74 Berkeley Street, Toronto, ON M5A 2W7
Tel: 647-795-8153 | www.pecg.ca

Hydrogeological Investigation

10 Aspen Springs Drive, Bowmanville, Ontario

Palmer Project #
2001518

Prepared For
Watters Environmental Group Inc.

April 29, 2022

74 Berkeley Street, Toronto, ON M5A 2W7
Tel: 647-795-8153 | www.pecg.ca

April 29, 2022

Tanner Leonhardt, B.Eng.
Watters Environmental Group Inc.
9135 Keele St., Unit A1
Concord, ON L4K 0J4

Dear Tanner:

Re: Hydrogeological Investigation – 10 Aspen Springs Drive, Bowmanville, Ontario
Project #: 2001518

Palmer is pleased to submit the attached report describing the results of our Hydrogeological Investigation for the proposed development located at 10 Aspen Springs Drive, Bowmanville, Ontario ("the site"). It is understood that the proposed development will consist of a 9-storey mid-rise and two 25-storey high-rise buildings with a shared 3-level basement. This report provides a characterization of the site hydrogeological conditions based on our records review, field investigations, laboratory testing and data analysis. In addition, dewatering rates from the proposed excavation were estimated and the need for a temporary and/or long-term drainage permit was assessed.

The site is underlain by the deposits of the Newmarket Till Formation over the depth of investigation (28 m). These deposits are heterogeneous, having hydraulic conductivities ranging from 6.1×10^{-9} to 7.3×10^{-6} m/s. A shallow, higher permeability and a deeper, lower permeability till unit were identified. Based on single well response testing, these units have geometric mean hydraulic conductivities of 4.9×10^{-7} and 4.4×10^{-8} m/s, respectively Groundwater levels measured on April 5th and April 7th, 2022 ranged from 0.57 to 3.64 metres below ground surface (mbgs) or ranged in elevation from 120.77 to 122.76 metres above sea level (masl).

We estimate short-term construction dewatering rates to be approximately 381,377 L/day. We therefore expect an EASR registration to be required, but a PTTW not to be required. The groundwater chemistry at the site meets all Durham Region's Storm and Sanitary Sewer Bylaw criteria, except for the Storm Sewer Total Suspended Solids (TSS) guideline. TSS can be managed with typical settling tank methods during construction phase or long-term dewatering.

We estimate that 43,444 L/day could be required for long-term foundation drainage of the proposed development. A PTTW would not be required for this rate of long-term drainage but a permit with Durham Region would be. Groundwater chemistry results demonstrate that the groundwater at the site meets all of the Durham Region Storm and Sanitary Sewer discharge criteria, except for the Total Suspended Solids (TSS) guideline for the storm sewer. TSS is a parameter that can be mitigated through standard settlement procedures and through a properly installed drainage layer.

No adverse impacts on the natural environment, aquifers or private well users are expected to result from the proposed development as the radius of influence from dewatering is expected to be 65 m, and there are no active potable groundwater users or nature features in this radius.

If you have any questions or require further information, please contact our office at your convenience. This report is subject to the Statement of Limitations provided at the end of this report

Yours truly,
Palmer

Jason Cole, M.Sc., P.Geo.
VP, Principal Hydrogeologist

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1. Introduction

Palmer was retained by Watters Environmental Group Inc. ("the client" or "Watters") to complete a Hydrogeological Investigation for the development of 10 Aspen Springs Drive, Bowmanville, Ontario ("the site") (**Figure 1**). It is understood that the proposed development will consist of a 9-storey mid-rise and two 25-storey high-rise buildings with a shared 3-level basement (**Appendix A**). The site is located approximately 1 km west of downtown Bowmanville at the intersection of Highway 57 (Bowmanville Avenue) and Aspen Springs Drive. The land use south and east of the site is residential with some public park spaces, while the west and north of the site is occupied by residential and commercial land use in addition to transportation corridors.

This Hydrogeological Investigation aims to characterize the existing hydrogeological conditions of the site, including: the possible presence of a shallow, perched water table overlying a deeper true water table, the groundwater flow direction at the site, the chemistry of the groundwater on site and the hydraulic conductivity of the overburden soils. The data resulting from our field investigations, laboratory and data analyses will allow us to address the hydrogeological constraints related to the proposed development, the need for groundwater control (dewatering) measures, hydrogeological foundation design and groundwater monitoring and mitigation measures.

In addition to the hydrogeological field investigations and site reconnaissance conducted by Palmer, information from the following sources was reviewed as part of the study:

- Available geology, hydrogeology, and physiography mapping (e.g., Ontario Geological Survey (OGS) Surficial and Palaeozoic Geology);
- Source Water Protection mapping; and,
- Ministry of the Environment, Conservation and Parks (MECP) water well records.

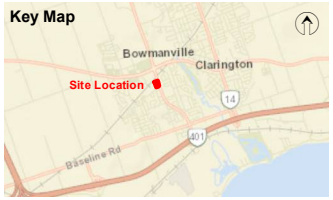
1.1 Scope of Work

The scope of work for this Hydrogeological Investigation included:

- Completion of a background review of applicable hydrogeological data including watershed plans, MECP water well records, surficial and bedrock geology mapping, Source Water Protection mapping;
- Drilling of eleven (11) boreholes by Davis Drilling Ltd. and supervised by staff from Watters;
- Development of the seven (7) monitoring wells completed by Davis Drilling Ltd. and supervised by Watters;
- Installation of one (1) datalogger in a shallow monitoring well and one (1) datalogger in a deep monitoring well;
- One (1) monitoring event where the groundwater levels in all seven (7) monitoring wells are measured to determine the groundwater flow direction at the site. Two (2) additional monitoring events will be conducted before the end of May 2022;
- Single well response tests (i.e., rising-head tests) to calculate the hydraulic conductivity of the shallow soils in all monitoring wells;
- Water chemistry sampling in one (1) monitoring well, with the results compared against Durham Region's Storm and Sanitary Sewer Discharge standards;

LEGEND

- Borehole
- Monitoring Well
- Subject Property



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NORTH

CLIENT

Watters Environmental Group Inc

PROJECT

10 Aspen Springs Drive

TITLE

Borehole and Monitoring Well Locations

Palmer™

REF. NO. 2001518-MR-101-A

Figure 1

Document Path: G:\Shared drives\Projects 2020\20015 - Watters Environmental Group Inc\2001518 - 10 Aspen Springs Drive\GIS\1_Workspace\Task 1 - HydroG Figures\2001518_1-1_Borehole and Monitoring Well Locations.mxd

- Estimation of the dewatering rates for the proposed development given the available site and foundation design plans, and assessment of the need for an EASR or a PTTW; and
- Completion of a Hydrogeological Investigation Report to support design and permitting, and to demonstrate compliance with Source Water Protection and municipal policy.

2. Hydrogeological Conditions

2.1 Regional Conditions

2.1.1 Physiography and Geology

The site is located within the Iroquois Plain physiographic region (Chapman & Putnam, 1984)**.** This area is characterized by fine to coarse grained glaciolacustrine sediments overlying till deposits or bedrock. Gravel beaches and nearshore sand deposits can be found along the shore of former Glacial Lake Iroquois, which grade to silts and clays in the calmer offshore areas. The Iroquois Plain physiographic region extends along the shores of Lake Ontario from Niagara-on-the-Lake through Hamilton and Toronto to Prince Edward County.

Surficial geology mapping by the Ontario Geological Survey (OGS) indicates that the site is underlain by sediments of the Newmarket Till (**Figure 2**). This regionally extensive till was deposited, initially into standing water, by a Late Wisconsinan advance of the Laurentide Ice Sheet, approximately 20,000 years before present. The Newmarket Till has a distinct and consistent lithology (Sharpe, *et al.*, 1999). It is typically dense and stony, with sandy silt to silty sand texture. According to the Oak Ridges Moraine Groundwater Program (ORMGP), the Newmarket Till is approximately 25 m thick at the site.

The Thorncliffe Formation, deposited in the Middle Wisconsinan (approximately 45,000 years before present), is approximately 10 m in thickness at the site and is composed of stratified sediments of glaciofluvial and glaciolacustrine origins. This unit is composed of sand and gravel and is confined by the Newmarket Till above.

Bedrock mapping by the OGS indicates that the site is underlain by the nodular to black laminated limestone of the Lindsay Formation (**Figure 3**). Data from the ORMGP and the Ministry of the Environment, Conservation and Parks (MECP) Well Records suggest that the top of bedrock is found at roughly 43 to 50 metres below ground surface (mbgs) at the site.

2.1.2 Hydrogeology

Hydrostratigraphic units can be subdivided into two distinct groups based on their ability to allow groundwater movement: an aquifer and an aquitard. An aquifer is defined as a layer of soil that is permeable enough to permit a usable supply of water to be extracted. An aquitard is a layer of soil that inhibits groundwater movement due to its low permeability. The major regional hydrostratigraphic units that control groundwater at the site are described below:

The Newmarket Till Aquitard is a dense, over-consolidated unit of sandy silt to silty sand textured till unit. It contains locally significant sandy and silty interbeds and stone lines which result in spatially variable hydraulic conductivities, ranging typically from 10^{-11} to 10^{-6} m/s (Gerber and Howard, 2000). In general, this unit forms a major regional aquitard within the site area and effectively acts to limit groundwater

LEGEND

- Borehole
- Monitoring Well
- Subject Property

Surficial Geology[1]

Phanerozoic / Cenozoic / Quaternary / Recent

- 19: Modern alluvial deposits *(clay, silt, sand, gravel, may contain organic remains)*

Phanerozoic / Cenozoic / Quaternary / Pleistocene

- 8a: Fine-textured glaciolacustrine deposits *(Massive-well laminated)*
- 5b: Tilll *(Stone-poor, sandy silt to silty sand-textured till on Paleozoic terrain)*

1. Ontario Geological Survey 2010 (Mapped at 1:50,000). Surficial geology of southern Ontario; Ontario Geological Survey. Miscellaneous Release-Data 128 - Revised

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Surficial Geology

Palmer

REF. NO. 2001518-MR-102-A

Figure 2

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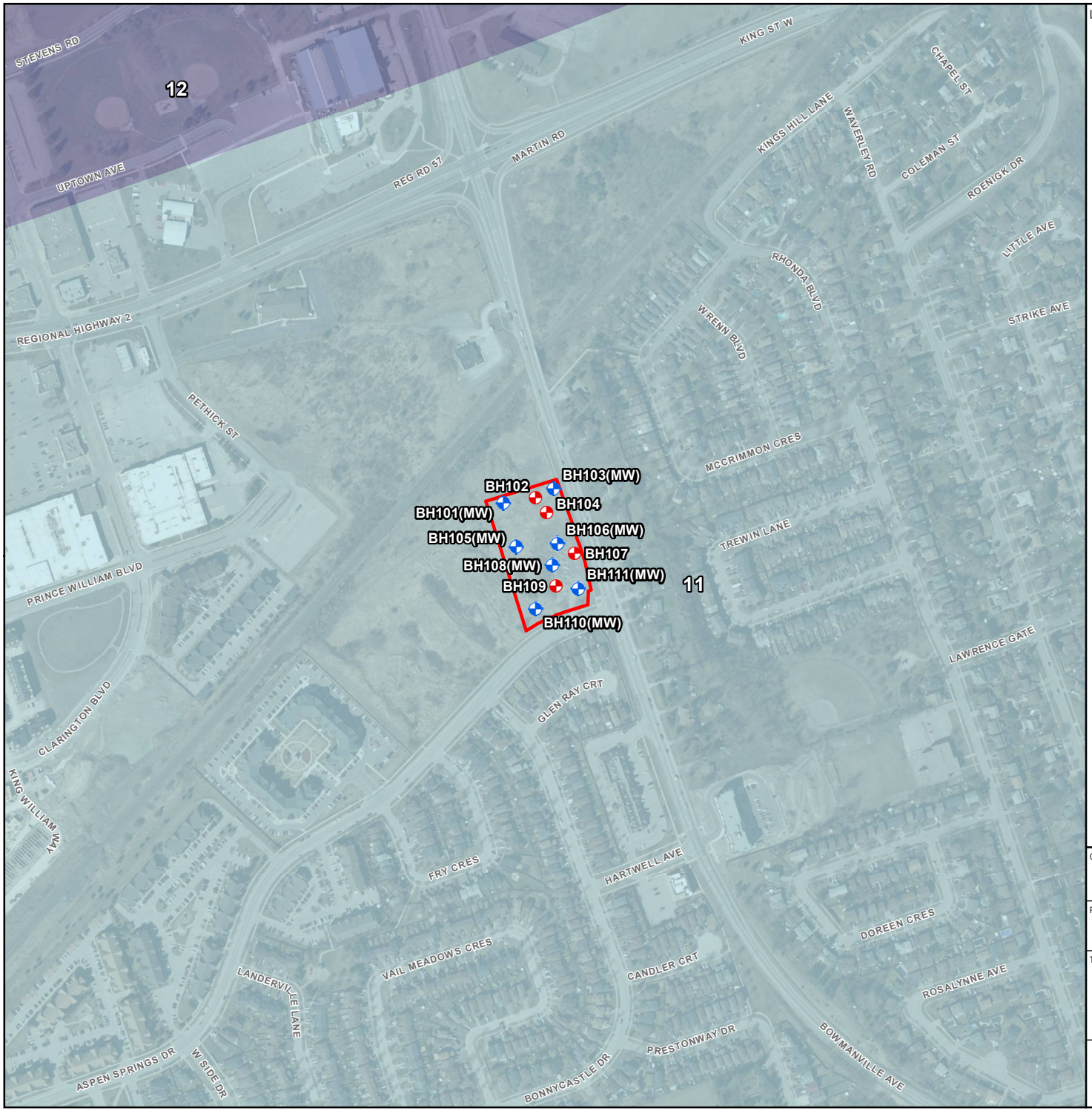

LEGEND

- Borehole
- Monitoring Well
- Subject Property

Paleozoic Bedrock Geology[1]

Upper Ordovician

12: Blue Mountain *(shale, minor limestone)*

Middle Ordovician - Simcoe Group

11: Lindsay *(limestone; nodular to black laminated)*

1. Armstrong, D.K. and Dodge, J.E.P. Paleozoic Geology Map of Southern Ontario; Ontario Geological Survey, Miscellaneous Release--Data 219

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TITLE
Bedrock Geology

Palmer

REF. NO. 2001518-MR-103-A

Figure 3

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recharge to deeper confined units and reduces the exposure of underlying aquifers to contamination (Sharpe, *et al.* 1999).

The Newmarket Till can be subdivided into three smaller units, the Upper Newmarket Till (UNT), Inter-Newmarket Sediments (INS), and the Lower Newmarket Till (LNT). The UNT and LNT units are comprised of consolidated stony till and are considered aquitard units, whereas the INS consists of glaciolacustrine to glaciofluvial silt to gravelly sands and behaves as an aquifer.

The Thorncliffe Aquifer Complex (TAC) forms a major, high-yielding regional aquifer composed of glaciolacustrine silt, sand and glaciofluvial gravels. The aquifer has a wide range of hydraulic conductivity values (10^{-8} to 10^{-4} m/s) due to variation in the sediments. According to the ORMGP, the TAC is found at approximately 35 mbgs at the site and. The top of bedrock is expected to be found at approximately 43 to 50 mbgs, according to the ORMGP and the Ministry of the Environment, Conservation and Parks (MECP) Well Records.

