1-6 (7)				
						3.10	192.25
	SS-5	49	1-3-4 (7)			GRAVELLY SILTY SAND: Grey gravelly silty sand, trace clay, occasional cobble/boulder, saturated, loose	← Quartz sand from 1.85 to 5.20 mbg
						3.80	191.55
4	SS-6	62	3-8-18 (26)			SANDY SILT: Grey sandy silt, some gravel, trace clay, occasional cobble/boulder, moist, compact	← 10-point slotted screen from 2.15 to 5.20 mbg
						4.80	190.55
5	SS-7	71	12-30-36 (66)			- gravelly sand seam, saturated	
						SILT: Grey silt, some sand, trace gravel, trace clay, moist, very dense - abundant cobble/boulders	
						5.20	190.15

Borehole terminated in silt at 5.20 mbg on presumed cobble/boulders. Borehole caved to 3.80 mbg. Groundwater at 3.35 mbg upon completion.



D.M. Wills Associates Limited
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WELL NUMBER MW24-06A

CLIENT Nirvana Homes
PROJECT NUMBER 21-85162
DATE STARTED 2024-01-03 **COMPLETED** 2024-01-03
DRILLING CONTRACTOR Canadian Environmental Drilling & Contractors Inc.
DRILLING METHOD 6" Solid Stem Auger with Split Spoons
LOGGED BY CO **CHECKED BY** LT
NOTES BH24-06A (nested well location)

PROJECT NAME 3491 Wallace Point Road
PROJECT LOCATION 3491 Wallace Point Road, Peterborough, ON
UTM EASTING 714111 **NORTHING** 4900951
GROUND ELEVATION 196.82 masl
GROUNDWATER LEVELS:
AT END OF DRILLING -Dry
▼ AFTER DRILLING 0.39 m / Elev 196.43 m

DEPTH (m)	SAMPLE TYPE NUMBER	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
1		WL Apr 29, 2024 - 0.39 mbg		TOPSOIL: Brown silty sand topsoil, trace clay, moist, loose 196.57	<p>Casing Top Elev: 197.75 (m) Casing Type: Monument Cement seal at surface Bentonite from 0.20 to 0.30 mbg PVC pipe from 0.93 mag to 0.60 mbg Quartz sand from 0.30 to 2.15 mbg 10-point slotted screen from 0.60 to 2.15 mbg</p>
2			SILTY SAND: Brown silty sand, trace to some gravel, trace clay, moist, loose - wet 194.67		

Borehole terminated in silty sand at 2.15 mbg.

BH LOGS WITH TERMINATION NOTES 85162.BOREHOLE LOGS.GPJ WILL BH LOGS WITH NVALUE.GDT 25-9-16



D.M. Wills Associates Limited
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 Peterborough, Ontario K9J 0B9

WELL NUMBER MW24-06B

CLIENT Nirvana Homes
PROJECT NUMBER 21-85162
DATE STARTED 2024-01-03 **COMPLETED** 2024-01-03
DRILLING CONTRACTOR Canadian Environmental Drilling & Contractors Inc.
DRILLING METHOD 6" Solid Stem Auger with Split Spoons
LOGGED BY CO **CHECKED BY** LT
NOTES BH24-06B (nested well location)

PROJECT NAME 3491 Wallace Point Road
PROJECT LOCATION 3491 Wallace Point Road, Peterborough, ON
UTM EASTING 714110 **NORTHING** 4900951
GROUND ELEVATION 196.87 masl
GROUNDWATER LEVELS:
 ▼ **AT END OF DRILLING** 1.80 m / Elev 195.07 m
 ▼ **AFTER DRILLING** 0.93 m / Elev 195.94 m

BH LOGS WITH TERMINATION NOTES 85162.BOREHOLE LOGS.GPJ WILL BH LOGS WITH NVALUE.GDT 25-9-16

DEPTH (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0.25	SS-1	32	2-3-3-3 (6)	WL Apr 29, 2024 - 0.93 mbg		TOPSOIL: Brown silty sand topsoil, trace clay, moist, loose	Casing Top Elev: 197.76 (m) Casing Type: Monument ← Cement seal at surface
	SS-2	100	2-5-4 (9)			SILTY SAND: Brown silty sand, trace to some gravel, trace clay, moist, loose	← PVC pipe from 0.89 mag to 3.05 mbg
	SS-3	62	1-2-3 (5)			- wet	← Bentonite from 0.20 to 2.75 mbg
	SS-4	67	3-8-8 (16)			- occasional cobble/boulder, compact	
	SS-5	38	3-6-7 (13)			- brown sand lens (40cm thick)	
3.05	SS-6	62	7-28-26 (54)			SANDY SILT: Brown sandy silt, trace gravel, trace clay, wet, compact	
3.80	SS-7	64	17-44-35 (79)			SAND: Grey sand, some gravel, trace to some silt, occasional cobble/boulder, saturated, very dense	← Quartz sand from 2.75 to 6.10 mbg
6.55	SS-8	67	14-19-26 (45)			- dense	← 10-point slotted screen from 3.05 to 6.10 mbg

Borehole terminated in sand at 6.55 mbg. Borehole caved to 3.05 mbg. Groundwater at 1.80 mbg upon completion.



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 Peterborough, Ontario K9J 0B9

WELL NUMBER MW24-07

CLIENT Nirvana Homes
PROJECT NUMBER 21-85162
DATE STARTED 2024-01-04 **COMPLETED** 2024-01-04
DRILLING CONTRACTOR Canadian Environmental Drilling & Contractors Inc.
DRILLING METHOD 6" Solid Stem Auger with Split Spoons
LOGGED BY CO **CHECKED BY** LT
NOTES BH24-07

PROJECT NAME 3491 Wallace Point Road
PROJECT LOCATION 3491 Wallace Point Road, Peterborough, ON
UTM EASTING 714205 **NORTHING** 4900854
GROUND ELEVATION 198.26 masl
GROUNDWATER LEVELS:
 ▼ **AT END OF DRILLING** 1.75 m / Elev 196.51 m
 ▼ **AFTER DRILLING** 0.29 m / Elev 197.97 m

BH LOGS WITH TERMINATION NOTES: 85162:BOREHOLE LOGS.GPJ WILL BH LOGS WITH NVALUE.GDT 25-9-16

DEPTH (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0.20	SS-1	20	2-3-4-3 (7)	WL Apr 29, 2024 - 0.29 mbg		TOPSOIL: Brown silty sand topsoil, trace clay, moist, loose	
1.55	SS-2	58	5-8-7 (15)			SAND: Brown sand, trace gravel, some silt, trace clay, moist to wet, loose - compact	
1.55	SS-3	62	3-4-5 (9)			SILTY SAND: Brown silty sand, some gravel to gravelly, trace clay, saturated, loose	
	SS-4	36	6-11-14 (25)			- occasional cobble/boulder, compact	
	SS-5	44	11-13-13 (26)			- grey	
	SS-6	80	8-20-28 (48)			- occasional cobble/boulder, dense	
6.10	SS-7	127	13-14-41 (55)			SAND: Brown sand, trace gravel, trace silt, saturated, very dense	
6.55						Borehole terminated in sand at 6.55 mbg. Borehole caved to 1.80 mbg. Groundwater at 1.75 mbg upon completion.	

WELL DIAGRAM
 Casing Top Elev: 199.26 (m)
 Casing Type: Monument

← Cement seal at surface

← PVC pipe from 1.00 mag to 3.05 mbg

← Bentonite from 0.20 to 2.75 mbg

← Quartz sand from 2.75 to 6.10 mbg

← 10-point slotted screen from 3.05 to 6.10 mbg



D.M. Wills Associates Limited
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WELL NUMBER MW24-08

CLIENT Nirvana Homes
PROJECT NUMBER 21-85162
DATE STARTED 2024-01-04 **COMPLETED** 2024-01-04
DRILLING CONTRACTOR Canadian Environmental Drilling & Contractors Inc.
DRILLING METHOD 6" Solid Stem Auger with Split Spoons
LOGGED BY CO **CHECKED BY** LT
NOTES BH24-08

PROJECT NAME 3491 Wallace Point Road
PROJECT LOCATION 3491 Wallace Point Road, Peterborough, ON
UTM EASTING 714030 **NORTHING** 4900685
GROUND ELEVATION 198.81 masl
GROUNDWATER LEVELS:
AT END OF DRILLING -Dry
AFTER DRILLING 1.17 m / Elev 197.64 m

BH LOGS WITH TERMINATION NOTES 85162:BOREHOLE LOGS.GPJ WILL BH LOGS WITH NVALUE.GDT 25-9-16

DEPTH (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0.20	SS-1	32	3-3-2-2 (5)	WL Feb 12, 2024 - 1.17 mbg	[Pattern]	TOPSOIL: Brown silty sand topsoil, trace clay, moist, loose	Casing Top Elev: 199.73 (m) Casing Type: Monument Cement seal at surface
1.00	SS-2	62	1-1-2 (3)		[Pattern]	SILTY SAND: Brown silty sand, some gravel, some clay, moist, loose - very loose	PVC pipe from 0.92 mag to 3.95 mbg
2.00	SS-3	69	3-2-12 (14)		[Pattern]	- occasional cobble/boulder, wet, compact	Bentonite from 0.20 to 3.65 mbg
3.00	SS-4	42	5-8-20 (28)		[Pattern]	- occasional cobble/boulder, moist	Quartz sand from 3.65 to 5.45 mbg
4.00	SS-5	67	8-7-10 (17)		[Pattern]	- wet to saturated	10-point slotted screen from 3.95 to 5.45 mbg
5.00	SS-6	56	1-2-3 (5)		[Pattern]	SAND: Brown sand, trace silt, saturated, loose	
6.00	SS-7	100	5-14-19 (33)		[Pattern]	- occasional cobble/boulder, moist, compact	
6.55				Borehole terminated in gravel at 6.55 mbg. Borehole caved to 2.60 mbg and dry upon completion.	[Pattern]		



D.M. Wills Associates Limited
 150 Jameson Drive
 Peterborough, Ontario K9J 0B9

WELL NUMBER MW24-09A

CLIENT Nirvana Homes
PROJECT NUMBER 21-85162
DATE STARTED 2024-01-04 **COMPLETED** 2024-01-04
DRILLING CONTRACTOR Canadian Environmental Drilling & Contractors Inc.
DRILLING METHOD 6" Solid Stem Auger with Split Spoons
LOGGED BY CO **CHECKED BY** LT
NOTES BH24-09A (nested well location)

PROJECT NAME 3491 Wallace Point Road
PROJECT LOCATION 3491 Wallace Point Road, Peterborough, ON
UTM EASTING 714455 **NORTHING** 4900834
GROUND ELEVATION 202.94 masl
GROUNDWATER LEVELS:
AT END OF DRILLING -Dry
AFTER DRILLING -Dry

DEPTH (m)	SAMPLE TYPE NUMBER	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
1				<p>TOPSOIL: Brown silty sand topsoil, trace clay, moist, loose</p> <p>SILTY SAND: Brown silty sand, some gravel, trace clay, moist, compact</p>	<p>Casing Top Elev: 203.93 (m) Casing Type: Monument</p> <p>← Cement seal at surface</p> <p>← Bentonite from 0.20 to 0.30 mbg</p> <p>← PVC pipe from 0.99 mag to 0.65 mbg</p> <p>← Quartz sand from 0.30 to 2.15 mbg</p> <p>← 10-point slotted screen from 0.65 to 2.15 mbg</p>
2		WL Jan 12, 2024 - DRY			

Borehole terminated in silty sand at 2.15 mbg.

BH LOGS WITH TERMINATION NOTES 85162.BOREHOLE LOGS.GPJ WILL BH LOGS WITH NVALUE.GDT 25-9-16



D.M. Wills Associates Limited
 150 Jameson Drive
 Peterborough, Ontario K9J 0B9

WELL NUMBER MW24-09B

CLIENT Nirvana Homes
PROJECT NUMBER 21-85162
DATE STARTED 2024-01-04 **COMPLETED** 2024-01-04
DRILLING CONTRACTOR Canadian Environmental Drilling & Contractors Inc.
DRILLING METHOD 6" Solid Stem Auger with Split Spoons
LOGGED BY CO **CHECKED BY** LT
NOTES BH24-09B (nested well location)

PROJECT NAME 3491 Wallace Point Road
PROJECT LOCATION 3491 Wallace Point Road, Peterborough, ON
UTM EASTING 714454 **NORTHING** 4900841
GROUND ELEVATION 202.99 masl
GROUNDWATER LEVELS:
 ▼ **AT END OF DRILLING** 6.40 m / Elev 196.59 m
 ▼ **AFTER DRILLING** 4.38 m / Elev 198.61 m

BH LOGS WITH TERMINATION NOTES: 85162:BOREHOLE LOGS.GPJ WILL BH LOGS WITH NVALUE.GDT 25-9-16


DEPTH (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	REMARKS	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0.15						202.84	Casing Top Elev: 203.94 (m) Casing Type: Monument
0.15 - 0.95	SS-1	67	4-3-5-6 (8)			TOPSOIL: Brown silty sand topsoil, trace clay, moist, loose	← Cement seal at surface
0.95 - 1.60	SS-2	67	5-4-22 (26)			SILTY SAND: Brown silty sand, some gravel, trace clay, moist, loose	
1.60 - 2.10						- compact	← PVC pipe from 0.95 mag to 4.60 mbg
2.10 - 2.70	SS-3	49	16-18-18 (36)			- occasional cobble/boulders, dense	
2.70 - 3.20						- trace to some clay, compact	← Bentonite from 0.20 to 4.30 mbg
3.20 - 3.80	SS-4	53	5-8-11 (19)				
3.80 - 4.30	SS-5	71	13-21-18 (39)			- occasional cobble/boulder, dense	
4.30 - 4.60						- trace gravel, occasional cobble/boulder	
4.60 - 4.65				WL Apr 23, 2025 - 4.38 mbg			
4.65 - 4.30	SS-6	64	10-16-23 (39)				
4.30 - 4.60							← Quartz sand from 4.30 to 6.10 mbg
4.60 - 4.65	SS-7	73	12-22-25 (47)			SAND: Brown sand, some silt, wet, dense	← 10-point slotted screen from 4.60 to 6.10 mbg
4.65 - 6.10							
6.10 - 6.55	SS-8	73	6-25-35 (60)			GRAVELLY SAND: Brown gravelly sand, some silt, trace clay, abundant cobble, wet to saturated, very dense	
6.55 - 6.40							

Borehole terminated in gravelly sand at 6.55 mbg.
 Groundwater level at 6.40 mbg in open borehole upon completion.



Project Number: 21-85261
Project Location: 3491 Wallace Point Road, Otonabee-South Monaghan
Project Name: Wallace Point Subdivision
Client: Nirvana Homes


Test Pit – TP22-01

Excavation Date: June 20, 2022		Elevation: 197.540 masl	UTM: 17T 713994 m E, 4800777 m N
Depth (mbg)	Soil Description		
0.0 – 0.9	Brown sandy silt topsoil, trace clay, moist		
0.9 - 1.4	Light brown sandy silt, some clay, moist		
1.4 – 2.9	Grey to light brown silty sand, some clay, trace gravel, occasional cobble, orange-brown mottling, moist to wet below 1.0 mbg		
Groundwater			
<ul style="list-style-type: none">Minor groundwater seepage at 1.0 mbg			
Additional Notes			
<ul style="list-style-type: none">Test pit terminated at 2.9 mbg0.1 m of pooling water in test pit upon completionTest pit backfilled and nominally compacted using excavator following completion of stratigraphic logging and sampling			
Test Pit Photos			
			



Project Number: 21-85261
Project Location: 3491 Wallace Point Road, Otonabee-South Monaghan
Project Name: Wallace Point Subdivision
Client: Nirvana Homes


Test Pit – TP22-02

Date Completed: June 20, 2022		Elevation: 201.889 masl	UTM: 17T 714016 m E, 4900575 m N
Depth (mbg)	Soil Description		
0.0 – 1.1	Brown sandy silt topsoil, trace clay, moist		
1.1 – 2.9	Light brown silty sand, some clay, trace gravel, occasional cobble below 2.3 mbg, moist to wet below 1.8 m		
Grab Sample Summary			
GS-02 collected at approximately 1.2 mbg	<u>GS2 GSA:</u> 0% Gravel 64% Sand 24% Silt 12% Clay		
Groundwater			
<ul style="list-style-type: none">Groundwater seepage at 2.2 mbg			
Additional Notes			
<ul style="list-style-type: none">Test pit terminated at 2.9 mbgTest pit walls sloughing below 2.2 mbg0.2 m of pooling water in test pit upon completionTest pit backfilled and nominally compacted using excavator following completion of stratigraphic logging and sampling			
Test Pit Photos			
			



Project Number: 21-85261
Project Location: 3491 Wallace Point Road, Otonabee-South Monaghan
Project Name: Wallace Point Subdivision
Client: Nirvana Homes


Test Pit – TP22-03

Date Completed: June 20, 2022		Elevation: 206.581 masl	UTM: 17T 714172 m E, 4900605 m N
Depth (mbg)	Soil Description		
0.0 – 0.2	Brown sandy silt topsoil, trace clay, moist		
0.2 – 0.6	Light brown sandy silt, some clay, moist		
0.6 – 2.7	Light grey-brown sandy silt, some clay, trace gravel, occasional cobble/boulder, moist		
Grab Sample Summary			
GS-03 collected at approximately 1.2 mbg	<u>GS3 GSA:</u> 2% Gravel 29% Sand 49% Silt 20% Clay		
Groundwater			
<ul style="list-style-type: none">Groundwater not encountered			
Additional Notes			
<ul style="list-style-type: none">Test pit terminated at 2.7 mbgTest pit backfilled and nominally compacted using excavator following completion of stratigraphic logging and sampling			
Test Pit Photos			
			



Project Number: 21-85261
Project Location: 3491 Wallace Point Road, Otonabee-South Monaghan
Project Name: Wallace Point Subdivision
Client: Nirvana Homes


Test Pit – TP22-04

Date Completed: June 20, 2022		Elevation: 201.163 masl	UTM: 17T 714478 m E, 4900745 m N
Depth (mbg)	Soil Description		
0.0 – 0.5	Brown sandy silt topsoil, trace clay, moist		
0.5 – 2.9	Light orange-brown to light grey-brown sandy silt, some clay, trace to some gravel, moist to wet below 2.1 mbg		
Groundwater			
<ul style="list-style-type: none">Groundwater encountered at 2.1 mbg			
Additional Notes			
<ul style="list-style-type: none">Test pit terminated at 2.9 mbg0.1 m of pooling water in test pit upon completionTest pit backfilled and nominally compacted using excavator following completion of stratigraphic logging and sampling			
Test Pit Photos			
			



Project Number: 21-85261
Project Location: 3491 Wallace Point Road, Otonabee-South Monaghan
Project Name: Wallace Point Subdivision
Client: Nirvana Homes


Test Pit – TP22-05

Date Completed: June 20, 2022		Elevation: 195.699 masl	UTM: 17T 714363 m E, 4901125 m N
Depth (mbg)	Soil Description		
0.0 – 0.3	Brown sandy silt topsoil, trace clay, moist		
0.3 - 1.4	Light brown to grey clayey silt, trace sand, some gravel, occasional cobble, drier than plastic limit		
1.4 – 2.7	Grey sandy silt, some clay, increasing cobble content with depth, wet		
Groundwater			
<ul style="list-style-type: none">Groundwater seepage at 1.4 mbg			
Additional Notes			
<ul style="list-style-type: none">Test pit terminated at 2.7 mbgTest pit backfilled and nominally compacted using excavator following completion of stratigraphic logging and sampling			
Test Pit Photos			
			



Project Number: 21-85261
Project Location: 3491 Wallace Point Road, Otonabee-South Monaghan
Project Name: Wallace Point Subdivision
Client: Nirvana Homes


Test Pit – TP22-06

Date Completed: June 20, 2022		Elevation: 194.991masl	UTM: 17T 714306 m E, 4901184 m N
Depth (mbg)	Soil Description		
0.0 – 0.3	Brown sandy silt topsoil, trace clay, some gravel, moist		
0.3 – 2.7	Grey to orange-brown sand and silt, some clay, some gravel, occasional cobble below 1.8 m, moist to wet below 1.1 mbg		
Grab Sample Summary			
GS-02 - collected at approximately 0.9 mbg	<u>GS2 GSA:</u> 16% Gravel 36% Sand 35% Silt 13% Clay		
Groundwater			
<ul style="list-style-type: none">Groundwater seepage at 1.1 mbg			
Additional Notes			
<ul style="list-style-type: none">Test pit terminated at 2.7 mbgTest pit backfilled and nominally compacted using excavator following completion of stratigraphic logging and sampling			
Test Pit Photos			
			



Project Number: 21-85261
Project Location: 3491 Wallace Point Road, Otonabee-South Monaghan
Project Name: Wallace Point Subdivision
Client: Nirvana Homes


Test Pit – TP22-07

Date Completed: June 20, 2022		Elevation: 195.670 masl	UTM: 17T 714246 m E, 4901136 m N
Depth (mbg)	Soil Description		
0.0 – 0.5	Brown sandy silt topsoil, trace clay, moist		
0.5 - 1.8	Light brown to grey sandy silt to sand and silt, some clay, trace gravel, occasional cobble, moist		
Groundwater			
<ul style="list-style-type: none">Groundwater not encountered			
Additional Notes			
<ul style="list-style-type: none">Test pit terminated at 1.8 mbgTest pit backfilled and nominally compacted using excavator following completion of stratigraphic logging and sampling			
Test Pit Photos			
			



Project Number: 21-85261
Project Location: 3491 Wallace Point Road, Otonabee-South Monaghan
Project Name: Wallace Point Subdivision
Client: Nirvana Homes


Test Pit – TP22-08

Date Completed: June 20, 2022		Elevation: 196.848 masl	UTM: 17T 714110 m E, 4900977 m N
Depth (mbg)	Soil Description		
0.0 – 0.5	Brown sandy silt topsoil, trace clay, moist.		
0.5 – 2.7	Grey to light orange-brown, sandy clayey silt, trace to some gravel, occasional cobble, moist		
Groundwater			
<ul style="list-style-type: none">Groundwater not encountered			
Additional Notes			
<ul style="list-style-type: none">Test pit terminated at 2.7 mbgTest pit backfilled and nominally compacted using excavator following completion of stratigraphic logging and sampling			
Test Pit Photos			
			



Project Number: 21-85261
Project Location: 3491 Wallace Point Road, Otonabee-South Monaghan
Project Name: Wallace Point Subdivision
Client: Nirvana Homes


Test Pit – TP22-09

Date Completed: June 20, 2022		Elevation: 196.924 masl	UTM: 17T 714216 m E, 4900901 m N
Depth (mbg)	Soil Description		
0.0 – 0.3	Brown sandy silt topsoil, trace clay, moist.		
0.3 – 2.4	Light grey-brown to orange-brown sandy silt, some clay to clayey, trace gravel, occasional cobble below 1.2 mbg, moist.		
Groundwater			
<ul style="list-style-type: none">Groundwater not encountered			
Additional Notes			
<ul style="list-style-type: none">Test pit terminated at 2.4 mbgWalls collapsing below 1.1 mbg upon test pit completionTest pit backfilled and nominally compacted using excavator following completion of stratigraphic logging and sampling			
Test Pit Photos			
			



Project Number: 21-85261
Project Location: 3491 Wallace Point Road, Otonabee-South Monaghan
Project Name: Wallace Point Subdivision
Client: Nirvana Homes


Test Pit – TP22-10

Date Completed: June 20, 2022		Elevation: 197.349 masl	UTM: 17T 714175 m E, 4900837 m N
Depth (mbg)	Soil Description		
0.0 – 0.3	Brown sandy silt topsoil, some clay, moist		
0.3 - 1.2	Light brown to grey sandy silt, some clay, trace gravel, moist		
1.4 – 2.9	Grey to light brown clayey silt, drier than plastic limit		
Groundwater			
<ul style="list-style-type: none">Groundwater not encountered			
Additional Notes			
<ul style="list-style-type: none">Test pit terminated at 2.9 mbgTest pit backfilled and nominally compacted using excavator following completion of stratigraphic logging and sampling			
Test Pit Photos			
			



Project Number: 21-85261
Project Location: 3491 Wallace Point Road, Otonabee-South Monaghan
Project Name: Wallace Point Subdivision
Client: Nirvana Homes


Test Pit – TP23-01

Excavation Date: December 13, 2023		Elevation: 196.19 masl	UTM: 17T 714169 m E 4901026 m N
Depth (mbg)	Soil Description		
0.0 – 0.5	Brown silty sand topsoil, trace clay, moist		
0.5 – 1.8	Brown-grey gravelly silty sand, some clay, moist		
1.8 – 3.0	Grey silty sand, some gravel, some clay, occasional cobble, wet		
Groundwater			
<ul style="list-style-type: none"> No groundwater seepage observed. 			
Laboratory GSA Summary			
GS2 Collected at approximately 0.75 mbg	Gravel: 22% Sand: 37% Silt: 30% Clay: 11%		
Additional Notes			
<ul style="list-style-type: none"> Test pit terminated at 3.0 mbg. Test pit backfilled and nominally compacted using excavator following completion of stratigraphic logging and sampling. 			
Test Pit Photos			
			



Project Number: 21-85261
Project Location: 3491 Wallace Point Road, Otonabee-South Monaghan
Project Name: Wallace Point Subdivision
Client: Nirvana Homes



Test Pit – TP23-02

Excavation Date: December 13, 2023		Elevation: 195.41 masl	UTM: 17T 714304 m E, 4901083 m N
Depth (mbg)	Soil Description		
0.0 – 0.4	Brown silty sand topsoil, trace clay, moist		
0.4 – 1.5	Brown-grey silt and sand, some gravel, some clay, moist to wet		
1.5 – 3.1	Grey sandy silt, some gravel, some clay, occasional cobbles/boulders, wet		
Groundwater			
<ul style="list-style-type: none">No groundwater seepage observed.			
Additional Notes			
<ul style="list-style-type: none">Test pit terminated at 3.1 mbg.No groundwater pooling observed in test pit upon completion.Test pit backfilled and nominally compacted using excavator following completion of stratigraphic logging and sampling.			
Test Pit Photos			
			



