FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT

3353-3359 LAKESHORE BOULEVARD WEST
TORONTO, ON M8W 1N1

PREPARED FOR:
APRIA INC.
144 FRONT STREET WEST, SUITE 310
TORONTO, ON M5J 2L7

DATE: NOVEMBER 2019

PROJECT NO. 191063

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

LIST OF DRAWINGS

1.0 INTRODUCTION

The purpose of this report is to provide site servicing and stormwater management (SWM) design information in support of the Re-Zoning and Site Plan Approval applications for the proposed residential development at 3353-3359 Lakeshore Boulevard in the City of Toronto.

Specifically, this report will demonstrate how storm, sanitary and water services will be delivered to the site and the SWM measures that will be undertaken to deal with the quantity, quality and water balance requirements for the site.

1.1 Site Description

The site is located on the south side of Lakeshore Boulevard West, between Twenty Seventh and Twenty Eighth Streets. There is an existing auto centre and associated parking on the site that will be demolished as part of the development. It is bordered by commercial development to the east and west and detached residential development to the south.

The site area is 1,410m^2. The site location is shown on **Figure 1**.

It is proposed to construct a 6 storey residential development with 304m^2 of retail on the main floor and mezzanine and one level of underground parking.

1.2 Background

The SWM design for the site has been prepared to meet the requirements of the City of Toronto. The following materials were referenced in the preparation of this report:

- The City of Toronto's Wet Weather Flow Management Guidelines (WWFM Guidelines).
- The site servicing design has been designed following the City of Toronto, Design Criteria for Sewers and Watermain, November 2009.
- The Stormwater Management Planning and Design Manual (MOE Guidelines), prepared by the Ministry of the Environment, March 2003, were referenced in the preparation of the stormwater management plan.
- Atlas mapping showing the existing services of the surround area was provided by the City.
- Toronto Water Asset Geodatabase (TWAG) information for existing municipal infrastructure was provided by the City, as no Plan Profile drawings were available for this section of Lakeshore Boulevard West.
- The Hydrogeological Impact Assessment, 3353-3359 Lakeshore Boulevard West, Toronto, Ontario, completed by PRI, dated November 13, 2019.

2.0 STORM DRAINAGE

2.1 Existing Drainage

The existing drainage on-site is generally flat. The northwest parking area drains to a catchbasin which is assumed to connect to the Lakeshore Boulevard storm sewer system. The east parking area is essentially flat, but would generally drain from south to north toward Lakeshore Boulevard as there is a curb that would block drainage from going to the south.

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LEGEND

SITE LOCATION

FIGURE 1

3353-3359 LAKESHORE BLVD WEST
SITE LOCATION PLAN

DATE: NOVEMBER 2019 SCALE: 1:10000 PROJECT: 191063

The existing site is entirely building or parking lot, therefore, the pre-development runoff coefficient is 0.90. As this runoff coefficient exceeds 0.50, a runoff coefficient of 0.50 used to determine the allowable peak flow, based on Section 2.2.3.8 of the WWFM Guidelines. Refer to **Figure 2** for details of the existing site conditions.

2.2 Minor System Drainage

The development's internal storm system will be designed to collect drainage from the majority of the site for the 100 year design storm. In addition, roof drainage will be collected by roof drains and routed towards a cistern located underground in the northwest corner of the building.

The controlled stormwater flows will discharge by gravity through an orifice to the storm sewer located on Lakeshore Boulevard. Refer to **Section 3.0** for details on the on-site controls.

2.3 Major System Drainage

The entire property is covered by rooftop or the driveway ramp, therefore, there will be no major system drainage. All drainage will be collected in the building's drainage system.

2.4 Groundwater

A hydrogeological impact assessment was completed by PRI Engineering, in November 2019. Groundwater depths were monitored and the seasonally high groundwater level was determined to be at an elevation of 87.51m. Based on a base dewatering elevation at the underside of the proposed floor slab of 83.7m grade, the building will need to be constructed water tight, groundwater would need to be pumped to a municipal sewer.

A groundwater sample was tested for quality and compared to the Toronto Municipal Code requirements for sanitary and combined sewers and storm sewers. It was determined that the quality exceeds the limits to the storm sewer for Total Suspended Solids (TSS), Manganese and Total PAHs. It met all limits for discharge to the sanitary or combined sewers with the exception of TSS.

Short Term Discharge

Based on a factor of safety of 1.5, it was determined in the hydrogeological analysis that the short-term daily groundwater volume, including groundwater seepage and rainfall, would be 118,800L.

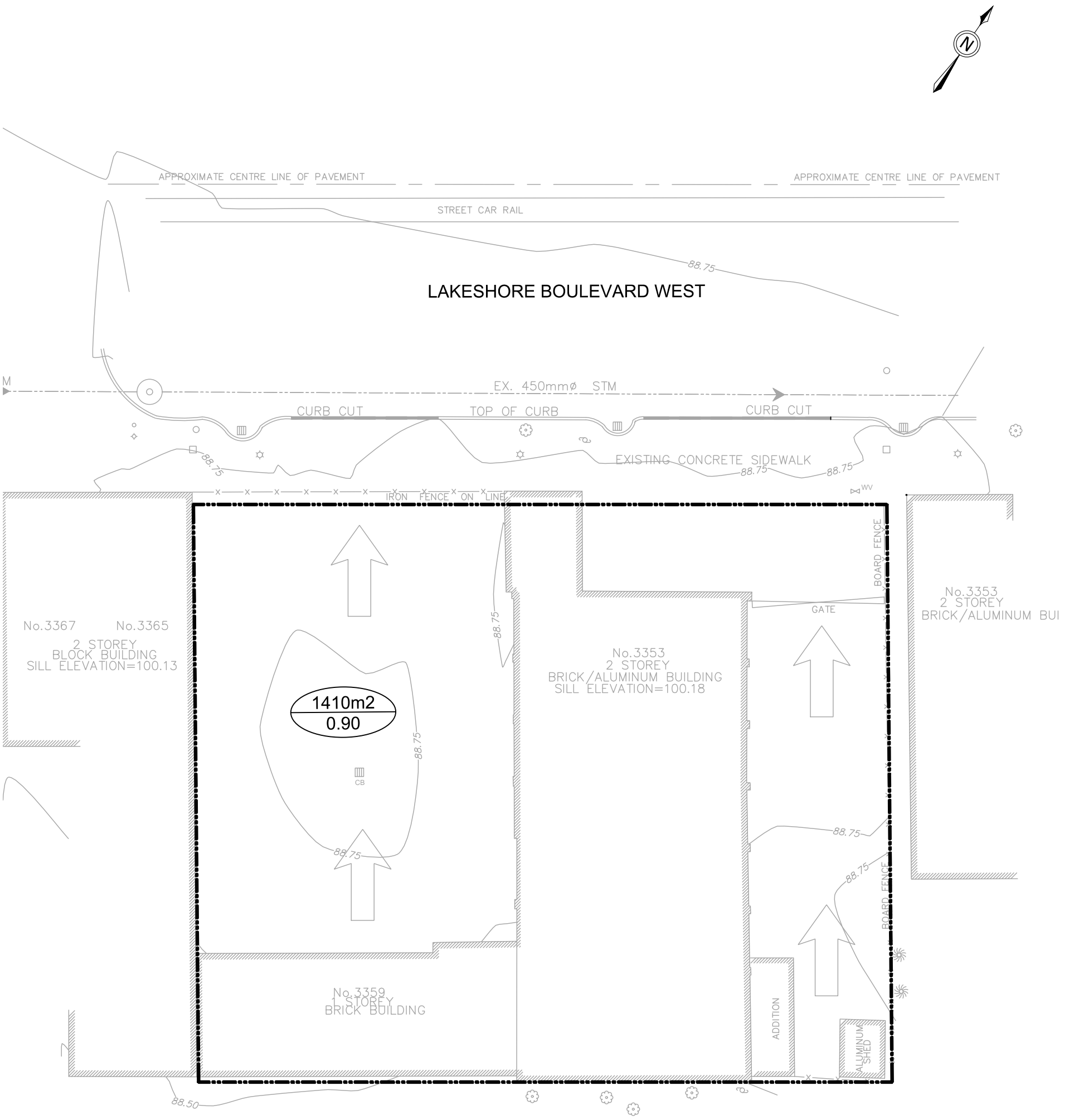
For the downstream capacity analysis, included in Section 5.3, the discharge from the site, including post development sanitary flow and groundwater is 2.81L/s (1.23L/s domestic flow + 1.58L/s groundwater), therefore, the peak discharge to the sanitary sewer, during construction, should be limited to this rate.

The hydrogeological assessment notes that, for sites discharging between 50,000 and 400,000L/day of groundwater and/or stormwater, is to be registered under the Environmental Activity and Sector Registry (EASR); however, a Permit to Take Water is not required.

A permit will be required from Toronto Water for the discharge of groundwater to a municipal sewer during construction.

Long Term Discharge

Based on a factor of safety of 1.5, it was determined in the hydrogeological analysis that the long-term daily groundwater volume, including groundwater seepage and rainfall, would be 102,800L.



LEGEND

- DRAINAGE BOUNDARY
- IMPERVIOUS AREA
- DIRECTION OF OVERLAND FLOW
- 1411m2 / 0.90 — CATCHMENT AREA (m^2) / RUNOFF COEFFICIENT
- PERVIOUS AREA

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FIGURE 2

3353 LAKESHORE BLVD
EXISTING DRAINAGE PLAN

DATE: NOV 2019 SCALE: 1:250 PROJECT: 191063

Based on these results, either the building will need to be constructed water-tight, or the the foundation drainage will be collected and pumped to the sanitary control maintenance hole which will be connected to the sanitary sewer on Lakeshore Boulevard. For the purpose of this study, it is assumed that the groundwater will be pumped to the

The peak long-term groundwater flow rate is 102,800L/day (1.36L/s). The downstream sanitary sewer capacity analysis assumed a peak pump discharge rate of 1.58L/s in the post development scenarios in addition to an infiltration and inflow allowance to be conservative. This rate will be confirmed by the mechanical engineer. Refer to Section 5.3 for details.

The hydrogeological impact assessment, is included in **Appendix C**.

3.0 STORMWATER MANAGEMENT PLAN

3.1 Stormwater Management Criteria

The WWFM Guidelines require a hierarchy approach to wet weather flow management using source controls, conveyance controls and finally end-of-pipe controls to meet the following objectives:

- Water balance – maintenance or reduction of annual runoff volume may be required.
- Water quality – water quality control. Enhanced control is required based on MOE guidelines, where applicable.
- Water quantity - peak flow controls for flood management and erosion protection.

The SWM criteria are referenced in Table 7 of the WWFM Guidelines, based on Section 3 – Residential Development (relatively small isolated development or intensification situations with site areas less than 5ha and storm/combined sewer infrastructure exists). The requirements are as follows:

Water Balance – The minimum on-site runoff retention requires the proponent to retain all runoff from a small design rainfall event, typically 5mm (in Toronto, storms with 24-hour volumes of 5mm or less contribute about 50 percent of annual rainfall volume). The City of Toronto permits a maximum drawdown time of 72 hours for infiltration measures. The on-site retention requirements for this site will be achieved through use of site landscaping, green roof and stormwater re-use for irrigation.

Water Quality – The water quality criteria for this site is 80 percent average annual TSS removal from runoff originating on-site. Filtration will be implemented to achieve the water quality requirements on-site.

Water Quantity – The site will outlet to a municipal storm sewer; therefore, the flood flow requirement is to control the 100 year post development flow to the 2 year pre-development level, as per the WWFM Guidelines.

For small infill/redevelopment sites less than 2 hectares, erosion control in the form of stormwater detention is not required, provided the on-site minimum runoff retention from a 5mm rainfall event is achieved under the Water Balance criteria.

The following measures are proposed to meet the requirements for this site:

- Landscaping and green roof.
- Underground detention and retention storage in conjunction with an orifice to provide storage, peak flow control and to retain stormwater for re-use.

The proposed stormwater management plan can be referenced on **Drawing SW2**.

3.2 Water Balance

The WWFM Guidelines require retention of water on site, to the extent possible, to match pre-development runoff volumes. This requirement is typically achieved by retaining the runoff from a 5mm, 24 hour storm on site, which is equivalent to 50 percent of the total average annual rainfall volume (WWFM Guidelines).

The required retention volume is 5mm over the site area (1,410m^2 x 0.005m) = 7.1m^3.

The initial abstraction refers to the water retained in surface depression, taken up by vegetation or infiltrated before any runoff begins from the site. To determine the initial abstraction from site runoff, the following assumptions have been made:

- For paved areas and flat rooftop areas, the initial abstraction is generally 1.0mm. The depression storage is based on the roughness of the surface area and will increase as the parking areas, rooftop and terrace surfaces degrade with time.
- For landscaped areas, a minimum of 0.3m of absorbent topsoil will be used; therefore an initial abstraction of 5.0mm has been applied.
- For roof planters, it is assumed that the topsoil level will be lower than the top of the planter, therefore there would be no runoff in smaller storm events. An initial abstraction of 5.0mm is assumed**.**
- An extensive green roof is proposed, therefore, an initial abstraction of 5.0mm is proposed, as per City standards.

The total required retention volume is 7.1m^3. A summary of the initial abstraction values and resulting retention volumes for the proposed site can be seen below. Refer to **Table 1** for the retention volumes.

Table 1. Proposed Site Retention from Initial Abstraction

Catchment	Area (m^2)	% of Total Area	IA (mm)	IA Over Site Area (mm)	Retention (m^3)
Impervious Rooftop	1,029	73.0%	1	0.73	1.03
Green Roof	175	12.4%	5	0.62	0.88
Landscape	27	1.9%	5	0.10	0.14
Driveway	179	12.7%	1	0.13	0.18
Front Walkways	-	0.0%	1	0.00	0.00
Total	1,410	100.0%		1.57	2.22

The retention volume, as a result of the initial abstraction is 2.2m^3, or an average of 1.57mm, therefore, an additional 4.9m^3 of retention storage will be required. A retention storage volume of 6m^3 will be provided below the outlet invert in the cistern. The retention volume will be used for irrigation and other on-site purposes. The details of the stormwater re-use will be provided with the site plan application.

3.3 Quality Control

Based on the City's requirements, the water quality criterion for this site is 80 percent average annual TSS removal from runoff originating onsite. The majority of the site is rooftop which produces clean runoff, additional treatment will be provided by the landscaped areas and on-site retention.

Overall TSS removal capabilities are based on the following assumptions:

- Rooftop runoff is generally clean, runoff from the rooftop will be routed to the cistern. Based on acceptable values provided by Toronto Water, rooftop runoff is credited with 80 percent TSS removal.
- Landscaped areas provide significant infiltration and generally have a lower TSS loading compared to roadways. Based on acceptable values provided by Toronto Water, landscape runoff is credited with 80 percent TSS removal.
- The remaining site area is the driveway ramp. Therefore, the driveway runoff is proposed to be treated with a Storm Filter System (SFPD0806). The system uses variable flow controls, media-filled cartridges, and a storage sump to capture and retain a broad spectrum of pollutants, and is certified for 80 percent TSS removal by the State of New Jersey Department of Environmental Protection (NJDEP). The system has been designed to treat an area of 179m^2 with a runoff coefficient of 0.9.

Runoff from the driveway will be captured in a trench drain at the bottom of the ramp and flow by gravity to the Storm Filter and then be routed to the cistern for re-use or controlled discharge. The Storm Filter System is an offline system consisting of three chambers; the inlet bay, outlet bay and filtration bay. Only the low flows, not exceeding the filter capacity, will enter the filtration bay. There is a weir between the inlet bay and outlet bay such that, during high flows, the filtration bay will be by-passed.

Therefore, with the Storm Filter in place, all runoff originating on site will be treated to the minimum requirement of 80 percent TSS removal. System specifications are included in **Appendix B**.

3.4 Quantity Control

3.4.1 Target Release Rate

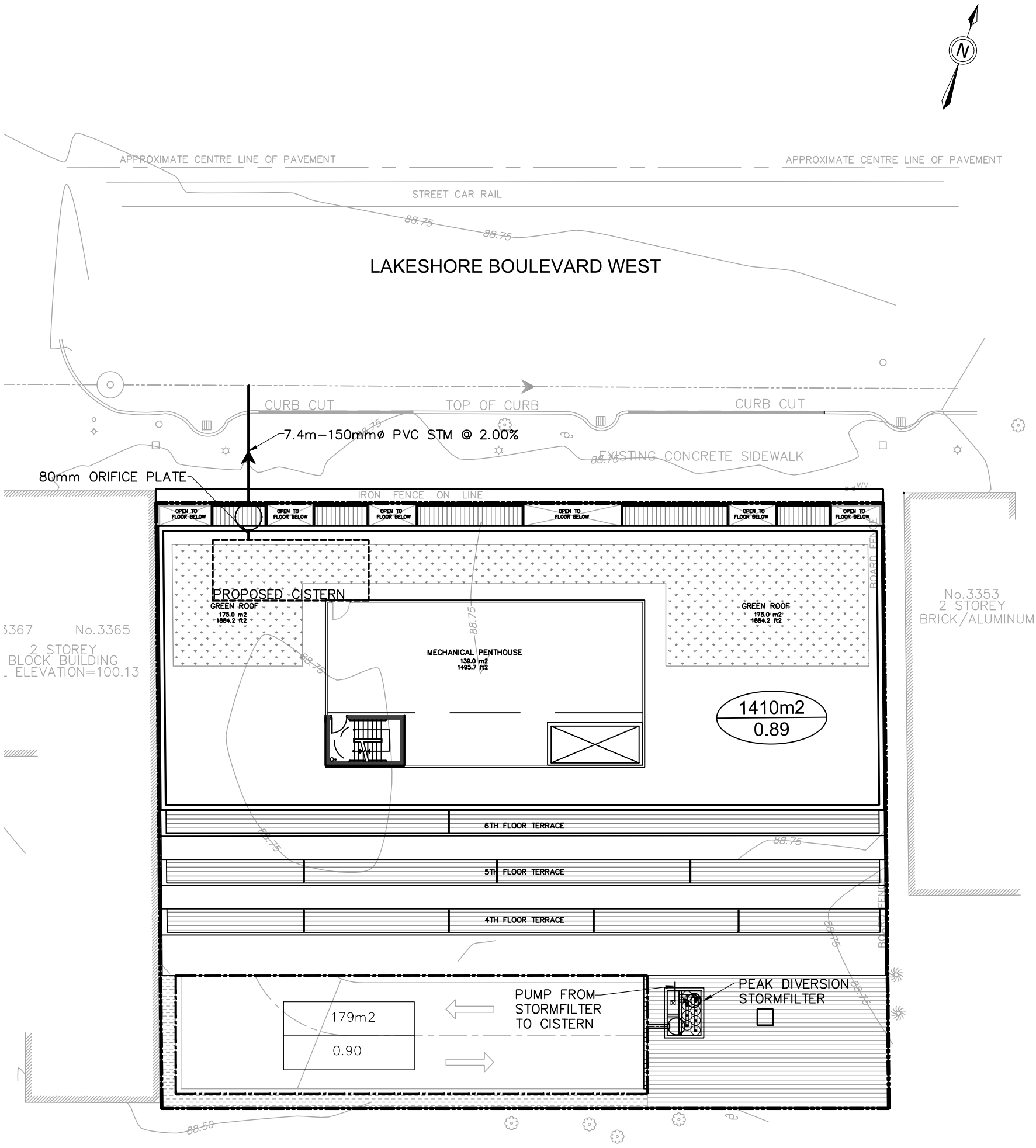
A rational method calculation was used to determine the target flow from the site, based on the 2 year pre-development peak flow. The pre-development peak flow from the site was calculated using the existing imperviousness, which resulted in a corresponding runoff coefficient of 0.90, therefore 0.50 was used for calculations as per the WWFM Guidelines, and the City of Toronto 2 year storm IDF curve. The allowable peak release rate for the site is 17.3L/s.

3.4.2 Quantity Control Measures

Quantity control will be provided in the cistern in conjunction with an orifice which allow for excess runoff to be stored and released at a controlled rate. A portion of the rooftop will be a green roof. The remainder of the rooftop area will be comprised of terraces where rooftop controls cannot be utilized. Refer to **Figure 3** for the rooftop and driveway catchment areas.

Uncontrolled Drainage

There will be no uncontrolled drainage from the site. The rooftop and driveway drainage will be directed internally to the buildings mechanical drainage system.



LEGEND

DRAINAGE BOUNDARY

DIRECTION OF OVERLAND FLOW

1411m² — CATCHMENT AREA (m²)

0.89 — RUNOFF COEFFICIENT

PERVIOUS AREA

179m2 — CATCHMENT AREA TO STORMFILTER

0.90 — RUNOFF COEFFICIENT

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FIGURE 3

3353 LAKESHORE BLVD POST SWM PLAN

DATE: NOV 2019 SCALE: 1:250 PROJECT: 191063

Cistern Storage

An 80mm diameter orifice plate will be installed on the outlet of the cistern. This will control the discharge from the cistern to 16.2L/s at a water surface elevation of 88.31m.

A Modified Rational Method calculation was completed to determine the required storage volume in the 100 year storm. Based on a building area of 1,410m^2 and a runoff coefficient of 0.84, the required storage volume to control the discharge to 16.2L/s is 39.5m^3. The cistern will be used to provide all of the required storage.

The cistern will have a footprint of 30.25m^2. Active storage will be provided between the outlet pipe invert of 86.89m and the high water level of 88.31m, resulting in a total storage depth of 1.42m. Based on these dimensions a total volume of 43.0m^3 is provided to attenuate flows.

The retention portion of the cistern will be located below the outlet and therefore will never discharge to the offsite to the municipal storm sewer system. A retention storage depth of 0.3m is proposed to the bottom elevation of the cistern of 166.86m, resulting in a total retention volume of 11.1m^3 for reuse. An irrigation pump will be provided to use the retention volume during the warmer months.

All flows captured in the cistern will be discharged through the site storm sewer connection to the Lakeshore Boulevard storm sewer. Calculations for the discharge rate at the maximum water level can be found in **Appendix A**.

Site Release Rate

The majority of the flow is captured by the onsite cistern and controlled by an 80mm orifice plate. The site flows are summarized below in **Table 2**.

Table 2. Site Quantity Control

Catchment Name	Area (m^2)	100 Year Runoff Coefficient (C)	Storage Required (m^3)	Peak Flow (L/s)
Drainage to Cistern	1,410*	0.84	39.5	16.2
Total Uncontrolled	0	-	-	0
Total	**1,410**		**39.5**	**16.2**

Therefore, with all controls in place the 100 year post development peak flow will not exceed the target flow of 17.3L/s.

Figure 3 shows the proposed catchment plan. Refer to **Drawings SW2** and **SW3** for the full servicing and cistern details. Hydrology calculations are provided in **Appendix A**.

3.5 Maintenance & Monitoring

3.5.1 Cistern

Based on the pretreatment and clean flows directed to the cistern there should be minimal sediment accumulation. The cistern and access hatches will be installed in the northern portion of the site. The system should be inspected every 6 months for the first two years and annually after that, once the sediment loading rate is determined. The cistern should be cleaned out when there is noticeable sediment accumulation to ensure the pump intake does not become obstructed by sediment.

3.5.2 Storm Filter System

The Storm Filter System is to be inspected on a regular interval as specified in the manufacture's maintenance guidelines. Maintenance is to take place on regular intervals ranging from 1 to 3 years as specified by the manufacturer. This maintenance includes replacement of filter cartridges and removal of any debris or sediment which have accumulated in the vault. Refer to manufacturer's specifications for all inspection and maintenance requirements.

4.0 EROSION AND SEDIMENT CONTROL

Erosion and sediment control plans have been prepared to meet the requirements of the City. The plans have been designed to limit sediment and debris from leaving the site during construction and from entering the adjacent lands. The plans consist of the following:

- A sediment control fence will be installed along the perimeter of the site where the grade will direct flows off-site.
- Site access will be limited to one entrance. A gravel access pad will be installed to remove mud from vehicles leaving the site.
- Once the site has been stripped of topsoil and then pre-graded, the lot will generally be lower than the surrounding property. This will limit runoff from entering neighbouring properties until the storm sewers are installed.
- Once the storm sewer system has been constructed, catchbasin sediment control devices will be installed and maintained until the majority of the construction is complete.

Erosion measures will be in place prior to any grading on the site. A program will be in place to monitor and maintain the erosion and sediment controls. The sediment controls will be inspected by the Site Engineer and contractor every two weeks and after each significant rainfall event.

Proper construction sequencing will also help with erosion and sediment control. The following schedule is recommended:

1. Install sediment control fence and gravel access road.
2. Strip topsoil and stockpile.
3. Rough grade site to subgrade elevations.
4. Install services and sediment control devices on catchbasins.
5. Re-vegetate disturbed areas.
6. Remove sediment controls.

Refer to **Drawing SW4** for erosion and sediment control details.

5.0 WASTEWATER

5.1 Receiving System

There is an existing 300mm local sanitary sewer and 1350mm diameter sanitary trunk sewer within the Lakeshore Boulevard West right-of-way. The local sewer flows west toward Twenty Eighth Street where it connects to the trunk sewer. The site is located in sewershed area 53 of the City's Chronic Basement Flooding Class Environmental Assessment (EA) program. The EA for study area 53 is underway, but no results are available at this time.

A comparison of the pre and post development peak flows from the site to the sanitary sewer was completed as per the City's design criteria.

City Design Criteria:

Persons per unit (ppu):	Apartment	
	Bachelor/1 Bedroom	1.4
	2 Bedroom	2.1
	3 Bedroom	3.1

Residential (for new sanitary systems):		450L/cap/day
Peaking Factor (pf):	Peak Hour	2.48
	Maximum Day	1.65
Commercial:		180,000L/ha/day

Existing Development:

The existing site is commercial lands, with a building gross floor area of approximately 0.16ha. Based on the City's criteria, the average daily commercial flow is 180,000L/s/gross floor ha. This includes peaking. Therefore, the maximum daily wastewater volume is 28,800L and the peak wastewater flow is 0.33L/s.

Proposed Development:

The proposed development will be mixed use and consist of apartment residential and main floor commercial development. **Table 3** provides the calculation for the proposed sanitary flow.

Table 3. Proposed Site Sanitary Flow

Unit Type	Number of Units	People per Unit	Population
Bachelor/1 BR	43	1.4	60.2
2BR	11	2.1	23.1
3BR	6	3.1	18.6
Total			**102**
Average Daily Flow Res. (L/day)			45,900
Harmon Peaking Factor			4.2

Peak Residential Flow (L/s)	2.25
Commercial Flow:	
GFA (m^2)	304
Average Daily Demand Comm. (L/day)	5,472
Peak Commercial Flow	0.06
Peak Wastewater Flow (L/s)	**2.32**

Therefore, with the proposed development, there will be an increase in wastewater flow from 0.33 to 2.32L/s. This does not include contributions from

5.2 Proposed Sanitary System

Gravity service connections can be provided on the north side of the site, discharging to the 300mm diameter sanitary sewer located within the Lakeshore Boulevard right-of-way. The sewer design follows the City's design criteria. The groundwater will be pumped and flow through a monitoring port before connecting to the sanitary maintenance hole and ultimately discharge to the sanitary sewer by gravity.

Refer to **Drawing SW2** for the proposed sanitary design.

5.3 Downstream Capacity Analysis

A downstream capacity analysis has been completed for the sanitary sewer from the site to where it connects into the trunk sewer at the intersection of Lakeshore Boulevard West and Twenty Eighth Street. The lots on the south side of Lakeshore Boulevard West are mixed use and consist of commercial/retail and residential. A separate 225mm diameter sanitary sewer services the developments on the north side of the road. Trunk connection points are located upstream and downstream of the site, therefore it is assumed that all sanitary drainage from the network upstream is collected at these connection points. The external sanitary drainage plan is shown on **Figure 4**.

Information for the analysis is based on:

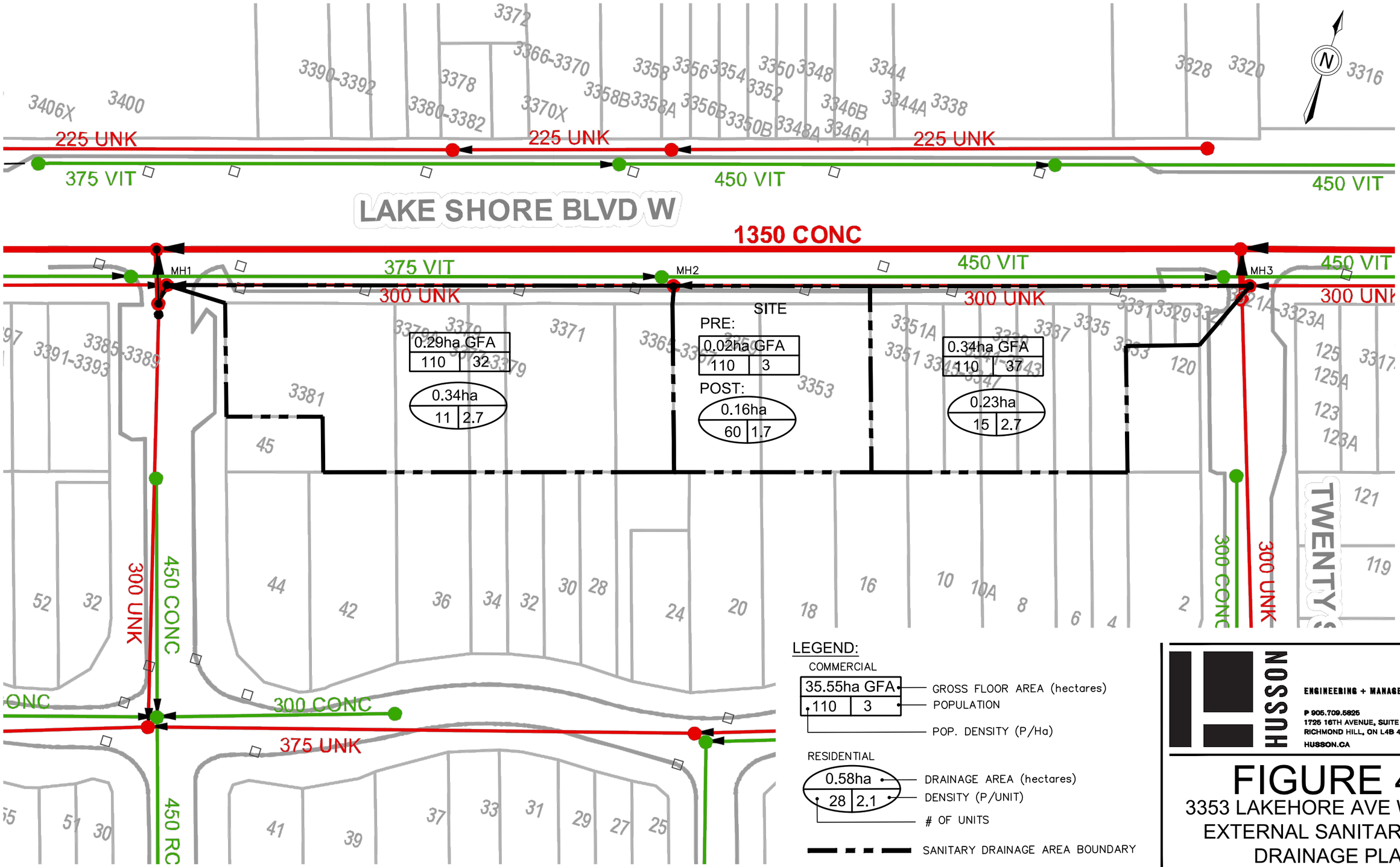
- Atlas mapping from the City which provide the existing sewer size and locations of the existing sanitary system.
- Toronto Water Asset Geodatabase (TWAG) information was requested to confirm the slopes and inverts of the pipes as no Plan Profile drawings were available.
- The catchment areas, unit counts, and densities for developments have been calculated based on current information as taken from Google Maps.

Projects which have submitted planning applications or been approved have been included in this analysis. Based on the City of Toronto Development Applications website, there are no other proposed developments within the sanitary catchment shown on **Figure 4**.

Based on the project timing, no flow monitoring was completed for this site. Therefore, as the catchment area is less than 50 hectares, a conservative estimate of 3L/s/ha was used for the extreme wet weather scenario. The analysis was run based on four scenarios:

Scenario 1 – Existing Conditions Design Flows (I/I = 0.26L/s/ha)

Scenario 2 – Proposed Conditions Design Flows (I/I = 0.26L/s/ha)



LEGEND:

COMMERCIAL

35.55ha GFA	GROSS FLOOR AREA (hectares)
110 | 3	POPULATION
POP. DENSITY (P/Ha)	

RESIDENTIAL

0.58ha	DRAINAGE AREA (hectares)
28 | 2.1	DENSITY (P/UNIT)
# OF UNITS	

SANITARY DRAINAGE AREA BOUNDARY

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FIGURE 4

3353 LAKEHORE AVE W EXTERNAL SANITARY DRAINAGE PLAN

DATE: NOVEMBER 2019 SCALE: 1:750 PROJECT: 191063

Scenario 3 – Existing Conditions Extreme Wet Weather Flows (I/I = 3.0L/s/ha)

Scenario 4 – Proposed Conditions Extreme Wet Weather Flows (I/I = 3.0L/s/ha)

For the analysis of the existing system, the average domestic flow rate is based on 240l/cap/day, as per City standards. Therefore, the peak domestic flow from the site is 1.23L/s. As stated in Section 2.4, it is proposed to discharge collected groundwater via pumping to the sanitary system at a rate of 1.58L/s. This flow has been included in the analysis. Therefore, the total flow from the site to the sanitary sewer is 2.81L/s. This does not include the infiltration allowance.