2.1.3 Environmental Features and Drainage

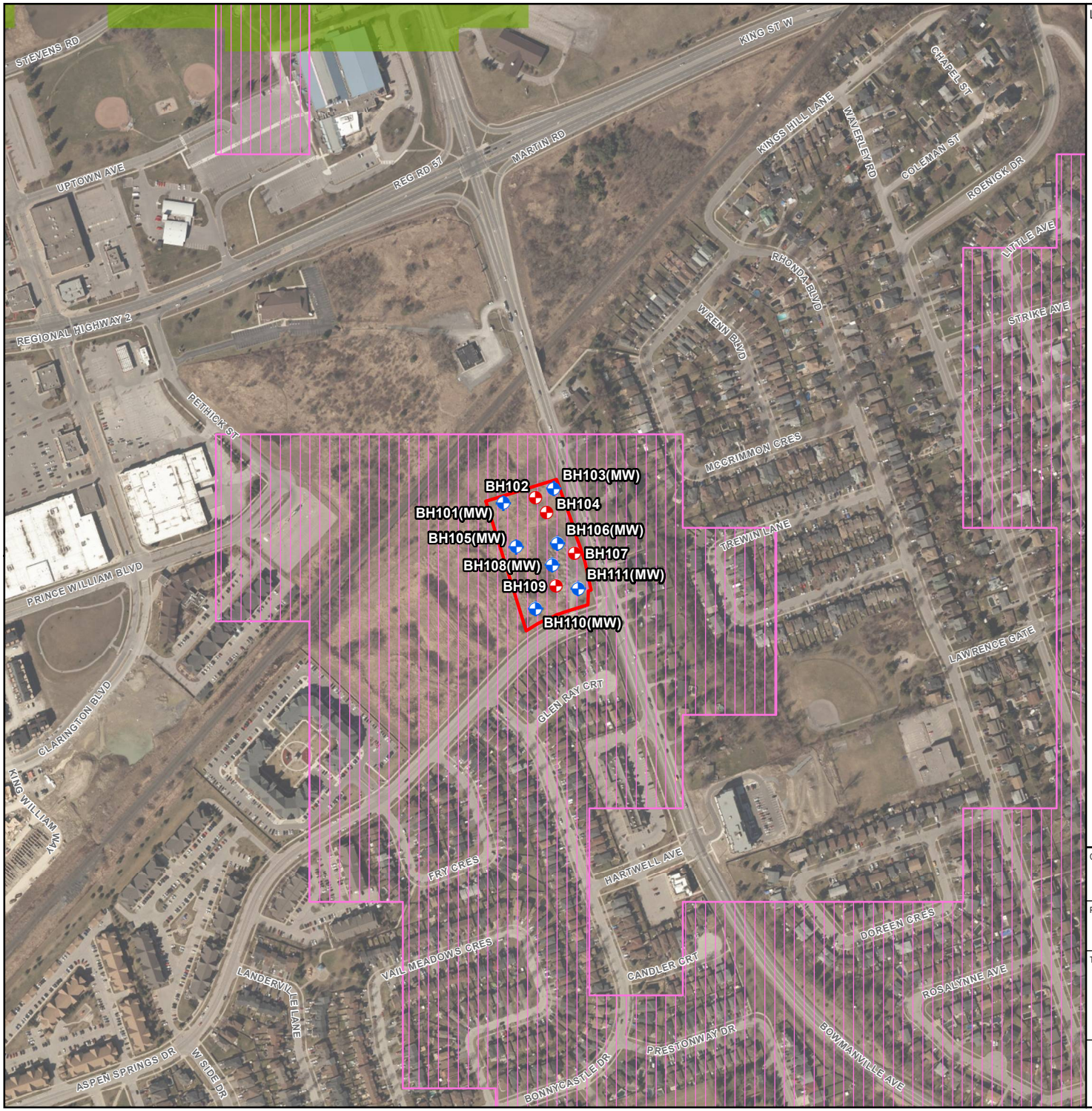
The site is located at the southwestern border of the Bowmanville Creek subwatershed, which originates in the area of Burketon Station in the north and encompasses towns such as Enniskillen, Tyrone and Clarington, in addition to Bowmanville before reaching its outlet at Lake Ontario. Bowmanville Creek is approximately 900 m east of the site.

2.1.4 Source Water Protection

The Source Water Protection Plan identifies four main regulatory factors under the *Clean Water Act (2006),* Wellhead Protection Areas (WHPAs), Intake Protection Zones (IPZs), Significant Groundwater Recharge Area (SGRAs), and Highly Vulnerable Aquifers (HVAs).

A WHPA is the area around the wellhead where land use activities have the potential to affect the quality or quantity of water that flows into the well. These areas are delineated into zones of vulnerability (A, B, C, and D) based on the travel-time of water into the well, and zones around a surface water body influencing a Groundwater Under Direct Influence (GUDI) (E, F). Other zones (Q1, and Q2) are defined as the areas where new water takings or reduced recharge could impact the quantity of water available to municipal supply wells. IPZs are the area on the water and land surrounding a municipal surface water intake. HVAs are aquifers that are susceptible to contamination as a result of the soil structure/material or due its location near the ground surface. Lastly, SGRAs are areas where recharge is important to maintain the water level in a community drinking water aquifer.

The site is located within the Central Lake Ontario Source Protection Area. Though the site is considered an HVA, it is not within any WHPA, IPZ or SGRA. **Figure 4** presents the site in the context of the relevant Source Protection Areas.



LEGEND

- Borehole
- Monitoring Well
- Subject Property
- Highly Vulnerable Aquifer[1]

Significant Groundwater Recharge Area[1]

- Score 2

1. CLOCA SWP Mapping

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10 Aspen Springs Drive

TITLE
Source Water Protection

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REF. NO. 2001518-MR-104-A

Figure 4

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2.2 Site Specific Conditions

2.2.1 Borehole Drilling and Monitoring Well Installation

From February 28th to March 22, 2022 a borehole drilling program was conducted by Davis Drilling Ltd. and supervised by staff from Watters Environmental. A total of eleven (11) boreholes were drilled at the site, ranging from depths of 10.9 to 28.0 metres below ground surface (mbgs). Following drilling, monitoring wells were installed in seven (7) of the boreholes in accordance with Ontario Regulation 903 (Wells Regulation). Each monitoring well was completed with 51 mm (2 inch) diameter schedule 40 polyvinyl chloride (PVC) pipe, with a 3.05 m (10 ft) screened interval at bottom of the well. The monitoring wells were sealed using bentonite grout and completed with stick up casings. Additional details are provided in **Table 1**. The remaining boreholes were backfilled and sealed upon completion of drilling. **Figure 1** presents the location of the boreholes and monitoring wells, and the borehole logs can be found in **Appendix B**.

Table 1. Borehole and Monitoring Well Installation Details

Borehole ID	Surface Elevation (masl)	Depth (mbgs)	Screened Interval (mbgs)	Screened Geological Unit
BH101(MW)	121.6	15.3	12.15 - 15.20	Silty sandy clay (Newmarket Till)
BH102	124.4	28.0	-	-
BH103(MW)	124.8	21.6	18.40 - 21.45	Silty clay (Newmarket Till)
BH104	125.0	21.4	-	-
BH105(MW)	121.2	10.9	7.75 - 10.80	Silty clay (Newmarket Till)
BH106(MW)	124.3	12.8	9.15 - 12.20	Silty sandy clay (Newmarket Till)
BH107	124.3	28.0	-	-
BH108(MW)	124.9	21.4	18.25 - 21.30	Silty sandy clay (Newmarket Till)
BH109	125.1	21.4	-	-
BH110(MW)	122.0	21.6	9.15 - 12.20	Silty sandy clay / silty clay (Newmarket Till)
BH111(MW)	124.6	21.7	18.40 - 21.45	Silty sandy clay (Newmarket Till)

2.2.2 Geology and Soil Profile

The stratigraphy of the site area encountered during both borehole drilling program is summarized below:

Topsoil: Topsoil was encountered in all boreholes except BH106(MW), BH109 and BH111(MW). When it was present, the thickness of the topsoil ranged from 50 to 900 mm.

Reworked or Disturbed Native Soils (Fill): Fill was encountered in all boreholes except BH101(MW), BH103(MW), BH105(MW) and BH110(MW). The composition of this unit was a mix of silty clay and silty sandy, sand and gravel, with the occasional presence of trace rootlets.

Newmarket Till: This unit was encountered in all boreholes below the topsoil and/or fill unit and extended to the bottom of each borehole. The texture of this unit varied from silty clay to silt and fine sand.

A unit of silty sandy clay was encountered over the following depths, which possibly represents the Upper Newmarket Till (UNT):

- BH103(MW): 0.7 to 1.5 mbgs (0.8 m thick);
- BH106 (MW): 0.7 to 3.8 mbgs (3.1 m thick);
- BH107: 0.8 to 2.3 mbgs (1.5 m thick) and
- BH108(MW): 0.5 to 2.3 mbgs (1.8 mbgs).

According to the ORMGP, the Inter-Newmarket Sediments (INS), which constitute a sub-group within the Newmarket Till, are present at the site and range in thickness from about 3 to 5 m. In all boreholes the upper portion of this unit was composed of either silt and fine sand or silty sand. This specific soil texture was encountered at the following depths:

- BH101(MW): 0.2 to 6.4 mbgs (6.2 m thick);
- BH102: 1.8 to 6.1 mbgs (4.3 m thick);
- BH103(MW): 1.5 to 6.1 mbgs (4.6 m thick);
- BH104: 1.6 to 6.1 mbgs (4.5 m thick);
- BH105(MW): 0.1 to 6.4 mbgs (6.3 m thick);
- BH106(MW): 3.8 to 9.1 mbgs (5.3 m thick);
- BH107: 2.3 to 11.9 mbgs (9.6 m thick);
- BH108(MW): 2.3 to 13.7 mbgs (11.4 m thick);
- BH109: 0.8 to 12.2 mbgs (11.4 m thick);
- BH110(MW): 0.9 to 7.9 mbgs (7.0 m thick) and
- BH111(MW): 0.2 to 10.7 mbgs (10.5 m thick).

The silty sand or silt and fine sand described above is possibly the INS owing to its lack of gravel or clay. The colour transition from brown to grey (typically an indicator of the permanent saturated zone) was observed within this unit between 3.8 and 7.6 mbgs.

Below the unit of silty sand or silt and fine sand, all boreholes encountered a unit that extended to the bottom of each borehole and whose texture was described as either silty clay, silty sandy clay or sandy silty clay till. Considering that the silt and sand above is possibly the INS, this unit could be considered the Lower Newmarket Till (LNT).

2.2.3 Groundwater Levels and Flow

On March 18th, 2022 monitoring wells BH103(MW), BH106(MW), BH108(MW) and BH111(MW) were developed using Waterra tubing and a Waterra Hydrolift pump. Approximately 63 L of water and sediment was purged from BH106(MW). BH108(MW) and BH111(MW) were purged dry after approximately 38 L and 40 L, respectively. On April 5th, the remaining monitoring wells were developed using the same method. BH101(MW) and BH103(MW) were purged dry after approximately 70 L and 38 L, respectively. BH105(MW) and BH110(MW) did not go dry during well development, and an approximate total of 57 L and 60 L was purged from each, respectively.

On April 5th, the static water level in BH106(MW), BH108(MW) and BH111(MW) was measured. The static water level all monitoring wells was measured on April 7th, 2022. Water levels were measured manually using a water level tape and recorded to the nearest centimetre. **Table 2** provides a summary of the measured water level depths.

Table 2. Groundwater Levels

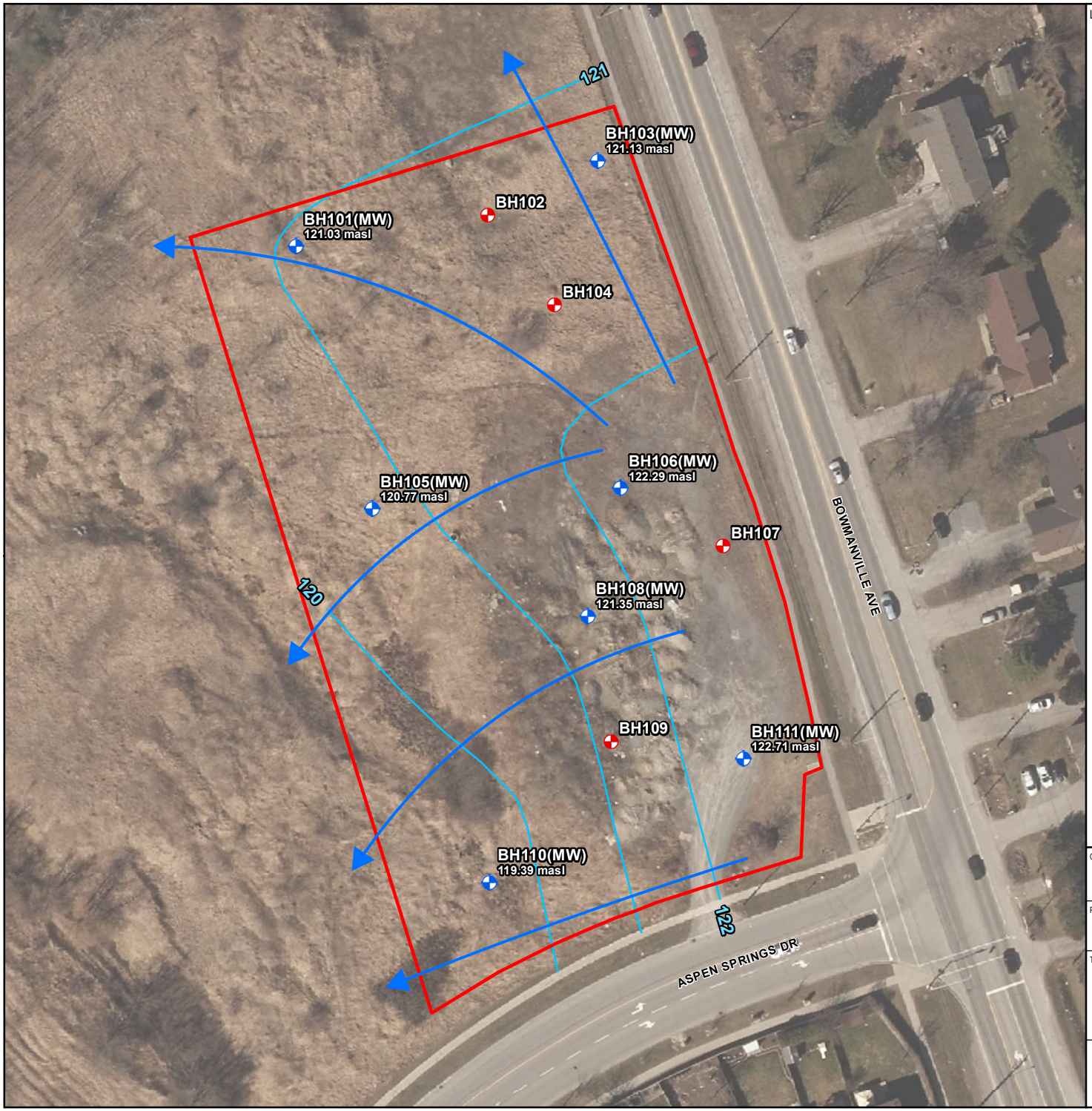
Borehole ID	April 5, 2022		April 7, 2022	
	Depth to water (mbgs)	Elevation of water (masl)	Depth to water (mbgs)	Elevation of water (masl)
BH101(MW)	-	-	0.57	121.03
BH103(MW)	-	-	3.64	121.16
BH105(MW)	-	-	0.43	120.77
BH106(MW)	2.03	122.27	2.01	122.29
BH108(MW)	3.45	121.45	3.55	121.35
BH110(MW)	-	-	2.61	119.39
BH111(MW)	1.84	122.76	1.89	122.71

Note: units are metres below ground surface (mbgs) and metres above sea level (masl)

Based on the measured groundwater elevations on April 7th, 2022 groundwater flow at the site is expected to flow away from the southeast edge of the property boundary (**Figure 5**). In the northern portion of the site, groundwater flow is expected to flow northwest. In portions of the site that are further south, groundwater is expected to flow approximately west to southwest. **Figure 6** presents the data collected from the dataloggers in BH105(MW) and BH111(MW).

Within the Newmarket Till soils encountered, coarser textured units (i.e., silt and fine sand or silty sand) were encountered above finer textured soils (i.e., silty sandy clay, silty clay or sandy silty clay). In addition, the colour transition from brown to grey was observed at a lower elevation than the elevation of the static water level in all monitoring wells. This suggests that over the depth of investigation, a shallow perched water table does not exist. The static water levels in **Table 2** therefore represent the piezometric head for the depth of the well screen, which was found to be generally consistent with depth suggesting only a small downwards vertical gradient. This result would also suggest that this area does not function as a significant groundwater recharge area. This conclusion is supported by the data presented in **Figure 6**, which demonstrates the stability of the water levels at the site despite a precipitation event of 8.8 mm between April 6th and 7th, 2022.

Groundwater monitoring will be completed early and late May 2022 will serve to further establish the relationship between precipitation events and groundwater levels at the site. These data will be provided in an updated report or as an addendum to this document.