Project Number: 21-85261
Project Location: 3491 Wallace Point Road, Otonabee-South Monaghan
Project Name: Wallace Point Subdivision
Client: Nirvana Homes

Test Pit – TP23-03

Excavation Date: December 13, 2023		Elevation: 195.82 masl	UTM: 17T 714169 m E, 4901026 m N
Depth (mbg)	Soil Description		
0.0 – 0.4	Brown silty sand topsoil, trace clay, moist		
0.4 – 2.8	Brown-grey silt and sand, some gravel, some clay, moist		
2.8 – 3.1	Brown-grey sandy silt, some gravel, trace clay, orange mottling, abundant cobbles/boulders, wet		
Groundwater			
<ul style="list-style-type: none"> No groundwater seepage observed. 			
Laboratory GSA Summary			
GS2 Collected at approximately 0.8 mbg		Gravel: 13% Sand: 40% Silt: 37% Clay: 10%	
Additional Notes			
<ul style="list-style-type: none"> Test pit terminated at 3.1 mbg. No groundwater pooling observed in test pit upon completion. Test pit backfilled and nominally compacted using excavator following completion of stratigraphic logging and sampling. 			
Test Pit Photos			
			



Project Number: 21-85261
Project Location: 3491 Wallace Point Road, Otonabee-South Monaghan
Project Name: Wallace Point Subdivision
Client: Nirvana Homes

Test Pit – TP23-04

Excavation Date: December 13, 2023		Elevation: 196.25 masl	UTM: 17T 714271 m E, 4901000 m N
Depth (mbg)	Soil Description		
0.0 – 0.2	Brown silty sand topsoil, trace clay, moist		
0.2 – 2.5	Brown-grey silt and sand, some gravel, some clay, moist to wet		
2.5 – 3.0	Grey sand, some silt, saturated		
Groundwater			
<ul style="list-style-type: none">Minimal groundwater seepage observed at 1.0 mbg.			
Additional Notes			
<ul style="list-style-type: none">Test pit terminated at 3.0 mbg.Groundwater seepage not significant enough to cause pooling upon test pit completion.Test pit backfilled and nominally compacted using excavator following completion of stratigraphic logging and sampling.			
Test Pit Photos			




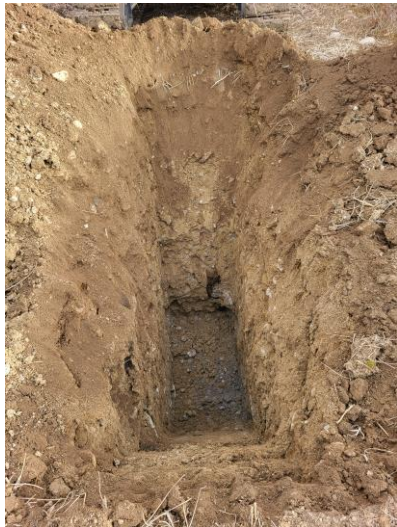
Project Number: 21-85261

Project Location: 3491 Wallace Point Road, Otonabee-South Monaghan

Project Name: Wallace Point Subdivision

Client: Nirvana Homes



Test Pit – TP23-05

Excavation Date: December 13, 2023		Elevation: 197.62 masl	UTM: 17T 714386 m E, 4900998 m N
Depth (mbg)	Soil Description		
0.0 – 0.2	Brown silty sand topsoil, trace clay, moist		
0.2 – 1.0	Brown silty sand, trace to some gravel, occasional cobbles/boulders, moist		
1.0 – 3.1	Brown-grey silty sand and gravel, trace clay, abundant cobbles/boulders, moist to wet		
Groundwater			
<ul style="list-style-type: none"> No groundwater seepage observed. 			
Laboratory GSA Summary			
<p>GS3 Collected at approximately 1.4 mbg</p>		<p>Gravel: 33% Sand: 31% Silt: 28% Clay: 8%</p>	
Additional Notes			
<ul style="list-style-type: none"> Test pit terminated at 3.1 mbg. No groundwater pooling observed in test pit upon completion. Test pit backfilled and nominally compacted using excavator following completion of stratigraphic logging and sampling. 			
Test Pit Photos			
			



Project Number: 21-85261
Project Location: 3491 Wallace Point Road, Otonabee-South Monaghan
Project Name: Wallace Point Subdivision
Client: Nirvana Homes

Test Pit – TP23-06

Excavation Date: December 13, 2023		Elevation: 199.01 masl	UTM: 17T 714287 m E, 4900910 m N
Depth (mbg)	Soil Description		
0.0 – 0.3	Brown silty sand topsoil, trace clay, moist		
0.3 – 2.8	Brown silty sand and gravel, trace clay, occasional cobbles/boulders, moist to wet		
Groundwater			
<ul style="list-style-type: none">Minimal groundwater seepage observed at 1.8 mbg.			
Additional Notes			
<ul style="list-style-type: none">Test pit terminated at 2.8 mbg.Test pit backfilled and nominally compacted using excavator following completion of stratigraphic logging and sampling.			
Test Pit Photos			
			



Project Number: 21-85261
Project Location: 3491 Wallace Point Road, Otonabee-South Monaghan
Project Name: Wallace Point Subdivision
Client: Nirvana Homes


Test Pit – TP23-07

Excavation Date: December 13, 2023		Elevation: masl	UTM: 17T 714447 m E, 4900891 m N
Depth (mbg)	Soil Description		
0.0 – 0.5	Brown silty sand topsoil, trace clay, moist		
0.5 – 1.2	Brown sandy silt, some clay, moist		
1.2 – 3.3	Brown-grey sandy silt, trace clay, moist		
Groundwater			
<ul style="list-style-type: none"> No groundwater seepage observed. 			
Laboratory GSA Summary			
GS2 Collected at approximately 1.1 mbg		Gravel: 0% Sand: 23% Silt: 65% Clay: 12%	
Additional Notes			
<ul style="list-style-type: none"> Test pit terminated at 3.3 mbg. Test pit backfilled and nominally compacted using excavator following completion of stratigraphic logging and sampling. 			
Test Pit Photos			



Project Number: 21-85261
Project Location: 3491 Wallace Point Road, Otonabee-South Monaghan
Project Name: Wallace Point Subdivision
Client: Nirvana Homes


Test Pit – TP23-08

Excavation Date: December 13, 2023		Elevation: 203.94 masl	UTM: 17T 714420 m E, 4900771 m N
Depth (mbg)	Soil Description		
0.0 – 0.3	Brown silty sand topsoil, trace clay, moist		
0.3 – 2.6	Brown gravelly silty sand, trace clay, occasional cobble/boulder, moist		
2.6 – 3.1	Brown gravelly sand, some silt, occasional cobble/boulder, moist		
Groundwater			
<ul style="list-style-type: none">No groundwater seepage observed.			
Additional Notes			
<ul style="list-style-type: none">Test pit terminated at 3.1 mbg.No groundwater pooling observed in test pit upon completion.Test pit backfilled and nominally compacted using excavator following completion of stratigraphic logging and sampling.			
Test Pit Photos			
			



Project Number: 21-85261
Project Location: 3491 Wallace Point Road, Otonabee-South Monaghan
Project Name: Wallace Point Subdivision
Client: Nirvana Homes

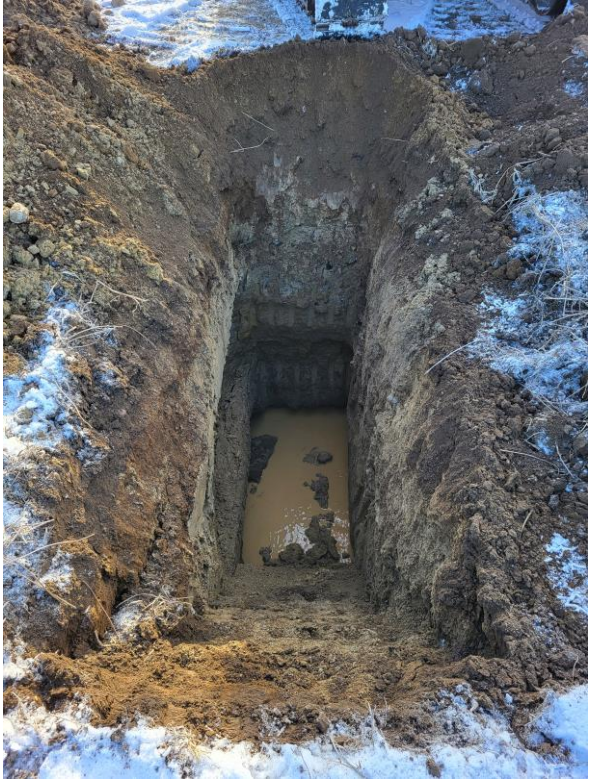
Test Pit – TP23-09

Excavation Date: December 13, 2023		Elevation: 205.01 masl	UTM: 17T 714262 m E, 4900698 m N
Depth (mbg)	Soil Description		
0.0 – 0.3	Brown silty sand topsoil, trace clay, moist		
0.3 – 0.9	Brown gravelly silty sand, trace clay, occasional cobble/boulder, moist		
0.9 – 2.1	Brown sand and gravel, trace silt, occasional cobbles/boulders, moist		
2.1 – 3.1	Brown sand, trace gravel, trace silt, moist		
Groundwater			
<ul style="list-style-type: none"> No groundwater seepage observed. 			
Laboratory GSA Summary			
GS3 Collected at approximately 1.5 mbg	Gravel: 57% Sand: 35% Silt & Clay: 8%		
Additional Notes			
<ul style="list-style-type: none"> Test pit terminated at 3.1 mbg. No groundwater pooling observed in test pit upon completion. Test pit backfilled and nominally compacted using excavator following completion of stratigraphic logging and sampling. 			
Test Pit Photos			
			



Project Number: 21-85261
Project Location: 3491 Wallace Point Road, Otonabee-South Monaghan
Project Name: Wallace Point Subdivision
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Test Pit – TP23-10

Excavation Date: December 13, 2023		Elevation: 200.85 masl	UTM: 17T 714078 m E, 4900653 m N
Depth (mbg)	Soil Description		
0.0 – 0.4	Brown silty sand topsoil, trace clay, moist		
0.4 – 2.0	Brown silty sand, some gravel, trace to some clay, occasional cobble/boulder, moist to wet		
2.0 – 3.3	Brown silt and sand, saturated		
Groundwater			
<ul style="list-style-type: none">Groundwater seepage observed at 2.0 mbg.			
Additional Notes			
<ul style="list-style-type: none">Test pit terminated at 3.3 mbg and caved to 2.8 mbg.20 cm of groundwater pooling observed in test pit upon completion.Test pit backfilled and nominally compacted using excavator following completion of stratigraphic logging and sampling.			
Test Pit Photos			
			



Project Number: 21-85261
Project Location: 3491 Wallace Point Road, Otonabee-South Monaghan
Project Name: Wallace Point Subdivision
Client: Nirvana Homes

Test Pit – TP23-11

Excavation Date: December 13, 2023		Elevation: 197.64 masl	UTM: 17T 713981 m E, 4900739 m N
Depth (mbg)	Soil Description		
0.0 – 0.5	Brown silty sand topsoil, trace clay, moist		
0.5 – 3.2	Brown silt and sand, some gravel, some clay, occasional cobble/boulder, moist to wet.		
Groundwater			
<ul style="list-style-type: none"> No groundwater seepage observed. 			
Laboratory GSA Summary			
<p>GS2 Collected at approximately 0.8 mbg</p>		<p>Gravel: 16% Sand: 35% Silt: 36% Clay: 13%</p>	
Additional Notes			
<ul style="list-style-type: none"> Test pit terminated at 3.2 mbg. No groundwater pooling observed in test pit upon completion. Test pit backfilled and nominally compacted using excavator following completion of stratigraphic logging and sampling. 			
Test Pit Photos			
			




Project Number: 21-85261

Project Location: 3491 Wallace Point Road, Otonabee-South Monaghan

Project Name: Wallace Point Subdivision

Client: Nirvana Homes

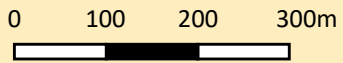
Test Pit – TP23-12

Excavation Date: December 13, 2023		Elevation: 200.51 masl	UTM: 17T 714220 m E, 4900810 m N
Depth (mbg)	Soil Description		
0.0 – 0.2	Brown silty sand topsoil, trace clay, moist		
0.2 – 3.1	Brown silty sand, some gravel, trace clay, occasional cobble/boulder, moist.		
Groundwater			
<ul style="list-style-type: none">No groundwater seepage observed.			
Additional Notes			
<ul style="list-style-type: none">Test pit terminated at 3.1 mbg.No groundwater pooling observed in test pit upon completion.Test pit backfilled and nominally compacted using excavator following completion of stratigraphic logging and sampling.			
Test Pit Photos			
			




Appendix C

OGS Mapping





Legend

-  Till Plains (Drumlinized)
-  Drumlins
-  Subject Property Boundary

Regional Physiography Map

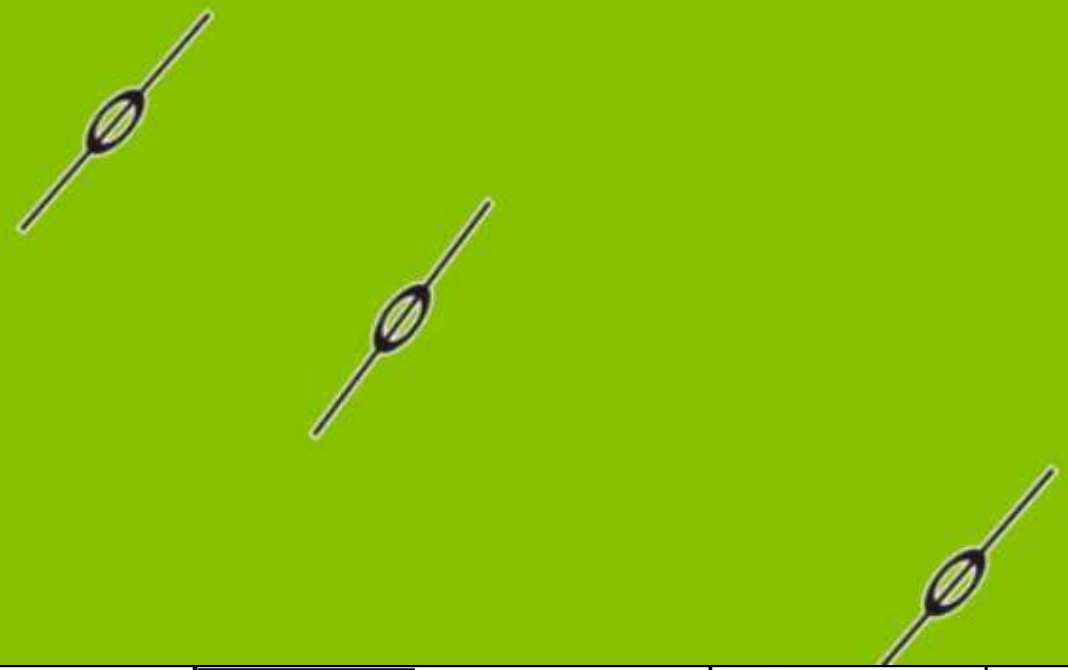
Hydrogeological Study
949 Eighth Line, Lakefield, Township
of Selwyn, Ontario






D.M. Wills Associates Limited
150 Jameson Drive
Peterborough, Ontario
Canada K9J 0B9

P. 705.742.2297
F. 705.749.9944
E. wills@dmwills.com

Drawn By	LT	Scale	See Scale Bar
Checked	IA	Date	March 2022
Project No.	22-85260	Drawing File No.	APP-B1



-  Stone-poor, sandy silt to silty sand-textured
-  Drumlin, Drumlinoid Ridges
-  Subject Property Boundary

Legend

Regional Surficial Geology Map

Hydrogeological Study
949 Eighth Line, Lakefield, Township
of Selwyn, Ontario



D.M. Wills Associates Limited
150 Jameson Drive
Peterborough, Ontario
Canada K9J 0B9

P. 705.742.2297
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E. wills@dmwills.com



Drawn By	LT	Scale	See Scale Bar
Checked	IA	Date	March 2022
Project No.	22-85260	Drawing File No.	APP-B2



0 100 200 300m



Legend

-  Clastic Metasedimentary Rocks
-  Subject Property

Regional Bedrock Geology Map
Hydrogeological Study
949 Eighth Line, Lakefield, Township
of Selwyn, Ontario



D.M. Wills Associates Limited
150 Jameson Drive
Peterborough, Ontario
Canada K9J 0B9
P. 705.742.2297
F. 705.749.9944
E. wills@dmwills.com

Drawn By	LT	Scale	See Scale Bar
Checked	IA	Date	March 2022
Project No.	22-85260	Drawing File No.	APP-B3

Appendix D

Certificates of Analysis – Physical Soil Testing



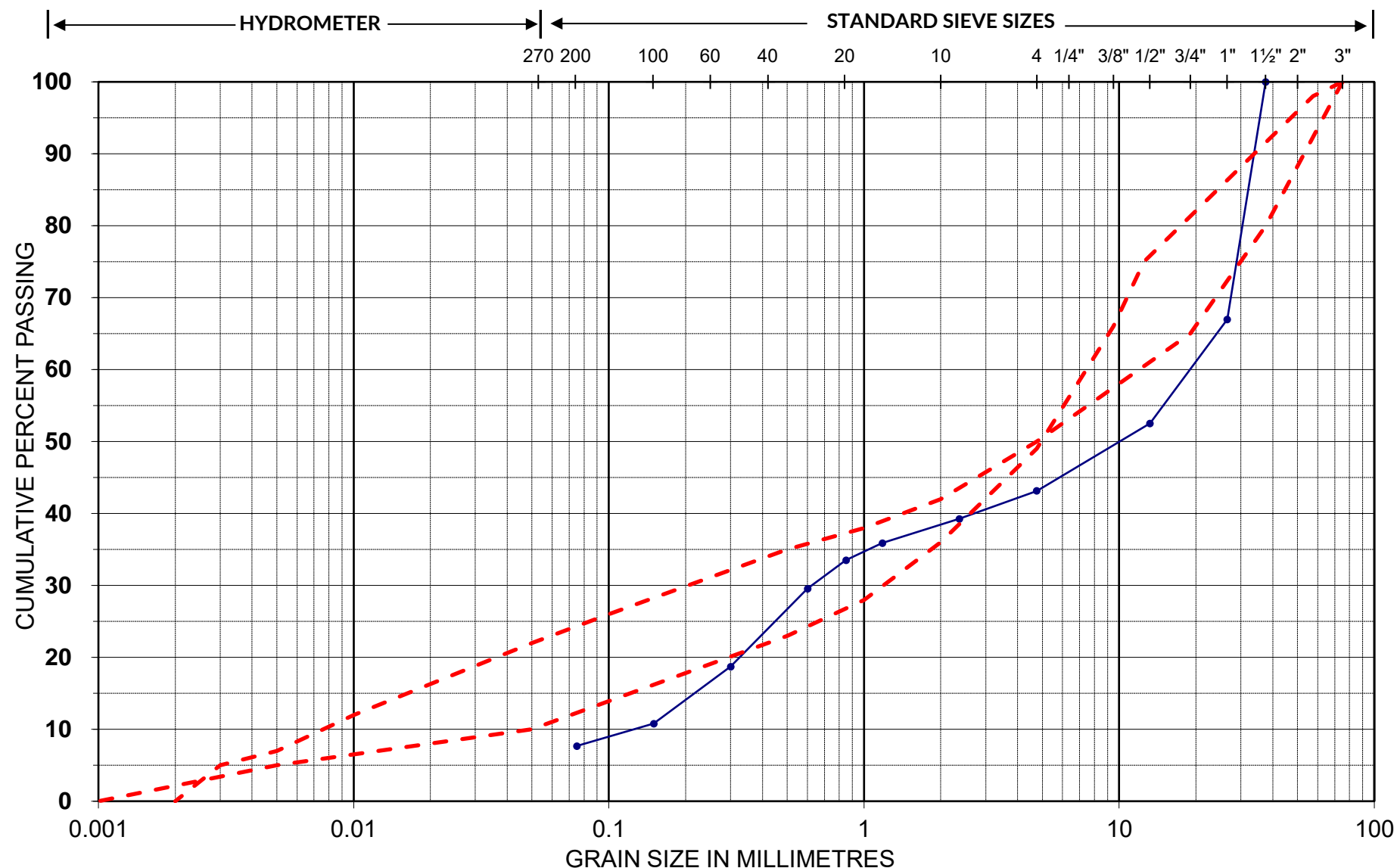
PRI ENGINEERING

205 St. George Street, Unit 2, Lindsay, ON, K9V 5Z9
 (705) 702-3921
 info@priengineering.com
 www.priengineering.com

SIEVE ANALYSIS

LS - 602
 T-Time Analysis
 MMAH Supplementary Standard SB-6

Project Name: Wallace Point Rd (85162) Project No.: 22-154 Sample Date: 13-Dec-23
 Site ID: TP23-09 Sample No./Depth: GS3 / 1.5 m LAB ID: 24GSA-003



Silt or Clay	Sand	Gravel
--------------	------	--------

----- GM envelope T = 4 - 12 min/cm

Estimated T = 4 min/cm

Sieve Size (mm)	% Passing
37.5	100.0
26.5	67.0
13.2	52.5
4.75	43.1
2.36	39.3

Sieve Size (mm)	% Passing
1.180	35.9
0.600	29.5
0.300	18.7
0.150	10.8
0.075	7.7

NOTES

Percolation rates are based on the Supplementary Standard to the Ontario Building Code 2012 document *Percolation Time and Soil Descriptions* (SB-5). It should be noted, PRI did not conduct field investigations in conjunction with the sample collection, or witness the collection of the sample tested. PRI assumes no responsibility for the application of the above-noted percolation rate ("T"-Time) for use in design of an on-site sewage disposal system. The design of an on-site sewage system must be conducted by a qualified professional with due regard for a number of site-specific conditions in addition to the percolation rate of the soil. The client or any third party using this information as a basis for design assumes all risk associated with their evaluation of this report and all other criteria used in the design of any private sewage disposal system. This report is based entirely on the grain size distribution curve of the soil sample submitted for analysis. Additional analyses may be required following any future processing of the subject material or following supply of the material to individual sites for use in any tile bed construction.

Project Name: Wallace Point Rd (85612)

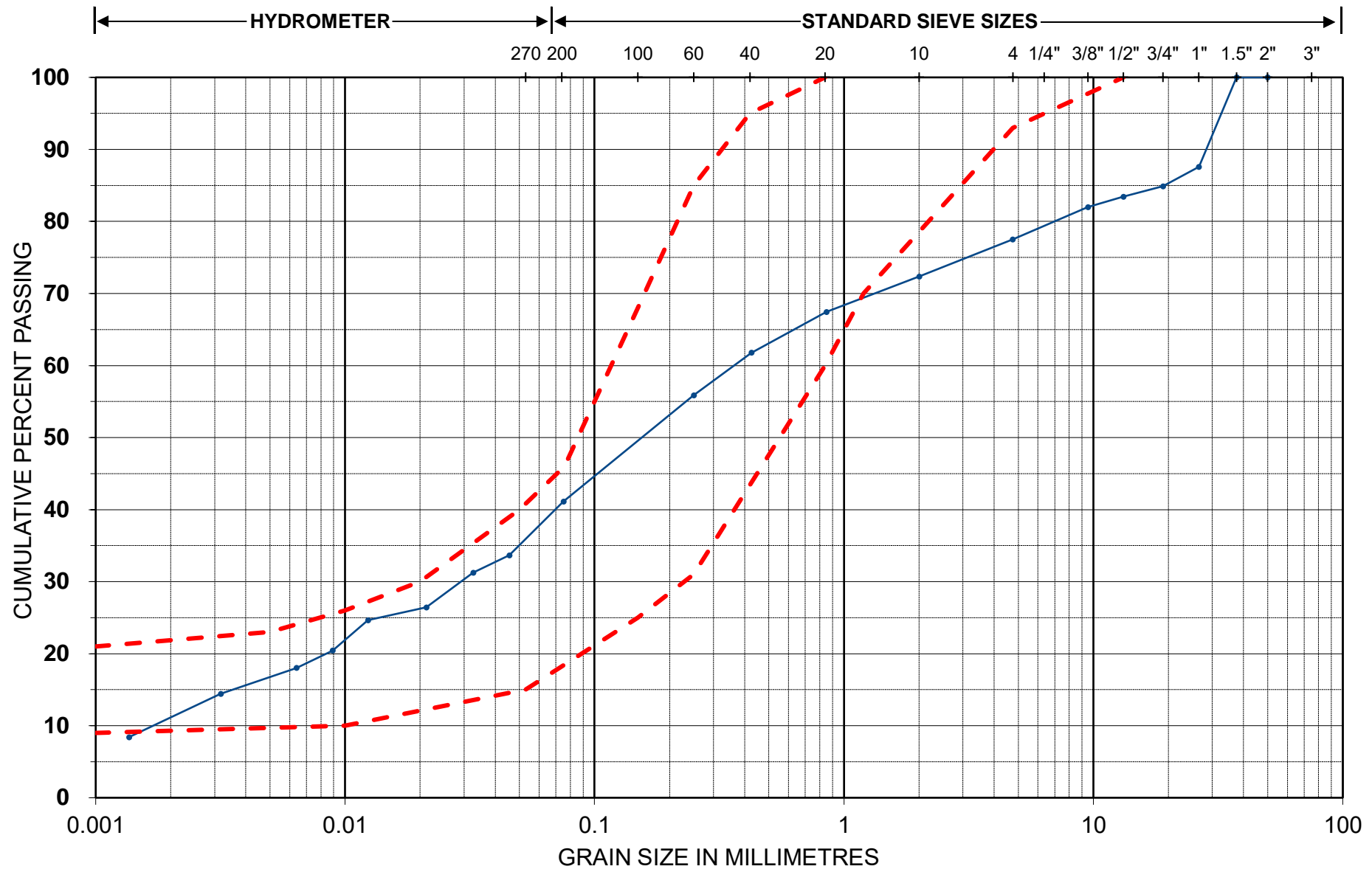
Project No.: 22-154

Sample Date: 13-Dec-23

Borehole/Test Pit ID.: TP23-01

Sample No./Depth: GS2 / 0.75m

LAB ID: 24HYD-016



Silt or Clay	Sand	Gravel
--------------	------	--------

--- SC envelope T = 12 - 50 min/cm

Estimated T = 20 min/cm

Sieve Size (mm)	% Passing
37.5	100.0
26.5	87.6
19.0	84.9
13.2	83.5
9.5	82.0
4.750	77.5
2.000	72.3
0.850	67.4
0.425	61.8
0.250	55.9
0.075	41.1

Hydrometer (mm)	% Passing
0.046	33.6
0.033	31.2
0.021	26.4
0.012	24.6
0.009	20.4
0.006	18.0
0.003	14.4
0.001	8.4

NOTES

Percolation rates are based on the Supplementary Standard to the Ontario Building Code 2012 document *Percolation Time and Soil Descriptions (SB-5)*. It should be noted, PRI did not conduct field investigations in conjunction with the sample collection, or witness the collection of the sample tested. PRI assumes no responsibility for the application of the above-noted percolation rate ("T"-Time) for use in design of an on-site sewage disposal system. The design of an on-site sewage system must be conducted by a qualified professional with due regard for a number of site-specific conditions in addition to the percolation rate of the soil. The client or any third party using this information as a basis for design assumes all risk associated with their evaluation of this report and all other criteria used in the design of any private sewage disposal system. This report is based entirely on the grain size distribution curve of the soil sample submitted for analysis. Additional analyses may be required following any future processing of the subject material or following supply of the material to individual sites for use in any tile bed construction.

