450 Dufferin Street, Toronto

Site Servicing and Stage 1 Stormwater Management Report

November 4, 2022

Prepared for:

HM RK (450 Dufferin) Ltd.

450 Dufferin Street

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RVA 205396.01

November 4, 2022

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1.0 INTRODUCTION

HM RK (450 Dufferin) Ltd. (the Owner) is proposing the redevelopment of 450 Dufferin Street in the City of Toronto.

R.V. Anderson Associates Limited (RVA) has been retained by the Owner to prepare a Site Servicing and Stage 1 Stormwater Management (SWM) Report in support of Zoning By-law Amendment (ZBA) application for the proposed site redevelopment.

The scope of this report specifically includes:

- Identification and review of existing municipal storm, sanitary and water services available for the site;
- Identification of the City of Toronto criteria with respect to sanitary, water and storm servicing including stormwater management criteria for the redevelopment of the site, in accordance with the City of Toronto Wet Weather Flow (WWF) Guideline criteria and targets;
- Estimate existing sanitary and storm demands from the site;
- Estimate water, sanitary and storm demands that will result from the redevelopment;
- Investigation of the capacity of existing municipal water mains and sewers;
- Calculation of allowable post-development peak storm discharge rates;
- Calculation of WWF water balance target criteria and development of appropriate methods to achieve the criteria;
- Provide a summary of proposed servicing of the site with water, sanitary and storm services;
- Recommendation and description of proposed stormwater management (SWM) system for the site to address water balance, water quality, and discharge rate targets.

2.0 BACKGROUND

2.1 Existing Conditions

The site is located on the northwest corner of Dufferin Street and Alma Avenue in the City of Toronto.

The 0.1495-hectare site currently has a single-storey building occupied by a clothing manufacturer. The existing building frontage takes up the entirety of the east property line along Dufferin Street. A paved parking area occupies the rear of the property and encompasses approximately 75% of the total site area.

The site is bounded by Alma Street to the south and Dufferin Street to the east. A 4.57m wide sewer 'block' occupies the adjacent property to the north, and a produce warehouse at the adjacent property to the west. Refer to Figure 2.1 for site location.

Figure 2.1 – Site Location

2.2 Proposed Redevelopment

The proposed site redevelopment is currently assumed of an approximately fifteen (15) storeys mixed-use building with two (2) levels of underground parking. Commercial/employment space will occupy a portion of the ground level and mezzanine, and the remainder will be residential units. The new building will fall under a single ownership.

The width of the existing sewer block to the north of the site does not meet current City standards which require a minimum 6.0m wide easement for sewers. As a result, a 1.43 m wide strip of land will be reserved as a municipal sewer easement for the purpose of effectively widening the existing sewer block, to a total width of 6.0m.

Refer to Appendix A for the architectural site plans.

2.3 Background and Resource Information

In preparing this report, the following information was obtained and reviewed:

- PUCC Drawing 15-B-96.
- Toronto Sewer and Water Atlas Maps of surrounding underground infrastructure, dated January 9, 2010.
- City As-built Plan and Profile Drawings:
    - Alma Avenue – Drawing A-269
    - Brock Avenue – Drawing B-89
    - Dufferin Street – Drawing D-18
    - Dufferin Street – Drawing U557-025, U557-026
- Topographic Survey of Part of Lot 8, Registered Plan 294, prepared by R. Avis Surveying Inc., signed July 29, 2020
- Site plan and project statistics, provided by Superkul Architects

3.0 SERVICING INVESTIGATION

Information with respect to existing municipal services and utilities was determined from PUCC drawings, record plan and profile drawings, sewer and water atlas maps obtained form the City of Toronto and a site visit undertaken in August 2020. A Subsurface Utility Engineering (SUE) Quality Level B (QL-B) Investigation has also been conducted in September 2022.

3.1 Foundation Drainage

The current City Sewer Code and Foundation Drainage Policy prohibits the discharge of long-term foundation drainage from within the saturated zone of the ground, to a municipal sewer, for new applications submitted after January 2022.

A hydrogeological review prepared by Terrapex, dated October 14, 2022, has been completed for the site. This report indicates that the groundwater table is approximately 0.9 to 4.3m below ground surface (mbgs) on shallowest and average depth, respectively.

Based on samples taken and analyzed for water quality, the groundwater is suitable for discharge to the sanitary/combined sewer but not to storm (i.e. Municipal Code Chapter 681, Table 1 and Table 2 respectively). Therefore, pre-treatment would be required prior to discharge into the storm sewer system. However, discharging into the sanitary sewer system would not require pre-treatment.

In consideration of the aforementioned City Policy, it is currently envisioned that there will be no long-term discharge of foundation drainage for the site.

Regarding short-term dewatering for the development, the report estimates groundwater inflow during construction range from 49,400 L/day (0.57 L/s), based on an assumed excavation bottom of 83.5 masl and with a safety factor of 2. It is proposed that the short-term groundwater will be discharged into the 450mm combined sewer located along Dufferin Street, in front of the site.

To facilitate construction dewatering, a short-term Private Water Discharge Agreement (PWDA) application will be submitted to the Environmental Monitoring & Protection (EM&P) Unit of Toronto during construction. However, as the groundwater taking volume is less than 50,000 L/day, a Environmental Activity and Sector Registry (EASR) or Permit to Take Water (PTTW) will not be required.

Refer to Hydrogeological Review by Terrapex, and Watertight Foundation Letters in Appendix F.

3.2 Water Servicing

3.2.1 Water Servicing Criteria

The City of Toronto's Design Criteria for Sewers and Watermains (January 2021) was used to analyze the sanitary demand from the proposed development. The City criteria are generally summarized as follows:

- Water supply systems should be designed to satisfy the greater of maximum day demand plus fire flow or peak hour demand;
- Average domestic water demands of 190 litres per capita per day for high-rise or low-rise apartment buildings and condominiums with greater than six (6) units;
- Maximum day and peak hour factors for apartments are 1.30 and 2.50 respectively
- Maximum day and peak hour factors for commercial are 1.10 and 1.20 respectively

- Fire flow requirements for the site shall be based on Fire Underwriters Survey (FUS) (1999) and are to not exceed the available flow in the municipal watermain that the site will connect to at a minimum residual pressure of 140 kPa (20 psi).
- Population Densities as follows:
    - 1-Bedroom – 1.4 persons per unit
    - 2-Bedroom – 2.1 persons per unit
    - 3-Bedroom – 3.1 persons per unit
    - Townhouse – 2.7 persons per unit

3.2.2 Existing Water Servicing

Based on City records, there is an existing 300mm PVC watermain on the west side of Dufferin Street. The watermain was installed in 2013/2014. There is an old 300mm watermain on the east side of Dufferin Street that was abandoned in place when the new 300mm PVC watermain was installed. All service connections would have been transferred to the new watermain during construction.

There is an existing fire hydrant located in the northeast corner of Dufferin Street and Waterloo Avenue, and another hydrant in the northeast corner of Dufferin Street and Alma Avenue. These two hydrants can provide coverage of the entire site within 90m.

Based on a site visit on August 21, 2020, a domestic water service enters the building from Dufferin Street at the east face of the building.

3.2.3 Proposed Water Servicing

3.2.3.1 Domestic Water Demand Analysis

The total estimated average daily flow rates, maximum day, and peak demand rates required for the future development are estimated to be as follows:

Table 3.1 – Estimated Water Demand

	Average Day Demand (L/s)	Maximum Day Demand (L/s)	Peak Hour Demand (L/s)
Residential	0.57	0.74	1.43
Commercial	0.02	0.02	0.03
TOTAL	**0.59**	**0.76**	**1.46**

Refer to Appendix B for water demand analysis calculations.

3.2.3.2 Fire Flow Analysis

In accordance with the City of Toronto Design Criteria for Sewers and Watermains, fire flows shall not be less than 80 L/s (4,800L/min) for a 2-hour duration in addition to maximum daily domestic demand with a residual pressure of not less than 140 kPa (20 psi). Additionally, fire flows shall not be less than 83.3L/s (5,000 L/min) for a 4-hour duration for commercial/employment areas. This flow is to be delivered with a residual pressure of not less than 140 kPa (20 psi).

Calculations using the Fire Underwriters Survey (FUS) indicate a maximum required fire flow of approximately 116.7 L/s (7,000 L/min) for the development (based on fire resistive construction with a sprinkler system designed to NFPA, and vertical openings and exterior vertical communications properly protected for a one-hour rating).

Refer to Appendix B for fire flow analysis calculations.

As described in Section 3.2.1, the water supply system should be designed to satisfy the greater of peak hour demand or maximum day demand plus fire flow. Therefore, the maximum day demand plus fire flow rate (i.e. 0.76 L/s + 116.7 L/s = 117.5 L/s (7,046 L/min)) is the governing requirement.

3.2.3.3 Proposed Watermain Service Connections

In accordance with the City of Toronto Municipal Watermain Code a new domestic water service will be required for the new building and existing services removed and capped at the watermain.

A fire service will also be required for the building sprinkler system. The proposed water services will be connected to the existing 300mm diameter Dufferin Street watermain.

Approximately 2.0 m in front of the building face, domestic water service will be branched off the fire service in an “h” configuration. The fire service line will continue into the building as a fire water service.

The location of the water service connections will be entering from the east face of the building, where there will be a water meter room in the building basement.

Refer to Appendix E for conceptual servicing plan GS-1.

3.2.4 Capacity of Existing Watermain System

To evaluate the adequacy of the existing 300mm watermain on Dufferin Street, a hydrant flow test has been conducted for the hydrant at the northeast corner of Dufferin Street and Waterloo Avenue. The results of this flow test indicate that the watermain is capable to supplying 347 L/s at 20psi (150 kPa). Since the design water demand of 117.3 L/s is less

than 347 L/s, it can be concluded that the capacity of the existing City watermain network is sufficient to meet the demand of the proposed redevelopment/use.

Refer to Appendix B for hydrant flow test result.

3.3 Sanitary Servicing

3.3.1 Sanitary Servicing Criteria

The City of Toronto's Design Criteria for Sewers and Watermains (January 2021) was used to analyze the sanitary demand from the future development. The City criteria are generally summarized as follows:

- Average domestic residential sewage flows of 450 litres per capita per day for design of new sewers.
- Average domestic residential sewage flows of 240 litres per capita per day for analysis of existing sewers (separated systems)
- The peak domestic sewage flow to be calculated by utilizing a calculated Harmon Peaking Factor of [$M = 1 + 14 / (4+P^{0.5})$]
- Average commercial/industrial/institutional flows of 180,000 litres per floor hectare per day for new local sewers (peaking factor included in average flow)
- A dry weather peak infiltration allowance of 0.26 L/s/ha is required for all sewers
- Combined sewer flows will include dry weather domestic flows plus the runoff from a 2-year storm event
- Population Densities as follows:
    - 1-Bedroom – 1.4 persons per unit
    - 2-Bedroom – 2.1 persons per unit
    - 3-Bedroom – 3.1 persons per unit

3.3.2 Existing Sanitary Servicing

A review of the City's Sewer Atlas Mapping indicates that the Site is located in an area of Toronto that is predominantly serviced by combined sewers. Based on these records and City as-built Plan and Profile drawings, there are several combined sewers in the vicinity of the Site.

- A 450mm diameter vitrified clay combined sewer located within a sewer block adjacent to the north of the site; this pipe directs south into the 450mm diameter

vitrified clay combined sewer located on the west side of Dufferin Street, and into the 450mm diameter vitrified clay combined sewer which drains to the east within Alma Street (east of Dufferin Street).

- A 900mmx600mm diameter brick egg shaped combined sewer located near the centreline of Dufferin Street right-of-way.
- Both above noted sewers connect to the 900 x 600mm brick combined sewer on Gladstone Avenue and drain to the south towards Queen Street West. This sewer eventually connects to the trunk sewer on King Street West.

The estimated peak sanitary discharge rate from the existing site is estimated to be 0.05 L/s (refer to Appendix C for calculations).

Based on a site visit on August 21, 2020, a sanitary service connection exits the building at the east face of the building towards Dufferin Street, into the 450mm combined sewer immediately in front of the 450 Dufferin property.

3.3.3 Proposed Sanitary Servicing

3.3.3.1 Sanitary Demand Analysis

The proposed site redevelopment will result in an estimated total peak sanitary flow rate of 5.78 L/s, which represents an estimated increase of 5.73 L/s over the existing sanitary flow rate. The estimated breakdown of peak sanitary discharge from the redevelopment is as follows:

Table 3.2 – Estimated Sanitary Demand

	Sanitary Flow (L/s)
Total Residential Peak Flow	5.56
Total Commerical Peak Flow	0.18
Total Infiltration Peak Flow	0.04
TOTAL	**5.78**

Refer to Appendix C for sanitary servicing analysis calculations.

3.3.3.2 Proposed Sanitary Service Connection

As required by the City municipal code with respect to sewers, a new sanitary service connection will be required, and the existing service connections will be required to be removed.

In accordance with the City Sewer Code, a sanitary control maintenance hole (MH) will be provided near the property line for City sampling purposes. The new service connection will be connected to the 450mm Dufferin Street combined sewer.

The capacity of the receiving combined sewer is discussed in section 3.5 of this report. Refer to Appendix E for conceptual servicing plan GS-1.

3.4 Storm Servicing

3.4.1 Storm Servicing Criteria

The City of Toronto Wet Weather Flow Management (WWFM) Guidelines encourages the use of a "treatment train" approach to stormwater management that considers storm run-off as a resource. This approach considers best management measures that can be undertaken at the source, conveyance and end of pipe locations. Opportunities to allow stormwater run-off to be infiltrated back into the ground at the source either by directing run-off to pervious surfaces or by way of infiltration/exfiltration techniques are key components of the City's WWFM guidelines.

Based on the City's WWFM Guidelines (November 2006), the following general SWM criteria would apply to the future development:

- Water Balance: Retain stormwater on-site to the extent practicable to achieve the same level of annual volume of overland runoff from the site in the pre-development condition. The maximum allowable annual volume is 50% of the total average annual rainfall depth (equates to the capture and retention of approximately 5 mm of runoff on a daily event basis).
- Water Quality: Provide long-term average removal of 80% of Total Suspended Solids on an annual loading basis from the post-development site.
- Water Quantity (Rate Control): Control flows from the site during all design storm events (2 year through 100 year design storm) to a rate no greater than the peak run off rate that would be generated on the site in a 2 year storm event with a runoff coefficient C=0.50. Runoff generated from all storm events up to the and including the 100-year event shall be detained on site.
- Run-off generated on the entire site, in all storm events, up to and including the 100-year event, shall be contained on-site; and
- Maintain existing drainage patterns, ensuring adjacent properties are not adversely affected.

3.4.2 Existing Storm Servicing

There are no municipal storm sewers within the frontage of the site. As indicated in Section 3.3.2 of this report, only combined sewers exist across the front of the site along Dufferin Street.

Based on a site visit conducted on August 21, 2020, there is no existing stormwater management plan for the Site. Existing storm runoff from the building rooftop (365m^2) drains via downspouts onto the paved parking area. There is no existing catch-basins located in the parking lot; storm runoffs sheet flows towards Alma Avenue and captured by street catch-basins, which ultimately discharges into the Dufferin Street combined sewer.

Using the Rational Method Equation Q = CiA, the existing 2-year and 100-year storm event existing peak storm discharge rates from the site can be calculated as follows:

$$Q_{2yr} = 2.78\ x\ CiA = 2.78\ x\ 0.90\ x\ 88.20\,mm/hr\ x\ 0.1495ha = 33.0\,L/s$$

$$Q_{100yr} = 2.78\ x\ CiA = 2.78\ x\ 0.90\ x\ 250.3\,mm/hr\ x\ 0.1495ha = 93.6\,L/s$$

3.4.3 Proposed Storm Servicing

3.4.3.1 Proposed Storm Service Connection

It is noted that the City Municipal Code, Chapter 681 generally prohibits a storm connection from a site to the municipal sewer. However, in the case of site developments that are not individual single-family lots, a storm service connection is required to meet WWFM Guidelines and implement the required SWM. Therefore, the SWM plan serves as a request through the City of Toronto for a storm service connection and exemption from the associated requirements in the Sewer Code.

As required by the City municipal code with respect to sewers, a new storm service connection will be required, and the existing service connection will be required to be removed.

In accordance with the City Sewer Code, a storm control MH will be provided near the property line for City sampling purposes. This MH will be incorporated into the basement structure where the basement extends out from the finished portion of the above ground building.

The new storm sewer service connection will be connected to the 450mm Dufferin Street combined sewer.

The storm service connection will convey controlled drainage from the on-site SWM system which will be employed to meet the City's stormwater discharge requirements outlined in section 3.4.4 of this report.

Refer to Appendix E for conceptual servicing plan GS-1.

3.4.3.2 Allowable Storm Discharge

Based on the WWFMP Guidelines, the allowed peak discharge from the site is to be based on controlling the discharge rate to the existing condition with a maximum runoff coefficient of C=0.5. Since the existing site is 100% impervious, a runoff coefficient of C=0.5 would therefore apply to the site and the allowed peak discharge rate from the redeveloped site can be calculated as follows:

$$Q_{allowable} = 2.78\ x\ CiA = 2.78\ x\ 0.50\ x\ 88.20\ mm/hr\ x\ 0.1495\ ha = 18.3\ L/s$$

The capacity of the receiving combined sewer is discussed below in section 3.5.

3.4.3.3 Proposed Storm Discharge

SWM measures will be employed as discussed in the following section to limit the peak discharge rate to the total allowable 18.3 L/s. This will result in a net decrease in storm peak discharge rate of 14.7 L/s. See Table 3.3 for details.

Table 3.3 – Estimated Storm Flow Directed to Combined Sewer in Dufferin Street

	Area (m2)	Pre Development 2-Year Storm (L/s)	Allowable Discharge (L/s)	Post Development 2-Year Storm (L/s)	Difference (L/s)
Existing	1495	33.0	-	-	-33.0
Proposed	1495		18.3	18.3	18.3
TOTAL					**-14.7**

Note: The maximum allowable post development 2-year discharge flow is 18.3 L/s with a C=0.5.

Refer to Appendix D for post-development storm peak discharge rate and preliminary detention storage calculations.

3.4.4 Stormwater Management Plan

With no storm water control installed at the subject site under existing conditions, the objectives of the stormwater management plan for the future development are to increase

runoff retention on site, improve water quality, and reduce the amount of runoff leaving the development site into the downstream receiving sewers.

As noted in section 3.4.3, a new storm service connection to the 450mm combined sewer is required to service the future development. A detailed (Stage 2) stormwater management (SWM) report will be prepared to support the proposed Site Plan application for the redevelopment. This plan will be comprised of a number of different components that will combine to achieve WWFM Guideline targets. The conceptual SWM plan at this stage is summarized as follows:

1) The pre-development storm drainage patterns will be maintained in the post-development condition to the degree possible, with storm connection to Dufferin Street.

2) As per WWFM Guidelines, the building rooftop area is not subject to vehicular traffic, and the application of sand and de-icing salt constituents, petroleum hydrocarbons and heavy metals. As such, the stormwater generated from the roof area is considered clean and can satisfy 80% TSS removal efficiency for the purposes of water quality control.

3) A portion of the sewer easement located along the north property line is uncovered and will be receiving storm runoff. The runoff generated within this easement area will flow uncontrolled into the Dufferin Street right-of-way into the street catch-basins. The runoff from this area will be accounted for as uncontrolled flow to ensure the total peak flow from the site will not exceed the allowable rate outlined in Section 3.4.3.2. The 100-year storm peak flow from this area can be calculated as follows:

$$Q_{Easement(100-yr)} = 2.78\ x\ CiA = 2.78\ x\ 0.25\ x\ 250.3\ mm/hr\ x\ 0.0066ha = 1.1\ L/s$$

4) As outlined in section 3.4.3.2, the total allowable discharge rate from the site is 18.3 L/s. Since the uncontrolled peak flow from the sewer easement is calculated to be 1.1 L/s, the allowable discharge from the remainder of the site is calculated as follows:

$$Q_{Allowable} - Q_{Easement(100-yr)} = 18.3 - 1.1 = 17.2\ L/s$$

5) As the building canopy extends to the property limit (with exception of portion of the sewer easement area and a small area in the southeast corner), storm runoff generated from within the site boundary are captured by area drains within the building rooftop and are considered clean and satisfy 80% TSS removal efficiency. As such, no stormwater treatment device is proposed for the site.