LEGEND

- Borehole
- Monitoring Well
- Groundwater Elevation Contour
- Groundwater Flow Direction
- Subject Property

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Universal Transverse Mercator Projection Zone 17

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CLIENT

Watters Environmental Group Inc

PROJECT

10 Aspen Springs Drive

TITLE

Groundwater Flow Direction

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REF. NO. 2001518-MR-105-A

Figure 5

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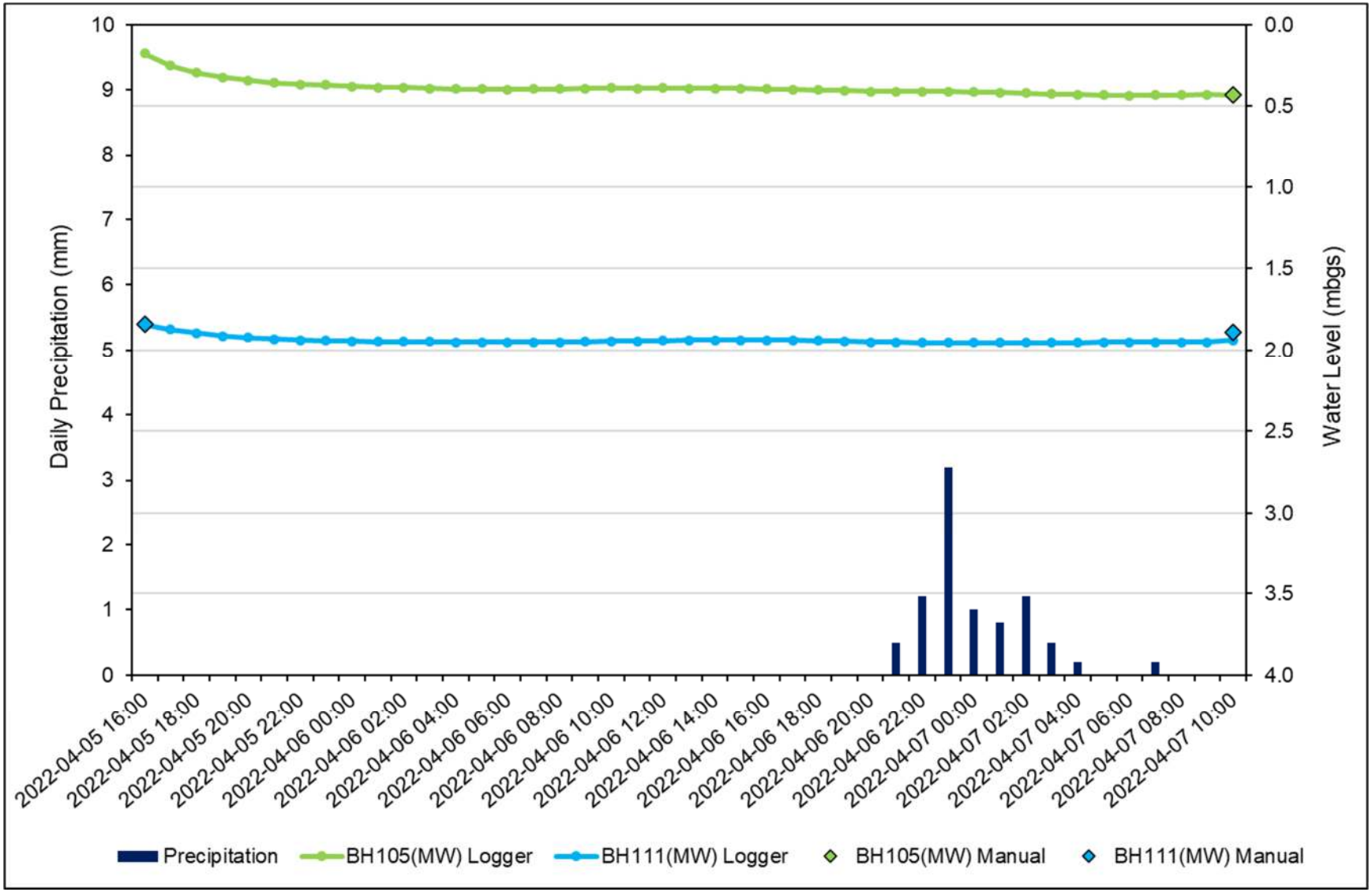
Figure 6. Groundwater Monitoring Data



2.2.4 MECP Water Well Records

Figure 7 shows the 44 wells from the MECP Water Well Records that are within a 500 m radius of the site. They range in depth from 3.0 to 89.9 m. Static water levels range from 1.5 to 23.3 mbgs for those wells that have this value on record. Sixteen (16) wells are used for domestic purposes, sixteen (16) are either a test hole, monitoring well or both, one (1) is for public use, one (1) is for municipal use and three (3) are of unknown use. These well records indicate that the top of bedrock ranges from 43.0 to 49.4 mbgs in the vicinity of the site. There are two well records that indicate a bedrock depth of 0.3 and 7.6 mbgs, respectively. Upon closer examination of the soil geology descriptions, it appears that these wells (Well ID 1908709 and 1908869) encountered very hard layer of till that was not in fact the bedrock.

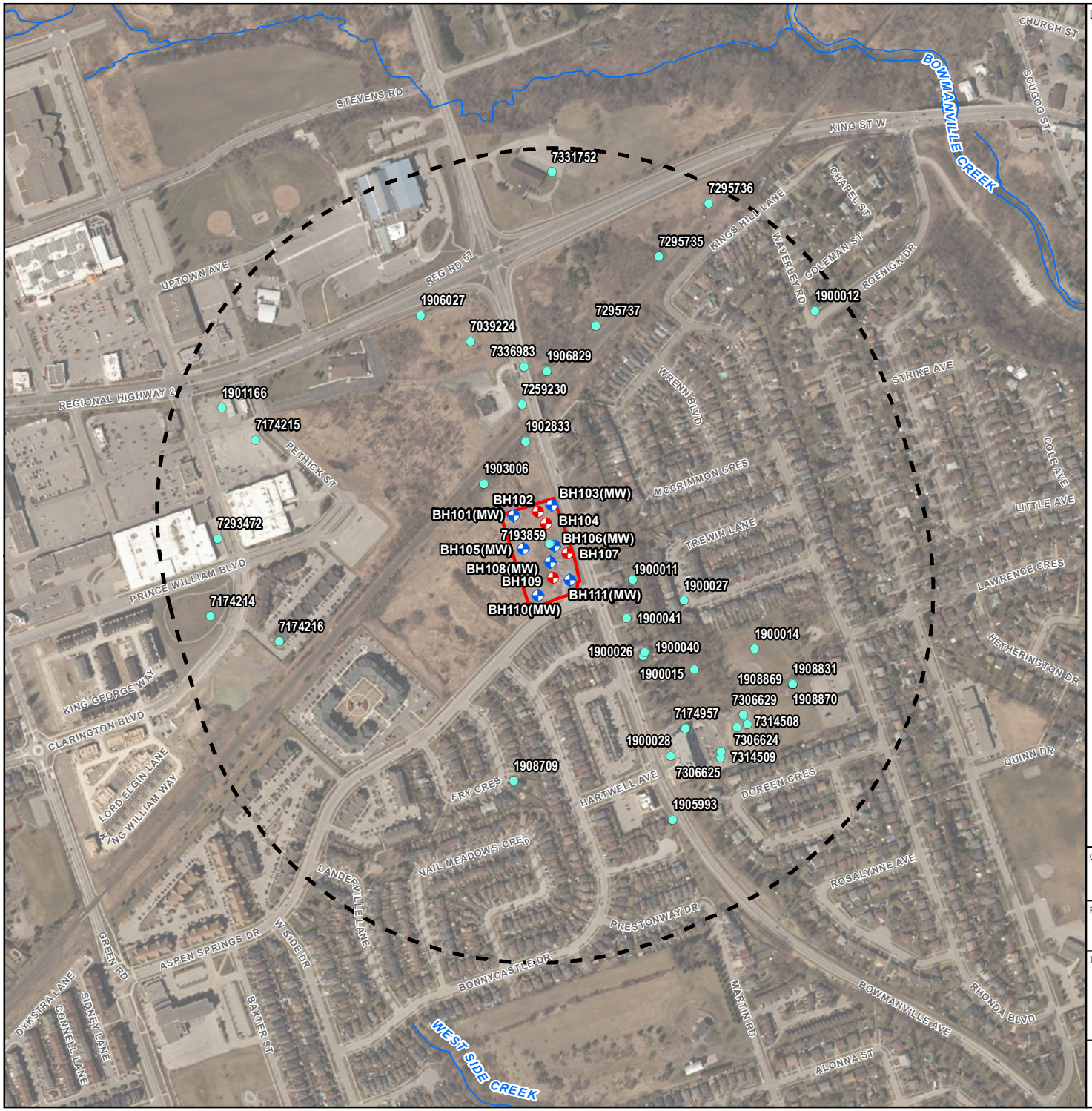
As the site is located within the urban area of Bowmanville, no active potable groundwater users are expected to be found in the vicinity of the site.

Table 3. MECP Well Records within 500 m of the Site

Well ID	Date Completed	Use	Depth (m)	Depth to Bedrock (m)	Static Water Level (mbgs)	Recommended Rate (L/min)
1900011	June 4, 1953	Domestic	24.4	-	12.2	-
1900012	November 14, 1954	Domestic	31.7	-	6.1	-
1900014	September 26, 1955	Domestic	18.3	-	6.7	-
1900015	September 28, 1955	Domestic	17.4	-	6.7	-
1900026	February 12, 1959	-	54.9	49.4	-	-
1900027	February 14, 1959	Domestic	48.8	-	4.3	-
1900028	April 1, 1959	Domestic	32.9	-	6.1	3.8
1900040	June 29, 1964	Domestic	12.8	-	6.1	15.1
1900041	March 28, 1965	Domestic	18.3	-	6.1	15.1
1901166	July 20, 1953	Domestic	40.8	-	4.0	-
1902833	January 7, 1970	Domestic	89.9	47.5	21.3	7.6
1903006	November 10, 1970	Domestic	20.7	-	7.6	11.4
1905993	August 22, 1980	Domestic	48.8	48.2	23.2	37.9
1906027	May 21, 1981	Municipal	45.7	43	11.9	18.9
1906829	September 5, 1983	Public	16.2	-	7.6	11.4
1908870	February 16, 1988	Domestic	10.7	-	6.1	11.4
1908709	November 17, 1987	Domestic	9.1	0.3*	6.1	15.1
1908831	December 21, 1987	Domestic	31.1	-	1.5	11.4
1908869	February 16, 1988	Domestic	10.7	7.6*	6.1	15.1
7039224	December 2, 2006	-	-	-	-	-
7174214	December 21, 2011	Monitoring and Test Hole	-	-	-	-
7174215	December 21, 2011	Monitoring and Test Hole	-	-	-	-
7174216	December 21, 2011	Monitoring and Test Hole	-	-	-	-

Well ID	Date Completed	Use	Depth (m)	Depth to Bedrock (m)	Static Water Level (mbgs)	Recommended Rate (L/min)
7174957	September 13, 2011	-	-	-	-	-
7193859	December 5, 2012	Monitoring	6.1	-	-	-
7259230	May 19, 2015	Monitoring and Test Hole	9.1	-	-	-
7293472	June 30, 2017	Test Hole	6.7	-	-	-
7295735	August 23, 2017	Monitoring	5.5	-	-	-
7295736	August 23, 2017	Test Hole	6.4	-	-	-
7295737	August 23, 2017	Test Hole	4.6	-	-	-
7306624	May 31, 2017	Test Hole	3.8	-	-	-
7306625	May 31, 2017	Test Hole	3.0	-	-	-
7306629	May 31, 2017	Test Hole	4.6	-	-	-
7314508	June 4, 2018	Test Hole	-	-	-	-
7314509		Test Hole	-	-	-	-
7331752	March 4, 2019	Monitoring and Test Hole	-	-	-	-
7336983	May 15, 2019	Test Hole	9.1	-	-	-

*Inaccurate depth to bedrock; hard layer of till that was recorded as bedrock in the MECP Well Records



LEGEND

- Well Record within 500m[1]
- Borehole
- Monitoring Well
- Watercourse[2]
- Subject Property
- 500m Site Buffer

1. MECP
2. LIO/MNRF

50 25 0 50 100 150 200
METRE SCALE

North American Datum 1983
Universal Transverse Mercator Projection Zone 17

Scale: 1:8,000
Page Size: Letter (8.5 x 11 inches)

Drawn: CV
Checked: WC
Date: Apr 14, 2022

Source Notes:
Imagery (2020) provided by Clarington map service

NORTH

CLIENT
Watters Environmental Group Inc

PROJECT
10 Aspen Springs Drive

TITLE
MECP Well Records within a 500 m Radius

Palmer

REF. NO. 2001518-MR-107-A

Figure 7

Document Path: G:\Shared drives\Projects 2020\20015 - Watters Environmental Group Inc\2001518 - 10 Aspen Springs Drive\GIS\1_Workspace\Task 1 - HydroG Figures\2001518_7-1_MECP Well Records.mxd

2.2.5 Hydraulic Conductivity

On April 5th, 2022 we conducted single well response tests (SWRTs) in BH106(MW), BH108(MW) and BH111(MW). On April 7th, 2022, SWRTs were conducted in BH101(MW), BH103(MW), BH105(MW) and BH110(MW). Bail tests (i.e., rising-head tests) were conducted by removing a bailer of water (<1 L) from the well to create a change in hydraulic head. Hydraulic conductivity values were estimated by measuring the rate of change in recovery of the water level. Water levels in each well were recorded using a datalogger set to record every second. Manual water level measurements were used to gauge recovery to equilibrium. Tests were terminated after the 80% recovery was achieved or 30 minutes had passed.

Hydraulic conductivity (K) values were then calculated using the displacement-time data and were analyzed using the Hvorslev (1951) method for confined aquifers, modelled using Aqtesolv™ software. The analysis results are presented in **Appendix C**, and the calculated hydraulic conductivity values are summarized in **Table 4**. The hydraulic conductivity values ranged from $6.1x10^{-9}$ to $7.3x10^{-6}$ m/s are consistent with the geological materials encountered during drilling (i.e., silty clay, sandy silty clay, silty sandy clay) and reflect the internal heterogeneity of the Newmarket Till soils.

In general, the till soils had a very dense to hard N-value; however, a less dense till layer was identified in most boreholes. This layer is generally found at depths ranging from approximately 6 to 16 mbgs. It is expected that this unit is most representative of the shallow INS Till deposits and is where the majority of groundwater flow/seepage will occur. The hydraulic conductivity values have been presented in **Table 4** to reflect this difference in permeability trends.

Table 4. Single Well Response Test Summary Table

Well ID	Screened Interval (mbgs)	Screened Interval (masl)	Screened Geology	Analysis Method	Hydraulic Conductivity, K (m/s)	Geometric Mean K (m/s)	90th Percentile K (m/s)
BH101(MW)	12.15 - 15.20	109.10 - 106.40	Shallow INS	Confined Hvorslev	$6.9x10^{-9}$	$4.9x10^{-7}$	$6.0x10^{-6}$
BH105(MW)	7.75 - 10.80	113.45 - 110.40			$2.9x10^{-6}$		
BH106(MW)	9.15 - 12.20	115.15 - 112.10			$4.3x10^{-7}$		
BH110(MW)	9.15 - 12.20	112.85 - 109.80			$7.3x10^{-6}$		
BH103(MW)	18.40 - 21.45	106.40 - 103.35	Deeper LNT	Confined Hvorslev	$1.2x10^{-7}$	$4.4x10^{-8}$	$1.1x10^{-7}$
BH108(MW)	18.25 - 21.30	106.65 - 103.60			$8.8x10^{-9}$		
BH111(MW)	18.40 - 21.45	106.20 - 103.15			$8.2x10^{-8}$		

2.2.6 Groundwater Chemistry

On April 7th, 2022 groundwater chemistry samples were collected from BH106(MW) and submitted for analysis for a suite of water quality parameters, the results of which were compared to the Durham Region Storm and Sanitary Sewer Bylaws. **Table 5** presents a summary of the analysis results. The samples exceeded none of the guideline limits except the Total Suspended Solids guideline for the Durham Storm Sewer Bylaw. Total Suspended Solids can be mitigated during construction dewatering using typical settling tank methods.

Table 5. Groundwater Chemistry Analyses

Parameter	Guideline Limit		Lowest Detection Limit	Units	BH106(MW) April 6, 2022
	Durham Sanitary Sewer	Durham Storm Sewer			
Physical Tests (Water)					
pH	6 -> 10.5	6 -> 9	0.10	pH units	7.56
Total Suspended Solids	350 (U)	15 (U)	3.0	mg/L	**17.8**
Anions and Nutrients (Water)					
Fluoride (F)	10 (U)		0.10	mg/L	0.14
Total Kjeldahl Nitrogen	100 (U)	1 (U)	0.050	mg/L	0.175
Phosphorus, Total	10 (U)	0.4 (U)	0.0030	mg/L	0.0139
Sulfate (SO4)	1500 (U)		1.5	mg/L	92.6
Cyanides (Water)					
Cyanide, Total	2 (U)	0.02 (U)	0.0020	mg/L	<0.0020
Bacteriological Tests (Water)					
E. Coli		200 (U)		CFU/100mL	0
Total Metals (Water)					
Aluminum (Al)-Total	50 (U)		0.050	mg/L	<0.050
Antimony (Sb)-Total	5 (U)		0.0010	mg/L	<0.0010
Arsenic (As)-Total	1 (U)	0.02 (U)	0.0010	mg/L	0.0018
Cadmium (Cd)-Total	0.7 (U)	0.008 (U)	0.000050	mg/L	<0.000050
Chromium (Cr)-Total	2 (U)	0.08 (U)	0.0050	mg/L	<0.0050
Cobalt (Co)-Total	5 (U)		0.0010	mg/L	<0.0010
Copper (Cu)-Total	3 (U)	0.05 (U)	0.0050	mg/L	<0.0050
Lead (Pb)-Total	1 (U)	0.12 (U)	0.00050	mg/L	<0.00050
Manganese (Mn)-Total	5 (U)	0.15 (U)	0.0050	mg/L	0.0945
Mercury (Hg)-Total	0.01 (U)	0.0004 (U)	0.0000050	mg/L	<0.0000050
Molybdenum (Mo)-Total	5 (U)		0.00050	mg/L	0.00772
Nickel (Ni)-Total	2 (U)	0.08 (U)	0.0050	mg/L	<0.0050
Selenium (Se)-Total	1 (U)	0.02 (U)	0.00050	mg/L	<0.00050
Silver (Ag)-Total	5 (U)	0.12 (U)	0.00050	mg/L	<0.00050
Tin (Sn)-Total	5 (U)		0.0010	mg/L	0.0037
Titanium (Ti)-Total	5 (U)		0.0030	mg/L	<0.0030
Zinc (Zn)-Total	2 (U)	0.04 (U)	0.030	mg/L	<0.030
Aggregate Organics (Water)					