Table 4 provides the percent full for the sanitary sewers at the critical pipe for each scenario.

Table 4. Municipal Sewer Capacity

Scenario	Critical Pipe (% Full)
Existing Conditions Design Flows	3%
Proposed Conditions Design Flows	7%
Existing Conditions Extreme Wet Weather Flows	5%
Proposed Conditions Extreme Wet Weather Flows	7%

As shown in **Table 6** although there is an increase in sanitary flows; there is capacity in the existing sanitary system, even during wet weather conditions. Therefore, there is sufficient capacity in the downstream network for the proposed development.

External sanitary design sheets are provided in **Appendix D**.

6.0 WATER DISTRIBUTION

6.1 Proposed Water System

There is an existing 300mm diameter watermain under the roadway of Lakeshore Boulevard across the frontage of the site. It is proposed to provide a 100mm diameter domestic and 200mm diameter fire line to service the new development.

6.2 Water Design Criteria

The following calculations for water demand and fire flow for the proposed development are based on the City of Toronto's Design Criteria for Sewers and Watermains and the Fire Underwriters Survey (FUS).

City of Toronto's Design Criteria for Sewers and Watermains:

Persons per unit (ppu):	Apartment	
	Bachelor/1 Bedroom	1.4
	2 Bedroom	2.1
	3 Bedroom	3.1

Residential (high rise apartment): 191L/cap/day

Peaking Factor (pf):	Peak Hour	2.48
	Maximum Day	1.65
Commercial:		180,000L/ha/day
Peaking Factor (pf):	Peak Hour	1.10
	Maximum Day	1.20

Minimum Pressure (under non-fire demand scenario)	275kPa
Minimum Pressure (under fire demand scenario)	140kPa

Fire Underwriters Survey:

Minimum high rise fire flow – 19,000L/min - 2 hour duration (5,019gal/min)

6.3 Watermain Analysis

The Average Daily Demand is calculated based on the residential population and gross floor area of the retail development as shown in **Table 5**.

Table 5. Average Daily Demand Calculation

Unit Type	Number of Units	People per Unit	Population
Bachelor/1 BR	43	1.4	60.2
2BR	11	2.1	23.1
3BR	6	3.1	18.6
Total			102

Average Daily Demand Res. (L/day)		19,482
Commercial Flow:		
GFA (m2)	304	
Average Daily Demand Comm. (L/day)		5,472
Average Daily Demand Total (L/day)		**23,784**

Based on the Average Daily Demand and peaking factors

Peak Hour Demand:

Residential	= 0.56L/s
Commercial	= 0.08L/s
Total	= 0.64L/s

Maximum Day Demand:

Residential	= 0.37L/s
Commercial	= 0.07L/s
Total	= 0.44L/s

Fire Demand:

The detailed fire formula on page 17 of the FUS was used to calculate the minimum fire flow.

As per the FUS, if the vertical openings and exterior vertical communications are properly protected (one hour rating), consider only the area of the largest floor plus 25% of each of the two immediately adjoining floors. **Table 6** provides the estimate for the maximum GFA.

Table 6. Building Area Breakdown

	GFA
Third Floor (Largest)	1,069
Second Floor (use 25%)	1,069 x 25%
Fourth Floor (use 25%)	914 x 25%
Total	**1,565m^2**

The following is assumed regarding the construction of the building.

- Fire resistive construction with fully protected frame, floors and roof.
- Sprinklers are will be provided as per NFPA 13, at a minimum.

Table 7. Fire Flow Estimates

Population Type	**Area (m^2)**	**Construction Coefficient**	**Occupancy Increase/ Decrease**	**Sprinkler**	**Exposure**	**Required Flow (L/min.)**
Full Building	1565	0.6	0%	30%	60%	3,000

As shown in **Table 7**, when using this information, the minimum fire flow is 3,000L/min. Refer to calculations attached in **Appendix E**.

A hydrant flow test will be required to confirm that adequate flow is available. The test is scheduled and results can be provided when available.

7.0 CONCLUSIONS

The proposed development meets the City of Toronto's requirements as follows:

- Retention measures, including a cistern with retention storage in conjunction with an irrigation system for on-site re-use and landscaping will be provided to reduce runoff volumes.
- Quality control will be provided by a StormFilter system to treat the storm runoff to a minimum of 80% TSS removal for the driveway. The remainder of the site will be rooftop or landscape and therefore, 80% TSS removal is provided.
- A cistern in conjunction with an orifice will be provided on site to meet the storage requirements and to limit the release rates to below the allowable release rate as per the WWFM Guidelines.
- An effective erosion and sediment control plan has been prepared to limit sediment from leaving the site during construction.
- Gravity connections can be provided to the new development from the existing municipal sanitary sewer on Sheppard Avenue East.
- A hydrogeological impact assessment was completed by PRI Engineering and recommendations in the report will be followed. An application for a Discharge Permit for Private Water into the sanitary sewer will be required. Groundwater collected by the foundation drainage system will be pumped to the sanitary sewer at a rate of 1.58L/s. This flow is included in the downstream sanitary sewer capacity analysis.
- The sanitary system has been analyzed from the site to where it outlets into the trunk sewer at the intersection of Lakeshore Boulevard West and Twenty Eighth Street. It has been determined there is sufficient capacity to accommodate the proposed development in dry and wet conditions and the addition of the proposed flows will not result in basement flooding.
- The water system has been analyzed and adequate fire and domestic flows can be provided to the site from the municipal main. The results of the hydrant flow test will be provided when available.

With the proposed controls in place, the site design will meet the requirements of the Wet Weather Flow Management Guidelines and City of Toronto Standards.

Greg Rapp, P.Eng.

APPENDIX A

STORMWATER MANAGEMENT CALCULATIONS

Runoff Coefficients

Project:	3353 Lakeshore
Project No.:	191063
Municipality:	Toronto

Pervious runoff coefficient =	0.25
Green Roof runoff coefficient =	0.50
Roof runoff coefficient =	0.90
Imperv runoff coefficient =	0.90

Pre	Area (m2)	C	C x A/Composite C
Landscaped	0	0.25	0
Roof	586	0.90	527
Impervious	824	0.90	742
Total	1410	0.90	**1269**

Post Full Site	Area (m2)	C	C x A/Composite C
Landscaped	28	0.25	7
Green Roof	175	0.50	88
Roof	1029	0.90	926
Impervious	178	0.90	160
Total	1410	0.84	**1181**

Rational Method Calc. - Target Flows

Project:	3353 Lakeshore
Project No.:	191063
Municipality:	Toronto
Catchment:	Total Site

PRE DEVELOPMENT (2 Year)	
Runoff Coefficient (C) =	0.50
Area (A) =	0.141
A:	21.80
B:	0.00
C:	-0.78
Tc:	0.167
Intensity (I) mm/hr =	88.2
Peak Flow (Q) L/s =	17.3

Modified Rational Method

Project:	3353 Lakeshore
Project No.:	191063
Municipality:	Toronto
	Controlled Site 100 Year

Area:	0.1410 ha	Rainfall $I=A*(T+B)^C$	
Runoff Coefficient:	0.84	A:	1579.4
		B:	0
Orifice Flow:	0.0162 m^3/s	C:	-0.8
Storage Required	39.5 m^3		

Initial Time 5 min Increment 1 min

Time (min)	Intensity (mm/hr)	Peak Flow (m^3/s)	Roof Flow (m^3/s)	Peak Flow (m^3/s)	Runoff Volume (m^3)	Discharge Volume (m^3)	Storage Volume (m^3)
5	435.8	0.143	0.000	0.143	42.89	4.86	38.0
6	376.7	0.124	0.000	0.124	44.48	5.84	38.6
7	333.0	0.109	0.000	0.109	45.87	6.81	39.1
8	299.2	0.098	0.000	0.098	47.11	7.78	39.3
9	272.3	0.089	0.000	0.089	48.24	8.76	39.5
10	250.3	0.082	0.000	0.082	49.26	9.73	39.5
11	231.9	0.076	0.000	0.076	50.21	10.70	39.5
12	216.3	0.071	0.000	0.071	51.09	11.68	39.4
13	202.9	0.067	0.000	0.067	51.92	12.65	39.3
14	191.2	0.063	0.000	0.063	52.69	13.62	39.1
15	181.0	0.059	0.000	0.059	53.42	14.59	38.8
16	171.9	0.056	0.000	0.056	54.12	15.57	38.6
17	163.7	0.054	0.000	0.054	54.78	16.54	38.2
18	156.4	0.051	0.000	0.051	55.41	17.51	37.9
19	149.8	0.049	0.000	0.049	56.01	18.49	37.5
20	143.8	0.047	0.000	0.047	56.59	19.46	37.1
21	138.3	0.045	0.000	0.045	57.14	20.43	36.7
22	133.2	0.044	0.000	0.044	57.68	21.41	36.3
23	128.6	0.042	0.000	0.042	58.19	22.38	35.8
24	124.3	0.041	0.000	0.041	58.69	23.35	35.3
25	120.3	0.039	0.000	0.039	59.17	24.32	34.8

Orifice Flow Calculation

Pipe Diameter	80	mm
Area	0.005	m^2
Maximum WL	88.31	m
Invert	86.89	m
Head (h)	1.38	m
Co-efficient	0.62	
Flow (Q)	$Q=CA(2gh)^{0.5}$	
	0.0162	m^3/s

HUSSON

Rational Method Calc. - Driveway 100 Year Flow

Project:	3353 Lakeshore
Project No.:	191063
Municipality:	Toronto
Catchment:	Driveway

DRIVEWAY (100 Year)	
Runoff Coefficient (C) =	0.90
Area (A) =	0.0179
A:	59.70
B:	0.00
C:	-0.80
Tc:	0.167
Intensity (I) mm/hr =	250.3
Peak Flow (Q) L/s =	11.2

APPENDIX B

STORMFILTER CALCULATIONS

Determining Number of Cartridges for Flow Based Systems

Date	**11/11/2019**	**Black Cells =**	**Calculation**

Site Information

Project Name	**3353 Lakeshore Blvd**		
Project Location	**Toronto**		
OGS ID	**OGS**		
Drainage Area, Ad	**0.04**	ac	(0.0179 ha)
Impervious Area, Ai	**0.04**	ac	
Pervious Area, Ap	**0.00**		
% Impervious	**100%**		
Runoff Coefficient, Rc	**0.90**		
Treatment storm flow rate, Q_{treat}	**0.03**	cfs	(1 L/s)
Peak storm flow rate, Q_{peak}	**TBD**	cfs	

Filter System

Filtration brand	**StormFilter**	
Cartridge height	**18**	in
Specific Flow Rate	**2.00**	gpm/ft^2
Flow rate per cartridge	**15.00**	gpm

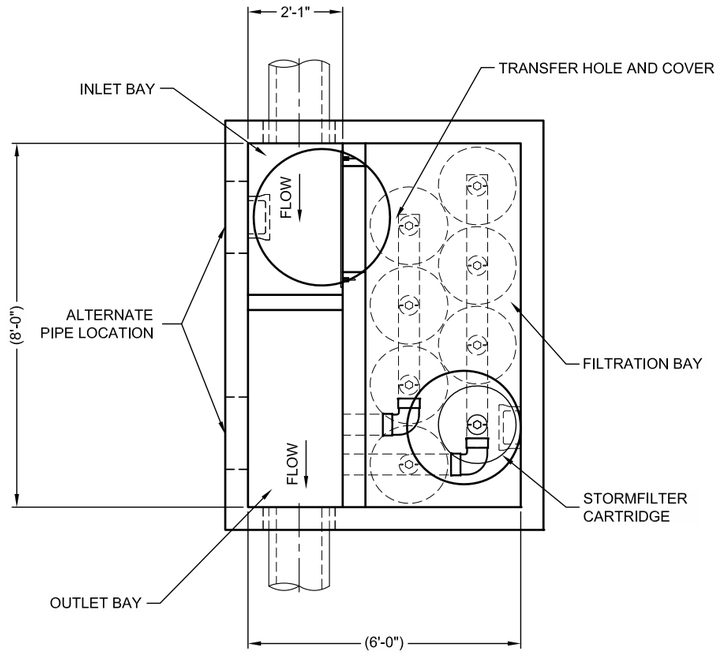
SUMMARY

Number of Cartridges	1
Media Type	Perlite

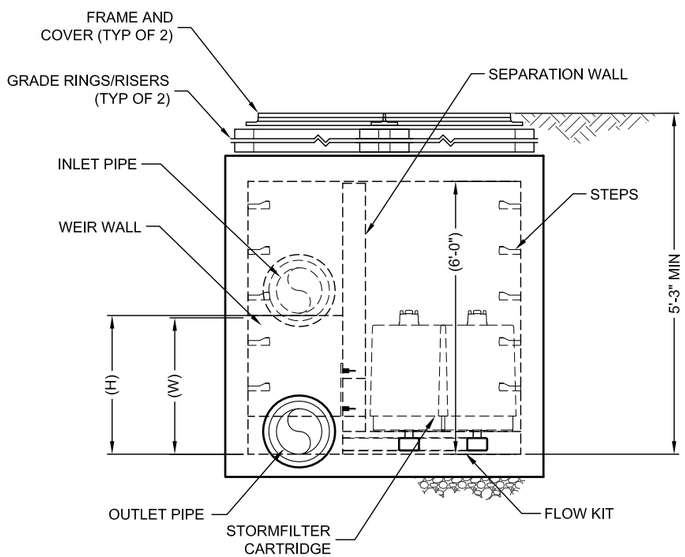
Event Mean Concentration (EMC)	**150**	mg/L
Annual TSS Removal	**80%**	
Percent Runoff Capture	**90%**	

Recommend SFPD0806 vault or CIP

200 Enterprise Drive
Scarborough, ME 04074
Phone 877-907-8676
Fax 207-885-9825



PLAN



ELEVATION

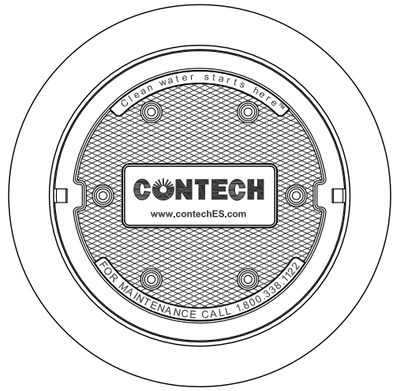
The Stormwater Management StormFilter®

THIS PRODUCT MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING U.S. PATENTS: 5,322,629; 5,324,579; 5,707,527; 5,985,157; 6,027,639; 6,946,065; RELATED FOREIGN PATENTS, OR OTHER PATENTS PENDING.

STORMFILTER DESIGN TABLE

- THE 8' x 6' PEAK DIVERSION STORMFILTER TREATMENT CAPACITY VARIES BY CARTRIDGE COUNT AND LOCALLY APPROVED SURFACE AREA SPECIFIC FLOW RATE. PEAK CONVEYANCE CAPACITY TO BE DETERMINED BY ENGINEER OF RECORD.
- THE PEAK DIVERSION STORMFILTER IS AVAILABLE IN A LEFT INLET (AS SHOWN) OR RIGHT INLET CONFIGURATION.
- ALL PARTS AND INTERNAL ASSEMBLY PROVIDED BY CONTECH UNLESS OTHERWISE NOTED.

CARTRIDGE HEIGHT	27"		18"		LOW DROP	
SYSTEM HYDRAULIC DROP (H - REQ'D. MIN.)	3.05'		2.3'		1.8'	
HEIGHT OF WEIR (W)	3.00'		2.25'		1.75'	
TREATMENT BY MEDIA SURFACE AREA	2 gpm/ft²	1 gpm/ft²	2 gpm/ft²	1 gpm/ft²	2 gpm/ft²	1 gpm/ft²
CARTRIDGE FLOW RATE (gpm)	22.5	11.25	15	7.5	10	5



FRAME AND COVER
(DIAMETER VARIES)
N.T.S.

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID	*
WATER QUALITY FLOW RATE (cfs)	*
PEAK FLOW RATE (cfs)	*
RETURN PERIOD OF PEAK FLOW (yrs)	*
# OF CARTRIDGES REQUIRED	*
CARTRIDGE FLOW RATE	*
MEDIA TYPE (CSF, PERLITE, ZPG)	*

PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE	*	*	*
OUTLET PIPE	*	*	*

INLET BAY RIM ELEVATION	*
FILTER BAY RIM ELEVATION	*

ANTI-FLOTATION BALLAST	WIDTH	HEIGHT
	*	*

NOTES/SPECIAL REQUIREMENTS:

PERFORMANCE SPECIFICATION

FILTER CARTRIDGES SHALL BE MEDIA-FILLED, PASSIVE, SIPHON ACTUATED, RADIAL FLOW, AND SELF CLEANING. **RADIAL MEDIA DEPTH SHALL BE 7-INCHES**. FILTER MEDIA CONTACT TIME SHALL BE AT LEAST **37 SECONDS**. SPECIFIC FLOW RATE SHALL BE **2 GPM/SF (MAXIMUM)**. SPECIFIC FLOW RATE IS THE MEASURE OF THE FLOW (GPM) DIVIDED BY THE MEDIA SURFACE CONTACT AREA (SF). MEDIA VOLUMETRIC FLOW RATE SHALL BE **6 GPM/CF OF MEDIA (MAXIMUM).**

GENERAL NOTES

1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. DIMENSIONS MARKED WITH ( ) ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
3. FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH REPRESENTATIVE. www.ContechES.com
4. STORMFILTER WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING. CONTRACTOR TO CONFIRM STRUCTURE MEETS REQUIREMENTS OF PROJECT.
5. STRUCTURE SHALL MEET AASHTO HS20 LOAD RATING, ASSUMING EARTH COVER OF 0' - 5' AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET AASHTO M306 AND BE CAST WITH THE CONTECH LOGO.

INSTALLATION NOTES

A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STORMFILTER STRUCTURE (LIFTING CLUTCHES PROVIDED).
C. CONTRACTOR TO INSTALL JOINT SEALANT BETWEEN ALL SECTIONS AND ASSEMBLE STRUCTURE.
D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH OUTLET PIPE INVERT WITH OUTLET BAY FLOOR.
E. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT CARTRIDGES FROM CONSTRUCTION-RELATED EROSION RUNOFF.
F. CONTRACTOR TO REMOVE THE TRANSFER HOLE COVER WHEN THE SYSTEM IS BROUGHT ONLINE.

CONTECH® ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

THE STORMWATER MANAGEMENT STORMFILTER 8' x 6' PEAK DIVERSION STORMFILTER STANDARD DETAIL

APPENDIX C

HYDROGEOLOGICAL ASSESSMENT

PRI ENGINEERING

HYDROGEOLOGICAL INVESTIGATION REPORT

PROPOSED MULTI-STOREY MIXED-USE DEVELOPMENT
3353-3359 LAKESHORE BOULEVARD WEST
ETOBICOKE, ONTARIO

Prepared for Apria Inc.
144 Front Street West, Suite 310
Toronto, ON M5J 2L7

November 14, 2019

Manish Nayar
Managing Director
Apria Inc.
144 Front Street, Suite 310
Toronto, ON M5J 2L7

Subject: **Hydrogeological Investigation Report – FINAL**
Proposed Multi-Storey Mixed-Use Development
3353-3359 Lakeshore Boulevard West
Etobicoke, ON

Dear Mr. Nayar:

We are pleased to submit the following Hydrogeological Investigation Report, describing subsurface hydrologic and geological conditions to determine the quality and quantity of groundwater that may be required to be discharged to the City of Toronto sewage works as a result of the construction of the Proposed Multi-Storey Mixed-Use Development located at 3353-3359 Lakeshore Boulevard West in Etobicoke, Ontario. The proposed development includes a six (6) storey residential building with one (1) underground parking level, an outdoor amenity area, a paved access road, loading area and ramp leading to the underground parking level.

This Report presents the results of the subsurface investigation for the subject site which was conducted from May 2019 to September 2019. Attached is a site plan noting borehole and monitoring well locations, hydraulic conductivity test data and hydrographs, laboratory test results, and dewatering calculation summary.

We trust that the information is straightforward and meets with your present requirements. Please contact us if you have any questions.

Yours truly,
PRI Engineering Inc.

Arash Yazdani, P.Eng.
Director of Engineering Services

TABLE OF CONTENTS

TABLES IN TEXT

LIST OF FIGURES AND APPENDICES

ACRONYMS AND ABBREVIATIONS

Apria	Apria Inc.
BH	Borehole
BTOP	Below Top of Pipe
COT	City of Toronto
DMW	D.M. Wills Ltd.
EASR	Environmental Activity and Sector Registry
ESA	Environmental Site Assessment
GFA	Gross Floor Area
mASL	Metres Above Sea Level
mBGS	Metres Below Ground Surface
MECP	Ministry of Environment, Conservation and Parks
MW	Monitoring Well
O.D.	Outer Diameter
OGS	Ontario Geological Survey
O. Reg.	Ontario Regulation
PAH	Polycyclic Aromatic Hydrocarbons
PRI	PRI Engineering Inc.
PTTW	Permit To Take Water
PVC	Polyvinyl chloride
Site	3353-3359 Lakeshore Blvd West
TT	Tanktek Environmental Services Ltd.

1 Introduction

PRI Engineering Inc. (PRI) was retained by Apria Inc. (Apria) to conduct a Hydrogeological Investigation for the proposed Multi-Storey Mixed Used Development located at 3353-3359 Lakeshore Boulevard West, Etobicoke, Ontario M8W 1N1 (the "Site"). The purpose of this Review is to determine the quantity and quality of groundwater that would need to be discharged to the City of Toronto (COT) sewer works as a result of the construction of the proposed development.

1.1 Existing Development

The existing site, currently owned by Apria, is approximately 1,410 m^2. For more details, refer to the Geotechnical Investigation Report. The study area map and existing site layout are attached as **Figures 1 and 2**.

1.2 Proposed Development

Based on Drawing No. A100 provided by Icon Architects Inc., dated November 11, 2019, it is understood that the proposed development is a mixed-use six (6) storey building with a total gross floor area (GFA) of approximately 5,378 m^2. This consists of 60 residential units with a GFA of 5,074 m^2 situated on the second floor up to the sixth floor and a retail area situated on the first floor with a GFA of 304 m^2. One (1) underground level is designated as a parking area with a GFA of 1,293.5 m^2. The underside of the underground parking floor slab is approximately 5.9 m below ground surface (mBGS), which is inferred to be approximately 83.7 m above sea level (mASL). The total roof area is 1,159.6 m^2 including 284 m^2 designated for residential private terraces, 316.3 m^2 designated for solar panels and 175 m^2 provided as Green Roof space which accounts for 31.29% coverage. Additionally, a total soil volume of 44.5 m^3 is proposed. The proposed site layout is shown on the attached **Figure 3** with existing conditions noted on **Figure 2**.

1.3 Scope of Work

This Hydrogeological Review was completed in conjunction with a Geotechnical Investigation, by PRI personnel under the supervision of Arash Yazdani, P.Eng., Director of Engineering Services, and includes the following scope of work:

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- → Reviewed existing Ministry of Environment, Conservation and Parks (MECP) Ontario Water Well Records;
- → Reviewed existing geotechnical, environmental and hydrogeological reports for nearby sites;
- → Reviewed geological maps, related to physiographic regions, surficial depositions, bedrock formations and groundwater conditions;
- → Reviewed of published topographic maps or site-specific survey information of ground slopes and natural features including watercourses, runoff and development;
- → Obtained buried utility clearances for the site prior to undertaking field work;
- → Advanced five (5) exterior boreholes and four (4) interior boreholes to depths of up to 5.0 mBGS, or to practical refusal;
- → Advanced two (2) exterior boreholes into presumed bedrock up to 10.0 mBGS, if encountered;
- → Installed up to seven (7) groundwater monitoring piezometers to provide static groundwater information. Five (5) piezometers will extend to a minimum of 9.0 mBGS to meet the COT's hydrogeological requirements and two (2) piezometers will extend down to top of competent bedrock (no greater than 5.0 mBGS);
- → Installed up to three (3) interior groundwater monitoring piezometers to provide static groundwater information. Piezometers will extend down to top of competent bedrock (no greater than 5.0 mBGS);
- → Measured weekly static water levels at all monitoring wells for a minimum of three (3) months;
- → Completed four (4) slug tests using a digital data-logger to determine soil hydraulic conductivity;
- → Sampled and analyze groundwater quality against both sanitary and storm sewer requirements (Toronto Municipal Code Chapter 681 - Sewers); and
- → Assessed groundwater controls and impacts.

In conjunction with this Hydrogeological Report, a Geotechnical Investigation Report and Phase Two ESA Investigation Report were completed. Both reports are submitted under separate covers, with the Geotechnical Investigation Report prepared by PRI and the Phase Two ESA prepared by DMW.

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1.4 General Hydrogeological Characterization

The ground surface elevation at the Site ranges from 88.2 mASL to 89 mASL, sloping towards Lake Ontario which is the nearest surface water feature at approximately 700 m south from the Site. Etobicoke Creek is located approximately 2 km west of the Site, and Mimico Creek and Humber River are located approximately 5 km and 6.2 km east of the Site, respectively. According to the Physiography of Southern Ontario Map from the Ontario Geological Survey (OGS), the site consists of beveled till plains within the Iroquois Plain physiographic region which formed when the last glacier was receding during the last ice age. The surficial soils generally consist of sand and gravel deposits with local soils containing fill material underlain by native clayey deposits. Based on bedrock geological mapping by the OGS, the bedrock consists of shale with interbedded limestone, dolostone and siltstone of the Georgian Bay Formation which is approximately 250 m thick and slopes to the southeast at approximately 5 m/km and is Ordovician in age.

Monitoring well BH 4732C, installed on the property by TT on October 7, 2015, was the only historical well present within the site boundaries prior to the field investigation program and consists of 1.2 m thick loose fill material and sand overlying 1.2 m of sandy clay overlying another 1.2 m of clay to a bedrock depth of 3.6 m. The recorded depth to groundwater was 1.8 m. It is assumed based on grain size analyses of surrounding strata detailed in the PRI Geotechnical Investigation Report that the stratum unit located along the well screening from 85.14 mASL to 87.58 mASL is sandy silt.

Based on the borehole data presented in the PRI Geotechnical Investigation Report, the area of the site outside the existing building perimeter consists of approximately 75 mm thick surficial asphalt underlain by coarse-grained fill material and the area of the site within the existing building perimeter consists of approximately 100 mm thick surficial concrete slab underlain by coarse-grained fill material. The coarse-grained fill material is generally gravel and sand, to sand, ranging from approximately 0.2 m to 1.1 m in thickness and is underlain by silty sand to sandy silt to clayey sandy silt at depths ranging from 0.8 mBGS to 1.2 mBGS extending down to borehole refusal upon presumed bedrock (at depths 2.7 mBGS to 4.6 mBGS).

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2 Hydrogeological Investigation Procedures

The hydrological field program was performed in conjunction with the geotechnical field program which started in May 2019 and was completed in September 2019. For full details of the field investigation including borehole construction and elevation survey, refer to the PRI Geotechnical Investigation Report.

2.1 Well Installation

A total of seven (7) exterior and three (3) interior groundwater monitoring wells were installed in boreholes constructed on May 27 to 30, 2019, at depths ranging from 2.74 mBGS to 10.45 mBGS. The wells outer diameters for exterior and interior monitoring wells are 60 mm and 33 mm, respectively. A borehole/monitoring well location plan is attached as **Figures 2 and 3**, with borehole logs attached as **Appendix A**. Monitoring well construction details including the depths to the top and bottom of the screen interval and the screened geological units are summarized in **Table 1** below.

Table 1: Monitoring Well Surface Elevation and Depths to Top and Bottom of Screen

WELL ID	WELL O.D. (mm)	SURFACE ELEVATION (mASL)	TOP OF SCREEN		BOTTOM OF SCREEN		SCREENED GEOLOGICAL UNIT
			DEPTH (mBGS)	ELEVATION (mASL)	DEPTH (mBGS)	ELEVATION (mASL)	
BH19-01	60	89.0	6.60	82.40	9.60	79.40	shale/limestone
BH19-02	60	88.8	6.10	82.70	9.17	79.63	shale/limestone
BH19-03	60	89.0	1.38	87.62	4.43	84.57	clayey sandy silt
BH19-04	60	88.9	1.92	86.98	4.05	84.85	clayey sandy silt
BH19-05	60	88.7	6.23	82.47	9.28	79.42	shale/limestone
BH19-07	33	89.0	1.83	87.17	4.57	85.66	sandy silt
BH19-08	33	88.4	0.00	88.40	2.74	84.39	sandy silt
BH19-09	33	88.2	0.76	87.44	3.81	79.12	sandy silt
MW19-10	60	88.7	6.53	82.17	9.58	78.35	shale/limestone
MW19-11	60	88.8	7.55	81.25	10.45	79.40	shale/limestone
BH 4732C	51	88.8	1.22	87.58	3.66	85.14	sandy silt

mASL = metres above sea level
mBGS = metres below ground surface
BH 4732C data according to MECP Ontario Well Records

2.2 Well Development / Groundwater Sampling

The primary goal of well development is to ensure that water extracted from the wells for purposes of the hydrogeological review are representative of groundwater conditions in the formation surrounding the well. As such, prior to any sampling event, the monitoring well was first pumped dry (purged) up to three times over a one to two-day period. For wells with very slow recharge, the well was purged at least once and allowed to recharge for a maximum of 48 hours before sampling. Groundwater samples were collected as part of the environmental sampling program conducted for the Phase Two ESA Report for the subject Site. The results for an unfiltered MW19-11 sample taken on July 5, 2019, will be used for comparison with the parameters listed in Chapter 681-Sewers of the Toronto Municipal Code. A true copy of the analysis report, Certificate of Analysis and chain of custody record for the sample are attached as **Appendix C**.

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2.3 Groundwater Monitoring

Groundwater monitoring was initiated 1 month after completion of well construction to allow enough time for groundwater to recover from any effects of well construction. Static groundwater level measurements were taken on a weekly basis at all current wells for a period of 3 months from June 27 to September 25, 2019. The results are presented in **Appendix B** including three additional measurements from the historic well BH 4732C. All water levels were measured using a *Solinst 101* water level meter. To prevent cross-contamination between wells, the probe was cleaned with methanol and distilled water before and after taking readings at each well.

2.4 Hydraulic Conductivity Testing

2.4.1 Estimation from Grain Size

Hazen's Approximation is applicable for sands with effective particle size (D10) between 0.1 mm and 3 mm. Similarly, Hazen's Approximation is based on the laboratory grain analysis of disturbed soils samples and therefore does not consider soil structure, density, and varying soil stratigraphy as generally accomplished with in-situ testing. For design, PRI recommends that greater weight should be given to in-situ infiltration test values, particularly for finer-grained soils. Refer to PRI Geotechnical Investigation Report for further details regarding estimates of hydraulic conductivity based on Hazen's Approximation.

2.4.2 Pump Tests

Pump tests were not performed at the Site due to the low permeability of the soil in some monitoring well locations. As such, hydraulic conductivity was based on slug tests which is deemed to be sufficient to evaluate the perched and localized ground water condition for developments where construction dewatering or long-term groundwater management is required.

2.4.3 Slug Tests

Slug tests were performed during the week of July 31, 2019, on a total of four (4) monitoring wells which were selected based on stratigraphy and location to obtain a representative range of hydraulic conductivity values for the site.

Monitoring wells BH19-02 and MW19-10 which were terminated upon bedrock at depths of 9.2 mBGS and 9.6 mBGS, respectively, were anticipated to have a higher hydraulic conductivity based on groundwater recharge rates observed during purging and sampling. Monitoring wells BH19-04 and BH19-03 which were terminated in clayey sandy silt at depths of 4.4 mBGS and 4.1 mBGS, respectively, were anticipated to have a lower hydraulic conductivity based on slow groundwater recharge rates observed during purging and sampling.

For BH19-02 and MW19-10, the Rising Head method was used. This involved removing a "slug" or a volume of water from each well and then monitoring the increase in water levels at recorded periods of time until greater than 63% recovery was obtained or 24 hours have passed, whichever occurred first. Water was removed by pumping with an LDPE tubing attached to a foot valve until a target of 1.5 m of standing water was displaced. Due to the shortage of water in BH19-03 and BH19-04, the Falling Head method was used. This involved adding a "slug" of water to each well and then monitoring the decrease in water levels until greater than 63% recovery was obtained, or 24 hours have passed, whichever occurred first.

A *Solinst 3000 Levelogger EDGE* digital datalogger was used to obtain water level readings every 20 seconds during the test. Additionally, manual readings were taken using a *Solinst 101* water level meter at the start of the test, during the first 15 to 30 minutes, and at the end of the test.

Slug test results for both manual readings and datalogger measurements taken at each well are attached as **Appendix D**. Hydraulic conductivity was estimated from the data using the following **Equation 1** (Hvorslev, 1951):

$$K = \frac{r^2 \ln\left(\frac{L}{R}\right)}{2LT_0}$$

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Where:

- → K is hydraulic conductivity in cm/s;
- → r is the radius of well casing in cm;
- → L is the sand screen length in cm;
- → R is the radius of the screen; and
- → T_0 is the time for water level to recover to 37% of its initial change.

2.5 Dewatering Calculations

Short-term and long-term daily groundwater volumes were calculated using the following Dupuit Forcheimer **Equation 2** for radial flow to a well or point source excavation in an unconfined aquifer:

$$Q = \frac{\pi K(H^2 - {H_w}^2)}{\ln(R_0/R_e)}$$

Where:

- → Q is the pumping rate in m^3/s;
- → K is the hydraulic conductivity in m/s;
- → H is the hydraulic head of the original water table in m;
- → H_w is the hydraulic head at maximum dewatering in m;
- → R_o is the radius of influence in m; and
- → R_e is the equivalent radius in m.