6) A stormwater management (SWM) tank will be incorporated into the basement level of the building to provide the detention volume associated with the controlled rate from the site. The tank will be placed in a location where the underground foundation walls extend beyond the limits of the above ground building, allowing for maintenance access via openings in the basement roof slab to the finished grade outside of the building. The access openings will be grated to provide a means for the tank to safely overflow to grade and out to the public roadway during storm events that exceed its capacity (i.e. greater than the 100-year design storm).

7) The SWM tank will also serve to capture and retain harvested rainwater for reuse. The tank will have gravity outlet through an orifice control to a storm control MH accessible by the City. The portion of the tank located above a gravity outlet will provide the required detention storage for rate control and the portion of the tank located below the gravity outlet will provide the required rainwater harvesting volume to meet the water balance requirements. The rainwater captured in the lower portion of the tank would be pumped out and into a dedicated reuse system designed by others. Possible uses for harvested rainwater currently being considered include irrigation or grey-water for toilet flushing. Based on the current site plan, a total retention volume of 5.7 m^3 will be required for water balance.

8) Preliminary estimates of detention storage for the site, using the Modified Rational Method, indicate that the required total detention volume is approximately 60 m^3. To achieve the quantity control requirement, an 68mm orifice plate at the outlet of the SWM tank will limit storm flow to the allowable peak discharge rate of 17.2 L/s. Refer to Appendix D for post-development storm peak discharge rate and preliminary detention storage calculations.

3.5 Combined Sewer Capacity

3.5.1 Criteria and Approach

As indicated in Section 3.3.3.1, the proposed redevelopment will result in an increase in sanitary demand on the municipal combined sewer. Based on 450 L/cap/d, this increase is estimated to be 5.73 L/s. The City requires an assessment of the impact of the development on their sewer system. The City's Sewer Capacity Assessment Guidelines dated July 2021, provide a methodology for assessing combined sewer capacity. This methodology initially requires an assessment of proposed versus existing discharge. If it determined that the proposed discharge is less than the existing discharge, then the system is deemed to have adequate capacity.

3.5.2 Existing and Proposed Combined Sewer Analysis

A review of pre and post combined sewer demands was undertaken to assess the impact of the development on the existing combined sewer system and establish the maximum discharge rate for the SWM system, and is summarized below in the following table:

Table 3.4 – Estimated Sanitary Flow Directed to Dufferin Street Combined Sewer

	Existing Conditions (L/s)	Proposed Conditions (L/s)	Difference (L/s)
2 Year Storm Flow (L/S)	33.0	18.3	-14.7
Sanitary Flow (L/s)	0.05	5.78	5.73
TOTAL (L/s)	**33.05**	**24.08**	**-8.97**

Table 3.4 indicates that as a result of controlling the peak storm discharge from the site to comply with the WWFM guidelines, there is a decrease in total storm and sanitary discharge to the Dufferin Street combined system in the post-development condition.

It is noted that the redeveloped site does not propose to any discharge of stormwater to the ground surface at the rear of the site as is the case in the existing condition. Therefore, there will also be a net decrease of discharge that enters the City combined drainage system from the parking lot.

3.5.3 Capacity for Short Term Private Water Discharge

As indicated in Section 3.1 of this report, since final hydrogeological investigation is completed at this time, short-term discharge rate will be revisited at a subsequent submission.

The approach to determining available capacity for the short-term discharge is that it cannot exceed the existing total site discharge from the site to the combined sewer. Therefore, at the time of a PWDA application for short term discharge, the peak discharge would have to be limited to less than 33.05 L/s (i.e. existing total discharge from the site).

4.0 EROSION AND SEDIMENT CONTROL DURING CONSTRUCTION

Measures are to be taken during construction to ensure that erosion and/or transportation of sediments off-site is controlled. Mitigation measures include:

- Erection of sediment control fence prior to construction, and maintenance throughout construction activities;

- Construction of a clear-stone “mud-mat” at construction site exists to control the tracking of sediments off-site from the tires of vehicles;
- Use of watering for dust control;
- Application to the City for a permit to discharge construction water, including the testing and sediment removal pre-pumping measures required to meet the City permit requirements and sewer use bylaw;

5.0 CONCLUSION

With respect to the proposed land use change and assumed development parameters at 450 Dufferin Street, the proposed site servicing and stormwater management system will address the requirements of the City of Toronto, as follows:

5.1 Foundation Drainage

Pursuant to City Foundation Drainage Policy, it is currently envisioned that there will be no long-term discharge of foundation drainage for the site.

5.2 Water

A fire water service with a domestic branch is proposed to be connected to the 300mm diameter watermain on Dufferin Street. A peak water demand of 117.5 L/s has been estimated for the future development. A hydrant flow test has been completed that indicates that the existing watermain network is capable of supplying 347 L/s at 20Psi and therefore it can be concluded that there is sufficient watermain capacity for the proposed redevelopment / use change.

5.3 Sanitary

A sanitary service connection to the existing 450mm combined sewer located on Dufferin Street will convey an estimated peak sanitary discharge of 5.78 L/s from the proposed site redevelopment. While this peak discharge is greater than the estimated sanitary discharge from the existing site, the storm discharge from the site will be controlled and the foundation drainage limited to result in a net-zero post redevelopment discharge to the Dufferin Street combined sewer.

5.4 Storm

A storm service connection to the existing 450mm combined sewer located on Dufferin Street will convey a maximum controlled discharge of less than 17.2 L/s from the proposed building SWM system. This discharge rate accounts for the uncontrolled peak rate of 1.1

L/s from the sewer easement. This discharge rate was established so that in conjunction with the sanitary discharge, the total discharge from the site to the Dufferin Street combined sewer in the post development condition does not exceed the total predevelopment discharge to the Dufferin Street combined sewer. A SWM detention tank with an 68mm orifice plate will provide the required detention volume for that discharge rate.

The implementation of rainwater harvesting for reuse such as irrigation or toilet flushing will serve to meet the City's water balance target and limit the total average runoff volume to 50% of the annual average rainfall.

R. V. ANDERSON ASSOCIATES LIMITED

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APPENDIX A

Architectural Plans and Site Statistics

450 DUFFERIN

ISSUED FOR ZBA ON NOVEMBER 4, 2022

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(T) 416.XXX.XXXX

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PMA LANDSCAPE ARCHITECTS
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TERRAPEX ENVIRONMENTAL LTD.
90 SCARSDALE RD.
TORONTO, ON M3B 2R7
(T) 416.245.2011

MECHANICAL ENGINEER
SMITH + ANDERSEN
100 SHEPPARD AVENUE EAST
TORONTO, ON M2N 6N5
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SMITH + ANDERSEN
100 SHEPPARD AVENUE EAST
TORONTO, ON M2N 6N5
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CIVIL ENGINEER
R.V. ANDERSON & ASSOCIATES
302-2001 SHEPPARD AVENUE EAST
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URBAN STRATEGIES
197 SPADINA AVENUE
TORONTO, ON M5T 2C8
(T) 416.340.9004

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127 WALGREEN ROAD
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(T) 613.836.0934

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2C4-2000 ARGENTIA RD 1
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ENERGY CONSULTANT
EQ BUILDING PERFORMANCE INC.
1982A25 ADELAIDE STREET EAST
TORONTO, ON M5C 3A1
(T) 416.640.1186

SHEET LIST

A 000	COVER SHEET & DRAWING LIST
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A 020	GFA DIAGRAMS AS PER 569-2013
A 030	AERIAL VIEWS
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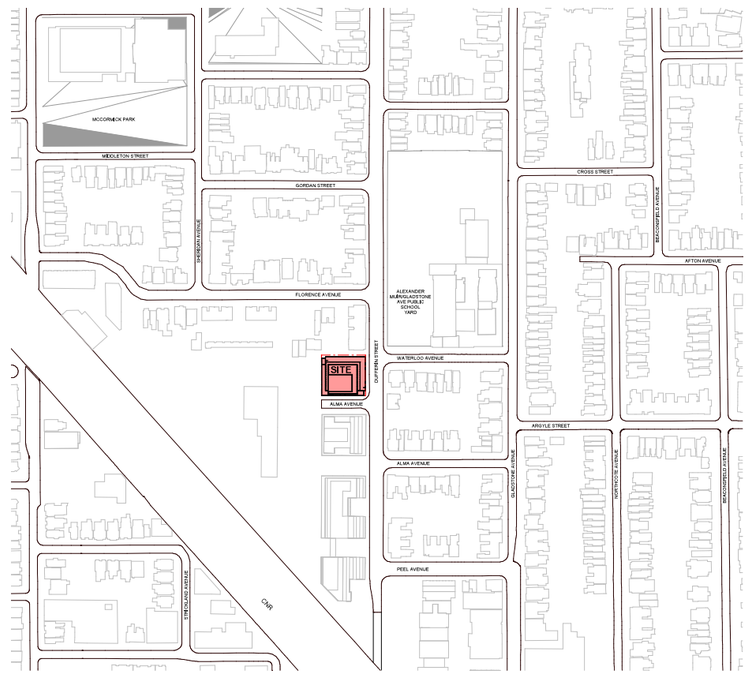
A 400	EAST-WEST BUILDING SECTION
A 401	NORTH-SOUTH BUILDING SECTION
A.100	SITE PLAN
A.200	EAST ELEVATION
A.201	SOUTH ELEVATION
A.202	WEST ELEVATION
A.203	NORTH ELEVATION



1 CONTEXT PLAN
1 : 2000

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No.	Date	Issue/Revision
1	2022.11.04	ISSUED FOR ZBA

450 DUFFERIN
450 DUFFERIN STREET
TORONTO, ON, M6K 2A5

Title:
COVER SHEET & DRAWING LIST

Project No. 2214 | Scale 1 : 2000

Drawing No.
A 000

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ZONING BY-LAW PROJECT STATISTICS

	GROSS CONSTRUCTION AREA		ZBL 569-2013 EXCLUSIONS		CITY WIDE BY-LAW 569-2013 GROSS FLOOR AREA							
					GFA (RESIDENTIAL)		GFA (Commercial)		Amenity Floor Area		TOTAL GROSS FLOOR AREA	
Level	Area (m²)	Area (sq ft)	Area (m²)	Area (sq ft)	Area (m²)	Area (sq ft)	Area (m²)	Area (sq ft)	Area (m²)	Area (sq ft)	Area (m²)	Area (sq ft)
P2	1371,7 m²	14765 ft²	1349,9 m²	14530 ft²	21,8 m²	235 ft²					21,8 m²	235 ft²
P1	1371,8 m²	14766 ft²	1333,8 m²	14357 ft²	23,8 m²	256 ft²	14,2 m²	153 ft²			38,0 m²	409 ft²
GROUND LEVEL	1331,6 m²	14334 ft²	642,0 m²	6910 ft²	127,2 m²	1369 ft²	562,5 m²	6055 ft²			689,7 m²	7424 ft²
MEZZANINE	439,4 m²	4729 ft²	86,1 m²	927 ft²			353,2 m²	3802 ft²			353,2 m²	3802 ft²
LEVEL 2	1226,2 m²	13199 ft²	79,0 m²	850 ft²	1147,3 m²	12349 ft²					1147,3 m²	12349 ft²
LEVEL 3	1226,2 m²	13199 ft²	72,0 m²	775 ft²	1154,2 m²	12424 ft²					1154,2 m²	12424 ft²
LEVEL 4	1226,2 m²	13199 ft²	72,0 m²	775 ft²	1154,2 m²	12424 ft²					1154,2 m²	12424 ft²
LEVEL 5	729,0 m²	7847 ft²	48,9 m²	527 ft²	680,1 m²	7320 ft²					680,1 m²	7320 ft²
LEVEL 6	729,0 m²	7847 ft²	64,9 m²	699 ft²	664,1 m²	7148 ft²					664,1 m²	7148 ft²
LEVEL 7	729,0 m²	7847 ft²	64,9 m²	699 ft²	664,1 m²	7148 ft²					664,1 m²	7148 ft²
LEVEL 8	729,0 m²	7847 ft²	64,9 m²	699 ft²	664,1 m²	7148 ft²					664,1 m²	7148 ft²
LEVEL 9	729,0 m²	7847 ft²	64,9 m²	699 ft²	664,1 m²	7148 ft²					664,1 m²	7148 ft²
LEVEL 10	729,0 m²	7847 ft²	64,9 m²	699 ft²	664,1 m²	7148 ft²					664,1 m²	7148 ft²
LEVEL 11	729,0 m²	7847 ft²	64,9 m²	699 ft²	664,1 m²	7148 ft²					664,1 m²	7148 ft²
LEVEL 12	729,0 m²	7847 ft²	64,9 m²	699 ft²	664,1 m²	7148 ft²					664,1 m²	7148 ft²
LEVEL 13	729,0 m²	7847 ft²	64,9 m²	699 ft²	664,1 m²	7148 ft²					664,1 m²	7148 ft²
LEVEL 14	729,0 m²	7847 ft²	64,9 m²	699 ft²	664,1 m²	7148 ft²					664,1 m²	7148 ft²
LEVEL 15	333,8 m²	3593 ft²	333,8 m²	3593 ft²					289,6 m²	3117 ft²		
MPH	358,1 m²	3854 ft²	358,1 m²	3854 ft²								
TOTAL	16175,1 m²	174108 ft²	4960,0 m²	53389 ft²	10285,2 m²	110709 ft²	929,9 m²	10010 ft²	289,6 m²	3117 ft²	11215,1 m²	120718 ft²

NOTES:

In the Residential Apartment Zone category, the gross floor area of an apartment building is reduced by the area in the building used for:
(A) parking, loading and bicycle parkingbelow established grade;
(B) required loading spaces and required bicycle parking spaces at or above established grade;
(C) storage rooms, washrooms, electrical, utility, mechanical and ventilation rooms in the basement;
(D) shower and change facilities required by this By-law for required bicycle parking spaces;
(E) indoor amenity space required by this By-law;
(F) elevator shafts;
(G) garbage shafts;
(H) mechanical penthouse; and
(I) exit stairwells in the building.

PROJECT STATISTIC SUMMARY

SITE STATISTICS

450 DUFFERIN STREET
TORONTO, ONTARIO M6K 2A5

ZONING DESIGNATION

ZBL 438-86 (EXISTING), ZBL 569-2013 (PROPOSED)

SITE DENSITY

EXISTING LOT AREA: 1495,0 m² (16,092 sf)

SITE FSI: 7.50

BUILDING HEIGHT: 53.1m (174.2f)

OF STORIES (ABOVE GRADE): 15

UNIT STATISTICS

TOTAL RESIDENTIAL SUITES: 143

SUITE BREAKDOWN:

# OF BEDROOMS	COUNT	PERCENTAGE	AVERAGE (SM)	AVERAGE (SF)
STUDIO	50	35,0%	41,27 m²	444,2 m²
1 BD	46	32,2%	60,96 m²	656,1 m²
2 BD	32	22,4%	79,46 m²	855,2 m²
3 BD	15	10,5%	102.67 m²	1105.1 m²

COMMERCIAL SPACE	REQUIRED*	PROVIDED
	897,2 9657,5	897,8 m² 9664 ft²

NOTES:
*Required commercial space @ 8% of GFA (m² / ft²), Provided Commercial space excludes Commercial Elevator Lobby.

AMENITY SPACE

REQUIRED AMENITY SPACE PER ZBL 569-2013
15.10.40.50 Decks, Platforms and Amenities
(1) Amenity Space for an Apartment Buildingin the RA zone, an apartment building with 20 or more dwelling units must provide amenity space at a **minimum rate of 4.0 square metres** for each dwelling unit, of which:
(A) at least 2.0 square metres for each dwelling unit is indoor amenity space located at or above established grade; [By-law: 1353-2015]

(B) at least 40.0 square metres is outdoor amenity space in a location adjoining or directly accessible to the indoor amenity space; and

(C) no more than 25% of the outdoor component may be a green roof.

	REQUIRED	PROVIDED
INDOOR AMENITY SPACE	286 m² 3079 ft²	289,6 m² 3117 ft²
OUTDOOR AMENITY SPACE	286 m² 3079 ft²	286,5 m² 3084 ft²

PARKING SPACE

	PROVIDED	
	Rate	Spaces
RESIDENTIAL PARKING	0,16/unit	22
VISITOR (RESIDENTIAL) PARKING	0,09/unit	12
COMMERCIAL PARKING**	0	0
TOTAL		34

NOTES:
* of 35 parking spots provided 6 will be BF.
** No exclusive commercial parking but will be shared with visitor (residential) parking
*** All residential parking spaces (22 spaces) and 25% of non-residential parking spaces (3 spaces) to include an energized outlet capable of providing level 2 charging or higher to the parking space.

BIKE PARKING SPACES

	REQUIRED		PROVIDED	
	Rate	Spaces	Rate	Spaces
SHORT TERM BIKE PARKING	0.2/unit	29	0.2/unit	29
LONG TERM BIKE PARKING	0.9/unit	129	0.9/unit	129
TOTAL		158		158

NOTES
1. As per the new Toronto Green Standard V4.0, 15% of the residential long-term spaces must be electric spaces. 20 of the Long Term spaces are electric bicycle spaces (see floor plans).
2. Assumes double decker bike rack system for all non-electric bikes.

STORAGE LOCKERS

	PROVIDED	
	Rate	Spaces
STORAGE LOCKERS	1.0/unit	143
TOTAL		**143**

LOADING TYPE

1 - TYPE "G"

UNIT BREAKDOWN (PER FLOOR)