Parameter	Guideline Limit		Lowest Detection Limit	Units	BH106(MW) April 6, 2022
	Durham Sanitary Sewer	Durham Storm Sewer			
BOD	300 (U)	15 (U)	3.0	mg/L	<3.0
Oil and Grease, Total			5.0	mg/L	<5.0
Animal/Veg Oil & Grease	150 (U)		5.0	mg/L	<5.0
Mineral Oil and Grease	15 (U)		2.5	mg/L	<2.5
Phenols (4AAP)	1 (U)	0.008 (U)	0.0010	mg/L	<0.0010
Volatile Organic Compounds (Water)					
Benzene	10 (U)	2 (U)	0.50	ug/L	<0.50
Chloroform	40 (U)	2 (U)	1.0	ug/L	<1.0
1,2-Dichlorobenzene	50 (U)	5.6 (U)	0.50	ug/L	<0.50
1,4-Dichlorobenzene	80 (U)	6.8 (U)	0.50	ug/L	<0.50
cis-1,2-Dichloroethylene	4000 (U)	5.6 (U)	0.50	ug/L	<0.50
Dichloromethane	2000 (U)	5.2 (U)	2.0	ug/L	<2.0
trans-1,3-Dichloropropene	140 (U)	5.6 (U)	0.50	ug/L	<0.50
Ethylbenzene	160 (U)	2 (U)	0.50	ug/L	<0.50
Methyl Ethyl Ketone	8000 (U)		20	ug/L	<20
Styrene	200 (U)		0.50	ug/L	<0.50
1,1,2,2-Tetrachloroethane	1400 (U)	17 (U)	0.50	ug/L	<0.50
Tetrachloroethylene	1000 (U)	4.4 (U)	0.50	ug/L	<0.50
Toluene	270 (U)	2 (U)	0.50	ug/L	2.00
Trichloroethylene	400 (U)	8 (U)	0.50	ug/L	<0.50
o-Xylene			0.50	ug/L	<0.50
m+p-Xylenes			1.0	ug/L	<1.0
Xylenes (Total)	1400 (U)	4.4 (U)	1.1	ug/L	<1.1
4-Bromofluorobenzene				%	97.6
1,4-Difluorobenzene				%	97.4
Phthalate Esters (Water)					
Bis(2-ethylhexyl)phthalate	12 (U)	8.8 (U)	2.0	ug/L	3.3
2-fluorobiphenyl				%	92.5
p-Terphenyl d14				%	96.5
Semi-Volatile Organics (Water)					
Di-n-butylphthalate	80 (U)	15 (U)	1.0	ug/L	<1.0
2-Fluorobiphenyl				%	92.5
p-Terphenyl d14				%	96.5
Polychlorinated Biphenyls (Water)					

Parameter	Guideline Limit		Lowest Detection Limit	Units	BH106(MW) April 6, 2022
	Durham Sanitary Sewer	Durham Storm Sewer			
Aroclor 1242			0.020	ug/L	<0.020
Aroclor 1248			0.020	ug/L	<0.020
Aroclor 1254			0.020	ug/L	<0.020
Aroclor 1260			0.020	ug/L	<0.020
Decachlorobiphenyl				%	74.4
Total PCBs	1 (U)	0.4 (U)	0.040	ug/L	<0.040
Tetrachloro-m-xylene				%	95.8
Organic Parameters (Water)					
Nonylphenol	20 (U)		1.0	ug/L	<1.0
Nonylphenol Diethoxylates			0.10	ug/L	<0.10
Total Nonylphenol Ethoxylates	200 (U)		2.0	ug/L	<2.0
Nonylphenol Monoethoxylates	6 -> 10.5		2.0	ug/L	<2.0

BOLD - Exceeds Guideline Limit

3. Hydrogeological Conceptual Model

The site is underlain by the heterogeneous, low permeability deposits of the Newmarket Till. This till unit is present in a range of textures, from silt and fine sand to silty clay, over the depth of investigation. A depth-dependant permeability trend was identified at the site. Approximately the initial 6 to 12 m of overburden was varied in texture as well as compactness. From approximately 6 to 16 mbgs, a softer unit (lower N-value) found shallower in the soil column was identified, and possibly corresponds to the INS. This unit had the higher hydraulic conductivities at the site, with a geometric mean hydraulic conductivity of 4.9×10^{-7} m/s as measured by single well response tests in BH101(MW), BH105(MW), BH106(MW) and BH110(MW). At the site, the majority of groundwater flow will come from this more permeable unit. Underneath is a very compact unit of till that was distinguished by high N-values during drilling, and which likely corresponds to the Lower Newmarket Till. Owing to its lower hydraulic conductivity (geometric mean of 4.4×10^{-8} m/s), this unit restricts groundwater flow even more.

Considering that the brown-grey colour transition occurs within the potential INS unit is lower in elevation than the measured static water levels in all monitoring wells, a shallow perched water table does not exist at the site. The measured static water levels represent the piezometric head of the Newmarket Till across the length of each well screen. Based on the measured groundwater levels on April 7th, 2022, the horizontal component of groundwater flow ranges in direction from west-southwest in the southern portion of the site to northwest in the northern portion of the site (**Figure 5**). There would also likely be a non-negligible vertical component of groundwater flow, owing to the overall low hydraulic conductivity of the Newmarket Till.

Based on these results, it is expected that the site does not function as a significant groundwater recharge area; but rather is dominated by surface water runoff. No natural environmental features were identified on or adjacent to the site, and therefore groundwater recharge or surface water runoff from the site do not support natural features.

4. Preliminary Dewatering Assessment

4.1 Estimation of Dewatering Rates

We understand that the proposed development consists of two (2) high-rise residential towers with a combined podium, and one (1) mid-rise residential building with two (2) or three (3) levels of underground parking. For our calculations the geometric mean hydraulic conductivity of 4.9×10^{-7} m/s was used, the April 2022 groundwater level in BH106(MW) plus -1 mbgs (2 mbgs + (-1 mbgs) = 1 mbgs). We considered the low shallow INS unit to extend to 16 mbgs as a conservative estimate, and that the full vertical extent of this unit would need to be dewatered, regardless of the number of underground levels. Our calculations use the geometric mean hydraulic conductivity of the shallow INS unit (4.9×10^{-7} m/s). For preliminary considerations, the dewatering rate (Q) or the steady-state groundwater inflow in m^3/s into an excavation can be calculated using Jacob's modified non-equilibrium equation for an unconfined aquifer (Powers *et al.*, 2007).

$$Q = \frac{\pi K (H^2 - h^2)}{\ln\left(\frac{R_0}{r_e}\right)} + 2\left[\frac{xK(H^2 - h^2)}{2L}\right] \quad m^3/s$$

Where K = hydraulic conductivity (m/s) – 4.9×10^{-7} m/s
H = saturated thickness before dewatering (m) – 15 m
h = saturated thickness after dewatering – 0 m
r_e = equivalent radius of influence estimated by:

$$r_e = \sqrt{\frac{a*x}{\pi}} \text{ (m)}$$

Where a = width (m) – 40 m for the combined 25-storey Towers A and B, 23 m for the 9-storey mid-rise building
x = length (m) – 88 m for the combined 25-storey Towers A and B, 65 m for the 9-storey mid-rise building

R_O = radius of influence estimated using:
$R_0 = 3000(H - h)\sqrt{K} + r_e$ (m) – 65 m for the combined 25-storey Towers A and B, 53 m for the 9-storey mid-rise building;

L = the greater of $R_O/2$ or 10 m

Table 5 presents our preliminary dewatering rate estimates based on the information available in the site plan (**Appendix A**), for both 2 and 3 storeys of underground parking. A 2x factor of safety has been added to account for heterogeneities in the till soils.

Table 6. Dewatering Rate Estimates

Estimated Inflow Rate (L/day)					
25-Storey Towers A and B	9-Storey Mid-Rise Building	All Buildings Combined	All Buildings Combined with a 2x safety factor	Direct Precipitation (25 mm storm)	Total Estimated Dewatering Rate
70,924	56,714	127,638	255,277	126,100	381,377

4.2 Permitting

A registration on the MECP Environmental and Sector Registry (EASR) is required for all construction related water taking between 50,000 and 400,000 L/day. A Permit to Take Water (PTTW) is required for all water construction takings exceeding 400,000 L/day. Based on our dewatering rate estimates, 127,638 L/day could be required for the construction of proposed development. Applying a factor of safety of 2x to these estimates gives an estimate of 255,277 L/day. When direct precipitation is included, the total dewatering rate estimate is 381,377 L/day, which is the value we recommend be used for permitting purposes. Therefore, we expect that an EASR registration will be required, but a PTTW will not be required for the proposed development.

4.3 Hydrogeological Design Considerations

Short-Term Dewatering – Based on the calculated dewatering rates, sump pumping from a well constructed sump pit or pits is expected to be suitable to manage the volume of groundwater seepage for this project. Dewatering discharge must be treated to meet Region of Durham standards prior to discharge to the sewer system and a discharge agreement must be in place.

It is important to note that dewatering rates at the beginning of excavation below the water table and following precipitation/snow melt events is expected to be highest, with lower dewatering volumes

required once steady state is reached. The Contractor should be prepared to manage dewatering rates as high as 381,377 L/day.

While the dewatering volume is expected to be manageable through the use of sumps, the geology at the site of saturated silty, sandy till is expected to cause long-term seepage along the excavation sidewalls at depths ranging from approximately 6 to 16 m. Due to the fine-grained nature of the soils, this may result in loss of ground behind the wood lagging. The Contractor should take steps to avoid loss of ground behind the shoring. It is recommended that at a minimum, filter cloth be installed behind the wood lagging to minimize the loss of fines from groundwater seepage in the fill.

Should the Contractor find that the risk due to loss of ground or long-term seepage into the excavation is too high, active dewatering methods such as closely spaced educator wells should be installed around the perimeter of the excavation to control groundwater. A dewatering contractor should be consulted to provide a recommended design of the eductor wells.

Long-Term Foundation Drainage – We expect that the basement foundations will be below the groundwater table and therefore, management of long-term seepage will be required for this project. As the groundwater chemistry results met all Durham Region Storm and Sanitary Sewer discharge criteria, except for TSS, which can be mitigated through the use of a settling tank and through a well designed drainage layer, long-term discharge is recommended to be directed into the Durham Region storm sewer system. A permit from Durham Region is expected to be required for this discharge

The same equation as in Section 4.1 was used to estimate the long-term foundation drainage rate. Considering a long-term drainage scenario, the average depth to the water table was used, excluding monitoring wells that are not on building footprints (i.e., 2.74 mbgs), and considered the depth of dewatering to be the base of a 3-level basement, or approximately 9.5 mbgs. As in Section 4.1, the geometric mean hydraulic conductivity of 4.9×10^{-7} m/s was used for the calculations. It is estimated that long-term drainage of 24,334 L/day could be required for the combined 25-storey Towers A and B, and that 19,110 L/day could be required for the 9-storey mid-rise building. Overall, a combined 43,444 L/day could be required for long-term foundation drainage for the proposed development. A PTTW would not be required for this rate of long-term drainage.

5. Impact Assessment

5.1 Aquifers and Natural Environmental Features

We understand that a maximum of 3 levels of underground parking (excavation to approximately 11 mbgs) will be included in the proposed development. The low hydraulic conductivity of the Newmarket Till aquitard at the site would limit infiltration and protect the underlying Thorncliffe Aquifer Complex from potential surface contaminants. We expect that the proposed development will therefore have no impact on the underlying Thorncliffe Aquifer Complex.

Within a 500 m radius of the site, there are no surface water features or wetlands. In addition, the estimated radius of influence of construction dewatering is expected to be relatively limited (approximately 65 m). We do not expect the proposed development to cause any impacts on the natural environment.

5.2 Private Water Wells

Considering the surface water intake present in Lake Ontario approximately 3.5 km southeast of the site, the Town of Bowmanville has full municipal water servicing. Within a 500 m radius of the site, there are sixteen (16) domestic wells, one (1) public and one (1) municipal well in the MECP Well Records. Of these 18 wells, they range in date of completion from June 4, 1953 to February 16, 1988. Considering that municipal water servicing is available and the date of completion, none of the wells described above are likely to be active. Within the estimated radius of influence of 65 m from each proposed building footprint, there are no domestic wells on record. Impacts from the proposed development on private water wells is therefore considered to be null.

6. Conclusions and Recommendations

Based on the results of this Hydrogeological Investigation, the following conclusions and recommendations are presented:

- The geotechnical drilling program, conducted by Davis Drilling and overseen by the client, consisted of drilling eleven (11) boreholes, seven (7) of which were completed with monitoring wells (i.e., BH101(MW), BH103(MW), BH105(MW), BH106(MW), BH108(MW), BH110(MW) and BH111(MW));

- The site is underlain by the low permeability, heterogeneous deposits of the Newmarket Till over the depth of investigation;

- A shallow, slightly higher permeability till unit was identified and potentially corresponds to the Inter-Newmarket Sediments (INS), and overlies a deeper, lower permeability unit corresponding to the Lower Newmarket Till (LNT);

- The Thorncliffe Aquifer Complex is likely to be found at depths greater than 30 m and the top of bedrock is likely approximately 50 mbgs at the site;

- Groundwater levels as measured on April 5th and 7th, 2022 ranged from 1.84 to 3.64 mbgs. Two additional round of water levels will be collected in April and May 2022 and included with future reporting;

- Groundwater is expected to flow away from Bowmanville Avenue. In the north portion of the site, it is expected to flow northwest and in the south portion of the site groundwater is expected to flow west to southwest;

- Seven (7) single well response tests were conducted in all monitoring wells. Hydraulic conductivities ranged from 6.1×10^{-9} to 7.3×10^{-6} m/s. The shallow INS unit had a geometric mean hydraulic conductivity of 4.9×10^{-7} m/s and the deeper LNT unit had a geometric mean hydraulic conductivity of 4.4×10^{-8} m/s.

- One (1) groundwater chemistry sample was taken from BH106(MW). The results of the laboratory analyses show that the groundwater on site passes all criteria for the Durham Region's Storm

and Sanitary Sewer Bylaws, except the Total Suspended Solids (TSS) guideline for the Storm Sewer Bylaw. TSS can be mitigated using typical settling tank methods during dewatering;

- Short-term construction dewatering rates were estimated to be approximately 381,377 L/day. We expect an EASR registration to be required, but a PTTW not to be required;

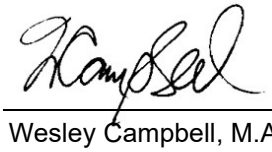
- Long-term foundation drainage rates were estimated to be approximately 43,444 L/day for the proposed development. A PTTW would not be required for long-term discharge at this rate. Discharge waters should be directed into the Durham Region storm sewer system. A permit from Durham Region is expected to be required for this discharge; and

- No adverse impacts on the natural environment, aquifers or private well users are expected to result from the proposed development.

7. Signatures

This report was prepared and reviewed by the undersigned:

Prepared By:



Wesley Campbell, M.A.Sc., G.I.T.
Environmental Scientist

Reviewed By:

Jason Cole, M.Sc., P.Geo.
VP, Principal Hydrogeologist

Limitations of Report

The extent of this study was limited to the specific scope of work for which we were retained and that is described in this report. Palmer has assumed that the information provided by the client or any secondary sources of information are factual and accurate. Palmer accepts no responsibility for any deficiency, misstatement or inaccuracy contained in this report as a result of omissions, misinterpretations or negligent acts from relied upon data. Judgment has been used by Palmer in the interpretation of the information provided but subsurface physical and chemical characteristics may differ from regional scale geology mapping and vary between or beyond well/borehole locations given the inherent variability in geological conditions.

Palmer is not a guarantor of the geological or groundwater conditions at the subject site, but warrants only that its work was undertaken and its report prepared in a manner consistent with the level of skill and diligence normally exercised by competent geoscience professionals practicing in the Province of Ontario. Our findings, conclusions and recommendations should be evaluated in light of the limited scope of our work.

The information and opinions expressed in the Report are for the sole benefit of the Client. NO OTHER PARTY MAY USE OR RELY UPON THE REPORT OR ANY PORTION THEREOF WITHOUT PALMER'S WRITTEN CONSENT AND SUCH USE SHALL BE ON SUCH TERMS AND CONDITIONS AS PALMER MAY EXPRESSLY APPROVE. Ownership in and copyright for the contents of the Report belongs to Palmer. Any use which a third party makes of the Report is the sole responsibility of such third party. Palmer accepts no responsibility whatsoever for damages suffered by any third party resulting from use of the Report without Palmer's express written permission. Should the project design change following issuance of the Report, Palmer must be provided the opportunity to review and revise the Report in light of such alteration or variation.