The radius of influence can then be calculated based on the Sichardt equation in **Equation 3** below:

$$R = Ch\sqrt{K} + R_e$$

Where:

- → C = a factor equal to 3000 for radial flow to a pumping well;
- → h = required drawdown in m;
- → K = hydraulic conductivity in m/s; and
- → R_e is the equivalent radius in m.

A summary of the calculations is provided in **Appendix E**, using a factor of safety of 1.5.

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3 Hydrogeological Conditions

3.1 Static Water Level Analysis

Groundwater measurements collected at the Site are presented in **Appendix B**. The values ranged from 84.5 mASL to 87.9 mASL during the 3-month study period and were generally consistent at each monitoring well, except during the removal/addition of water for slug tests and groundwater sampling events. BH19-01, BH19-02, BH19-05, MW19-10 and MW19-11 were relatively quick to recover from purging events and were able to recharge to their initial water levels within the following week's measurement. All the interior monitoring wells (BH19-07, BH19-08 and BH19-09) had low-yielding recharge rates throughout the monitoring program and took one to four weeks to recharge to their initial water levels after a purging event.

Based on subsurface conditions and measured static groundwater elevations, the site is inferred to consist of perched groundwater upon the encountered shale/limestone bedrock, as well as confined groundwater within the horizontal bedding fractures of the shale/limestone bedrock. Based on the bedding properties of the encountered shale/limestone bedrock, it is inferred that vertical groundwater infiltration is low at the overburden to bedrock boundary, as well as within the bedrock, resulting in perched groundwater above the bedrock. Disregarding the water removal/addition events and relatively variable water levels within the month of July 2019, approximate groundwater elevations are summarized in **Table 2** below.

Table 2: Summary of Groundwater Elevations Across the Site

Main Stratigraphic Unit	Monitoring Well ID	Last Measured Groundwater Level Elevation - Sept. 25, 2019 (mASL)	Approximate Static Groundwater Level Elevations (mASL)
Bedrock	BH19-01	86.40	86.50
	BH19-02	86.05	86.00
	MW19-10	85.73	85.80
	MW19-11	85.03	85.00
	BH19-05	86.98	87.00
Overburden	BH19-03	85.05	87.80
	BH19-04	86.41	87.50
	BH19-07	86.81	87.10
	BH19-08	86.91	87.40
	BH19-09	86.85	86.90
	BH 4732C	87.12	87.00

In general, the perched groundwater elevation within the overburden ranges from approximately 87.0 mASL to 87.8 mASL; while the confined groundwater elevation within the bedrock ranges from approximately 85.0 mASL to 87.0 mASL. It is inferred that the perched overburden groundwater elevation fluctuates based on precipitation events, while groundwater within the bedrock is localized based on variable localized fractured zones within the bedrock.

Disregarding the water removal/addition events, the seasonally high groundwater level was observed at 87.51 mASL in BH19-08 on June 27, 2019 and September 26, 2019.

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3.2 Hydraulic Conductivity

Two bedrock wells and two overburden wells were selected for hydraulic conductivity testing. The results of the slug test analysis are attached as **Appendix D** and summarized in **Table 3** below. The slug tests for the two bedrock wells were completed in 17 and 23 minutes, respectively, when 63% recovery was reached. The resulting hydraulic conductivity values are 1.1 x 10^{-6} m/s for BH19-02 and 9.4 x 10^{-7} m/s for MW19-10 based on the datalogger readings of groundwater levels. The slug tests for the two overburden wells in clayey sandy silt only reached 33-35% recovery over a 1 to 5-day period. As such, the data was extrapolated to obtain estimates for hydraulic conductivity which were calculated to be 3.6 x 10^{-9} m/s for BH19-03 and 3.8 x 10^{-9} m/s for BH19-04.

Table 3: Summary of Slug Test Results

MONITORING WELL	WELL SCREEN ELEVATION (mASL)*	SCREENED UNIT	APPROXIMATE HYDRAULIC CONDUCTIVITY (m/s)
BH19-02	82.7 to 79.6	shale/limestone	1.1 x 10^{-6}
BH19-03	87.6 to 84.6	clayey sandy silt	3.6 x 10^{-9}
BH19-04	87.0 to 84.9	clayey sandy silt	3.8 x 10^{-9}
MW19-10	82.2 to 78.4	shale/limestone	9.4 x 10^{-7}

3.3 Groundwater Flow Direction and Hydraulic Gradient

Based on regional surface water features, regional groundwater flow is inferred to flow south or southeast towards Lake Ontario (approximately 700 m south from the site) at a horizontal gradient of 0.02 m/m, assuming a long-term mean water level of 74.76 mASL for Lake Ontario according to the US Army Corps of Engineers. However, it should be noted that regional groundwater flow can be affected by local subsurface features such as sewers and subsurface drainage.

Using the interpreted groundwater elevation contours within the Site, the water levels within the bedrock units generally flow east at a horizontal gradient of 0.03 m/m. The perched groundwater table within the overburden appears to drain west at a horizontal gradient of 0.06 m/m.

Based on the borehole data, there are three subsurface hydrostratigraphic units present at the Site. The first unit is the coarse-grained fill material containing gravel and sand to sand that is approximately 0.2 m to 1.1 m thick with an estimated hydraulic conductivity of 1.6 x 10^{-5} m/s (based on Hazen's Approximation). This is underlain by the second unit consisting of finer-grained silty sand to sandy silt to clayey sandy silt layer that is approximately 1.9 m to 3.4 m thick with an estimated hydraulic conductivity of 1.0 x 10^{-8} m/s (based on Hazen's Approximation) to 3.8 x 10^{-9} (based on slug tests results in Table 3). The third unit is the shale/limestone bedrock unit that extends below the well depths with an approximate thickness of 250 m (OGS Mapping) and an estimated hydraulic conductivity of 9.4 x 10^{-7} m/s to 1.1 x 10^{-6} m/s (Table 3). Since all groundwater level measurements were only observed within the second and third unit, the first unit will not be considered in the following groundwater velocity calculations.

3.4 Groundwater Velocity

Groundwater velocity was calculated for the above-noted units and summarized in Table 4 below, assuming a porosity of 0.3 and gradient of 0.06 m/m for the clayey sandy silt unit and an effective porosity of 0.05 and gradient of 0.03 m/m for the shale/limestone unit.

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Table 4: Estimated Hydraulic Conductivity and Groundwater Velocity

STRATIGRAPHIC UNIT	ESTIMATED HYDRAULIC CONDUCTIVITY (m/s)		ESTIMATED VELOCITY (m/y)	
	Lower bound	Upper bound	Lower bound	Upper bound
Clayey sandy silt	3.8×10^{-9}	1.0×10^{-8}	0.02	0.06
Shale/limestone	9.4×10^{-7}	1.1×10^{-6}	18	21

3.5 Groundwater Quality

One unfiltered sample was collected from MW19-11 on July 5, 2019 and analyzed by a Canadian laboratory accredited and licensed by Canadian Association for Laboratory Association. The sample was analyzed for the parameters listed in the Toronto Municipal Code (Chapter 681-Sewers) requirements for sanitary and combined sewers and storm sewer discharge.

The results for the groundwater analysis meet all the limits set for sanitary and combined sewers discharge and storm sewer discharge except for the following parameters in Table 5. A full summary of the results in comparison to the City limits are provided in **Appendix C**.

Table 5: Comparison with Limits for Sanitary and Combined Sewer and Storm Sewer Discharge

PARAMETER	GROUNDWATER ANALYSIS SAMPLE FOR MW19-11 (mg/L)	SANITARY AND COMBINED SEWER		STORM SEWER	
		LIMIT (mg/L)	MEETS REQUIREMENT	LIMIT (mg/L)	MEETS REQUIREMENT
Total Suspended Solids	1540	350	No	15	No
Total Manganese	0.676	5	Yes	0.05	No
Total PAHs	0.0048	0.005	Yes	0.002	No

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4 Recommendations

4.1 Groundwater Extraction and Discharge

Assuming a dewatering area of approximately 1400 m^2, a seasonally high water table elevation of 87.5 mASL, a dewatering base elevation of 83.7 mASL (underside of the proposed underground floor slab), and an assumed impermeable layer elevation of 80.0 mASL, the short-term and long-term groundwater daily volumes are summarized in **Table 6** below.

Table 6: Total Short-term and Long-term Daily Groundwater Volumes

	WITH FOS = 1.5			WITHOUT FOS		
	GROUND WATER SEEPAGE (L/DAY)	DESIGN RAINFALL EVENT (L/DAY)	TOTAL GROUND WATER VOLUME (L/DAY)	GROUND WATER SEEPAGE (L/DAY)	DESIGN RAINFALL EVENT (L/DAY)	TOTAL GROUND WATER VOLUME (L/DAY)
Short-Term	83,800	35,000	118,800	55,900	35,000	90,900
Long-Term	86,600	16,200	102,800	57,700	16,200	73,900

Under the Ontario Regulation (O.Reg.) 63/16 Registrations Under Part II.2 of the Environmental Protection Act – Water Taking, if water takings from ground water and/or stormwater that are between 50,000 L/day and 400,000 L/day on any day are registered under and prescribed by the Environmental Activity and Sector Registry (EASR) for the purposes of construction site dewatering, a Permit To Take Water (PTTW) is not required. For water takings below 50,000 L/day, EASR registration is not required but all EASR activity requirements must be met. However, considering the variability in groundwater levels, it should be assumed that the groundwater volumes could exceed 50,000 L/day on any day. As such, an EASR registration must be made.

4.1.1 Short-Term Groundwater Control Requirements (Construction)

Excavations must be made per the recommendations in the Geotechnical Report. Based on the borehole investigation, groundwater seepage is anticipated where the excavations will be made below the groundwater level. It is assumed that the groundwater elevation would be lowered to 0.5 m below the bottom of the excavation during construction, at an approximate elevation of 83.2 mASL, using a standard sump pump or equivalent and that effort would be made to prevent loss of fines during dewatering. A 25 mm design rainfall event was used to estimate the daily rainfall volume based on historical climate data for Toronto, Ontario. A summary of assumed parameters is provided in **Appendix E**.

4.1.2 Long-Term Groundwater Control Requirements (Post-Construction)

A final foundation design was not available at the time of this report. For the purpose of this investigation, a dewatering elevation of 83.5 mASL or 0.2 m below the lowest floor elevation (underside of the proposed underground floor slab) is assumed, based on the recommendations in the Geotechnical Investigation Report. A 2-year design storm was used to estimate the long-term daily rainfall volume, assuming 60% total runoff and attenuation from the roof to the stormwater drainage system and green roof technology. A summary of assumed parameters is provided in **Appendix E**.

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4.2 Evaluation of Impacts

4.2.1 Nearby Water Well Records

According to the Ontario Water Well Records, one pre-existing water well is present within a 100 m radius from the Site prior to the field investigation. The recorded stratigraphy at this well, ID 7256318 (#A189611), denoted as BH 4732C in this report, was similar to what was encountered in the boreholes with weathered shale bedrock at 3.4 mBGS a water depth of 1.8 mBGS. The well is for monitoring purposes only, and due to its shallow nature we assume dewatering would not need to consider protection to this monitoring well. At least five other test holes or monitoring wells were identified within 250 m of the site which noted shale/limestone bedrock depths of 2.1 to 3.0 mBGS. However, no water levels were recorded at these locations.

4.3 Proposed Mitigation Measures and Monitoring Plan

As described in Section 3.5 of this report, there were exceedances in the City of Toronto limits for Total Suspended Solids in the Sanitary and Combined Sewer and Total Manganese, Total PAH and Total Suspended Solids for the Stormwater Sewer. Therefore, water removed during construction would require treatment prior to discharge to either of the sewer systems and monitored for quality control. According to the Wet Weather Flow Management Policy, the City of Toronto also requires the long-term average removal of 80% of Total Suspended Solids on an annual loading basis from all runoff leaving site. Options for dewatering and water management techniques will be determined in consultation with the excavation contractor and submitted to the City of Toronto for approval. It is also proposed that additional water level monitoring be performed in the Spring to assess potential seasonal variations.

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5 Construction Supervision and Limitations

The data, conclusions and recommendations which are presented in this hydrogeological review report, and the quality thereof, are based on a scope of work authorized by the Client. While we believe the borehole and monitoring well information to be representative of Site conditions in the investigated areas, subsurface conditions between and beyond sampled locations may vary. If significant differences in any of the subsurface conditions described in this report are found, PRI should be contacted immediately to revise our findings and recommendations, if necessary.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. PRI accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

We trust this meets your current requirement, please don't hesitate to contact the undersigned if you have any questions.

Yours truly,
PRI Engineering Inc.

Jelica Garcia, M.A.Sc.
Geotechnical Project Coordinator

Reviewed by:

LICENSED PROFESSIONAL ENGINEER
A. YAZDANI
100173202
Nov. 18/19
PROVINCE OF ONTARIO

Arash Yazdani, P.Eng.
Director of Engineering Services

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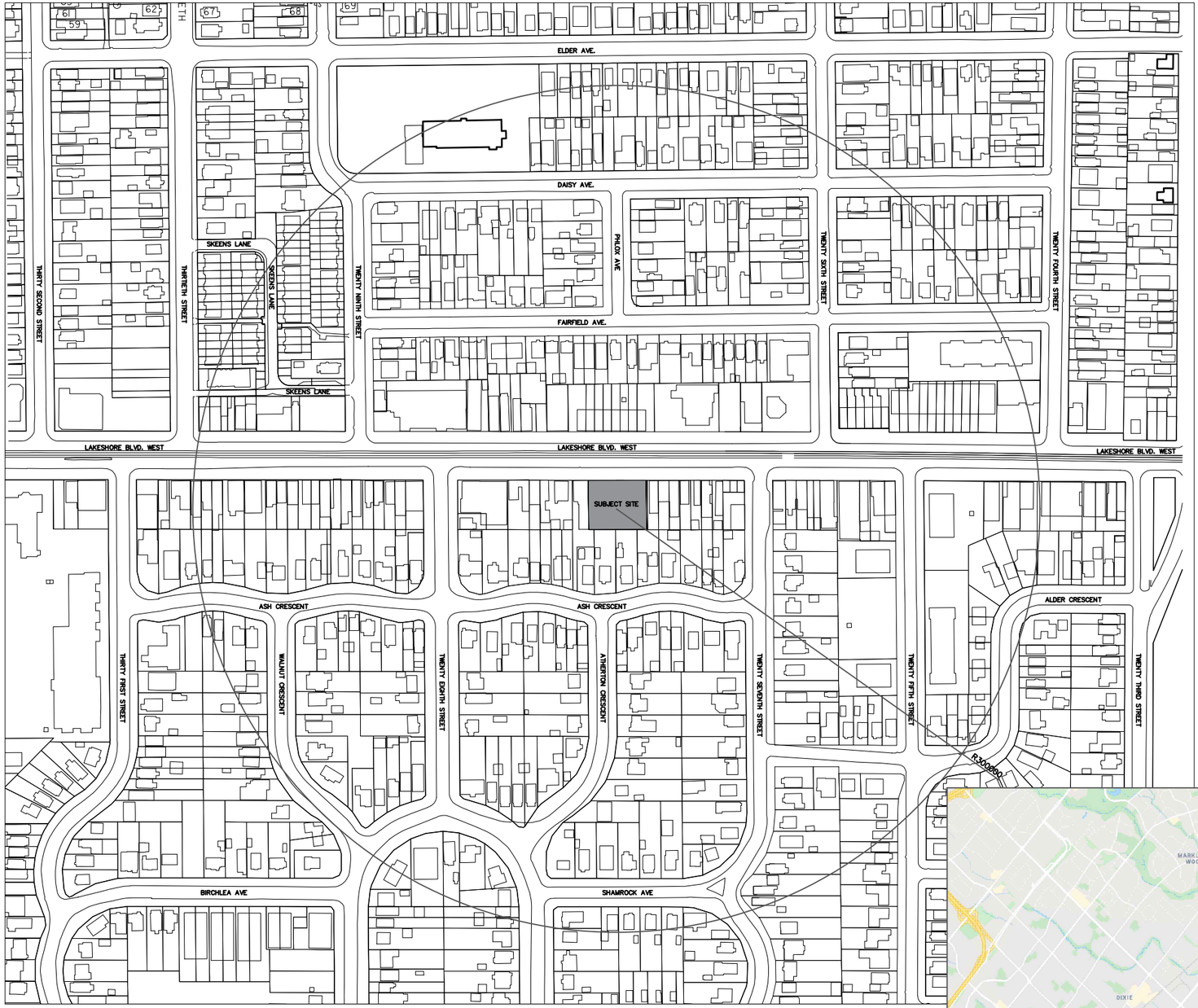
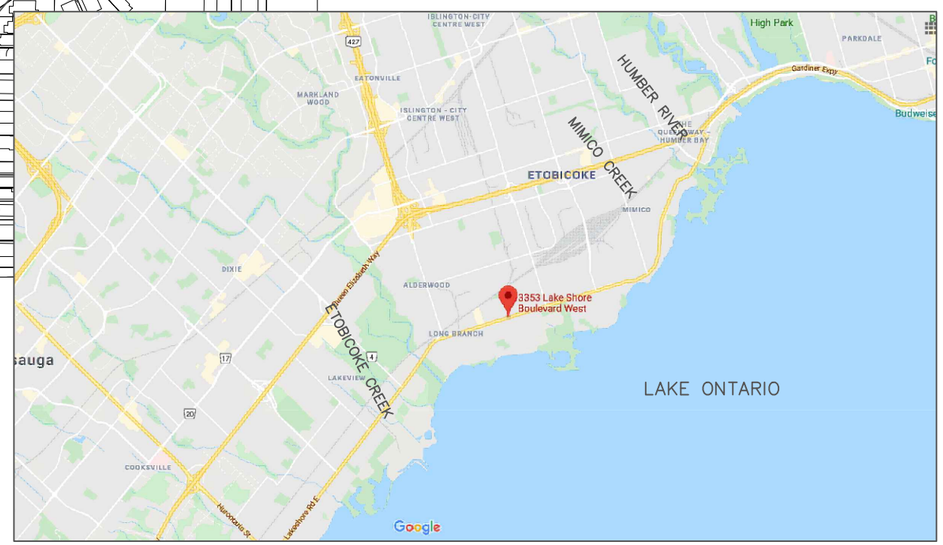
Figures





NOTES:
1. PROPOSED CONDITIONS LAYOUT AS PER 3353-3359 LAKESHORE BLVD WEST, SITE PLAN DRAWING PACKAGE NO. A100 PREPARED BY ICON ARCHITECTS, DATED NOVEMBER 11, 2019.
2. NEARBY WATERSHED LOCATIONS OBTAINED FROM TORONTO AND REGION CONSERVATION AUTHORITY FLOOD PLAIN MAP.

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TEL: 419-840-3358
www.apria.ca

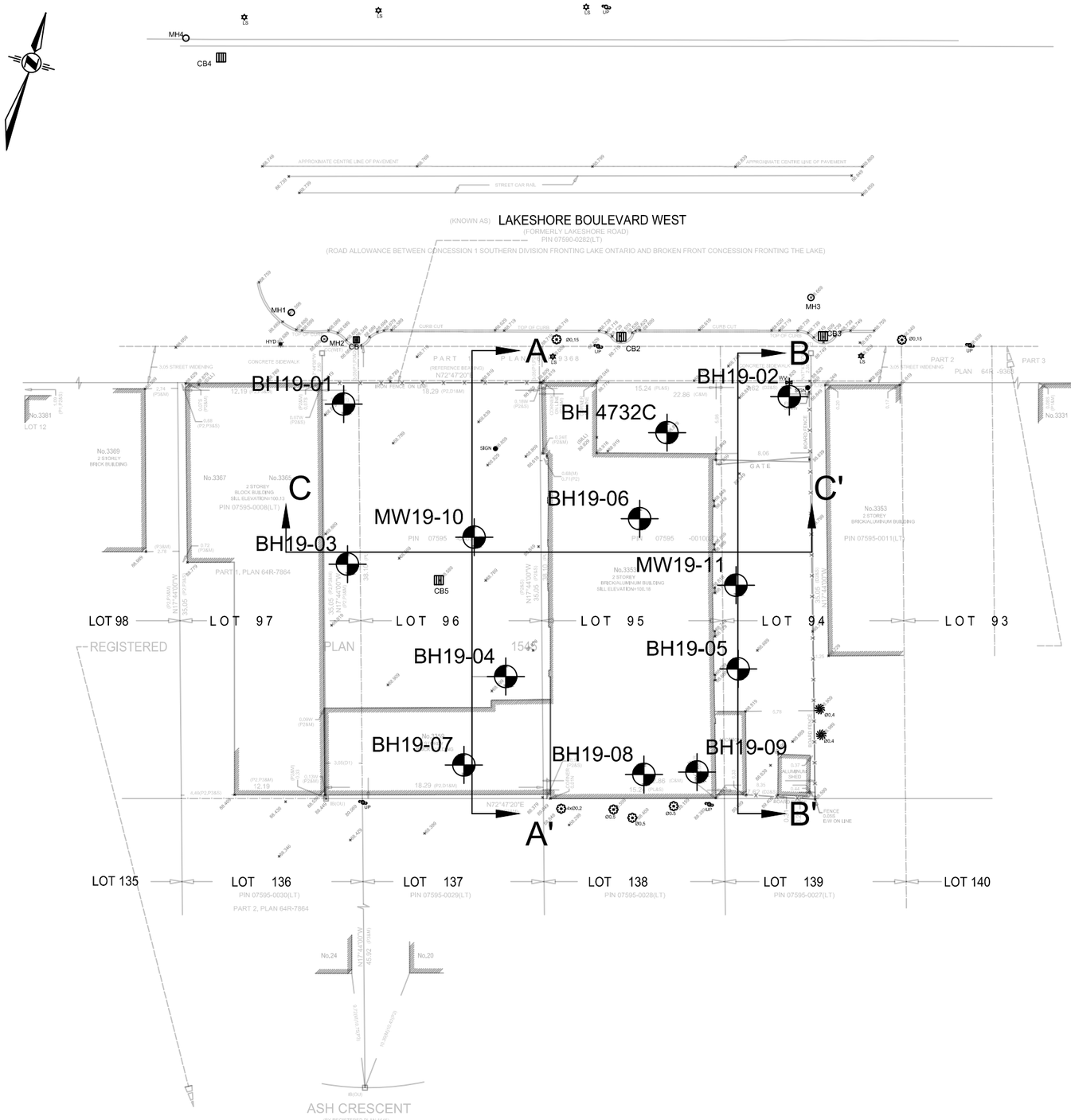
REV NO.	ISSUANCE	DATE
0	ISSUED FOR REPORT	13NOV19

PROJECT NAME:
PROPOSED MULTI STOREY MIXED USE DEVELOPMENT
3353-3359 LAKESHORE BLVD W

DRAWING NAME:
STUDY AREA

PROJ. NO.:	DWG. BY:	CHKD. BY:	APPR. BY:
19-0026	JG	AY	AY

DRAWING NUMBER: FIGURE 1



0 10 20 Meters

SCALE 1:400

LEGEND

□	DENOTES SURVEY MONUMENT PLANTED
▨	DENOTES SURVEY MONUMENT FOUND
SIB	DENOTES STANDARD IRON BAR
CC	DENOTES CUT CROSS
IB	DENOTES IRON BAR
IP	DENOTES IRON PIPE
M	DENOTES MEASURED
S	DENOTES SET
C	DENOTES CALCULATED
WIT	DENOTES WITNESS
PL	DENOTES REGISTERED PLAN 1545
P1	DENOTES PLAN 64R-9368
P2	DENOTES PLAN BY DUNNING AND TAYLOR LTD., O.L.S. DATED NOVEMBER 3, 1993
P3	DENOTES 64R-7864
D1	DENOTES INST. No.TB469971
D2	DENOTES INST. No.TB371082
OU	DENOTES ORIGIN UNKNOWN
SIGN	DENOTES SIGN POLE
UP	DENOTES UTILITY POLE
LS	DENOTES LAMP STANDARD
WV	DENOTES WATER VSLVE
CB	DENOTES CATCH BASIN
MH	DENOTES MANHOLE
HYD	DENOTES FIRE HYDRANT
SIGN	DENOTES SIGN POLE
Ø	DENOTES DIAMETER
100.10	DENOTES EXISTING ELEVATION
	DENOTES TREE
	DENOTES PINE TREE
BH19-##	DENOTES APPROXIMATE BOREHOLE LOCATION AND DESIGNATION

NOTES:

1. PROPERTY PARCEL DEVELOPED FROM *SURVEYOR'S REAL PROPERTY REPORT* PART 1) PLAN AND TOPOGRAPHIC DETAIL OF LOTS 95,96 AND PART OF LOTS 94 AND 97 REGISTERED PLAN 1545, CITY OF TORONTO (FORMERLY CITY OF ETOBICOKE) JOB No. 15515 DATE FEBRUARY 22,2016 BY: *VLADIMIR DOSEN SURVEYING.*
2. SURVEY PLAN WAS UPDATED TO GEODETIC AND UTM ZONE NAD 83 17 NORTH, BY PRI ENGINEERING INC, SURVEY COMPLETED JULY 23,2019.
3. HISTORICAL GROUNDWATER MONITORING WELL DESIGNATED AS BH 4732C INSTALLED BY *TANKTEK ENVIRONMENTAL SERVICES LTD.* ON OCTOBER 5, 2015.

BOREHOLE LOCATION			
ID	NORTHING	EASTING	ELEVATION
BH19-01	4828052.391	618953.93	89.0
BH19-02	4828064.614	618989.273	88.8
BH19-03	4828039.571	618958.379	89.0
BH19-04	4828034.572	618974.089	88.9
BH19-05	4828041.364	618992.228	88.7
BH19-06	4828050.9	618980.2	88.1
BH19-07	4828026.5	618973.0	89.0
BH19-08	4828029.8	618989.7	88.4
BH19-09	4828031.5	618992.8	88.2
MW19-10	4828045.058	618967.846	88.7
MW19-11	4828048.015	618989.928	88.8
BH 4732C	4828058.474	618980.441	88.8

STRUCTURE INVERTS					
ID	ELEVATION	NORTH	EAST	SOUTH	WEST
MH1	88.599	-	86.66	-	86.60
MH2	88.699	-	86.10	-	86.05
MH3	88.699	-	-	87.30	87.30
MH4	88.625	-	-	-	-
CB1	88.549	87.65	87.85	-	87.85
CB2	88.579	-	87.93 87.53	-	87.93
CB3	88.609	87.56	87.91	-	87.91
CB4	88.548	-	-	-	-
CB5	88.589	-	88.58	-	-

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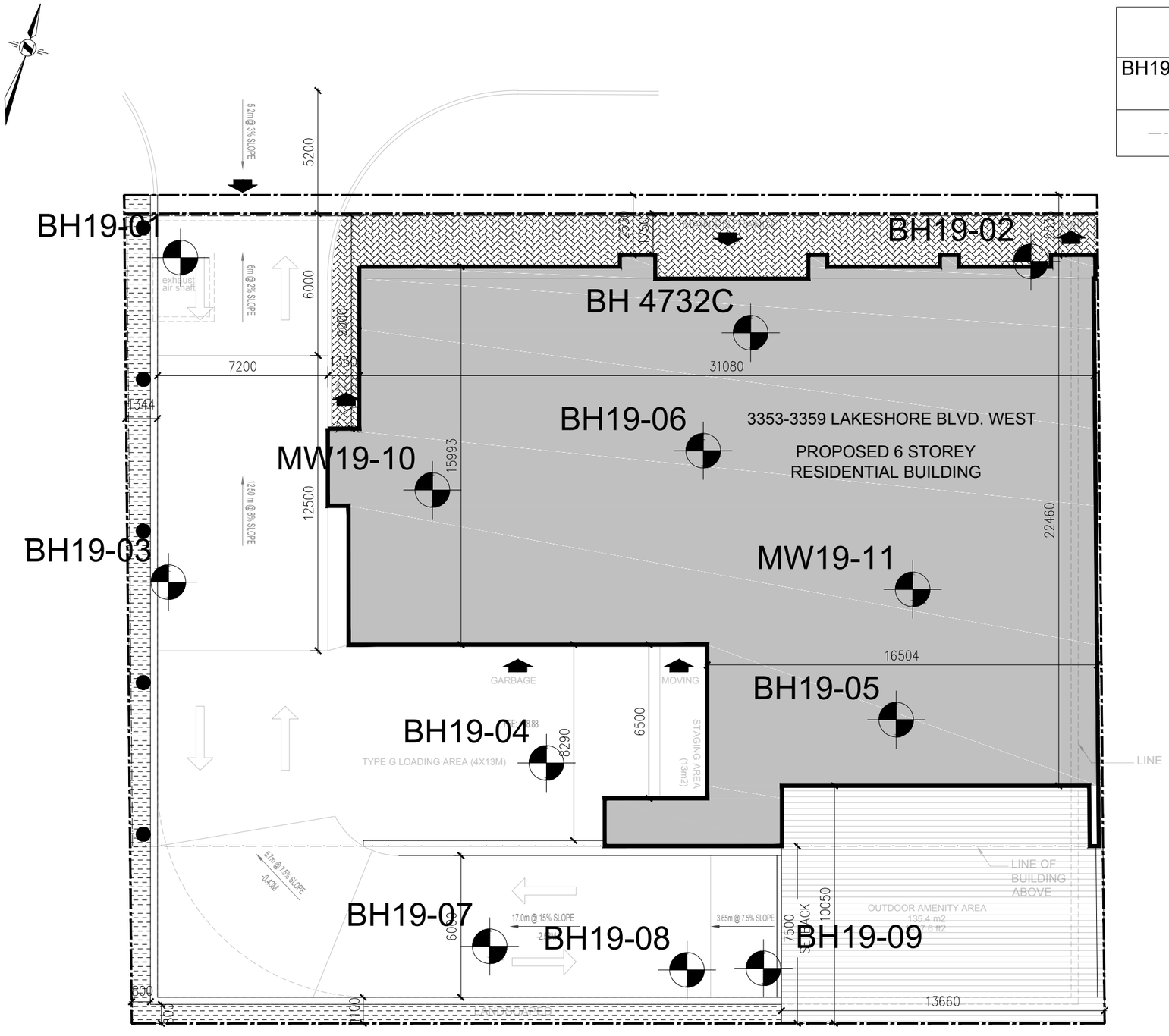
REV NO.	ISSUANCE	DATE
0	ISSUED FOR REPORT	16SEP19

PROJECT NAME:
PROPOSED MULTI STOREY MIXED USE DEVELOPMENT
3353-3359 LAKSHORE BLVD W

DRAWING NAME:
EXISTING CONDITIONS BOREHOLE LOCATION SITE PLAN

PROJ. NO.:	DWG. BY:	CHKD. BY:	APPR. BY:
19-0026	AYJr	GK	AY

DRAWING NUMBER: FIGURE 2



LEGEND	
BH19-##	DENOTES APPROXIMATE BOREHOLE LOCATION AND DESIGNATION
—·—·—	PROPERTY LINE

1. HISTORICAL GROUNDWATER MONITORING WELL DESIGNATED AS BH 4732C INSTALLED BY *TANKTEK ENVIRONMENTAL SERVICES LTD.* ON OCTOBER 5, 2015.
2. PROPOSED CONDITIONS LAYOUT AS PER 3353-3359 LAKESHORE BLVD WEST, SITE PLAN DRAWING PACKAGE, PREPARED BY *ICON ARCHITECTS*, DATED NOVEMBER 11,2019.
3. ALL DIMENSIONS IN mm, UNLESS OTHERWISE NOTED.