Level	# of Bedrooms	Area
LEVEL 2		
LEVEL 2	1 BD	66,4 m²
LEVEL 2	1 BD	82,4 m²
LEVEL 2	1 BD	67,0 m²
LEVEL 2	2 BD	85,7 m²
LEVEL 2	2 BD	70,3 m²
LEVEL 2	2 BD	70,3 m²
LEVEL 2	3 BD	94,2 m²
LEVEL 2	3 BD	95,4 m²
LEVEL 2	3 BD	117,3 m²
LEVEL 2	3 BD	107,1 m²
LEVEL 2	3 BD	99,7 m²
LEVEL 3		
LEVEL 3	1 BD	66,4 m²
LEVEL 3	1 BD	67,4 m²
LEVEL 3	2 BD	85,7 m²
LEVEL 3	2 BD	70,0 m²
LEVEL 3	2 BD	70,3 m²
LEVEL 3	2 BD	89,7 m²
LEVEL 3	3 BD	94,2 m²
LEVEL 3	3 BD	94,5 m²
LEVEL 3	3 BD	117,3 m²
LEVEL 3	3 BD	107,1 m²
LEVEL 3	3 BD	100,0 m²
LEVEL 4		
LEVEL 4	1 BD	66,4 m²
LEVEL 4	1 BD	67,4 m²
LEVEL 4	2 BD	85,7 m²
LEVEL 4	2 BD	70,0 m²
LEVEL 4	2 BD	70,3 m²
LEVEL 4	2 BD	89,7 m²
LEVEL 4	3 BD	94,2 m²
LEVEL 4	3 BD	94,5 m²
LEVEL 4	3 BD	117,3 m²
LEVEL 4	3 BD	107,1 m²
LEVEL 4	3 BD	100,0 m²
LEVEL 5		
LEVEL 5	1 BD	56,2 m²
LEVEL 5	1 BD	50,5 m²
LEVEL 5	1 BD	67,2 m²
LEVEL 5	2 BD	84,8 m²
LEVEL 5	2 BD	84,7 m²
LEVEL 5	2 BD	73,7 m²
LEVEL 5	STUDIO	44,0 m²
LEVEL 5	STUDIO	42,2 m²
LEVEL 5	STUDIO	37,6 m²
LEVEL 5	STUDIO	39,7 m²
LEVEL 5	STUDIO	43,0 m²
LEVEL 6		
LEVEL 6	1 BD	51,5 m²
LEVEL 6	1 BD	50,5 m²
LEVEL 6	1 BD	67,4 m²
LEVEL 6	1 BD	69,0 m²
LEVEL 6	2 BD	80,1 m²
LEVEL 6	2 BD	80,1 m²
LEVEL 6	STUDIO	44,0 m²
LEVEL 6	STUDIO	42,2 m²
LEVEL 6	STUDIO	39,5 m²
LEVEL 6	STUDIO	37,6 m²
LEVEL 6	STUDIO	43,1 m²
LEVEL 7		
LEVEL 7	1 BD	51,5 m²
LEVEL 7	1 BD	50,5 m²
LEVEL 7	1 BD	67,4 m²
LEVEL 7	1 BD	69,0 m²
LEVEL 7	2 BD	80,1 m²
LEVEL 7	2 BD	80,1 m²
LEVEL 7	STUDIO	44,0 m²
LEVEL 7	STUDIO	42,2 m²
LEVEL 7	STUDIO	39,5 m²
LEVEL 7	STUDIO	37,6 m²
LEVEL 7	STUDIO	43,1 m²
LEVEL 8		
LEVEL 8	1 BD	51,5 m²
LEVEL 8	1 BD	50,5 m²
LEVEL 8	1 BD	67,4 m²
LEVEL 8	1 BD	69,0 m²
LEVEL 8	2 BD	80,1 m²
LEVEL 8	2 BD	80,1 m²
LEVEL 8	STUDIO	44,0 m²
LEVEL 8	STUDIO	42,2 m²
LEVEL 8	STUDIO	39,5 m²
LEVEL 8	STUDIO	37,6 m²
LEVEL 8	STUDIO	43,1 m²
LEVEL 9		
LEVEL 9	1 BD	51,5 m²
LEVEL 9	1 BD	50,5 m²
LEVEL 9	1 BD	67,4 m²
LEVEL 9	1 BD	69,0 m²
LEVEL 9	2 BD	80,1 m²
LEVEL 9	2 BD	80,1 m²
LEVEL 9	STUDIO	44,0 m²
LEVEL 9	STUDIO	42,2 m²
LEVEL 9	STUDIO	39,5 m²
LEVEL 9	STUDIO	37,6 m²
LEVEL 9	STUDIO	43,1 m²
LEVEL 10		
LEVEL 10	1 BD	51,5 m²
LEVEL 10	1 BD	50,5 m²
LEVEL 10	1 BD	67,4 m²
LEVEL 10	1 BD	69,0 m²
LEVEL 10	2 BD	80,1 m²
LEVEL 10	2 BD	80,1 m²
LEVEL 10	STUDIO	44,0 m²
LEVEL 10	STUDIO	42,2 m²
LEVEL 10	STUDIO	39,5 m²
LEVEL 10	STUDIO	37,6 m²
LEVEL 10	STUDIO	43,1 m²
LEVEL 11		
LEVEL 11	1 BD	51,5 m²
LEVEL 11	1 BD	50,5 m²
LEVEL 11	1 BD	67,4 m²
LEVEL 11	1 BD	69,0 m²
LEVEL 11	2 BD	80,1 m²
LEVEL 11	STUDIO	44,0 m²
LEVEL 11	STUDIO	42,2 m²
LEVEL 11	STUDIO	39,5 m²
LEVEL 11	STUDIO	37,6 m²
LEVEL 11	STUDIO	43,1 m²
LEVEL 12		
LEVEL 12	1 BD	51,5 m²
LEVEL 12	1 BD	50,5 m²
LEVEL 12	1 BD	67,4 m²
LEVEL 12	1 BD	69,0 m²
LEVEL 12	2 BD	80,1 m²
LEVEL 12	2 BD	80,1 m²
LEVEL 12	STUDIO	44,0 m²
LEVEL 12	STUDIO	42,2 m²
LEVEL 12	STUDIO	39,5 m²
LEVEL 12	STUDIO	37,6 m²
LEVEL 12	STUDIO	43,1 m²
LEVEL 13		
LEVEL 13	1 BD	51,5 m²
LEVEL 13	1 BD	50,5 m²
LEVEL 13	1 BD	67,4 m²
LEVEL 13	1 BD	69,0 m²
LEVEL 13	2 BD	80,1 m²
LEVEL 13	2 BD	80,1 m²
LEVEL 13	STUDIO	44,0 m²
LEVEL 13	STUDIO	42,2 m²
LEVEL 13	STUDIO	39,5 m²
LEVEL 13	STUDIO	37,6 m²
LEVEL 13	STUDIO	43,1 m²
LEVEL 14		
LEVEL 14	1 BD	51,5 m²
LEVEL 14	1 BD	50,5 m²
LEVEL 14	1 BD	67,4 m²
LEVEL 14	1 BD	69,0 m²
LEVEL 14	2 BD	80,1 m²
LEVEL 14	2 BD	80,1 m²
LEVEL 14	STUDIO	44,0 m²
LEVEL 14	STUDIO	42,2 m²
LEVEL 14	STUDIO	39,5 m²
LEVEL 14	STUDIO	37,6 m²
LEVEL 14	STUDIO	43,1 m²

TORONTO GREEN STANDARD (VERSION 4.0)

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No.	Date	Issue/Revision
1	2022.11.04	ISSUED FOR ZBA

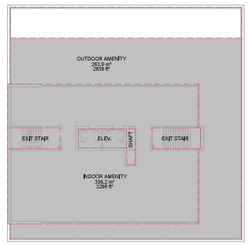
450 DUFFERIN
450 DUFFERIN STREET
TORONTO, ON, M6K 2A5

Title:
PROJECT STATISTICS

Project No. 2214 | Scale

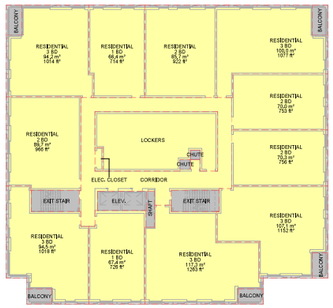
Drawing No.
A 010

GFA EXCLUSIONS PER ZBL 569-2013 (LEVEL 15)	
INDOOR AMENITY	306.2 m²
EXIT STAIR	14.4 m²
ELEV.	12.1 m²
EXIT STAIR	13.4 m²
SHAFT	4.0 m²
OUTDOOR AMENITY	263.6 m²



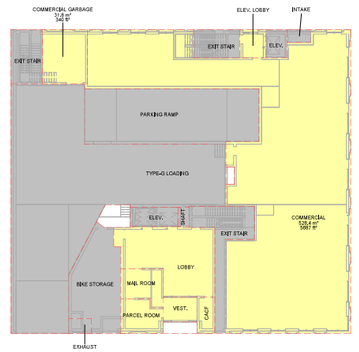
9 GFA DIAGRAM- LEVEL 15
1 : 250

GFA EXCLUSIONS PER ZBL 569-2013 (LEVEL 3-14)	
RESIDENTIAL	64.2 m²
RESIDENTIAL	66.4 m²
RESIDENTIAL	85.7 m²
RESIDENTIAL	70.0 m²
RESIDENTIAL	70.3 m²
RESIDENTIAL	89.7 m²
RESIDENTIAL	67.4 m²
RESIDENTIAL	84.5 m²
RESIDENTIAL	117.3 m²
RESIDENTIAL	107.1 m²
RESIDENTIAL	100.0 m²
ELEV.	12.3 m²
EXIT STAIR	13.2 m²
SHAFT	3.7 m²
EXIT STAIR	13.2 m²
LOCKERS	88.9 m²
CHUTE	1.3 m²
CHUTE	1.2 m²
CORRIDOR	100.3 m²
BALCONY	6.0 m²
BALCONY	6.0 m²
BALCONY	5.0 m²
BALCONY	5.0 m²
BALCONY	5.0 m²
ELEC. CLOSET	2.4 m²



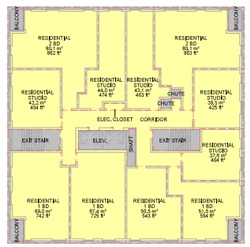
6 GFA DIAGRAM- TYP. LEVEL 3-4
1 : 250

GFA EXCLUSIONS PER ZBL 569-2013 (GROUND LEVEL)	
COMMERCIAL	528.4 m²
LOBBY	72.3 m²
BIKE STORAGE	56.6 m²
TYPE-G LOADING	344.7 m²
PARKING RAMP	124.4 m²
ELEV.	12.1 m²
SHAFT	2.7 m²
EXIT STAIR	22.2 m²
VEST.	11.1 m²
ELEV.	7.7 m²
EXIT STAIR	17.0 m²
EXHAUST	4.4 m²
INTAKE	3.9 m²
COMMERCIAL GARBAGE	31.6 m²
MAIL ROOM	18.0 m²
PARCEL ROOM	17.5 m²
CACF	8.3 m²
ELEV. LOBBY	9.7 m²
EXIT STAIR	37.1 m²



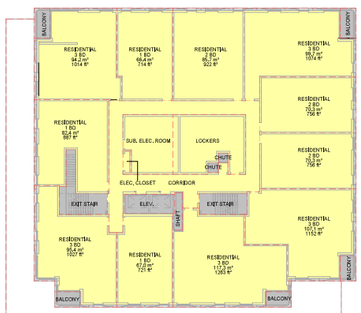
3 GFA DIAGRAM- GROUND FLOOR
1 : 250

GFA EXCLUSIONS PER ZBL 569-2013 (LEVEL 1)	
RESIDENTIAL	80.1 m²
RESIDENTIAL	44.0 m²
RESIDENTIAL	80.1 m²
RESIDENTIAL	42.2 m²
RESIDENTIAL	39.5 m²
RESIDENTIAL	37.6 m²
RESIDENTIAL	51.5 m²
RESIDENTIAL	59.5 m²
RESIDENTIAL	67.4 m²
RESIDENTIAL	69.0 m²
EXIT STAIR	14.4 m²
ELEV.	12.4 m²
EXIT STAIR	13.2 m²
CHUTE	1.3 m²
CHUTE	1.2 m²
CORRIDOR	97.0 m²
SHAFT	3.8 m²
BALCONY	4.7 m²
BALCONY	4.7 m²
BALCONY	4.7 m²
BALCONY	4.7 m²
RESIDENTIAL	43.1 m²
ELEC. CLOSET	2.0 m²



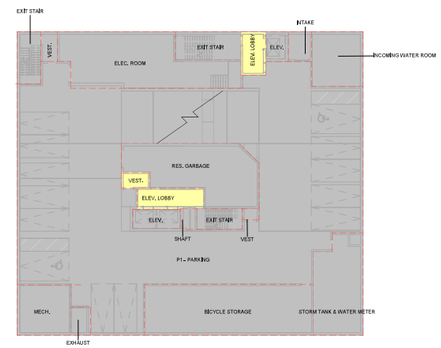
8 GFA DIAGRAM- TYP. LEVEL 5-14
1 : 250

GFA EXCLUSIONS PER ZBL 569-2013 (LEVEL 2)	
COMMERCIAL	337.8 m²
EXIT STAIR	54.4 m²
EXIT STAIR	17.8 m²
VEST.	4.1 m²
ELEV.	8.2 m²
INTAKE SHAFT	5.5 m²
ELEV. LOBBY	8.7 m²



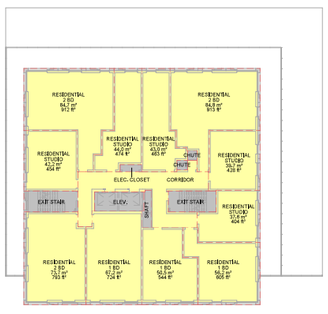
5 GFA DIAGRAM- LEVEL 2
1 : 250

GFA EXCLUSIONS PER ZBL 569-2013 (LEVEL P1)	
RES. GARBAGE	86.8 m²
ELEV. LOBBY	18.0 m²
ELEV.	11.9 m²
P1 - PARKING	790.2 m²
SHAFT	4.5 m²
EXIT STAIR	12.5 m²
VEST	2.5 m²
EXIT STAIR	16.2 m²
ELEC. ROOM	107.4 m²
VEST.	6.5 m²
ELEV.	8.7 m²
MECH.	35.2 m²
STORM TANK & WATER METER	62.0 m²
VEST.	5.8 m²
EXHAUST	7.3 m²
INTAKE	9.1 m²
INCOMING WATER ROOM	37.0 m²
BICYCLE STORAGE	111.8 m²
ELEV. LOBBY	14.2 m²
EXIT STAIR	24.2 m²



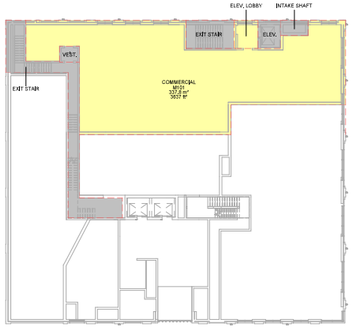
2 GFA DIAGRAM- P1 FLOOR
1 : 250

GFA EXCLUSIONS PER ZBL 569-2013 (LEVEL 1)	
RESIDENTIAL	64.8 m²
RESIDENTIAL	44.0 m²
RESIDENTIAL	84.7 m²
RESIDENTIAL	42.2 m²
RESIDENTIAL	37.6 m²
RESIDENTIAL	56.2 m²
RESIDENTIAL	50.5 m²
RESIDENTIAL	67.2 m²
RESIDENTIAL	73.7 m²
EXIT STAIR	14.8 m²
ELEV.	12.4 m²
EXIT STAIR	13.2 m²
CHUTE	1.3 m²
RESIDENTIAL	39.7 m²
CORRIDOR	56.3 m²
SHAFT	4.0 m²
CHUTE	1.2 m²
RESIDENTIAL	43.0 m²
ELEC. CLOSET	2.0 m²



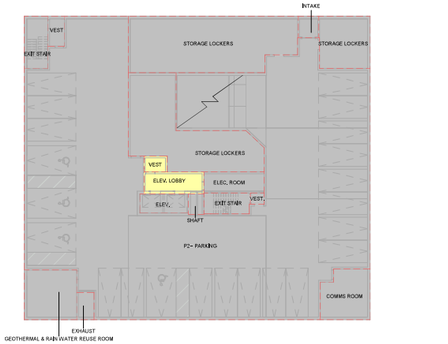
7 GFA DIAGRAM- LEVEL 1
1 : 250

GFA EXCLUSIONS PER ZBL 569-2013 (MEZZANINE LEVEL)	
COMMERCIAL	337.8 m²
EXIT STAIR	54.4 m²
EXIT STAIR	17.8 m²
VEST.	4.1 m²
ELEV.	8.2 m²
INTAKE SHAFT	5.5 m²
ELEV. LOBBY	8.7 m²



4 GFA DIAGRAM- MEZZANINE LEVEL
1 : 250

GFA EXCLUSIONS PER ZBL 569-2013 (LEVEL P2)	
P2 - PARKING	950.8 m²
STORAGE LOCKERS	99.3 m²
ELEV. LOBBY	17.1 m²
EXIT STAIR	12.6 m²
ELEV.	12.2 m²
SHAFT	4.2 m²
STORAGE LOCKERS	117.7 m²
EXIT STAIR	16.1 m²
STORAGE LOCKERS	34.8 m²
COMMS ROOM	30.8 m²
GEOTHERMAL & RAIN WATER REUSE ROOM	34.1 m²
VEST	2.1 m²
ELEC. ROOM	16.6 m²
VEST	4.7 m²
VEST	6.6 m²
INTAKE	5.7 m²
EXHAUST	4.2 m²



1 GFA DIAGRAM- P2 FLOOR
1 : 250

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NOTES:

In the Residential Apartment Zone category, the gross floor area of an apartment building is reduced by the area in the building used for:

(A) parking, loading and bicycle parking below established grade;
(B) required loading spaces and required bicycle parking spaces at or above established grade;
(C) storage rooms, washrooms, electrical, utility, mechanical and ventilation rooms in the basement;
(D) shower and change facilities required by this By-law for required bicycle parking spaces;
(E) indoor amenity space required by this By-law;
(F) elevator shafts;
(G) garbage shafts;
(H) mechanical penthouse; and
(I) exit stairwells in the building.

569-2013 exclusions

Gross floor Area

DRAFT

No.	Date	Issue/Revision
1	2022.11.04	ISSUED FOR ZBA

450 DUFFERIN
450 DUFFERIN STREET
TORONTO, ON, M6K 2A5

Title:
GFA DIAGRAMS AS PER 569-2013

Project No. 2214	Scale	As indicated

Drawing No.
A 020

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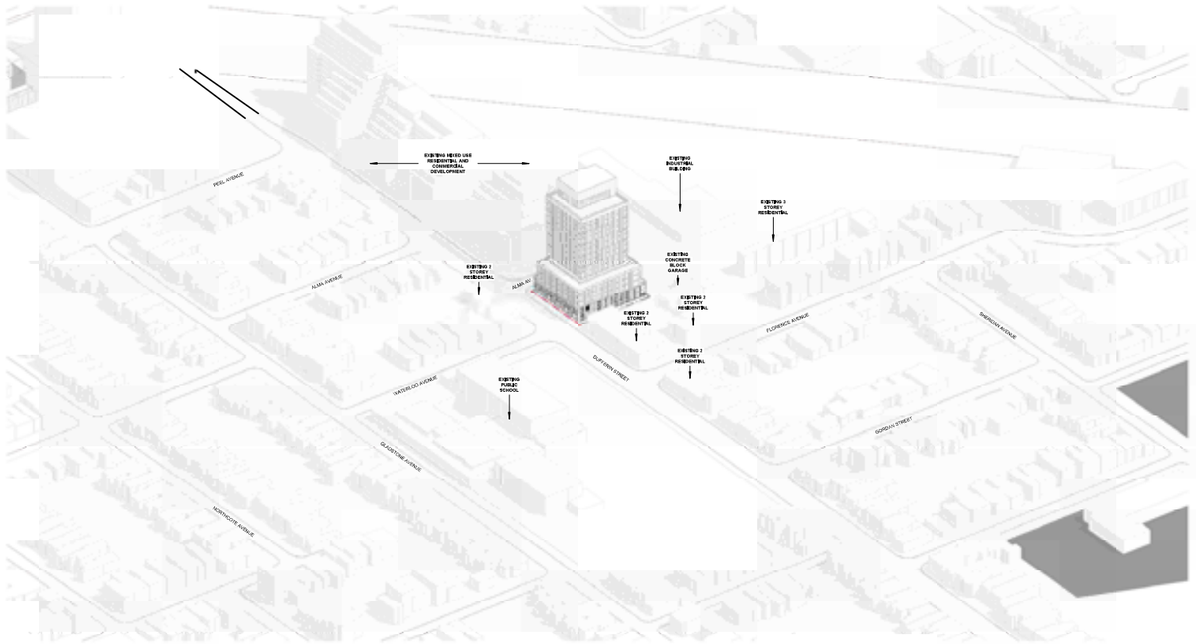
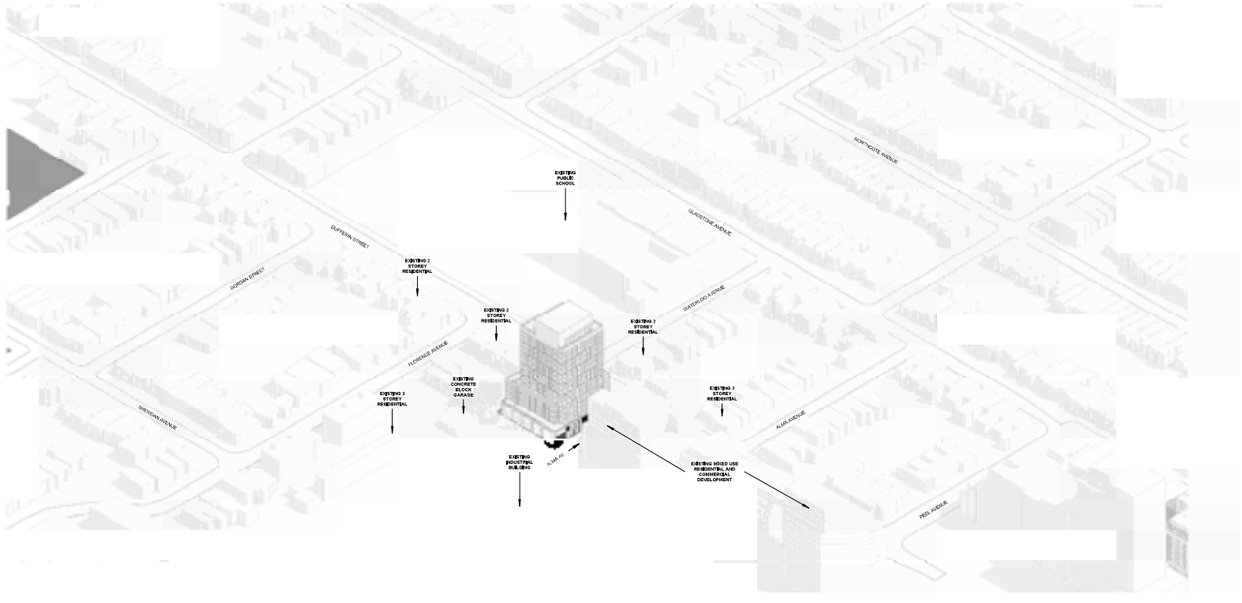