Project Name: Wallace Point Rd (85162)

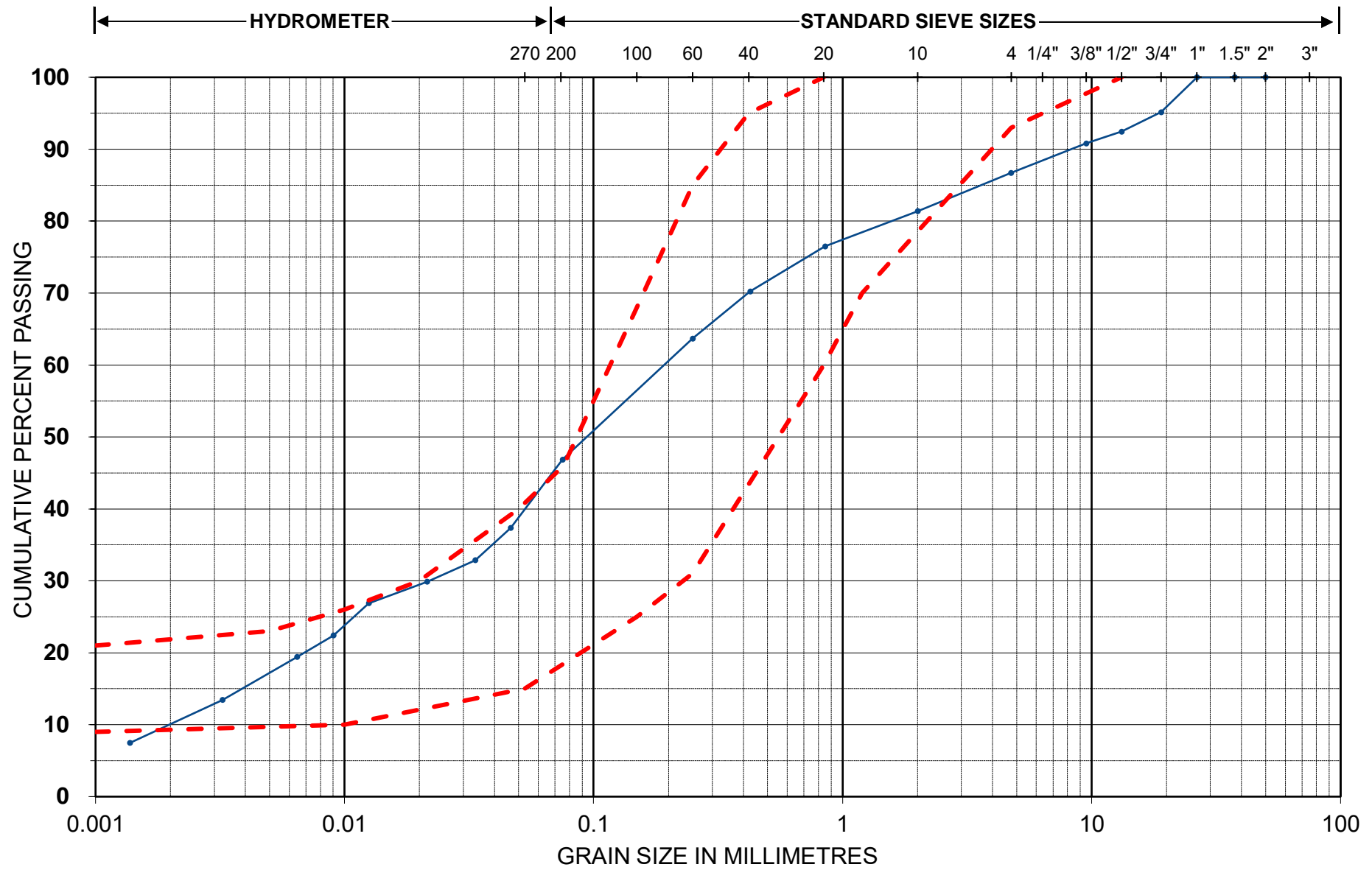
Project No.: 22-154

Sample Date: 13-Dec-23

Borehole/Test Pit ID.: TP23-03

Sample No./Depth: GS2 / 0.8 m

LAB ID: 24HYD-017



Silt or Clay	Sand	Gravel
--------------	------	--------

--- SC envelope T = 12 - 50 min/cm

Estimated T = 20 min/cm

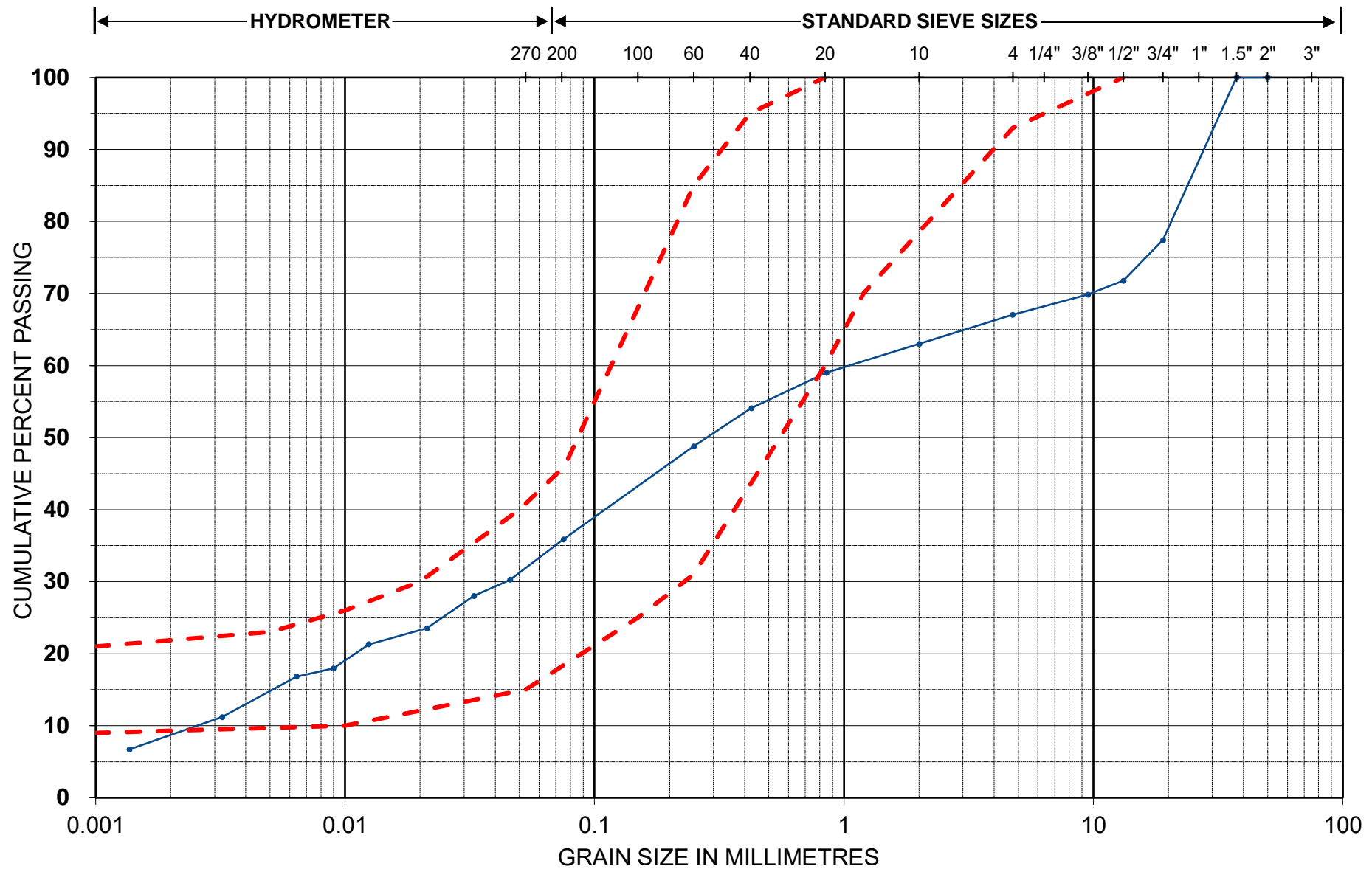
Sieve Size (mm)	% Passing
37.5	100.0
26.5	100.0
19.0	95.2
13.2	92.4
9.5	90.8
4.750	86.7
2.000	81.4
0.850	76.5
0.425	70.2
0.250	63.7
0.075	46.9

Hydrometer (mm)	% Passing
0.046	37.3
0.033	32.9
0.021	29.9
0.013	26.9
0.009	22.4
0.006	19.4
0.003	13.4
0.001	7.5

NOTES

Percolation rates are based on the Supplementary Standard to the Ontario Building Code 2012 document *Percolation Time and Soil Descriptions (SB-5)*. It should be noted, PRI did not conduct field investigations in conjunction with the sample collection, or witness the collection of the sample tested. PRI assumes no responsibility for the application of the above-noted percolation rate ("T"-Time) for use in design of an on-site sewage disposal system. The design of an on-site sewage system must be conducted by a qualified professional with due regard for a number of site-specific conditions in addition to the percolation rate of the soil. The client or any third party using this information as a basis for design assumes all risk associated with their evaluation of this report and all other criteria used in the design of any private sewage disposal system. This report is based entirely on the grain size distribution curve of the soil sample submitted for analysis. Additional analyses may be required following any future processing of the subject material or following supply of the material to individual sites for use in any tile bed construction.

Project Name: Wallace Point Rd (85162) Project No.: 22-154 Sample Date: 13-Dec-23
 Borehole/Test Pit ID.: TP23-05 Sample No./Depth: GS3 / 1.4 m LAB ID: 24HYD-018



Silt or Clay	Sand	Gravel
--------------	------	--------

--- SC envelope T = 12 - 50 min/cm

Estimated T = 18 min/cm

Sieve Size (mm)	% Passing
37.5	100.0
26.5	77.4
19.0	77.4
13.2	71.8
9.5	69.8
4.750	67.1
2.000	63.0
0.850	59.0
0.425	54.1
0.250	48.8
0.075	35.9

Hydrometer (mm)	% Passing
0.046	30.3
0.033	28.0
0.021	23.5
0.012	21.3
0.009	17.9
0.006	16.8
0.003	11.2
0.001	6.7

NOTES

Percolation rates are based on the Supplementary Standard to the Ontario Building Code 2012 document *Percolation Time and Soil Descriptions (SB-5)*. It should be noted, PRI did not conduct field investigations in conjunction with the sample collection, or witness the collection of the sample tested. PRI assumes no responsibility for the application of the above-noted percolation rate ("T"-Time) for use in design of an on-site sewage disposal system. The design of an on-site sewage system must be conducted by a qualified professional with due regard for a number of site-specific conditions in addition to the percolation rate of the soil. The client or any third party using this information as a basis for design assumes all risk associated with their evaluation of this report and all other criteria used in the design of any private sewage disposal system. This report is based entirely on the grain size distribution curve of the soil sample submitted for analysis. Additional analyses may be required following any future processing of the subject material or following supply of the material to individual sites for use in any tile bed construction.

Project Name: Wallace Point Rd (85162)

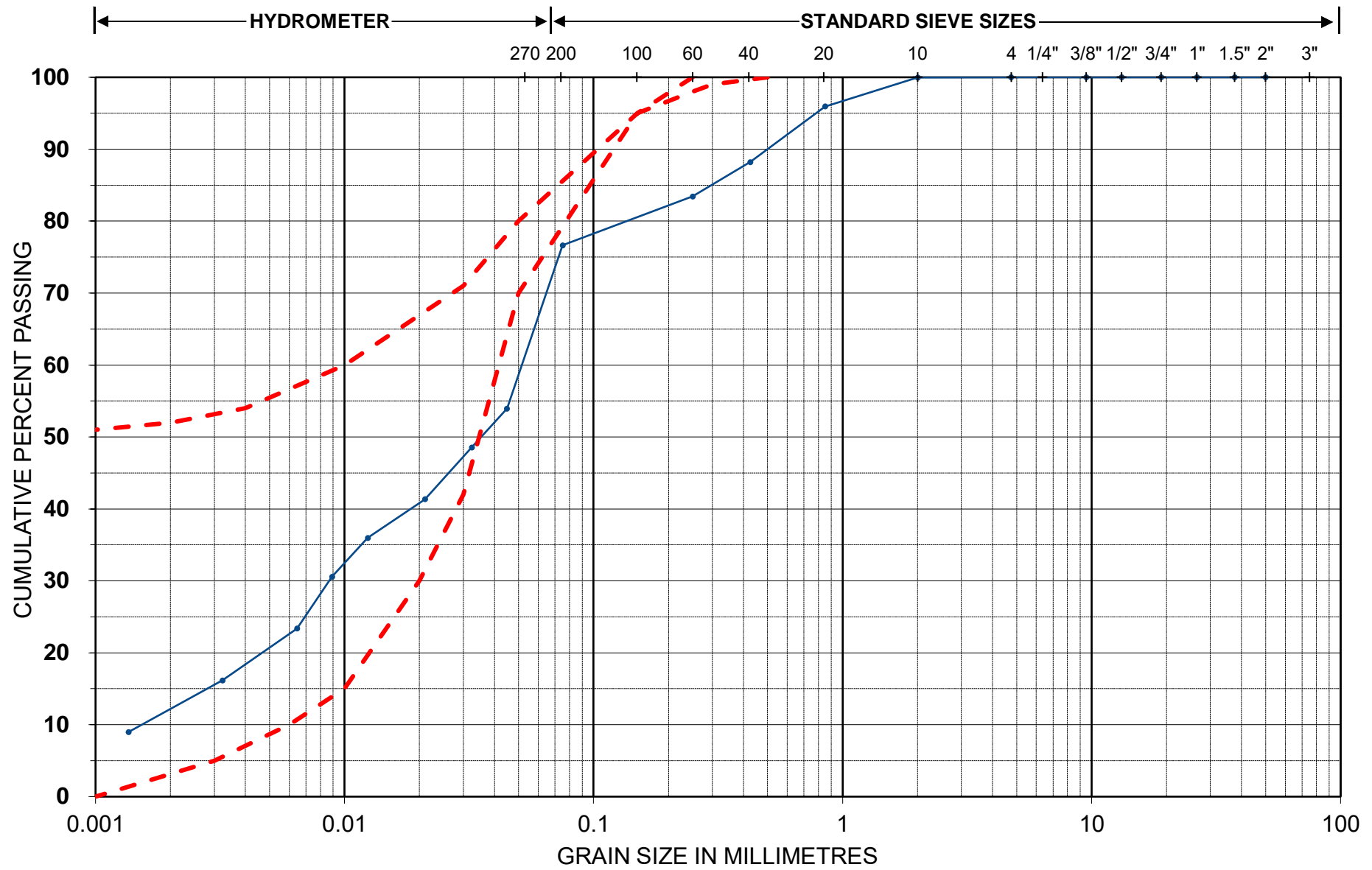
Project No.: 22-154

Sample Date: 13-Dec-23

Borehole/Test Pit ID.: TP23-07

Sample No./Depth: GS2 / 1.1 m

LAB ID: 24HYD-019



Silt or Clay	Sand	Gravel
--------------	------	--------

----- OL envelope T = 20 to over 50 min/cm Estimated T = 25 min/cm

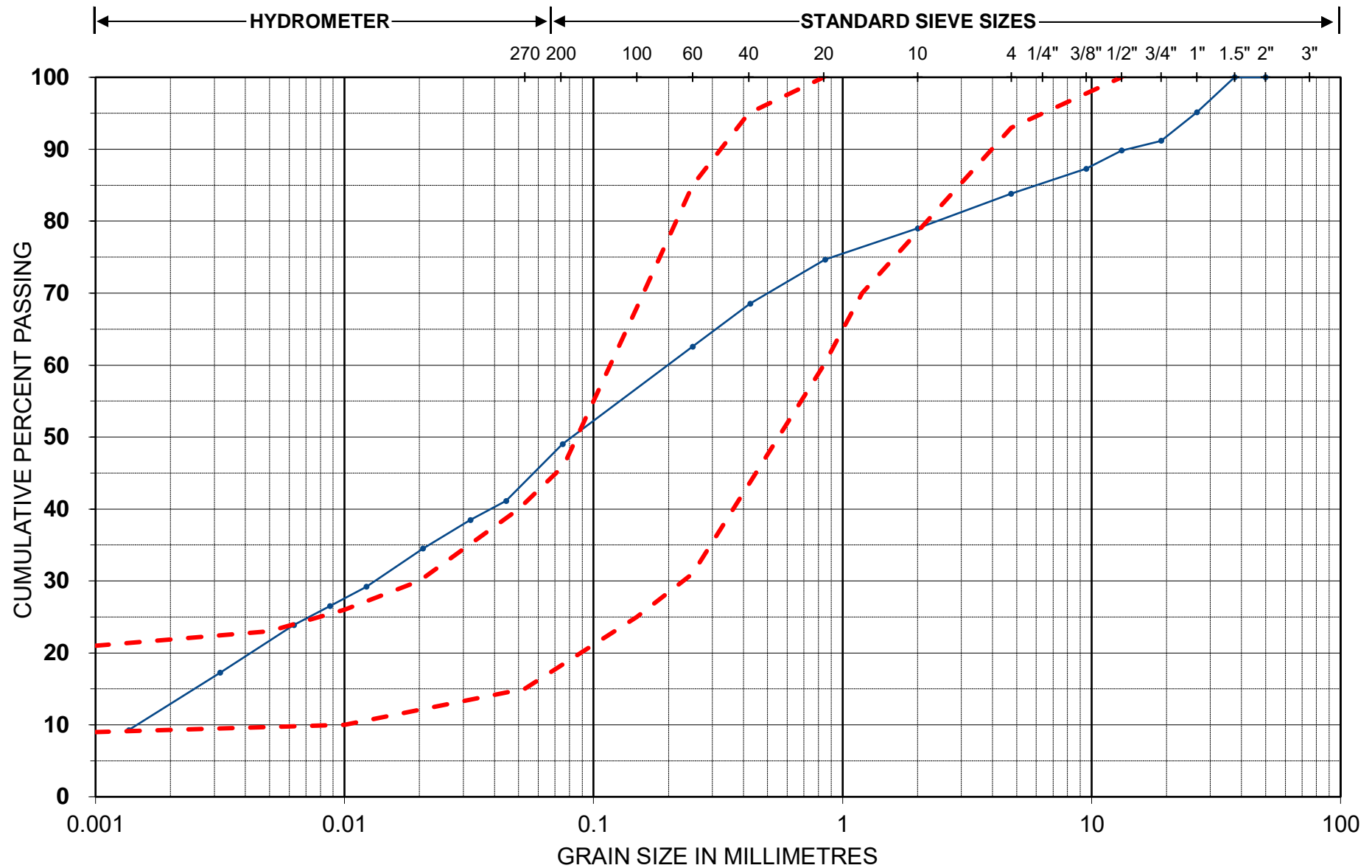
Sieve Size (mm)	% Passing
37.5	100.0
26.5	100.0
19.0	100.0
13.2	100.0
9.5	100.0
4.750	100.0
2.000	100.0
0.850	95.9
0.425	88.2
0.250	83.4
0.075	76.6

Hydrometer (mm)	% Passing
0.045	53.9
0.032	48.5
0.021	41.4
0.012	36.0
0.009	30.6
0.006	23.4
0.003	16.2
0.001	9.0

NOTES

Percolation rates are based on the Supplementary Standard to the Ontario Building Code 2012 document *Percolation Time and Soil Descriptions (SB-5)*. It should be noted, PRI did not conduct field investigations in conjunction with the sample collection, or witness the collection of the sample tested. PRI assumes no responsibility for the application of the above-noted percolation rate ("T"-Time) for use in design of an on-site sewage disposal system. The design of an on-site sewage system must be conducted by a qualified professional with due regard for a number of site-specific conditions in addition to the percolation rate of the soil. The client or any third party using this information as a basis for design assumes all risk associated with their evaluation of this report and all other criteria used in the design of any private sewage disposal system. This report is based entirely on the grain size distribution curve of the soil sample submitted for analysis. Additional analyses may be required following any future processing of the subject material or following supply of the material to individual sites for use in any tile bed construction.

Project Name: Wallace Point Rd (85162) Project No.: 22-154 Sample Date: 13-Dec-23
 Borehole/Test Pit ID.: TP23-11 Sample No./Depth: GS2 / 0.8 m LAB ID: 24HYD-020



Silt or Clay	Sand	Gravel
--------------	------	--------

----- SC envelope T = 12 - 50 min/cm

Estimated T = 20 min/cm

Sieve Size (mm)	% Passing
37.5	100.0
26.5	95.2
19.0	91.2
13.2	89.8
9.5	87.3
4.750	83.8
2.000	79.0
0.850	74.7
0.425	68.6
0.250	62.6
0.075	49.0

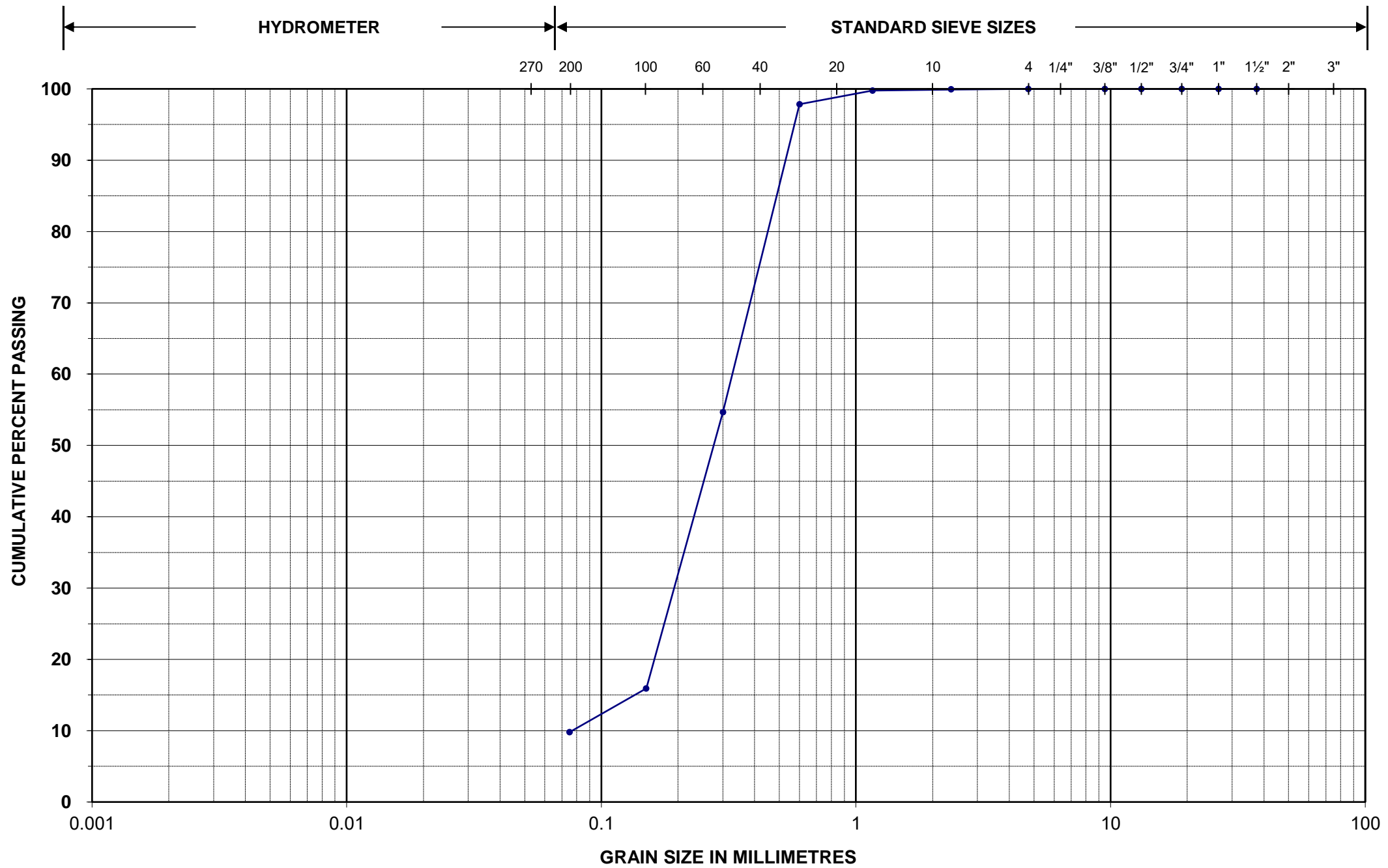
Hydrometer (mm)	% Passing
0.045	41.1
0.032	38.5
0.021	34.5
0.012	29.2
0.009	26.5
0.006	23.9
0.003	17.3
0.001	9.3

NOTES

Percolation rates are based on the Supplementary Standard to the Ontario Building Code 2012 document *Percolation Time and Soil Descriptions (SB-5)*. It should be noted, PRI did not conduct field investigations in conjunction with the sample collection, or witness the collection of the sample tested. PRI assumes no responsibility for the application of the above-noted percolation rate ("T"-Time) for use in design of an on-site sewage disposal system. The design of an on-site sewage system must be conducted by a qualified professional with due regard for a number of site-specific conditions in addition to the percolation rate of the soil. The client or any third party using this information as a basis for design assumes all risk associated with their evaluation of this report and all other criteria used in the design of any private sewage disposal system. This report is based entirely on the grain size distribution curve of the soil sample submitted for analysis. Additional analyses may be required following any future processing of the subject material or following supply of the material to individual sites for use in any tile bed construction.