BOREHOLE LOCATION

ID	NORTHING	EASTING	ELEVATION
BH19-01	4828052.391	618953.93	89.0
BH19-02	4828064.614	618989.273	88.8
BH19-03	4828039.571	618958.379	89.0
BH19-04	4828034.572	618974.089	88.9
BH19-05	4828041.364	618992.228	88.7
BH19-06	4828050.9	618980.2	88.1
BH19-07	4828026.5	618973.0	89.0
BH19-08	4828029.8	618989.7	88.4
BH19-09	4828031.5	618992.8	88.2
MW19-10	4828045.058	618967.846	88.7
MW19-11	4828048.015	618989.928	88.8
BH 4732C	4828058.474	618980.441	88.8

DRAWING IS NOT TO SCALE

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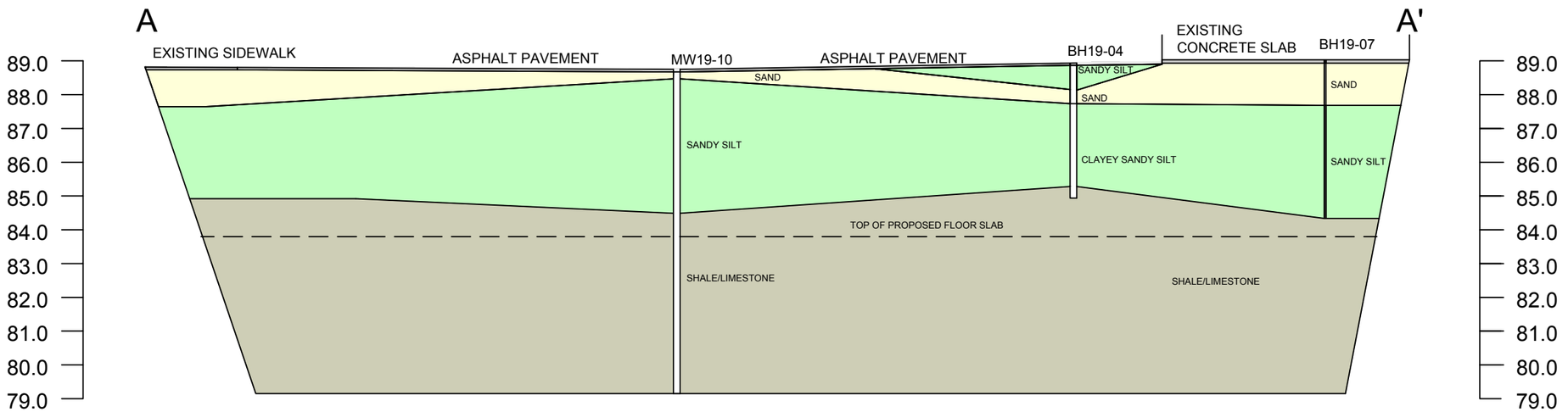
REV NO.	ISSUANCE	DATE
1	ISSUED FOR REPORT	13NOV19
0	ISSUED FOR REPORT	16SEP19

PROJECT NAME:
PROPOSED MULTI STOREY
MIXED USE DEVELOPMENT
3353-3359 LAKESHORE BLVD W

DRAWING NAME:
PROPOSED CONDITIONS
BOREHOLE LOCATION
SITE PLAN

PROJ. NO.:	DWG. BY:	CHKD. BY:	APPR. BY:
19-0026	AYJr	GK	AY

DRAWING NUMBER: FIGURE 2



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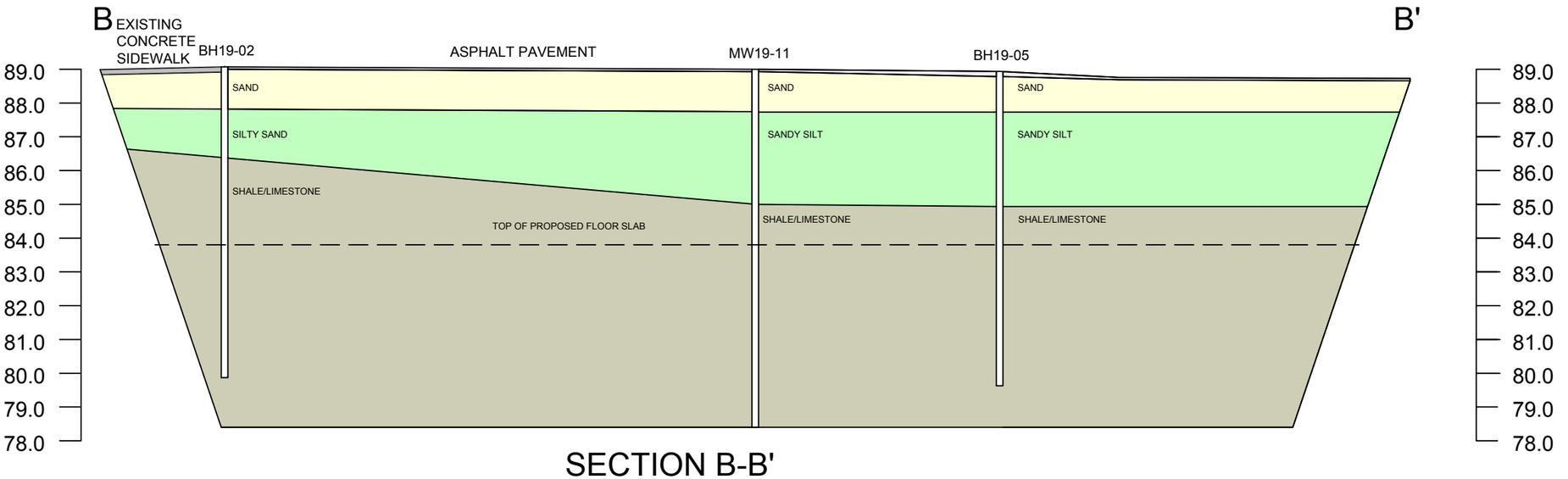

SECTION B-B'
SCALE 1:150

LEGEND

- GRAVEL AND SAND TO SAND
- SILTY SAND TO CLAYEY SANDY SILT
- SHALE/LIMESTONE
- CONCRETE
- ASPHALT
- TOP OF PROPOSED FLOOR SLAB

NOTES:
1. PROPERTY PARCEL DEVELOPMENT FROM SURVEYOR'S REAL PROPERTY REPORT PART 1) PLAN AND TOPOGRAPHIC DETAIL OF LOTS 95,96 AND PART OF LOTS 94 AND 97 REGISTERED PLAN 1545,CITY OF TORONTO (FORMERLY CITY OF ETOBICOKE) JOB No. 15515 DATE FEBRUARY 22,2016 BY: VLADIMIR DOSEN SURVEYING.
2. SURVEY PLAN WAS UPDATED TO GEODETIC AND UTM ZONE NAD 83 17 NORTH, BY PRI ENGINEERING INC, SURVEY COMPLETED JULY 23,2019.
3. HISTORICAL GROUNDWATER MONITORING WELL DESIGNATED AS BH 4732C INSTALLED BY TANKTER ENVIRONMENTAL SERVICES LTD. ON OCTOBER 5, 2015.
4. PROPOSED CONDITIONS LAYOUT AS PER 3353-3359 LAKESHORE BLVD WEST, SITE PLAN DRAWING PACKAGE, PREPARED BY ICON ARCHITECTS, DATED JULY 8,2019.

PRI ENGINEERING
6889 REXWOOD UNIT 5,
MISSISSAUGA ON L4V 1R2
TEL: 416-860-6722 FAX: 416-860-6719
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APRIA
144 FRONT STREET WEST, SUIT 310
TORONTO ON M5J 2L7
TEL: 419-840-3358
www.apria.ca

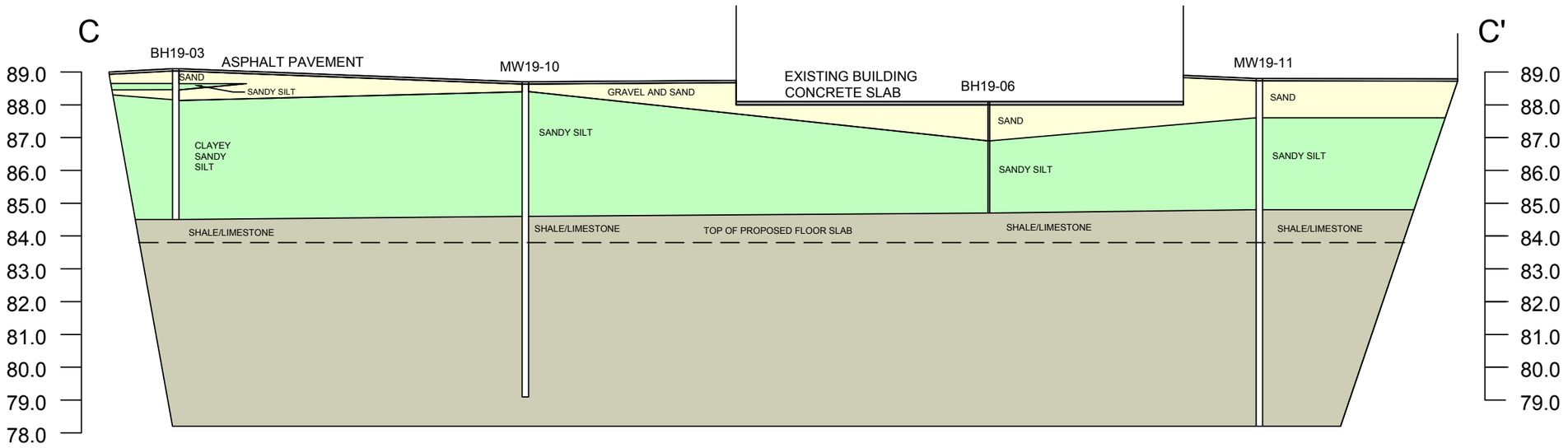
REV NO.	ISSUANCE	DATE
1	ISSUED FOR REPORT	13NOV19
0	ISSUED FOR REPORT	17SEP19

PROJECT NAME:
PROPOSED MULTI STOREY
MIXED USE DEVELOPMENT
3353-3359 LAKESHORE BLVD W

DRAWING NAME:
EXISTING CONDTIONS
CROSS SECTIONS

PROJ. NO.:	DWG. BY:	CHKD. BY:	APPR. BY:
19-0026	AYJr	GK	AY

DRAWING NUMBER: FIGURE 3



SECTION C-C'

SCALE 1:150

LEGEND

- GRAVEL AND SAND TO SAND
- SILTY SAND TO CLAYEY SANDY SILT
- SHALE/LIMESTONE
- CONCRETE
- ASPHALT
- TOP OF PROPOSED FLOOR SLAB

NOTES:

1. PROPERTY PARCEL DEVELOPMENT FROM SURVEYOR'S REAL PROPERTY REPORT PART 1) PLAN AND TOPOGRAPHIC DETAIL OF LOTS 95,96 AND PART OF LOTS 94 AND 97 REGISTERED PLAN 1545,CITY OF TORONTO (FORMERLY CITY OF ETOBICOKE) JOB No. 15515 DATE FEBRUARY 22,2016 BY: VLADIMIR DOSEN SURVEYING.
2. SURVEY PLAN WAS UPDATED TO GEODETIC AND UTM ZONE NAD 83 17 NORTH, BY PRI ENGINEERING INC, SURVEY COMPLETED JULY 23,2019.
3. HISTORICAL GROUNDWATER MONITORING WELL DESIGNATED AS BH 4732C INSTALLED BY TANKTER ENVIRONMENTAL SERVICES LTD. ON OCTOBER 5, 2015.
4. PROPOSED CONDITIONS LAYOUT AS PER 3353-3359 LAKESHORE BLVD WEST, SITE PLAN DRAWING PACKAGE, PREPARED BY ICON ARCHITECTS, DATED JULY 8,2019.

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REV NO.	ISSUANCE	DATE
1	ISSUED FOR REPORT	13NOV19
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PROJECT NAME:
PROPOSED MULTI STOREY
MIXED USE DEVELOPMENT
3353-3359 LAKESHORE BLVD W

DRAWING NAME:
EXISTING CONDTIONS
CROSS SECTIONS

PROJ. NO.:	DWG. BY:	CHKD. BY:	APPR. BY:
19-0026	AYJr	GK	AY

DRAWING NUMBER: FIGURE 4

Appendix A

Borehole Explanation Form,
Borehole Logs

BOREHOLE LOG EXPLANATION FORM

This explanatory section provides the background to assist in the use of the borehole logs. Each of the headings used on the borehole log, is briefly explained.

DEPTH

This column gives the depth of interpreted geologic contacts in metres below ground surface.

STRATIGRAPHIC DESCRIPTION

This column gives a description of the soil based on a tactile examination of the samples and/or laboratory test results. Each stratum is described according to the following classification and terminology.

Soil Classification*		Terminology	Proportion
Silt & Clay	< 0.075 mm	"trace" (e.g. trace sand)	<10%
Sand	0.075 to 4.75 mm	"some" (e.g. some sand)	10% - 20%
Gravel	4.75 to 75 mm	adjective (e.g. sandy)	20% - 35%
Cobbles	75 to 300 mm	"and" (e.g. and sand)	35% - 50%
Boulders	>300 mm	noun (e.g. sand)	>50%

* Extension of USCS Classification system unless otherwise noted.

The use of the geologic term "till" implies that both disseminated coarser grained (sand, gravel, cobbles or boulders) particles and finer grained (silt and clay) particles may occur within the described matrix.

The compactness of cohesionless soils and the consistency of cohesive soils are defined by the following:

COHESIONLESS SOIL		COHESIVE SOIL	
Compactness	Standard Penetration Resistance "N", Blows / 0.3 m	Consistency	Standard Penetration Resistance "N", Blows / 0.3 m
Very Loose	0 to 4	Very Soft	0 to 2
Loose	4 to 10	Soft	2 to 4
Compact	10 to 30	Firm	4 to 8
Dense	30 to 50	Stiff	8 to 15
Very Dense	Over 50	Very Stiff	15 to 30
		Hard	Over 30

The moisture conditions of cohesionless and cohesive soils are defined as follows.

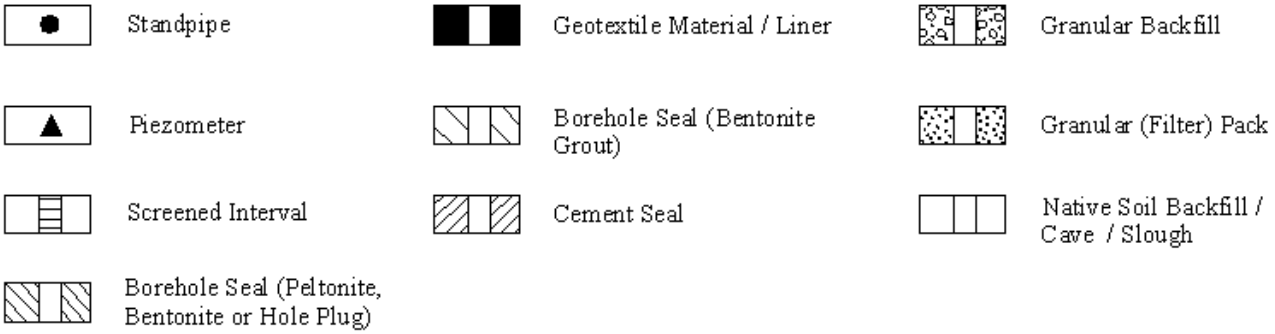
COHESIONLESS SOILS	COHESIVE SOILS		
Dry	DTPL	-	Drier Than Plastic Limit
Moist	APL	-	About Plastic Limit
Wet	WTPL	-	Wetter Than Plastic Limit
Saturated	MWTPL	-	Much Wetter Than Plastic Limit

STRATIGRAPHY

Symbols may be used to pictorially identify the interpreted stratigraphy of the soil and rock strata.

MONITOR DETAILS

This column shows the position and designation of standpipe and/or piezometer ground water monitors installed in the borehole. Also the water level may be shown for the date indicated.



Where monitors are placed in separate boreholes, these are shown individually in the "Monitor Details" column. Otherwise, monitors are in the same borehole. For further data regarding seals, screens, etc., the reader is referred to the summary of monitor details table.

SAMPLE

These columns describe the sample type and number, the "N" value, the water content, the percentage recovery, and Rock Quality Designation (RQD), of each sample obtained from the borehole where applicable. The information is recorded at the approximate depth at which the sample was obtained. The legend for sample type is explained below.

SS	=	Split Spoon	GS	=	Grab Sample
ST	=	Thin Walled Shelby Tube	CS	=	Channel Sample
AS	=	Auger Flight Sample	WS	=	Wash Sample
CC	=	Continuous Core	RC	=	Rock Core

$$\% \text{ Recovery} = \frac{\text{Length of Core Recovered Per Run}}{\text{Total Length of Run}} \times 100$$

Where rock drilling was carried out, the term RQD (Rock Quality Designation) is used. The RQD is an indirect measure of the number of fractures and soundness of the rock mass. It is obtained from the rock cores by summing the length of core recovered, counting only those pieces of sound core that are 100 mm or more in length. The RQD value is expressed as a percentage and is the ratio of the summed core lengths to the total length of core run. The classification based on the RQD value is given below.

RQD Classification	RQD (%)
Very poor quality	< 25
Poor quality	25 - 50
Fair quality	50 - 75
Good quality	75 - 90
Excellent quality	90 - 100

TEST DATA

The central section of the log provides graphs which are used to plot selected field and laboratory test results at the depth at which they were carried out. The plotting scales are shown at the head of the column.

Dynamic Penetration Resistance - The number of blows required to advance a 51 mm diameter, 60º steel cone fitted to the end of 45 mm OD drill rods, 0.3 m into the subsoil. The cone is driven with a 63.5 kg hammer over a fall of 750 mm.

Standard Penetration Resistance - Standard Penetration Test (SPT) "N" Value - The number of blows required to advance a 51 mm diameter standard split-spoon sampler 300 mm into the subsoil, driven by means of a 63.5 kg hammer falling freely a distance of 750 mm. In cases where the split spoon does not penetrate 300 mm, the number of blows over the distance of actual penetration in millimetres is shown as $\frac{xBlows}{mm}$

Water Content - The ratio of the mass of water to the mass of oven-dry solids in the soil expressed as a percentage.

W_P - Plastic Limit of a fine-grained soil expressed as a percentage as determined from the Atterberg Limit Test.

W_L - Liquid Limit of a fine-grained soil expressed as a percentage as determined from the Atterberg Limit Test.

REMARKS

The last column describes pertinent drilling details, field observations and/or provides an indication of other field or laboratory tests that were performed.

BORING NUMBER BH19-01

PRI ENGINEERING

CLIENT Apria Inc.
PROJECT NAME Proposed Multi-Storey Mixed Use Development
PROJECT NUMBER 19-0026
PROJECT LOCATION 3353-3359 Lakeshore Blvd W, Etobicoke, ON
DATE STARTED 5-27-19 **COMPLETED** 5-27-19
GROUND ELEVATION 89.0 mASL
DRILLING CONTRACTOR Landshark Drilling Inc.
GROUND WATER LEVELS:
DRILLING METHOD 108 mm I.D. HSA/108 mm O.D. Tri-cone Coring Bit
LOGGED BY AYJr **CHECKED BY** GK
AT END OF DRILLING ---
NOTES
AFTER DRILLING 4.6 m / Elev 84.4 mASL upon completion of MW installation

DEPTH (m)	ELEVATION (mASL)	GRAPHIC LOG	MATERIAL DESCRIPTION	MONITOR WELL DETAILS	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (kPa)	MOISTURE CONTENT (%)	SPT N VALUE / PL MC LL / FINES CONTENT (%)	REMARKS AND TESTS
	89.0										
0.1	88.9		ASPHALT (70 mm)								
			Brown to grey GRAVEL AND SAND, trace silt, trace clay, occasional cobbles, moist, compact to loose		SS 1	79	3-10-12-10 (22)		13		Borehole was open upon completion of drilling.
					SS 2	42	1-3-3-4 (6)		12		GSA SS2 Gravel: 48% Sand: 36% Silt & Clay:16%
1.2	87.8		Light brown to grey SANDY SILT, some gravel, trace clay, moist, compact		SS 3	63	2-7-9-12 (16)		14		
2.0	87.0				SS 4	100	3-9-12-15 (21)		16		Auger refusal at 0.91 mBGS due to presumed cobble/boulder, borehole moved approximately 0.7 m to avoid obstruction.
					SS 5	79	3-10-11-8 (21)		11		
					SS 6	63	4-8-9-10 (17)		12		
3.7	85.3				SS 7	50	50/102			>>	
4.0	85.0		Dark grey SHALE/LIMESTONE bedrock, moderate to high weathering, very weak, laminated to thinly bedded								
4.5	84.5		Boring was advanced with 108 mm O.D. tri-cone coring bit below 4.5 mBGS, to install monitoring well.		SS 8	100	37-50/127			>>	
6.0	83.0										
8.0	81.0		Borehole terminated upon SHALE/LIMESTONE bedrock at 9.6 mBGS.								

BORING NUMBER BH19-02

PRI ENGINEERING

CLIENT Apria Inc.
PROJECT NAME Proposed Multi-Storey Mixed Use Development
PROJECT NUMBER 19-0026
PROJECT LOCATION 3353-3359 Lakeshore Blvd W, Etobicoke, ON
DATE STARTED 5-28-19 **COMPLETED** 5-28-19
GROUND ELEVATION 88.8 mASL
DRILLING CONTRACTOR Landshark Drilling Inc.
GROUND WATER LEVELS:
DRILLING METHOD 108 mm I.D. HSA/96 mm O.D. HQ Coring Bit
LOGGED BY AYJr **CHECKED BY** GK
AT END OF DRILLING 3.1 m / Elev 85.7 mASL
AFTER DRILLING 3.5 m / Elev 85.3 mASL upon completion of MW installation
NOTES

DEPTH (m)	ELEVATION (mASL)	GRAPHIC LOG	MATERIAL DESCRIPTION	MONITOR WELL DETAILS	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (kPa)	MOISTURE CONTENT (%)	SPT N VALUE / PL MC LL / FINES CONTENT (%)	REMARKS AND TESTS
	88.8									20 40 60 80	
0.1	88.7		ASPHALT (70 mm)								
			Greyish brown to brown SAND, some gravel, silty to some silt, trace clay, some red brick and asphalt debris, moist, loose		SS 1	71	7-4-4-6 (8)		15		Borehole was open upon completion of drilling.
					SS 2	33	2-6-5-4 (11)		16		
1.2	87.6		Brown to light brown SILTY SAND, some clay, trace gravel, moist, compact to very loose		SS 3	63	2-2-2-2 (4)		27		UW SS3 19.0 kN/m3
					SS 4	63	1-2-1-3 (3)				GSA SS4 Gravel: 0% Sand: 53% Silt & Clay: 47%
2.0	86.8				SS 5	91	5-6-22-50/102			>>	
2.7	86.1		Dark grey SHALE/LIMESTONE bedrock, fresh to moderate weathering, very weak to strong, laminated to thinly bedded		SS 6	63	5-25-50/102			>>	
					RC 1	100 (38)					PLI (Is(50)) RC2 Axial: 5.7 MPa Diametral: 0.1 MPa
4.0	84.8				RC 2	100 (41)					
					RC 3	100 (55)					PLI (Is(50)) RC3 Axial: 0.4 MPa Diametral: 0.1 MPa
6.0	82.8				RC 4	100 (79)					PLI (Is(50)) RC4 Axial: 0.5 MPa Diametral: 0.1 MPa
8.0	80.8				RC 5	100 (59)					PLI (Is(50)) RC5 Axial: 1.6 MPa Diametral: 0.1 MPa
9.1	79.7		Borehole terminated upon SHALE/LIMESTONE bedrock at 9.1 mBGS.								

BORING NUMBER BH19-03

CLIENT Apria Inc.
PROJECT NAME Proposed Multi-Storey Mixed Use Development
PROJECT NUMBER 19-0026
PROJECT LOCATION 3353-3359 Lakeshore Blvd W, Etobicoke, ON
DATE STARTED 5-29-19 **COMPLETED** 5-29-19
GROUND ELEVATION 89.0 mASL
DRILLING CONTRACTOR Landshark Drilling Inc.
GROUND WATER LEVELS:
DRILLING METHOD 108 mm I.D. HSA
LOGGED BY AYJr **CHECKED BY** GK
AT END OF DRILLING 1.6 m / Elev 87.4 mASL
AFTER DRILLING 1.0 m / Elev 88.0 mASL upon completion of MW installation
NOTES

DEPTH (m)	ELEVATION (mASL)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	MOISTURE CONTENT (%)	REMARKS AND TESTS
	89.0						
0.1	88.9	ASPHALT (70 mm)					
0.3	88.7	Black to dark brown SAND, some gravel, some silt, moist, loose	SS 1	92	4-2-4-5 (6)	17	Borehole was open upon completion of drilling.
0.6	88.4						
0.8	88.2	Brown SANDY SILT, some gravel, trace clay, some asphalt debris, moist, loose	SS 2	67	2-2-2-3 (4)	16	
		Greyish brown SAND, some gravel, some silt, moist, loose	SS 3	100	3-7-12-21 (19)	15	
2.0	87.0	Light brown to grey CLAYEY SANDY SILT, trace gravel, slightly plastic, moist, loose to dense	SS 4	100	6-12-22-22 (34)	16	UW SS4 22.2 kN/m3
			SS 5	58	7-13-18-18 (31)		GSA SS6 Gravel: 7% Sand: 32% Silt & Clay: 61%
			SS 6	67	7-7-7-9 (14)	15	AL SS6 Liquid Limit: 26% Plastic Limit: 18% Plasticity Index: 8%
4.0	85.0		SS 7		26-21-14-50/0	13	>>
4.6	84.4	Dark grey SHALE/LIMESTONE bedrock, moderate weathering, very weak, laminated to thinly bedded					
		Borehole terminated upon on auger refusal SHALE/LIMESTONE bedrock at 4.6 mBGS.					

SPT N VALUE 20 40 60 80
PL MC LL 20 40 60 80
FINES CONTENT (%) 20 40 60 80

BORING NUMBER BH19-04

PRI ENGINEERING

CLIENT Apria Inc.
PROJECT NAME Proposed Multi-Storey Mixed Use Development
PROJECT NUMBER 19-0026
PROJECT LOCATION 3353-3359 Lakeshore Blvd W, Etobicoke, ON
DATE STARTED 5-30-19 **COMPLETED** 5-30-19
GROUND ELEVATION 88.9 mASL
DRILLING CONTRACTOR Landshark Drilling Inc.
GROUND WATER LEVELS:
DRILLING METHOD 108 mm I.D. HSA
LOGGED BY AYJr **CHECKED BY** GK
AT END OF DRILLING ---
NOTES
AFTER DRILLING 1.6 m / Elev 87.3 mASL upon completion of MW installation

DEPTH (m)	ELEVATION (mASL)	GRAPHIC LOG	MATERIAL DESCRIPTION	MONITOR WELL DETAILS	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (kPa)	MOISTURE CONTENT (%)	SPT N VALUE / PL MC LL / FINES CONTENT (%)	REMARKS AND TESTS
	88.9										
0.1	88.8		ASPHALT (70 mm)								
0.6	88.3		Light brown SANDY SILT, some gravel, trace clay, some asphalt debris, moist, loose		SS 1	75	5-5-3-4 (8)		16		Borehole was open upon completion of drilling.
1.2	87.7		Light brown SAND, some gravel, trace silt, moist, loose		SS 2	71	1-2-2-3 (4)		21		
2.0	86.9		Light brown to gray CLAYEY SANDY SILT, trace gravel, slightly plastic, moist, loose to dense		SS 3	50	2-2-7-2 (9)		20		
					SS 4	58	5-7-11-16 (18)		14		GSA SS4 Gravel: 5% Sand: 22% Silt & Clay:73%
					SS 5	4	10-15-15-17 (30)				
3.7	85.2				SS 6	50	15-11-24-33 (35)		14		AL SS4 Liquid Limit: 30% Plastic Limit: 20% Plasticity Index: 10%
4.1	84.8		Dark grey SHALE/LIMESTONE, fresh to moderate weathering, very weak to strong, laminated to thinly bedded		SS 7	29	17-20-50/127			>>	
			Borehole terminated upon SHALE/LIMESTONE bedrock at 4.1 mBGS.								

BORING NUMBER BH19-05

PRI ENGINEERING

CLIENT Apria Inc.
PROJECT NAME Proposed Multi-Storey Mixed Use Development
PROJECT NUMBER 19-0026
PROJECT LOCATION 3353-3359 Lakeshore Blvd W, Etobicoke, ON
DATE STARTED 5-29-19 **COMPLETED** 5-29-19
GROUND ELEVATION 88.7 mASL
DRILLING CONTRACTOR Landshark Drilling Inc.
GROUND WATER LEVELS:
DRILLING METHOD 108 mm I.D. HSA/108 mm O.D. Tri-cone Coring Bit
LOGGED BY AYJr **CHECKED BY** GK
AT END OF DRILLING 2.0 m / Elev 86.7 mASL
AFTER DRILLING 1.5 m / Elev 87.2 mASL upon completion of MW installation
NOTES

DEPTH (m)	ELEVATION (mASL)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	MOISTURE CONTENT (%)	REMARKS AND TESTS
	88.7						
0.2	88.5	ASPHALT (150 mm)					
		Brown SAND, some gravel, some silt, moist, loose	SS 1	100	4-4-4-4 (8)	17	Borehole was open upon completion of drilling.
1.2	87.5		SS 2	63	7-3-3-6 (6)	18	
		Brown to grey SANDY SILT, some gravel, trace clay, moist, compact to dense	SS 3	0	7-9-5-15 (14)		
2.0	86.7		SS 4	88	8-8-12-15 (20)	16	
			SS 5	63	4-8-11-13 (19)	13	
			SS 6	83	5-20-21-17 (41)		UW SS6 24.1 kN/m3
4.0	84.7						
		Auger Refusal on SHALE/LIMESTONE bedrock at 4.0 mBGS Boring was advanced with 108 mm O.D. tri-cone coring bit below 4.0 m BGS, to install monitoring well.					
6.0	82.7						
8.0	80.7						
		Borehole terminated upon SHALE/LIMESTONE bedrock at 9.3 mBGS.					

SPT N VALUE 20 40 60 80
PL MC LL 20 40 60 80
FINES CONTENT (%) 20 40 60 80

BORING NUMBER BH19-06

PRI ENGINEERING

CLIENT Apria Inc.
PROJECT NAME Proposed Multi-Storey Mixed Use Development
PROJECT NUMBER 19-0026
PROJECT LOCATION 3353-3359 Lakeshore Blvd W, Etobicoke, ON
DATE STARTED 5-30-19 **COMPLETED** 5-30-19
GROUND ELEVATION 88.1 mASL
DRILLING CONTRACTOR Kodiak Drilling
GROUND WATER LEVELS:
DRILLING METHOD 51 mm O.D. Direct Push Casing
LOGGED BY IA **CHECKED BY** GK
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (m)	ELEVATION (mASL)	GRAPHIC LOG	MATERIAL DESCRIPTION	MONITOR WELL DETAILS	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (kPa)	MOISTURE CONTENT (%)	SPT N VALUE 20 40 60 80 / PL MC LL 20 40 60 80 / FINES CONTENT (%) 20 40 60 80	REMARKS AND TESTS
	88.1										
0.1	88.0		CONCRETE SLAB (100 mm)								
			Grey to orangey brown SAND, some gravel, some silt, moist		UD 1	25					Borehole was open and dry upon completion of drilling.
1.2	86.9										
			Greyish brown SANDY SILT, some clay, trace gravel, slightly plastic, moist		UD 2	100					
2.0	86.1										
					UD 3	100					
3.4	84.7		Borehole terminated upon SHALE/LIMESTONE bedrock at 3.4 mBGS.								

BORING NUMBER BH19-07

PRI ENGINEERING

CLIENT Apria Inc.
PROJECT NAME Proposed Multi-Storey Mixed Use Development
PROJECT NUMBER 19-0026
PROJECT LOCATION 3353-3359 Lakeshore Blvd W, Etobicoke, ON
DATE STARTED 5-30-19 **COMPLETED** 5-30-19
GROUND ELEVATION 89.0 mASL
DRILLING CONTRACTOR Kodiak Drilling
GROUND WATER LEVELS:
DRILLING METHOD 51 mm O.D. Direct Push Casing
LOGGED BY IA **CHECKED BY** GK
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (m)	ELEVATION (mASL)	GRAPHIC LOG	MATERIAL DESCRIPTION	MONITOR WELL DETAILS	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (kPa)	MOISTURE CONTENT (%)	SPT N VALUE 20 40 60 80 / PL MC LL 20 40 60 80 / FINES CONTENT (%) 20 40 60 80	REMARKS AND TESTS
	89.0										
0.1	88.9		CONCRETE SLAB (100 mm)								
			Orangey brown SAND, some silt, some gravel, moist		UD 1	25					Borehole was open and dry upon completion of drilling.
1.2	87.8		Orangey grey SANDY SILT, some clay, trace gravel, slightly plastic, moist		UD 2	21					
2.0	87.0				UD 3	100					
4.0	85.0				UD 4	100					
4.7	84.3		Borehole terminated upon SHALE/LIMESTONE bedrock at 4.7 mBGS.		UD 5	100					

BORING NUMBER BH19-08

PRI ENGINEERING

CLIENT Apria Inc.
PROJECT NAME Proposed Multi-Storey Mixed Use Development
PROJECT NUMBER 19-0026
PROJECT LOCATION 3353-3359 Lakeshore Blvd W, Etobicoke, ON
DATE STARTED 5-30-19 **COMPLETED** 5-30-19
GROUND ELEVATION 88.4 mASL
DRILLING CONTRACTOR Kodiak Drilling
GROUND WATER LEVELS:
DRILLING METHOD 51 mm O.D. Direct Push Casing
LOGGED BY IA **CHECKED BY** GK
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (m)	ELEVATION (mASL)	GRAPHIC LOG	MATERIAL DESCRIPTION	MONITOR WELL DETAILS	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (kPa)	MOISTURE CONTENT (%)	SPT N VALUE 20 40 60 80 / PL MC LL 20 40 60 80 / FINES CONTENT (%) 20 40 60 80	REMARKS AND TESTS
	88.4										
0.1	88.3		CONCRETE SLAB (100 mm)								
			Dark grey to orangey brown SAND, some gravel, some silt, slight hydrocarbon odour, wet to saturated		UD 1	40					Borehole was open and dry upon completion of drilling.
1.2	87.2		Orangey brown SANDY SILT, some clay, trace gravel, slightly plastic, moist								
					UD 2	100					
2.0	86.4										
					UD 3	100					
2.7	85.7		Borehole terminated upon SHALE/LIMESTONE bedrock at 2.7 mBGS.								