1 PERSPECTIVE - NE AXO



2 PERSPECTIVE - SW AXO

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No.	Date	Issue/Revision
1	2022.11.04	ISSUED FOR ZBA

450 DUFFERIN
450 DUFFERIN STREET
TORONTO, ON, M6K 2A5

Title:
AERIAL VIEWS

Project No. 2214 | Scale

Drawing No.
A 030

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NOTES:

SITE PLAN NOTES

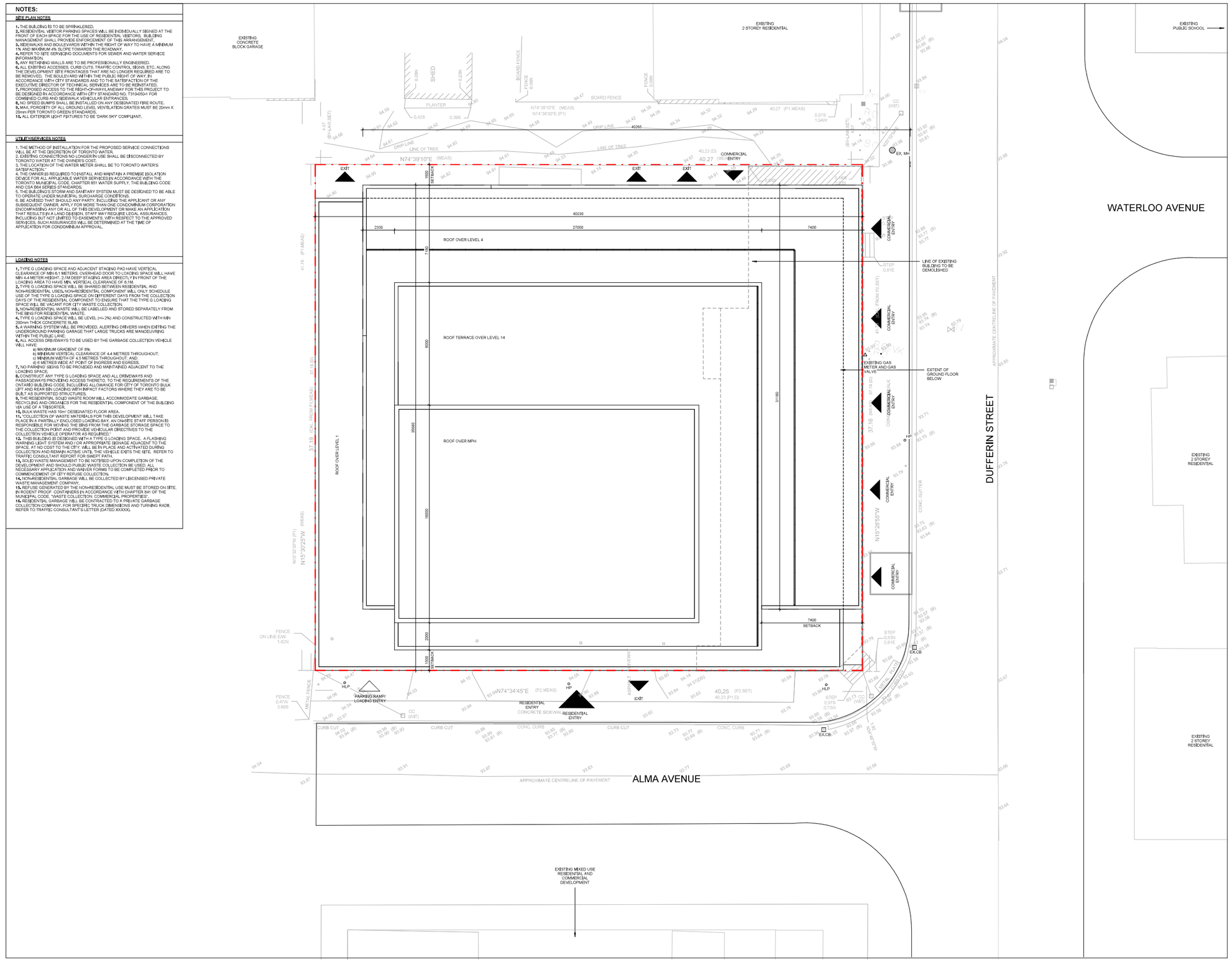
1. THE BUILDING IS TO BE SPRINKLERED.
2. RESIDENTIAL VISITOR PARKING SPACES WILL BE INDIVIDUALLY SIGNED AT THE FRONT OF EACH SPACE FOR THE USE OF RESIDENTIAL VISITORS. BUILDING MANAGEMENT SHALL PROVIDE ENFORCEMENT OF THIS ARRANGEMENT.
3. SIDEWALKS AND BOULEVARDS WITHIN THE RIGHT OF WAY TO HAVE A MINIMUM 1% AND MAXIMUM 4% SLOPE TOWARDS THE ROADWAY.
4. REFER TO SITE SERVICING DOCUMENTS FOR SEWER AND WATER SERVICE INFORMATION.
5. ANY RETAINING WALLS ARE TO BE PROFESSIONALLY ENGINEERED.
6. ALL EXISTING ACCESSES, CURB CUTS, TRAFFIC CONTROL SIGNS, ETC. ALONG THE DEVELOPMENT SITE FRONTAGES THAT ARE NO LONGER REQUIRED ARE TO BE REMOVED, THE BOULEVARD WITHIN THE PUBLIC RIGHT OF WAY, IN ACCORDANCE WITH CITY STANDARDS AND TO THE SATISFACTION OF THE EXECUTIVE DIRECTOR OF TECHNICAL SERVICES ARE TO BE REINSTATED.
7. PROPOSED ACCESS TO THE RIGHT-OF-WAY/LANEWAY FOR THIS PROJECT TO BE DESIGNED IN ACCORDANCE WITH CITY STANDARD NO. T310-050-1 FOR COMBINED CURB AND SIDEWALK VEHICULAR ENTRANCES.
8. NO SPEED BUMPS SHALL BE INSTALLED ON ANY DESIGNATED FIRE ROUTE.
9. MAX. POROSITY OF ALL GROUND LEVEL VENTILATION GRATES MUST BE 20mm X 20mm PER TORONTO GREEN STANDARDS.
10. ALL EXTERIOR LIGHT FIXTURES TO BE 'DARK SKY' COMPLIANT.

UTILITY/SERVICES NOTES

1. THE METHOD OF INSTALLATION FOR THE PROPOSED SERVICE CONNECTIONS WILL BE AT THE DISCRETION OF TORONTO WATER.
2. EXISTING CONNECTIONS NO LONGER IN USE SHALL BE DISCONNECTED BY TORONTO WATER AT THE OWNER'S COST.
3. THE LOCATION OF THE WATER METER SHALL BE TO TORONTO WATER'S SATISFACTION."
4. THE OWNER IS REQUIRED TO INSTALL AND MAINTAIN A PREMISE ISOLATION DEVICE FOR ALL APPLICABLE WATER SERVICES IN ACCORDANCE WITH THE TORONTO MUNICIPAL CODE, CHAPTER 851 WATER SUPPLY. THE BUILDING CODE AND CSA B64 SERIES STANDARDS.
5. THE BUILDING'S STORM AND SANITARY SYSTEM MUST BE DESIGNED TO BE ABLE TO OPERATE UNDER MUNICIPAL SURCHARGE CONDITIONS.
6. BE ADVISED THAT SHOULD ANY PARTY, INCLUDING THE APPLICANT OR ANY SUBSEQUENT OWNER, APPLY FOR MORE THAN ONE CONDOMINIUM CORPORATION ENCOMPASSING ANY OR ALL OF THIS DEVELOPMENT OR MAKE AN APPLICATION THAT RESULTS IN A LAND DIVISION, STAFF MAY REQUIRE LEGAL ASSURANCES, INCLUDING BUT NOT LIMITED TO EASEMENTS, WITH RESPECT TO THE APPROVED SERVICES, SUCH ASSURANCES WILL BE DETERMINED AT THE TIME OF APPLICATION FOR CONDOMINIUM APPROVAL.

LOADING NOTES

1. TYPE G LOADING SPACE AND ADJACENT STAGING PAD HAVE VERTICAL CLEARANCE OF MIN 6.1 METERS. OVERHEAD DOOR TO LOADING SPACE WILL HAVE MIN 4.4 METER HEIGHT. 2.1M DEEP STAGING AREA DIRECTLY IN FRONT OF THE LOADING AREA TO HAVE MIN. VERTICAL CLEARANCE OF 6.1M.
2. TYPE G LOADING SPACE WILL BE SHARED BETWEEN RESIDENTIAL AND NON-RESIDENTIAL USES. NON-RESIDENTIAL COMPONENT WILL ONLY SCHEDULE USE OF THE TYPE G LOADING SPACE ON DIFFERENT DAYS FROM THE COLLECTION DAYS OF THE RESIDENTIAL COMPONENT TO ENSURE THAT THE TYPE G LOADING SPACE WILL BE VACANT FOR CITY WASTE COLLECTION.
3. NON-RESIDENTIAL WASTE WILL BE LABELLED AND STORED SEPARATELY FROM THE BINS FOR RESIDENTIAL WASTE.
4. TYPE G LOADING SPACE WILL BE LEVEL (+/-2%) AND CONSTRUCTED WITH MIN 200mm THICK CONCRETE SLAB
5. A WARNING SYSTEM WILL BE PROVIDED, ALERTING DRIVERS WHEN EXITING THE UNDERGROUND PARKING GARAGE THAT LARGE TRUCKS ARE MANOEUVRING WITHIN THE PUBLIC LANE.
6. ALL ACCESS DRIVEWAYS TO BE USED BY THE GARBAGE COLLECTION VEHICLE WILL HAVE:
   a) MAXIMUM GRADIENT OF 6%
   b) MINIMUM VERTICAL CLEARANCE OF 4.4 METRES THROUGHOUT;
   c) MINIMUM WIDTH OF 4.5 METRES THROUGHOUT, AND;
   d) 6 METRES WIDE AT POINT OF INGRESS AND EGRESS.
7. NO PARKING' SIGNS TO BE PROVIDED AND MAINTAINED ADJACENT TO THE LOADING SPACE.
8. CONSTRUCT ANY TYPE G LOADING SPACE AND ALL DRIVEWAYS AND PASSAGEWAYS PROVIDING ACCESS THERETO, TO THE REQUIREMENTS OF THE ONTARIO BUILDING CODE, INCLUDING ALLOWANCE FOR CITY OF TORONTO BULK LIFT AND REAR BIN LOADING WITH IMPACT FACTORS WHERE THEY ARE TO BE BUILT AS SUPPORTED STRUCTURES.
9. THE RESIDENTIAL SOLID WASTE ROOM WILL ACCOMMODATE GARBAGE, RECYCLING AND ORGANICS FOR THE RESIDENTIAL COMPONENT OF THE BUILDING VIA USE OF A TRISORTER.
10. BULK WASTE HAS 10m² DESIGNATED FLOOR AREA.
11. COLLECTION OF WASTE MATERIALS FOR THIS DEVELOPMENT WILL TAKE PLACE IN A PARTIALLY ENCLOSED LOADING BAY. AN ON-SITE STAFF PERSON IS RESPONSIBLE FOR MOVING THE BINS FROM THE GARBAGE STORAGE SPACE TO THE COLLECTION POINT AND PROVIDE VEHICULAR DIRECTIVES TO THE COLLECTION VEHICLE OPERATOR AS REQUIRED.
12. THIS BUILDING IS DESIGNED WITH A TYPE G LOADING SPACE. A FLASHING WARNING LIGHT SYSTEM AND / OR APPROPRIATE SIGNAGE ADJACENT TO THE SPACE, AT NO COST TO THE CITY, WILL BE IN PLACE AND ACTIVATED DURING COLLECTION AND REMAIN ACTIVE UNTIL THE VEHICLE EXITS THE SITE. REFER TO TRAFFIC CONSULTANT REPORT FOR SWEPT PATH.
13. SOLID WASTE MANAGEMENT TO BE NOTIFIED UPON COMPLETION OF THE DEVELOPMENT AND SHOULD PUBLIC WASTE COLLECTION BE USED, ALL NECESSARY APPLICATION AND WAIVER FORMS TO BE COMPLETED PRIOR TO COMMENCEMENT OF CITY REFUSE COLLECTION.
14. NON-RESIDENTIAL GARBAGE WILL BE COLLECTED BY LISCENSED PRIVATE WASTE MANAGEMENT COMPANY.
15. REFUSE GENERATED BY THE NON-RESIDENTIAL USE MUST BE STORED ON SITE, IN RODENT PROOF CONTAINERS IN ACCORDANCE WITH CHAPTER 841 OF THE MUNICIPAL CODE, "WASTE COLLECTION, COMMERCIAL PROPERTIES".
16. RESIDENTIAL GARBAGE WILL BE CONTRACTED TO A PRIVATE GARBAGE COLLECTION COMPANY. FOR SPECIFIC TRUCK DIMENSIONS AND TURNING RADII, REFER TO TRAFFIC CONSULTANT'S LETTER (DATED XX/XX/XX).



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LEGEND

- PRINCIPAL ENTRY
- VEHICULAR ENTRY/EXIT
- SIAMESE CONNECTION
- FIRE HYDRANT
- EX. MH — EXISTING MANHOLE
- EX. CB — EXISTING CATCH BASIN
- MH — MANHOLE
- CB — CATCH BASIN
- HP — EXISTING HYROPOLE
- HLP — EXISTING HYRO LIGHT POLE
- 600X1800mm BICYCLE PARKING SPACE
- 86.05 — GEODETIC ELEVATION (ESTABLISHED GRADE = XX.XX)
- 75.20 — EXISTING GRADE ELEVATION
- BARRIER FREE TURNING RADIUS
- PROPERTY LINE
- FFE — FINISHED FLOOR ELEVATION
- TOP — TOP OF PARAPET
- TOR — TOP OF ROOF
- TOS — TOP OF STRUCTURE
- TOFF — TOP OF FINISHED PAVER
- TGS — TORONTO GREEN STANDARDS
- TPZ — TREE PROTECTION ZONE

NOTES:

SURVEY INFORMATION TAKEN FROM "TOPOGRAPHICAL SURVEY OF PART OF LOT 8 REGISTERED PLAN 294 YORK, CITY OF TORONTO"

BY R. AMIS SURVEYING INC.

DRAFT

No.	Date	Issue/Revision

450 DUFFERIN
450 DUFFERIN STREET
TORONTO, ON, M6K 2A5

Title:
SITE PLAN

Project No. 2214 | Scale 1 : 100

Drawing No.
A 100

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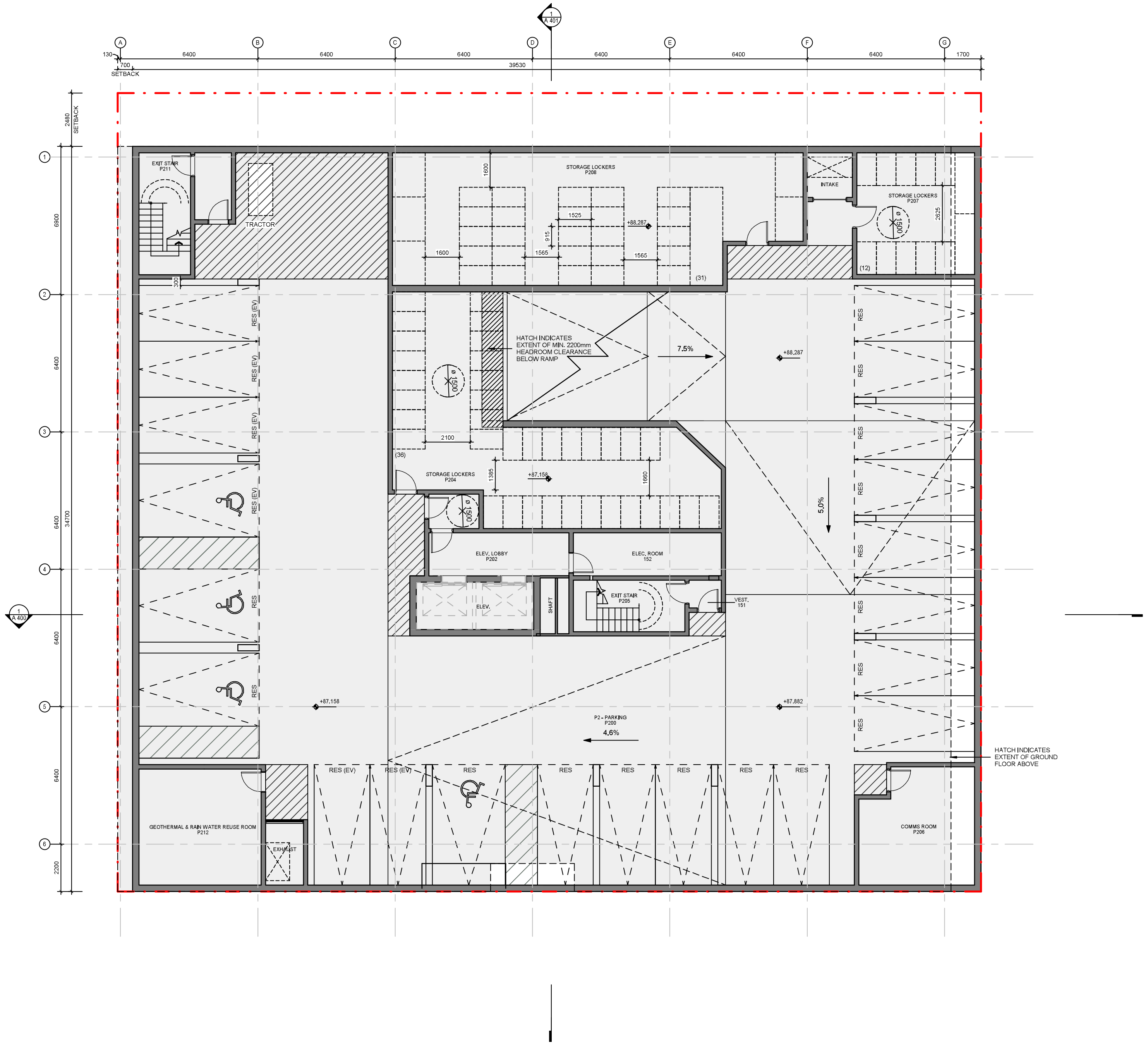
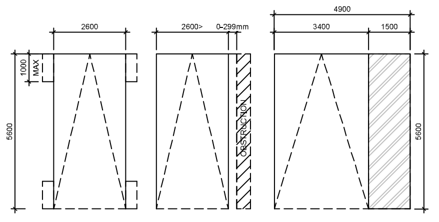


VEHICLE PARKING DIMENSIONS



TYPICAL
PARKING
SPACE

TYPICAL
OBSTRUCTED
PARKING SPACE

TYPICAL BARRIER FREE
PARKING SPACE
PER 569-2017

PARKING LEGEND	
RES	RESIDENTIAL
COM	COMMERCIAL
VIS	VISITOR
EV	ELETRICAL VEHICLE CHARGING STATIONS (WHERE INDICATED ON PLANS, PROVIDE EV CHARGING STATIONS AT PARKING SPACES. PROVIDE ROUGH-IN (CONDUIT ONLY) FOR EV CHARGING AT ALL REMAINING SPACES.

NOTE:

1) MIRRORS AND TRAFFIC CONTROL SIGNS ARE TO BE MOUNTED SO THAT THE BOTTOM OF THE SIGNS AND/OR MIRRORS ARE 2.10 METRES ABOVE CURB OR GRADE EXCEPT WHERE RESTRICTED BY OVERHEAD STRUCTURE/UTILITIES IN WHICH CASE THE DISTANCE BETWEEN BOTTOM OF SIGNS AND FLOOR SHALL BE MAXIMIZED. SIGNS RUNNING PARALLEL AND PERPENDICULAR TO THE CURB FACE, SHOULD BE PLACED SUCH THAT THE OUTER EDGE OF THE SIGN WILL NOT PROJECT BEYOND THE CURB INTO THE TRAFFIC LANE.

2) MAINTAIN MIN. 2100MM CLEAR HEADROOM IN ALL LOCKERS.

3) MAINTAIN MIN. 2100MM CLEAR HEADROOM THROUGHOUT.

4) THE SLOPE OF ALL DRIVE AISLES (EXCEPT RAMPS WITH NOTED SLOPES) DOES NOT EXCEED THE MAXIMUM OF 5%. THE WIDTH OF ALL DRIVE AISLES TO BE A MINIMUM OF 7000MM UNLESS OTHERWISE NOTED.