PARTICLE SIZE DISTRIBUTION



Unified Classification System

SILT AND CLAY	SAND	GRAVEL
---------------	------	--------

Project Name: DM Wills - 85162	Project No.: 201-07253-00
Location ID.: BH22-10	Sample No./Depth: SS-7

Sieve Size	% Passing Coarse	Sieve Size	% Passing Fine
37.5 mm	100.0	2.36 mm	99.9
26.5 mm	100.0	1.16 mm	99.8
19.0 mm	100.0	0.60 mm	97.9
13.2 mm	100.0	0.30 mm	54.7
9.5 mm	100.0	0.15 mm	15.9
4.75 mm	100.0	0.075 mm	9.8

Note: More information is available upon request.

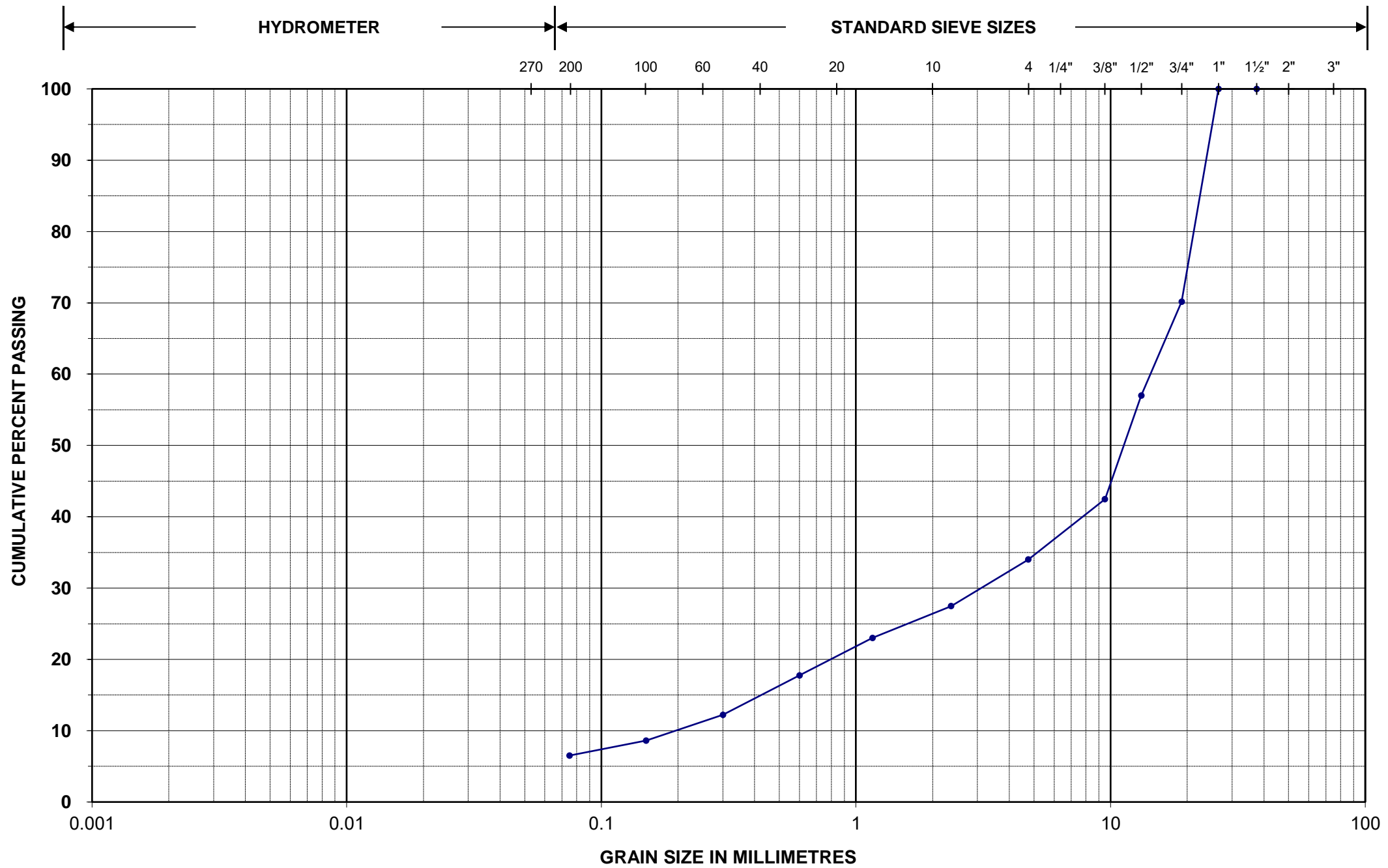
Tested by: WGH

Reviewed by:

Date: 17-Aug-22



PARTICLE SIZE DISTRIBUTION



Unified Classification System

SILT AND CLAY	SAND	GRAVEL
---------------	------	--------

Project Name: DM Wills - 85162	Project No.: 201-07253-00
Location ID.: BH22-11	Sample No./Depth: SS-7

Sieve Size	% Passing Coarse	Sieve Size	% Passing Fine
37.5 mm	100.0	2.36 mm	27.5
26.5 mm	100.0	1.16 mm	23.0
19.0 mm	70.2	0.60 mm	17.8
13.2 mm	57.0	0.30 mm	12.2
9.5 mm	42.5	0.15 mm	8.6
4.75 mm	34.0	0.075 mm	6.5

Note: More information is available upon request.

Tested by: WGH

Reviewed by:

Date: 17-Aug-22



MOISTURE CONTENTS

Project Location: DM Wills - 85162
File No.: 201-07253-00

Tech: JG
Date: 16-Aug-22

TIN NO.	FR11	SSM40	X15	I5	DM5
BOREHOLE NO.	BH22-01	BH22-01	BH22-01	BH22-01	BH22-01
SAMPLE & DEPTH	-	-	-	-	-
WT of TIN & WET SOIL (g)	115.0	110.9	139.4	122.9	150.0
WT of TIN & DRY SOIL (g)	107.1	101.0	129.5	111.3	139.2
WT of WATER (g)	8.0	9.9	9.8	11.6	10.7
TARE WT (g)	16.8	14.3	15.2	15.4	14.7
WT of DRY SOIL (g)	90.3	86.7	114.3	95.9	124.6
MOISTURE CONTENT	8.8%	11.4%	8.6%	12.1%	8.6%
TIN NO.	7F	BD13	AT53	LD1	BD9
BOREHOLE NO.	BH22-01	BH22-01	BH22-02	BH22-02	BH22-02
SAMPLE & DEPTH	-	-	-	-	-
WT of TIN & WET SOIL (g)	154.9	118.3	121.5	88.8	114.5
WT of TIN & DRY SOIL (g)	146.3	111.1	106.0	76.1	95.5
WT of WATER (g)	8.6	7.2	15.4	12.7	19.0
TARE WT (g)	16.9	16.3	14.8	14.6	16.7
WT of DRY SOIL (g)	129.5	94.9	91.2	61.5	78.7
MOISTURE CONTENT	6.6%	7.6%	16.9%	20.7%	24.1%
TIN NO.	HL01	BD5	SMS	BHWT6	LB8
BOREHOLE NO.	BH22-02	BH22-02	BH22-02	BH22-02	BH22-03
SAMPLE & DEPTH	-	-	-	-	-
WT of TIN & WET SOIL (g)	118.1	129.5	99.3	128.3	152.7
WT of TIN & DRY SOIL (g)	108.8	120.6	94.7	120.1	135.0
WT of WATER (g)	9.4	8.9	4.7	8.3	17.6
TARE WT (g)	16.3	16.1	14.9	15.3	15.6
WT of DRY SOIL (g)	92.4	104.5	79.8	104.8	119.5
MOISTURE CONTENT	10.1%	8.6%	5.8%	7.9%	14.7%
TIN NO.	BR18	J6	ALT	BB2	TP4
BOREHOLE NO.	BH22-03	BH22-03	BH22-03	BH22-03	BH22-03
SAMPLE & DEPTH	-	-	-	-	-
WT of TIN & WET SOIL (g)	105.6	169.3	138.3	153.8	134.1
WT of TIN & DRY SOIL (g)	90.4	154.3	127.0	132.6	115.3
WT of WATER (g)	15.2	15.0	11.2	21.2	18.9
TARE WT (g)	14.9	15.3	16.3	15.5	14.8
WT of DRY SOIL (g)	75.5	139.0	110.7	117.0	100.5
MOISTURE CONTENT	20.1%	10.8%	10.2%	18.1%	18.8%
TIN NO.	DF2	B2	E14	7AR	2E
BOREHOLE NO.	BH22-03	BH22-04	BH22-04	BH22-04	BH22-04
SAMPLE & DEPTH	-	-	-	-	-
WT of TIN & WET SOIL (g)	158.1	149.0	161.0	148.4	149.1
WT of TIN & DRY SOIL (g)	141.8	140.0	148.0	140.2	139.2
WT of WATER (g)	16.3	9.0	13.0	8.2	9.8
TARE WT (g)	15.4	15.4	15.5	15.0	14.8
WT of DRY SOIL (g)	126.5	124.6	132.5	125.2	124.4
MOISTURE CONTENT	12.9%	7.2%	9.8%	6.5%	7.9%



MOISTURE CONTENTS

Project Location: DM Wills - 85162
File No.: 201-07253-00

Tech: JG
Date: 16-Aug-22

TIN NO.	LF2	V127	X27	FR9	WK4
BOREHOLE NO.	BH22-04	BH22-04	BH22-04	BH22-05	BH22-05
SAMPLE & DEPTH	-	-	-	-	-
WT of TIN & WET SOIL (g)	88.5	161.7	158.4	129.2	167.3
WT of TIN & DRY SOIL (g)	79.4	147.9	147.6	112.1	145.5
WT of WATER (g)	9.1	13.8	10.8	17.1	21.8
TARE WT (g)	15.3	15.6	15.2	16.7	15.7
WT of DRY SOIL (g)	64.1	132.2	132.3	95.4	129.8
MOISTURE CONTENT	14.1%	10.4%	8.2%	17.9%	16.8%
TIN NO.	AB7	BR2	FR17	W4	BL3
BOREHOLE NO.	BH22-05	BH22-05	BH22-05	BH22-05	BH22-05
SAMPLE & DEPTH	-	-	-	-	-
WT of TIN & WET SOIL (g)	139.5	145.7	149.6	136.8	95.9
WT of TIN & DRY SOIL (g)	125.9	135.9	138.3	126.3	86.2
WT of WATER (g)	13.6	9.8	11.3	10.5	9.6
TARE WT (g)	15.4	15.3	16.7	14.7	15.3
WT of DRY SOIL (g)	110.6	120.6	121.6	111.6	70.9
MOISTURE CONTENT	12.3%	8.1%	9.3%	9.4%	13.6%
TIN NO.	LM20	BE87	F32	FR38	BR9
BOREHOLE NO.	BH22-06	BH22-06	BH22-06	BH22-06	BH22-06
SAMPLE & DEPTH	-	-	-	-	-
WT of TIN & WET SOIL (g)	147.3	79.7	167.1	120.8	170.6
WT of TIN & DRY SOIL (g)	137.3	72.8	152.4	114.6	152.4
WT of WATER (g)	10.0	6.8	14.7	6.2	18.3
TARE WT (g)	16.9	14.3	15.9	16.8	15.0
WT of DRY SOIL (g)	120.4	58.5	136.5	97.9	137.4
MOISTURE CONTENT	8.3%	11.7%	10.7%	6.3%	13.3%
TIN NO.	IU	OS16	LW4	LG4	X10
BOREHOLE NO.	BH22-06	BH22-06	BH22-07	BH22-07	BH22-07
SAMPLE & DEPTH	-	-	-	-	-
WT of TIN & WET SOIL (g)	134.3	157.6	88.7	154.6	157.8
WT of TIN & DRY SOIL (g)	126.0	143.4	80.8	134.8	142.1
WT of WATER (g)	8.4	14.2	7.9	19.9	15.7
TARE WT (g)	16.3	14.9	15.6	15.1	15.7
WT of DRY SOIL (g)	109.6	128.5	65.2	119.7	126.4
MOISTURE CONTENT	7.6%	11.1%	12.1%	16.6%	12.4%
TIN NO.	KR91	T1	BR16	6C	FR18
BOREHOLE NO.	BH22-07	BH22-07	BH22-07	BH22-08	BH22-08
SAMPLE & DEPTH	-	-	-	-	-
WT of TIN & WET SOIL (g)	155.2	104.3	175.0	130.0	105.5
WT of TIN & DRY SOIL (g)	143.7	84.9	155.4	122.2	90.5
WT of WATER (g)	11.6	19.5	19.6	7.8	15.0
TARE WT (g)	15.2	15.7	15.1	15.8	15.0
WT of DRY SOIL (g)	128.5	69.2	140.4	106.4	75.6
MOISTURE CONTENT	9.0%	28.1%	13.9%	7.3%	19.8%



MOISTURE CONTENTS

Project Location: DM Wills - 85162
File No.: 201-07253-00

Tech: JG
Date: 16-Aug-22

TIN NO.	HE	M	NLI	NL2	TP8
BOREHOLE NO.	BH22-08	BH22-08	-	-	BH22-09
SAMPLE & DEPTH	-	-	-	-	-
WT of TIN & WET SOIL (g)	176.4	183.7	133.6	167.5	166.0
WT of TIN & DRY SOIL (g)	162.1	166.3	125.6	153.9	150.6
WT of WATER (g)	14.3	17.3	8.1	13.6	15.4
TARE WT (g)	16.8	15.7	15.5	15.5	15.6
WT of DRY SOIL (g)	145.3	150.7	110.1	138.5	135.0
MOISTURE CONTENT	9.9%	11.5%	7.3%	9.8%	11.4%
TIN NO.	BS3	MVD5	LAB	BE43	BR19
BOREHOLE NO.	BH22-09	BH22-09	BH22-09	BH22-09	BH22-09
SAMPLE & DEPTH	-	-	-	-	-
WT of TIN & WET SOIL (g)	162.5	142.9	162.6	81.4	141.8
WT of TIN & DRY SOIL (g)	143.2	122.2	144.8	74.0	122.9
WT of WATER (g)	19.3	20.7	17.8	7.4	18.9
TARE WT (g)	15.6	15.8	15.1	15.0	15.0
WT of DRY SOIL (g)	127.6	106.5	129.7	59.1	107.9
MOISTURE CONTENT	15.1%	19.5%	13.7%	12.5%	17.5%
TIN NO.	AT57	BV9	BR10	X34	WC3
BOREHOLE NO.	BH22-09	BH22-10	BH22-10	BH22-10	BH22-10
SAMPLE & DEPTH	-	-	-	-	-
WT of TIN & WET SOIL (g)	147.4	147.2	133.1	136.5	148.9
WT of TIN & DRY SOIL (g)	135.3	136.1	126.1	125.5	131.5
WT of WATER (g)	12.1	11.0	7.0	11.0	17.4
TARE WT (g)	15.4	15.4	15.0	15.7	15.6
WT of DRY SOIL (g)	119.9	120.7	111.1	109.7	115.9
MOISTURE CONTENT	10.1%	9.1%	6.3%	10.0%	15.0%
TIN NO.	FR28	L24	BD1	TQ12	MVD6
BOREHOLE NO.	BH22-10	BH22-10	BH22-10	BH22-11	BH22-11
SAMPLE & DEPTH	-	-	-	-	-
WT of TIN & WET SOIL (g)	119.8	117.2	139.8	163.8	161.9
WT of TIN & DRY SOIL (g)	105.8	102.1	128.5	151.8	148.7
WT of WATER (g)	13.9	15.0	11.3	12.1	13.2
TARE WT (g)	15.0	14.7	16.9	17.1	15.1
WT of DRY SOIL (g)	90.8	87.5	111.6	134.7	133.6
MOISTURE CONTENT	15.3%	17.2%	10.1%	9.0%	9.9%
TIN NO.	D16	BR4	IL-42	12e	HN2
BOREHOLE NO.	BH22-11	BH22-11	BH22-11	BH22-11	BH22-12
SAMPLE & DEPTH	-	-	-	-	-
WT of TIN & WET SOIL (g)	162.3	167.0	107.3	82.4	109.2
WT of TIN & DRY SOIL (g)	150.0	152.0	103.1	66.6	95.7
WT of WATER (g)	12.2	14.9	4.3	15.8	13.6
TARE WT (g)	15.8	15.2	16.1	15.1	15.5
WT of DRY SOIL (g)	134.2	136.8	87.0	51.6	80.2
MOISTURE CONTENT	9.1%	10.9%	4.9%	30.7%	16.9%



MOISTURE CONTENTS

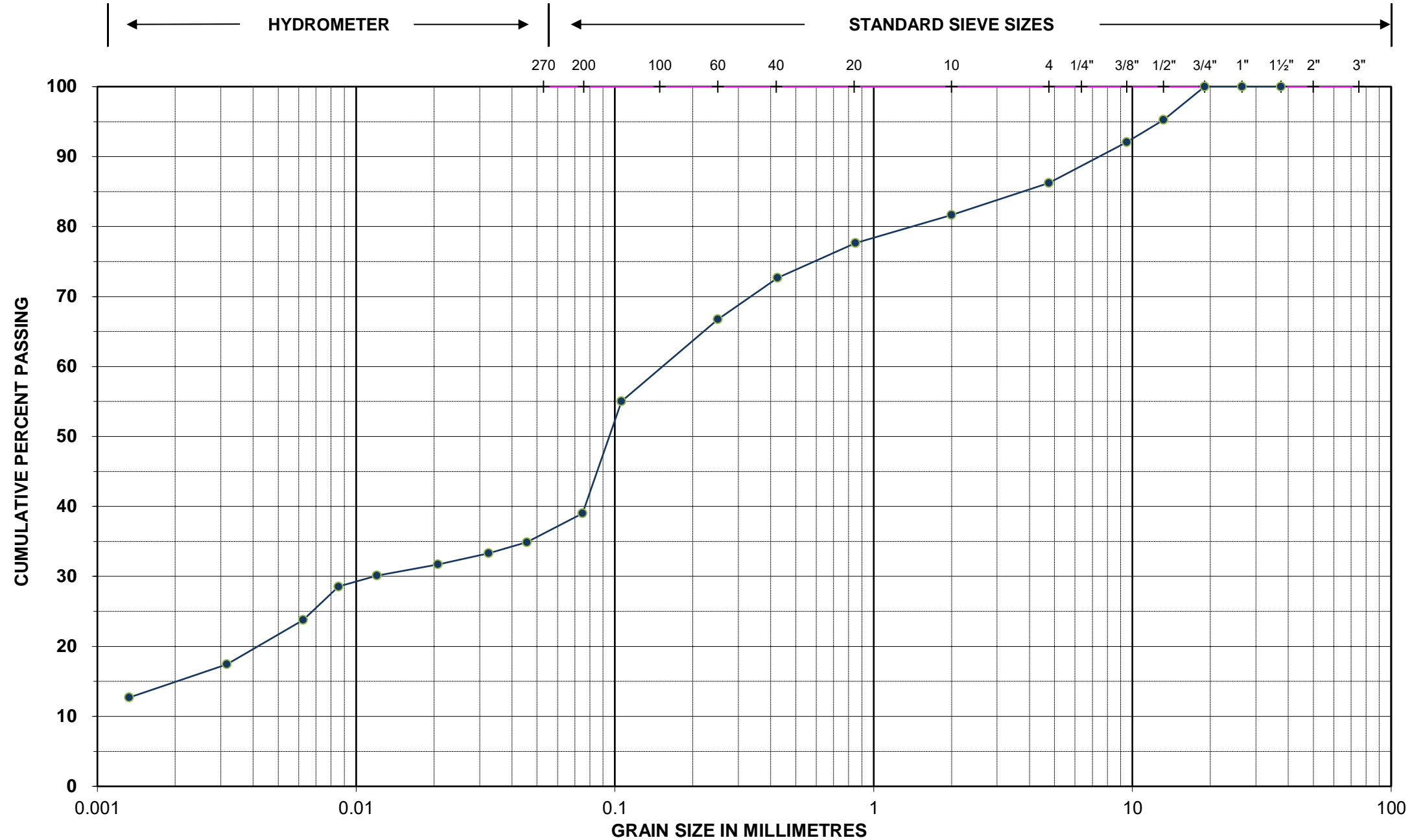
Project Location: DM Wills - 85162
File No.: 201-07253-00

Tech: JG
Date: 16-Aug-22

TIN NO.	BL8	4KR	MVD3	KZK	
BOREHOLE NO.	BH22-12	BH22-12	BH22-12	BH22-12	
SAMPLE & DEPTH	-	-	-	-	
WT of TIN & WET SOIL (g)	149.7	107.5	131.8	115.0	
WT of TIN & DRY SOIL (g)	139.6	102.2	122.4	111.8	
WT of WATER (g)	10.0	5.3	9.4	3.2	
TARE WT (g)	15.7	14.9	15.3	15.3	
WT of DRY SOIL (g)	123.9	87.3	107.1	96.5	
MOISTURE CONTENT	8.1%	6.1%	8.7%	3.3%	
TIN NO.					
BOREHOLE NO.					
SAMPLE & DEPTH					
WT of TIN & WET SOIL (g)					
WT of TIN & DRY SOIL (g)					
WT of WATER (g)					
TARE WT (g)					
WT of DRY SOIL (g)					
MOISTURE CONTENT					
TIN NO.					
BOREHOLE NO.					
SAMPLE & DEPTH					
WT of TIN & WET SOIL (g)					
WT of TIN & DRY SOIL (g)					
WT of WATER (g)					
TARE WT (g)					
WT of DRY SOIL (g)					
MOISTURE CONTENT					
TIN NO.					
BOREHOLE NO.					
SAMPLE & DEPTH					
WT of TIN & WET SOIL (g)					
WT of TIN & DRY SOIL (g)					
WT of WATER (g)					
TARE WT (g)					
WT of DRY SOIL (g)					
MOISTURE CONTENT					
TIN NO.					
BOREHOLE NO.					
SAMPLE & DEPTH					
WT of TIN & WET SOIL (g)					
WT of TIN & DRY SOIL (g)					
WT of WATER (g)					
TARE WT (g)					
WT of DRY SOIL (g)					
MOISTURE CONTENT					



PARTICLE SIZE DISTRIBUTION LS702/ASTM D422



Unified Classification System

SILT AND CLAY	SAND	GRAVEL
---------------	------	--------

Project Name: DM Wills - 85162	Project No.: 201-07253-00
Location ID.: BH22-04	Sample No./Depth: SS-5

Sieve Size	% Passing Coarse	Sieve Size	% Passing Fine	Hydrometer (mm)	% Passing
37.5 mm	100.0	2.00 mm	81.7	0.046	34.9
26.5 mm	100.0	0.850 mm	77.6	0.021	31.7
19.0 mm	100.0	0.425 mm	72.7	0.009	28.5
13.2 mm	95.2	0.250 mm	66.7	0.003	17.4
9.50 mm	92.0	0.106 mm	55.0	0.001	12.7
4.75 mm	86.2	0.075 mm	39.0		

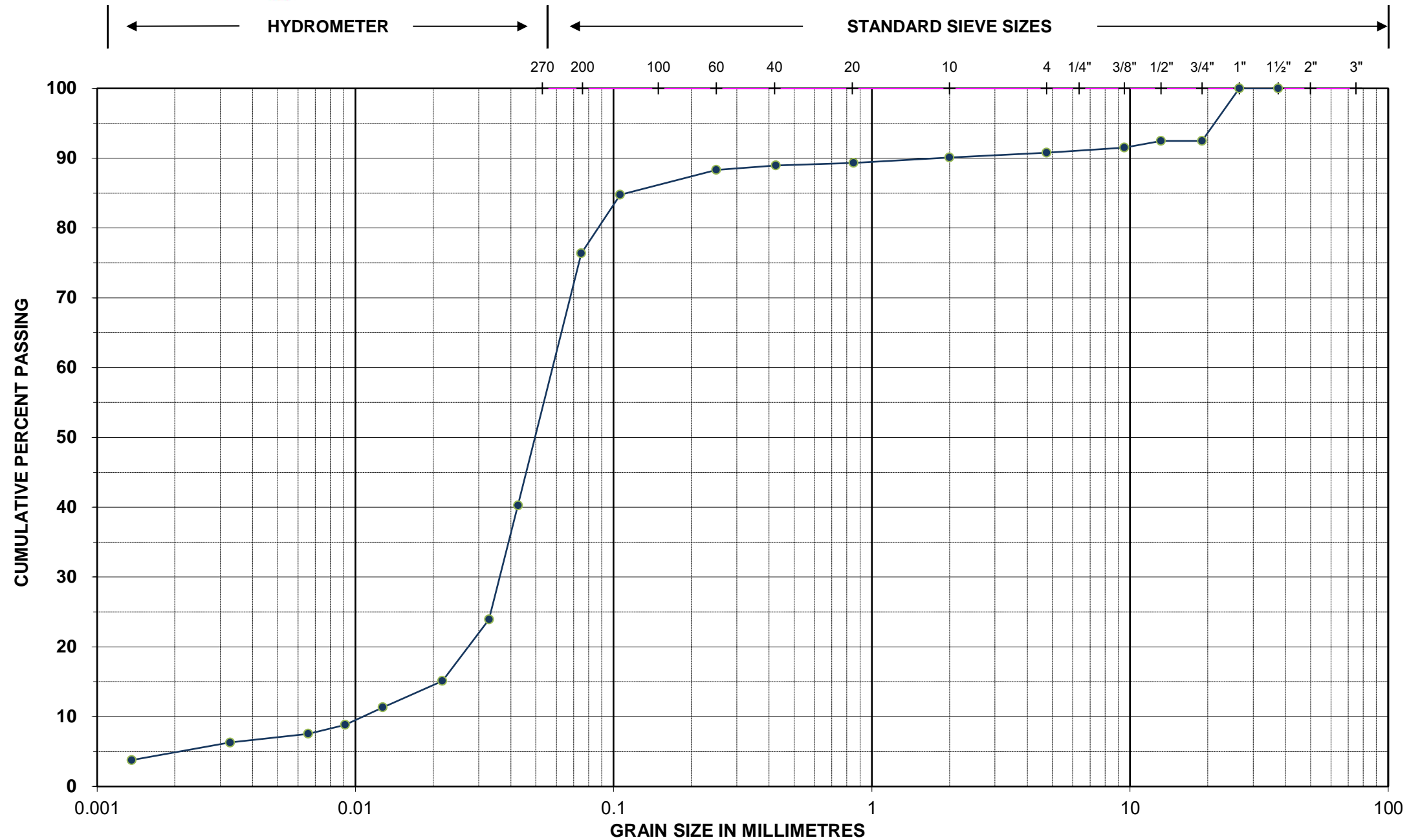
Note: More information is available upon request.