BORING NUMBER BH19-09

PRI ENGINEERING

CLIENT Apria Inc.
PROJECT NAME Proposed Multi-Storey Mixed Use Development
PROJECT NUMBER 19-0026
PROJECT LOCATION 3353-3359 Lakeshore Blvd W, Etobicoke, ON
DATE STARTED 5-30-19 **COMPLETED** 5-30-19
GROUND ELEVATION 88.2 mASL
DRILLING CONTRACTOR Kodiak Drilling
GROUND WATER LEVELS:
DRILLING METHOD 51 mm O.D. Direct Push Casing
LOGGED BY IA **CHECKED BY** GK
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (m)	ELEVATION (mASL)	GRAPHIC LOG	MATERIAL DESCRIPTION	MONITOR WELL DETAILS	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (kPa)	MOISTURE CONTENT (%)	SPT N VALUE 20 40 60 80 / PL MC LL 20 40 60 80 / FINES CONTENT (%) 20 40 60 80	REMARKS AND TESTS
	88.2										
0.1	88.1		CONCRETE SLAB (100 mm)								
			Grey to brown SAND, some gravel, trace silt, slight hydrocarbon odour, saturated to moist		UD 1	31					Borehole was open and dry upon completion of drilling.
1.2	87.0		Grey to brown SANDY SILT, some clay, trace gravel to gravelly, slightly plastic, moist		UD 2	100					
2.0	86.2				UD 3	100					
3.8	84.4		Borehole terminated in SHALE/LIMESTONE bedrock at 3.8 mBGS.		UD 4						

BORING NUMBER MW19-10

CLIENT Apria Inc.
PROJECT NAME Proposed Multi-Storey Mixed Use Development
PROJECT NUMBER 19-0026
PROJECT LOCATION 3353-3359 Lakeshore Blvd W, Etobicoke, ON
DATE STARTED 5-30-19 **COMPLETED** 5-30-19
GROUND ELEVATION 88.7 mASL
DRILLING CONTRACTOR Landshark Drilling Inc.
GROUND WATER LEVELS:
DRILLING METHOD 108 mm I.D. HSA/96 mm O.D. HQ Coring Bit
LOGGED BY AYJr **CHECKED BY** GK
AT END OF DRILLING 1.9 m / Elev 86.8 mASL
AFTER DRILLING 2.1 m / Elev 86.6 mASL upon completion of MW installation
NOTES

DEPTH (m)	ELEVATION (mASL)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	MOISTURE CONTENT (%)	REMARKS AND TESTS
	88.7						
0.1	88.6	ASPHALT (70 mm)					
0.2	88.5	Black GRAVEL and SAND, some silt, some asphalt debris, moist					
		Brown to grey SANDY SILT, some gravel, trace clay, moist, loose to dense	SS 1	67	4-2-2-3 (4)	22	Borehole was open upon completion of drilling.
			SS 2	50	2-10-23-12 (33)	21	
			SS 3	33	21-10-11-11 (21)	16	
2.0	86.7		SS 4	54	17-14-12-14 (26)	15	
			SS 5	0	9-13-23-14 (36)		
			SS 6	33	17-28-18-15 (46)	11	
			SS 7	100	37-50/51	14	>>
4.1	84.6	Dark grey SHALE/LIMESTONE bedrock, fresh to moderately weathered, very weak to strong, laminated to thinly bedded - 20 mm thick clay inclusions encountered at 4.3, 4.7 and 5.1 mBGS	RC 1	69 (25)			PLI (Is(50)) RC1 Diametral: 7.1 MPa
			RC 2	46 (0)			Void space encountered during advancement of drilling for RC2. PLI (Is(50)) RC2 Axial: 5.3 MPa Diametral: 2.9 MPa
6.0	82.7		RC 3	67 (56)			PLI (Is(50)) RC3 Axial: 0.6 MPa Diametral: 0.1 MPa
8.0	80.7	- Below 7.9 mBGS, moderate to strong	RC 4	86 (51)			PLI (Is(50)) RC4 Axial: 1.0 MPa Diametral: 0.2 MPa
9.6	79.1	Borehole terminated upon SHALE/LIMESTONE bedrock at 9.6 mBGS.					

SPT N VALUE 20 40 60 80
PL MC LL 20 40 60 80
FINES CONTENT (%) 20 40 60 80

BORING NUMBER MW19-11

PRI ENGINEERING

CLIENT Apria Inc.
PROJECT NAME Proposed Multi-Storey Mixed Use Development
PROJECT NUMBER 19-0026
PROJECT LOCATION 3353-3359 Lakeshore Blvd W, Etobicoke, ON
DATE STARTED 5-29-19 **COMPLETED** 5-29-19
GROUND ELEVATION 88.8 mASL
DRILLING CONTRACTOR Landshark Drilling Inc.
GROUND WATER LEVELS:
DRILLING METHOD 108 mm I.D. HSA/108 mm O.D. Tri-cone Coring Bit
LOGGED BY AYJr **CHECKED BY** GK
AT END OF DRILLING 1.9 m / Elev 86.9 mASL
AFTER DRILLING 2.0 m / Elev 86.8 mASL upon completion of MW installation
NOTES

DEPTH (m)	ELEVATION (mASL)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (kPa)	MOISTURE CONTENT (%)	REMARKS AND TESTS
	88.8							
0.1	88.7	ASPHALT (70 mm)						
		Brown SAND, some silt, trace gravel, trace clay, some asphalt debris, moist, loose to very loose	SS 1	92	4-4-3-4 (7)		17	Borehole was open upon completion of drilling.
			SS 2	83	2-2-1-1 (3)			
1.2	87.6	Light grey to brown SANDY SILT, some gravel, trace clay, moist, compact	SS 3	83	2-8-8-26 (16)		19	GSA SS2 Gravel: 1% Sand: 77% Silt & Clay: 22%
2.0	86.8		SS 4	79	6-8-9-14 (17)		15	
			SS 5	79	7-14-16-19 (30)		12	
3.7	85.2		SS 6	63	14-10-11-10 (21)		12	
4.0	84.8	Dark grey, SHALE/LIMESTONE bedrock, moderate weathering, very weak, laminated to thinly bedded	SS 7	67	17-50			
		- Boring was advanced with 108 mm O.D. tri-cone coring bit below 4.5 m BGS, to install monitoring well.						
6.0	82.8							
8.0	80.8							
10.0	78.8	Borehole terminated upon SHALE/LIMESTONE bedrock at 10.6 mBGS.						

SPT N VALUE 20 40 60 80
PL MC LL 20 40 60 80
FINES CONTENT (%) 20 40 60 80

GENERAL BH - POLAR WITH MW (METRIC) 19-0026 LOGS - AC WITH MW.GPJ GINT STD CANADA LAB.GDT 9-16-19

Appendix B

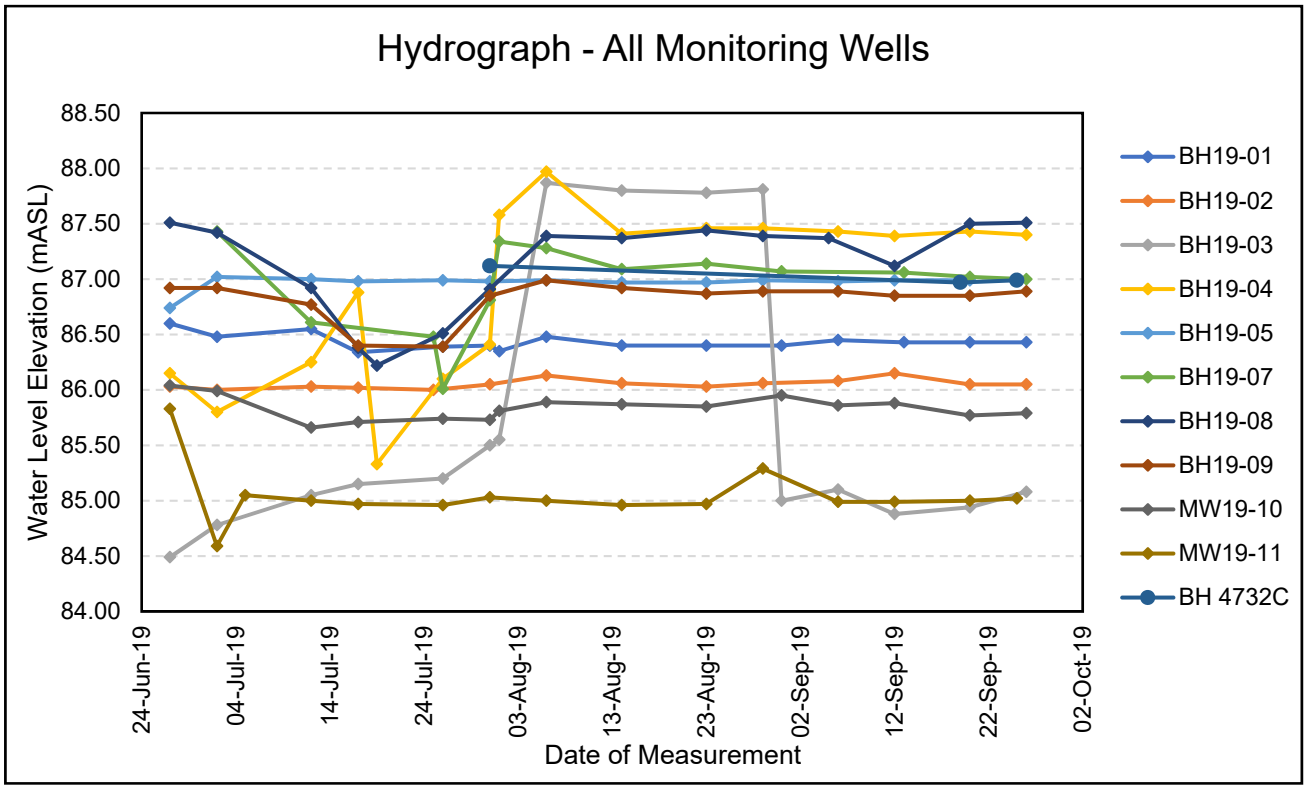
Groundwater Level Measurements

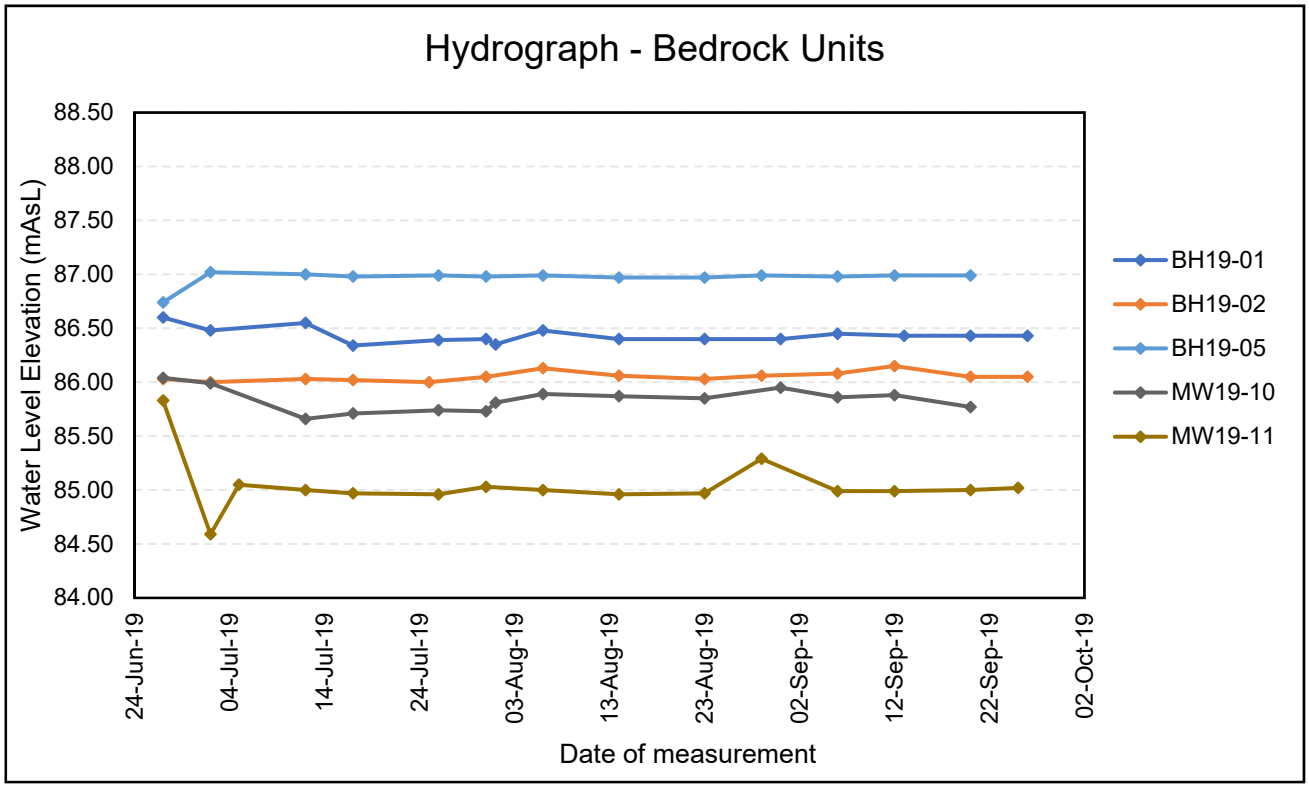
Hydrographs

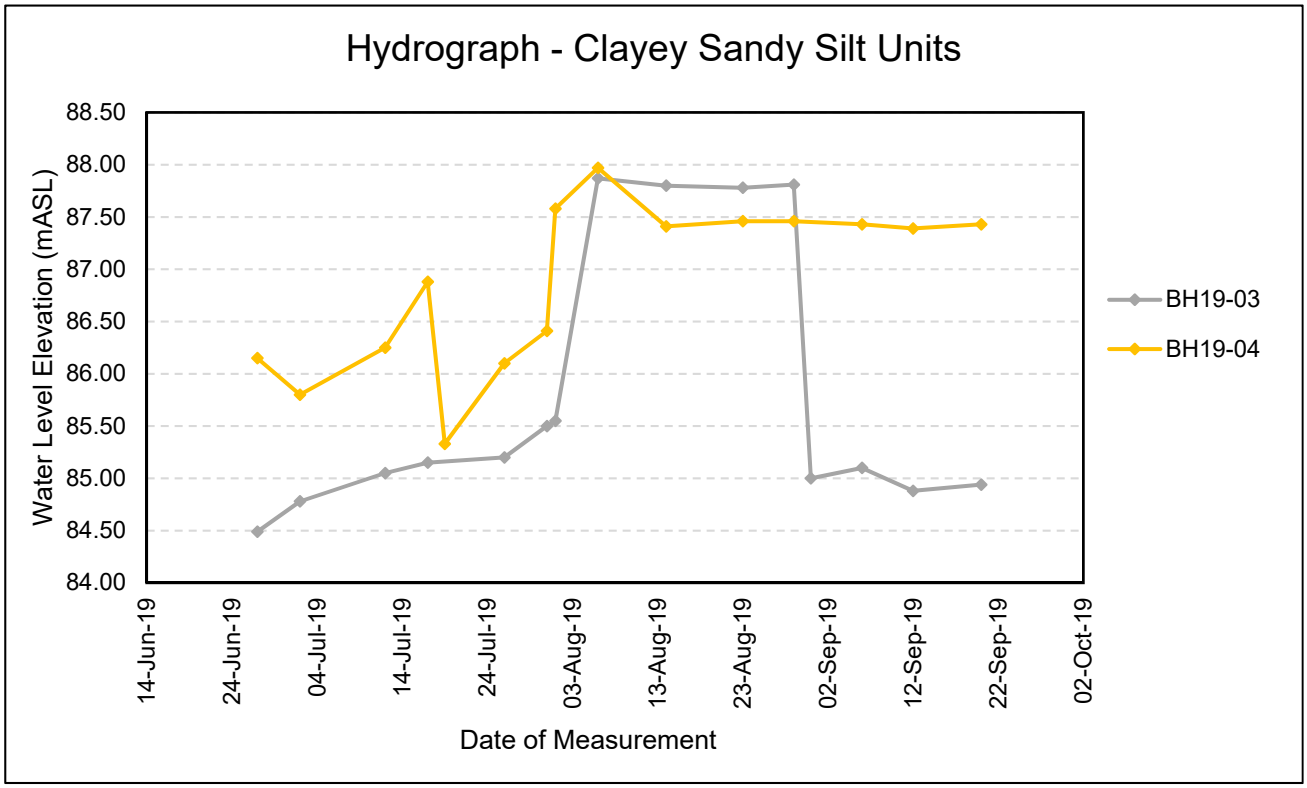
Groundwater Level Measurements
Monitoring Period: June 27, 2019 to September 25, 2019
Project: Proposed Multi-Storey Mixed Used Development
Location: 3353 Lakeshore Blvd West, Etobicoke, ON
Project No.: 19-0026

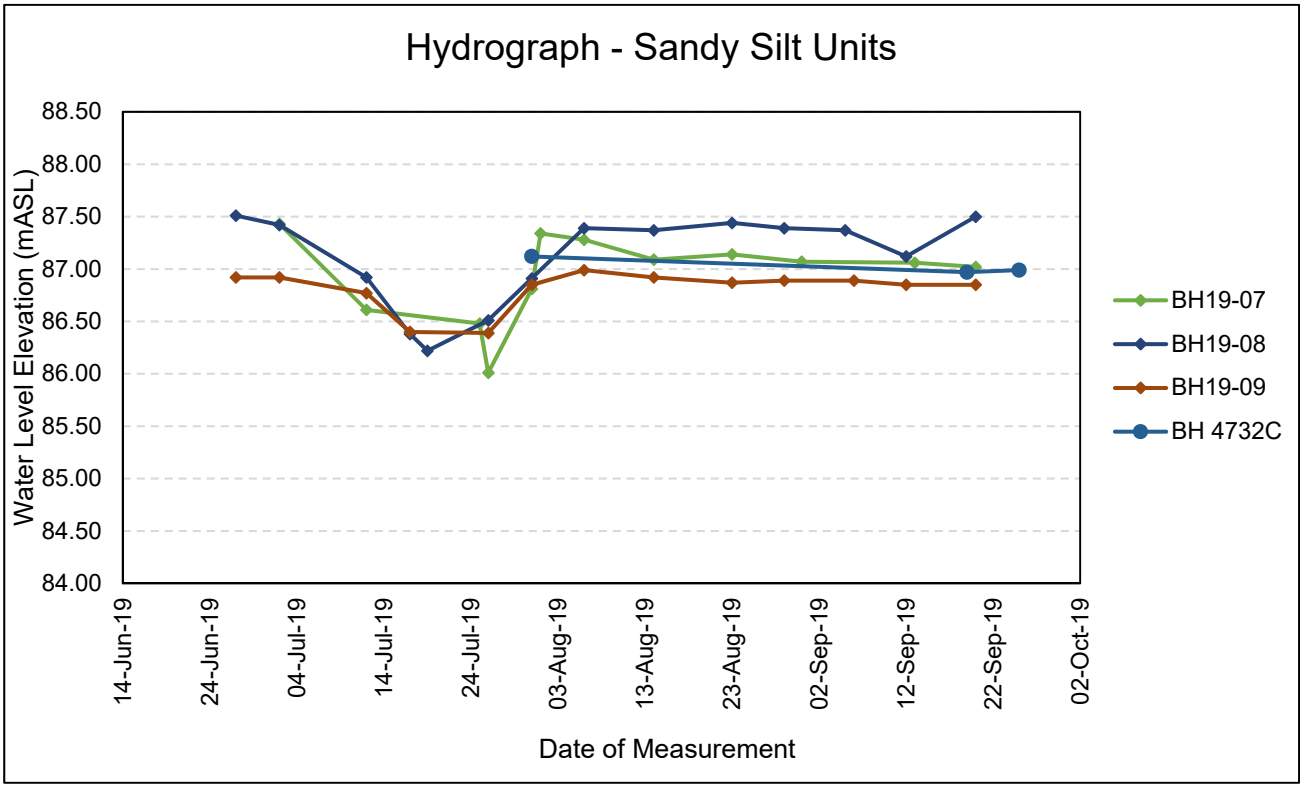
Monitor Details							Week 1		Week 2		Week 3		Week 4		Week 5		Week 6		Week 7		Week 8		Week 9		Week 10		Week 11		Week 12		Week 13		Week 14	
							27-Jun-19		02-Jul-19		12-Jul-19		17-Jul-19		25-Jul-19		31-Jul-19		06-Aug-19		14-Aug-19		23-Aug-19		29-Aug-19		06-Sep-19		12-Sep-19		19-Sep-19		25-Sep-19	
Monitor No.	Northing (m)	Easting (m)	Surface Elevation (mASL)	Top of Pipe (T.O.P.) Elevation (mASL)	Total Depth (m)	Screened Unit	Water level (mBTOP)	Groundwater elevation (mASL)	Water level (mBTOP)	Groundwater elevation (mASL)	Water level (mBTOP)	Groundwater elevation (mASL)	Water level (mBTOP)	Groundwater elevation (mASL)	Water level (mBTOP)	Groundwater elevation (mASL)	Water level (mBTOP)	Groundwater elevation (mASL)	Water level (mBTOP)	Groundwater elevation (mASL)	Water level (mBTOP)	Groundwater elevation (mASL)	Water level (mBTOP)	Groundwater elevation (mASL)	Water level (mBTOP)	Groundwater elevation (mASL)	Water level (mBTOP)	Groundwater elevation (mASL)	Water level (mBTOP)	Groundwater elevation (mASL)	Water level (mBTOP)	Groundwater elevation (mASL)
BH19-01	4828052.4	618953.9	89.00	88.90	9.60	Shale/limestone	2.30	86.60	2.42	86.48	2.35	86.55	2.56	86.34	2.51	86.39	2.50	86.40	2.42	86.48	2.50	86.40	2.50	86.40	2.50	86.40	2.45	86.45	2.47	86.43	2.47	86.43	2.47	86.43
BH19-02	4828064.6	618989.3	88.80	88.70	9.17	Shale/limestone	2.67	86.03	2.70	86.00	2.67	86.03	2.68	86.02	2.70	86.00	2.65	86.05	2.57	86.13	2.64	86.06	2.67	86.03	2.64	86.06	2.62	86.08	2.55	86.15	2.65	86.05	2.65	86.05
BH19-03	4828039.6	618958.4	89.00	88.90	4.57	Clayey Sandy Silt	4.41	84.49	4.12	84.78	3.85	85.05	3.75	85.15	3.70	85.20	3.40	85.50	1.03	87.87	1.10	87.80	1.12	87.78	1.09	87.81	3.80	85.10	4.02	84.88	3.96	84.94	3.82	85.08
BH19-04	4828034.6	618974.1	88.90	88.80	4.05	Clayey Sandy Silt	2.65	86.15	3.00	85.80	2.55	86.25	1.92	86.88	2.70	86.10	2.39	86.41	1.22	87.58	1.39	87.41	1.34	87.46	1.34	87.46	1.37	87.43	1.41	87.39	1.37	87.43	1.40	87.40
BH19-05	4828041.4	618992.2	88.70	88.60	9.30	Shale/limestone	1.86	86.74	1.58	87.02	1.60	87.00	1.62	86.98	1.61	86.99	1.62	86.98	1.61	86.99	1.63	86.97	1.61	86.99	1.63	86.97	1.62	86.98	1.61	86.99	1.61	86.99	1.61	86.99
BH19-06	4828050.9	618980.2	88.10	-	3.35	Sandy silt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH19-07	4828026.5	618973.0	89.00	88.87	4.72	Sandy silt	NA	NA	1.44	87.43	2.26	86.61	NA	NA	2.39	86.48	2.06	86.81	1.59	87.28	1.78	87.09	1.73	87.14	1.80	87.07	NA	NA	1.81	87.06	1.85	87.02	1.87	87.00
BH19-08	4828029.8	618989.7	88.40	88.32	2.74	Sandy silt	0.81	87.51	0.90	87.42	1.40	86.92	1.94	86.38	1.81	86.51	1.41	86.91	0.93	87.39	0.95	87.37	0.88	87.44	0.93	87.39	0.95	87.37	1.20	87.12	0.82	87.50	0.81	87.51
BH19-09	4828031.5	618992.8	88.20	88.12	3.81	Sandy silt	1.20	86.92	1.20	86.92	1.35	86.77	1.72	86.40	1.73	85.73	1.27	86.85	1.13	86.99	1.20	86.92	1.25	86.87	1.23	86.89	1.23	86.89	1.27	86.85	1.27	86.85	1.23	86.89
MW19-10	4828045.1	618967.8	88.70	88.58	9.63	Shale/limestone	2.54	86.04	2.59	85.99	2.92	85.66	2.87	85.71	2.84	86.19	2.85	85.73	2.69	85.89	2.71	85.87	2.73	85.85	2.63	85.95	2.72	85.86	2.70	85.88	2.81	85.77	2.79	85.79
MW19-11	4828048.0	618989.9	88.80	88.70	10.60	Shale/limestone	2.87	85.83	4.11	84.59	3.70	85.00	3.73	84.97	3.74	86.31	3.67	85.03	3.70	85.00	3.74	84.96	3.73	84.97	3.41	85.29	3.71	84.99	3.71	84.99	3.70	85.00	3.68	85.02
BH4732C	4828058.5	618980.4	88.80	88.65	3.70	Shale/limestone	-	-	-	-	-	-	-	-	-	-	1.53	87.12	-	-	-	-	-	-	-	-	-	-	-	-	1.68	86.97	1.66	86.99

- monitoring well not installed
indicates reading was taken ***before*** a water removal event (purging, sampling or slug test)
indicates reading was taken ***before*** a water addition event (slug test)
mASL metres above sea level
T.O.P top of pipe
NA no access to well at time of measurement due to owner operations


Hydrograph - All Monitoring Wells
Water Level Elevation (mASL)
88.50
88.00
87.50
87.00
86.50
86.00
85.50
85.00
84.50
84.00
24-Jun-19
04-Jul-19
14-Jul-19
24-Jul-19
03-Aug-19
13-Aug-19
23-Aug-19
02-Sep-19
12-Sep-19
22-Sep-19
02-Oct-19
Date of Measurement
BH19-01
BH19-02
BH19-03
BH19-04
BH19-05
BH19-07
BH19-08
BH19-09
MW19-10
MW19-11
BH 4732C


Hydrograph - Bedrock Units
Water Level Elevation (mAsL)
88.50
88.00
87.50
87.00
86.50
86.00
85.50
85.00
84.50
84.00
24-Jun-19
04-Jul-19
14-Jul-19
24-Jul-19
03-Aug-19
13-Aug-19
23-Aug-19
02-Sep-19
12-Sep-19
22-Sep-19
02-Oct-19
Date of measurement
BH19-01
BH19-02
BH19-05
MW19-10
MW19-11


Hydrograph - Clayey Sandy Silt Units
Water Level Elevation (mASL)
88.50
88.00
87.50
87.00
86.50
86.00
85.50
85.00
84.50
84.00
14-Jun-19
24-Jun-19
04-Jul-19
14-Jul-19
24-Jul-19
03-Aug-19
13-Aug-19
23-Aug-19
02-Sep-19
12-Sep-19
22-Sep-19
02-Oct-19
Date of Measurement
BH19-03
BH19-04


Hydrograph - Sandy Silt Units
Water Level Elevation (mASL)
88.50
88.00
87.50
87.00
86.50
86.00
85.50
85.00
84.50
84.00
14-Jun-19
24-Jun-19
04-Jul-19
14-Jul-19
24-Jul-19
03-Aug-19
13-Aug-19
23-Aug-19
02-Sep-19
12-Sep-19
22-Sep-19
02-Oct-19
Date of Measurement
BH19-07
BH19-08
BH19-09
BH 4732C

Appendix C

Groundwater Quality Summary
Laboratory Certificate of Analysis, Report,
and Chain of Custody

Groundwater Analysis Results for MW19-11 in Comparison with City of Toronto Sewer Requirements (Toronto Municipal Code Chapter 681-Sewers -March 28, 2019)

Parameter	Units	MW19-11 (Sampled on 05-Jul-19)	Limits for Sanitary and Combined Sewers	Meets Limits for Sanitary and Combined Sewers?	Limits for Storm Sewers	Meets Limits for Storm Sewer?
pH	SU	7.49	>6.0 to <11.5	Yes	>6.0 to <9.5	Yes
Temperature	°C	15	<60	Yes	<40	Yes
Biochemical oxygen demand	mg/L	<3	300	Yes	15	Yes
Cyanide (total)	mg/L	<0.002	2	Yes	0.02	Yes
Fluoride	mg/L	<0.4	10	Yes	-	Yes
Total Kjeldahl Nitrogen	mg/L	12.1	100	Yes	-	Yes
Oil and grease - animal and vegetable (non-miner	mg/L	<2	150	Yes	-	Yes
Oil and grease - mineral and synthetic	mg/L	<1	15	Yes	-	Yes
Phenolics (4AAP)	mg/L	<0.001	1	Yes	0.008	Yes
Phosphorus (total)	mg/L	1.15	10	Yes	0.4	Yes
Suspended Solids (total)	mg/L	1540	350	No	15	No
Aluminum (total)	mg/L	<0.05	50	Yes	-	Yes
Antimony (total)	mg/L	<0.001	5	Yes	-	Yes
Arsenic (total)	mg/L	0.0021	1	Yes	0.02	Yes
Cadmium (total)	mg/L	<0.00005	0.7	Yes	0.008	Yes
Chromium (hexavalent)	mg/L	<0.00005	2	Yes	0.04	Yes
Chromium (total)	mg/L	<0.005	4	Yes	0.08	Yes
Cobalt (total)	mg/L	0.0029	5	Yes	-	Yes
Copper (total)	mg/L	<0.01	2	Yes	0.04	Yes
Lead (total)	mg/L	<0.0005	1	Yes	0.12	Yes
Manganese (total)	mg/L	0.676	5	Yes	0.05	No
Mercury (total)	mg/L	<0.00001	0.01	Yes	0.0004	Yes
Molybdenum (total)	mg/L	<0.00404	5	Yes	-	Yes
Nickel (total)	mg/L	<0.005	2	Yes	0.08	Yes
Selenium (total)	mg/L	<0.0005	1	Yes	0.02	Yes
Silver (total)	mg/L	<0.0005	5	Yes	0.12	Yes
Tin (total)	mg/L	<0.001	5	Yes	-	Yes
Titanium (total)	mg/L	<0.003	5	Yes	-	Yes
Zinc (total)	mg/L	<0.03	2	Yes	0.04	Yes
1,1,2,2-tetrachloroethane	mg/L	<0.0005	1.4	Yes	0.017	Yes
1,2-dichlorobenzene	mg/L	<0.0005	0.05	Yes	0.0056	Yes
1,4-dichlorobenzene	mg/L	<0.0005	0.08	Yes	0.0068	Yes
3,3'-dichlorobenzene	mg/L	<0.0004	0.002	Yes	0.0008	Yes
Benzene	mg/L	<0.0005	0.01	Yes	0.002	Yes
Bis (2-ethylhexyl) phthalate	mg/L	<0.002	0.012	Yes	0.0088	Yes
Chloroform	mg/L	<0.001	0.04	Yes	0.002	Yes
Cis-1,2-dichloroethylene	mg/L	<0.0005	0.4	Yes	0.0056	Yes
Di-n-butyl phtalate	mg/L	<0.001	0.08	Yes	0.015	Yes
Ethyl benzene	mg/L	<0.0005	0.16	Yes	0.002	Yes
Methylene chloride	mg/L	<0.002	2	Yes	0.0052	Yes
Nonylphenols	mg/L	<0.001	0.02	Yes	0.001	Yes
Nonylphenols ethoxylates	mg/L	<0.01	0.2	Yes	0.01	Yes
PCBs	mg/L	<0.00004	0.001	Yes	0.0004	Yes
Pentachlorophenol	mg/L	<0.0005	0.005	Yes	0.002	Yes
Tetrachloroethylene	mg/L	<0.0006	1	Yes	0.0044	Yes
Toluene	mg/L	<0.0007	0.016	Yes	0.002	Yes
Total PAHs	mg/L	0.0048	0.005	Yes	0.002	No
Trans-1,3-dichloropropylene	mg/L	<0.0005	0.14	Yes	0.0056	Yes
Trichloroethylene	mg/L	<0.0005	0.4	Yes	0.0076	Yes
Xylenes (total)	mg/L	<0.0011	1.4	Yes	0.0044	Yes

D.M. Wills Associates Ltd. (Peterborough)
ATTN: Kyle Plumpton
150 Jameson Drive
Peterborough ON K9J 0B9

Date Received: 05-JUL-19
Report Date: 12-JUL-19 15:14 (MT)
Version: FINAL

Client Phone: 705-742-2297

Certificate of Analysis

Lab Work Order #: L2305043

Project P.O. #: NOT SUBMITTED
Job Reference: LAKESHORE
C of C Numbers: 17-639621
Legal Site Desc:

Amanda Fazekas
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2305043-1 MW19-11 Sampled By: CLIENT on 05-JUL-19 @ 09:00 Matrix: WATER							
Physical Tests							
pH	7.49		0.10	pH units		08-JUL-19	R4699054
Total Suspended Solids	1540	DLHC	20	mg/L	09-JUL-19	10-JUL-19	R4703050
Anions and Nutrients							
Fluoride (F)	<0.40	DLDS	0.40	mg/L		09-JUL-19	R4702685
Total Kjeldahl Nitrogen	12.1	DLM	1.5	mg/L	10-JUL-19	11-JUL-19	R4708198
Phosphorus, Total	1.15	DLM	0.030	mg/L	10-JUL-19	11-JUL-19	R4707849
Cyanides							
Cyanide, Total	<0.0020		0.0020	mg/L		09-JUL-19	R4707736
Bacteriological Tests							
E. Coli	<2	DLM	2	CFU/100mL		07-JUL-19	R4695731
Total Metals							
Aluminum (Al)-Total	<0.050	DLHC	0.050	mg/L	08-JUL-19	09-JUL-19	R4695990
Antimony (Sb)-Total	<0.0010	DLHC	0.0010	mg/L	08-JUL-19	08-JUL-19	R4695990
Arsenic (As)-Total	0.0021	DLHC	0.0010	mg/L	08-JUL-19	08-JUL-19	R4695990
Cadmium (Cd)-Total	<0.000050	DLHC	0.000050	mg/L	08-JUL-19	08-JUL-19	R4695990
Chromium (Cr)-Total	<0.0050	DLHC	0.0050	mg/L	08-JUL-19	08-JUL-19	R4695990
Cobalt (Co)-Total	0.0029	DLHC	0.0010	mg/L	08-JUL-19	08-JUL-19	R4695990
Copper (Cu)-Total	<0.010	DLHC	0.010	mg/L	08-JUL-19	08-JUL-19	R4695990
Lead (Pb)-Total	<0.00050	DLHC	0.00050	mg/L	08-JUL-19	08-JUL-19	R4695990
Manganese (Mn)-Total	0.676	DLHC	0.0050	mg/L	08-JUL-19	08-JUL-19	R4695990
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		09-JUL-19	R4699169
Molybdenum (Mo)-Total	0.00404	DLHC	0.00050	mg/L	08-JUL-19	08-JUL-19	R4695990
Nickel (Ni)-Total	<0.0050	DLHC	0.0050	mg/L	08-JUL-19	08-JUL-19	R4695990
Selenium (Se)-Total	<0.00050	DLHC	0.00050	mg/L	08-JUL-19	08-JUL-19	R4695990
Silver (Ag)-Total	<0.00050	DLHC	0.00050	mg/L	08-JUL-19	08-JUL-19	R4695990
Tin (Sn)-Total	<0.0010	DLHC	0.0010	mg/L	08-JUL-19	08-JUL-19	R4695990
Titanium (Ti)-Total	<0.0030	DLHC	0.0030	mg/L	08-JUL-19	09-JUL-19	R4695990
Zinc (Zn)-Total	<0.030	DLHC	0.030	mg/L	08-JUL-19	08-JUL-19	R4695990
Speciated Metals							
Chromium, Hexavalent	<0.00050		0.00050	mg/L		08-JUL-19	R4698494
Aggregate Organics							
BOD	<3.0	BODL	3.0	mg/L	06-JUL-19	11-JUL-19	R4707973
Oil and Grease, Total	<2.0		2.0	mg/L	08-JUL-19	08-JUL-19	R4696308
Animal/Veg Oil & Grease	<2.0		2.0	mg/L		09-JUL-19	
Mineral Oil and Grease	<1.0		1.0	mg/L	08-JUL-19	08-JUL-19	R4696308
Phenols (4AAP)	<0.0010		0.0010	mg/L		10-JUL-19	R4698590
Volatile Organic Compounds							
Benzene	<0.50	OWP	0.50	ug/L		12-JUL-19	R4706448
Chloroform	<1.0	OWP	1.0	ug/L		12-JUL-19	R4706448
1,2-Dichlorobenzene	<0.50	OWP	0.50	ug/L		12-JUL-19	R4706448
1,4-Dichlorobenzene	<0.50	OWP	0.50	ug/L		12-JUL-19	R4706448
cis-1,2-Dichloroethylene	<0.50	OWP	0.50	ug/L		12-JUL-19	R4706448

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2305043-1 MW19-11 Sampled By: CLIENT on 05-JUL-19 @ 09:00 Matrix: WATER							
Volatile Organic Compounds							
Dichloromethane	<2.0	OWP	2.0	ug/L		12-JUL-19	R4706448
trans-1,3-Dichloropropene	<0.50	OWP	0.50	ug/L		12-JUL-19	R4706448
Ethylbenzene	<0.50	OWP	0.50	ug/L		12-JUL-19	R4706448
1,1,2,2-Tetrachloroethane	<0.50	OWP	0.50	ug/L		12-JUL-19	R4706448
Tetrachloroethylene	<0.50	OWP	0.50	ug/L		12-JUL-19	R4706448
Toluene	<0.50	OWP	0.50	ug/L		12-JUL-19	R4706448
Trichloroethylene	<0.50	OWP	0.50	ug/L		12-JUL-19	R4706448
o-Xylene	<0.50	OWP	0.50	ug/L		12-JUL-19	R4706448
m+p-Xylenes	<1.0	OWP	1.0	ug/L		12-JUL-19	R4706448
Xylenes (Total)	<1.1		1.1	ug/L		12-JUL-19	
Surrogate: 4-Bromofluorobenzene	97.8		70-130	%		12-JUL-19	R4706448
Surrogate: 1,4-Difluorobenzene	99.3		70-130	%		12-JUL-19	R4706448
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	0.040		0.010	ug/L	08-JUL-19	10-JUL-19	R4702800
Anthracene	0.080		0.010	ug/L	08-JUL-19	10-JUL-19	R4702800
Benzo(a)anthracene	0.272		0.010	ug/L	08-JUL-19	10-JUL-19	R4702800
Benzo(a)pyrene	0.259		0.010	ug/L	08-JUL-19	10-JUL-19	R4702800
Benzo(b)fluoranthene	0.377		0.010	ug/L	08-JUL-19	10-JUL-19	R4702800
Benzo(e)pyrene	0.200		0.050	ug/L	08-JUL-19	10-JUL-19	R4702212
Benzo(ghi)perylene	0.199		0.010	ug/L	08-JUL-19	10-JUL-19	R4702800
Benzo(k)fluoranthene	0.128		0.010	ug/L	08-JUL-19	10-JUL-19	R4702800
Chrysene	0.317		0.010	ug/L	08-JUL-19	10-JUL-19	R4702800
Dibenz(a,h)acridine	<0.050		0.050	ug/L	08-JUL-19	10-JUL-19	R4702212
Dibenz(a,j)acridine	<0.050		0.050	ug/L	08-JUL-19	10-JUL-19	R4702212
Dibenzo(a,h)anthracene	0.048		0.010	ug/L	08-JUL-19	10-JUL-19	R4702800
Dibenzo(a,i)pyrene	<0.050		0.050	ug/L	08-JUL-19	10-JUL-19	R4702212
7H-Dibenzo(c,g)carbazole	<0.050		0.050	ug/L	08-JUL-19	10-JUL-19	R4702212
1,3-Dinitropyrene	<1.0		1.0	ug/L	08-JUL-19	10-JUL-19	R4702212
1,6-Dinitropyrene	<1.0		1.0	ug/L	08-JUL-19	10-JUL-19	R4702212
1,8-Dinitropyrene	<1.0		1.0	ug/L	08-JUL-19	10-JUL-19	R4702212
Fluoranthene	0.980		0.010	ug/L	08-JUL-19	10-JUL-19	R4702800
Fluorene	0.057		0.010	ug/L	08-JUL-19	10-JUL-19	R4702800
Indeno(1,2,3-cd)pyrene	0.174		0.010	ug/L	08-JUL-19	10-JUL-19	R4702800
Naphthalene	0.193		0.010	ug/L	08-JUL-19	10-JUL-19	R4702800
Perylene	0.072		0.010	ug/L	08-JUL-19	10-JUL-19	R4702800
Phenanthrene	0.683		0.010	ug/L	08-JUL-19	10-JUL-19	R4702800
Pyrene	0.728		0.010	ug/L	08-JUL-19	10-JUL-19	R4702800
Surrogate: 2-Fluorobiphenyl	85.7		40-130	%	08-JUL-19	10-JUL-19	R4702800
Surrogate: d14-Terphenyl	63.8		40-130	%	08-JUL-19	10-JUL-19	R4702212
Surrogate: p-Terphenyl d14	79.3		40-130	%	08-JUL-19	10-JUL-19	R4702800
Total PAHs	4.8		1.7	ug/L		10-JUL-19	

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2305043-1 MW19-11 Sampled By: CLIENT on 05-JUL-19 @ 09:00 Matrix: WATER							
Phthalate Esters							
Bis(2-ethylhexyl)phthalate	<2.0		2.0	ug/L	08-JUL-19	11-JUL-19	R4699149
Surrogate: 2-fluorobiphenyl	100.0		40-130	%	08-JUL-19	11-JUL-19	R4699149
Surrogate: p-Terphenyl d14	86.4		40-130	%	08-JUL-19	11-JUL-19	R4699149
Semi-Volatile Organics							
3,3'-Dichlorobenzidine	<0.40		0.40	ug/L	08-JUL-19	11-JUL-19	R4699149
Di-n-butylphthalate	<1.0		1.0	ug/L	08-JUL-19	11-JUL-19	R4699149
Surrogate: 2-Fluorobiphenyl	100.0		40-130	%	08-JUL-19	11-JUL-19	R4699149
Surrogate: p-Terphenyl d14	86.4		40-130	%	08-JUL-19	11-JUL-19	R4699149
Surrogate: p-Terphenyl d14	86.4		40-130	%	08-JUL-19	11-JUL-19	R4699149
Phenolics							
Pentachlorophenol	<0.50		0.50	ug/L	08-JUL-19	11-JUL-19	R4699149
Surrogate: 2,4,6-Tribromophenol	101.9		40-150	%	08-JUL-19	11-JUL-19	R4699149
Polychlorinated Biphenyls							
Aroclor 1242	<0.020		0.020	ug/L	09-JUL-19	09-JUL-19	R4706708
Aroclor 1248	<0.020		0.020	ug/L	09-JUL-19	09-JUL-19	R4706708
Aroclor 1254	<0.020		0.020	ug/L	09-JUL-19	09-JUL-19	R4706708
Aroclor 1260	<0.020		0.020	ug/L	09-JUL-19	09-JUL-19	R4706708
Total PCBs	<0.040		0.040	ug/L	09-JUL-19	09-JUL-19	R4706708
Surrogate: 2-Fluorobiphenyl	73.7		50-150	%	09-JUL-19	09-JUL-19	R4706708
Organic Parameters							
Nonylphenol	<1.0		1.0	ug/L		08-JUL-19	R4696340
Nonylphenol Diethoxylates	<0.10		0.10	ug/L		08-JUL-19	R4696340
Total Nonylphenol Ethoxylates	<10		10	ug/L		08-JUL-19	R4696340
Nonylphenol Monoethoxylates	<10	DLI	10	ug/L		08-JUL-19	R4696340
L2305043-2 TRIP BLANK Sampled By: CLIENT on 05-JUL-19 @ 09:00 Matrix: WATER							
Volatile Organic Compounds							
Benzene	<0.50		0.50	ug/L		11-JUL-19	R4706448
Chloroform	<1.0		1.0	ug/L		11-JUL-19	R4706448
1,2-Dichlorobenzene	<0.50		0.50	ug/L		11-JUL-19	R4706448
1,4-Dichlorobenzene	<0.50		0.50	ug/L		11-JUL-19	R4706448
cis-1,2-Dichloroethylene	<0.50		0.50	ug/L		11-JUL-19	R4706448
Dichloromethane	<2.0		2.0	ug/L		11-JUL-19	R4706448
trans-1,3-Dichloropropene	<0.50		0.50	ug/L		11-JUL-19	R4706448
Ethylbenzene	<0.50		0.50	ug/L		11-JUL-19	R4706448
1,1,2,2-Tetrachloroethane	<0.50		0.50	ug/L		11-JUL-19	R4706448
Tetrachloroethylene	<0.50		0.50	ug/L		11-JUL-19	R4706448
Toluene	<0.50		0.50	ug/L		11-JUL-19	R4706448
Trichloroethylene	<0.50		0.50	ug/L		11-JUL-19	R4706448
o-Xylene	<0.50		0.50	ug/L		11-JUL-19	R4706448
m+p-Xylenes	<1.0		1.0	ug/L		11-JUL-19	R4706448

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2305043-2 TRIP BLANK Sampled By: CLIENT on 05-JUL-19 @ 09:00 Matrix: WATER							
Volatile Organic Compounds							
Xylenes (Total)	<1.1		1.1	ug/L		11-JUL-19	
Surrogate: 4-Bromofluorobenzene	100.1		70-130	%		11-JUL-19	R4706448
Surrogate: 1,4-Difluorobenzene	101.3		70-130	%		11-JUL-19	R4706448

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Aluminum (Al)-Total	DUP-H,J	L2305043-1
Laboratory Control Sample	1,3-Dinitropyrene	LCS-H	L2305043-1
Laboratory Control Sample	1,6-Dinitropyrene	LCS-H	L2305043-1
Laboratory Control Sample	Pentachlorophenol	LCS-ND	L2305043-1
Matrix Spike	Manganese (Mn)-Total	MS-B	L2305043-1

Sample Parameter Qualifier key listed:

Qualifier	Description
BODL	Limit of Reporting for BOD was increased to account for the largest volume of sample tested.
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLI	Detection Limit Raised: Dilution required to address Internal Standard response problems caused by matrix interference.
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
DUP-H,J	Duplicate results outside ALS DQO, due to sample heterogeneity. Duplicate results and limits are expressed in terms of absolute difference.
LCS-H	Lab Control Sample recovery was above ALS DQO. Non-detected sample results are considered reliable. Other results, if reported, have been qualified.
LCS-ND	Lab Control Sample recovery was slightly outside ALS DQO. Reported non-detect results for associated samples were unaffected.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
OWP	Organic water sample contained visible sediment (must be included as part of analysis). Measured concentrations of organic substances in water can be biased high due to presence of sediment.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
625-33DCBENZIDINE-WT	Water	3,3-Dichlorobenzidine	SW846 8270
Aqueous samples are extracted and extracts are analyzed on GC/MSD.			
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.			
625-PAH-LOW-WT	Water	EPA 8270 PAH (Low Level)	SW846 8270
Aqueous samples are extracted and extracts are analyzed on GC/MSD. Depending on the analytical GC/MS column used benzo(j)fluoranthene may chromatographically co-elute with benzo(b)fluoranthene or benzo(k)fluoranthene.			
625-PCP-WT	Water	Pentachlorophenol	SW846 8270
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			
CR-CR6-IC-WT	Water	Chromium +6	EPA 7199
This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Method 7199, published by the United States Environmental Protection Agency (EPA). The procedure involves analysis for chromium (VI) by ion chromatography using diphenylcarbazide in a sulphuric acid solution. Chromium (III) is calculated as the difference between the total chromium and the chromium (VI) results. 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).			
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)

Reference Information

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

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

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

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

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

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

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

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.

PAH-EXTRA-WT	Water	Sanitary Sewer Use By-Law Additional PAH	SW846 8270

PAH-SUM-CALC-WT	Water	TOTAL PAH's	CALCULATION

Total PAH represents the sum of all PAH analytes reported for a given sample. Note that regulatory agencies and criteria differ in their definitions of Total PAH in terms of the individual PAH analytes to be included.

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.

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-WT	Water	Total Kjeldahl Nitrogen	APHA 4500-Norg D

This analysis is carried out using procedures adapted from APHA Method 4500-Norg "Nitrogen (Organic)". Total Kjeldahl Nitrogen is determined by sample digestion at 380 Celsius with analysis using an automated colorimetric method.

VOC-ROU-HS-WT	Water	Volatile Organic Compounds	SW846 8260

Aqueous samples are analyzed by headspace-GC/MS.

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.

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:

Reference Information

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

Chain of Custody Numbers:

17-639621

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 weight of sample
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.

Quality Control Report

Client: D.M. Wills Associates Ltd. (Peterborough)
150 Jameson Drive
Peterborough ON K9J 0B9
Contact: Kyle Plumpton

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
625-33DCBENZIDINE-WT	**Water**							
Batch	**R4699149**							
WG3098882-2	**LCS**							
3,3'-Dichlorobenzidine			91.6		%		50-140	09-JUL-19
WG3098882-1	**MB**							
3,3'-Dichlorobenzidine			<0.40		ug/L		0.4	09-JUL-19
Surrogate: p-Terphenyl d14			105.4		%		40-130	09-JUL-19
625-BIS-2-PHTH-WT	**Water**							
Batch	**R4699149**							
WG3098882-2	**LCS**							
Bis(2-ethylhexyl)phthalate			114.2		%		50-140	09-JUL-19
WG3098882-1	**MB**							
Bis(2-ethylhexyl)phthalate			<2.0		ug/L		2	09-JUL-19
Surrogate: 2-fluorobiphenyl			86.5		%		40-130	09-JUL-19
Surrogate: p-Terphenyl d14			105.4		%		40-130	09-JUL-19
625-DNB-PHTH-WT	**Water**							
Batch	**R4699149**							
WG3098882-2	**LCS**							
Di-n-butylphthalate			112.4		%		50-150	09-JUL-19
WG3098882-1	**MB**							
Di-n-butylphthalate			<1.0		ug/L		1	09-JUL-19
Surrogate: 2-Fluorobiphenyl			86.5		%		40-130	09-JUL-19
Surrogate: p-Terphenyl d14			105.4		%		40-130	09-JUL-19
625-PAH-LOW-WT	**Water**							
Batch	**R4702800**							
WG3098882-2	**LCS**							
Acenaphthene			93.9		%		50-140	10-JUL-19
Anthracene			96.6		%		50-140	10-JUL-19
Benzo(a)anthracene			99.1		%		50-140	10-JUL-19
Benzo(a)pyrene			96.1		%		60-130	10-JUL-19
Benzo(b)fluoranthene			101.1		%		50-140	10-JUL-19
Benzo(ghi)perylene			98.7		%		50-140	10-JUL-19
Benzo(k)fluoranthene			94.7		%		50-140	10-JUL-19
Chrysene			105.6		%		50-140	10-JUL-19
Dibenzo(a,h)anthracene			99.6		%		50-140	10-JUL-19
Fluoranthene			99.4		%		50-140	10-JUL-19
Fluorene			98.8		%		50-140	10-JUL-19
Indeno(1,2,3-cd)pyrene			99.3				50-140	

Quality Control Report

Client: D.M. Wills Associates Ltd. (Peterborough)
150 Jameson Drive
Peterborough ON K9J 0B9
Contact: Kyle Plumpton

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
625-PAH-LOW-WT	**Water**							
Batch R4702800								
WG3098882-2 LCS								
Indeno(1,2,3-cd)pyrene			99.3		%		50-140	10-JUL-19
Naphthalene			88.8		%		50-130	10-JUL-19
Perylene			91.0		%		50-140	10-JUL-19
Phenanthrene			97.6		%		50-140	10-JUL-19
Pyrene			95.7		%		50-140	10-JUL-19
WG3098882-1 MB								
Acenaphthene			<0.010		ug/L		0.01	10-JUL-19
Anthracene			<0.010		ug/L		0.01	10-JUL-19
Benzo(a)anthracene			<0.010		ug/L		0.01	10-JUL-19
Benzo(a)pyrene			<0.010		ug/L		0.01	10-JUL-19
Benzo(b)fluoranthene			<0.010		ug/L		0.01	10-JUL-19
Benzo(ghi)perylene			<0.010		ug/L		0.01	10-JUL-19
Benzo(k)fluoranthene			<0.010		ug/L		0.01	10-JUL-19
Chrysene			<0.010		ug/L		0.01	10-JUL-19
Dibenzo(a,h)anthracene			<0.010		ug/L		0.01	10-JUL-19
Fluoranthene			<0.010		ug/L		0.01	10-JUL-19
Fluorene			<0.010		ug/L		0.01	10-JUL-19
Indeno(1,2,3-cd)pyrene			<0.010		ug/L		0.01	10-JUL-19
Naphthalene			<0.010		ug/L		0.01	10-JUL-19
Perylene			<0.010		ug/L		0.01	10-JUL-19
Phenanthrene			<0.010		ug/L		0.01	10-JUL-19
Pyrene			<0.010		ug/L		0.01	10-JUL-19
Surrogate: 2-Fluorobiphenyl			83.0		%		40-130	10-JUL-19
Surrogate: p-Terphenyl d14			77.3		%		40-130	10-JUL-19
625-PCP-WT	**Water**							
Batch R4699149								
WG3098882-2 LCS								
Pentachlorophenol			46.8	LCS-ND	%		50-140	09-JUL-19
WG3098882-1 MB								
Pentachlorophenol			<0.50		ug/L		0.5	09-JUL-19
Surrogate: 2,4,6-Tribromophenol			67.5		%		40-150	09-JUL-19
BOD-WT	**Water**							

Quality Control Report

Client: D.M. Wills Associates Ltd. (Peterborough)
150 Jameson Drive
Peterborough ON K9J 0B9
Contact: Kyle Plumpton

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BOD-WT	**Water**							
Batch R4707973								
WG3097994-2 DUP		**L2305151-1**						
BOD		<2.0	<2.0	RPD-NA	mg/L	N/A	20	11-JUL-19
WG3097994-3 LCS								
BOD			89.4		%		85-115	11-JUL-19
WG3097994-1 MB								
BOD			<2.0		mg/L		2	11-JUL-19
CN-TOT-WT	**Water**							
Batch R4707736								
WG3099898-7 DUP		**L2304982-1**						
Cyanide, Total		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	09-JUL-19
WG3099898-6 LCS								
Cyanide, Total			81.8		%		80-120	09-JUL-19
WG3099898-5 MB								
Cyanide, Total			<0.0020		mg/L		0.002	09-JUL-19
WG3099898-8 MS		**L2304982-1**						
Cyanide, Total			82.5		%		70-130	09-JUL-19
CR-CR6-IC-WT	**Water**							
Batch R4698494								
WG3099034-4 DUP		**WG3099034-3**						
Chromium, Hexavalent		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	08-JUL-19
WG3099034-2 LCS								
Chromium, Hexavalent			99.6		%		80-120	08-JUL-19
WG3099034-1 MB								
Chromium, Hexavalent			<0.00050		mg/L		0.0005	08-JUL-19
WG3099034-5 MS		**WG3099034-3**						
Chromium, Hexavalent			94.8		%		70-130	08-JUL-19
EC-WW-MF-WT	**Water**							
Batch R4695731								
WG3097736-3 DUP		**L2304696-1**						
E. Coli		0	0		CFU/100mL	0.0	65	07-JUL-19
WG3097736-1 MB								
E. Coli			0		CFU/100mL		1	07-JUL-19
F-IC-N-WT	**Water**							
Batch R4702685								
WG3099837-4 DUP		**WG3099837-3**						
Fluoride (F)		0.140	0.141		mg/L	0.4	20	09-JUL-19
WG3099837-2 LCS								

Quality Control Report

Client: D.M. Wills Associates Ltd. (Peterborough)
150 Jameson Drive
Peterborough ON K9J 0B9
Contact: Kyle Plumpton

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F-IC-N-WT	**Water**							
Batch R4702685								
WG3099837-2 LCS								
Fluoride (F)			98.8		%		90-110	09-JUL-19
WG3099837-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	09-JUL-19
WG3099837-5 MS		**WG3099837-3**						
Fluoride (F)			96.9		%		75-125	09-JUL-19
HG-T-CVAA-WT	**Water**							
Batch R4699169								
WG3099486-3 DUP		**L2304755-1**						
Mercury (Hg)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	09-JUL-19
WG3099486-2 LCS								
Mercury (Hg)-Total			114.0		%		80-120	09-JUL-19
WG3099486-1 MB								
Mercury (Hg)-Total			<0.000010		mg/L		0.00001	09-JUL-19
WG3099486-4 MS		**L2304755-2**						
Mercury (Hg)-Total			109.7		%		70-130	09-JUL-19
MET-T-CCMS-WT	**Water**							
Batch R4695990								
WG3098296-4 DUP		**WG3098296-3**						
Aluminum (Al)-Total		0.0119	0.0299	DUP-H,J	mg/L	0.0180	0.01	09-JUL-19
Antimony (Sb)-Total		0.00040	0.00036		mg/L	10	20	08-JUL-19
Arsenic (As)-Total		0.00147	0.00145		mg/L	1.5	20	08-JUL-19
Cadmium (Cd)-Total		<0.0000050	<0.000005(	RPD-NA	mg/L	N/A	20	08-JUL-19
Chromium (Cr)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	08-JUL-19
Cobalt (Co)-Total		0.00027	0.00025		mg/L	6.7	20	08-JUL-19
Copper (Cu)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	08-JUL-19
Lead (Pb)-Total		0.000063	<0.000050	RPD-NA	mg/L	N/A	20	08-JUL-19
Manganese (Mn)-Total		0.201	0.197		mg/L	1.7	20	08-JUL-19
Molybdenum (Mo)-Total		0.000765	0.000786		mg/L	2.8	20	08-JUL-19
Nickel (Ni)-Total		0.00071	0.00066		mg/L	6.9	20	08-JUL-19
Selenium (Se)-Total		0.000058	<0.000050	RPD-NA	mg/L	N/A	20	08-JUL-19
Silver (Ag)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	08-JUL-19
Tin (Sn)-Total		0.00011	<0.00010	RPD-NA	mg/L	N/A	20	08-JUL-19
Titanium (Ti)-Total		0.00031	0.00065	J	mg/L	0.00034	0.0006	09-JUL-19
Zinc (Zn)-Total		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	08-JUL-19
WG3098296-2 LCS								

Quality Control Report

Client: D.M. Wills Associates Ltd. (Peterborough)
150 Jameson Drive
Peterborough ON K9J 0B9
Contact: Kyle Plumpton

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4695990								
WG3098296-2 LCS								
Aluminum (Al)-Total			102.5		%		80-120	08-JUL-19
Antimony (Sb)-Total			104.1		%		80-120	08-JUL-19
Arsenic (As)-Total			99.2		%		80-120	08-JUL-19
Cadmium (Cd)-Total			97.6		%		80-120	08-JUL-19
Chromium (Cr)-Total			97.6		%		80-120	08-JUL-19
Cobalt (Co)-Total			97.5		%		80-120	08-JUL-19
Copper (Cu)-Total			95.8		%		80-120	08-JUL-19
Lead (Pb)-Total			97.9		%		80-120	08-JUL-19
Manganese (Mn)-Total			99.3		%		80-120	08-JUL-19
Molybdenum (Mo)-Total			103.6		%		80-120	08-JUL-19
Nickel (Ni)-Total			96.4		%		80-120	08-JUL-19
Selenium (Se)-Total			96.1		%		80-120	08-JUL-19
Silver (Ag)-Total			100.8		%		80-120	08-JUL-19
Tin (Sn)-Total			100.9		%		80-120	08-JUL-19
Titanium (Ti)-Total			98.8		%		80-120	08-JUL-19
Zinc (Zn)-Total			96.4		%		80-120	08-JUL-19
WG3098296-1 MB								
Aluminum (Al)-Total			<0.0050		mg/L		0.005	08-JUL-19
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	08-JUL-19
Arsenic (As)-Total			<0.00010		mg/L		0.0001	08-JUL-19
Cadmium (Cd)-Total			<0.000005(		mg/L		0.000005	08-JUL-19
Chromium (Cr)-Total			<0.00050		mg/L		0.0005	08-JUL-19
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	08-JUL-19
Copper (Cu)-Total			<0.0010		mg/L		0.001	08-JUL-19
Lead (Pb)-Total			<0.000050		mg/L		0.00005	08-JUL-19
Manganese (Mn)-Total			<0.00050		mg/L		0.0005	08-JUL-19
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	08-JUL-19
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	08-JUL-19
Selenium (Se)-Total			<0.000050		mg/L		0.00005	08-JUL-19
Silver (Ag)-Total			<0.000050		mg/L		0.00005	08-JUL-19
Tin (Sn)-Total			<0.00010		mg/L		0.0001	08-JUL-19
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	08-JUL-19
Zinc (Zn)-Total			<0.0030		mg/L		0.003	08-JUL-19
WG3098296-5 MS		**WG3098296-3**						

Quality Control Report

Client: D.M. Wills Associates Ltd. (Peterborough)
150 Jameson Drive
Peterborough ON K9J 0B9
Contact: Kyle Plumpton

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R4695990								
WG3098296-5 MS		**WG3098296-3**						
Aluminum (Al)-Total			99.3		%		70-130	08-JUL-19
Antimony (Sb)-Total			101.4		%		70-130	08-JUL-19
Arsenic (As)-Total			101.6		%		70-130	08-JUL-19
Cadmium (Cd)-Total			96.5		%		70-130	08-JUL-19
Chromium (Cr)-Total			96.6		%		70-130	08-JUL-19
Cobalt (Co)-Total			95.6		%		70-130	08-JUL-19
Copper (Cu)-Total			89.9		%		70-130	08-JUL-19
Lead (Pb)-Total			91.4		%		70-130	08-JUL-19
Manganese (Mn)-Total			N/A	MS-B	%		-	08-JUL-19
Molybdenum (Mo)-Total			104.3		%		70-130	08-JUL-19
Nickel (Ni)-Total			91.9		%		70-130	08-JUL-19
Selenium (Se)-Total			99.6		%		70-130	08-JUL-19
Silver (Ag)-Total			93.2		%		70-130	08-JUL-19
Tin (Sn)-Total			102.2		%		70-130	08-JUL-19
Titanium (Ti)-Total			99.1		%		70-130	08-JUL-19
Zinc (Zn)-Total			86.9		%		70-130	08-JUL-19
NP,NPE-LCMS-WT	**Water**							
Batch R4696340								
WG3098458-3 DUP		**L2304599-1**						
Nonylphenol		<1.0	<1.0	RPD-NA	ug/L	N/A	30	08-JUL-19
Nonylphenol Monoethoxylates		<2.0	<2.0	RPD-NA	ug/L	N/A	30	08-JUL-19
Nonylphenol Diethoxylates		<0.10	<0.10	RPD-NA	ug/L	N/A	30	08-JUL-19
WG3098458-2 LCS								
Nonylphenol			83.7		%		75-125	08-JUL-19
Nonylphenol Monoethoxylates			122.5		%		75-125	08-JUL-19
Nonylphenol Diethoxylates			101.0		%		75-125	08-JUL-19
WG3098458-1 MB								
Nonylphenol			<1.0		ug/L		1	08-JUL-19
Nonylphenol Monoethoxylates			<2.0		ug/L		2	08-JUL-19
Nonylphenol Diethoxylates			<0.10		ug/L		0.1	08-JUL-19
WG3098458-4 MS		**L2304599-1**						
Nonylphenol			94.8		%		50-150	08-JUL-19
Nonylphenol Monoethoxylates			143.4		%		50-150	08-JUL-19
Nonylphenol Diethoxylates			98.7		%		50-150	08-JUL-19

Quality Control Report

Client: D.M. Wills Associates Ltd. (Peterborough)
150 Jameson Drive
Peterborough ON K9J 0B9
Contact: Kyle Plumpton

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
OGG-SPEC-WT	**Water**							
Batch R4696308								
WG3098327-2 LCS								
Oil and Grease, Total			89.3		%		70-130	08-JUL-19
Mineral Oil and Grease			76.2		%		70-130	08-JUL-19
WG3098327-1 MB								
Oil and Grease, Total			<2.0		mg/L		2	08-JUL-19
Mineral Oil and Grease			<1.0		mg/L		1	08-JUL-19
P-T-COL-WT	**Water**							
Batch R4707849								
WG3101589-3 DUP		**L2305272-1**						
Phosphorus, Total		0.0054	0.0069	J	mg/L	0.0016	0.006	11-JUL-19
WG3101589-2 LCS								
Phosphorus, Total			100.3		%		80-120	11-JUL-19
WG3101589-1 MB								
Phosphorus, Total			<0.0030		mg/L		0.003	11-JUL-19
WG3101589-4 MS		**L2305272-1**						
Phosphorus, Total			93.3		%		70-130	11-JUL-19
PAH-EXTRA-WT	**Water**							
Batch R4702212								
WG3098882-2 LCS								
Benzo(e)pyrene			88.3		%		60-130	10-JUL-19
1,3-Dinitropyrene			140.1	LCS-H	%		60-130	10-JUL-19
1,6-Dinitropyrene			144.5	LCS-H	%		60-130	10-JUL-19
Dibenz(a,h)acridine			94.0		%		60-130	10-JUL-19
1,8-Dinitropyrene			100.4		%		60-130	10-JUL-19
Dibenz(a,j)acridine			69.7		%		60-130	10-JUL-19
7H-Dibenzo(c,g)carbazole			88.0		%		60-130	10-JUL-19
Dibenzo(a,i)pyrene			79.6		%		60-130	10-JUL-19
WG3098882-1 MB								
Benzo(e)pyrene			<0.050		ug/L		0.05	10-JUL-19
1,3-Dinitropyrene			<1.0		ug/L		1	10-JUL-19
1,6-Dinitropyrene			<1.0		ug/L		1	10-JUL-19
Dibenz(a,h)acridine			<0.050		ug/L		0.05	10-JUL-19
1,8-Dinitropyrene			<1.0		ug/L		1	10-JUL-19
Dibenz(a,j)acridine			<0.050		ug/L		0.05	10-JUL-19
7H-Dibenzo(c,g)carbazole			<0.050		ug/L		0.05	10-JUL-19
Dibenzo(a,i)pyrene			<0.050		ug/L		0.05	10-JUL-19

Quality Control Report

Client: D.M. Wills Associates Ltd. (Peterborough)
150 Jameson Drive
Peterborough ON K9J 0B9
Contact: Kyle Plumpton