Prior to commencement of the Work the Contractor shall verify all drawing dimensions, datums, and levels with the Contract Documents and with the conditions on site; ascertain any discrepancies between the site and the Contract Documents, and bring these items to the attention of the Architect for clarification.

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No.	Date	Issue/Revision
1	2022.11.04	ISSUED FOR ZBA

450 DUFFERIN
450 DUFFERIN STREET
TORONTO, ON, M6K 2A5

Title:
P2 FLOOR PLAN

Project No. 2214
Scale 1 : 100

Drawing No.
A 200

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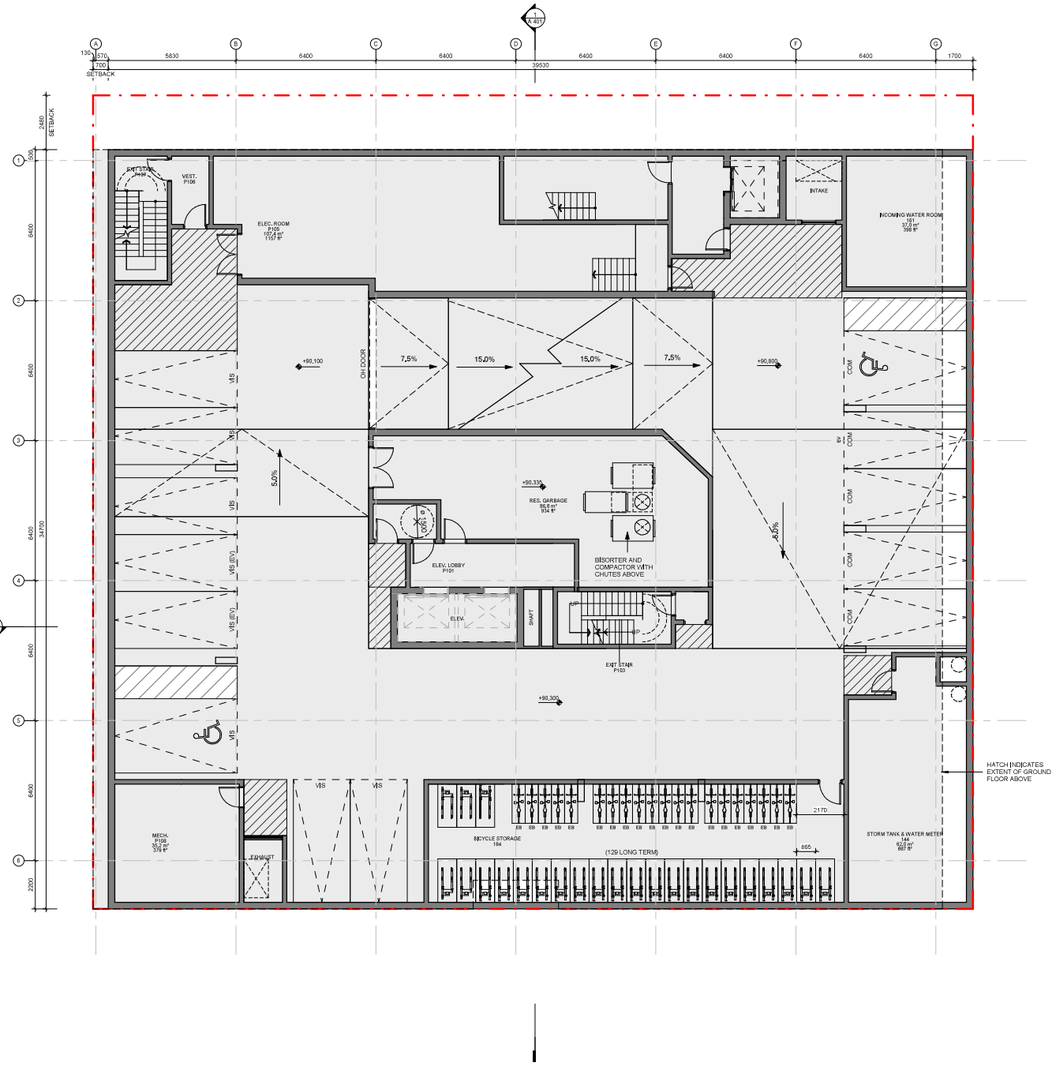
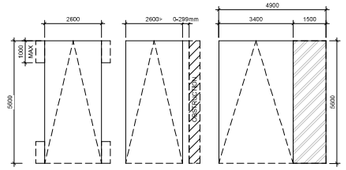


VEHICLE PARKING DIMENSIONS



PARKING LEGEND	
RES	RESIDENTIAL
COM	COMMERCIAL
VIS	VISITOR
EV	ELETRICAL VEHICLE CHARGING STATIONS (WHERE INDICATED ON PLANS, PROVIDE EV CHARGING STATIONS AT PARKING SPACES. PROVIDE ROUGH-IN (CONDUIT ONLY) FOR EV CHARGING AT ALL REMAINING SPACES.

NOTE:

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3) MAINTAIN MIN. 2100MM CLEAR HEADROOM THROUGHOUT.

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No.	Date	Issue/Revision
1	2022.11.04	ISSUED FOR ZBA

450 DUFFERIN

450 DUFFERIN STREET
TORONTO, ON, M6K 2A5

Title:
P1 FLOOR PLAN

Project No. 2214 | Scale 1 : 100

Drawing No.

A 201

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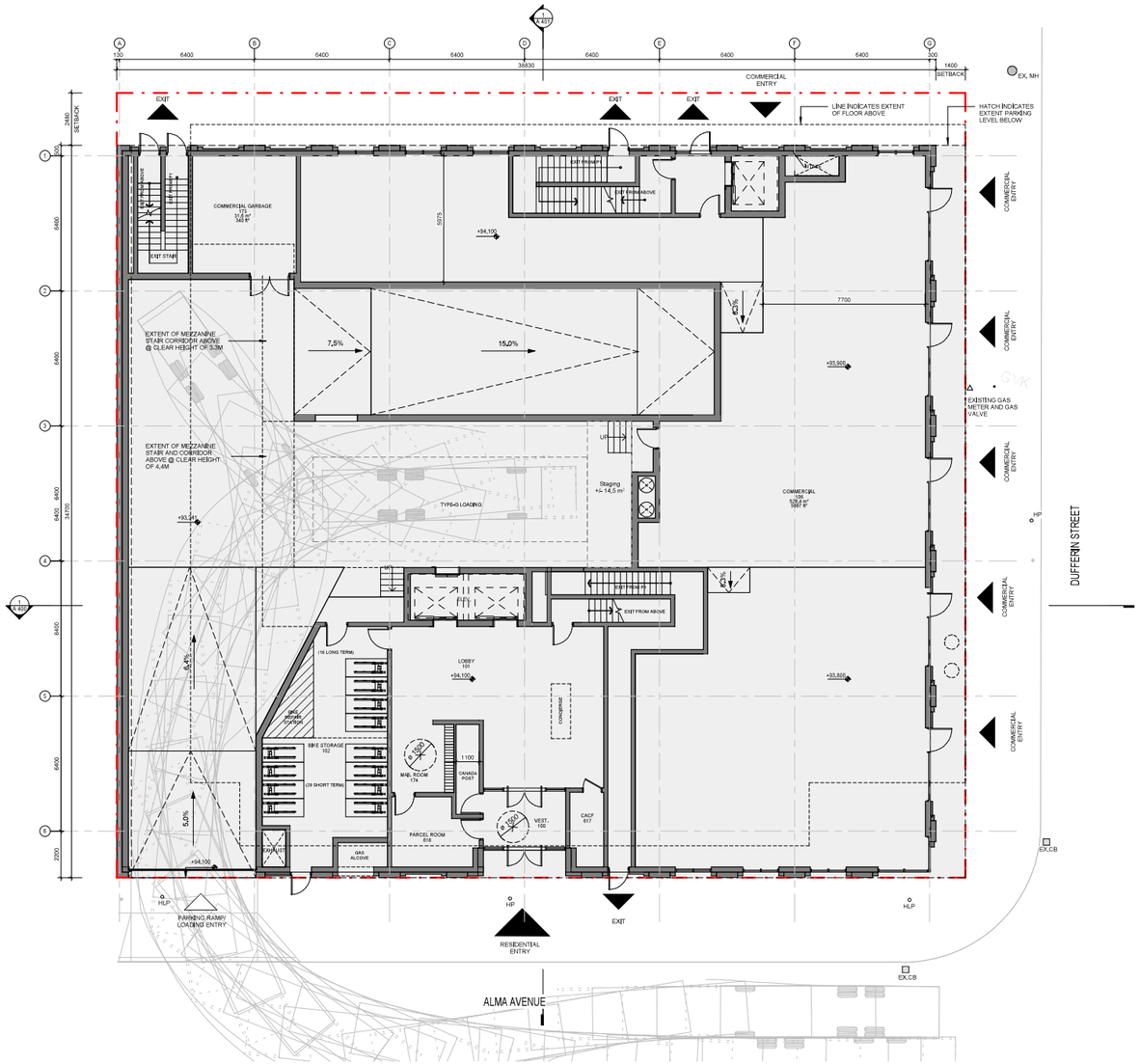

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LEGEND

- PRINCIPAL ENTRY
- VEHICULAR ENTRY/EXIT
- SIAMESE CONNECTION
- FIRE HYDRANT
- EX. MH — EXISTING MANHOLE
- EX. CB — EXISTING CATCH BASIN
- MH — MANHOLE
- CB — CATCH BASIN
- HP — EXISTING HYROPOLE
- HLP — EXISTING HYRO LIGHT POLE
- 600X1800mm BICYCLE PARKING SPACE
- 86.95 — GEODETIC ELEVATION (ESTABLISHED GRADE = XX.XX)
- 78.20 — EXISTING GRADE ELEVATION
- BARRIER FREE TURNING RADIUS
- PROPERTY LINE
- FFE — FINISHED FLOOR ELEVATION
- TOP — TOP OF PARAPET
- TOR — TOP OF ROOF
- TOS — TOP OF STRUCTURE
- TOFF — TOP OF FINISHED PAVER
- TGS — TORONTO GREEN STANDARDS
- TPZ — TREE PROTECTION ZONE

NOTES:

SURVEY INFORMATION TAKEN FROM "TOPOGRAPHIC SURVEY OF PART OF LOT 8 REGISTERED PLAN 294 YORK, CITY OF TORONTO"

BY R. AVIS SURVEYING INC.

DRAFT

No.	Date	Issue/Revision
1	2022.11.04	ISSUED FOR ZBA

450 DUFFERIN

450 DUFFERIN STREET
TORONTO, ON, M6K 2A5

Title:
GROUND FLOOR PLAN

Project No. 2214 | Scale 1 : 100

Drawing No.
A 202

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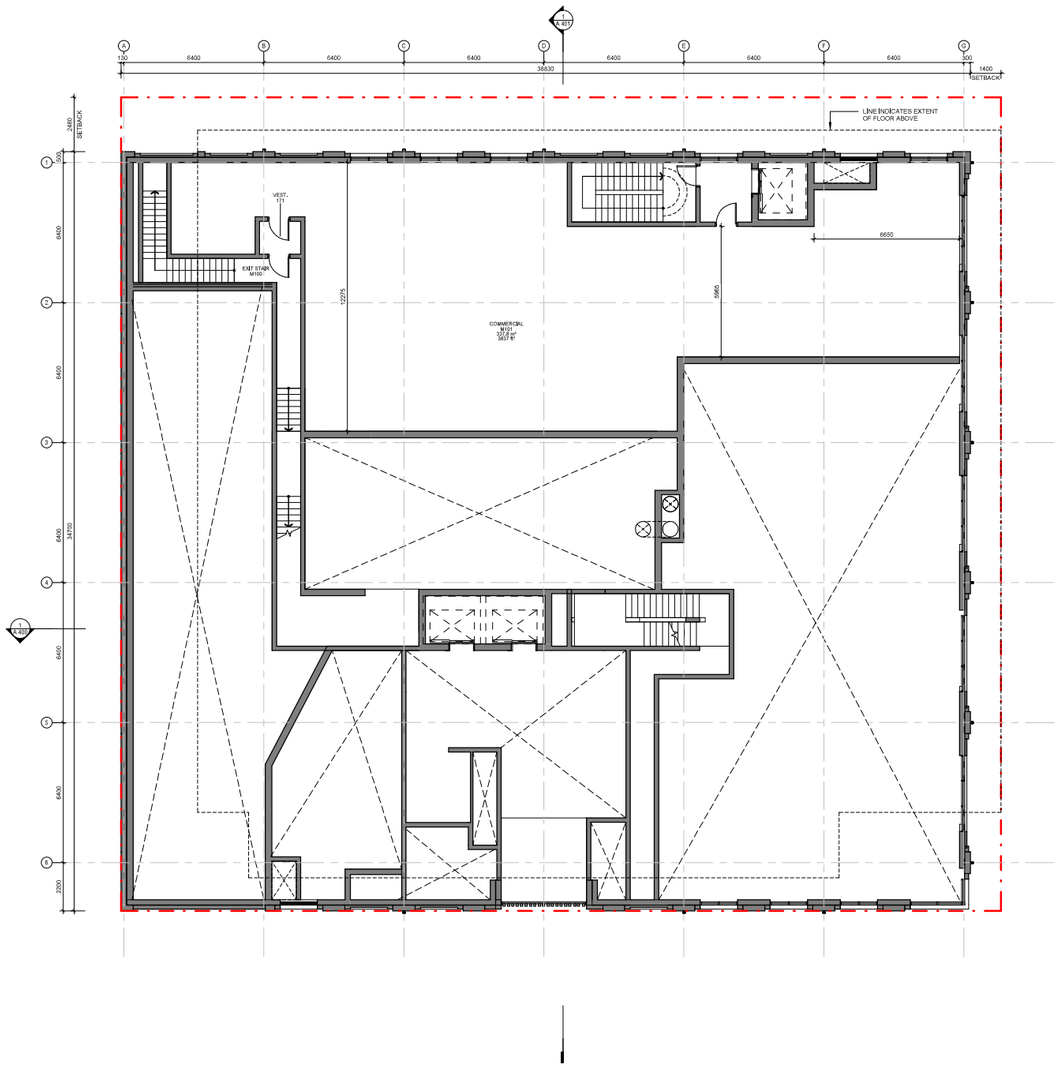

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No.	Date	Issue/Revision
1	2022.11.04	ISSUED FOR ZBA

450 DUFFERIN

450 DUFFERIN STREET
TORONTO, ON, M6K 2A5

Title:
MEZZANINE FLOOR PLAN

Project No. 2214 | Scale 1 : 100

Drawing No.

A 203

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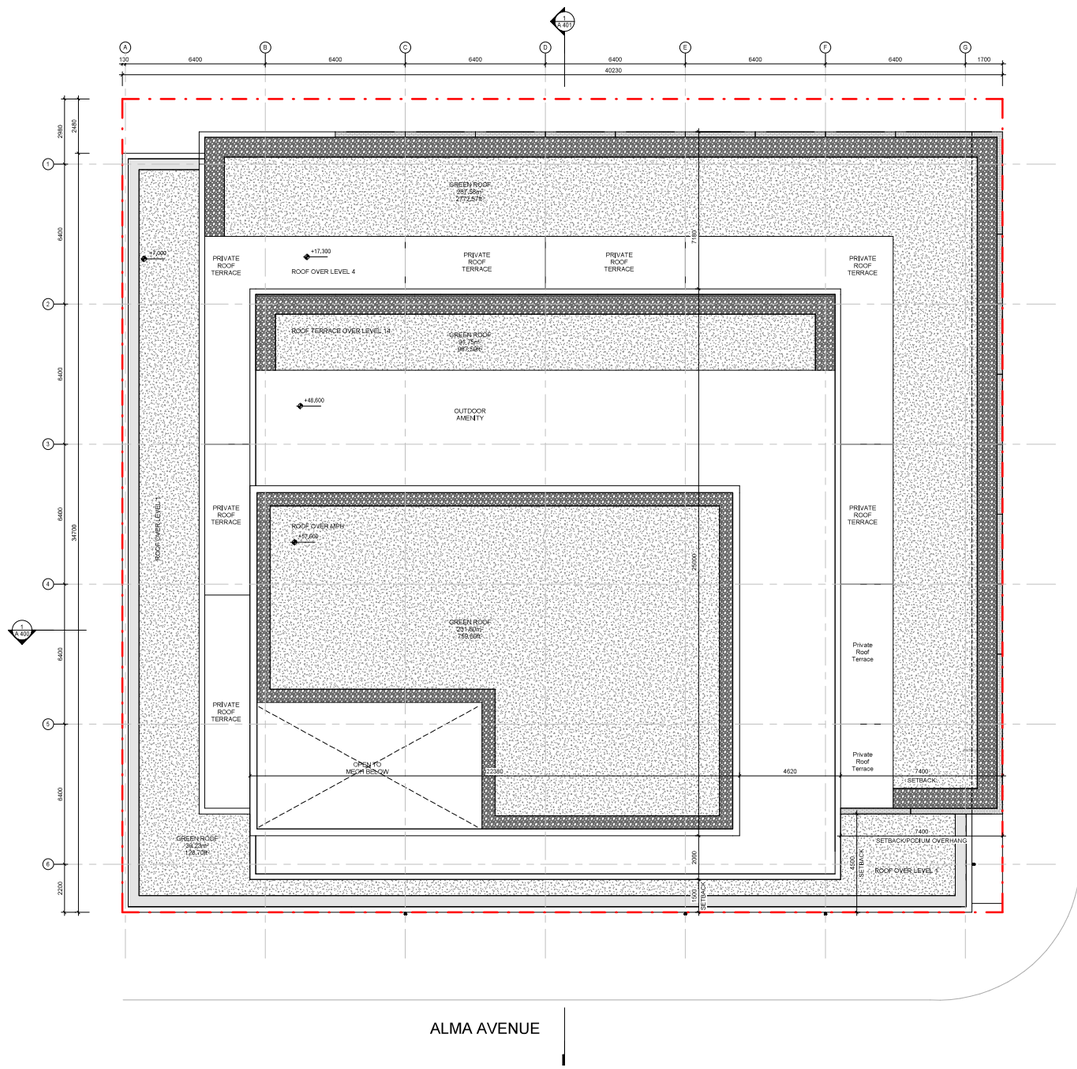

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Prior to commencement of the Work the Contractor shall verify all drawing dimensions, datums, and levels with the Contract Documents and with the conditions on site; ascertain any discrepancies between the site and the Contract Documents, and bring these items to the attention of the Architect for clarification.

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No.	Date	Issue/Revision
1	2022.11.04	ISSUED FOR ZBA

450 DUFFERIN
450 DUFFERIN STREET
TORONTO, ON, M6K 2A5

Title:
ROOF PLAN

Project No. 2214
Scale 1 : 100
Drawing No.

A 210

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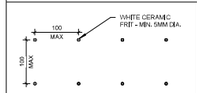
MATERIAL LEGEND

- **MAS-1** MASONRY CLADDING (LIGHT BEIGE)
- **PC-1** PRECAST (SANDBLAST FINISH)
- **STL-1** PREFIN. STEEL CLADDING SYSTEM (GREY)
- **GL-1** CLEAR GLASS
- **GL-2** TINTED GLASS (LIGHT GREY)
- **LV-1** LOUVRES (GREY)
- **G-1** GUARDRAIL 1 (CLEAR GLASS)
- **G-2** GUARDRAIL 2 (METAL IN DARK GREY)
- **G-3** GUARDRAIL 3 (JULIET, METAL IN DARK GREY)

TYP. BIRD FRIENDLY FRIT PATTERN



NOTES:

1) ALL EXTERIOR LIGHT FIXTURES WILL BE DARK SKY COMPLIANT, DIRECTED DOWNWARD, AND DESIGNED TO PREVENT GLARE AND LIGHT TRESPASS ONTO NEIGHBOURING PROPERTIES

DRAFT

No.	Date	Issue/Revision
1	2022.11.04	ISSUED FOR ZBA

450 DUFFERIN

450 DUFFERIN STREET
TORONTO, ON, M6K 2A5

Title:
ELEVATION - EAST

Project No. 2214 | Scale As indicated

Drawing No.