Tested by: NLO

Reviewed by: [Signature] Date: 17-Aug-22



PARTICLE SIZE DISTRIBUTION LS702/ASTM D422



Unified Classification System

SILT AND CLAY	SAND	GRAVEL
---------------	------	--------

Project Name: DM Wills - 85162	Project No.: 201-07253-00
Location ID.: BH22-06	Sample No./Depth: SS-6

Sieve Size	% Passing Coarse	Sieve Size	% Passing Fine	Hydrometer (mm)	% Passing
37.5 mm	100.0	2.00 mm	90.1	0.043	40.3
26.5 mm	100.0	0.850 mm	89.3	0.022	15.1
19.0 mm	92.5	0.425 mm	89.0	0.009	8.8
13.2 mm	92.5	0.250 mm	88.3	0.003	6.3
9.50 mm	91.5	0.106 mm	84.8	0.001	3.8
4.75 mm	90.8	0.075 mm	76.4		

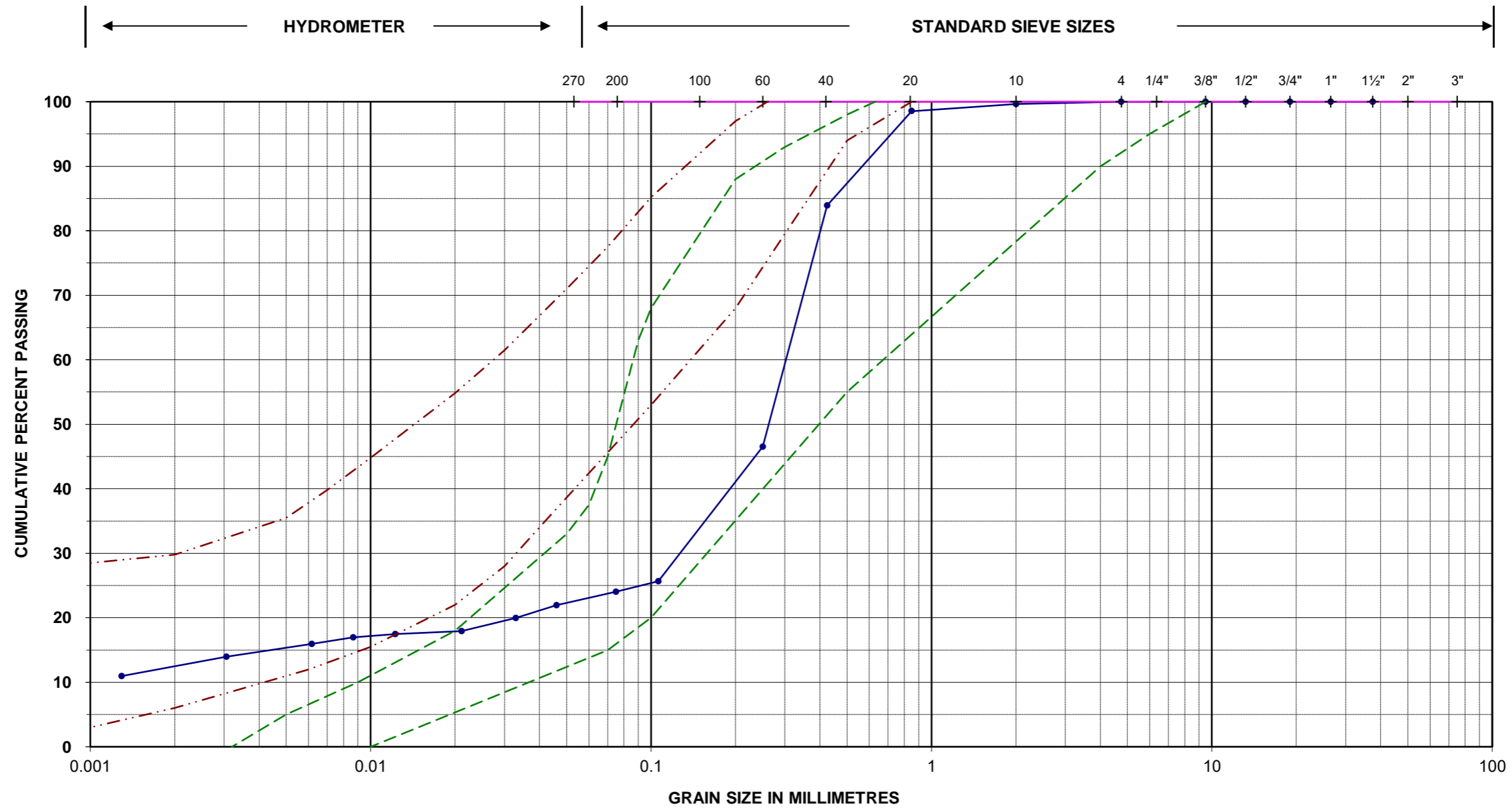
Note: More information is available upon request.

Tested by: NLO

Reviewed by: [Signature] Date: 17-Aug-22



PARTICLE SIZE DISTRIBUTION LS702/ASTM D422



Unified Classification System

SILT AND CLAY	SAND	GRAVEL
---------------	------	--------

GRAVEL	0	%
SAND	64	%
SILT	24	%
CLAY	12	%

----- sm envelope T = 8 - 20 min/cm

Estimated T = 20 min/cm

----- ml envelope T = 20 - 50 min/cm

Project Name: DM Wills - 85162	Project No.: 201-07253-00
Location ID.: TP22-02	Sample No./Depth: GS2

Sieve Size	% Passing Coarse	Sieve Size	% Passing Fine	Hydrometer (mm)	% Passing
37.5 mm	100.0	2.00 mm	99.66	0.046	21.9
26.5 mm	100.0	0.850 mm	98.5	0.021	17.9
19.0 mm	100.0	0.425 mm	83.9	0.009	17.0
13.2 mm	100.0	0.250 mm	46.5	0.003	14.0
9.50 mm	100.0	0.106 mm	25.6	0.001	11.0
4.75 mm	100.0	0.075 mm	24.0		

Note: More information is available upon request.

Tested by: WGH

Reviewed by: Date: 29-Jun-22

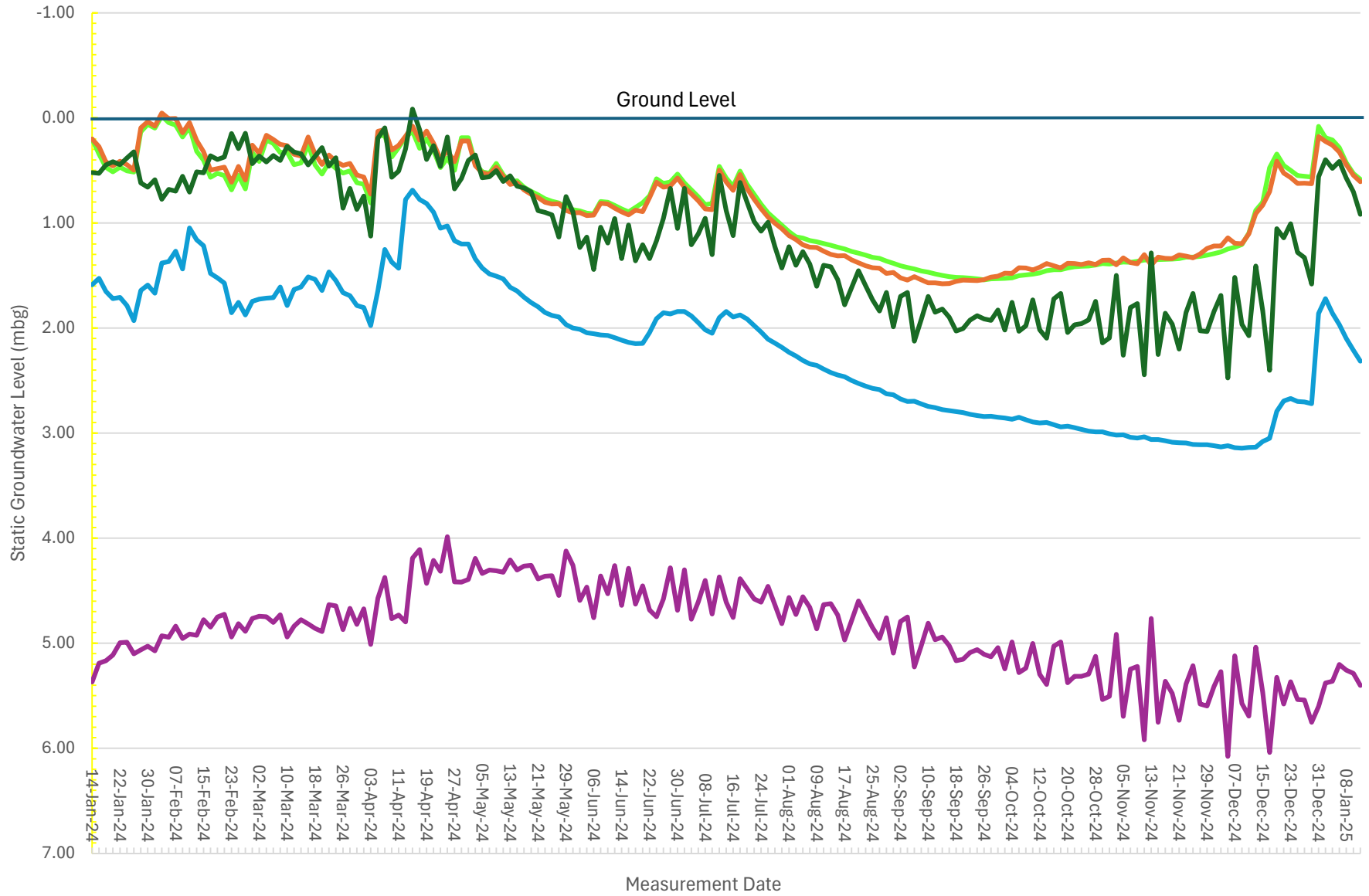
Appendix E

Groundwater Levels Graph 2024-2025



85162 Wallace Point Road - Groundwater Levels (mbg)

MW24-02A MW24-02B MW24-06A MW24-08 MW24-09B



Appendix F

Infiltration Graphs



IN-SITU INFILTRATION TEST

Project: Wallace Point Road
Site Location: 3491 Wallace Point Road
Test ID: INF22-01

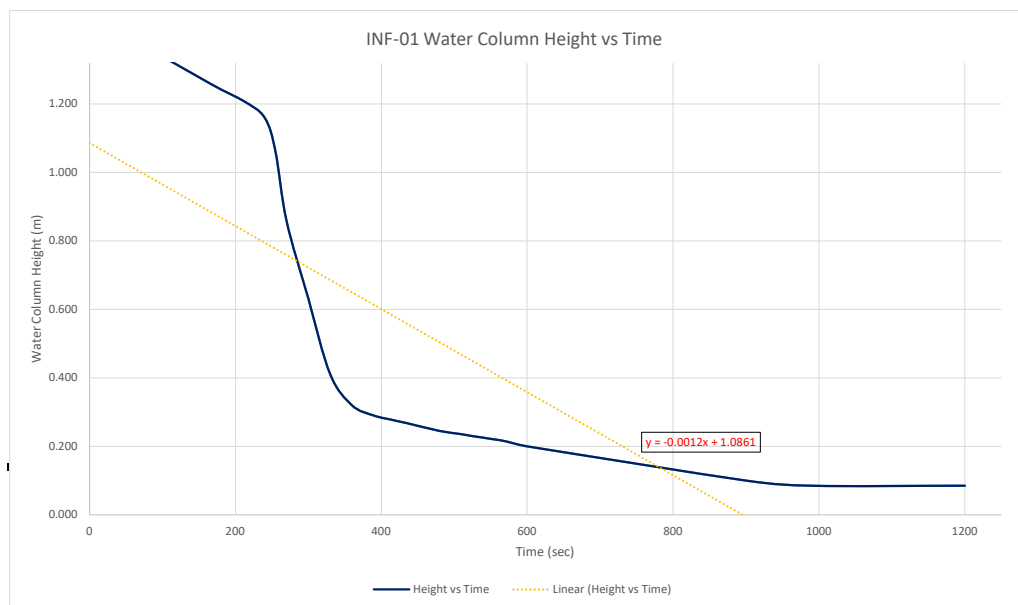
PROJECT NO.: 85162
Date: 21-Jun-22
Start Time:
Test No. 1

Depth of Test Pit (m):	0.91	Pipe Stickup (m):	0.37	Total Pipe Length(m):	1.46	
Time* (Seconds)	Measurement Interval (sec)	Depth** (m)	Water Column Height (m)	Distance dropped per interval (m1)	Infiltration Rate per Interval (m/sec)	Cumulative Infiltration Rate (m/sec)
0	-	0.000	1.460	-	--	--
165	165	0.200	1.260	0.200	1.212E-03	1.212E-03
210	45	0.250	1.210	0.050	1.111E-03	1.190E-03
240	30	0.300	1.160	0.050	1.667E-03	1.250E-03
255	15	0.400	1.060	0.100	6.667E-03	1.569E-03
270	15	0.600	0.860	0.200	1.333E-02	2.222E-03
300	30	0.830	0.630	0.230	7.667E-03	2.767E-03
330	30	1.050	0.410	0.220	7.333E-03	3.182E-03
360	30	1.140	0.320	0.090	3.000E-03	3.167E-03
390	30	1.170	0.290	0.030	1.000E-03	3.000E-03
420	30	1.185	0.275	0.015	5.000E-04	2.821E-03
450	30	1.200	0.260	0.015	5.000E-04	2.667E-03
480	30	1.215	0.245	0.015	5.000E-04	2.531E-03
510	30	1.225	0.235	0.010	3.333E-04	2.402E-03
540	30	1.235	0.225	0.010	3.333E-04	2.287E-03
570	30	1.245	0.215	0.010	3.333E-04	2.184E-03
600	30	1.260	0.200	0.015	5.000E-04	2.100E-03
900	300	1.360	0.100	0.100	3.333E-04	1.511E-03
990	90	1.375	0.085			1.389E-03
1,200	870	1.375	0.085	0.015	1.724E-05	1.146E-03

** Depth at time 0 indicates measurement below top of measuring pipe at the start of the test.
 Not used for statistical analysis

	(m/sec)	(mm/sec)	(mm/hour)
Maximum Infiltration Rate Between Sampling Intervals -	1.33E-02	1.33E+01	48000
Minimum Infiltration Rate Between Sampling Intervals -	1.72E-05	1.72E-02	62
Median Infiltration Rate Between Sampling Intervals -	7.50E-04	7.50E-01	2700
Average Infiltration Rate Between Sampling Intervals -	2.57E-03	2.57E+00	9268
Cumulative Infiltration Rate for Entire Data Set -	1.15E-03	1.15E+00	4125

In-situ Infiltration Rate Measured in the Field (mm/sec):	1.15
In-situ Infiltration Rate Measured in the Field (mm/hour):	4125
Calculated Percolation Time (T) based on field infiltration (min/cm):	0.15



		Test 1 - Observed
Test Duration (seconds)		1,200
Total Drop Distance (mm)		1375
Total Number of Measured Intervals		20
Infiltration Rate (mm/sec) - Test Average		1.15
Infiltration Rate (mm/hour) - Test Average		4125
Calculated Percolation Time (T) based on Field Infiltration (min/cm)		0.15

IN-SITU INFILTRATION TEST

Project: Wallace Point Road
Site Location: 3491 Wallace Point Road
Test ID: INF22-02

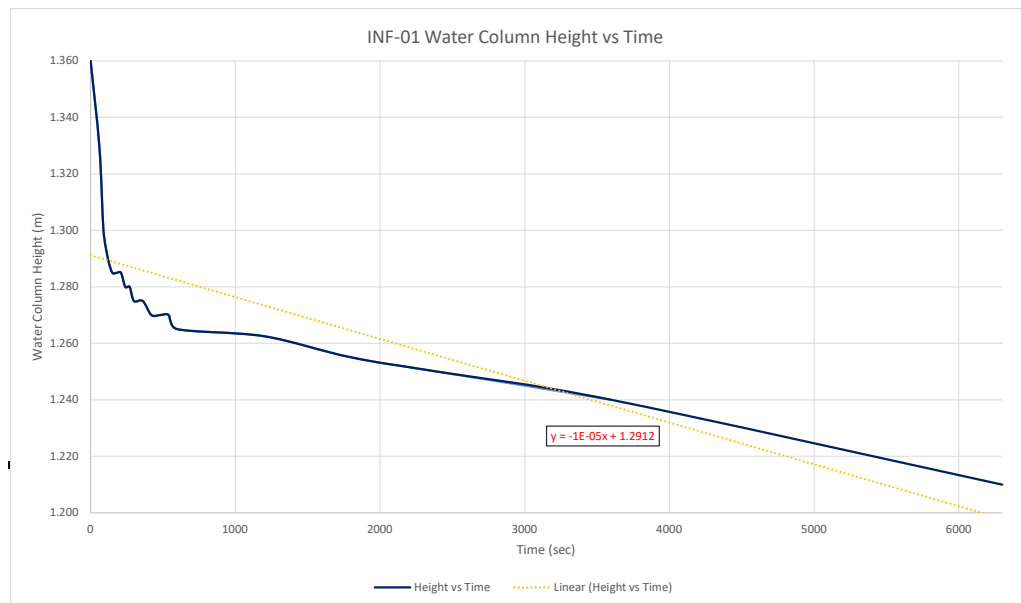
PROJECT NO.: 85162
Date: 21-Jun-22
Start Time:
Test No. 1

Depth of Test Pit (m):	0.91	Pipe Stickup (m):	0.26	Total Pipe Length(m):	1.36	
Time* (Seconds)	Measurement Interval (sec)	Depth** (m)	Water Column Height (m)	Distance dropped per interval (m1)	Infiltration Rate per Interval (m/sec)	Cumulative Infiltration Rate (m/sec)
0	-	0.000	1.360	-	--	--
60	60	0.030	1.330	0.030	5.000E-04	5.000E-04
90	30	0.060	1.300	0.030	1.000E-03	6.667E-04
120	30	0.070	1.290	0.010	3.333E-04	5.833E-04
150	30	0.075	1.285	0.005	1.667E-04	5.000E-04
180	30	0.075	1.285	0.000	0.000E+00	4.167E-04
210	30	0.075	1.285	0.000	0.000E+00	3.571E-04
240	30	0.080	1.280	0.005	1.667E-04	3.333E-04
270	30	0.080	1.280	0.000	0.000E+00	2.963E-04
300	30	0.085	1.275	0.005	1.667E-04	2.833E-04
360	60	0.085	1.275	0.000	0.000E+00	2.361E-04
420	60	0.090	1.270	0.005	8.333E-05	2.143E-04
480	60	0.090	1.270	0.000	0.000E+00	1.875E-04
540	60	0.090	1.270	0.000	0.000E+00	1.667E-04
600	60	0.095	1.265	0.005	8.333E-05	1.583E-04
1,200	600	0.098	1.263	0.003	4.167E-06	8.125E-05
1,800	600	0.105	1.255	0.007	1.250E-05	5.833E-05
2,400	600	0.110	1.250	0.005	8.333E-06	4.583E-05
3,600	1200	0.120	1.240	0.010	8.333E-06	3.333E-05
6,300	2700	0.150	1.210	0.030	1.111E-05	2.381E-05

** Depth at time 0 indicates measurement below top of measuring pipe at the start of the test.
 Not used for statistical analysis

	(m/sec)	(mm/sec)	(mm/hour)
Maximum Infiltration Rate Between Sampling Intervals -	1.00E-03	1.00E+00	3600
Minimum Infiltration Rate Between Sampling Intervals -	0.00E+00	0.00E+00	0
Median Infiltration Rate Between Sampling Intervals -	1.11E-05	1.11E-02	40
Average Infiltration Rate Between Sampling Intervals -	1.34E-04	1.34E-01	482
Cumulative Infiltration Rate for Entire Data Set -	2.38E-05	2.38E-02	86

In-situ Infiltration Rate Measured in the Field (mm/sec):	0.02
In-situ Infiltration Rate Measured in the Field (mm/hour):	86
Calculated Percolation Time (T) based on field infiltration (min/cm):	7.00



		Test 1 - Observed
Test Duration (seconds)		6,300
Total Drop Distance (mm)		150
Total Number of Measured Intervals		20
Infiltration Rate (mm/sec) - Test Average		0.02
Infiltration Rate (mm/hour) - Test Average		86
Calculated Percolation Time (T) based on Field Infiltration (min/cm)		7.00

IN-SITU INFILTRATION TEST

Project: Wallace Point Road
Site Location: 3491 Wallace Point Road
Test ID: INF22-03

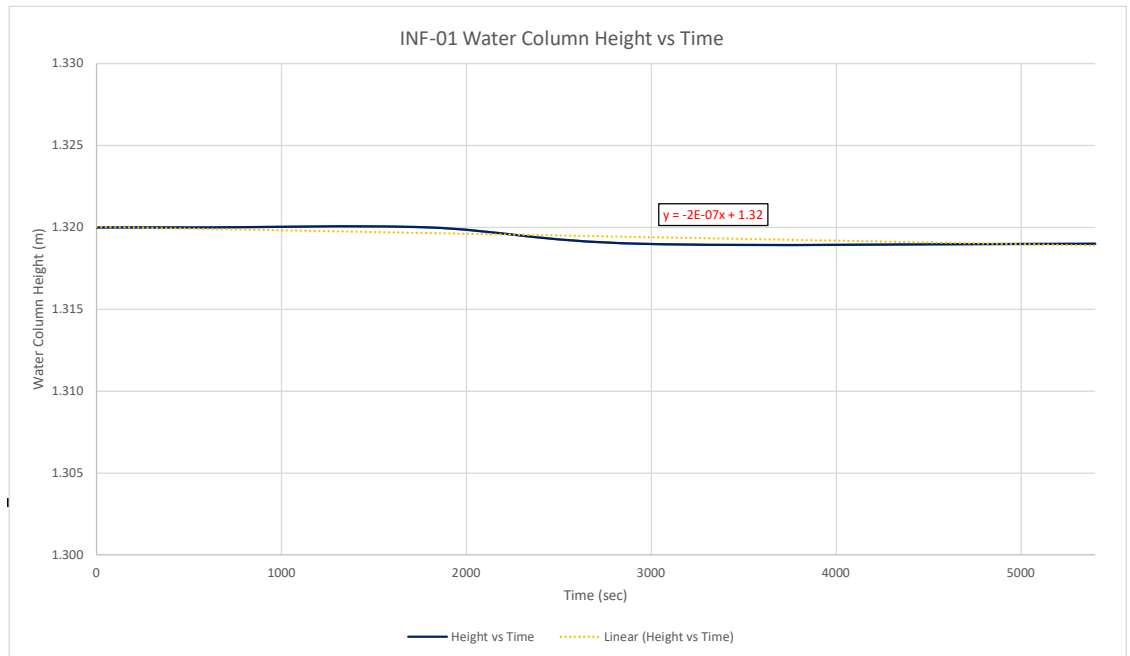
PROJECT NO.: 85162
Date: 21-Jun-22
Start Time: 1:11 PM
Test No. 1

Depth of Test Pit (m):	0.91	Pipe Stickup (m):	0.15	Total Pipe Length(m):	1.32	
Time* (Seconds)	Measurement Interval (sec)	Depth** (m)	Water Column Height (m)	Distance dropped per interval (m1)	Infiltration Rate per Interval (m/sec)	Cumulative Infiltration Rate (m/sec)
0	-	0.000	1.320	-	--	--
30	30	0.000	1.320	0.000	0.000E+00	0.000E+00
60	30	0.000	1.320	0.000	0.000E+00	0.000E+00
90	30	0.000	1.320	0.000	0.000E+00	0.000E+00
120	30	0.000	1.320	0.000	0.000E+00	0.000E+00
150	30	0.000	1.320	0.000	0.000E+00	0.000E+00
180	30	0.000	1.320	0.000	0.000E+00	0.000E+00
300	120	0.000	1.320	0.000	0.000E+00	0.000E+00
600	300	0.000	1.320	0.000	0.000E+00	0.000E+00
1,800	1200	0.000	1.320	0.000	0.000E+00	0.000E+00
2,940	1140	0.001	1.319	0.001	8.772E-07	3.401E-07
5,400	2460	0.001	1.319	0.000	0.000E+00	1.852E-07