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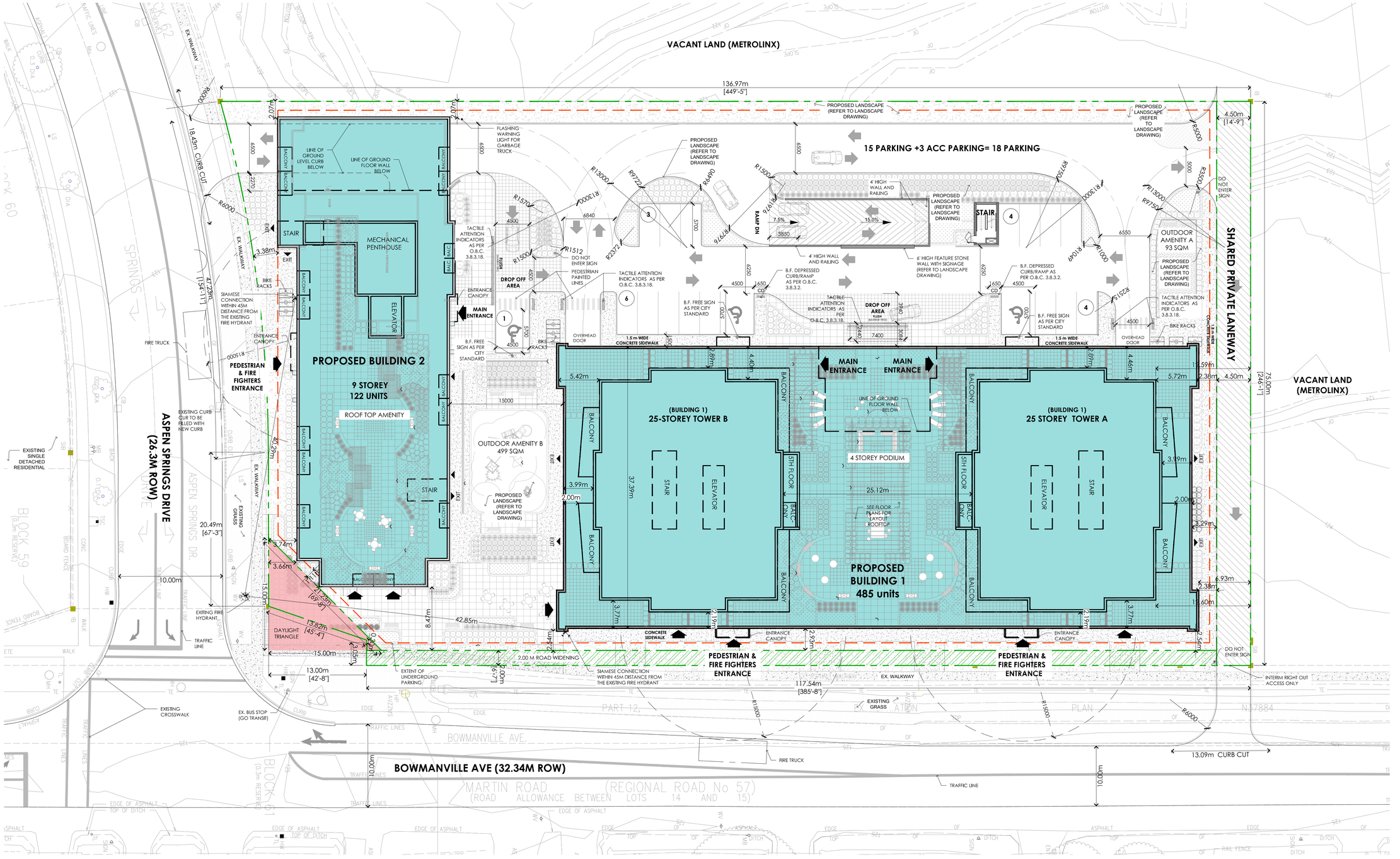
Appendix A

Site Plan

Mataj Architects Inc., 2022



PROPERTY LINE		OTHER ACCESS POINTS		HOSE BIB (REFER TO MECHANICAL DWGS)		WALL MOUNTED LIGHT FIXTURE -REFER TO ELECTRICAL DWGS
EXTENT OF UNDERGROUND PARKING		EXISTING TOWN HYDRANT		PAD MOUNTED HYDRO TRANSFORMER W/ STEEL BOLLARDS		LANDSCAPED AREA
CURB RAMP AS PER OBC 3.8.3.2		PROPOSED LOCATION OF NEW FIRE HYDRANT W/ STEEL BOLLARDS (REFER TO CIVIL DWGS)		SINGLE HEADED LIGHT FIXTURE ON CONCRETE BASE -REFER TO ELECTRICAL		DAYLIGHT TRIANGLE
PRINCIPLE ENTRANCE		FIRE DEPARTMENT CONNECTION		DOUBLE HEADED LIGHT FIXTURE ON CONCRETE BASE -REFER TO ELECTRICAL DWGS		

Project North: | True North:

Key Plan:

No.	Date:	Issue/Revision	By:
1	YY/MM/DD	Issued for	XX

Drawing Issues/Revisions:

Note:
ALL DIMENSIONS AND INFORMATION SHOWN ON THESE DRAWINGS MUST BE CHECKED AND VERIFIED ON SITE AND ANY DISCREPANCIES REPORTED TO THE ARCHITECT PRIOR TO CONSTRUCTION AND FABRICATION OF ITS COMPONENTS. SHOULD EXISTING CONDITIONS OR SERVICES BE FOUND TO VARY FROM THAT INDICATED ON THE DRAWINGS, THE ARCHITECT MUST BE NOTIFIED IMMEDIATELY.

FEATURES OF CONSTRUCTION NOT FULLY SHOWN ARE ASSUMED TO BE THE SAME CHARACTER AS THOSE NOTED FOR SIMILAR CONDITIONS.

UNLESS SPECIFICALLY NOTED OTHERWISE ON THE DRAWINGS, NO PROVISION HAS BEEN MADE IN THE DESIGN FOR CONDITIONS OCCURRING DURING CONSTRUCTION. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO PROVIDE ALL NECESSARY BRACING, SHORINGS, SHEET PILING OR OTHER TEMPORARY SUPPORTS, TO SAFEGUARD ALL EXISTING OR ADJACENT STRUCTURES AFFECTED BY THIS WORK.

WORK IN PROGRESS

MATAJ ARCHITECTS INC

Architect's Stamp

MATAJ ARCHITECTS INCORPORATED

Project:
BOWMANVILLE

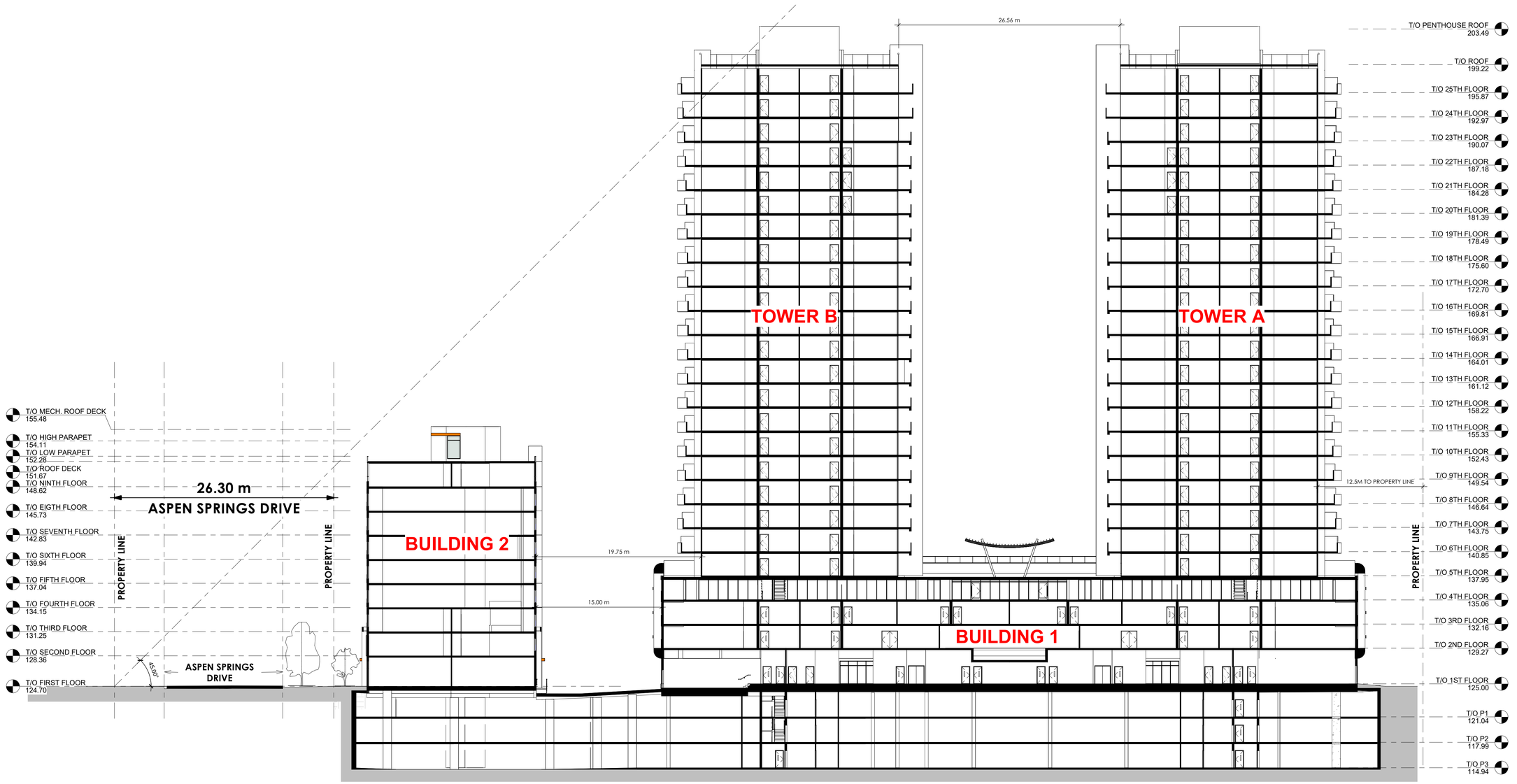
10 ASPEN SPRINGS DR, BOWMANVILLE, ON L1C 4W7

Sheet Title:
SITE PLAN

Design By:	Drawn By:	Approved By:
M.A	X.Z	EM
Scale: 1:250	Date: 22.03.10	Project No.: 21-019

Drawing No:
ASP-3
Of:

Drawing Series:



SPA FILE NO. -

REV	DESCRIPTION	REV. DATE
1	PROGRESS SET	Date 2

Drawing Issues/Revisions:

Note:

ALL DIMENSIONS AND INFORMATION SHOWN ON THESE DRAWINGS MUST BE CHECKED AND VERIFIED ON SITE AND ANY DISCREPANCIES REPORTED TO THE ARCHITECT PRIOR TO CONSTRUCTION AND FABRICATION OF ITS COMPONENTS. SHOULD EXISTING CONDITIONS OR SERVICES BE FOUND TO VARY FROM THAT INDICATED ON THE DRAWINGS, THE ARCHITECT MUST BE NOTIFIED IMMEDIATELY.

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USE LATEST REVISED DRAWINGS. DO NOT SCALE DRAWINGS.

WORK IN PROGRESS

MATAJ ARCHITECTS INC

Architect's Stamp

MATAJ ARCHITECTS
INCORPORATED
418 Iroquois Shore Road, Unit 206,
Oakville Ontario
L6H 0X7
T.905.281.4444

Project:

BOWMANVILLE

10 ASPEN SPRINGS DR.,
BOWMANVILLE, ON L1C 4W7

Sheet Title:

SITE SECTION

Design By:	Drawn By:	Approved By:
EM	BL	EM
Scale:	Date:	Project No.:
1 : 250	Issue Date	20-034

Drawing No:

A401

Of:

Drawing Series:

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Appendix B

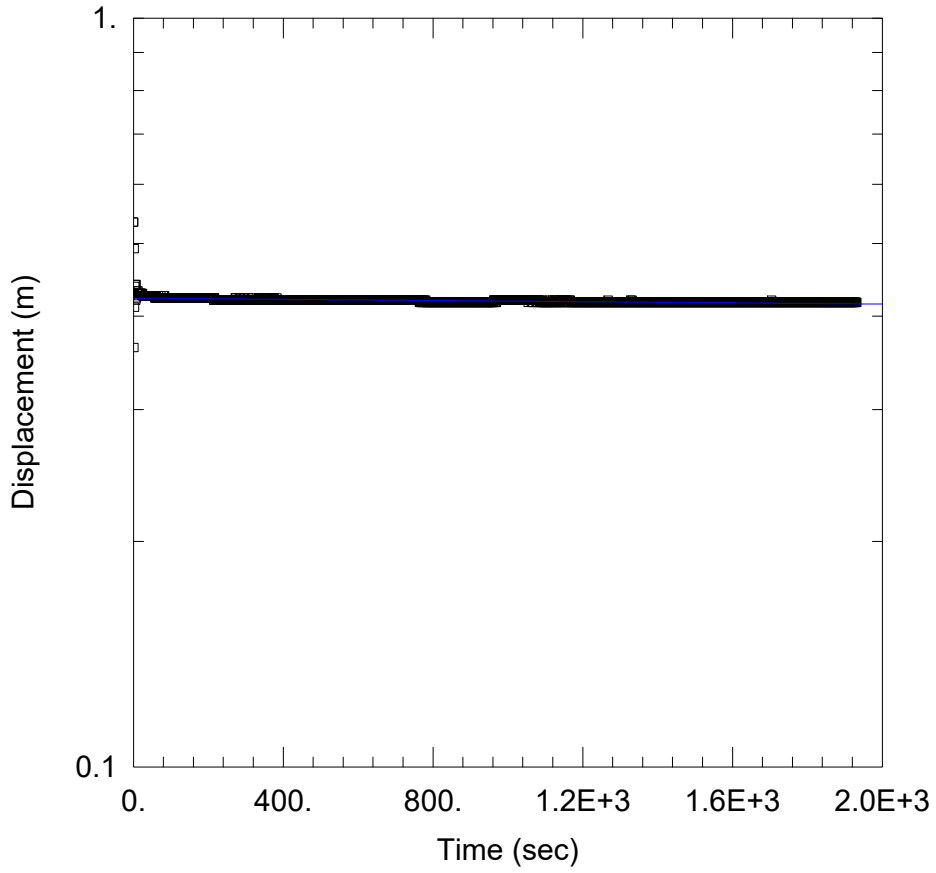
Borehole Logs

Watters Environmental Group Inc., 2022

Appendix C

Single Well Response Tests

Palmer, 2022



WELL TEST ANALYSIS

Data Set: G:\...\MW101.aqt
Date: 04/08/22 Time: 17:05:35

PROJECT INFORMATION

Company: Palmer
Client: Watters Environmental Group
Project: 2001518
Location: 10 Aspen Springs Drive
Test Well: BH101(MW)
Test Date: April 7, 2022

AQUIFER DATA

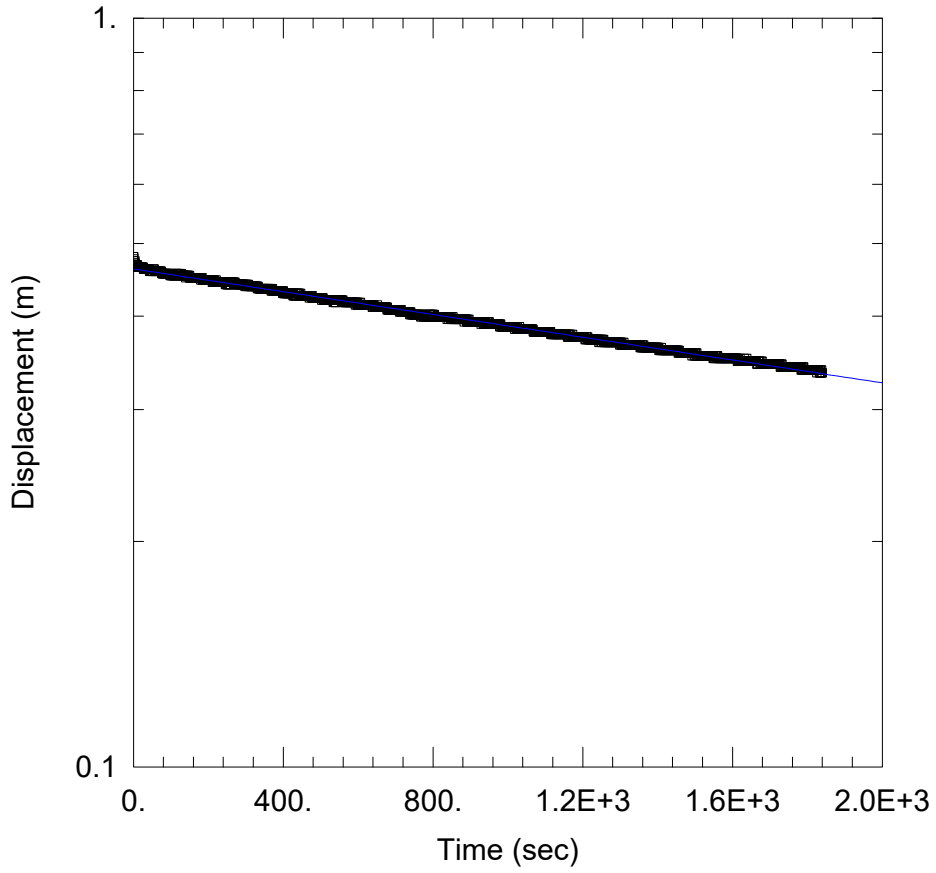
Saturated Thickness: 14.73 m Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (BH101(MW))

Initial Displacement: 0.534 m Static Water Column Height: 14.73 m
Total Well Penetration Depth: 14.73 m Screen Length: 3.05 m
Casing Radius: 0.025 m Well Radius: 0.025 m

SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev
K = 6.136E-9 m/sec y0 = 0.4226 m



WELL TEST ANALYSIS

Data Set: G:\...\MW103.aqt
Date: 04/08/22 Time: 17:06:08

PROJECT INFORMATION

Company: Palmer
Client: Watters Environmental Group
Project: 2001518
Location: 10 Aspen Springs Drive
Test Well: BH103(MW)
Test Date: April 7, 2022