A 300

2022-10-28 4:19:05 PM
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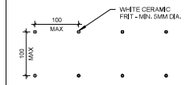
MATERIAL LEGEND

- **MAS-1** MASONRY CLADDING (LIGHT BEIGE)
- **PC-1** PRECAST (SANDBLAST FINISH)
- **STL-1** PREFIN. STEEL CLADDING SYSTEM (GREY)
- **GL-1** CLEAR GLASS
- **GL-2** TINTED GLASS (LIGHT GREY)
- **LV-1** LOUVRES (GREY)
- **G-1** GUARDRAIL 1 (CLEAR GLASS)
- **G-2** GUARDRAIL 2 (METAL IN DARK GREY)
- **G-3** GUARDRAIL 3 (JULIET, METAL IN DARK GREY)

TYP. BIRD FRIENDLY FRIT PATTERN



NOTES:

1) ALL EXTERIOR LIGHT FIXTURES WILL BE DARK SKY COMPLIANT, DIRECTED DOWNWARD, AND DESIGNED TO PREVENT GLARE AND LIGHT TRESPASS ONTO NEIGHBOURING PROPERTIES

DRAFT

No.	Date	Issue/Revision
1	2022.11.04	ISSUED FOR ZBA

450 DUFFERIN
450 DUFFERIN STREET
TORONTO, ON, M6K 2A5

Title:
ELEVATON - SOUTH

Project No. 2214 | Scale As indicated

Drawing No.

A 301

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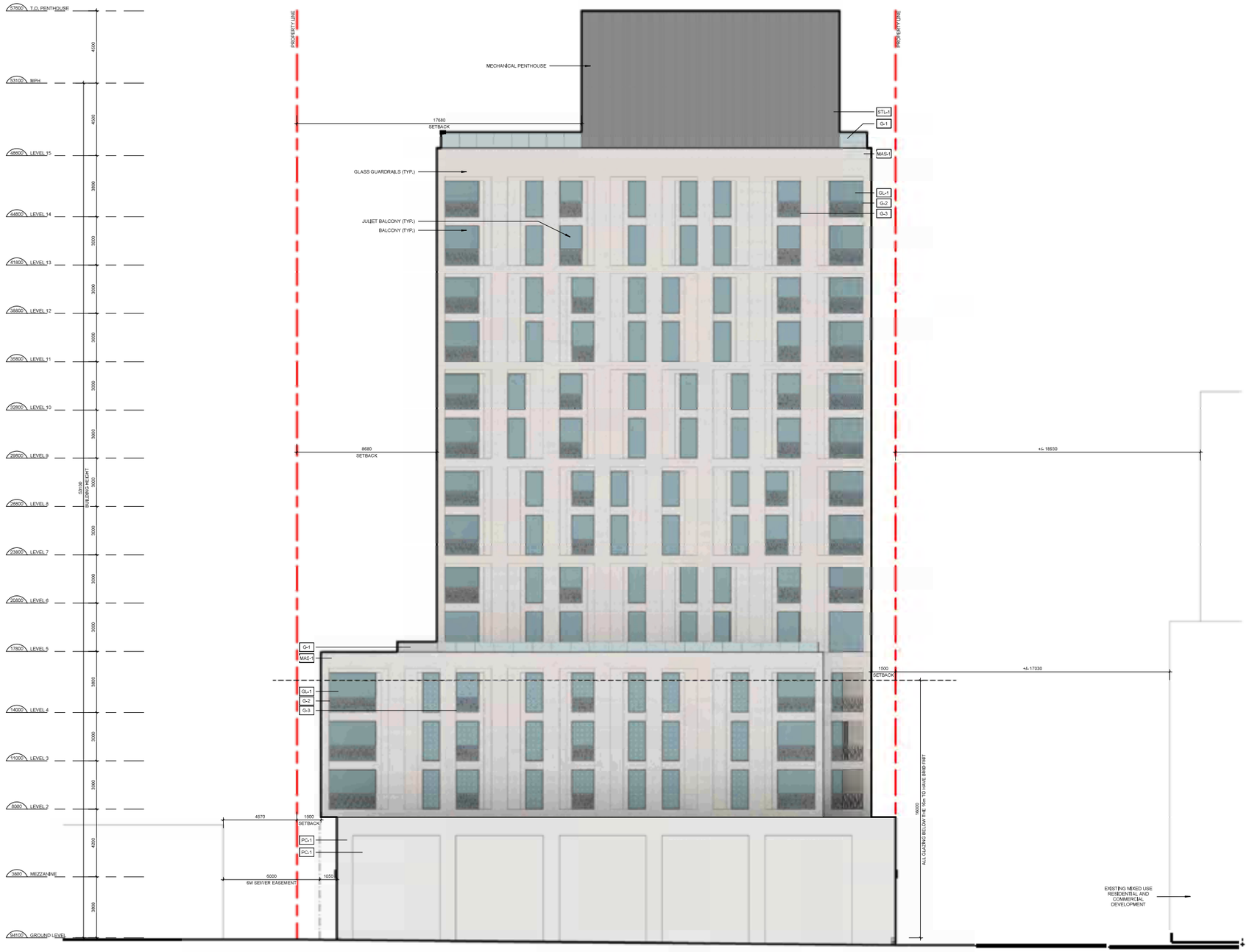

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101 - 35 Golden Avenue
Toronto, ON M6R 2J5

t> 416.596.0700
f> 416.533.6986
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MATERIAL LEGEND

- MAS-1 MASONRY CLADDING (LIGHT BEIGE)
- PC-1 PRECAST (SANDBLAST FINISH)
- STL-1 PREFIN. STEEL CLADDING SYSTEM (GREY)
- GL-1 CLEAR GLASS
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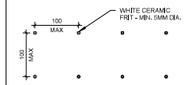
TYP. BIRD FRIENDLY FRIT PATTERN



NOTES:

1) ALL EXTERIOR LIGHT FIXTURES WILL BE DARK SKY COMPLIANT, DIRECTED DOWNWARD, AND DESIGNED TO PREVENT GLARE AND LIGHT TRESPASS ONTO NEIGHBOURING PROPERTIES

DRAFT

No.	Date	Issue/Revision
1	2022.11.04	ISSUED FOR ZBA

450 DUFFERIN
450 DUFFERIN STREET
TORONTO, ON, M6K 2A5

Title:
ELEVATION - WEST

Project No. 2214	Scale As indicated

Drawing No.
A 302

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MATERIAL LEGEND

- **MAS-1** MASONRY CLADDING (LIGHT BEIGE)
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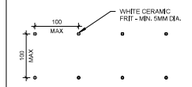
TYP. BIRD FRIENDLY FRIT PATTERN



NOTES:

1) ALL EXTERIOR LIGHT FIXTURES WILL BE DARK SKY COMPLIANT, DIRECTED DOWNWARD, AND DESIGNED TO PREVENT GLARE AND LIGHT TRESPASS ONTO NEIGHBOURING PROPERTIES

DRAFT

No.	Date	Issue/Revision
1	2022.11.04	ISSUED FOR ZBA

450 DUFFERIN
450 DUFFERIN STREET
TORONTO, ON, M6K 2A5

Title:
ELEVATION - NORTH

Project No. 2214 | Scale As indicated

Drawing No.
A 303

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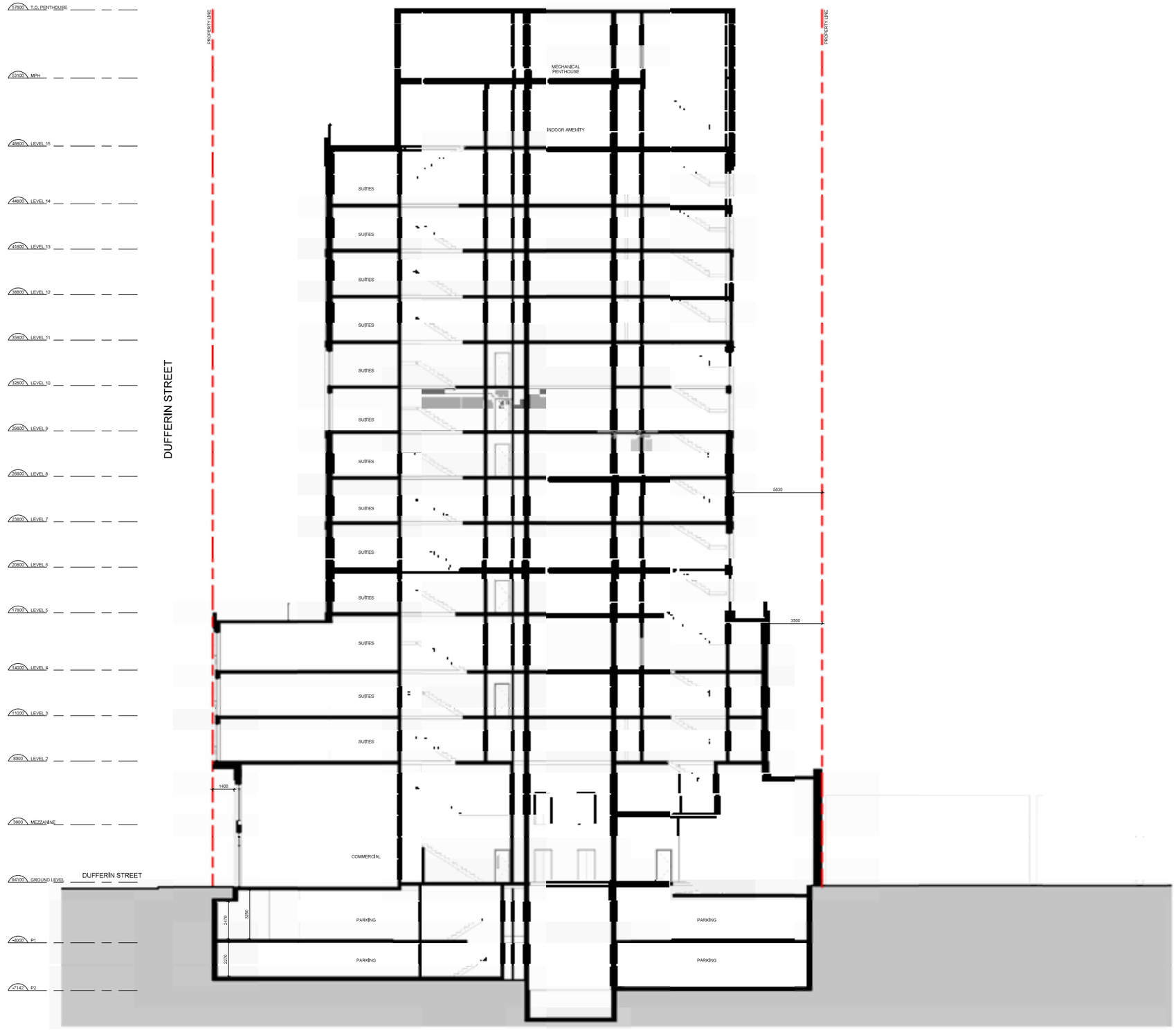

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No.	Date	Issue/Revision
1	2022.11.04	ISSUED FOR ZBA

450 DUFFERIN
450 DUFFERIN STREET
TORONTO, ON, M6K 2A5

Title:
EAST-WEST BUILDING SECTION

Project No. 2214 | Scale 1 : 100

Drawing No.
A 400

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No.	Date	Issue/Revision
1	2022.11.04	ISSUED FOR ZBA

450 DUFFERIN
450 DUFFERIN STREET
TORONTO, ON, M6K 2A5

Title:
NORTH-SOUTH BUILDING SECTION

Project No. 2214 | Scale 1 : 100

Drawing No.
A 401

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APPENDIX B

Water Demand Analysis

TABLE B1 - PROPOSED PEAK WATER DEMAND CALCULATIONS - RESIDENTIAL

		TOTAL
1.1 Total Townhouse Units	units	0
1.2 Persons Per Unit*	persons/unit	2.7
1.3 Total One-Bedroom or One Bedroom + Den Units	units	96
1.4 Persons Per Unit*	persons/unit	1.4
1.5 Total Two Bedroom Units	units	35
1.6 Persons Per Unit*	persons/unit	2.1
1.7 Total Three Bedroom Units	units	12
1.8 Persons Per Unit*	persons/unit	3.1
1.9 Total Residential Population	persons	245
1.10 Total Population Used for Calculation Purposes**	persons	260
1.11 Per Capita Demand @ 190 L/person/day	L/day	49,400
1.12 Equivalent Population Demand	L/s	0.57
1.13 Peak Hour Peaking Factor*		2.5
1.14 Peak Hour Design Demand Rate	L/s	1.43
1.15 Peak Hour Design Demand Rate (m^3/day)	m^3/day	124
1.16 Maximum Day Peaking Factor*		1.3
1.17 Maximum Day Design Demand Rate	L/s	0.74
1.18 Maximum Day Design Demand Rate (m^3/day)	m^3/day	64

* as per City of Toronto Design Criteria for Sewers and Watermains - Nov. 2009

TABLE B2 - PROPOSED PEAK WATER DEMAND CALCULATIONS - COMMERCIAL

BUILDING A

		TOTAL
2.1 Total Net Retail Floor Area	m^2	882
2.2 Persons Per $100m^2$*	persons/$100m^2$	1.1
2.3 Total Population	persons	10
2.4 Per Capita Demand @ 190 L/person/day	L/day	1,843
2.5 Equivalent Population Demand	L/s	0.02
2.6 Peak Hour Peaking Factor*		1.2
2.7 Peak Hour Design Demand Rate	L/s	0.03
2.8 Peak Hour Design Demand Rate (m^3/day)	m^3/day	2
2.9 Maximum Day Peaking Factor*		1.1
2.10 Maximum Day Design Demand Rate	L/s	0.02
2.11 Maximum Day Design Demand Rate (m^3/day)	m^3/day	2

* as per City of Toronto Design Criteria for Sewers and Watermains - Jan 2021

TABLE B3 - PROPOSED PEAK WATER DEMAND CALCULATIONS - DOMESTIC + COMMERCIAL

BUILDING A

		AVERAGE DEMAND	PEAK HOUR	MAXIMUM DAY
3.1 Residential Demand	L/s	0.57	1.43	0.74
3.2 Commerical Demand	L/s	0.02	0.03	0.02
3.3. Total Flow Rate	L/s	0.59	1.45	0.77
3.4 Total Flow Rate	L/min	36	87	46

TABLE B4 - FIRE DEMAND CALCULATIONS - BASED ON F.U.S. GUIDELINES

			TOTAL
4.1	Coefficient for type of construction:		0.6*
4.2	Height in Stories		14
4.3	2nd Floor Area	m^2	1,179
4.4	3rd Floor Area (Largest Floor Area)	m^2	1,179
4.5	4th Floor Area	m^2	1,179
4.6	Stories to Use in Calculation (1 + 25% of each of the two floors immediately adjoining the largest floor)		1 + 2 * 25%
4.7	Total Area **	m^2	1,769
4.8	Fire Flow Required	L/min	6,000
4.9	25% Reduction for Occupancy Charge - low fire hazard	L/min	-1,500
4.10	Fire Flow Required	L/min	4,500
4.11	30% Reduction for NFPA13 Comforming Sprinkler System	L/min	-1,350
4.12	Charge for Building Separation		
	North: Nearest Building	4.5	20%
	West: Nearest Building	8.5	20%
	South: Nearest Building	12.5	15%
	East: Nearest Building	18.5	15%
4.13	Charge for Building Separation	L/min	3,150
4.14	Fire Flow Required	L/min	7,000
4.15	Fire Flow Required	L/s	116.7

*Based on ISO class of construction "Modified Fire Resistive". Refer to Technical Bulletin ISTB-2018-02 Revisions to Ottawa Design Guidelines - Water Distribution dated March 21st, 2018

**As per FUS Guidelines, assuming the vertical openings and exterior vertical communications are properly protected (1 hr rating), consider only the area of the largest floor plus 25% of each of the 2 immediately adjoining floors.

TABLE B5 - PROPOSED REDEVELOPMENT TOTAL WATER DEMAND

PER CITY OF TORONTO DESIGN CRITERIA AND MOE DESIGN GUIDELINES, WATER SUPPLY SYSTEMS SHOULD BE DESIGNED TO SATISFY THE GREATER OF EITHER OF THE FOLLOWING DEMANDS:

-MAXIMUM DAY DOMESTIC DEMAND PLUS FIRE FLOW

-PEAK HOUR DOMESTIC DEMAND

BUILDING A
MAX DAY & FIRE FLOWS

MAX DAY	0.77 L/S
FIRE	116.67 L/s
Total Max Day & Fire Flow	117.43 L/s

PEAK HOUR DOMESTIC DEMAND

PEAK RATE	1.45 L/s

THEREFORE, MAX DAY + FIRE FLOW IS GOVERNING REQUIREMENT

WATER DEMAND

Max Day Demand	0.77 L/s	46 L/min
Fire Flow*	116.7 L/s	7,000 L/min
Total Water Demand Requirement	117.4 L/s	7,046 L/min

Note (*): Per City of Toronto's Design Criteria for Sewers and Watermains, in accordance with the Fire Underwriters Survey (FUS), fire flows will not be less than 4,800L/minute for a 2-hour duration in addition to maximum daily domestic demand, delivered with a residual pressure of not less than 140kPa (20psi).

Hydrant #	**HY1361207**	2001 Sheppard Ave E, North York, ON M2J 4Z8
NFPA Colour Code	**BLUE**	

Client

Customer Info

Location **480 Dufferin St., Toronto, ON**

Date **27-Sep-22**

Time **10:00AM**

Wartermain Dia. **300mm**

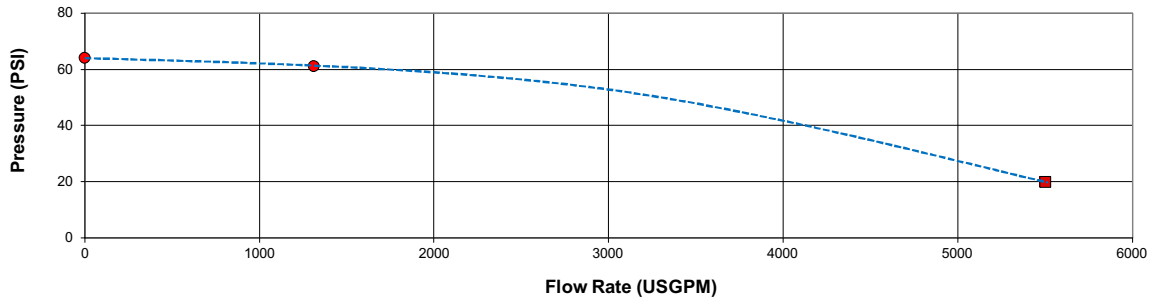
RESIDUAL HYDRANT INFO.

HYDRANT #	HY1361207	
N.F.P.A. COLOUR CODE	BLUE	
STATIC PRESSURE	64.2	psi
RESIDUAL PRESSURE	61.1	psi
PRESSURE DROP	3.1	psi
% PRESSURE DROP	4.8	% of psi
Flow At Test Hydrant at 20 psi	5501	USGPM

FLOW HYDRANT(S) INFO.

Test #	Hydrant #	# of Ports Flowed	OUTLET Dia (inches)	FM or Diffuser type	Nozzle coeff	Pitot Reading	Discharge flow (USGPM)
1	HY1362402	2	2.5	SWIVEL BELL	0.90	22.0	1309.9
2							
3							
4							
					Total Flow (USGPM)		1310

Pressure - Flow Graph



COMMENTS

Field Tech 1	G. Manigbas
Field Tech 2	n/a
Operator 1	Paul
Operator 2	n/a
Pressure Zone	n/a
Towe Level	ft
Pumps(ON/OFF)	n/a

APPENDIX C

Sanitary Demand Analysis

TABLE D1 - PROPOSED TOTAL SANITARY FLOW ESTIMATE - RESIDENTIAL

BUILDING A

			TOTAL
1.1	Total Townhouse Units	units	0
1.2	Persons Per Unit*	persons/unit	2.7
1.3	Total Studio and One Bedroom/One Bedroom + Den Units	units	96
1.4	Persons Per Unit*	persons/unit	1.4
1.5	Total Two Bedroom Units	units	35
1.6	Persons Per Unit*	persons/unit	2.1
1.7	Total Three Bedroom Units	units	12
1.8	Persons Per Unit*	persons/unit	3.1
1.9	Total Residential Population	persons	245
1.10	Total Population Used for Calculation Purposes	persons	260
1.11	Total Residential Flow @ 450 L/capita/day*	L/day	117,000
1.12	Total Residential Flow	L/s	1.35
1.13	Peaking Factor**		4.10
1.14	**Total Residential Peak Flow @ 450 L/capita/day**	**L/s**	**5.56**

* as per City of Toronto Design Criteria for Sewers and Watermains - Jan 2021
** Peaking Factor calculated by using Harmon's Formula (1+ 14/(4 + P^0.5)).