** Depth at time 0 indicates measurement below top of measuring pipe at the start of the test.
 Not used for statistical analysis

	(m/sec)	(mm/sec)	(mm/hour)
Maximum Infiltration Rate Between Sampling Intervals -	8.77E-07	8.77E-04	3
Minimum Infiltration Rate Between Sampling Intervals -	0.00E+00	0.00E+00	0
Median Infiltration Rate Between Sampling Intervals -	0.00E+00	0.00E+00	0
Average Infiltration Rate Between Sampling Intervals -	7.97E-08	7.97E-05	0
Cumulative Infiltration Rate for Entire Data Set -	1.85E-07	1.85E-04	1

In-situ Infiltration Rate Measured in the Field (mm/sec):	0.00
In-situ Infiltration Rate Measured in the Field (mm/hour):	1
Calculated Percolation Time (T) based on field infiltration (min/cm):	900.00



		Test 1 - Observed
Test Duration (seconds)		5,400
Total Drop Distance (mm)		1
Total Number of Measured Intervals		12
Infiltration Rate (mm/sec) - Test Average		0.000185
Infiltration Rate (mm/hour) - Test Average		1
Calculated Percolation Time (T) based on Field Infiltration (min/cm)		900.00

IN-SITU INFILTRATION TEST

Project: Wallace Point Road
Site Location: 3491 Wallace Point Road
Test ID: INF22-04

PROJECT NO.: 85162
Date: 21-Jun-22
Start Time: 2:20 PM
Test No. 1

Depth of Test Pit (m):	0.91	Pipe Stickup (m):	0.2	Total Pipe Length(m):	1.40	
Time* (Seconds)	Measurement Interval (sec)	Depth** (m)	Water Column Height (m)	Distance dropped per interval (m1)	Infiltration Rate per Interval (m/sec)	Cumulative Infiltration Rate (m/sec)
0	-	0.000	1.400	-	--	--
30	30	0.000	1.400	0.000	0.000E+00	0.000E+00
60	30	0.000	1.400	0.000	0.000E+00	0.000E+00
90	30	0.000	1.400	0.000	0.000E+00	0.000E+00
120	30	0.000	1.400	0.000	0.000E+00	0.000E+00
150	30	0.000	1.400	0.000	0.000E+00	0.000E+00
180	30	0.000	1.400	0.000	0.000E+00	0.000E+00
300	120	0.000	1.400	0.000	0.000E+00	0.000E+00
600	300	0.000	1.400	0.000	0.000E+00	0.000E+00
1,800	1200	0.000	1.400	0.000	0.000E+00	0.000E+00
2,940	1140	0.000	1.400	0.000	0.000E+00	0.000E+00
5,400	2460	0.000	1.400	0.000	0.000E+00	0.000E+00

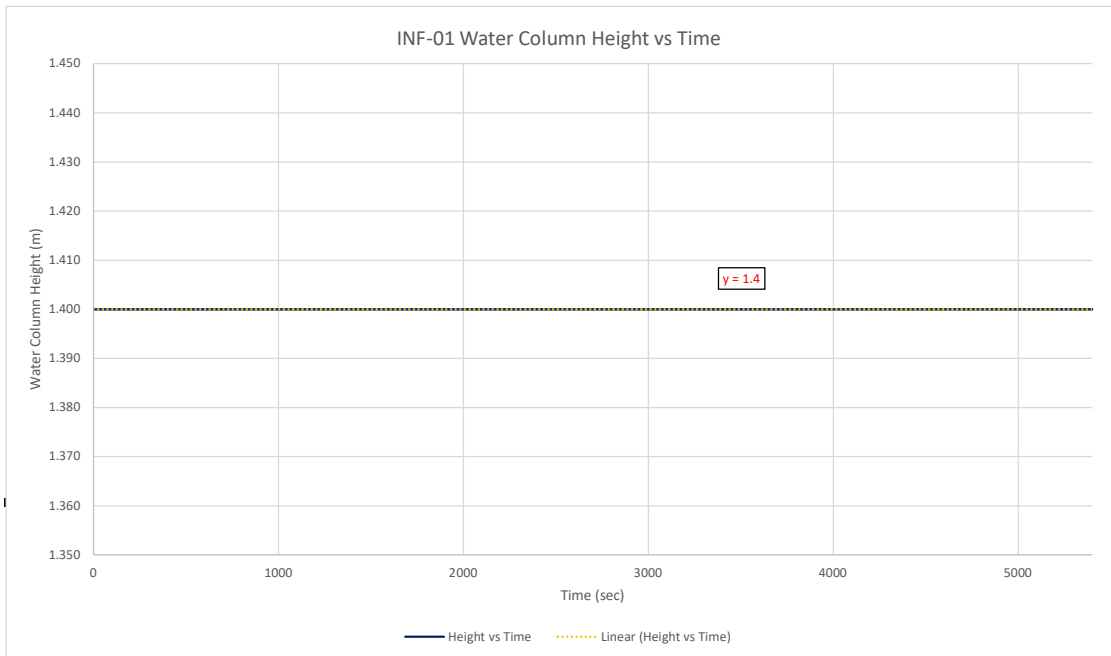
** Depth at time 0 indicates measurement below top of measuring pipe at the start of the test.
 Not used for statistical analysis

	(m/sec)	(mm/sec)	(mm/hour)
Maximum Infiltration Rate Between Sampling Intervals -	0.00E+00	0.00E+00	0
Minimum Infiltration Rate Between Sampling Intervals -	0.00E+00	0.00E+00	0
Median Infiltration Rate Between Sampling Intervals -	0.00E+00	0.00E+00	0
Average Infiltration Rate Between Sampling Intervals -	0.00E+00	0.00E+00	0
Cumulative Infiltration Rate for Entire Data Set -	0.00E+00	0.00E+00	0

In-situ Infiltration Rate Measured in the Field (mm/sec): 0.00

In-situ Infiltration Rate Measured in the Field (mm/hour): 0

Calculated Percolation Time (T) based on field infiltration (min/cm): 0.00



		Test 1 - Observed
Test Duration (seconds)		5,400
Total Drop Distance (mm)		0
Total Number of Measured Intervals		12
Infiltration Rate (mm/sec) - Test Average		0.00
Infiltration Rate (mm/hour) - Test Average		0
Calculated Percolation Time (T) based on Field Infiltration (min/cm)		0.00



Guelph Permeameter Calculations

Project Name Wallace Point Road
Project Number 85162

Date: November 30, 2023
Permeameter Test Number: INF23-01, Test 1
Permeameter Installation Depth: 0.85 m

Single Head Method

Reservoir Cross-sectional area in cm ² ("35.22" for Combined or "2.16" for Inner reservoir):	35.22
Water Head Height ("H" in cm):	10
Borehole Radius ("a" in cm):	3
Soil texture-structure category:	3

Soil Texture Categories

1 - Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.

2- Soils which are both fine textured (clayey or silty) and unstructured, may also include some fine sands.

3 - Most structured soils from clay through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils

4- Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropores, etc.

USCS Soil Classification:
 Brown-grey gravely silty sand, some clay, moist

Steady State Rate of Water Level Change ("R" in cm/min): 0.1000

Calculations:

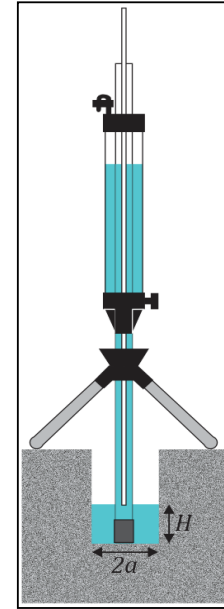
Res Type	35.22
H	10
a	3
H/a	3.333333
α*	0.12
C0.01	1.21841
C0.04	1.290234
C0.12	1.287543
C0.36	1.287543
C	1.287543
R	0.100
Q	0.0587
pi	3.1415

Inferred T-Time*
 20 min/cm
 30 mm/hr

*Inferred T-Times are based on the Credit Valley Conservation and Toronto and Region Conservation document, Low Impact Development Stormwater Management Planning and Design Guide, dated 2010.

Calculation formulas related to shape factor (C). Where H₁ is the first water head height (cm), H₂ is the second water head height (cm), a is borehole radius (cm) and α* is microscopic capillary length factor which is decided according to the soil texture-structure category. For one-head method, only C₁ needs to be calculated while for two-head method, C₁ and C₂ are calculated (Zang et al., 1998).

α* = 0.12 cm⁻¹
 C = 1.287543
 Q = 0.0587
 K_{fs} = 0.00006 cm/sec
 0.0038 cm/min
 0.00 m/sec
 0.00 inch/min
 0.00 inch/sec
 Φ_m = 0.00 cm²/min



Definitions:
 H - Water Head Height
 a - Borehole radius
 R - Steady-state rate of fall
 α* - ratio of gravity to capillary forces during infiltration or drainage
 C - Shape Factor
 Q - Rate of discharge
 K_{fs} - Soil saturated hydraulic conductivity
 Φ_m - Soil matrix flux potential



Guelph Permeameter Calculations

Project Name Wallace Point Road
Project Number 85162

Date: November 30, 2023
Permeameter Test Number: INF23-01, Test 2
Permeameter Installation Depth: 0.85 m

Single Head Method

Reservoir Cross-sectional area in cm ² ("35.22" for Combined or "2.16" for Inner reservoir):	35.22
Water Head Height ("H" in cm):	10
Borehole Radius ("a" in cm):	3
Soil texture-structure category:	3

Soil Texture Categories

- 1 - Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
- 2- Soils which are both fine textured (clayey or silty) and unstructured, may also include some fine sands.
- 3 - Most structured soils from clay through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils
- 4- Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropores, etc.

USCS Soil Classification:

Brown-grey gravely silty sand, some clay, moist

Steady State Rate of Water Level Change ("R" in cm/min): 0.2000

Calculations:

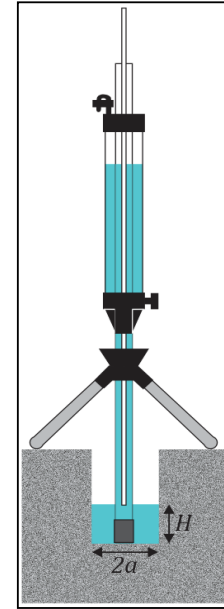
Res Type	35.22
H	10
a	3
H/a	3.333333
α*	0.12
C0.01	1.21841
C0.04	1.290234
C0.12	1.287543
C0.36	1.287543
C	1.287543
R	0.200
Q	0.1174
pi	3.1415

Inferred T-Time*
 12 min/cm
 50 mm/hr

*Inferred T-Times are based on the Credit Valley Conservation and Toronto and Region Conservation document, Low Impact Development Stormwater Management Planning and Design Guide, dated 2010.

Calculation formulas related to shape factor (C). Where H₁ is the first water head height (cm), H₂ is the second water head height (cm), a is borehole radius (cm) and α* is microscopic capillary length factor which is decided according to the soil texture-structure category. For one-head method, only C₁ needs to be calculated while for two-head method, C₁ and C₂ are calculated (Zang et al., 1998).

α* = 0.12 cm⁻¹
 C = 1.287543
 Q = 0.1174
 K_{fs} = 0.00013 cm/sec
 0.0076 cm/min
 0.00 m/sec
 0.00 inch/min
 0.00 inch/sec
 Φ_m = 0.00 cm²/min



Definitions:

- H - Water Head Height
- a - Borehole radius
- R - Steady-state rate of fall
- α* - ratio of gravity to capillary forces during infiltration or drainage
- C - Shape Factor
- Q - Rate of discharge
- K_{fs} - Soil saturated hydraulic conductivity
- Φ_m - Soil matrix flux potential



Guelph Permeameter Calculations

Project Name Wallace Point Road
Project Number 85162

Date: November 30, 2023
Permeameter Test Number: INF23-02, Test 1
Permeameter Installation Depth: 0.90 m

Single Head Method

Reservoir Cross-sectional area in cm ² ("35.22" for Combined or "2.16" for Inner reservoir):	35.22
Water Head Height ("H" in cm):	10
Borehole Radius ("a" in cm):	3
Soil texture-structure category:	3

Soil Texture Categories

- 1 - Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
- 2- Soils which are both fine textured (clayey or silty) and unstructured, may also include some fine sands.
- 3 - Most structured soils from clay through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils
- 4- Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropores, etc.

USCS Soil Classification:

Brown-grey silt and sand, some gravel, some clay, moist to wet

Steady State Rate of Water Level Change ("R" in cm/min): 0.0000

Calculations:

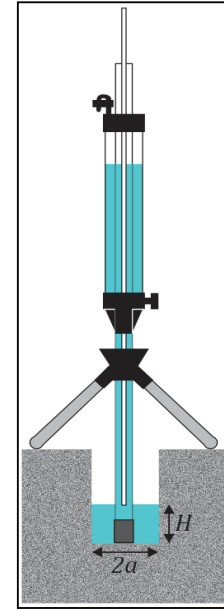
Res Type	35.22
H	10
a	3
H/a	3.333333
α*	0.12
C0.01	1.21841
C0.04	1.290234
C0.12	1.287543
C0.36	1.287543
C	1.287543
R	0.000
Q	0
pi	3.1415

Inferred T-Time*
 No infiltration observed

*Inferred T-Times are based on the Credit Valley Conservation and Toronto and Region Conservation document, Low Impact Development Stormwater Management Planning and Design Guide, dated 2010.

Calculation formulas related to shape factor (C). Where H₁ is the first water head height (cm), H₂ is the second water head height (cm), a is borehole radius (cm) and α* is microscopic capillary length factor which is decided according to the soil texture-structure category. For one-head method, only C₁ needs to be calculated while for two-head method, C₁ and C₂ are calculated (Zang et al., 1998).

α* = 0.12 cm⁻¹
 C = 1.287543
 Q = 0
 K_{fs} = 0.00000 cm/sec
 0.0000 cm/min
 0.00 m/sec
 0.00 inch/min
 0.00 inch/sec
 Φ_m = 0.00 cm²/min



Definitions:

- H - Water Head Height
- a - Borehole radius
- R - Steady-state rate of fall
- α* - ratio of gravity to capillary forces during infiltration or drainage
- C - Shape Factor
- Q - Rate of discharge
- K_{fs} - Soil saturated hydraulic conductivity
- Φ_m - Soil matrix flux potential



Guelph Permeameter Calculations

Project Name Wallace Point Road
Project Number 85162

Date: November 30, 2023
Permeameter Test Number: INF23-02, Test 2
Permeameter Installation Depth: 0.95 m

Single Head Method

Reservoir Cross-sectional area in cm ² ("35.22" for Combined or "2.16" for Inner reservoir):	2.16
Water Head Height ("H" in cm):	20
Borehole Radius ("a" in cm):	3
Soil texture-structure category:	3

Soil Texture Categories

- 1 - Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
- 2- Soils which are both fine textured (clayey or silty) and unstructured, may also include some fine sands.
- 3 - Most structured soils from clay through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils
- 4- Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropores, etc.

USCS Soil Classification:

Brown-grey silt and sand, some gravel, some clay, moist to wet

Steady State Rate of Water Level Change ("R" in cm/min): 0.1000

Calculations:

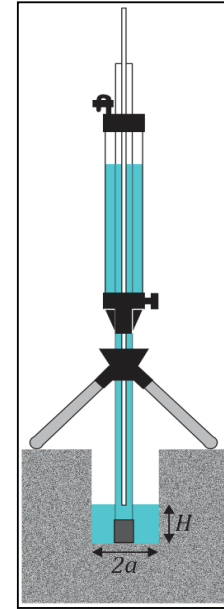
Res Type	2.16
H	20
a	3
H/a	6.666667
α*	0.12
C0.01	1.754604
C0.04	1.903071
C0.12	1.980192
C0.36	1.980192
C	1.980192
R	0.100
Q	0.0036
pi	3.1415

Inferred T-Time*
 50 min/cm
 12 mm/hr

*Inferred T-Times are based on the Credit Valley Conservation and Toronto and Region Conservation document, Low Impact Development Stormwater Management Planning and Design Guide, dated 2010.

Calculation formulas related to shape factor (C). Where H₁ is the first water head height (cm), H₂ is the second water head height (cm), a is borehole radius (cm) and α* is microscopic capillary length factor which is decided according to the soil texture-structure category. For one-head method, only C₁ needs to be calculated while for two-head method, C₁ and C₂ are calculated (Zang et al., 1998).

α* = 0.12 cm⁻¹
 C = 1.980192
 Q = 0.0036
 K_{fs} = 0.000002 cm/sec
 0.0001 cm/min
 0.00 m/sec
 0.00 inch/min
 0.00 inch/sec
 Φ_m = 0.00 cm²/min



Definitions:

- H - Water Head Height
- a - Borehole radius
- R - Steady-state rate of fall
- α* - ratio of gravity to capillary forces during infiltration or drainage
- C - Shape Factor
- Q - Rate of discharge
- K_{fs} - Soil saturated hydraulic conductivity
- Φ_m - Soil matrix flux potential



Guelph Permeameter Calculations

Project Name Wallace Point Road
Project Number 85162

Date: November 30, 2023
Permeameter Test Number: INF23-03, Test 1
Permeameter Installation Depth: 0.85 m

Single Head Method

Reservoir Cross-sectional area in cm ² ("35.22" for Combined or "2.16" for Inner reservoir):	35.22
Water Head Height ("H" in cm):	15
Borehole Radius ("a" in cm):	3
Soil texture-structure category:	3

Soil Texture Categories

- 1 - Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
- 2- Soils which are both fine textured (clayey or silty) and unstructured, may also include some fine sands.
- 3 - Most structured soils from clay through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils
- 4- Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropores, etc.

USCS Soil Classification:

Brown-grey silt and sand, some gravel, some clay, moist

Steady State Rate of Water Level Change ("R" in cm/min): 0.5000

Calculations:

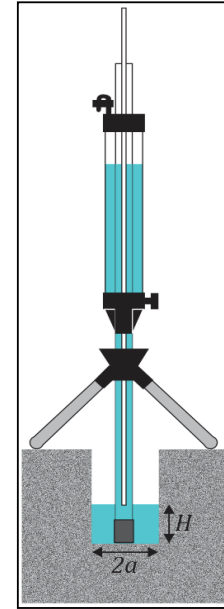
Res Type	35.22
H	15
a	3
H/a	5
α*	0.12
C0.01	1.518269
C0.04	1.629144
C0.12	1.666893
C0.36	1.666893
C	1.666893
R	0.500
Q	0.2935
pi	3.1415

Inferred T-Time*
 12 min/cm
 50 mm/hr

*Inferred T-Times are based on the Credit Valley Conservation and Toronto and Region Conservation document, Low Impact Development Stormwater Management Planning and Design Guide, dated 2010.

Calculation formulas related to shape factor (C). Where H₁ is the first water head height (cm), H₂ is the second water head height (cm), a is borehole radius (cm) and α* is microscopic capillary length factor which is decided according to the soil texture-structure category. For one-head method, only C₁ needs to be calculated while for two-head method, C₁ and C₂ are calculated (Zang et al., 1998).

α* = 0.12 cm⁻¹
 C = 1.666893
 Q = 0.2935
 K_{fs} = 0.000218 cm/sec
 0.0131 cm/min
 0.00 m/sec
 0.01 inch/min
 0.00 inch/sec
 Φ_m = 0.00 cm²/min



Definitions:

- H - Water Head Height
- a - Borehole radius
- R - Steady-state rate of fall
- α* - ratio of gravity to capillary forces during infiltration or drainage
- C - Shape Factor
- Q - Rate of discharge
- K_{fs} - Soil saturated hydraulic conductivity
- Φ_m - Soil matrix flux potential



Guelph Permeameter Calculations

Project Name Wallace Point Road
Project Number 85162

Date: November 30, 2023
Permeameter Test Number: INF23-03, Test 2
Permeameter Installation Depth: 0.75 m

Single Head Method

Reservoir Cross-sectional area in cm ² ("35.22" for Combined or "2.16" for Inner reservoir):	35.22
Water Head Height ("H" in cm):	10
Borehole Radius ("a" in cm):	3
Soil texture-structure category:	3

Soil Texture Categories

- 1 - Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
- 2- Soils which are both fine textured (clayey or silty) and unstructured, may also include some fine sands.
- 3 - Most structured soils from clay through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils
- 4- Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropores, etc.

USCS Soil Classification:

Brown-grey silt and sand, some gravel, some clay, moist

Steady State Rate of Water Level Change ("R" in cm/min): 0.1000

Calculations:

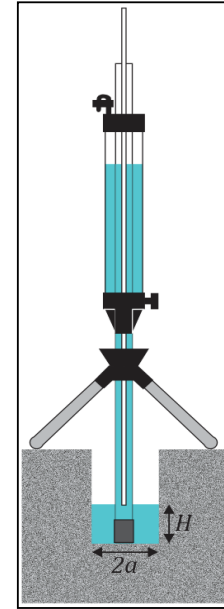
Res Type	35.22
H	10
a	3
H/a	3.333333
α*	0.12
C0.01	1.21841
C0.04	1.290234
C0.12	1.287543
C0.36	1.287543
C	1.287543
R	0.100
Q	0.0587
pi	3.1415

Inferred T-Time*
 20 min/cm
 30 mm/hr

*Inferred T-Times are based on the Credit Valley Conservation and Toronto and Region Conservation document, Low Impact Development Stormwater Management Planning and Design Guide, dated 2010.

Calculation formulas related to shape factor (C). Where H₁ is the first water head height (cm), H₂ is the second water head height (cm), a is borehole radius (cm) and α* is microscopic capillary length factor which is decided according to the soil texture-structure category. For one-head method, only C₁ needs to be calculated while for two-head method, C₁ and C₂ are calculated (Zang et al., 1998).

α* = 0.12 cm⁻¹
 C = 1.287543
 Q = 0.0587
 K_{fs} = 0.000064 cm/sec
 0.0038 cm/min
 0.00 m/sec
 0.00 inch/min
 0.00 inch/sec
 Φ_m = 0.00 cm²/min



Definitions:

- H - Water Head Height
- a - Borehole radius
- R - Steady-state rate of fall
- α* - ratio of gravity to capillary forces during infiltration or drainage
- C - Shape Factor
- Q - Rate of discharge
- K_{fs} - Soil saturated hydraulic conductivity
- Φ_m - Soil matrix flux potential



Guelph Permeameter Calculations

Single Head Method

Project Name Wallace Point Road
Project Number 85162

Date: April 29, 2024
Permeameter Test Number: INF23-04, Test 1

Reservoir Cross-sectional area in cm^2 ("35.22" for Combined or "2.16" for Inner reservoir):	0
Water Head Height ("H" in cm):	0
Borehole Radius ("a" in cm):	0
Soil texture-structure category:	0

Soil Texture Categories

- 1 - Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
- 2- Soils which are both fine textured (clayey or silty) and unstructured, may also include some fine sands.
- 3 - Most structured soils from clay through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils
- 4- Coarse and gravelly sands; may also include some highly structured soils with large and/or numerous cracks, macropores, etc.

USCS Soil Classification:

Brown-grey silt and sand, some gravel, trace clay, abundance of cobble/boulder, moist

Steady State Rate of Water Level Change ("R" in cm/min): -

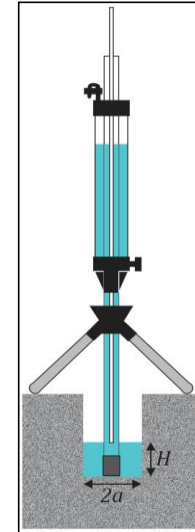
Res Type	0
H	0
a	0
H/a	#DIV/0!
a*	0
C0.01	#DIV/0!
C0.04	#DIV/0!
C0.12	#DIV/0!
C0.36	#DIV/0!
C	0
R	-
Q	#VALUE!
pi	3.1415

Infiltration Rates:

Groundwater at 0.35 mbg - not able to conduct test due to shallow groundwater

Calculation formulas related to shape factor (C). Where H_1 is the first water head height (cm), H_2 is the second water head height (cm), a is borehole radius (cm) and a^* is microscopic capillary length factor which is decided according to the soil texture-structure category. For one-head method, only C_1 needs to be calculated while for two-head method, C_1 and C_2 are calculated (Zang et al., 1996).

$a^* = 0 \text{ cm}^{-1}$
 $C = 0$
 $Q = \#VALUE!$
 $K_{fs} = \#VALUE! \text{ cm/sec}$
 $\#VALUE! \text{ cm/min}$
 $\#VALUE! \text{ m/sec}$
 $\#VALUE! \text{ inch/min}$
 $\#VALUE! \text{ inch/sec}$
 $\Phi_m = \#VALUE! \text{ cm}^2/\text{min}$



Definitions:

- H - Water Head Height
- a - Borehole radius
- R - Steady-state rate of fall
- a^* - ratio of gravity to capillary forces during infiltration or drainage
- C - Shape Factor
- Q - Rate of discharge
- K_{fs} - Soil saturated hydraulic conductivity
- Φ_m - Soil matrix flux potential



Guelph Permeameter Calculations

Project Name Wallace Point Road
Project Number 85162

Date: November 30, 2023
Permeameter Test Number: INF23-05, Test 1
Permeameter Installation Depth: 0.85 m

Single Head Method

Reservoir Cross-sectional area in cm ² ("35.22" for Combined or "2.16" for Inner reservoir):	35.22
Water Head Height ("H" in cm):	15
Borehole Radius ("a" in cm):	3
Soil texture-structure category:	3

Soil Texture Categories

- 1 - Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
- 2- Soils which are both fine textured (clayey or silty) and unstructured, may also include some fine sands.
- 3 - Most structured soils from clay through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils
- 4- Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropores, etc.