AQUIFER DATA

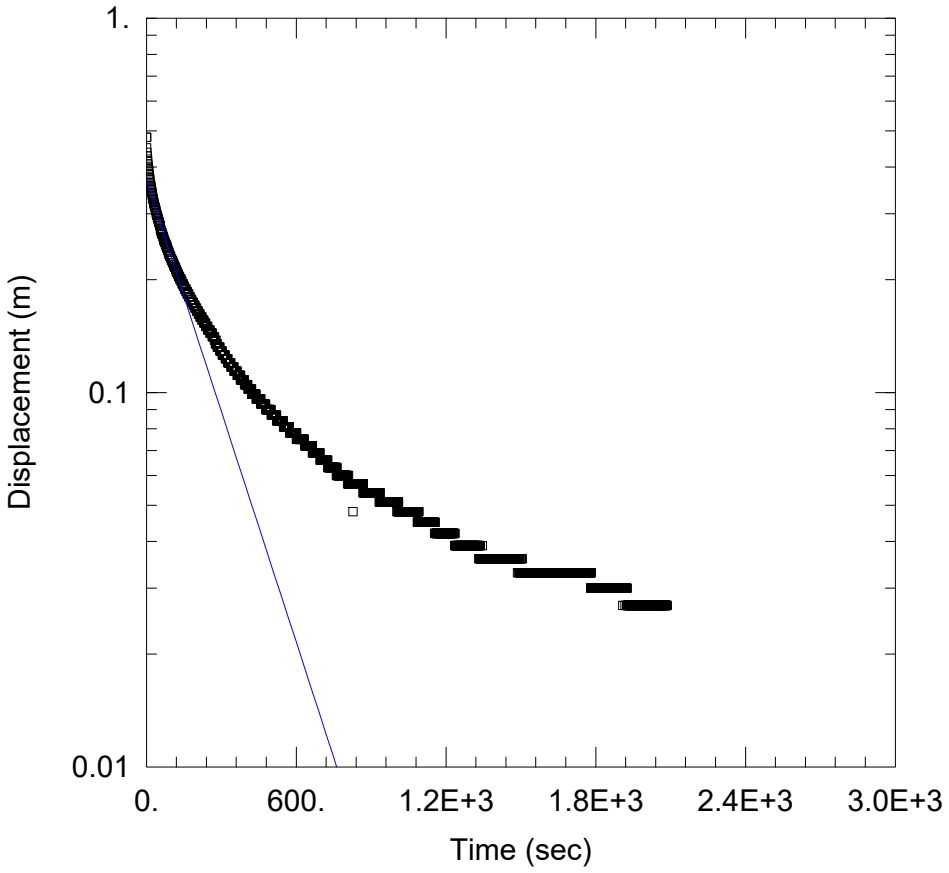
Saturated Thickness: 17.96 m Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (BH103(MW))

Initial Displacement: 0.48 m Static Water Column Height: 17.96 m
Total Well Penetration Depth: 17.96 m Screen Length: 3.05 m
Casing Radius: 0.025 m Well Radius: 0.025 m

SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev
K = 1.193E-7 m/sec y0 = 0.4623 m



WELL TEST ANALYSIS

Data Set: G:\...\MW105.aqt
Date: 04/08/22 Time: 17:04:52

PROJECT INFORMATION

Company: Palmer
Client: Watters Environmental Group
Project: 2001518
Location: 10 Aspen Springs Drive
Test Well: BH105(MW)
Test Date: April 7, 2022

AQUIFER DATA

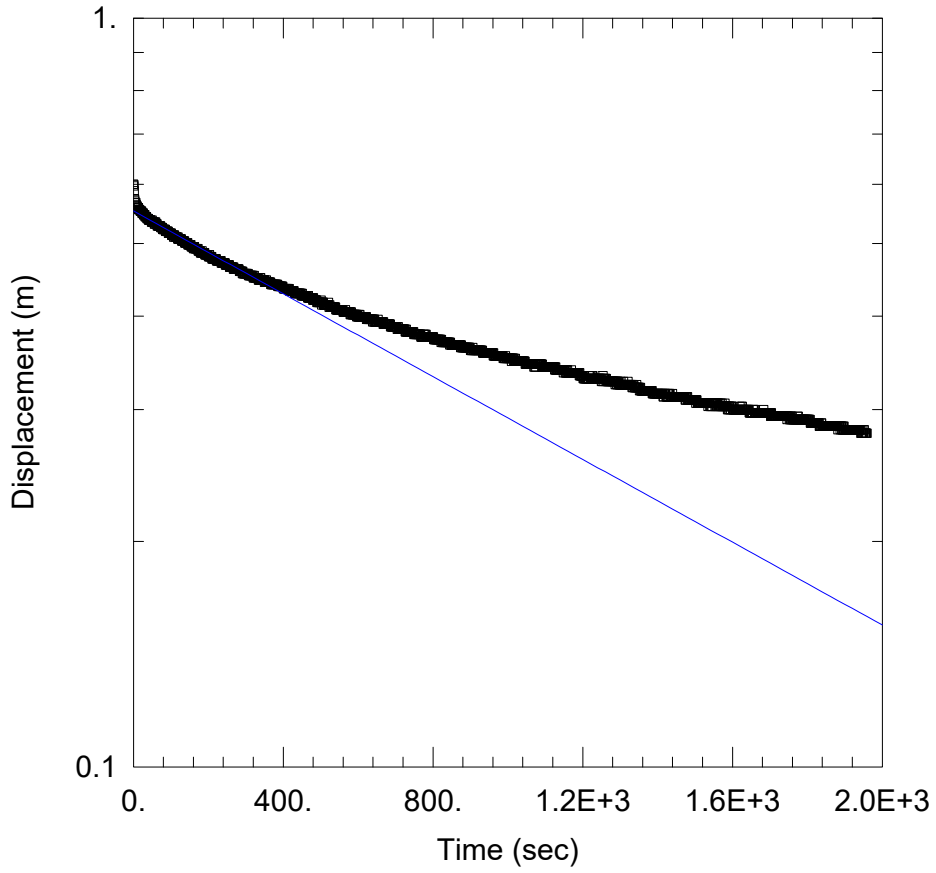
Saturated Thickness: 10.47 m Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (BH105(MW))

Initial Displacement: 0.48 m
Static Water Column Height: 10.47 m
Total Well Penetration Depth: 10.47 m
Screen Length: 3.05 m
Casing Radius: 0.025 m
Well Radius: 0.025 m

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev
K = 2.884E-6 m/sec
y0 = 0.3673 m



WELL TEST ANALYSIS

Data Set: G:\...\MW106.aqt
Date: 04/08/22 Time: 16:29:15

PROJECT INFORMATION

Company: Palmer
Client: Watters Environmental Group
Project: 2001518
Location: 10 Aspen Springs Drive
Test Well: BH106(MW)
Test Date: April 5, 2022

AQUIFER DATA

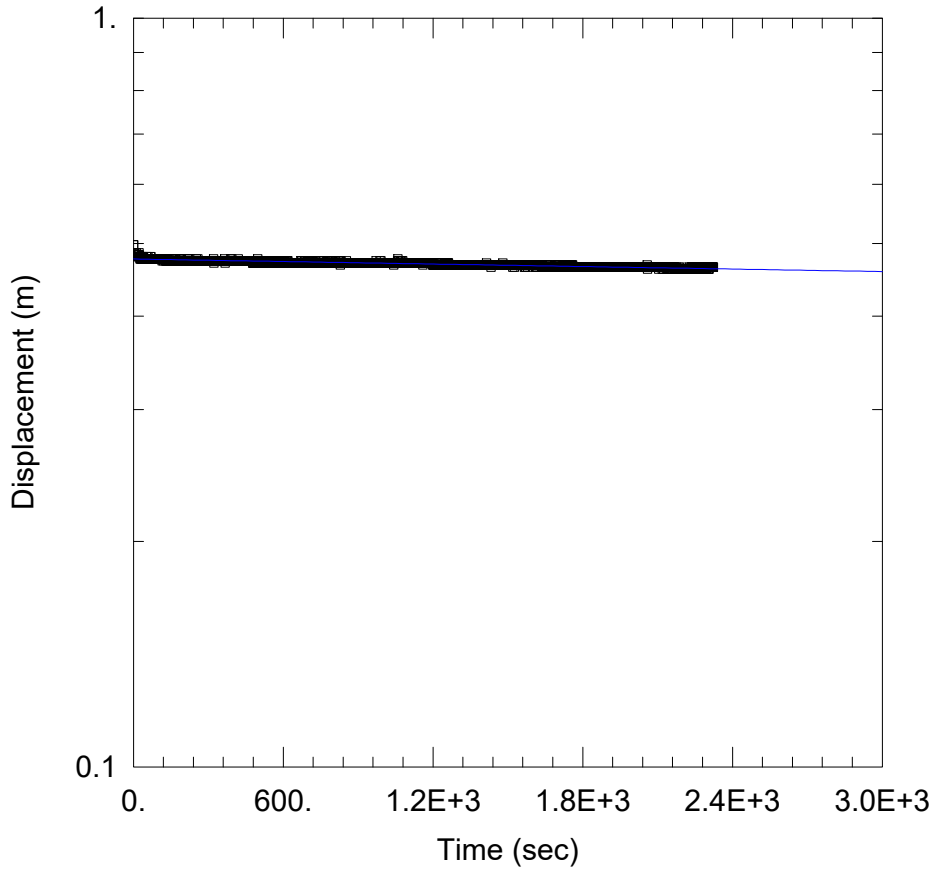
Saturated Thickness: 10.77 m Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (BH106(MW))

Initial Displacement: 0.6 m Static Water Column Height: 10.77 m
Total Well Penetration Depth: 10.77 m Screen Length: 3.05 m
Casing Radius: 0.025 m Well Radius: 0.025 m

SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev
K = 4.337E-7 m/sec y0 = 0.5526 m



WELL TEST ANALYSIS

Data Set: G:\...\MW108.aqt
Date: 04/08/22 Time: 16:29:39

PROJECT INFORMATION

Company: Palmer
Client: Watters Environmental Group
Project: 2001518
Location: 10 Aspen Springs Drive
Test Well: BH108(MW)
Test Date: April 5, 2022

AQUIFER DATA

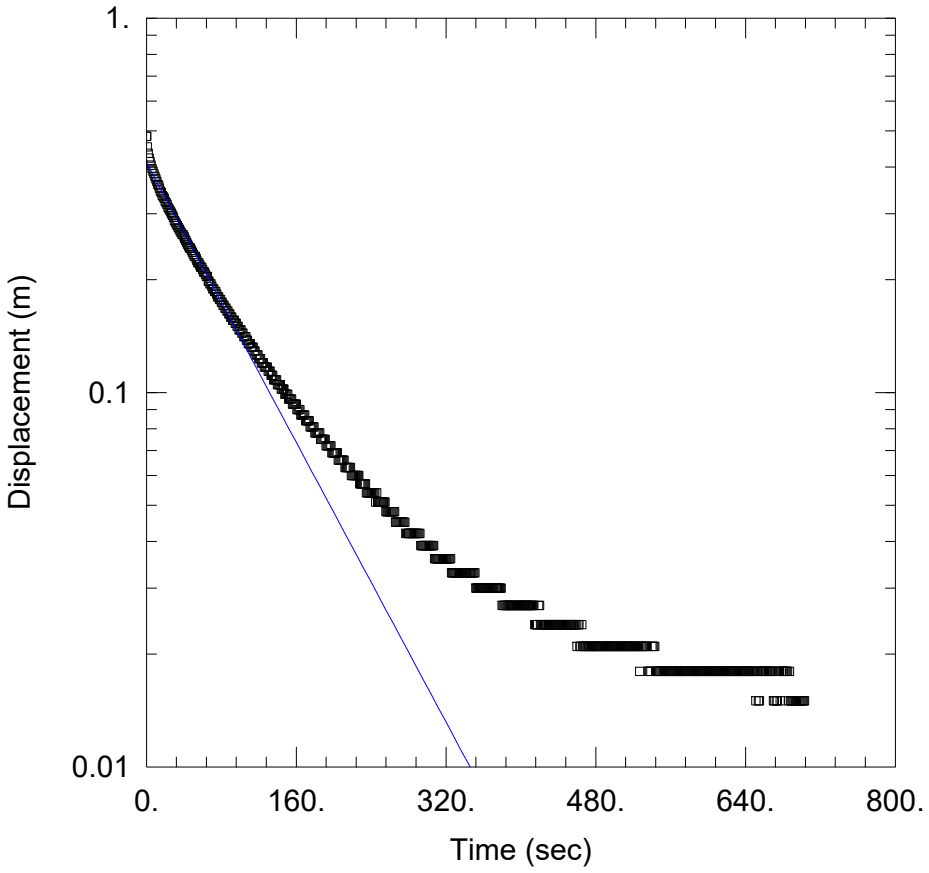
Saturated Thickness: 17.95 m Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (BH108(MW))

Initial Displacement: 0.498 m Static Water Column Height: 17.95 m
Total Well Penetration Depth: 17.95 m Screen Length: 3.05 m
Casing Radius: 0.025 m Well Radius: 0.025 m

SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev
K = 8.769E-9 m/sec y0 = 0.4767 m



WELL TEST ANALYSIS

Data Set: G:\...\MW110.aqt
Date: 04/08/22 Time: 17:04:17

PROJECT INFORMATION

Company: Palmer
Client: Watters Environmental Group
Project: 2001518
Location: 10 Aspen Springs Drive
Test Well: BH110(MW)
Test Date: April 7, 2022

AQUIFER DATA

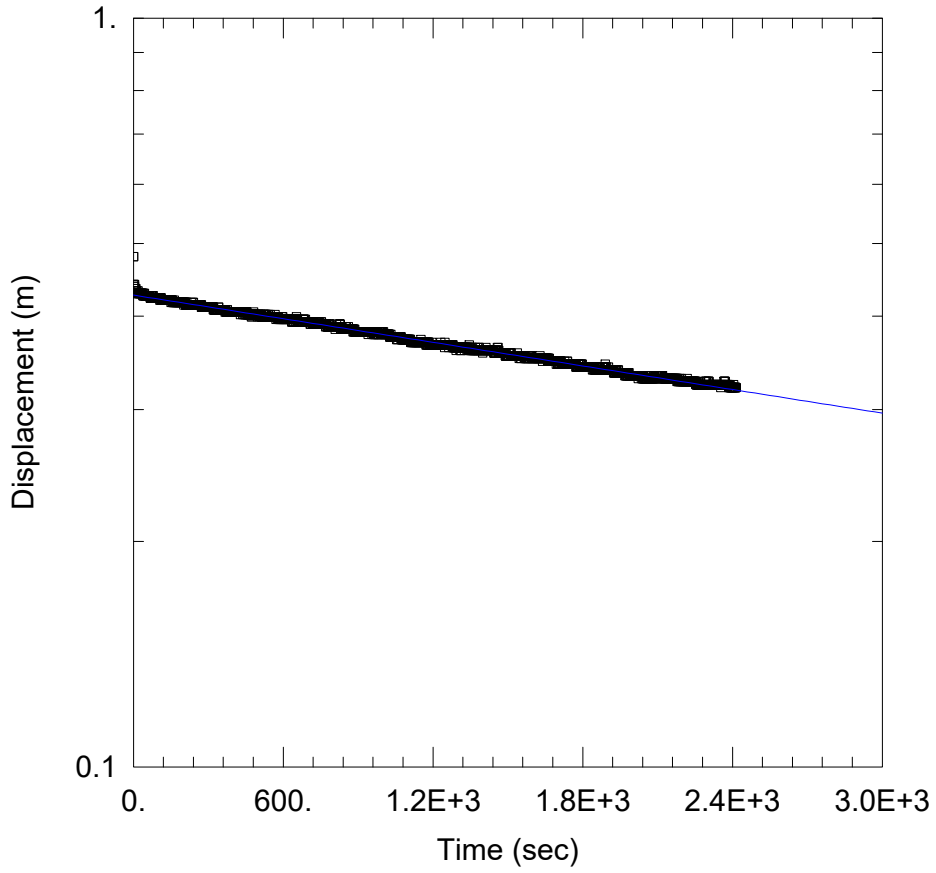
Saturated Thickness: 9.59 m Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (BH110(MW))

Initial Displacement: 0.483 m Static Water Column Height: 9.59 m
Total Well Penetration Depth: 9.59 m Screen Length: 3.05 m
Casing Radius: 0.025 m Well Radius: 0.025 m

SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev
K = 7.323E-6 m/sec y0 = 0.4109 m



RISING HEAD TEST

Data Set: G:\...\MW111.aqt
Date: 04/08/22 Time: 16:30:18

PROJECT INFORMATION

Company: Palmer
Client: Watters Environmental Group
Project: 2001518
Location: 10 Aspen Springs Drive
Test Well: BH111(MW)
Test Date: April 5, 2022

AQUIFER DATA

Saturated Thickness: 19.86 m Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (BH111(MW))

Initial Displacement: 0.48 m Static Water Column Height: 19.86 m
Total Well Penetration Depth: 19.86 m Screen Length: 3.05 m
Casing Radius: 0.025 m Well Radius: 0.025 m

SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev
K = 8.244E-8 m/sec y0 = 0.4266 m

Appendix D

Groundwater Chemistry Analyses

ALS, 2022

PALMER ENVIRONMENTAL CONSULTING GROUP INC. (Richmond Hill)
ATTN: Wesley Campbell
74 Berkeley Street
Toronto ON M5V 1E3

Date Received: 08-APR-22
Report Date: 13-APR-22 16:24 (MT)
Version: FINAL

Client Phone: 647-795-8153

Certificate of Analysis

Lab Work Order #: L2697796

Project P.O. #: NOT SUBMITTED
Job Reference: 2001518
C of C Numbers: 20-955230
Legal Site Desc:

KARANPARTAP SINGH
Account Manager

Summary of Guideline Exceedances

ALS ID	Client ID	Grouping	Analyte	Result	Guideline Limit	Unit
Guideline						
Ontario Sewer Use Bylaws - Durham Sanitary Sewer (55-2013)						
(No parameter exceedances)						
Ontario Sewer Use Bylaws - Durham Storm Sewer - (55-2013)						
L2697796-1	MW106	Physical Tests	Total Suspended Solids	17.8	15	mg/L

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

ANALYTICAL REPORT

Physical Tests - WATER

Analyte	Unit	Guide Limits #1	Guide Limits #2	Lab ID: L2697796-1 Sample Date: 07-APR-22 Sample ID: MW106
pH	pH units	6.00-10.5	6.0-9.0	7.56 HTD
Total Suspended Solids	mg/L	350	15	17.8

Guide Limit #1: Durham Sanitary Sewer (55-2013)
Guide Limit #2: Durham Storm Sewer - (55-2013)

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

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

ANALYTICAL REPORT

Anions and Nutrients - WATER

Analyte	Unit	Guide Limits #1	Guide Limits #2	Lab ID: L2697796-1 Sample Date: 07-APR-22 Sample ID: MW106
Fluoride (F)	mg/L	10	-	0.14 DLDS
Total Kjeldahl Nitrogen	mg/L	100	1	0.175
Phosphorus, Total	mg/L	10	0.4	0.0139
Sulfate (SO4)	mg/L	1500	-	92.6 DLDS

Guide Limit #1: Durham Sanitary Sewer (55-2013)
Guide Limit #2: Durham Storm Sewer - (55-2013)

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

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

ANALYTICAL REPORT

Cyanides - WATER

		Guide Limits		
Analyte	**Unit**	**#1**	**#2**	
Lab ID				L2697796-1
Sample Date				07-APR-22
Sample ID				MW106
Cyanide, Total	mg/L	2	0.02	<0.0020

Guide Limit #1: Durham Sanitary Sewer (55-2013)
Guide Limit #2: Durham Storm Sewer - (55-2013)

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

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

ANALYTICAL REPORT

Bacteriological Tests - WATER

			Lab ID	L2697796-1
			Sample Date	07-APR-22
			Sample ID	MW106
		Guide Limits		
Analyte	Unit	#1	#2	
E. Coli	CFU/100mL	-	200	0

Guide Limit #1: Durham Sanitary Sewer (55-2013)
Guide Limit #2: Durham Storm Sewer - (55-2013)

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

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

ANALYTICAL REPORT

Total Metals - WATER

			Lab ID	L2697796-1
			Sample Date	07-APR-22
			Sample ID	MW106
Analyte	**Unit**	**Guide Limits #1**	**#2**	
Aluminum (Al)-Total	mg/L	50	-	<0.050 DLHC
Antimony (Sb)-Total	mg/L	5	-	<0.0010 DLHC
Arsenic (As)-Total	mg/L	1	0.02	0.0018 DLHC
Cadmium (Cd)-Total	mg/L	0.7	0.008	<0.000050 DLHC
Chromium (Cr)-Total	mg/L	2	0.08	<0.0050 DLHC
Cobalt (Co)-Total	mg/L	5	-	<0.0010 DLHC
Copper (Cu)-Total	mg/L	3	0.05	<0.0050 DLHC
Lead (Pb)-Total	mg/L	1	0.12	<0.00050 DLHC
Manganese (Mn)-Total	mg/L	5	0.15	0.0945 DLHC
Mercury (Hg)-Total	mg/L	0.01	0.0004	<0.0000050
Molybdenum (Mo)-Total	mg/L	5	-	0.00772 DLHC
Nickel (Ni)-Total	mg/L	2	0.08	<0.0050 DLHC
Selenium (Se)-Total	mg/L	1	0.02	<0.00050 DLHC
Silver (Ag)-Total	mg/L	5	0.12	<0.00050 DLHC
Tin (Sn)-Total	mg/L	5	-	0.0037 DLHC
Titanium (Ti)-Total	mg/L	5	-	<0.0030 DLHC
Zinc (Zn)-Total	mg/L	2	0.04	<0.030 DLHC

Guide Limit #1: Durham Sanitary Sewer (55-2013)
Guide Limit #2: Durham Storm Sewer - (55-2013)

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

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

ANALYTICAL REPORT

Aggregate Organics - WATER

			Lab ID	L2697796-1
			Sample Date	07-APR-22
			Sample ID	MW106
Analyte	**Unit**	**Guide Limits #1**	**#2**	
BOD	mg/L	300	15	<3.0 BODL
Oil and Grease, Total	mg/L	-	-	<5.0
Animal/Veg Oil & Grease	mg/L	150	-	<5.0
Mineral Oil and Grease	mg/L	15	-	<2.5
Phenols (4AAP)	mg/L	1	0.008	<0.0010

Guide Limit #1: Durham Sanitary Sewer (55-2013)
Guide Limit #2: Durham Storm Sewer - (55-2013)

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

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

Volatile Organic Compounds - WATER

			Lab ID	L2697796-1
			Sample Date	07-APR-22
			Sample ID	MW106
		Guide Limits		
Analyte	Unit	#1	#2	
Benzene	ug/L	10	2	<0.50
Chloroform	ug/L	40	2	<1.0
1,2-Dichlorobenzene	ug/L	50	5.6	<0.50
1,4-Dichlorobenzene	ug/L	80	6.8	<0.50
cis-1,2-Dichloroethylene	ug/L	4000	5.6	<0.50
Dichloromethane	ug/L	2000	5.2	<2.0
trans-1,3-Dichloropropene	ug/L	140	5.6	<0.50
Ethylbenzene	ug/L	160	2	<0.50
Methyl Ethyl Ketone	ug/L	8000	-	<20
Styrene	ug/L	200	-	<0.50
1,1,2,2-Tetrachloroethane	ug/L	1400	17	<0.50
Tetrachloroethylene	ug/L	1000	4.4	<0.50
Toluene	ug/L	270	2	2.00
Trichloroethylene	ug/L	400	8	<0.50
o-Xylene	ug/L	-	-	<0.50
m+p-Xylenes	ug/L	-	-	<1.0
Xylenes (Total)	ug/L	1400	4.4	<1.1
Surrogate: 4-Bromofluorobenzene	%	-	-	97.6
Surrogate: 1,4-Difluorobenzene	%	-	-	97.4

Guide Limit #1: Durham Sanitary Sewer (55-2013)
Guide Limit #2: Durham Storm Sewer - (55-2013)

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

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

ANALYTICAL REPORT

Phthalate Esters - WATER

			Lab ID	L2697796-1
			Sample Date	07-APR-22
			Sample ID	MW106
		Guide Limits		
Analyte	Unit	#1	#2	
Bis(2-ethylhexyl)phthalate	ug/L	12	8.8	3.3
Surrogate: 2-fluorobiphenyl	%	-	-	92.5
Surrogate: p-Terphenyl d14	%	-	-	96.5

Guide Limit #1: Durham Sanitary Sewer (55-2013)
Guide Limit #2: Durham Storm Sewer - (55-2013)

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

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

ANALYTICAL REPORT

Semi-Volatile Organics - WATER

Analyte	Unit	Guide Limits #1	Guide Limits #2	Lab ID: L2697796-1 Sample Date: 07-APR-22 Sample ID: MW106
Di-n-butylphthalate	ug/L	80	15	<1.0
Surrogate: 2-Fluorobiphenyl	%	-	-	92.5
Surrogate: p-Terphenyl d14	%	-	-	96.5

Guide Limit #1: Durham Sanitary Sewer (55-2013)
Guide Limit #2: Durham Storm Sewer - (55-2013)

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

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

ANALYTICAL REPORT

Polychlorinated Biphenyls - WATER

			Lab ID	L2697796-1
			Sample Date	07-APR-22
			Sample ID	MW106
		Guide Limits		
Analyte	Unit	#1	#2	
Aroclor 1242	ug/L	-	-	<0.020
Aroclor 1248	ug/L	-	-	<0.020
Aroclor 1254	ug/L	-	-	<0.020
Aroclor 1260	ug/L	-	-	<0.020
Surrogate: Decachlorobiphenyl	%	-	-	74.4
Total PCBs	ug/L	1	0.4	<0.040
Surrogate: Tetrachloro-m-xylene	%	-	-	95.8

Guide Limit #1: Durham Sanitary Sewer (55-2013)
Guide Limit #2: Durham Storm Sewer - (55-2013)

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

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

ANALYTICAL REPORT

Organic Parameters - WATER

Analyte	Unit	Guide Limits #1	Guide Limits #2	Lab ID: L2697796-1 Sample Date: 07-APR-22 Sample ID: MW106
Nonylphenol	ug/L	20	-	<1.0
Nonylphenol Diethoxylates	ug/L	-	-	<0.10
Total Nonylphenol Ethoxylates	ug/L	200	-	<2.0
Nonylphenol Monoethoxylates	ug/L	-	-	<2.0

Guide Limit #1: Durham Sanitary Sewer (55-2013)
Guide Limit #2: Durham Storm Sewer - (55-2013)

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

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

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
HTD	Hold time exceeded for re-analysis or dilution, but initial testing was conducted within hold time.
BODL	Limit of Reporting for BOD was increased to account for the largest volume of sample tested.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**
625-BIS-2-PHTH-WT	Water	Bis(2-ethylhexyl)phthalate	SW846 8270
Aqueous samples are extracted and extracts are analyzed on GC/MSD.			
625-DNB-PHTH-WT	Water	Di-n-Butyl Phthalate	SW846 8270
Aqueous samples are extracted and extracts are analyzed on GC/MSD.			
BOD-WT	Water	BOD	APHA 5210 B
This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.			
CN-TOT-WT	Water	Cyanide, Total	ISO 14403-2
Total cyanide is determined by the combination of UV digestion and distillation. Cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex.			
When using this method, high levels of thiocyanate in samples can cause false positives at ~1-2% of the thiocyanate concentration. For samples with detectable cyanide analyzed by this method, ALS recommends analysis for thiocyanate to check for this potential interference			
EC-SCREEN-WT	Water	Conductivity Screen (Internal Use Only)	APHA 2510
Qualitative analysis of conductivity where required during preparation of other tests - e.g. TDS, metals, etc.			
EC-WW-MF-WT	Water	E. Coli	SM 9222D
A 100 mL volume of sample is filtered through a membrane, the membrane is placed on mFC-BCIG agar and incubated at 44.5 –0 .2 °C for 24 – 2 h. Method ID: WT-TM-1200			
F-IC-N-WT	Water	Fluoride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
HG-T-CVAA-WT	Water	Total Mercury in Water by CVAAS	EPA 1631E (mod)
Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.			
MET-T-CCMS-WT	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)
Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.			
Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**
		Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).	
NP,NPE-LCMS-WT	Water	Nonylphenols and Ethoxylates by LC/MS-MS	J. Chrom A849 (1999) p.467-482
		Water samples are filtered and analyzed on LCMS/MS by direct injection.	
OGG-SPEC-CALC-WT	Water	Speciated Oil and Grease A/V Calc	CALCULATION
		Sample is extracted with hexane, sample speciation into mineral and animal/vegetable fractions is achieved via silica gel separation and is then determined gravimetrically.	
OGG-SPEC-WT	Water	Speciated Oil and Grease-Gravimetric	APHA 5520 B
		The procedure involves an extraction of the entire water sample with hexane. Sample speciation into mineral and animal/vegetable fractions is achieved via silica gel separation and is then determined gravimetrically.	
P-T-COL-WT	Water	Total P in Water by Colour	APHA 4500-P PHOSPHORUS
		This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.	
PCB-WT	Water	Polychlorinated Biphenyls	EPA 8082
		PCBs are extracted from an aqueous sample at neutral pH with aliquots of dichloromethane using a modified separatory funnel technique. The extracts are analyzed by GC/MSD.	
PH-WT	Water	pH	APHA 4500 H-Electrode
		Water samples are analyzed directly by a calibrated pH meter.	
		Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011). Holdtime for samples under this regulation is 28 days	
PHENOLS-4AAP-WT	Water	Phenol (4AAP)	EPA 9066
		An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.	
SO4-IC-N-WT	Water	Sulfate in Water by IC	EPA 300.1 (mod)
		Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.	
SOLIDS-TSS-WT	Water	Suspended solids	APHA 2540 D-Gravimetric
		A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 104–1°C for a minimum of four hours or until a constant weight is achieved.	
TKN-F-WT	Water	TKN in Water by Fluorescence	J. ENVIRON. MONIT., 2005,7,37-42,RSC
		Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection	
VOC-ROU-HS-WT	Water	Volatile Organic Compounds	SW846 8260
		Aqueous samples are analyzed by headspace-GC/MS.	

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**
XYLENES-SUM-CALC-WT	Water	Sum of Xylene Isomer Concentrations	CALCULATION

Total xylenes represents the sum of o-xylene and m&p-xylene.

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

Chain of Custody Numbers:

20-955230

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

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

GLOSSARY OF REPORT TERMS

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

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

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

Quality Control Report

Workorder: L2697796 Report Date: 13-APR-22

Client: PALMER ENVIRONMENTAL CONSULTING GROUP INC. (Richmond Hill)
74 Berkeley Street
Toronto ON M5V 1E3
Contact: Wesley Campbell

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
625-BIS-2-PHTH-WT	**Water**							
Batch R5762052								
WG3715468-2 LCS								
Bis(2-ethylhexyl)phthalate			113.0		%		50-140	12-APR-22
WG3715468-1 MB								
Bis(2-ethylhexyl)phthalate			<2.0		ug/L		2	12-APR-22
Surrogate: 2-fluorobiphenyl			88.1		%		40-130	12-APR-22
Surrogate: p-Terphenyl d14			115.1		%		40-130	12-APR-22
625-DNB-PHTH-WT	**Water**							
Batch R5762052								
WG3715468-2 LCS								
Di-n-butylphthalate			97.9		%		50-150	12-APR-22
WG3715468-1 MB								
Di-n-butylphthalate			<1.0		ug/L		1	12-APR-22
Surrogate: 2-Fluorobiphenyl			88.1		%		40-130	12-APR-22
Surrogate: p-Terphenyl d14			115.1		%		40-130	12-APR-22
BOD-WT	**Water**							
Batch R5762408								
WG3715351-6 DUP		**L2697573-5**						
BOD		<2.0	<2.0	RPD-NA	mg/L	N/A	30	08-APR-22
WG3715351-7 LCS								
BOD			94.9		%		85-115	08-APR-22
WG3715351-5 MB								
BOD			<2.0		mg/L		2	08-APR-22
CN-TOT-WT	**Water**							
Batch R5760692								
WG3715856-3 DUP		**WG3715856-5**						
Cyanide, Total		0.0619	0.0612		mg/L	1.1	20	11-APR-22
WG3715856-2 LCS								
Cyanide, Total			105.9		%		80-120	11-APR-22
WG3715856-1 MB								
Cyanide, Total			<0.0020		mg/L		0.002	11-APR-22
WG3715856-4 MS		**WG3715856-5**						
Cyanide, Total			95.0		%		70-130	11-APR-22
EC-WW-MF-WT	**Water**							
Batch R5759988								
WG3715485-3 DUP		**L2697987-1**						
E. Coli		0	0		CFU/100mL	0.0	65	09-APR-22
WG3715485-1 MB								

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
EC-WW-MF-WT	**Water**							
Batch R5759988								
WG3715485-1 MB								
E. Coli			0		CFU/100mL		1	09-APR-22
F-IC-N-WT	**Water**							
Batch R5762274								
WG3716406-9 DUP		**WG3716406-8**						
Fluoride (F)		0.600	0.595		mg/L	0.8	20	12-APR-22
WG3716406-7 LCS								
Fluoride (F)			101.8		%		90-110	12-APR-22
WG3716406-6 MB								
Fluoride (F)			<0.020		mg/L		0.02	12-APR-22
WG3716406-10 MS		**WG3716406-8**						
Fluoride (F)			102.8		%		75-125	12-APR-22
HG-T-CVAA-WT	**Water**							
Batch R5760690								
WG3715434-3 DUP		**WG3715434-5**						
Mercury (Hg)-Total		<0.0000050	0.0000057	RPD-NA	mg/L	N/A	20	11-APR-22
WG3715434-2 LCS								
Mercury (Hg)-Total			97.7		%		80-120	11-APR-22
WG3715434-1 MB								
Mercury (Hg)-Total			<0.000005(		mg/L		0.000005	11-APR-22
WG3715434-4 MS		**WG3715434-6**						
Mercury (Hg)-Total			97.3		%		70-130	11-APR-22
MET-T-CCMS-WT	**Water**							
Batch R5760424								
WG3715410-4 DUP		**WG3715410-3**						
Aluminum (Al)-Total		0.221	0.224		mg/L	1.2	20	11-APR-22
Antimony (Sb)-Total		<0.00010	0.00010	RPD-NA	mg/L	N/A	20	11-APR-22
Arsenic (As)-Total		0.00058	0.00055		mg/L	4.9	20	11-APR-22
Cadmium (Cd)-Total		<0.0000050	<0.000005(	RPD-NA	mg/L	N/A	20	11-APR-22
Chromium (Cr)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	11-APR-22
Cobalt (Co)-Total		0.00021	0.00021		mg/L	1.1	20	11-APR-22
Copper (Cu)-Total		0.00185	0.00188		mg/L	2.1	20	11-APR-22
Lead (Pb)-Total		0.000130	0.000133		mg/L	2.0	20	11-APR-22
Manganese (Mn)-Total		0.0158	0.0159		mg/L	0.7	20	11-APR-22
Molybdenum (Mo)-Total		0.00144	0.00146		mg/L	2.0	20	11-APR-22