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-EXTRA-WT	**Water**							
Batch R4702212								
WG3098882-1 MB								
Surrogate: d14-Terphenyl			63.7		%		40-130	10-JUL-19
PCB-WT	**Water**							
Batch R4706708								
WG3099420-2 LCS								
Aroclor 1242			105.8		%		65-130	09-JUL-19
Aroclor 1248			94.7		%		65-130	09-JUL-19
Aroclor 1254			107.9		%		65-130	09-JUL-19
Aroclor 1260			102.8		%		65-130	09-JUL-19
WG3099420-1 MB								
Aroclor 1242			<0.020		ug/L		0.02	09-JUL-19
Aroclor 1248			<0.020		ug/L		0.02	09-JUL-19
Aroclor 1254			<0.020		ug/L		0.02	09-JUL-19
Aroclor 1260			<0.020		ug/L		0.02	09-JUL-19
Surrogate: 2-Fluorobiphenyl			75.8		%		50-150	09-JUL-19
PH-WT	**Water**							
Batch R4699054								
WG3099186-4 DUP		**WG3099186-3**						
pH		8.18	8.08	J	pH units	0.10	0.2	08-JUL-19
WG3099186-2 LCS								
pH			7.03		pH units		6.9-7.1	08-JUL-19
PHENOLS-4AAP-WT	**Water**							
Batch R4698590								
WG3099616-7 DUP		**L2305058-1**						
Phenols (4AAP)		0.0011	0.0011		mg/L	0.0	20	09-JUL-19
WG3099616-6 LCS								
Phenols (4AAP)			106.8		%		85-115	09-JUL-19
WG3099616-5 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	09-JUL-19
WG3099616-8 MS		**L2305058-1**						
Phenols (4AAP)			102.7		%		75-125	09-JUL-19
SOLIDS-TSS-WT	**Water**							

Quality Control Report

Client: D.M. Wills Associates Ltd. (Peterborough)
150 Jameson Drive
Peterborough ON K9J 0B9
Contact: Kyle Plumpton

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TSS-WT	**Water**							
Batch R4703050								
WG3099883-3 DUP		**L2304900-7**						
Total Suspended Solids		3140	3340		mg/L	6.2	20	10-JUL-19
WG3099883-2 LCS								
Total Suspended Solids			99.2		%		85-115	10-JUL-19
WG3099883-1 MB								
Total Suspended Solids			<2.0		mg/L		2	10-JUL-19
TKN-WT	**Water**							
Batch R4708198								
WG3100595-3 DUP		**L2304971-1**						
Total Kjeldahl Nitrogen		<0.15	<0.15	RPD-NA	mg/L	N/A	20	11-JUL-19
WG3100595-2 LCS								
Total Kjeldahl Nitrogen			111.7		%		75-125	11-JUL-19
WG3100595-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	11-JUL-19
WG3100595-4 MS		**L2304971-1**						
Total Kjeldahl Nitrogen			104.4		%		70-130	11-JUL-19
VOC-ROU-HS-WT	**Water**							
Batch R4706448								
WG3101554-1 LCS								
1,1,2,2-Tetrachloroethane			88.0		%		70-130	11-JUL-19
1,2-Dichlorobenzene			112.7		%		70-130	11-JUL-19
1,4-Dichlorobenzene			116.9		%		70-130	11-JUL-19
Benzene			113.7		%		70-130	11-JUL-19
Chloroform			114.4		%		70-130	11-JUL-19
cis-1,2-Dichloroethylene			107.4		%		70-130	11-JUL-19
Dichloromethane			100.6		%		70-130	11-JUL-19
Ethylbenzene			115.7		%		70-130	11-JUL-19
m+p-Xylenes			116.2		%		70-130	11-JUL-19
o-Xylene			112.0		%		70-130	11-JUL-19
Tetrachloroethylene			121.6		%		70-130	11-JUL-19
Toluene			116.0		%		70-130	11-JUL-19
trans-1,3-Dichloropropene			99.8		%		70-130	11-JUL-19
Trichloroethylene			118.9		%		70-130	11-JUL-19
WG3101554-2 MB								
1,1,2,2-Tetrachloroethane			<0.50		ug/L		0.5	11-JUL-19
1,2-Dichlorobenzene			<0.50		ug/L		0.5	11-JUL-19

Quality Control Report

Client: D.M. Wills Associates Ltd. (Peterborough)
150 Jameson Drive
Peterborough ON K9J 0B9
Contact: Kyle Plumpton

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-ROU-HS-WT	**Water**							
Batch R4706448								
WG3101554-2 MB								
1,4-Dichlorobenzene			<0.50		ug/L		0.5	11-JUL-19
Benzene			<0.50		ug/L		0.5	11-JUL-19
Chloroform			<1.0		ug/L		1	11-JUL-19
cis-1,2-Dichloroethylene			<0.50		ug/L		0.5	11-JUL-19
Dichloromethane			<2.0		ug/L		2	11-JUL-19
Ethylbenzene			<0.50		ug/L		0.5	11-JUL-19
m+p-Xylenes			<1.0		ug/L		1	11-JUL-19
o-Xylene			<0.50		ug/L		0.5	11-JUL-19
Tetrachloroethylene			<0.50		ug/L		0.5	11-JUL-19
Toluene			<0.50		ug/L		0.5	11-JUL-19
trans-1,3-Dichloropropene			<0.50		ug/L		0.5	11-JUL-19
Trichloroethylene			<0.50		ug/L		0.5	11-JUL-19
Surrogate: 1,4-Difluorobenzene			101.2		%		70-130	11-JUL-19
Surrogate: 4-Bromofluorobenzene			99.7		%		70-130	11-JUL-19

Quality Control Report

Workorder: L2305043 Report Date: 12-JUL-19

Client: D.M. Wills Associates Ltd. (Peterborough)
150 Jameson Drive
Peterborough ON K9J 0B9
Contact: Kyle Plumpton

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
DUP-H,J	Duplicate results outside ALS DQO, due to sample heterogeneity. Duplicate results and limits are expressed in terms of absolute difference.
J	Duplicate results and limits are expressed in terms of absolute difference.
LCS-H	Lab Control Sample recovery was above ALS DQO. Non-detected sample results are considered reliable. Other results, if reported, have been qualified.
LCS-ND	Lab Control Sample recovery was slightly outside ALS DQO. Reported non-detect results for associated samples were unaffected.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

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

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

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

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

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L2305043-COFC

COC Number: 17 - 639621

Page of

Report To	Contact and company name below will appear on the final report
Company:	PRI ENGINEERING INC
Contact:	GREG KUPFER
Phone:	647-395-6660
	Company address below will appear on the final report
Street:	6889 REXWOOD ROAD
City/Province:	MISSISSAUGA, ONTARIO
Postal Code:	L4V-1R2
Invoice To	Same as Report To [X] YES [ ] NO
	Copy of Invoice with Report [X] YES [ ] NO
Company:	PRI ENGINEERING INC
Contact:	GREG KUPFER

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

ALS Lab Work Order # (lab use only): L2305043 COC

Report Format / Distribution	
Select Report Format:	[X] PDF [X] EXCEL | EDD (DIGITAL)
Quality Control (QC) Report with Report	[ ] YES [ ] NO
[ ] Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	[X] EMAIL | MAIL [ ] FAX
Email 1 or Fax	GREG.KUFFER@PRIENGINEERING.com
Email 2	JELICA.GARCIA@PRIENGINEERING.com
Email 3	

Invoice Distribution	
Select Invoice Distribution:	[X] EMAIL [ ] MAIL [ ] FAX
Email 1 or Fax	SAME AS ABOVE.
Email 2	

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

Select Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)

Regular [R] [X] Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days): [ ] 4 day [P4-20%] [ ] 3 day [P3-25%] [ ] 2 day [P2-50%]

EMERGENCY: [ ] 1 Business day [E-100%] [ ] Same Day, Weekend or Statutory holiday [E2-200%] (Laboratory opening fees may apply)]

Date and Time Required for all E&P TATs:

For tests that can not be performed according to the service level selected, you will be contacted.

Analysis Request

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

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	PHTHALATES	PAH-EXTRA	PAH-LOW-WT	PCB'S	VOC'S	HEXAVALENT CHROMIUM	TOTAL MERCURY	TOTAL METALS	SPECIATED OIL&GREASE	TKN/PHENOLS/TP	TOTAL CYANIDE	TOTAL BOD/pH/TSS	E. COLI	GLYCOLS AND ETHOXYLATES	NONYLPHENOLS AND NONYLPHENOL ETHOXYLATES	SAMPLES ON HOLD	Sample is hazardous (please provide further details)	NUMBER OF CONTAINERS
1	MW19-11	05-July-19	9:00	GW	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			
2.	TRIP BLANK (MW19-11)	"	—	"																		

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

Are samples taken from a Regulated DW System? [ ] YES [X] NO

Are samples for human consumption/ use? [ ] YES [X] NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen [ ] SIF Observations Yes [ ] No [ ]

Ice Packs [ ] Ice Cubes [X] Custody seal intact Yes [ ] No [ ]

Cooling Initiated [X]

INITIAL COOLER TEMPERATURES °C	FINAL COOLER TEMPERATURES °C
5.0°C	16.8

SHIPMENT RELEASE (client use)

Released by:	Date:	Time:
ARMAN YAZDANI	July 5/19	13:19

INITIAL SHIPMENT RECEPTION (lab use only)

Received by:	Date:	Time:
PA	7/5/2019	1:20 PM

FINAL SHIPMENT RECEPTION (lab use only)

Received by:	Date:	Time:
MG	July 5, 2019	15:50

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

JULY 2017 F

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**.

VOC-417

Appendix D

Hydraulic Conductivity Tests

SLUG TEST - MANUAL READINGS

PROJECT:	Proposed Multi-Storey Mixed Use Development
LOCATION:	3353-3359 Lakeshore Blvd West, Etobicoke, ON
PROJECT NO:	19-0026
WELL ID:	BH19-02

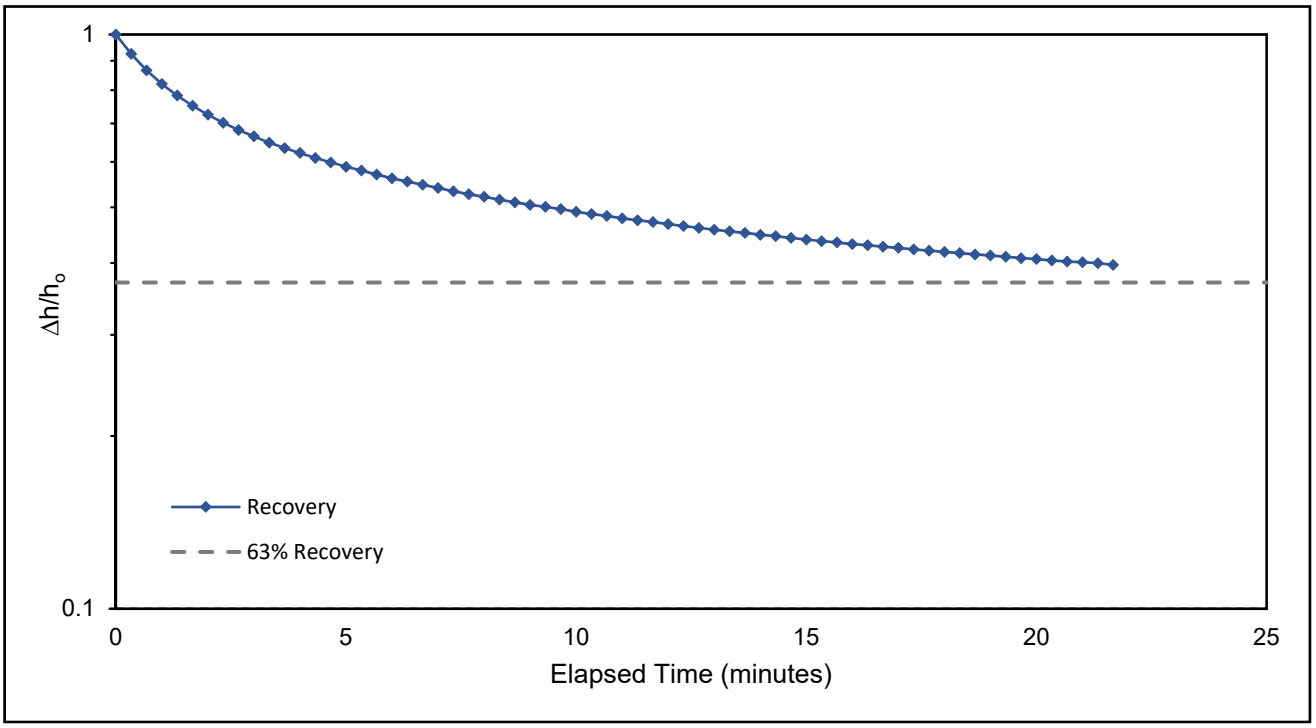
Test Date:	31-Jul-19	Technician:	JG / AYJr
Static Water Level (mBTOP):	2.65	Sand screen Length, L (m):	3.68
Well Depth (mBGS):	9.17	Pipe Screen Length (m):	3.05
Borehole Radius, R (mm):	110	Time, T_0 (min):	6
Monitoring Radius, r (mm):	60	Hydraulic Conductivity,K(m/s):	4.8E-06

ELAPSED TIME (min)	WATER LEVEL (mBTOP)	CHANGE IN WATER LEVEL (m)	Δh/ho
0	4.05	-1.40	1.00
1	3.85	-1.20	0.86
2	3.59	-0.94	0.67
3	3.40	-0.75	0.54
4	3.29	-0.64	0.46
5	3.29	-0.64	0.46
6	3.20	-0.55	0.39
10	3.06	-0.41	0.29
14	3.02	-0.37	0.26
17	2.97	-0.32	0.23

SLUG TEST - DATALOGGER READINGS

PROJECT:	Proposed Multi-Storey Mixed Use Development
LOCATION:	3353-3359 Lakeshore Blvd West, Etobicoke, ON
PROJECT NO:	19-0026
WELL ID:	BH19-02

Test Date:	31-Jul-19	Technician:	JG / AYJr
Static Water Level (mBTOP):	2.65	Sand screen Length, L (m):	3.68
Well Depth (mBGS):	9.17	Pipe Screen Length (m):	3.05
Borehole Radius, R (mm):	110	Time, T_0 (min)*:	25
Monitoring Radius, r (mm):	60	Hydraulic Conductivity,K(m/s):	1.1E-06



*extrapolated

SLUG TEST - MANUAL READINGS

PROJECT:	Proposed Multi-Storey Mixed Use Development
LOCATION:	3353-3359 Lakeshore Blvd West, Etobicoke, ON
PROJECT NO:	19-0026
WELL ID:	BH19-03

Test Date:	1-Aug-19	Technician:	JG
Static Water Level (mBTOP):	3.35	Sand screen Length, L (m):	4.27
Well Depth (mBGS):	4.57	Pipe Screen Length (m):	3.05
Borehole Radius, R (mm):	110	Time, T_0 (min)*:	15496
Monitoring Radius, r (mm):	60	Hydraulic Conductivity,K(m/s):	1.7E-09

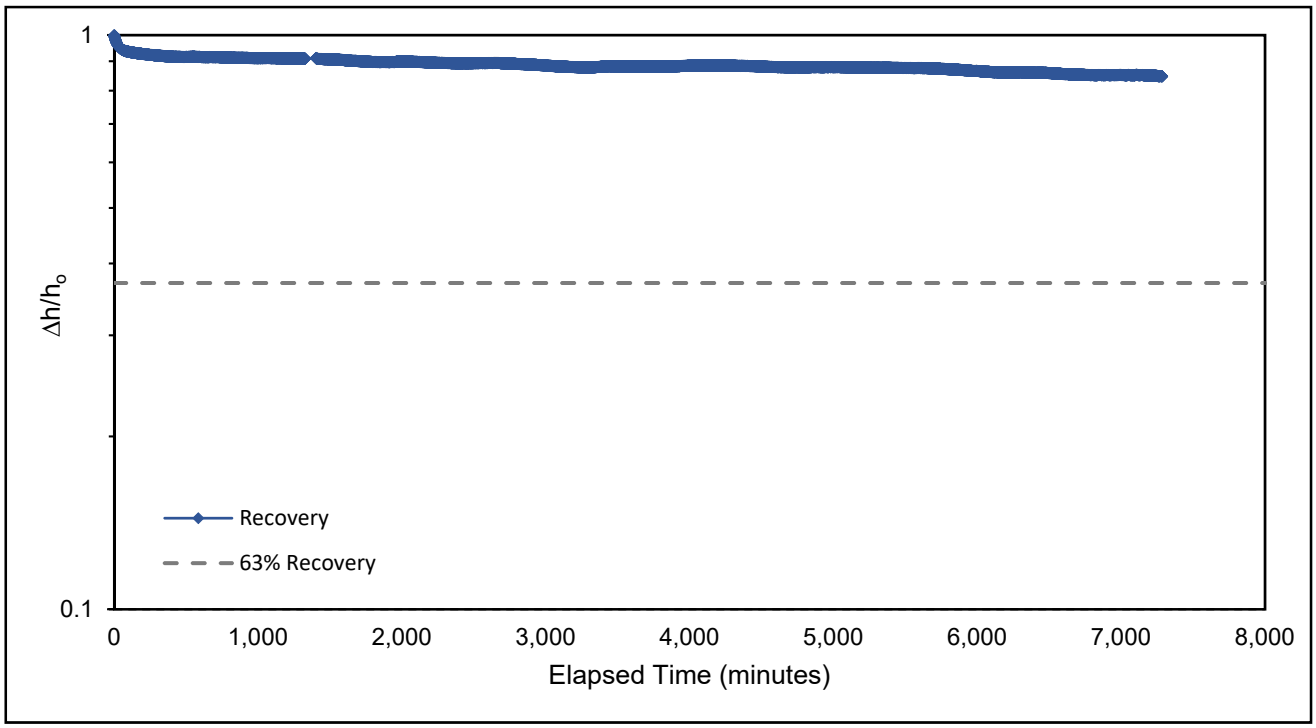
ELAPSED TIME (min)	WATER LEVEL (mBTOP)	CHANGE IN WATER LEVEL (m)	∆h/ho
0	0.79	2.54	1.00
1	0.8	2.53	1.00
2	0.8	2.53	1.00
3	0.81	2.53	0.99
5	0.82	2.52	0.99
6	0.82	2.51	0.99
10	0.84	2.50	0.98
20	0.87	2.46	0.97
25	0.89	2.44	0.96
30	0.9	2.43	0.96
1328	1.04	1.61	0.63
7285	1.01	1.64	0.65

*extrapolated

SLUG TEST - DATALOGGER READINGS

PROJECT:	Proposed Multi-Storey Mixed Use Development
LOCATION:	3353-3359 Lakeshore Blvd West, Etobicoke, ON
PROJECT NO:	19-0026
WELL ID:	BH19-03

Test Date:	1-Aug-19	Technician:	JG
Static Water Level (mBTOP):	3.35	Sand screen Length, L (m):	4.27
Well Depth (mBGS):	4.57	Pipe Screen Length (m):	3.05
Borehole Radius, R (mm):	110	Time, T_0 (min)*:	7200
Monitoring Radius, r (mm):	60	Hydraulic Conductivity,K(m/s):	3.6E-09



*extrapolated

SLUG TEST - MANUAL READINGS

PROJECT:	Proposed Multi-Storey Mixed Use Development
LOCATION:	3353-3359 Lakeshore Blvd West, Etobicoke, ON
PROJECT NO:	19-0026
WELL ID:	BH19-04

Test Date:	31-Jul-19	Technician:	JG / AYJr
Static Water Level (mBTOP):	2.41	Sand screen Length, L (m):	2.83
Well Depth (mBGS):	4.05	Pipe Screen Length (m):	2.13
Borehole Radius, R (mm):	110	Time, T_0 (min)*:	6039
Monitoring Radius, r (mm):	60	Hydraulic Conductivity,K(m/s):	5.7E-09

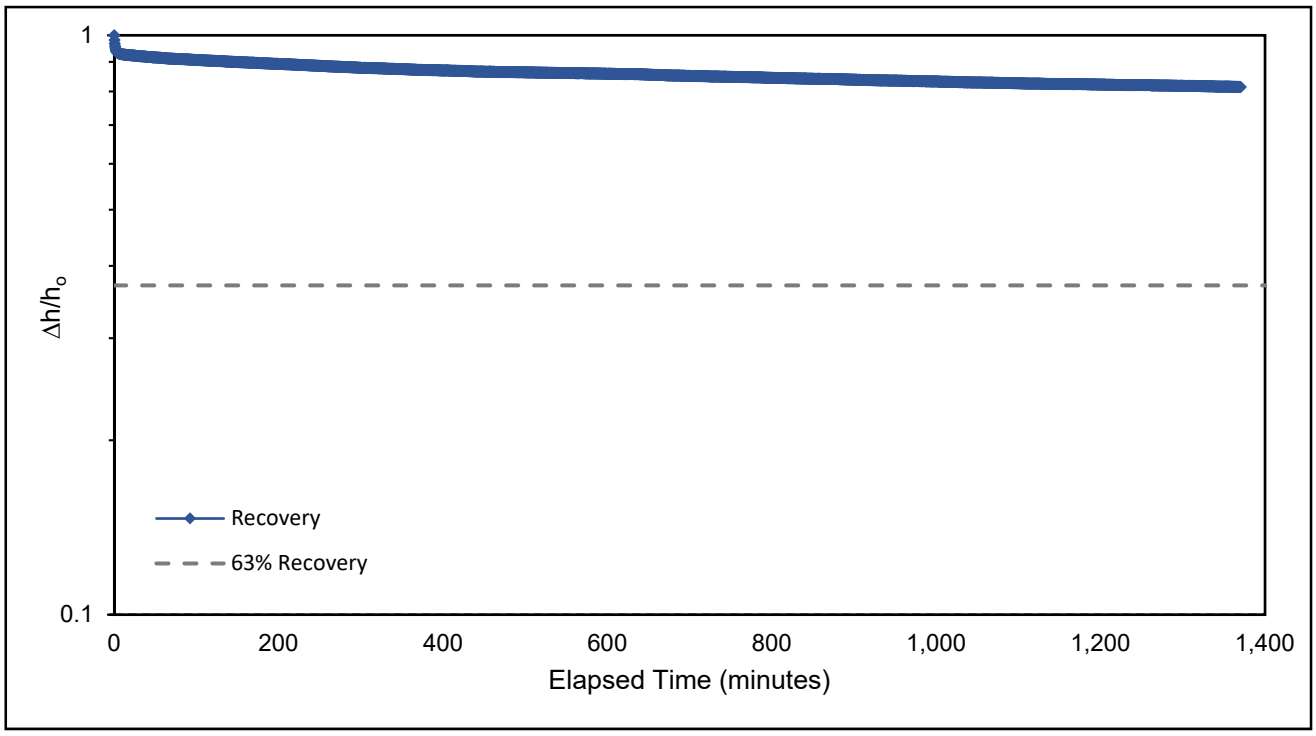
ELAPSED TIME (min)	WATER LEVEL (mBTOP)	CHANGE IN WATER LEVEL (m)	Δh/ho
0	0.3	2.11	1.00
1	0.44	1.97	0.93
2	0.51	1.90	0.90
3	0.53	1.88	0.89
57	0.56	1.85	0.88
1341	0.78	1.63	0.77

*extrapolated

SLUG TEST - DATALOGGER READINGS

PROJECT:	Proposed Multi-Storey Mixed Use Development
LOCATION:	3353-3359 Lakeshore Blvd West, Etobicoke, ON
PROJECT NO:	19-0026
WELL ID:	BH19-04

Test Date:	31-Jul-19	Technician:	JG / AYJr
Static Water Level (mBTOP):	2.41	Sand screen Length, L (m):	2.83
Well Depth (mBGS):	4.05	Pipe Screen Length (m):	2.13
Borehole Radius, R (mm):	110	Time, T_0 (min)*:	9000
Monitoring Radius, r (mm):	60	Hydraulic Conductivity,K(m/s):	3.8E-09



*extrapolated

SLUG TEST - MANUAL READINGS

PROJECT:	Proposed Multi-Storey Mixed Use Development
LOCATION:	3353-3359 Lakeshore Blvd West, Etobicoke, ON
PROJECT NO:	19-0026
WELL ID:	MW19-10

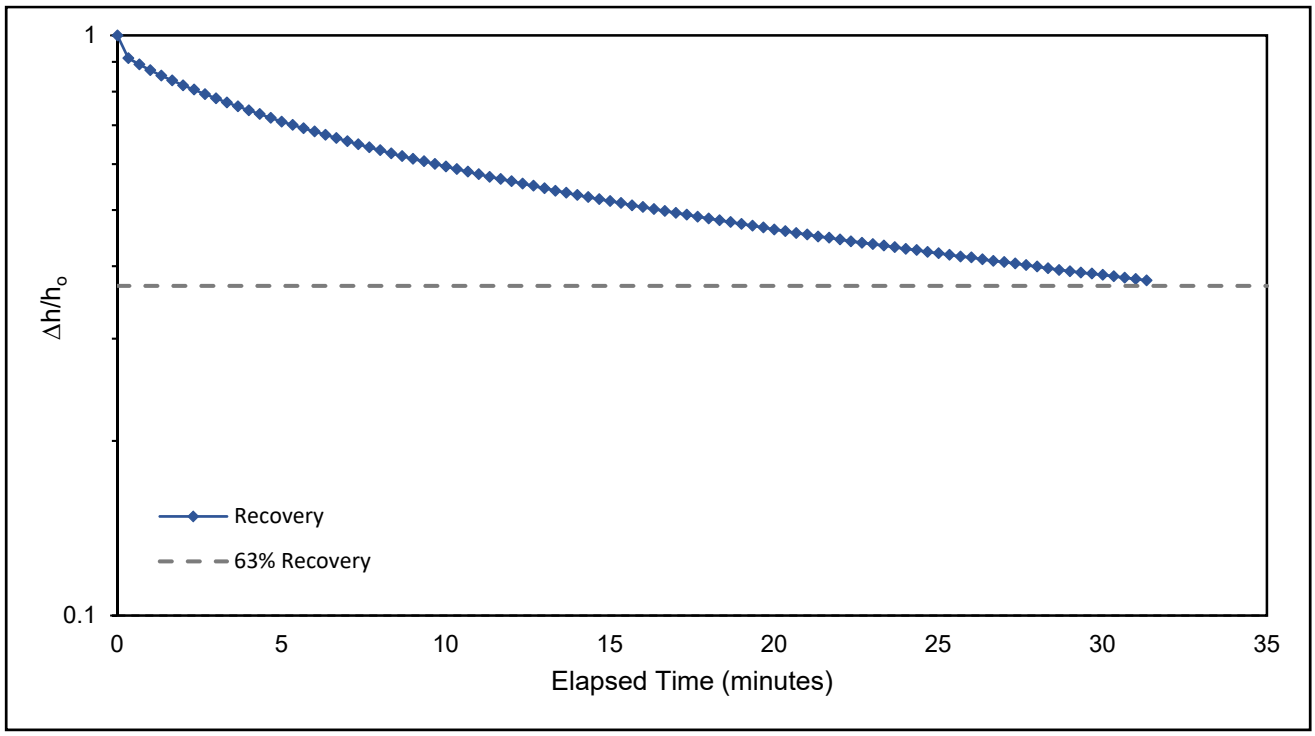
Test Date:	31-Jul-19	Technician:	JG / AYJr
Static Water Level (mBTOP):	2.85	Sand screen Length, L (m):	3.60
Well Depth (mBGS):	9.63	Pipe Screen Length (m):	3.05
Borehole Radius, R (mm):	110	Time, T_0 (min)*:	14
Monitoring Radius, r (mm):	60	Hydraulic Conductivity,K(m/s):	2.1E-06

ELAPSED TIME (min)	WATER LEVEL (mBTOP)	CHANGE IN WATER LEVEL (m)	Δh/ho
0	4.77	-1.92	1.00
1	4.57	-1.72	0.90
2	4.5	-1.65	0.86
3	4.42	-1.57	0.82
4	4.33	-1.48	0.77
5	4.26	-1.41	0.73
6	4.15	-1.30	0.68
7	4.12	-1.27	0.66
13	3.94	-1.09	0.57
20	3.74	-0.89	0.46
23	3.70	-0.85	0.44

SLUG TEST - DATALOGGER READINGS

PROJECT:	Proposed Multi-Storey Mixed Use Development
LOCATION:	3353-3359 Lakeshore Blvd West, Etobicoke, ON
PROJECT NO:	19-0026
WELL ID:	MW19-10

Test Date:	31-Jul-19	Technician:	JG / AYJr
Static Water Level (mBTOP):	2.85	Sand screen Length, L (m):	3.6
Well Depth (mBGS):	9.63	Pipe Screen Length (m):	3.05
Borehole Radius, R (mm):	110	Time, T_0 (min):	31
Monitoring Radius, r (mm):	60	Hydraulic Conductivity,K(m/s):	9.4E-07



Appendix E

Dewatering Calculations

Short Term Dewatering Calculations

	Units	Values	Remarks
Dewatering Method		Open Excavation	
Dewatering Length	m	40	
Dewatering Width	m	35	
Dewatering Area	m2	1400	40 m x 35 m
Equivalent Radius	m	21.1	=√(1400/π)
Water Table Elevation	mASL	87.5	highest recorded groundwater elevation, disregarding removal/addition events
Dewatering Base Elevation	mASL	83.7	underside of proposed floor slab
Dewatering Elevation	mASL	83.2	assume drainage will be 0.5 m below the base
Assumed Impermeable Layer Elevation	mASL	80.0	assume negligible vertical and horizontal groundwater flow
Saturated Aquifer Thickness	m	7.5	
Lowest Drawdown Level	m	4.3	
Hydraulic Conductivity	m/s	3.4E-06	Weight K of three hydrostratigraphic units above 80 mASL
Constant		3000	for radial flow
Radius of Influence	m	44.8	Equation 3
Groundwater Inflow to Dewatering	m3/sec	6.5E-04	
Groundwater Inflow to Dewatering	m3/day	55.86	
Groundwater Inflow to Dewatering, without FOS	L/day	55,865	
Groundwater Inflow to Dewatering (FOS = 1.5)	L/day	83,797	

Long Term Dewatering Calculations

	Units	Values	Remarks
Dewatering Method		Subsurface drains	
Dewatering Length	m	40	
Dewatering Width	m	35	
Dewatering Area	m2	1400	40 m x 35 m
Equivalent Radius	m	21.1	=√(1400/π)
Water Table Elevation	mASL	87.5	highest recorded groundwater elevation, disregarding removal/addition events
Dewatering Base Elevation	mASL	83.7	underside of proposed floor slab
Dewatering Elevation	mASL	83.5	Assume base of spread footing will be 0.2 m below the base
Assumed Impermeable Layer Elevation	mASL	80.0	assume negligible vertical and horizontal groundwater flow
Saturated Aquifer Thickness	m	7.5	
Lowest Drawdown Level	m	4	
Hydraulic Conductivity	m/s	3.5E-06	Weight K of three hydrostratigraphic units above 80 mASL
Constant		3000	for radial flow
Radius of Influence	m	43.6	Equation 3
Groundwater Inflow to Dewatering	m3/sec	0.0007	
Groundwater Inflow to Dewatering	m3/day	57.67	
Groundwater Inflow to Dewatering, without FOS	L/day	57,674	
Groundwater Inflow to Dewatering (FOS = 1.5)	L/day	86,511	

2-year design storm	mm	40	
Perimeter of building	m	135	Based on Floor Plans by ICON (Nov.11,2019)
Zone of influence (FOS=1.5)	m	7.5	Assume base of spread footing at 83.7 mASL, or 5m below grade
Volume of rainfall	L/day	40500	
Assume 60% runoff and attenuation	L/day	24300	
Volume retained	L/day	16200	
Total Groundwater Volume	L/day	102,711	

August 2018

HYDROLOGICAL REVIEW SUMMARY

The form is to be completed by the Professional that prepared the Hydrological Review.
Use of the form by the City of Toronto is not to be construed as verification of engineering/hydrological content.

Refer to the Terms of Reference, Hydrological Review:
Link to Terms of Reference Hydrological Review

For City Staff Use Only:	
Name of ECS Case Manager (Please print)	
Date Review Summary provided to to TW, EM&P	

IF ANY OF THE REQUIREMENTS LISTED BELOW HAVE NOT BEEN INLCUDED IN THE HYDROLOGICAL REVIEW, THE REVIEW WILL BE CONSIDERED INCOMPLETE.
THE GREY SHADED BOXES WILL REQUIRE A CONSISTANCY CHECK BY THE ECS CASE MANAGER.