USCS Soil Classification:

Brown silty sand and gravel, trace clay, occasional cobbles/boulders, moist

Steady State Rate of Water Level Change ("R" in cm/min): 1.7000

Calculations:

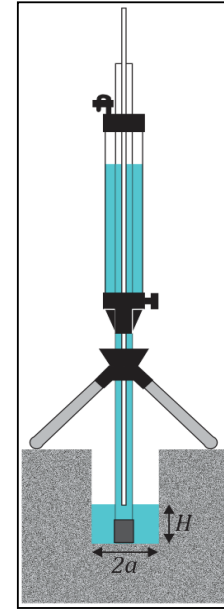
Res Type	35.22
H	15
a	3
H/a	5
α*	0.12
C0.01	1.518269
C0.04	1.629144
C0.12	1.666893
C0.36	1.666893
C	1.666893
R	1.700
Q	0.9979
pi	3.1415

Inferred T-Time*
 12 min/cm
 50 mm/hr

*Inferred T-Times are based on the Credit Valley Conservation and Toronto and Region Conservation document, Low Impact Development Stormwater Management Planning and Design Guide, dated 2010.

Calculation formulas related to shape factor (C). Where H₁ is the first water head height (cm), H₂ is the second water head height (cm), a is borehole radius (cm) and α* is microscopic capillary length factor which is decided according to the soil texture-structure category. For one-head method, only C₁ needs to be calculated while for two-head method, C₁ and C₂ are calculated (Zang et al., 1998).

α* = 0.12 cm⁻¹
 C = 1.666893
 Q = 0.9979
 K_{fs} = 0.000741 cm/sec
 0.0444 cm/min
 0.00 m/sec
 0.02 inch/min
 0.00 inch/sec
 Φ_m = 0.01 cm²/min



Definitions:

- H - Water Head Height
- a - Borehole radius
- R - Steady-state rate of fall
- α* - ratio of gravity to capillary forces during infiltration or drainage
- C - Shape Factor
- Q - Rate of discharge
- K_{fs} - Soil saturated hydraulic conductivity
- Φ_m - Soil matrix flux potential



Guelph Permeameter Calculations

Project Name Wallace Point Road
Project Number 85162

Date: November 30, 2023
Permeameter Test Number: INF23-05, Test 2
Permeameter Installation Depth: 1.10 m

Single Head Method

Reservoir Cross-sectional area in cm ² ("35.22" for Combined or "2.16" for Inner reservoir):	35.22
Water Head Height ("H" in cm):	15
Borehole Radius ("a" in cm):	3
Soil texture-structure category:	3

Soil Texture Categories

- 1 - Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
- 2 - Soils which are both fine textured (clayey or silty) and unstructured, may also include some fine sands.
- 3 - Most structured soils from clay through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils
- 4 - Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropores, etc.

USCS Soil Classification:

Brown silty sand and gravel, occasional cobbles/boulders, moist

Steady State Rate of Water Level Change ("R" in cm/min): 0.5000

Calculations:

Res Type	35.22
H	15
a	3
H/a	5
α*	0.12
C0.01	1.518269
C0.04	1.629144
C0.12	1.666893
C0.36	1.666893
C	1.666893
R	0.500
Q	0.2935
pi	3.1415

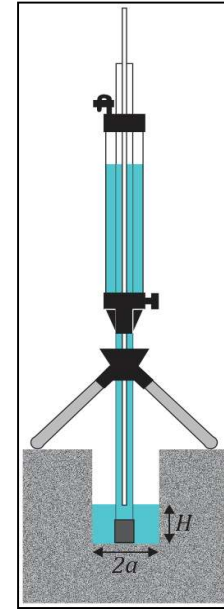
Inferred T-Time*

12 cm/min
50 mm/hr

*Inferred T-Times are based on the Credit Valley Conservation and Toronto and Region Conservation document, Low Impact Development Stormwater Management Planning and Design Guide, dated 2010.

Calculation formulas related to shape factor (C). Where H₁ is the first water head height (cm), H₂ is the second water head height (cm), a is borehole radius (cm) and α* is microscopic capillary length factor which is decided according to the soil texture-structure category. For one-head method, only C₁ needs to be calculated while for two-head method, C₁ and C₂ are calculated (Zang et al., 1998).

α* = 0.12 cm⁻¹
 C = 1.666893
 Q = 0.2935
 K_{fs} = 0.000218 cm/sec
 0.0131 cm/min
 0.00 m/sec
 0.01 inch/min
 0.00 inch/sec
 Φ_m = 0.00 cm²/min



Definitions:

- H - Water Head Height
- a - Borehole radius
- R - Steady-state rate of fall
- α* - ratio of gravity to capillary forces during infiltration or drainage
- C - Shape Factor
- Q - Rate of discharge
- K_{fs} - Soil saturated hydraulic conductivity
- Φ_m - Soil matrix flux potential



Guelph Permeameter Calculations

Project Name Wallace Point Road
Project Number 85162

Date: December 1, 2023
Permeameter Test Number: INF23-06, Test 1 & 2
Permeameter Installation Depth: 0.65 m

Single Head Method

Reservoir Cross-sectional area in cm ² ("35.22" for Combined or "2.16" for Inner reservoir):	35.22
Water Head Height ("H" in cm):	15
Borehole Radius ("a" in cm):	3
Soil texture-structure category:	3

Soil Texture Categories

- 1 - Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
- 2 - Soils which are both fine textured (clayey or silty) and unstructured, may also include some fine sands.
- 3 - Most structured soils from clay through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils
- 4 - Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropores, etc.

USCS Soil Classification:

Brown silty sand and gravel, occasional cobbles/boulders, moist to wet

Steady State Rate of Water Level Change ("R" in cm/min): 1.0000

Calculations:

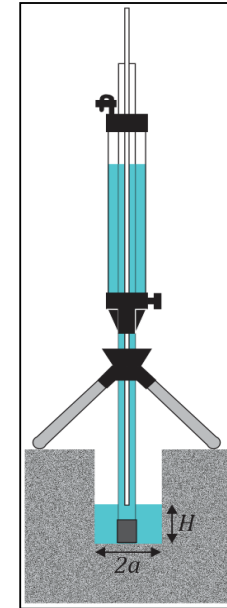
Res Type	35.22
H	15
a	3
H/a	5
a*	0.12
C0.01	1.518269
C0.04	1.629144
C0.12	1.666893
C0.36	1.666893
C	1.666893
R	1.000
Q	0.587
pi	3.1415

Inferred T-Time*
 12 cm/min
 50 mm/hr

*Inferred T-Times are based on the Credit Valley Conservation and Toronto and Region Conservation document, Low Impact Development Stormwater Management Planning and Design Guide, dated 2010.

Calculation formulas related to shape factor (C). Where H₁ is the first water head height (cm), H₂ is the second water head height (cm), a is borehole radius (cm) and a* is microscopic capillary length factor which is decided according to the soil texture-structure category. For one-head method, only C₁ needs to be calculated while for two-head method, C₁ and C₂ are calculated (Zang et al., 1998).

α* = 0.12 cm⁻¹
C = 1.666893
Q = 0.587
K_{fs} = 0.000436 cm/sec
 0.0261 cm/min
 0.00 m/sec
 0.01 inch/min
 0.00 inch/sec
Φ_m = 0.00 cm²/min



Definitions:

- H - Water Head Height
- a - Borehole radius
- R - Steady-state rate of fall
- α* - ratio of gravity to capillary forces during infiltration or drainage
- C - Shape Factor
- Q - Rate of discharge
- K_{fs} - Soil saturated hydraulic conductivity
- Φ_m - Soil matrix flux potential



Guelph Permeameter Calculations

Project Name Wallace Point Road
Project Number 85162

Date: December 1, 2023
Permeameter Test Number: INF23-07, Test 1 & 2
Permeameter Installation Depth: 1.05 m

Single Head Method

Reservoir Cross-sectional area in cm ² ("35.22" for Combined or "2.16" for Inner reservoir):	35.22
Water Head Height ("H" in cm):	20
Borehole Radius ("a" in cm):	3
Soil texture-structure category:	3

Soil Texture Categories

- 1 - Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
- 2 - Soils which are both fine textured (clayey or silty) and unstructured, may also include some fine sands.
- 3 - Most structured soils from clay through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils
- 4 - Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropores, etc.

USCS Soil Classification:

Brown sandy silt, some clay, moist

Steady State Rate of Water Level Change ("R" in cm/min): 0.9000

Calculations:

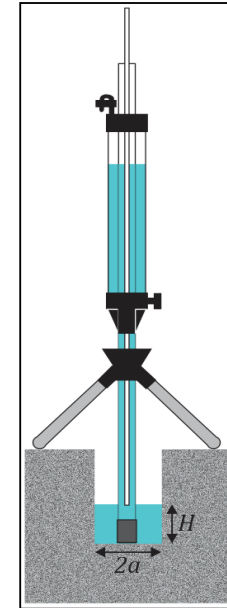
Res Type	35.22
H	20
a	3
H/a	6.666667
a*	0.12
C0.01	1.754604
C0.04	1.903071
C0.12	1.980192
C0.36	1.980192
C	1.980192
R	0.900
Q	0.5283
pi	3.1415

Inferred T-Time*
 12 cm/min
 50 mm/hr

*Inferred T-Times are based on the Credit Valley Conservation and Toronto and Region Conservation document, Low Impact Development Stormwater Management Planning and Design Guide, dated 2010.

Calculation formulas related to shape factor (C). Where H₁ is the first water head height (cm), H₂ is the second water head height (cm), a is borehole radius (cm) and a* is microscopic capillary length factor which is decided according to the soil texture-structure category. For one-head method, only C₁ needs to be calculated while for two-head method, C₁ and C₂ are calculated (Zang et al., 1998).

a* = 0.12 cm⁻¹
C = 1.980192
Q = 0.5283
Kfs = 0.000289 cm/sec
0.0174 cm/min
0.00 m/sec
0.01 inch/min
0.00 inch/sec
Φ_m = 0.00 cm²/min



Definitions:

- H - Water Head Height
- a - Borehole radius
- R - Steady-state rate of fall
- a* - ratio of gravity to capillary forces during infiltration or drainage
- C - Shape Factor
- Q - Rate of discharge
- Kfs - Soil saturated hydraulic conductivity
- Φ_m - Soil matrix flux potential



Guelph Permeameter Calculations

Project Name Wallace Point Road
Project Number 85162

Date: December 1, 2023
Permeameter Test Number: INF23-08, Test 1
Permeameter Installation Depth: 0.80 m

Single Head Method

Reservoir Cross-sectional area in cm ² ("35.22" for Combined or "2.16" for Inner reservoir):	2.16
Water Head Height ("H" in cm):	15
Borehole Radius ("a" in cm):	3
Soil texture-structure category:	3

Soil Texture Categories

- 1 - Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
- 2- Soils which are both fine textured (clayey or silty) and unstructured, may also include some fine sands.
- 3 - Most structured soils from clay through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils
- 4- Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropores, etc.

USCS Soil Classification:

Brown silty sand and gravel, trace clay, occasional cobble/boulder, moist

Steady State Rate of Water Level Change ("R" in cm/min): 0.9000

Calculations:

Res Type	2.16
H	15
a	3
H/a	5
α*	0.12
C0.01	1.518269
C0.04	1.629144
C0.12	1.666893
C0.36	1.666893
C	1.666893
R	0.900
Q	0.0324
pi	3.1415

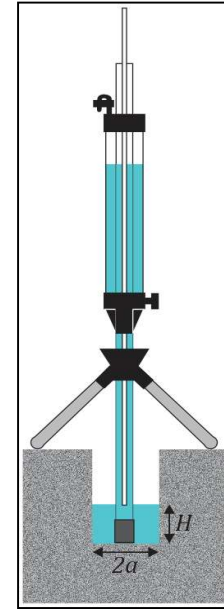
Inferred T-Time*

20 cm/min
30 mm/hr

*Inferred T-Times are based on the Credit Valley Conservation and Toronto and Region Conservation document, Low Impact Development Stormwater Management Planning and Design Guide, dated 2010.

Calculation formulas related to shape factor (C). Where H₁ is the first water head height (cm), H₂ is the second water head height (cm), a is borehole radius (cm) and α* is microscopic capillary length factor which is decided according to the soil texture-structure category. For one-head method, only C₁ needs to be calculated while for two-head method, C₁ and C₂ are calculated (Zang et al., 1998).

α* = 0.12 cm⁻¹
C = 1.666893
Q = 0.0324
K_{fs} = 0.000024 cm/sec
0.0014 cm/min
0.00 m/sec
0.00 inch/min
0.00 inch/sec
Φ_m = 0.00 cm²/min



Definitions:

- H - Water Head Height
- a - Borehole radius
- R - Steady-state rate of fall
- α* - ratio of gravity to capillary forces during infiltration or drainage
- C - Shape Factor
- Q - Rate of discharge
- K_{fs} - Soil saturated hydraulic conductivity
- Φ_m - Soil matrix flux potential



Guelph Permeameter Calculations

Project Name Wallace Point Road
Project Number 85162

Date: December 1, 2023
Permeameter Test Number: INF23-08, Test 2
Permeameter Installation Depth: 0.70 m

Single Head Method

Reservoir Cross-sectional area in cm ² ("35.22" for Combined or "2.16" for Inner reservoir):	35.22
Water Head Height ("H" in cm):	15
Borehole Radius ("a" in cm):	3
Soil texture-structure category:	3

Soil Texture Categories

- 1 - Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
- 2 - Soils which are both fine textured (clayey or silty) and unstructured, may also include some fine sands.
- 3 - Most structured soils from clay through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils
- 4 - Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropores, etc.

USCS Soil Classification:

Brown silty sand and gravel, trace clay, occasional cobble/boulder, moist

Steady State Rate of Water Level Change ("R" in cm/min): 0.5000

Calculations:

Res Type	35.22
H	15
a	3
H/a	5
α*	0.12
C0.01	1.518269
C0.04	1.629144
C0.12	1.666893
C0.36	1.666893
C	1.666893
R	0.500
Q	0.2935
pi	3.1415

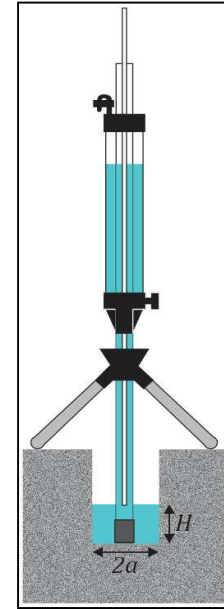
Inferred T-Time*

12 cm/min
50 mm/hr

*Inferred T-Times are based on the Credit Valley Conservation and Toronto and Region Conservation document, Low Impact Development Stormwater Management Planning and Design Guide, dated 2010.

Calculation formulas related to shape factor (C). Where H₁ is the first water head height (cm), H₂ is the second water head height (cm), a is borehole radius (cm) and α* is microscopic capillary length factor which is decided according to the soil texture-structure category. For one-head method, only C₁ needs to be calculated while for two-head method, C₁ and C₂ are calculated (Zang et al., 1998).

α* = 0.12 cm⁻¹
 C = 1.666893
 Q = 0.2935
 K_{fs} = 0.000218 cm/sec
 0.0131 cm/min
 0.00 m/sec
 0.01 inch/min
 0.00 inch/sec
 Φ_m = 0.00 cm²/min



Definitions:

- H - Water Head Height
- a - Borehole radius
- R - Steady-state rate of fall
- α* - ratio of gravity to capillary forces during infiltration or drainage
- C - Shape Factor
- Q - Rate of discharge
- K_{fs} - Soil saturated hydraulic conductivity
- Φ_m - Soil matrix flux potential



Guelph Permeameter Calculations

Project Name Wallace Point Road
Project Number 85162

Date: December 1, 2023
Permeameter Test Number: INF23-09, Test 1
Permeameter Installation Depth: 0.59 m

Single Head Method

Reservoir Cross-sectional area in cm ² ("35.22" for Combined or "2.16" for Inner reservoir):	35.22
Water Head Height ("H" in cm):	15
Borehole Radius ("a" in cm):	3
Soil texture-structure category:	3

Soil Texture Categories

- 1 - Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
- 2 - Soils which are both fine textured (clayey or silty) and unstructured, may also include some fine sands.
- 3 - Most structured soils from clay through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils
- 4 - Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropores, etc.

USCS Soil Classification:

Brown sand and gravel, some silt, trace clay, occasional cobble/boulder, moist

Steady State Rate of Water Level Change ("R" in cm/min): 0.7000

Calculations:

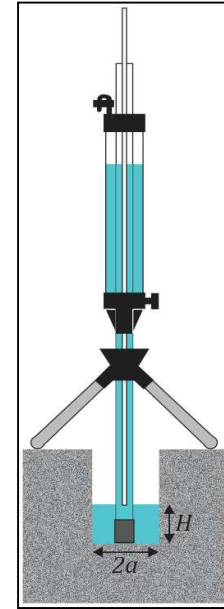
Res Type	35.22
H	15
a	3
H/a	5
α*	0.12
C0.01	1.518269
C0.04	1.629144
C0.12	1.666893
C0.36	1.666893
C	1.666893
R	0.700
Q	0.4109
pi	3.1415

Inferred T-Time*
 12 cm/min
 50 mm/hr

*Inferred T-Times are based on the Credit Valley Conservation and Toronto and Region Conservation document, Low Impact Development Stormwater Management Planning and Design Guide, dated 2010.

Calculation formulas related to shape factor (C). Where H₁ is the first water head height (cm), H₂ is the second water head height (cm), a is borehole radius (cm) and α* is microscopic capillary length factor which is decided according to the soil texture-structure category. For one-head method, only C₁ needs to be calculated while for two-head method, C₁ and C₂ are calculated (Zang et al., 1998).

α* = 0.12 cm⁻¹
 C = 1.666893
 Q = 0.4109
 K_{fs} = 0.000305 cm/sec
 0.0183 cm/min
 0.00 m/sec
 0.01 inch/min
 0.00 inch/sec
 Φ_m = 0.00 cm²/min



Definitions:

- H - Water Head Height
- a - Borehole radius
- R - Steady-state rate of fall
- α* - ratio of gravity to capillary forces during infiltration or drainage
- C - Shape Factor
- Q - Rate of discharge
- K_{fs} - Soil saturated hydraulic conductivity
- Φ_m - Soil matrix flux potential



Guelph Permeameter Calculations

Project Name Wallace Point Road
Project Number 85162

Date: December 1, 2023
Permeameter Test Number: INF23-10, Test 1
Permeameter Installation Depth: 1.05 m

Single Head Method

Reservoir Cross-sectional area in cm ² ("35.22" for Combined or "2.16" for Inner reservoir):	2.16
Water Head Height ("H" in cm):	20
Borehole Radius ("a" in cm):	3
Soil texture-structure category:	3

Soil Texture Categories

- 1 - Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
- 2- Soils which are both fine textured (clayey or silty) and unstructured, may also include some fine sands.
- 3 - Most structured soils from clay through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils
- 4- Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropores, etc.

USCS Soil Classification:

Brown silty sand, some gravel, trace to some clay, occasional cobble/boulder, moist to wet

Steady State Rate of Water Level Change ("R" in cm/min): 0.4500

Calculations:

Res Type	2.16
H	20
a	3
H/a	6.666667
α*	0.12
C0.01	1.754604
C0.04	1.903071
C0.12	1.980192
C0.36	1.980192
C	1.980192
R	0.450
Q	0.0162
pi	3.1415

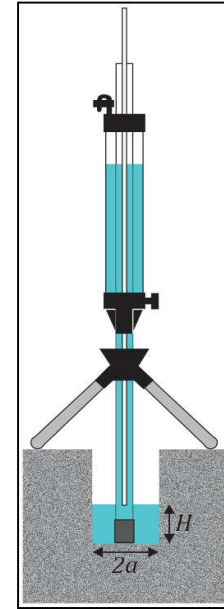
Inferred T-Time*

50 cm/min
12 mm/hr

*Inferred T-Times are based on the Credit Valley Conservation and Toronto and Region Conservation document, Low Impact Development Stormwater Management Planning and Design Guide, dated 2010.

Calculation formulas related to shape factor (C). Where H₁ is the first water head height (cm), H₂ is the second water head height (cm), a is borehole radius (cm) and α* is microscopic capillary length factor which is decided according to the soil texture-structure category. For one-head method, only C₁ needs to be calculated while for two-head method, C₁ and C₂ are calculated (Zang et al., 1998).

α* = 0.12 cm⁻¹
 C = 1.980192
 Q = 0.0162
 K_{fs} = 0.000009 cm/sec
 0.0005 cm/min
 0.00 m/sec
 0.00 inch/min
 0.00 inch/sec
 Φ_m = 0.00 cm²/min



Definitions:

- H - Water Head Height
- a - Borehole radius
- R - Steady-state rate of fall
- α* - ratio of gravity to capillary forces during infiltration or drainage
- C - Shape Factor
- Q - Rate of discharge
- K_{fs} - Soil saturated hydraulic conductivity
- Φ_m - Soil matrix flux potential



Guelph Permeameter Calculations

Project Name Wallace Point Road
Project Number 85162

Date: December 1, 2023
Permeameter Test Number: INF23-11, Test 1
Permeameter Installation Depth: 1.05 m

Single Head Method

Reservoir Cross-sectional area in cm ² ("35.22" for Combined or "2.16" for Inner reservoir):	2.16
Water Head Height ("H" in cm):	20
Borehole Radius ("a" in cm):	3
Soil texture-structure category:	3

Soil Texture Categories

- 1 - Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
- 2- Soils which are both fine textured (clayey or silty) and unstructured, may also include some fine sands.
- 3 - Most structured soils from clay through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils
- 4- Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropores, etc.

USCS Soil Classification:

Brown silt and sand, some gravel, some clay, occasional cobble/boulder, moist to wet

Steady State Rate of Water Level Change ("R" in cm/min): 0.7000

Calculations:

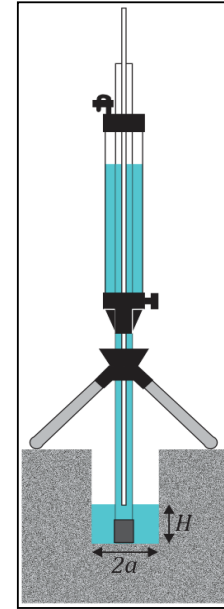
Res Type	2.16
H	20
a	3
H/a	6.666667
α*	0.12
C0.01	1.754604
C0.04	1.903071
C0.12	1.980192
C0.36	1.980192
C	1.980192
R	0.700
Q	0.0252
pi	3.1415

Inferred T-Time*
 20 min/cm
 30 mm/hr

*Inferred T-Times are based on the Credit Valley Conservation and Toronto and Region Conservation document, Low Impact Development Stormwater Management Planning and Design Guide, dated 2010.

Calculation formulas related to shape factor (C). Where H₁ is the first water head height (cm), H₂ is the second water head height (cm), a is borehole radius (cm) and α* is microscopic capillary length factor which is decided according to the soil texture-structure category. For one-head method, only C₁ needs to be calculated while for two-head method, C₁ and C₂ are calculated (Zang et al., 1998).

α* = 0.12 cm⁻¹
 C = 1.980192
 Q = 0.0252
 K_{fs} = 0.000014 cm/sec
 0.0008 cm/min
 0.00 m/sec
 0.00 inch/min
 0.00 inch/sec
 Φ_m = 0.00 cm²/min



Definitions:

- H - Water Head Height
- a - Borehole radius
- R - Steady-state rate of fall
- α* - ratio of gravity to capillary forces during infiltration or drainage
- C - Shape Factor
- Q - Rate of discharge
- K_{fs} - Soil saturated hydraulic conductivity
- Φ_m - Soil matrix flux potential



Guelph Permeameter Calculations

Project Name Wallace Point Road
Project Number 85162

Date: December 1, 2023
Permeameter Test Number: INF23-11, Test 2
Permeameter Installation Depth: 1.10 m

Single Head Method

Reservoir Cross-sectional area in cm ² ("35.22" for Combined or "2.16" for Inner reservoir):	2.16
Water Head Height ("H" in cm):	15
Borehole Radius ("a" in cm):	3
Soil texture-structure category:	3

Soil Texture Categories

- 1 - Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
- 2- Soils which are both fine textured (clayey or silty) and unstructured, may also include some fine sands.
- 3 - Most structured soils from clay through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils
- 4- Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropores, etc.

USCS Soil Classification:

Brown silt and sand, some gravel, some clay, occasional cobble/boulder, moist to wet

Steady State Rate of Water Level Change ("R" in cm/min): 5.5000

Calculations:

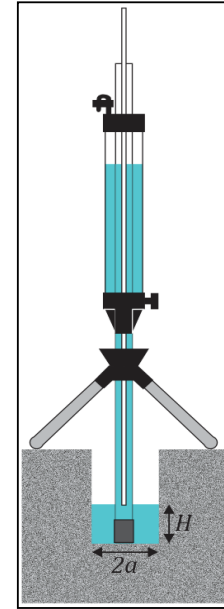
Res Type	2.16
H	15
a	3
H/a	5
α*	0.12
C0.01	1.518269
C0.04	1.629144
C0.12	1.666893
C0.36	1.666893
C	1.666893
R	5.500
Q	0.198
pi	3.1415

Inferred T-Time*
 12 min/cm
 50 mm/hr

*Inferred T-Times are based on the Credit Valley Conservation and Toronto and Region Conservation document, Low Impact Development Stormwater Management Planning and Design Guide, dated 2010.

Calculation formulas related to shape factor (C). Where H₁ is the first water head height (cm), H₂ is the second water head height (cm), a is borehole radius (cm) and α* is microscopic capillary length factor which is decided according to the soil texture-structure category. For one-head method, only C₁ needs to be calculated while for two-head method, C₁ and C₂ are calculated (Zang et al., 1998).