Quality Control Report

Client: PALMER ENVIRONMENTAL CONSULTING GROUP INC. (Richmond Hill)
74 Berkeley Street
Toronto ON M5V 1E3
Contact: Wesley Campbell

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R5760424								
WG3715410-4 DUP		**WG3715410-3**						
Nickel (Ni)-Total		0.00096	0.00093		mg/L	2.8	20	11-APR-22
Selenium (Se)-Total		0.000155	0.000140		mg/L	10	20	11-APR-22
Silver (Ag)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	11-APR-22
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	11-APR-22
Titanium (Ti)-Total		0.00659	0.00657		mg/L	0.2	20	11-APR-22
Zinc (Zn)-Total		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	11-APR-22
WG3715410-2 LCS								
Aluminum (Al)-Total			98.7		%		80-120	11-APR-22
Antimony (Sb)-Total			96.1		%		80-120	11-APR-22
Arsenic (As)-Total			99.6		%		80-120	11-APR-22
Cadmium (Cd)-Total			99.8		%		80-120	11-APR-22
Chromium (Cr)-Total			97.4		%		80-120	11-APR-22
Cobalt (Co)-Total			94.6		%		80-120	11-APR-22
Copper (Cu)-Total			96.2		%		80-120	11-APR-22
Lead (Pb)-Total			94.5		%		80-120	11-APR-22
Manganese (Mn)-Total			98.4		%		80-120	11-APR-22
Molybdenum (Mo)-Total			96.4		%		80-120	11-APR-22
Nickel (Ni)-Total			95.6		%		80-120	11-APR-22
Selenium (Se)-Total			98.8		%		80-120	11-APR-22
Silver (Ag)-Total			89.8		%		80-120	11-APR-22
Tin (Sn)-Total			92.4		%		80-120	11-APR-22
Titanium (Ti)-Total			93.8		%		80-120	11-APR-22
Zinc (Zn)-Total			92.5		%		80-120	11-APR-22
WG3715410-1 MB								
Aluminum (Al)-Total			<0.0050		mg/L		0.005	11-APR-22
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	11-APR-22
Arsenic (As)-Total			<0.00010		mg/L		0.0001	11-APR-22
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	11-APR-22
Chromium (Cr)-Total			<0.00050		mg/L		0.0005	11-APR-22
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	11-APR-22
Copper (Cu)-Total			<0.00050		mg/L		0.0005	11-APR-22
Lead (Pb)-Total			<0.000050		mg/L		0.00005	11-APR-22
Manganese (Mn)-Total			<0.00050		mg/L		0.0005	11-APR-22
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	11-APR-22

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R5760424								
WG3715410-1 MB								
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	11-APR-22
Selenium (Se)-Total			<0.000050		mg/L		0.00005	11-APR-22
Silver (Ag)-Total			<0.000050		mg/L		0.00005	11-APR-22
Tin (Sn)-Total			<0.00010		mg/L		0.0001	11-APR-22
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	11-APR-22
Zinc (Zn)-Total			<0.0030		mg/L		0.003	11-APR-22
WG3715410-5 MS		**WG3715410-6**						
Aluminum (Al)-Total			N/A	MS-B	%		-	11-APR-22
Antimony (Sb)-Total			98.1		%		70-130	11-APR-22
Arsenic (As)-Total			101.3		%		70-130	11-APR-22
Cadmium (Cd)-Total			101.1		%		70-130	11-APR-22
Chromium (Cr)-Total			99.4		%		70-130	11-APR-22
Cobalt (Co)-Total			96.9		%		70-130	11-APR-22
Copper (Cu)-Total			95.3		%		70-130	11-APR-22
Lead (Pb)-Total			92.9		%		70-130	11-APR-22
Manganese (Mn)-Total			N/A	MS-B	%		-	11-APR-22
Molybdenum (Mo)-Total			98.0		%		70-130	11-APR-22
Nickel (Ni)-Total			94.7		%		70-130	11-APR-22
Selenium (Se)-Total			102.7		%		70-130	11-APR-22
Silver (Ag)-Total			89.6		%		70-130	11-APR-22
Tin (Sn)-Total			95.7		%		70-130	11-APR-22
Titanium (Ti)-Total			110.4		%		70-130	11-APR-22
Zinc (Zn)-Total			92.1		%		70-130	11-APR-22
NP,NPE-LCMS-WT	**Water**							
Batch R5760980								
WG3715057-8 DUP		**L2697830-1**						
Nonylphenol		10.2	8.7		ug/L	16	30	09-APR-22
Nonylphenol Monoethoxylates		<2.0	<2.0	RPD-NA	ug/L	N/A	30	09-APR-22
Nonylphenol Diethoxylates		<0.10	<0.10	RPD-NA	ug/L	N/A	30	09-APR-22
WG3715057-2 LCS								
Nonylphenol			108.5		%		75-125	08-APR-22
Nonylphenol Monoethoxylates			101.0		%		75-125	08-APR-22
Nonylphenol Diethoxylates			97.5		%		75-125	08-APR-22
WG3715057-1 MB								

Quality Control Report

Client: PALMER ENVIRONMENTAL CONSULTING GROUP INC. (Richmond Hill)
74 Berkeley Street
Toronto ON M5V 1E3
Contact: Wesley Campbell

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NP,NPE-LCMS-WT	**Water**							
Batch R5760980								
WG3715057-1 MB								
Nonylphenol			<1.0		ug/L		1	08-APR-22
Nonylphenol Monoethoxylates			<2.0		ug/L		2	08-APR-22
Nonylphenol Diethoxylates			<0.10		ug/L		0.1	08-APR-22
WG3715057-7 MS		**L2697830-1**						
Nonylphenol			N/A	MS-B	%		-	09-APR-22
Nonylphenol Monoethoxylates			196.3	K	%		60-140	09-APR-22
Nonylphenol Diethoxylates			111.1		%		60-140	09-APR-22
OGG-SPEC-WT	**Water**							
Batch R5761177								
WG3715298-2 LCS								
Oil and Grease, Total			86.8		%		70-130	08-APR-22
Mineral Oil and Grease			82.0		%		70-130	08-APR-22
WG3715298-1 MB								
Oil and Grease, Total			<5.0		mg/L		5	08-APR-22
Mineral Oil and Grease			<2.5		mg/L		2.5	08-APR-22
P-T-COL-WT	**Water**							
Batch R5762245								
WG3716193-3 DUP		**L2697987-1**						
Phosphorus, Total		0.0315	0.0306		mg/L	2.9	20	13-APR-22
WG3716193-2 LCS								
Phosphorus, Total			97.2		%		80-120	13-APR-22
WG3716193-1 MB								
Phosphorus, Total			<0.0030		mg/L		0.003	13-APR-22
WG3716193-4 MS		**L2697987-1**						
Phosphorus, Total			93.6		%		70-130	13-APR-22
PCB-WT	**Water**							
Batch R5760241								
WG3715322-2 LCS								
Aroclor 1242			118.0		%		65-130	11-APR-22
Aroclor 1248			94.9		%		65-130	11-APR-22
Aroclor 1254			107.1		%		65-130	11-APR-22
Aroclor 1260			106.3		%		65-130	11-APR-22
WG3715322-1 MB								
Aroclor 1242			<0.020		ug/L		0.02	11-APR-22
Aroclor 1248			<0.020		ug/L		0.02	11-APR-22

Quality Control Report

Client: PALMER ENVIRONMENTAL CONSULTING GROUP INC. (Richmond Hill)
74 Berkeley Street
Toronto ON M5V 1E3
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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PCB-WT	**Water**							
Batch R5760241								
WG3715322-1 MB								
Aroclor 1254			<0.020		ug/L		0.02	11-APR-22
Aroclor 1260			<0.020		ug/L		0.02	11-APR-22
Surrogate: Decachlorobiphenyl			80.6		%		50-150	11-APR-22
Surrogate: Tetrachloro-m-xylene			85.8		%		50-150	11-APR-22
PH-WT	**Water**							
Batch R5762180								
WG3716673-4 DUP		**WG3716673-3**						
pH		7.90	7.92	J	pH units	0.02	0.2	12-APR-22
WG3716673-2 LCS								
pH			7.01		pH units		6.9-7.1	12-APR-22
PHENOLS-4AAP-WT	**Water**							
Batch R5762296								
WG3716018-3 DUP		**L2697576-1**						
Phenols (4AAP)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	12-APR-22
WG3716018-2 LCS								
Phenols (4AAP)			95.9		%		85-115	12-APR-22
WG3716018-1 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	12-APR-22
WG3716018-4 MS		**L2697576-1**						
Phenols (4AAP)			92.5		%		75-125	12-APR-22
SO4-IC-N-WT	**Water**							
Batch R5762274								
WG3716406-9 DUP		**WG3716406-8**						
Sulfate (SO4)		25.5	25.5		mg/L	0.1	20	12-APR-22
WG3716406-7 LCS								
Sulfate (SO4)			103.7		%		90-110	12-APR-22
WG3716406-6 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	12-APR-22
WG3716406-10 MS		**WG3716406-8**						
Sulfate (SO4)			105.0		%		75-125	12-APR-22
SOLIDS-TSS-WT	**Water**							
Batch R5761358								
WG3715822-3 DUP		**L2697642-3**						
Total Suspended Solids		<3.0	<3.0	RPD-NA	mg/L	N/A	20	12-APR-22
WG3715822-2 LCS								
Total Suspended Solids			96.0		%		85-115	12-APR-22

Quality Control Report

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74 Berkeley Street
Toronto ON M5V 1E3
Contact: Wesley Campbell

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TSS-WT	**Water**							
Batch R5761358								
WG3715822-1 MB								
Total Suspended Solids			<3.0		mg/L		3	12-APR-22
TKN-F-WT	**Water**							
Batch R5761997								
WG3715989-3 DUP		**L2697796-1**						
Total Kjeldahl Nitrogen		0.175	0.162		mg/L	8.1	20	12-APR-22
WG3715989-2 LCS								
Total Kjeldahl Nitrogen			114.7		%		75-125	12-APR-22
WG3715989-1 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	12-APR-22
WG3715989-4 MS		**L2697796-1**						
Total Kjeldahl Nitrogen			129.9		%		70-130	12-APR-22
VOC-ROU-HS-WT	**Water**							
Batch R5760177								
WG3715313-4 DUP		**WG3715313-3**						
1,1,2,2-Tetrachloroethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	11-APR-22
1,2-Dichlorobenzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	11-APR-22
1,4-Dichlorobenzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	11-APR-22
Benzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	11-APR-22
Chloroform		<1.0	<1.0	RPD-NA	ug/L	N/A	30	11-APR-22
cis-1,2-Dichloroethylene		5.83	5.41		ug/L	7.5	30	11-APR-22
Dichloromethane		<2.0	<2.0	RPD-NA	ug/L	N/A	30	11-APR-22
Ethylbenzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	11-APR-22
m+p-Xylenes		<0.40	<0.40	RPD-NA	ug/L	N/A	30	11-APR-22
Methyl Ethyl Ketone		<20	<20	RPD-NA	ug/L	N/A	30	11-APR-22
o-Xylene		<0.30	<0.30	RPD-NA	ug/L	N/A	30	11-APR-22
Styrene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	11-APR-22
Tetrachloroethylene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	11-APR-22
Toluene		<0.40	<0.40	RPD-NA	ug/L	N/A	30	11-APR-22
trans-1,3-Dichloropropene		<0.30	<0.30	RPD-NA	ug/L	N/A	30	11-APR-22
Trichloroethylene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	11-APR-22
WG3715313-1 LCS								
1,1,2,2-Tetrachloroethane			100.4		%		70-130	11-APR-22
1,2-Dichlorobenzene			96.1		%		70-130	11-APR-22

Quality Control Report

Client: PALMER ENVIRONMENTAL CONSULTING GROUP INC. (Richmond Hill)
74 Berkeley Street
Toronto ON M5V 1E3
Contact: Wesley Campbell

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-ROU-HS-WT	**Water**							
Batch R5760177								
WG3715313-1 LCS								
1,4-Dichlorobenzene			97.7		%		70-130	11-APR-22
Benzene			90.0		%		70-130	11-APR-22
Chloroform			96.9		%		70-130	11-APR-22
cis-1,2-Dichloroethylene			96.1		%		70-130	11-APR-22
Dichloromethane			95.3		%		70-130	11-APR-22
Ethylbenzene			108.8		%		70-130	11-APR-22
m+p-Xylenes			107.2		%		70-130	11-APR-22
Methyl Ethyl Ketone			82.0		%		60-140	11-APR-22
o-Xylene			110.9		%		70-130	11-APR-22
Styrene			97.2		%		70-130	11-APR-22
Tetrachloroethylene			112.3		%		70-130	11-APR-22
Toluene			105.5		%		70-130	11-APR-22
trans-1,3-Dichloropropene			96.5		%		70-130	11-APR-22
Trichloroethylene			81.0		%		70-130	11-APR-22
WG3715313-2 MB								
1,1,2,2-Tetrachloroethane			<0.50		ug/L		0.5	11-APR-22
1,2-Dichlorobenzene			<0.50		ug/L		0.5	11-APR-22
1,4-Dichlorobenzene			<0.50		ug/L		0.5	11-APR-22
Benzene			<0.50		ug/L		0.5	11-APR-22
Chloroform			<1.0		ug/L		1	11-APR-22
cis-1,2-Dichloroethylene			<0.50		ug/L		0.5	11-APR-22
Dichloromethane			<2.0		ug/L		2	11-APR-22
Ethylbenzene			<0.50		ug/L		0.5	11-APR-22
m+p-Xylenes			<0.40		ug/L		0.4	11-APR-22
Methyl Ethyl Ketone			<20		ug/L		20	11-APR-22
o-Xylene			<0.30		ug/L		0.3	11-APR-22
Styrene			<0.50		ug/L		0.5	11-APR-22
Tetrachloroethylene			<0.50		ug/L		0.5	11-APR-22
Toluene			<0.40		ug/L		0.4	11-APR-22
trans-1,3-Dichloropropene			<0.30		ug/L		0.3	11-APR-22
Trichloroethylene			<0.50		ug/L		0.5	11-APR-22
Surrogate: 1,4-Difluorobenzene			99.0		%		70-130	11-APR-22
Surrogate: 4-Bromofluorobenzene			104.2		%		70-130	11-APR-22

Quality Control Report

Workorder: L2697796 Report Date: 13-APR-22

Client: PALMER ENVIRONMENTAL CONSULTING GROUP INC. (Richmond Hill)
74 Berkeley Street
Toronto ON M5V 1E3
Contact: Wesley Campbell

Legend:

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

Sample Parameter Qualifier Definitions:

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

Quality Control Report

Workorder: L2697796 Report Date: 13-APR-22

Client: PALMER ENVIRONMENTAL CONSULTING GROUP INC. (Richmond Hill)
74 Berkeley Street
Toronto ON M5V 1E3
Contact: Wesley Campbell

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
pH							
	1	07-APR-22 11:00	12-APR-22 00:00	4	5	days	EHT

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2697796 were received on 08-APR-22 10:00.

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

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

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

Chain of Custody (COC) / Analytical Request Form

COC Number: 20 - 955230

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Page of

Report To	Contact and company name below will appear on the final report
Company:	Palmer
Contact:	Wesley Campbell
Phone:	416-885-9378
	Company address below will appear on the final report
Street:	74 Berkeley St.
City/Province:	Toronto, ON
Postal Code:	M5A 2W7
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	
Contact:	

Reports / Recipients	
Select Report Format:	☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Merge QC/QCI Reports with COA	☑ YES ☐ NO ☐ N/A
☑ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	wesley.campbell@pecg.ca
Email 2	bethany.gruber@pecg.ca
Email 3	sarah.sipak@pecg.ca

Invoice Recipients	
Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	accounting@pecg.ca
Email 2	

Turnaround Time (TAT) Requested
☑ Routine [R] if received by 3pm M-F -
☐ 4 day [P4] if received by 3pm M-F -
☐ 3 day [P3] if received by 3pm M-F -
☐ 2 day [P2] if received by 3pm M-F -
☐ 1 day [E] if received by 3pm M-F -
☐ Same day [E2] if received by 10am M-F - may apply to rush requests on weekend

L2697796-COFC

Date and Time Required for all E&P TATs:

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

Project Information	
ALS Account # / Quote #:	24400
Job #:	2001518
PO / AFE:	
LSD:	

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

ALS Lab Work Order # (ALS use only): L2697796 JD

ALS Contact: Karan Sampler: WC

Analysis Request

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

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	Durham Storm + Sanitary	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	MW106	07-04-22	11:00	Water	16				

Drinking Water (DW) Samples[1] (client use)	Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)
Are samples taken from a Regulated DW System? ☐ YES ☑ NO	Compare to Durham Region Storm + Sanitary Sewer Discharge criteria
Are samples for human consumption/ use? ☐ YES ☑ NO	

SAMPLE RECEIPT DETAILS (ALS use only)

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

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

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

INITIAL COOLER TEMPERATURES °C	FINAL COOLER TEMPERATURES °C
	2.7

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
	Apr. 7/22	17:15					8 APR 22	10:00

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

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

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