Summary of Key Information:

SITE INFORMATION		Page # & Section # of Review	Review Includes this Information City Staff (Check)
Site Address	Toronto, Ontario	Pg. 1, S. 1	
Postal Code	M8W 1N1	Pg. 1, S. 1	
Property Owner (on request for comments memo)	Apria Inc.	Pg. 1, S. 1.1	
Proposed description of the project (if applicable) (point towers, number of podiums)	Multi-storey Mixed-Use Development	Pg. 1, S. 1	
Land Use (ex. commercial, residential, mixed, institutional, industrial)	Mixed residential and commercial	Pg. 1, S. 1.2	
Number of below grade levels for the proposed structure	1	Pg. 1, S. 1.2	
HYDROLOGICAL REVIEW INFORMATION			
Date Hydrological Review was prepared:	October 21, 2019	Title page	
Who Performed the Hydrological Review (Consulting Firm)	PRI Engineering Inc.	Title page	
Name of Author of Hydrological Review	Arash Yazdani, P.Eng Director of Engineering Services	Pg. 12, S. 5	

August 2018

HYDROLOGICAL REVIEW SUMMARY

SITE INFORMATION		Page # & Section # of Review	Review Includes this Information City Staff (Check)
Check the directories on the website for Professional Geoscientists and/or Professional Engineers of Ontario been checked to ensure that the Hydrological Report has been prepared by a qualified person who is a licensed Professional Geoscientist as set out in the Professional Geoscientist Act of Ontario or a Professional Engineer? PEO: Professional Engineers of Ontario APGO: Association of Professional Geoscientists of Ontario	PEO Member # 100173202	N/A	
Has the Hydrological Review been prepared in accordance with all the following: • Ontario Water Resources Act • Ontario Regulation 387/04 • Toronto Municipal Code Chapter 681-Sewers	Yes - Ontario Water Resources Act - Ontario Regulation 387/04 - Toronto Municipal Code Chapter 681 - Sewers	Pg. 10, S. 4.1.1 Pg. 10, S. 4.1.1 Pg. 9, S. 3.5	
		Page # & Section # of every occurrence in the Review	**Review Includes this Information City Staff (Check)**

TORONTO

August 2018

HYDROLOGICAL REVIEW SUMMARY

SITE INFORMATION		Page # & Section # of Review	Review Includes this Information City Staff (Check)
Total Volume (L/day) Short Term Discharge of groundwater (construction dewatering) **with safety factor included**	118,800 What safety factor was used? 1.5	P.10, S. 4.1	
Total Volume (L/day) Short Term Discharge of groundwater (construction dewatering) **without safety factor included**	90,900	P.10, S.4.1	
Total Volume (L/day) Long Term drainage of groundwater (from foundation drainage, weeping tiles, sub slab drainage) **with safety factor included** If the development is part of a multiple tower complex, include total volume for each separate tower	102,800 What safety factor was used? 1.5	P.10, S.4.1	
List the nearest surface water (river, creek, lake)	Lake Ontario ~700 m		

August 2018

HYDROLOGICAL REVIEW SUMMARY

SITE INFORMATION		Page # & Section # of Review	Review Includes this Information City Staff (Check)
Lowest basement elevation	83.7 mASL	P.1, S. 1.2 P.10, S.4.1	
Foundation elevation	83.5 mASL	P.10, S. 4.1.2	
Ground elevation	88.2 to 89.0 mASL	P.4, S. 2.1 (Table1)	
STUDY AREA MAP		**Page # & Section # of every occurrence in the Review**	**Review Includes this Information City Staff (Check)**
Study area map(s) have been included in the report.	ⓧ **Yes**	Figure 1 Figure 2 Figure 3	N/A
Study area map(s) been prepared according to the Hydrological Review Terms of Reference.	ⓧ **Yes**	Figure 1 Figure 2 Figure 3	N/A
WATER LEVEL AND WELLS		**Page # & Section # of every occurrence**	**Review Includes this Information (City Staff Initial)**

TORONTO

August 2018

HYDROLOGICAL REVIEW SUMMARY

SITE INFORMATION		Page # & Section # of Review in the Review	Review Includes this Information City Staff (Check)
The groundwater level has been monitored using all wells located on site (within property boundary).	Yes	P. 4, S. 2.1	
The static water level measurements have been monitored at all monitoring wells for a minimum of 3 months with samples taken every 2 weeks for a minimum of 6 samples. The intent is for the qualified professional to use professional judgement to estimate the seasonally high groundwater level.	Yes, measurements were taken at all monitoring wells every week for 3 months.	P.5, S. 2.3	
All water levels in the wells have been measured with respect to masl.	Yes	P.4-5, S. 2	
A table of geology/soil stratigraphy for the property has been included.	Yes	P. 4, S. 2.1 (Table 1)	
GEOLOGY AND PHYSICAL HYDROLOGY		**Page # & Section # of every occurrence in the Review**	**Review Includes this Information (City Staff Initial)**
The review has made reference to the soil materials including thickness, composition and texture, and bedrock environments.	Yes	P. 3, S. 1.4	
Key aquifers and the site's proximity to nearby surface water has been identified.	ⓧ **Yes**	P. 3, S. 1.4 P. 8, S. 3.3	N/A

August 2018

HYDROLOGICAL REVIEW SUMMARY

SITE INFORMATION		Page # & Section # of Review	Review Includes this Information City Staff (Check)
PUMP TEST/SLUG TEST/DRAWDOWN ANALYSIS		**Page # & Section # of every occurrence in the Review**	**Review Includes this Information City Staff (Check)**
A summary of the pumping test data and analysis is included in the review.	Yes	P. 8, S. 3.2	
The pump test been carried out for at least 24 hours if possible. If not, has a slug test been conducted?	Slug tests were completed at 4 monitoring wells.	P. 8, S. 3.2	
Have the monitoring well(s) have been monitored using digital devices? If yes how frequently?	A datalogger was used for the entire duration of each test.	P. 5, S. 2.4.3	
If a slug or pump test has been conducted has the static groundwater level been monitored at all monitoring well(s) multiple times to measure recovery? -prior to the slug or pumping test(s)? -post slug or pumping test(s)?	ⓧ **Yes**	P.5, S.2.4.3	N/A
The above noted slug or pump tests have been included in the report.	ⓧ **Yes**	P.5. S.3.2	
WATER QUALITY		**Page # & Section # of every occurrence in the Review**	**Review Includes this Information City Staff (Check)**

TORONTO

August 2018

HYDROLOGICAL REVIEW SUMMARY

SITE INFORMATION		Page # & Section # of Review	Review Includes this Information City Staff (Check)
The report includes baseline water quality samples from a laboratory. The water quality must be analyzed for all parameters listed in Tables 1 and 2 of Chapter 681 Sewers of the Toronto Municipal Code (found in Appendix A) and the samples must have to be taken unfiltered within 9 months of the date of submission.	Yes, the sample was unfiltered and collected on July 5, 2019.	P.9, S. 3.5	
The water quality data templates in Appendix A have been completed for each sample taken for both sanitary/combined and storm sewer limits.	For sanitary discharge- See the sanitary/combined sewer parameter limit template For storm discharge- See the storm sewer parameter limit template		
Qualified professional to list all sample parameters that have violated the Bylaw limits for each sample taken for the sanitary/combined Bylaw limits **If there are any sample parameter Exceedances the groundwater can't be discharged as is.**	Total Suspended Solids	P.9, S.3.5 (Table 5)	
Qualified professional to list all sample parameters that have violated the Bylaw limits for each sample taken for the storm Bylaw limits. **If there are any sample parameter exceedances the groundwater can't be discharged as is.**	Total Suspended Solids Total Manganese Total PAHs	P.9, S.3.5 (Table 5)	
The water quality samples have been analyzed by a Canadian laboratory accredited and licensed by Standards Council of Canada and/or Canadian Association for Laboratory Accreditation.	ⓧ **Yes**	P.9, S.3.5. Appendix C	N/A

TORONTO

August 2018

HYDROLOGICAL REVIEW SUMMARY

SITE INFORMATION		Page # & Section # of Review	Review Includes this Information City Staff (Check)
List of Canadian accredited laboratories: Standards Council of Canada	ALS Environmental (Waterloo) ALS Canada Ltd. Accreditation No. A3149 (CALA)	Appendix C	
A chain of custody record for the samples is included with the report.	Yes	Appendix C	
Has the chain of custody reference any filtered sample? If yes, the report has to be amended and re-submitted to include only non-filtered samples.	unfiltered sample only	Appendix C	
List any of the sample parameters that exceed the Bylaw limits with the reporting detection limit (RDL) included.	Total Suspended Solids	Appendix C	
A true copy of the Certificate of Analysis report, is included with the report.	Yes	Appendix C	
EVALUATION OF IMPACT		**Page # & Section # of every occurrence in the Review**	**Review Includes this Information City Staff (Check)**
Does the report recommend a back-up system or relief safety valve(s)?	◯ **Yes** ⓧ **No**		
Does the associated Geotechnical report recommend a back-up system or relief safety valve(s)?	◯ **Yes** ⓧ **No**		
The taking and discharging of groundwater on site has been analyzed to ensure that no negative	ⓧ **Yes**	P.10-11, S. 4	N/A

August 2018

HYDROLOGICAL REVIEW SUMMARY

SITE INFORMATION		Page # & Section # of Review	Review Includes this Information City Staff (Check)
impacts will occur to: the City sewage works in terms of quality and quantity (including existing infrastructure), the natural environment, and settlement issues.			
Has it been determined that there will be a negative impact to the natural environment, City sewage works, or surrounding properties has the study identified the following: the extent of the negative impact, the detail of the precondition state of all the infrastructure, City sewage works, and natural environment within the effected zone and the proposed remediation and monitoring plan?	◯ **Yes** **If yes, identify impact:** Ⓧ **No**	P11, S. 4.2-4.3	N/A

Summary of Additional Information and Key Items (if applicable):

HYDROLOGICAL REVIEW SUMMARY

Appendix A:

SANITARY/COMBINED **Sample Location:** MW19-11 (4828048.015 N, 618989.928 E)

Inorganics		Sample Result	Sample Result with upper RDL included	
Parameter	mg/L	mg/L	mg/L	ug/L
BOD	300	< 3	3.0	300,000
Fluoride	10	< 0.4	0.40	10,000
TKN	100	12.1	1.5	100,000
pH	6.0 - 11.5	7.49	0.1	6.0 - 11.5
Phenolics 4AAP	1	< 0.0010	0.0010	1,000
TSS	350	1540	20	350,000
Total Cyanide	2	< 0.0020	0.0020	2,000
Metals				
Chromium Hexavalent	2	< 0.00050	0.00050	2,000
Mercury	0.01	< 0.000010	0.000010	10
Total Aluminum	50	< 0.050	0.050	50,000
Total Antimony	5	< 0.0010	0.0010	5,000
Total Arsenic	1	0.0021	0.0010	1,000
Total Cadmium	0.7	< 0.000050	0.000050	700
Total Chromium	4	< 0.0050	0.0050	4,000
Total Cobalt	5	0.0029	0.0010	5,000
Total Copper	2	< 0.010	0.010	2,000
Total Lead	1	< 0.00050	0.00050	1,000
Total Manganese	5	0.676	0.0050	5,000
Total Molybdenum	5	0.0040	0.00050	5,000
Total Nickel	2	<0.0050	0.0050	2,000
Total Phosphorus	10	1.15	0.030	10,000
Total Selenium	1	< 0.00050	0.00050	1,000
Total Silver	5	<0.00050	0.00050	5,000
Total Tin	5	< 0.0010	0.0010	5,000
Total Titanium	5	< 0.0030	0.0030	5,000
Total Zinc	2	< 0.03	0.03	2,000
Petroleum Hydrocarbons				
Animal/Vegetable Oil & Grease	150	< 2.0	2.0	150,000
Mineral/Synthetic Oil & Grease	15	< 1.0	1.0	15,000

August 2018

HYDROLOGICAL REVIEW SUMMARY

Volatile Organics		**Sample Result**	**Sample Result with upper RDL included**	
Parameter	**mg/L**	mg/L	mg/L	**ug/L**
Benzene	0.01	< 0.00050	0.00050	10
Chloroform	0.04	< 0.0010	0.0010	40
1,2-Dichlorobenzene	0.05	< 0.00050	0.00050	50
1,4-Dichlorobenzene	0.08	< 0.00050	0.00050	80
Cis-1,2-Dichloroethylene	4	< 0.00050	0.00050	4,000
Trans-1,3-Dichloropropylene	0.14	< 0.00050	0.00050	140
Ethyl Benzene	0.16	< 0.00050	0.00050	160
Methylene Chloride	2	< 0.0020	0.0020	2,000
1,1,2,2-Tetrachloroethane	1.4	< 0.00050	0.00050	1,400
Tetrachloroethylene	1	< 0.00050	0.00050	1,000
Toluene	0.016	< 0.00050	0.00050	16
Trichloroethylene	0.4	< 0.00050	0.00050	400
Total Xylenes	1.4	< 0.0011	0.0011	1,400
Semi-Volatile **Organics**				
Di-n-butyl Phthalate	0.08	< 0.0010	0.0010	80
Bis (2-ethylhexyl) Phthalate	0.012	< 0.0020	0.0020	12
3,3'-Dichlorobenzidine	0.002	< 0.00040	0.00040	2
Pentachlorophenol	0.005	< 0.00050	0.00050	5
Total PAHs	0.005	0.0048	0.0017	5
Misc **Parameters**				
Nonylphenols	0.02	< 0.0010	0.0010	20
Nonylphenol Ethoxylates	0.2	< 0.010	0.010	200

Sample Collected:
Temperature:

August 2018

HYDROLOGICAL REVIEW SUMMARY

STORM **Sample Location:** MW19-11 (4828048.015 N, 618989.928 E)

Inorganics		Sample Result	Sample Result with upper RDL included	
Parameter	**mg/L**	mg/L	mg/L	**ug/L**
pH	6.0 - 9.5	7.49	0.1	
BOD	15	< 3	3.0	15,000
Phenolics 4AAP	0.008	< 0.0010	0.0010	8
TSS	15	1540	20	15,000
Total Cyanide	0.02	< 0.0020	0.0020	20
Metals				
Total Arsenic	0.02	0.0021	0.0010	20
Total Cadmium	0.008	< 0.000050	0.000050	8
Total Chromium	0.08	< 0.0050	0.0050	80
Chromium Hexavalent	0.04	< 0.00050	0.00050	40
Total Copper	0.04	< 0.010	0.010	40
Total Lead	0.12	< 0.00050	0.00050	120
Total Manganese	0.05	0.676	0.0050	50
Total Mercury	0.0004	< 0.000010	0.000010	0.4
Total Nickel	0.08	<0.0050	0.0050	80
Total Phosphorus	0.4	1.15	0.030	400
Total Selenium	0.02	< 0.00050	0.00050	20
Total Silver	0.12	<0.00050	0.00050	120
Total Zinc	0.04	< 0.03	0.03	40
Microbiology				
E.coli	200	< 2 CFU/100mL	2	200,000
Volatile Organics				
Parameter	**mg/L**			**ug/L**
Benzene	0.002	< 0.00050	0.00050	2
Chloroform	0.002	< 0.0010	0.0010	2
1,2-Dichlorobenzene	0.0056	< 0.00050	0.00050	6
1,4-Dichlorobenzene	0.0068	< 0.00050	0.00050	7
Cis-1,2-Dichloroethylene	0.0056	< 0.00050	0.00050	6
Trans-1,3-Dichloropropylene	0.0056	< 0.00050	0.00050	6
Ethyl Benzene	0.002	< 0.00050	0.00050	2
Methylene Chloride	0.0052	< 0.0020	0.0020	5
1,1,2,2-Tetrachloroethane	0.017	< 0.00050	0.00050	17
Tetrachloroethylene	0.0044	< 0.00050	0.00050	4
Toluene	0.002	< 0.00050	0.00050	2
Trichloroethylene	0.0076	< 0.00050	0.00050	8
Total Xylenes	0.0044	< 0.0011	0.0011	4

August 2018

HYDROLOGICAL REVIEW SUMMARY

Semi-Volatile Organics		Sample Result mg/L	Sample Result with upper RDL included mg/L	
Di-n-butyl Phthalate	0.015	< 0.0010	0.0010	5
Bis (2-ethylhexyl) Phthalate	0.0088	< 0.0020	0.0020	8.8
3,3'-Dichlorobenzidine	0.0008	< 0.00040	0.00040	0.8
Pentachlorophenol	0.002	< 0.00050	0.00050	2
Total PAHs	0.002	0.0048	0.0017	2
PCBs	0.0004	< 0.00040	0.00040	0.4
Misc Parameters				
Nonylphenols	0.001	< 0.0010	0.001	1
Nonylphenol Ethoxylates	0.01	< 0.010	0.01	10

Sample Collected: 05-JUL-19 , 9:00AM
Temperature: 15.0 deg C

Consulting Firm that prepared Hydrological Report: PRI Engineering Inc.

Qualified Professional who completed the report summary: Arash Yazdani, P.Eng
Print Name

Qualified Professional who completed the report summary: ayazdani
Signature

Date & Stamp

October 2017

SERVICING REPORT GROUNDWATER SUMMARY

The form is to be completed by the Professional that prepared the Servicing Report.
Use of the form by the City of Toronto is not to be construed as verification of engineering/hydrological content.

For City Staff Use Only:	
Name of ECS Case Manager (please print)	
Date Review Summary provided to to TW	

A. SITE INFORMAITON		**Included in SR (reference page number)**	**Report Includes this information City staff (Check)**
Date Servicing Report was prepared:	November 2019	Cover	
Title of Servicing Report:	Functional Servicing and Stormwater Management Report	Cover	
Name of Consulting Firm that prepared Servicing Report:	Husson Limited	Cover	
Site Address	3353-3359 Lakeshore Boulevard West Toronto, Ontario	Cover	
Postal Code	M5J 2L7	Cover	
Property Owner (identified on planning request for comments memo)	Apria Inc.	Cover	
Proposed description of the project (ex. number of point towers, number of podiums, etc.)	Mixed use development including main floor commercial, 6 storey residential and 1 level of underground parking.	Page 1.	
Land Use (ex. commercial, residential, mixed, industrial, institutional) as defined by the Planning Act	Commercial Auto Centre	Page 1	
Number of below grade levels	1 below grade parking level.	Page 1	

TORONTO

October 2017

SERVICING REPORT GROUNDWATER SUMMARY

Does the SR include a private water drainage system (PWDS)? **PWDS: Private Water Drainage System:** A subsurface drainage system which may consist of but is not limited to weeping tile(s), foundation drain(s), private water collection sump(s), private water pump or any combination thereof for the disposal of private water on the surface of the ground or to a private sewer connection or drainage system for disposal in a municipal sewer.	If **Yes** continue completing Section B (Information Relating to Groundwater) **ONLY** **If Yes, Number of PWDS?** 1 *(Each of these PWDS may require a separate Toronto Water agreement)* If **No** skip to Sections C (On-site Groundwater Containment) and/or D (Water Tight Requirements) as applicable	ⓧ YES ◯ NO	
B. INFORMATION RELATING TO GROUNDWATER		**Included in SR (reference page number)**	**Report Includes this information City Staff (Check)**
A copy of the pump schedule(s) for **ALL** groundwater sump pump(s) for the development site has been included in the FSR **or** A letter written by a Mechanical Consultant (signed and stamped by a Professional Engineer of Ontario) shall be attached to the SR stating the peak flow rate of the groundwater discharge for the development site for all groundwater sump pump(s). This peak flow rate must be based on the pump schedule(s) that have been designed by the Mechanical Consultant. A template of this letter is attached in Schedule A.	To be provided at a later date.		

TORONTO

October 2017

SERVICING REPORT GROUNDWATER SUMMARY

****If there is more than one sump they must ALL be included in the letters along with a combined flow****			
Is it proposed that the groundwater from the development site will be discharged to the sanitary, combined or storm sewer?	ⓧ Sanitary Sewer ◯ Combined Sewer ◯ Storm Sewer	Page 3	
Will the proposed PWDS discharge from the site go to the Western Beaches Tunnel (WBT)? *Reference attached WBT drainage map*	◯ YES ⓧ NO **If Yes, private water discharge fees will apply and site requires a sanitary discharge agreement.**		
What is the street name where the receiving sewer is located?	Lakeshore Boulevard West	Page 3	
What is the diameter of the receiving sewer?	300mm	Page 8	
Is there capacity in the proposed local sewer system? ⓧ YES ◯ NO	Are there any improvements required to the sewer system? If yes, identify them below and refer to the section and page number of the FSR where this information can be found. If a sewer upgrade is required, the owner is required to enter into an Agreement with the City to improve the infrastructure? ◯ YES	Page 10	
Total allowable peak flow rate during a 100 year storm event (L/sec) to storm sewer When groundwater is to be discharged to the storm sewer the total groundwater and stormwater discharge shall not exceed the permissible peak flow rate during a 2 year pre development storm event, as per the City's	_____ L/sec N/A		

SERVICING REPORT GROUNDWATER SUMMARY

Wet Weather Flow Management Guidelines, dated 2006			
Short-Term Groundwater Discharge Provide proposed total flow rate to the sanitary/combined sewer in post-development scenario Total Flow (L/sec) = sanitary flow + peak short-term groundwater flow rate	2.81 L/sec	Page 2	
Long-Tem Groundwater Discharge Provide proposed total flow rate to the sanitary/combined sewer in post-development scenario Total Flow (L/sec) = sanitary flow + peak long-term groundwater flow rate	3.88 L/sec	Page 9/10	
Does the water quality meet the receiving sewer Bylaw limits? ◯ YES Ⓧ NO	If the water quality does not meet the applicable receiving sewer Bylaw limits and the applicant is proposing a treatment system the applicant will need to include a letter stating that a treatment system will be installed and the details of the treatment system will be included in the private water discharge application that will be submitted to TW EM&P.		
C. ON-SITE GROUNDWATER CONTAINMENT		**Included in SR (reference page number)**	**Report Includes this information City Staff (Check)**
How is the site proposing to manage the groundwater discharge on site?			

October 2017

SERVICING REPORT GROUNDWATER SUMMARY

Has the above proposal been approved by:	◯ TW-WIM And ◯ TW-EM&P And ◯ ECS		
If the site is proposing a groundwater infiltration gallery, has it been stated that the groundwater infiltration gallery will not be connected to the municipal sewer? A connection between the infiltration gallery/dry well and the municipal sewer is not permitted Please be advised if an infiltration gallery/dry well on site is not connected to the municipal sewer, the site **must** submit two letters using the templates in Schedule B and Schedule C.	◯ YES ◯ NO		
Confirm that the infiltration gallery can infiltrate 100% of the expected peak groundwater flow year round, ensure that the top of the infiltration trench is below the frost line (1.8m depth), not less than 5 m from the building foundation, bottom of the trench 1m above the seasonally high water table, and located so that the drainage is away from the building.			
D. WATER TIGHT REQUIREMENTS		**Included in SR (reference page number)**	**Report Includes this information City Staff**

TORONTO

October 2017

SERVICING REPORT GROUNDWATER SUMMARY

		(Check)
If the site is proposing a water tight structure: 1. The owner must submit a letter using the template in Schedule D. 2. A Professional Engineer (Structural), licensed to practice in Ontario and qualified in the subject must submit a letter using the template in Schedule E.		

Provide a copy of the approved SR to Toronto Water Environmental Monitoring & Protection Unit at pwapplication@toronto.ca.

Consulting Firm that prepared Servicing Report: Husson Limited

Professional Engineer who completed the report summary: Greg Rapp, P.Eng
Print Name

Professional Engineer who completed the report summary: _____
Signature

LICENSED PROFESSIONAL ENGINEER
G.K. RAPP
100010306
19-11-18
PROVINCE OF ONTARIO

Date & Stamp

APPENDIX D

DOWNSTREAM SANITARY ANALYSIS

Minimum Dia. = 300 mm
Mannings "n"= 0.013
Minimum Velocity = 0.6 m/s
Minimum Grade = 0.5 %
Avg. Proposed Domestic Flow = 450 l/c/d
Avg. Existing Domestic Flow = 240 l/c/d
Avg. Com/Ind/Inst Flow = 2.08 l/s per ha of floor area
Infiltration = 0.26 l/s/ha
Peaking Factors calculated as per City Criteria
Harmon equation: PF=1 + (14/(4+(P/1000)½))

3353 Lakeshore Blvd. W
Estimated Pipe Capacities
Scenario 1 - Pre Development Dry Weather Conditions

HUSSON

Project No: 191063
Date: 01-Oct-19
Designed by: BJJ

STREET	FROM	TO	RESIDENTIAL						COMMERCIAL/INDUSTRIAL/INSTITUTIONAL									FLOW CALCULATIONS					PIPE DATA					% FULL
			AREA (ha)	ACC. AREA (ha)	UNITS (#)	DENSITY (P/unit)	POP	ACC. RES. POP.	AREA (ha)	ACC. AREA (ha)	FLOOR AREA	ACC. FLOOR AREA (ha)	DENSITY (P/unit)	POP	ACC. RES. POP.	EXT. GWF (l/s)	ACC. GWF (l/s)	INFILTRATION ALLOWANCE (l/s)	TOTAL ACC. POP.	PEAKING FACTOR (Res Only)	SAN FLOW (l/s)	TOTAL FLOW (l/s)	DIA. (mm)	SLOPE (%)	Q FULL (L/s)	V FULL (m/s)	V ACT (m/s)	
Lakeshore Blvd	MH3	MH2	0.2325	0.23	15	2.7	41	41			0.34	0.34	110	37	37			0.06	78	4.27	0.92	0.98	300	0.45	64.8	0.92	0.32	2%
Lakeshore Blvd	SITE	MH2									0.07	0.07	110	8	8				8	4.42	0.10	0.10	300	0.45	64.8	0.92	0.13	0%
Lakeshore Blvd	MH2	MH1	0.342	0.57	11	2.7	30	70			0.29	0.70	110	32	77			0.15	147	4.19	1.72	1.87	300	0.48	67.0	0.95	0.40	3%

Minimum Dia. = 300 mm
Mannings "n"= 0.013
Minimum Velocity = 0.6 m/s
Minimum Grade = 0.5 %
Avg. Proposed Domestic Flow = 450 l/c/d
Avg. Existing Domestic Flow = 240 l/c/d
Avg. Com/Ind/Inst Flow = 2.08 l/s per ha of floor area
Infiltration = 0.26 l/s/ha
Peaking Factors calculated as per City Criteria
Harmon equation: PF=1 + (14/(4+(P/1000)½))

3353 Lakeshore Blvd. W
Estimated Pipe Capacities
Scenario 2 - Post Development Dry Weather Conditions

Project No: 191063
Date: 01-Oct-19
Designed by: BJJ

STREET	FROM	TO	RESIDENTIAL						COMMERCIAL/INDUSTRIAL/INSTITUTIONAL									FLOW CALCULATIONS					PIPE DATA					% FULL
			AREA (ha)	ACC. AREA (ha)	UNITS (#)	DENSITY (P/unit)	POP	ACC. RES. POP.	AREA (ha)	ACC. AREA (ha)	FLOOR AREA	ACC. FLOOR AREA (ha)	DENSITY (P/unit)	POP	ACC. RES. POP.	EXT. GWF (l/s)	ACC. GWF (l/s)	INFILTRATION ALLOWANCE (l/s)	TOTAL ACC. POP.	PEAKING FACTOR (Res Only)	SAN FLOW (l/s)	TOTAL FLOW (l/s)	DIA. (mm)	SLOPE (%)	Q FULL (L/s)	V FULL (m/s)	V ACT (m/s)	
Lakeshore Blvd	MH3	MH2	0.2325	0.23	15	2.7	41	41			0.34	0.34	110	37	37			0.06	78	4.27	0.93	0.99	300	0.45	64.8	0.92	0.32	2%
Lakeshore Blvd	SITE	MH2	0.1597	0.16	60	1.7	102	102			0.03	0.03	110	3	3	1.58	1.58	0.04	105	4.24	1.24	2.86	300	0.45	64.8	0.92	0.45	4%
Lakeshore Blvd	MH2	MH1	0.342	0.73	11	2.7	30	173			0.29	0.66	110	32	73		1.58	0.19	245	4.11	2.80	4.57	300	0.48	67.0	0.95	0.53	7%

Minimum Dia. = 250 mm
Mannings "n"= 0.013
Minimum Velocity = 0.6 m/s
Minimum Grade = 0.5 %
Avg. Proposed Domestic Flow = 450 l/c/d
Avg. Existing Domestic Flow = 240 l/c/d
Avg. Com/Ind/Inst Flow = 2.08 l/s per ha of floor area
Base Infiltration = 0.26 l/s/ha
Wet Infiltration= 2.74 l/s/ha (Acc.Area<50ha) 1.74 l/s/ha (Acc.Area>50ha)
Total Wet Infiltration= 3.00 l/s/ha (Acc.Area<50ha) 2.00 l/s/ha (Acc.Area>50ha)
Peaking Factors calculated as per City Criteria
Harmon equation: PF=1 + (14/(4+(P/1000)^½))

3353 Lakeshore Blvd. W
Estimated Pipe Capacities for Wet Weather Flows
Scenario 3 - Pre Development Wet Weather Conditions

HUSSON

Project No: 191070
Date: 08-Oct-19
Designed by: BJJ

STREET	FROM	TO	RESIDENTIAL						COMMERCIAL/INDUSTRIAL/INSTITUTIONAL									FLOW CALCULATIONS						PIPE DATA					% FULL
			AREA (ha)	ACC. AREA (ha)	UNITS (#)	DENSITY (P/unit)	POP	ACC. RES. POP.	AREA (ha)	ACC. AREA (ha)	FLOOR AREA (ha)	ACC. FLOOR AREA (ha)	DENSITY (P/unit)	POP	ACC. RES. POP.	EXT. GWF (l/s)	ACC. GWF (l/s)	BASE INFILTRATION (l/s)	WET I&I (l/s)	TOTAL ACC. POP.	PEAKING FACTOR (Res Only)	SAN FLOW (l/s)	TOTAL FLOW (l/s)	DIA. (mm)	SLOPE (%)	Q FULL (L/s)	V FULL (m/s)	V ACT (m/s)	
Lakeshore Blvd	MH3	MH2	0.23	0.23	15	2.7	41	41			0.34	0.34	110	37	37			0.06	0.64	78	4.27	0.93	1.63	300	0.45	64.8	0.92	0.37	3%
Lakeshore Blvd	SITE	MH2									0.07	0.07	110	8	8					8	4.42	0.10	0.10	300	0.45	64.8	0.92	0.13	0%
Lakeshore Blvd	MH2	MH1	0.34	0.57	11	2.7	30	71			0.29	0.70	110	32	77			0.15	1.57	148	4.19	1.72	3.44	300	0.48	67.0	0.95	0.49	5%

Minimum Dia. = 250 mm
Mannings "n"= 0.013
Minimum Velocity = 0.6 m/s
Minimum Grade = 0.5 %
Avg. Proposed Domestic Flow = 450 l/c/d
Avg. Existing Domestic Flow = 240 l/c/d
Avg. Com/Ind/Inst Flow = 2.08 l/s per ha of floor area
Base Infiltration = 0.26 l/s/ha
Wet Infiltration= 2.74 l/s/ha (Acc.Area<50ha) 1.74 l/s/ha (Acc.Area>50ha)
Total Wet Infiltration= 3.00 l/s/ha (Acc.Area<50ha) 2.00 l/s/ha (Acc.Area>50ha)
Peaking Factors calculated as per City Criteria
Harmon equation: PF=1 + (14/(4+(P/1000)^½))

3353 Lakeshore Blvd. W
Estimated Pipe Capacities
Scenario 4 - Post Development Wet Weather Conditions

Project No: 191070
Date: 08-Oct-19
Designed by: BJJ

STREET	FROM	TO	RESIDENTIAL						COMMERCIAL/INDUSTRIAL/INSTITUTIONAL							FLOW CALCULATIONS							PIPE DATA					
			AREA (ha)	ACC. AREA (ha)	UNITS (#)	DENSITY (P/unit)	POP	ACC. RES. POP.	AREA (ha)	ACC. AREA (ha)	FLOOR AREA (ha)	ACC. FLOOR AREA (GFA) (ha)	DENSITY (P/GFA)	POP	ACC. RES. POP.	BASE INFILTRATION (l/s)	WET I&I (l/s)	TOTAL ACC. POP.	PEAKING FACTOR (Res Only)	TOTAL FLOW (l/s)	EXT. GWF (l/s)	TOTAL FLOW (l/s)	DIA. (mm)	SLOPE (%)	Q FULL (L/s)	V FULL (m/s)	V ACT (m/s)	% FULL
Lakeshore Blvd	MH3	MH2	0.23	0.23	15	2.7	41	41			0.34	0.34	110	37	37	0.06	0.64	78	4.27	0.93		1.63	300	0.45	64.8	0.92	0.37	3%
Lakeshore Blvd	SITE	MH2	0.16	0.16	60	1.7	102	102			0.03	0.03	110	3	3	0.04	0.44	105	4.24	1.24	1.58	3.30	300	0.45	64.8	0.92	0.47	5%
Lakeshore Blvd	MH2	MH1	0.34	0.73	11	2.7	30	173			0.29	0.66	110	32	73	0.19	2.01	245	4.11	2.80		5.01	300	0.48	67.0	0.95	0.55	7%

HUSSON

APPENDIX E

WATER DEMAND CALCULATIONS

Fire Flow Requirements

Project: 3353 Lakeshore Blvd W
Project No.: 191063
Municipality: City of Toronto

Commercial/Office Building

GUIDE FOR DETERMINATION OF REQUIRED FIRE FLOW
(as per the Water Supply for Public Fire Protection 1999 manual by the Fire Underwriters Survey)

STEP 1
Determine the fire flow.

Required Fire Flow (F)	F = 220 x C x sqrt(A)		The required fire flow in litres per minute.
Maximum Floor Area (A) =	1565	m2	If the vertical openings and exterior vertical communications are properly protected (one hour rating), consider only the area of the largest floor plus 25% of each of the two immediately adjoining floors.
		3rd Floor	1069 m2
		2nd Floor	1069 m2
		4th Floor	914.2 m2
Coefficient (C) =	0.6		Coefficient related to the type of construction. = 1.5 for wood frame construction (structure essentially all combustible). = 1.0 for ordinary construction (brick or other masonry walls, combustible floor = 0.8 for non-combustible construction (unprotected metal structural) = 0.6 for fire-resistive construction (fullyprotected frame,floors, roof).
F =	2650	L/min.	

STEP 2
Determine the increase or decrease for occupancy.

	0%		Reduction for Low Hazard Occupancy (Dwellings).
Decrease	0	L/min.	

STEP 3
Determine the decrease, if any, for automatic sprinkler protection.

	30%		30% for sprinklered as per NFPA 13.
Decrease	795	L/min.	50% for fully automatic sprinkler.

STEP 4
Determine the total increase for exposures.

0 -3m (25%), 3-10m (20%), 10-20m (15%), 20-30m (10%), 30-45m (5%)

North	5%		35
East	25%		1
South	10%		23
West	20%		8.5
	60.0%		Maximum exposure increase is 75%.
Increase	1590	L/min.	

STEP 5
Determine the minimum required fire flow.

F =	**3,000**	**L/min.**	**Round to the nearest 1000L/min.**