α* = 0.12 cm⁻¹
 C = 1.666893
 Q = 0.198
 K_{fs} = 0.000147 cm/sec
 0.0088 cm/min
 0.00 m/sec
 0.00 inch/min
 0.00 inch/sec
 Φ_m = 0.00 cm²/min



Definitions:

- H - Water Head Height
- a - Borehole radius
- R - Steady-state rate of fall
- α* - ratio of gravity to capillary forces during infiltration or drainage
- C - Shape Factor
- Q - Rate of discharge
- K_{fs} - Soil saturated hydraulic conductivity
- Φ_m - Soil matrix flux potential



Guelph Permeameter Calculations

Project Name Wallace Point Road
Project Number 85162

Date: December 1, 2023
Permeameter Test Number: INF23-12, Test 1
Permeameter Installation Depth: 0.65 m

Single Head Method

Reservoir Cross-sectional area in cm ² ("35.22" for Combined or "2.16" for Inner reservoir):	2.16
Water Head Height ("H" in cm):	10
Borehole Radius ("a" in cm):	3
Soil texture-structure category:	3

Soil Texture Categories

- 1 - Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
- 2- Soils which are both fine textured (clayey or silty) and unstructured, may also include some fine sands.
- 3 - Most structured soils from clay through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils
- 4- Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropores, etc.

USCS Soil Classification:

Brown silty sand, some gravel, trace clay, occasional cobble/boulder, moist

Steady State Rate of Water Level Change ("R" in cm/min): 3.4000

Calculations:

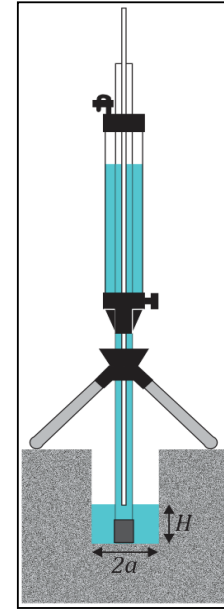
Res Type	2.16
H	10
a	3
H/a	3.333333
α*	0.12
C0.01	1.21841
C0.04	1.290234
C0.12	1.287543
C0.36	1.287543
C	1.287543
R	3.400
Q	0.1224
pi	3.1415

Inferred T-Time*
 12 cm/min
 50 mm/hr

*Inferred T-Times are based on the Credit Valley Conservation and Toronto and Region Conservation document, Low Impact Development Stormwater Management Planning and Design Guide, dated 2010.

Calculation formulas related to shape factor (C). Where H₁ is the first water head height (cm), H₂ is the second water head height (cm), a is borehole radius (cm) and α* is microscopic capillary length factor which is decided according to the soil texture-structure category. For one-head method, only C₁ needs to be calculated while for two-head method, C₁ and C₂ are calculated (Zang et al., 1998).

α* = 0.12 cm⁻¹
 C = 1.287543
 Q = 0.1224
 K_{fs} = 0.000133 cm/sec
 0.0080 cm/min
 0.00 m/sec
 0.00 inch/min
 0.00 inch/sec
 Φ_m = 0.00 cm²/min



Definitions:

- H - Water Head Height
- a - Borehole radius
- R - Steady-state rate of fall
- α* - ratio of gravity to capillary forces during infiltration or drainage
- C - Shape Factor
- Q - Rate of discharge
- K_{fs} - Soil saturated hydraulic conductivity
- Φ_m - Soil matrix flux potential



Guelph Permeameter Calculations

Project Name Wallace Point Road
Project Number 85162

Date: December 1, 2023
Permeameter Test Number: INF23-12, Test 2
Permeameter Installation Depth: 0.60 m

Single Head Method

Reservoir Cross-sectional area in cm ² ("35.22" for Combined or "2.16" for Inner reservoir):	35.22
Water Head Height ("H" in cm):	15
Borehole Radius ("a" in cm):	3
Soil texture-structure category:	3

Soil Texture Categories

- 1 - Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
- 2- Soils which are both fine textured (clayey or silty) and unstructured, may also include some fine sands.
- 3 - Most structured soils from clay through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils
- 4- Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropores, etc.

USCS Soil Classification:

Brown silty sand, some gravel, trace clay, occasional cobble/boulder, moist

Steady State Rate of Water Level Change ("R" in cm/min): 0.6500

Calculations:

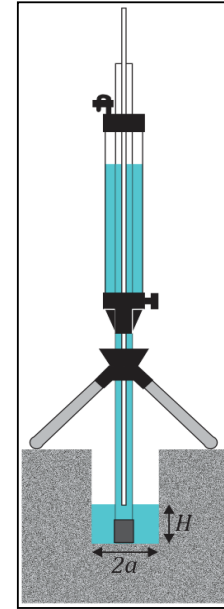
Res Type	35.22
H	15
a	3
H/a	5
α*	0.12
C0.01	1.518269
C0.04	1.629144
C0.12	1.666893
C0.36	1.666893
C	1.666893
R	0.650
Q	0.38155
pi	3.1415

Inferred T-Time*
 12 cm/min
 50 mm/hr

*Inferred T-Times are based on the Credit Valley Conservation and Toronto and Region Conservation document, Low Impact Development Stormwater Management Planning and Design Guide, dated 2010.

Calculation formulas related to shape factor (C). Where H₁ is the first water head height (cm), H₂ is the second water head height (cm), a is borehole radius (cm) and α* is microscopic capillary length factor which is decided according to the soil texture-structure category. For one-head method, only C₁ needs to be calculated while for two-head method, C₁ and C₂ are calculated (Zang et al., 1998).

α* = 0.12 cm⁻¹
 C = 1.666893
 Q = 0.38155
 K_{fs} = 0.000283 cm/sec
 0.0170 cm/min
 0.00 m/sec
 0.01 inch/min
 0.00 inch/sec
 Φ_m = 0.00 cm²/min



Definitions:

- H - Water Head Height
- a - Borehole radius
- R - Steady-state rate of fall
- α* - ratio of gravity to capillary forces during infiltration or drainage
- C - Shape Factor
- Q - Rate of discharge
- K_{fs} - Soil saturated hydraulic conductivity
- Φ_m - Soil matrix flux potential



Guelph Permeameter Calculations

Project Name Wallace Point Road
Project Number 85162

Date: November 30, 2023
Permeameter Test Number: INF23-13, Test 1
Permeameter Installation Depth: 0.65 m

Single Head Method

Reservoir Cross-sectional area in cm ² ("35.22" for Combined or "2.16" for Inner reservoir):	2.16
Water Head Height ("H" in cm):	15
Borehole Radius ("a" in cm):	3
Soil texture-structure category:	3

Soil Texture Categories

- 1 - Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
- 2- Soils which are both fine textured (clayey or silty) and unstructured, may also include some fine sands.
- 3 - Most structured soils from clay through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils
- 4- Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropores, etc.

USCS Soil Classification:

Brown-grey silt and sand, some gravel, some clay, moist to wet

Steady State Rate of Water Level Change ("R" in cm/min): 1.2000

Calculations:

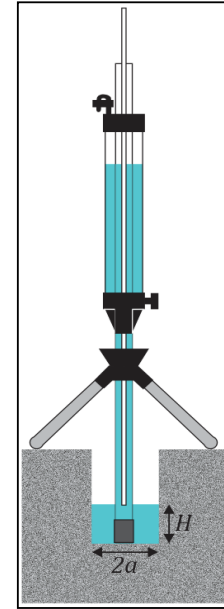
Res Type	2.16
H	15
a	3
H/a	5
α*	0.12
C0.01	1.518269
C0.04	1.629144
C0.12	1.666893
C0.36	1.666893
C	1.666893
R	1.200
Q	0.0432
pi	3.1415

Inferred T-Time*
 20 min/cm
 30 mm/hr

*Inferred T-Times are based on the Credit Valley Conservation and Toronto and Region Conservation document, Low Impact Development Stormwater Management Planning and Design Guide, dated 2010.

Calculation formulas related to shape factor (C). Where H₁ is the first water head height (cm), H₂ is the second water head height (cm), a is borehole radius (cm) and α* is microscopic capillary length factor which is decided according to the soil texture-structure category. For one-head method, only C₁ needs to be calculated while for two-head method, C₁ and C₂ are calculated (Zang et al., 1998).

α* = 0.12 cm⁻¹
 C = 1.666893
 Q = 0.0432
 K_{fs} = 0.000032 cm/sec
 0.0019 cm/min
 0.00 m/sec
 0.00 inch/min
 0.00 inch/sec
 Φ_m = 0.00 cm²/min



Definitions:

- H - Water Head Height
- a - Borehole radius
- R - Steady-state rate of fall
- α* - ratio of gravity to capillary forces during infiltration or drainage
- C - Shape Factor
- Q - Rate of discharge
- K_{fs} - Soil saturated hydraulic conductivity
- Φ_m - Soil matrix flux potential



Guelph Permeameter Calculations

Project Name Wallace Point Road
Project Number 85162

Date: November 30, 2023
Permeameter Test Number: INF23-13, Test 2
Permeameter Installation Depth: 0.67 m

Single Head Method

Reservoir Cross-sectional area in cm ² ("35.22" for Combined or "2.16" for Inner reservoir):	35.22
Water Head Height ("H" in cm):	20
Borehole Radius ("a" in cm):	3
Soil texture-structure category:	3

Soil Texture Categories

- 1 - Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
- 2- Soils which are both fine textured (clayey or silty) and unstructured, may also include some fine sands.
- 3 - Most structured soils from clay through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils
- 4- Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropores, etc.

USCS Soil Classification:

Brown-grey silt and sand, some gravel, some clay, moist to wet

Steady State Rate of Water Level Change ("R" in cm/min): 0.1000

Calculations:

Res Type	35.22
H	20
a	3
H/a	6.666667
α*	0.12
C0.01	1.754604
C0.04	1.903071
C0.12	1.980192
C0.36	1.980192
C	1.980192
R	0.100
Q	0.0587
pi	3.1415

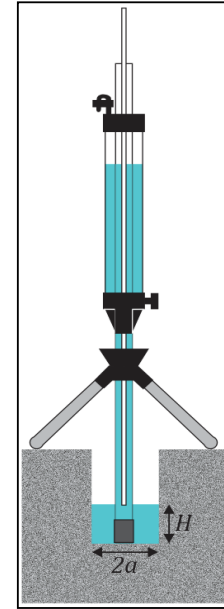
Inferred T-Time*

20 cm/min
30 mm/hr

*Inferred T-Times are based on the Credit Valley Conservation and Toronto and Region Conservation document, Low Impact Development Stormwater Management Planning and Design Guide, dated 2010.

Calculation formulas related to shape factor (C). Where H₁ is the first water head height (cm), H₂ is the second water head height (cm), a is borehole radius (cm) and α* is microscopic capillary length factor which is decided according to the soil texture-structure category. For one-head method, only C₁ needs to be calculated while for two-head method, C₁ and C₂ are calculated (Zang et al., 1998).

α* = 0.12 cm⁻¹
 C = 1.980192
 Q = 0.0587
 K_{fs} = 0.000032 cm/sec
 0.0019 cm/min
 0.00 m/sec
 0.00 inch/min
 0.00 inch/sec
 Φ_m = 0.00 cm²/min



Definitions:

- H - Water Head Height
- a - Borehole radius
- R - Steady-state rate of fall
- α* - ratio of gravity to capillary forces during infiltration or drainage
- C - Shape Factor
- Q - Rate of discharge
- K_{fs} - Soil saturated hydraulic conductivity
- Φ_m - Soil matrix flux potential

Appendix G

Certificates of Analysis – Groundwater Nitrates





FINAL REPORT

CA15000-AUG22 R1

85162

Prepared for

D.M. Wills -Peterborough

First Page

CLIENT DETAILS		LABORATORY DETAILS	
Client	D.M. Wills -Peterborough	Project Specialist	Maarit Wolfe, Hon.B.Sc
Address	150 Jameson Drive Peterborough, ON K9J 0B9, Canada	Laboratory Address	SGS Canada Inc. 185 Concession St., Lakefield ON, K0L 2H0
Contact	Lynsey Tuters	Telephone	705-652-2000
Telephone	289-385-6230	Facsimile	705-652-6365
Facsimile	705-741-3568	Email	Maarit.Wolfe@sgs.com
Email	ltuters@dmwills.com	SGS Reference	CA15000-AUG22
Project	85162	Received	08/02/2022
Order Number		Approved	08/09/2022
Samples	Ground Water (3)	Report Number	CA15000-AUG22 R1
		Date Reported	08/09/2022

COMMENTS
<p>MAC - Maximum Acceptable Concentration MDL - SGS Method Detection Limit</p> <p>Temperature of Sample upon Receipt: 6 degrees C Cooling Agent Present: No Custody Seal Present: Yes</p>

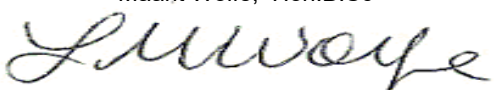
SIGNATORIES
<p>Maarit Wolfe, Hon.B.Sc</p> 

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FINAL REPORT

CA15000-AUG22 R1

Client: D.M. Wills -Peterborough

Project: 85162

Project Manager: Lynsey Tuters

Samplers: Lynsey Tuters

MATRIX: WATER

Sample Number	7	8	9
Sample Name	85162-MW22-01	85162-MW22-03	85162-MW22-02
Sample Matrix	Ground Water	Ground Water	Ground Water
Sample Date	28/07/2022	28/07/2022	28/07/2022

L1 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

Parameter	Units	RL	L1	Result	Result	Result
Metals and Inorganics						
Nitrite (as N)	as N mg/L	0.03	1	< 0.03	< 0.03	0.46
Nitrate (as N)	as N mg/L	0.06	10	2.24	1.17	5.70
Nitrate + Nitrite (as N)	as N mg/L	0.06		2.24	1.17	6.16

EXCEEDANCE SUMMARY

No exceedances are present above the regulatory limit(s) indicated

QC SUMMARY

Anions by IC

Method: EPA300/MA300-Ions1.3 | Internal ref.: ME-CA-IENVIIC-LAK-AN-001

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Nitrate + Nitrite (as N)	DIO0011-AUG22	mg/L	0.06	<0.06	NA		NA			NA		
Nitrite (as N)	DIO0011-AUG22	mg/L	0.03	<0.03	ND	20	98	90	110	104	75	125
Nitrate (as N)	DIO0011-AUG22	mg/L	0.06	<0.06	1	20	98	90	110	98	75	125

Method Blank: a blank matrix that is carried through the entire analytical procedure. Used to assess laboratory contamination.

Duplicate: Paired analysis of a separate portion of the same sample that is carried through the entire analytical procedure. Used to evaluate measurement precision.

LCS/Spike Blank: Laboratory control sample or spike blank refer to a blank matrix to which a known amount of analyte has been added. Used to evaluate analyte recovery and laboratory accuracy without sample matrix effects.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate laboratory accuracy with sample matrix effects.

Reference Material: a material or substance matrix matched to the samples that contains a known amount of the analyte of interest. A reference material may be used in place of a matrix spike.

RL: Reporting limit

RPD: Relative percent difference

AC: Acceptance criteria

Multielement Scan Qualifier: as the number of analytes in a scan increases, so does the chance of a limit exceedance by random chance as opposed to a real method problem. Thus, in multielement scans, for the LCS and matrix spike, up to 10% of the analytes may exceed the quoted limits by up to 10% absolute and the spike is considered acceptable.

Duplicate Qualifier: for duplicates as the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

Matrix Spike Qualifier: for matrix spikes, as the concentration of the native analyte increases, the uncertainty of the matrix spike recovery increases. Thus, the matrix spike acceptance limits apply only when the concentration of the matrix spike is greater than or equal to the concentration of the native analyte.

LEGEND

FOOTNOTES

- NSS** Insufficient sample for analysis.
- RL** Reporting Limit.
 - ↑ Reporting limit raised.
 - ↓ Reporting limit lowered.
- NA** The sample was not analysed for this analyte
- ND** Non Detect

Results relate only to the sample tested.

Data reported represent the sample as submitted to SGS. Solid samples expressed on a dry weight basis.

"Temperature Upon Receipt" is representative of the whole shipment and may not reflect the temperature of individual samples.

Analysis conducted on samples submitted pursuant to or as part of Reg. 153/04, are in accordance to the "Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act and Excess Soil Quality" published by the Ministry and dated March 9, 2004 as amended.

SGS provides criteria information (such as regulatory or guideline limits and summary of limit exceedances) as a service. Every attempt is made to ensure the criteria information in this report is accurate and current, however, it is not guaranteed. Comparison to the most current criteria is the responsibility of the client and SGS assumes no responsibility for the accuracy of the criteria levels indicated.

SGS Canada Inc. statement of conformity decision rule does not consider uncertainty when analytical results are compared to a specified standard or regulation.

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This report supersedes all previous versions.

-- End of Analytical Report --

Appendix H

Groundwater Impact Assessment



Water Balance Calculations for Existing Conditions

Sheet 1 of 3



Project No: 85162
Project Name: 3491 Wallace Point Road
Designed/Checked By: SC/CP
Date: 8-Jan-26

Catchment Parameters	EX-101	WL-102	EX-201									Total
Drainage Area (m ²)	196300	29100	22400									247800
Pervious Area (m ²)	194300	29100	22400									245800
Impervious Area (m ²)	2000	0	0									2000
Evapotranspiration Factors												
Pervious PET Ratio												
Impervious Evapotranspiration ³												
Infiltration Factors												
Topography Infiltration Factor												
Soil Infiltration Factor												
Land Cover Infiltration Factor												
MOE Infiltration Factor												
Actual Infiltration Factor												
Run-Off Coefficient												
Runoff from Impervious Surfaces												
Inputs (mm/yr)												
Precipitation	852.9	852.9	852.9									852.9
Run-On												0.0
Other Inputs												0.0
Total Inputs	852.9	852.9	852.9									852.9
Outputs (mm/yr)												
Precipitation Surplus	497.7	480.8	500.9									496.0
Net Surplus	497.7	480.8	500.9									496.0
Evapotranspiration	355.2	372.1	352.0									356.9
Infiltration	315.0	353.2	311.6									319.2
Infiltration Features ⁴	0.0	0.0	0.0									
Total Infiltration	315.0	353.2	311.6									319.2
Runoff Pervious Areas												0.0
Runoff Impervious Areas												0.0
Total Unadjusted Runoff	179.1	117.5	186.0									172.5
Total Adjusted Runoff⁵	179.1	117.5	186.0									172.5
Total Outputs	849.4	842.8	849.6									848.6
Inputs (m³/yr)												
Precipitation	167,425	24,820	19,105									211,350
Run-On												
Other Inputs												
Total Inputs	167,425	24,820	19,105									211,350
Outputs (m³/yr)												
Precipitation Surplus	97,697	13,991	11,220									122,909
Net Surplus	97,697	13,991	11,220									122,909
Evapotranspiration	69,727	10,828	7,886									88,441
Infiltration	61,844	10,278	6,979									79,101
Infiltration Features ⁴	0	0	0									0
Total Infiltration	61,844	10,278	6,979									79,100
Runoff Pervious Areas												
Runoff Impervious Areas												
Total Unadjusted Runoff	35,167	3,421	4,168									42,756
Total Adjusted Runoff ⁵	35,167	3,421	4,168									42,756
Total Outputs	166,738	24,527	19,033									210,297

Notes:

1. Water Balance Calculations area in based on methodology described in the Conservation Authority Guidelines for Hydrogeological Assessments (June 2013)
2. Precipitation, Evaporation, Infiltration and Runoff Volumes were determined using Visual Otthymo Version 6.2 Continuous Modelling

Water Balance Calculations for Proposed Conditions

Sheet 2 of 3



Project No: 85162
Project Name: 3491 Wallace Point Road
Designed/Checked By: SC/CP
Date: 8-Jan-26

Catchment Parameters	WB-101	WB-102	WB-103	WB-104	WB-105							Total
Drainage Area (m ²)	12500	139000	17200	50000	29100							247800
Pervious Area (m ²)	0	128714	6880	25000	0							160594
Impervious Area (m ²)	12500	10286	10320	25000	29100							87206
Evapotranspiration Factors												
Pervious PET Ratio												
Impervious Evapotranspiration ³												
Infiltration Factors												
Topography Infiltration Factor												
Soil Infiltration Factor												
Land Cover Infiltration Factor												
MOE Infiltration Factor												
Actual Infiltration Factor												
Run-Off Coefficient												
Runoff from Impervious Surfaces												
Inputs (mm/yr)												
Precipitation	852.9	852.9	852.9	852.9	852.9							852.9
Run-On												
Other Inputs												
Total Inputs	852.9	852.9	852.9	852.9	852.9							852.9
Outputs (mm/yr)												
Precipitation Surplus	811.1	482.3	679.5	646.5	480.8							545.5
Net Surplus												0.0
Evapotranspiration	41.8	370.6	173.4	206.4	372.1							307.4
Infiltration	0.0	347.6	143.4	179.3	353.2							282.6
Infiltration Features ⁴	759.8	53.9	223.0	0.0	0.0							84.1
Total Infiltration	759.8	401.6	366.4	179.3	353.2							366.7
Runoff Pervious Areas												
Runoff Impervious Areas												
Total Unadjusted Runoff	811.1	128.6	533.2	463.8	117.5							257.5
Total Adjusted Runoff⁵	51.3	74.7	310.3	463.8	202.0							183.3
Total Outputs	852.9	846.9	850.1	849.4	927.3							857.4
Inputs (m³/yr)												
Precipitation	10,662	118,554	14,670	42,645	24,819							211,350
Run-On												
Other Inputs												
Total Inputs	10,662	118,554	14,670	42,645	24,819							211,350
Outputs (m³/yr)												
Precipitation Surplus	10,139	67,040	11,686	32,326	13,991							135,182
Net Surplus	10,139	67,040	11,686	32,326	13,991							135,182
Evapotranspiration	523	51,514	2,984	10,319	10,828							76,168
Infiltration	0	48,321	2,467	8,964	10,278							70,030
Infiltration Features ⁴	9,498	7,499	3,835	0	0							20,832
Total Infiltration	9,498	55,820	6,302	8,964	10,278							90,861
Runoff Pervious Areas												
Runoff Impervious Areas												
Total Unadjusted Runoff	10,139	17,882	9,172	23,190	5,878							66,261
Total Adjusted Runoff ⁵	641	10,383	5,337	23,190	5,878							45,429
Total Outputs	10,662	117,717	14,623	42,473	26,984							212,459

Notes:

1. Water Balance Calculations area in based on methodology described in the Conservation Authority Guidelines for Hydrogeological Assessments (June 2013)
2. Precipitation, Evaporation, Infiltration and Runoff Volumes were determined using Visual Otthymo Version 6.2 Continuous Modelling
3. Residential Lots include infiltration trenches to capture rooftop runoff and infiltration basins to capture surface runoff.
4. Commercial Block includes infiltration basin to capture surface runoff.
5. No infiltration is assumed to occur from infiltration basins during months with average temperatures below freezing.
6. Total Adjusted Runoff is calculated as (Pervious Runoff + Impervious Runoff) - (Infiltration Features)

Water Balance Assessment

Sheet 3 of 3



Project No: 85162
 Project Name: 3491 Wallace Point Road
 Designed/Checked By: SC/CP
 Date: 8-Jan-26

Characteristic	Existing	Proposed No Mitigation	Change	Proposed With Mitigation	Change
Inputs (m³/yr)					
Precipitation	211,350	211,350	0.0%	211,350	0.0%
Run-On					
Other Inputs					
Total Inputs	211,350	211,350	0.0%	211,350	0.0%
Outputs (m³/yr)					
Precipitation Surplus	122,909	135,182	0.0%	135,182	0.0%
Net Surplus	34,468	59,014	0.0%	59,014	0.0%
Evapotranspiration	88,441	76,168	-13.9%	76,168	-13.9%
Infiltration	79,101	70,030	-11.5%	90,861	14.9%
Infiltration Features	0	0	0.0%	20,832	-
Total Infiltration	79,101	70,030	-11.5%	90,861	14.9%
Runoff Pervious Areas					
Runoff Impervious Areas					
Total Runoff	42,756	66,261	55.0%	45,429	6.3%
Total Outputs	210,297	212,459	1.0%	212,459	1.0%

Nitrate Dilution Calculations

	Residential	Commercial	Combined
Total Dilution Area (ha)	23.06	1.72	
No. of Lots	50	1	
Sewage Flow per Lot (L/day)	1000	4495	
Total Daily Sewage Loading (L/day)	50,000	4,495	
Nitrate in Septic Effluent (mg/L)	40	40	
Background Nitrates (mg/L)	3.04	3.04	
Stormwater Effluent Nitrates (mg/L)	0	0	
Infiltration Rates			
Infiltration Rate (Clean Water) (mm/year)	293.0	143.4	
Infiltration Rate (Clean Water) (L/day)	185,103	6,759	
Infiltration Rate (Stormwater) (mm/year)	73.7	223.0	
Infiltration Rate (Stormwater) (L/day)	46,565	10,508	
Nitrate Concentrations			
Nitrate Loading - Development (mg/day)	2,000,000	179,800	
Nitrate Loading - Rainfall (mg/day)	562,712	20,547	
Nitrate Loading - Runoff (mg/day)	0	0	
Total Nitrate Loading (mg/day)	2,562,712	200,347	
Dilution - Development (L/day)	50,000	4,495	
Dilution - Groundwater Recharge (L/day)	231,668	17,267	
Total Dilution (L/day)	281,668	21,762	
Boundary Nitrate Concentration (mg/L)	9.10	9.21	

Appendix I

Mass Balance Equation





Appendix G– D-5-4 Groundwater Impact Assessment: Mass Balance Equation

$$Q_t C_t = Q_e C_e + Q_i C_i$$

Where Q_t = Total Volume ($Q_e + Q_i$)

Note: As per the requirements of D-5-4, the maximum volume of effluent allowed to be used as dilution water is 1000L/day/lot.

C_t = Total Concentration of nitrate at property boundary

Q_e = volume of septic effluent

C_e = Concentration of nitrate in effluent (40 mg/L)

Q_i = Volume of available dilution water

C_i = Concentration of nitrate in dilution water

In order to determine the concentration of the nitrate at the property boundary (C_t), the mass balance equation is rearranged to the following:

$$C_t = \frac{Q_e C_e + Q_i C_i}{Q_t}$$