TABLE D2 - PROPOSED TOTAL SANITARY FLOW ESTIMATE - COMMERCIAL

			Total
2.1	Total Net Commercial Floor Area	m^2	882
2.2	Total Commercial Average Flow @ 180,000L/floor ha/day	L/day	15868.80
2.6	**Total Commercial Peak Flow**	**L/s**	**0.18**

* as per City of Toronto Design Criteria for Sewers and Watermains - Jan 2021

TABLE D3 - PROPOSED TOTAL SANITARY FLOW ESTIMATE - INFILTRATION

3.1	Site Area	m^2	1495
3.2	Site Area	ha	0.1495
3.3	Infiltration Allowance**	L/s/ha	0.26
3.4	**Total Infiltration Peak Flow**	L/s	**0.04**

* Entire Site Area

** as per City of Toronto Design Criteria for Sewers and Watermains - Jan 2021

TABLE D4 - PROPOSED TOTAL SANITARY FLOW ESTIMATE - SUMMARY

	At 450 L/capita/day		TOTAL
4.1	Total Residential Peak Flow @ 450 L/capita/day	L/s	5.56
4.2	Total Commercial Peak Flow	L/s	0.18
4.3	Total Infiltration Peak Flow	L/s	0.04
4.4	**Total Sanitary Peak Flow**	**L/s**	**5.78**

TABLE D5 - EXISTING TOTAL SANITARY FLOW ESTIMATE - COMMERICAL

			Total
5.1	Total Existing Site Area*	m^2	1495
5.2	Total Existing Site Area	ha	0.1495
5.3	Total Population @ 1.1 persons/100m^2 for Commerical**	persons	16.45
5.4	Total Commerical Flow @ 250 L/capita/day	L/day	4111.3
5.5	**Total Commerical Peak Flow**	**L/s**	**0.05**

* Entire Site Area

** as per City of Toronto Design Criteria for Sewers and Watermains - Nov.2009.

TABLE D6 - PROPOSED REDEVELOPMENT TOTAL NET SANITARY INCREASE (450 L/c/d)

			Total
6.1	Total Existing Sanitary Peak Flow	L/s	0.05
6.2	Total Redevelopment Sanitary Peak Flow @ 450 L/capita/day	L/s	5.78
6.3	**Total Net Sanitary Peak Flow Increase**	**L/s**	**5.73**

APPENDIX D

Post-Development Peak Discharge Rate and Required Storage

City of Toronto Stormwater Management Site Detention and Retention Requirements

Project: 450 Dufferin
Date: October 7, 2022

Site Area (ha) =	0.1495
Pre Dev. Runoff Coeficeint =	0.9
Post Dev.Runoff Coefficient =	0.9
Max. Allowed Runoff Coefficeint =	0.5

City of Toronto IDF

$$i_{Year} = AT^{c}$$

Return Period (Year)	A	C	I (mm/hr)
2	21.8	-0.78	88.19
5	32.0	-0.79	131.79
10	38.7	-0.80	162.27
25	45.2	-0.80	189.52
50	53.5	-0.80	224.32
100	59.7	-0.80	250.32
T_c=	10	min (in hours)	

Total Allowed Peak Discharge Rate from Site

$$Q = \frac{CIA}{360} * 1000$$

C = 0.5
I = 88.19 mm/hr
Q Allowed = 18.3 L/s
Q 100 = 93.6 L/s

Uncontrolled Peak Discharge Rate from Easement

Area (ha) = 0.0066
C = 0.25
I (mm/hr) = 250.32
Q 100 = 1.1 L/s

Allowable Peak Flow from Development (Controlled)
$Q_{allowed} - Q_{easement}$ = 17.2 L/s

Estimated On-Site Retention For Water Balance

Assume hard surface IA =	1	mm
Assume Soft Surface IA =	5	mm
Target Retention (mm) =	5	mm
Total Retention Volume Required =	7.5	cu.m
Estimated % Impervious =	100.0%	
Estmated Surface IA Provided =	1.00	mm
Estimated Deficit for Infiltration Or Rainwater Harvesting =	4.00	mm
or	5.7	cu.m

On Site Detention Storage
100 Yr Storm Event

Post Development Runoff Coefficeint =	0.9
Site Area (ha) =	0.1495
Allowed Realease Rate (cu.m/s) =	0.017
Peak Storage + 30% Allowance (m3) =	60.000

t_c (min)	i_{100} (mm/hr)	Q_{100} (m^3/s)	Q_{stored} (m^3/s)	Peak Volume (m^3)	
1	1579.412	0.590	0.573	34.388	
2	907.134	0.339	0.322	38.625	
3	655.841	0.245	0.228	41.032	
4	521.012	0.195	0.178	42.615	
5	435.832	0.163	0.146	43.718	
6	376.682	0.141	0.124	44.503	
7	332.979	0.124	0.107	45.060	
8	299.243	0.112	0.095	45.445	
9	272.334	0.102	0.085	45.695	
10	250.320	0.094	0.076	45.836	
11	231.943	0.087	0.070	45.886	***max***
12	216.347	0.081	0.064	45.861	
13	202.927	0.076	0.059	45.770	
14	191.246	0.071	0.054	45.624	
15	180.977	0.068	0.050	45.428	
16	171.870	0.064	0.047	45.189	
17	163.733	0.061	0.044	44.912	
18	156.415	0.058	0.041	44.599	
19	149.793	0.056	0.039	44.256	
20	143.771	0.054	0.037	43.884	
21	138.267	0.052	0.035	43.487	
22	133.216	0.050	0.033	43.066	
23	128.562	0.048	0.031	42.623	
24	124.259	0.046	0.029	42.160	
25	120.266	0.045	0.028	41.678	
26	116.551	0.044	0.026	41.179	
27	113.085	0.042	0.025	40.664	
28	109.842	0.041	0.024	40.134	
29	106.801	0.040	0.023	39.590	
30	103.944	0.039	0.022	39.033	
31	101.253	0.038	0.021	38.463	
32	98.713	0.037	0.020	37.881	
33	96.313	0.036	0.019	37.289	
34	94.040	0.035	0.018	36.686	
35	91.884	0.034	0.017	36.073	
36	89.837	0.034	0.016	35.450	
37	87.889	0.033	0.016	34.819	
38	86.034	0.032	0.015	34.179	
39	84.264	0.031	0.014	33.531	
40	82.575	0.031	0.014	32.876	
41	80.960	0.030	0.013	32.212	
42	79.414	0.030	0.013	31.542	
43	77.933	0.029	0.012	30.865	
44	76.513	0.029	0.011	30.182	
45	75.149	0.028	0.011	29.492	
46	73.840	0.028	0.010	28.796	
47	72.580	0.027	0.010	28.095	
48	71.368	0.027	0.010	27.387	
49	70.200	0.026	0.009	26.675	
50	69.075	0.026	0.009	25.958	

Storm Event Modelling - Storage System Characteristics

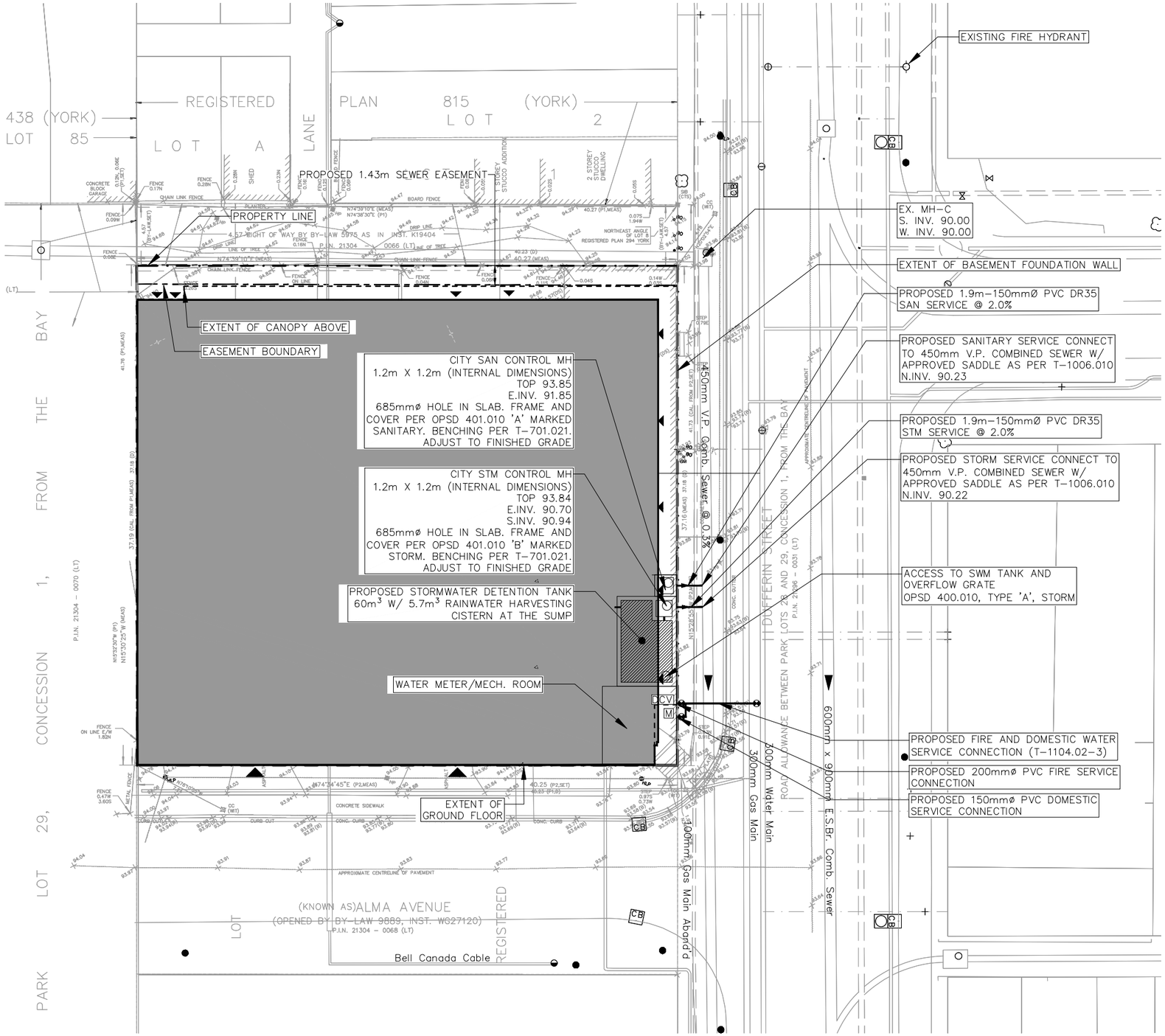
Table D1 - Primary Detention Tank

Storage System Discharge Details	
Orifice Coefficient	$Q=C_dA(2g(h_2-h_1))^{0.5}$
Orifice Coefficient	0.62
Orifice Diameter (mm)	68.00
Orifice Area (m²)	0.004

Elevation (m)	Storage Depth (m)	Orifice Head (m)	Storage (m³)	Orifice Discharge (L/s)	Notes
90.94	0.00	0.00	0.0	0.0	
91.24	0.30	0.20	4.1	4.5	
91.44	0.50	0.50	10.3	7.1	
92.94	2.00	2.00	41.0	14.1	
93.89	2.95	2.95	60.5	17.1	Top of Tank

APPENDIX E

Conceptual Servicing Plan



NOTES:
BEARINGS SHOWN HEREON ARE GRID BEARINGS AND ARE DERIVED FROM HORIZONTAL CONTROL MONUMENTS No. 02219740641 AND No. 02219740656, ZONE 10, CENTRAL MERIDIAN 79° 30' WEST LONGITUDE.
(3° MODIFIED TRANSVERSE MERCATOR PROJECTION, NAD 83 (CSRS–1997)

HCM No. 02219740641
N 4833996.893
E 310437.797

HCM No. 02219740656
N 4833953.975
E 3100285.384

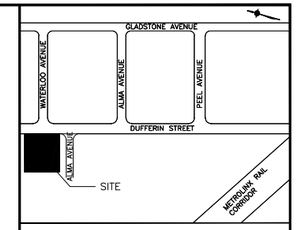
DISTANCES SHOWN HEREON ARE ADJUSTED GROUND DISTANCES AND CAN BE CONVERTED TO GRID DISTANCES BY MULTIPLYING BY A COMBINED SCALE FACTOR OF 0.99988563.

ELEVATIONS SHOWN HEREON ARE GEODETIC AND ARE REFERRED TO CITY OF TORONTO BENCH MARK No. CT368, HAVING AN ELEVATION = 95.107 metres.

INFORMATION PROVIDED BY R.AVIS. LTD. TOPOGRAPHIC SURVEY PERFORMED JULY 29, 2020

TORONTO ENGINEERING & CONSTRUCTION SERVICES
ACCEPTED TO BE IN ACCORDANCE WITH THE CITY OF TORONTO STANDARDS.
THIS ACCEPTANCE IS NOT TO BE CONSTRUED AS VERIFICATION OF ENGINEERING CONTENT.

MANAGER, DEVELOPMENT ENGINEERING — DATE



KEY PLAN
N.T.S.

REVISIONS:

No.	Revision	Comments
1.	2022–10–14	ISSUED FOR ZBA DRAFT

LEGEND
- PROPOSED PROPERTY LINE
- PROPOSED WATERMAIN
- PROPOSED SEWER AND FLOW DIRECTION
- M+B PROPOSED WATER METER & DOUBLE CHECK VALVE ASSEMBLY AS PER T–1107.04–1 (SEE MECH DWGS FOR DETAILS)
- D PROPOSED DETECTOR ASSEMBLY (SEE MECH DWGS FOR DETAILS)
- GM PROPOSED GAS METER
- PROPOSED VALVE & BOX
- PROPOSED ACCESS OPENING FRAME & GRATE (ACCESSIBLE AT GRADE)
- UNDERGROUND BUILDING STRUCTURE
- PROPOSED BUILDING AT GRADE
- PROPOSED BUILDING ROOF OVERHANG
- TREE PROTECTION HOARDING
- CB AD PROPOSED CATCH BASIN/AREA DRAIN

1:150

A WORK CONTRACT
2022–11–04
RVA 205396.01

Drawing Prepared By:
R.V. Anderson Associates Limited
engineering • environment • infrastructure

Client:
HM RK (450 DUFFERIN) LTD.

Project Name:
450 DUFFERIN STREET

Drawing Title:
CONCEPTUAL SERVICING PLAN

Drawn:	Design:	Date:
A.W.	A.W.	OCT 14, 2022
Checked:	Apprvd:	Scale:
A.S.T.	A.S.T.	1:150
CADD File: GS–1 SERVICING PLAN.dwg		Dwg. No.: GS–1
Project No.: 205396.01		

R:\2020\205396 – Hullmark–450–Dufferin\Q CADD – Urban\04 Sheets\GS–1 SERVICING PLAN.dwg

APPENDIX F

Reference Documents

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	450 Dufferin Street	S.1-pg.1.	
Postal Code	M6K 2A5	S.2.1-pg.1.	
Property Owner (on request for comments memo)	HM RK (450 Dufferin) LP	S.1-pg.1.	
Proposed description of the project (if applicable) (point towers, number of podiums)	Fifteen stories building with two underground parking levels	S.2.3-pg.1.	
Land Use (ex. commercial, residential, mixed, institutional, industrial)	Residential with commercial	S.2.3-pg.1.	
Number of below grade levels for the proposed structure	Two (2)	S.2.3-pg.1.	
HYDROLOGICAL REVIEW INFORMATION			
Date Hydrological Review was prepared:	3 November 2022	Cover page	
Who Performed the Hydrological Review (Consulting Firm)	Terrapex Environmental Ltd.	Cover page, S.1-pg.1.	
Name of Author of Hydrological Review	Brian D. Theimer, Andrew Durbano	S.8-pg.12	

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	Both are Professional Geoscientists	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.	S.1-pg.1.	
		Page # & Section # of every occurrence in the Review	**Review Includes this Information City Staff (Check)**

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**	16,800 L/day What safety factor was used? 2.0	S.6.1-pg.9.	
Total Volume (L/day) Short Term Discharge of groundwater (construction dewatering) **without safety factor included**	8,400 L/day	S.6.1-pg.9.	
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	Zero (0) L/day. Building garage will be water-tight. What safety factor was used? Not applicable to zero drainage.	S.6.1-pg.10.	
List the nearest surface water (river, creek, lake)	Lake Ontario is 1.5 km away	S2.5-pg.2.	

August 2018

HYDROLOGICAL REVIEW SUMMARY

SITE INFORMATION		Page # & Section # of Review	Review Includes this Information City Staff (Check)
Lowest basement elevation	Walking floor / driving surface of P2 garage = 87.1	S.5.4.-pg.8	
Foundation elevation	Bottom of excavation = 84.2 masl	S.5.4.-pg.8	
Ground elevation	Planned ground floor elevation = 94.1 masl	S.2.4-pg.2.	
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**	Appendix I, Figures 1, 2, 3 and 4	N/A
Study area map(s) been prepared according to the Hydrological Review Terms of Reference.	● **Yes**	Appendix I, Figures 2, 3 and 4	N/A
WATER LEVEL AND WELLS		**Page # & Section # of every occurrence**	**Review Includes this Information (City Staff Initial)**

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	S.3.3-pg.4; S.4.2-pg.6.	
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.	No. Three events obtained. Foundation Drainage Policy Guidelines of City of Toronto, under Option 1 (Flexible, Year-round) requires a minimum 3 events.	Appendix II, Table 2	
All water levels in the wells have been measured with respect to masl.	Yes.	S.4.2-pg.6.; Appendix II, Table 2	
A table of geology/soil stratigraphy for the property has been included.	Yes.	Appendix II, Table 5	
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.	S.4.1-pg 5. Appendix II, Table 5	
Key aquifers and the site's proximity to nearby surface water has been identified.	● Yes	S2.5.-pg2.; S2.8.-pg.2.	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.	No pumping test due to lower permeability soils and deep water table.		
The pump test been carried out for at least 24 hours if possible. If not, has a slug test been conducted?	No pumping test. Slug tests were carried out in wells with sufficient water.	S.3.5-pg.4; S.5.1-pg.7.	
Have the monitoring well(s) have been monitored using digital devices? If yes how frequently?	Yes. During slug tests meassured at 30 seconds intervals.	S.3.5-pg.4	
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	Not appplicable	N/A
The above noted slug or pump tests have been included in the report.	● Yes	S.3.5-pg.4; S.5.1-pg.7. Appendix IV.	
WATER QUALITY		**Page # & Section # of every occurrence in the Review**	**Review Includes this Information City Staff (Check)**

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	S.3.4-pg.4; S.5.3-pg.8.	
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 Included For storm discharge- See the storm sewer parameter limit template Included.	See also Appendix II, Table 3.	
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.**	No parameter exceeded the sanitary / combined bylaw limits.	S.6.3-pg.10.	
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.**	Manganese was 0.12 mg/L in comparison to storm bylaw of 0.05 mg/L.	S.6.3-pg.10.	
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	S.3.4-pg.4.	N/A

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 Laboratory Ltd.	S.3.4-pg4.	
A chain of custody record for the samples is included with the report.	Yes.	Appendix VI	
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.	No.		
List any of the sample parameters that exceed the Bylaw limits with the reporting detection limit (RDL) included.	Manganese was 0.12 mg/L in comparison to storm bylaw of 0.05 mg/L.	S.6.3-pg.10.	
A true copy of the Certificate of Analysis report, is included with the report.	Yes	Appendix VI	
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)? Does the associated Geotechnical report recommend a back-up system or relief safety valve(s)?	☐ Yes ● No ☐ Yes ● No These reports do not discuss back-up systems or relief safety valve(s)		
The taking and discharging of groundwater on site has been analyzed to ensure that no negative	● Yes	S.6.2. pg.10.	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** Yes, it has been determined and No, there are no anticipated negative impacts	S.6.2. pg.10.	N/A

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

Appendix A:

SANITARY/COMBINED **Sample Location: MW104A - 450 Dufferin Street, Toronto**

Inorganics		Sample Result	Sample Result with upper RDL included	
Parameter	mg/L	mg/L	mg/L	µg/L
BOD	300	3.1	3.1 (2.0)	300,000
Fluoride	10	0.72	0.72 (0.02)	10,000
TKN	100	3.41	3.41 (0.05)	100,000
pH	6.0 - 11.5	8	8 (0.1)	6.0 - 11.5
Phenolics 4AAP	1	<0.0010	<0.0010 (0.001)	1,000
TSS	350	8.1	8.1 (3.0)	350,000
Total Cyanide	2	<0.0020	<0.0020 (0.002)	2,000
Metals				
Chromium Hexavalent	2	<0.00050	<0.00050 (0.0005)	2,000
Mercury	0.01	<0.0000050	<0.0000050 (0.000005)	10
Total Aluminum	50	0.279	0.279 (0.003)	50,000
Total Antimony	5	0.00196	0.00196 (0.0001)	5,000
Total Arsenic	1	0.0069	0.0069 (0.0001)	1,000
Total Cadmium	0.7	<0.0000500	<0.0000500 (0.000005)	700
Total Chromium	4	<0.00500	<0.00500 (0.0005)	4,000
Total Cobalt	5	<0.00100	<0.00100 (0.0001)	5,000
Total Copper	2	<0.00500	<0.00500 (0.0005)	2,000
Total Lead	1	0.000733	0.000733 (0.00005)	1,000
Total Manganese	5	0.12	0.12 (0.0001)	5,000
Total Molybdenum	5	0.0337	0.0337 (0.00005)	5,000
Total Nickel	2	<0.00500	<0.00500 (0.0005)	2,000
Total Phosphorus	10	0.0773	0.0773 (0.002)	10,000
Total Selenium	1	<0.000500	<0.000500 (0.00005)	1,000
Total Silver	5	<0.000100	<0.000100 (0.00001)	5,000
Total Tin	5	0.0017	0.0017 (0.0001)	5,000
Total Titanium	5	0.00332	0.00332 (0.0003)	5,000
Total Zinc	2	<0.0300	<0.0300 (0.003)	2,000
Petroleum Hydrocarbons				
Animal/Vegetable Oil & Grease	150	<5.0	<5.0 (5)	150,000
Mineral/Synthetic Oil & Grease	15	<5.0	<5.0 (5)	15,000

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HYDROLOGICAL REVIEW SUMMARY

Volatile Organics		Sample Result	Sample Result with upper RDL included	
Parameter	mg/L	mg/L	mg/L	µg/L
Benzene	0.01	<0.00050	<0.00050 (0.0005)	10
Chloroform	0.04	<0.00050	<0.00050 (0.0005)	40
1,2-Dichlorobenzene	0.05	<0.00050	<0.00050 (0.0005)	50
1,4-Dichlorobenzene	0.08	<0.00050	<0.00050 (0.0005)	80
Cis-1,2-Dichloroethylene	4	<0.00050	<0.00050 (0.0005)	4,000
Trans-1,3-Dichloropropylene	0.14	<0.00030	<0.00030 (0.0003)	140
Ethyl Benzene	0.16	<0.00050	<0.00050 (0.0005)	160
Methylene Chloride	2	<0.0010	<0.0010 (0.001)	2,000
1,1,2,2-Tetrachloroethane	1.4	<0.00050	<0.00050 (0.0005)	1,400
Tetrachloroethylene	1	<0.00050	<0.00050 (0.0005)	1,000
Toluene	0.016	<0.00050	<0.00050 (0.0005)	16
Trichloroethylene	0.4	<0.00050	<0.00050 (0.0005)	400
Total Xylenes	1.4	<0.00050	<0.00050 (0.0005)	1,400
Semi-Volatile **Organics**				
Di-n-butyl Phthalate	0.08	<0.0010	<0.0010 (0.001)	80
Bis (2-ethylhexyl) Phthalate	0.012	<0.0020	<0.0020 (0.002)	12
3,3'-Dichlorobenzidine	0.002	<0.00040	<0.00040 (0.0004)	2
Pentachlorophenol	0.005	<0.00050	<0.00050 (0.0005)	5
Total PAHs	0.005	<0.00175	<0.00175 (0.00175)	5
Misc **Parameters**				
Nonylphenols	0.02	<0.0010	<0.0010 (0.001)	20
Nonylphenol Ethoxylates	0.2	<0.0020	<0.0020 (0.002)	200

Sample Collected: Sept 21 / Oct 3, 2022

Temperature: 12 °C

August 2018

HYDROLOGICAL REVIEW SUMMARY

STORM **Sample Location: MW104A - 450 Dufferin Street, Toronto**

Inorganics		Sample Result	Sample Result with upper RDL included	
Parameter	mg/L	mg/L	mg/L	ug/L
pH	6.0 - 9.5	8	8 (0.1)	
BOD	15	3.1	3.1 (2.0)	15,000
Phenolics 4AAP	0.008	<0.0010	<0.0010 (0.001)	8
TSS	15	8.1	8.1 (3.0)	15,000
Total Cyanide	0.02	<0.0020	<0.0020 (0.002)	20
Metals				
Total Arsenic	0.02	0.0069	0.0069 (0.0001)	20
Total Cadmium	0.008	<0.0000500	<0.0000500 (0.000005)	8
Total Chromium	0.08	<0.00500	<0.00500 (0.0005)	80
Chromium Hexavalent	0.04	<0.00050	<0.00050 (0.0005)	40
Total Copper	0.04	<0.00500	<0.00500 (0.0005)	40
Total Lead	0.12	0.000733	0.000733 (0.00005)	120
Total Manganese	0.05	**0.12**	**0.12 (0.0001)**	50
Total Mercury	0.0004	<0.0000050	<0.0000050 (0.000005)	0.4
Total Nickel	0.08	<0.00500	<0.00500 (0.0005)	80
Total Phosphorus	0.4	0.0773	0.0773 (0.002)	400
Total Selenium	0.02	<0.000500	<0.000500 (0.00005)	20
Total Silver	0.12	<0.000100	<0.000100 (0.00001)	120
Total Zinc	0.04	<0.0300	<0.0300 (0.003)	40
Microbiology				
E.coli	200	35	35 (1)	200,000
Volatile Organics				
Parameter	mg/L	mg/L	mg/L	ug/L
Benzene	0.002	<0.00050	<0.00050 (0.0005)	2
Chloroform	0.002	<0.00050	<0.00050 (0.0005)	2
1,2-Dichlorobenzene	0.0056	<0.00050	<0.00050 (0.0005)	6
1,4-Dichlorobenzene	0.0068	<0.00050	<0.00050 (0.0005)	7
Cis-1,2-Dichloroethylene	0.0056	<0.00050	<0.00050 (0.0005)	6
Trans-1,3-Dichloropropylene	0.0056	<0.00030	<0.00030 (0.0003)	6
Ethyl Benzene	0.002	<0.00050	<0.00050 (0.0005)	2
Methylene Chloride	0.0052	<0.0010	<0.0010 (0.001)	5
1,1,2,2-Tetrachloroethane	0.017	<0.00050	<0.00050 (0.0005)	17
Tetrachloroethylene	0.0044	<0.00050	<0.00050 (0.0005)	4
Toluene	0.002	<0.00050	<0.00050 (0.0005)	2
Trichloroethylene	0.0076	<0.00050	<0.00050 (0.0005)	8
Total Xylenes	0.0044	<0.00050	<0.00050 (0.0005)	4

August 2018

HYDROLOGICAL REVIEW SUMMARY

Semi-Volatile Organics		Sample Result	Sample Result with upper RDL included	
Di-n-butyl Phthalate	0.015	<0.0010	<0.0010 (0.001)	5
Bis (2-ethylhexyl) Phthalate	0.0088	<0.0020	<0.0020 (0.002)	8.8
3,3'-Dichlorobenzidine	0.0008	<0.00040	<0.00040 (0.0004)	0.8
Pentachlorophenol	0.002	<0.00050	<0.00050 (0.0005)	2
Total PAHs	0.002	<0.00175	<0.00175 (0.00175)	2
PCBs	0.0004	<0.000060	<0.000060 (0.00006)	0.4
Misc Parameters				
Nonylphenols	0.001	<0.0010	<0.0010 (0.001)	1
Nonylphenol Ethoxylates	0.01	<0.0020	<0.0020 (0.002)	10

Sample Collected: Sept 21 / Oct 3, 2022

Temperature: 12 °C

Consulting Firm that prepared Hydrological Repo : Terrapex Environmental Ltd.

Qualified Professional who completed the report summary: Brian Theimer

Print Name

Qualified Professional who completed the report summary: Brian D. Theimer 3 Nov 2022

Signature Date & Stamp

HM RK (450 Dufferin) LP

HYDROLOGICAL REVIEW

PROPOSED RESIDENTIAL DEVELOPMENT
450 DUFFERIN STREET
TORONTO, ONTARIO

3 November 2022

CT3580.00

Digital Distribution
HM RK (450 Dufferin) LP.
Terrapex Environmental Ltd.

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EXECUTIVE SUMMARY

Terrapex Environmental Ltd. (Terrapex) has prepared this hydrological review that is a study of hydrogeological characteristics in support of the development of a residential building that is planned for 450 Dufferin Street, in the City of Toronto. The study is designed to meet the City of Toronto's hydrological review requirements (August, 2018) and portions of the foundation drainage policy (January, 2022). The development will include a new underground parking garage extending to two levels.

A network of thirteen wells at ten locations is now established. Terrapex installed seven wells at four locations. Six monitoring wells were installed previously, with one additional well being demolished.

Groundwater levels were measured for three events over six weeks during late summer of 2022. Single well hydraulic tests were performed on two monitoring wells. A groundwater sample was analysed for suitability for discharge to the City of Toronto's sewers.

The average and shallowest depths to the water table observed were 4.3 and 0.9 metres below ground (mbg), respectively. The average and highest elevations of the water table were 90.2 and 93.4 metres above sea level, respectively. The construction excavation will cut below the water table into saturated soils. The walls will abut saturated silty clay till and sandy silt till and the base will abut saturated sandy silt till. The construction excavation for the garage will experience seepage that will need to be managed. Perched groundwater occurs at MW103 in the northeast corner, with a dry zone close to the excavation base.

According to the City prescribed methods, the maximum anticipated groundwater level ("MAGWL") using City of Toronto Foundation Drainage methods was 95.9 metres above sea level (masl).

The anticipated maximum dewatering rate to be managed of combined groundwater seepage (16,800 litres/day) and stormwater (37,400 litres) will be 54,200 litres/day. This amount indicates that dewatering will require an Environmental Activity and Sector Registry (EASR). A private discharge connection permit will still be required for discharge to a municipal sewer. We understand that the building garage will be constructed as watertight for the lifetime of the building so no foundation drainage will need to be managed.

The groundwater quality was acceptable for discharge to the City of Toronto's sanitary/combined sewer with no treatment. The groundwater quality was acceptable for discharge to the City of Toronto's storm sewer with treatment for manganese. Further confirmatory sampling is recommended if construction dewatering will be discharged to the storm sewer.

In pre-construction, the site is entirely covered by impervious surfaces of a building and paved parking. In post-construction, the site will be entirely covered by impervious surfaces of a building and paved parking. In pre- and post-construction there will be no pervious area. Thus, the amount of groundwater recharge is negligible in both scenarios, with no change due to development.

EXECUTIVE SUMMARY

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TABLES

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APPENDICES

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Appendix VI	Laboratory Record of Groundwater Quality

1.0 BACKGROUND

Terrapex Environmental Ltd. (Terrapex) was retained by HM RK (450 Dufferin) LP to review hydrogeological conditions at a planned development for 450 Dufferin Street (site) in the City of Toronto, Ontario. This document herein is intended to satisfy the requirements of the City of Toronto (City) for a hydrological review (August, 2018) and portions of the foundations drainage policy / guidelines (January, 2022) as part of the range of submissions required within the development application process.

This report was prepared in reference to the Ontario Water Resources Act, Ontario Regulation 387/04. "Water Taking Regulation" from the Ministry of the Environment, Conservation and Parks, and the Toronto Municipal Code Chapter 681 – Sewers.

2.0 LOCATION AND SETTING

2.1 LOCATION AND PROPERTY DIMENSIONS

The Site is located in the western portion of downtown Toronto, in the neighbourhood of Parkdale. It is approximately 330 m north of Queen Street West, fronting on the west side of Dufferin Street and the north side of Alma Avenue.

The Site essentially spans a square covering approximately 1,495 m^2 with dimensions of 39 m by 39 m, with these values being approximate. The general location is mapped on Figure 1. The postal code for the site is M6K 2A5.

2.2 PRESENT LAND USE

The current land use is a one-storey building on the eastern side hosting commercial uses and the central and western portions being a paved parking area.

Land in the site's vicinity within approximately 500 m is urbanized with mixed usage. Figures 2 and 3 show the site in its local context. The Site's vicinity within 500 m dominantly consists of low-rise residential single-family and semi-detached dwellings. Multiple low-rise and medium-rise apartment blocks are also found throughout the vicinity. Commercial use is found concentrated along Dufferin Street and Queen Street West. A multi-track railway corridor that is oriented northwest to southeast is located approximately 150 m to the southwest. A food produce distribution centre is located to immediate west.

2.3 PROPOSED DEVELOPMENT

The proposed development will demolish the existing building and then redevelop with a new residential/commercial building. The new building will have fifteen (15) storeys above grade.

Underlying the building will be constructed an underground parking garage consisting of two levels. The new garage structure will be designed with methods and materials that will render it water-tight for the lifetime of the building. The new underground garage structure will span essentially the extent of the property, as shown on Figure 5.

2.4 SITE TOPOGRAPHY

Relief in the site vicinity is a plain with a general slope grading down southward. The on-site grade is flat. The site elevation ranges from 94.2 masl in the southwest corner to 94.8 masl in the northeast corner, with these values being approximate. The planned main ground floor elevation will be at approximately 94.1 masl.

2.5 DRAINAGE

No watercourses, ponds, or other surface water features are located on the site.

The nearest surface water course is an un-named watercourse in High Park, approximately 2.1 kilometres to the west, which flows southward to Lake Ontario. The Lake Ontario shore is approximately 1.5 km to the southwest. Regional groundwater is expected to move southward towards the Lake.

The site itself, local roads and adjacent properties manage stormwater through catch basins and the piped municipal storm sewer system.

2.6 REGIONAL GEOLOGY

A surficial geological map (Ontario Geological Survey, 2010) shows the site as situated on coarse textured glacial lake deposits with a texture of sand and gravel with minor silt and clay.

Bedrock geology (Ontario Geological Survey, 2007) consists of shale with minor limestone of the Georgian Bay Formation.

2.7 SENSITIVE ECOLOGICAL RECEIVERS

Designated sensitive ecological areas such as Areas of Natural and Scientific Interest (ANSI) or Environmentally Significant Areas (ESA's) are absent within 500 m of the site (MNRF, 2022).

2.8 GROUNDWATER SUPPLY WELLS

The surrounding vicinity is urbanized, so is provided with piped municipal supplies sourced from Lake Ontario. No private supply wells are anticipated to be in active operation within 500 m.

The site is shown as being classified as Highly Vulnerable Aquifer with a score of 6 (MECP, 2022).

3.0 FIELD PROGRAM

The following describes the methodology and locations of investigation in the field program. Observations are provided in Section 4 and interpretations are provided in Section 5.

3.1 DRILLING

A drilling program was previously completed by Pinchin Ltd. during 20 to 24 February 2020. The program advanced seven (7) boreholes, MW1 through MW7, with depths ranging from 4.4 to 12.2 metres below ground (mbg).

Terrapex conducted a drilling program during 11 to 17 August 2022, to serve the purposes of this hydrological review, a geotechnical investigation, and the environmental site assessment. The main boreholes were advanced to depths ranging from 6.1 to 13.7 mbg. See Table 1 for specific depths.

Soils were logged in the field by a qualified geotechnical technician and descriptions were confirmed by a Professional Engineer at Terrapex's Toronto facilities. Drilling services were provided by Profile Drilling Inc. of Mississauga, Ontario.

3.2 MONITORING WELLS

The drilling program previously completed by Pinchin Ltd. during February 2020 installed seven monitoring wells, designated as, MW1 through MW7, with depths ranging from 4.8 to 9.1 mbg. These monitoring wells remained functional at the time of this study, with the exception of MW3 which was demolished. Locations are shown on Figure 4. The Pinchin wells are used for the study.

The Terrapex program installed monitoring wells at the four borehole locations: MW101, MW102, MW103 and MW104, as shown on Figure 4. The locations were selected to provide broad distribution with consideration of available space for manoeuvring a drilling rig at grade.

Monitoring well clusters were constructed at MW103 and MW104 to measure vertical hydraulic gradients. The wells were installed in adjacent separate boreholes. The designations have suffixes of deeper (D), intermediate (I) and shallower (S) screened intervals.

The target depth for MW101, MW103I, and MW104D was approximately 9.1 mbg, which has screens crossing the depth of 2 m below the P2 garage level driving surface. The target depth for MW103D was bedrock, which was encountered at 13.7 mbg. With the previous existing wells, the number of monitoring wells satisfied the City of Toronto Terms of Reference for Hydrological Review (2018).

The well components and their relationships to adjacent stratigraphy are shown in the borehole records of Appendix III and their dimensions are reported in Table 1. The well locations and elevations were surveyed using a TopCon GNSS Receiver.

The monitoring wells were constructed using environmental grade, 50 mm diameter, Schedule 40, PVC piping with machine slotted (10 slot) screens at the bottom. Each well was installed under a protective flush-mount casing.

Monitoring wells, when no longer useful, must eventually be abandoned by a licensed water well contractor. Abandonment must proceed in accordance with Regulation 903 and amendments issued under the Ontario Water Resources Act. The monitoring wells should remain until the time of construction to be available for observing groundwater conditions closer to the time of construction for dewatering planning.

3.3 GROUNDWATER LEVEL MEASUREMENTS

Suites of groundwater levels were measured in the monitoring well network on 23 August and 6 and 21 September 2022, at approximately two-weeks intervals. Groundwater levels were measured using an electric sounder device with graduated tape. Additional groundwater measurement events are recommended during Spring 2023.

3.4 GROUNDWATER SAMPLING

The monitoring well selected for groundwater sampling was MW104A at the southwestern corner. The well was purged and sampled using a peristaltic pump on 21 September 2022. Sample water was discharged directly without filtering to pre-cleaned bottles supplied by the laboratory with preservatives as appropriate for parameters. These bottles were iced and held in a cooler under Chain of Custody protocols prior to delivery.

The sample was submitted to ALS Laboratory Ltd. (ALS) of Waterloo, which is an independent laboratory that is accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA). It was analysed for the suite of parameters specified under the Chapter 681 bylaw that regulates discharges to the sanitary/combined and storm sewers in the City of Toronto.

A parallel sample was field filtered and submitted for analysis of the suite of metals specified under Chapter 681 for review of potential treatment options.

Due to scheduling conflicts, the E.Coli, Biological Oxygen Demand (BOD), and Total Suspended Solids (TSS) were re-sampled from MW104A on 3 October 2022.

3.5 HYDRAULIC CONDUCTIVITY TESTS

Single well response tests (commonly referred to as “slug tests”) to assess the hydraulic conductivity of adjacent formations were performed on monitoring wells MW101 and MW6. The test methods applied were a bail test, which is a rapid removal of a volume of slug of water using an elongated bailer, for MW6, and a slug test, which is a rapid introduction of a volume of slug of water, for MW101.

The ensuing rising or falling recovery to static level is observed over time initially using a manual instrument and by Solinst brand leveloggers over the test period. The loggers recorded at 30 seconds intervals. A barometric logger was also installed to allow removal of barometric pressure effects from the levelogger record.

Test data were analysed using the Aqtesolv software package by the Bouwer and Rice method.

4.0 OBSERVATIONS

4.1 SUBSURFACE MATERIALS AND HYDROSTRATIGRAPHY

The subsurface conditions encountered at each borehole are shown in detail on the borehole records provided in Appendix III. A hydrostratigraphic profile that illustrates the relationship to the planned building is provided as Figure 7.

The following stratigraphy was observed at Terrapex boreholes, in descending elevation sequence. See Table 5 for a schematic breakdown.

- *Fill*. This layer extends from near surface to a depth ranging of 1.1 to 1.7 mbg, with an average depth of 1.5 m. This layer is unsaturated. Its texture ranges from silty clay to sand and gravel, with inclusions of construction debris.
- *Sand*. A relatively thin layer of sand with trace to some silt extends from below the fill to depths of 2.0 to 2.7 mbg. This layer is unsaturated to possibly saturated at its base, depending on location. The layer is absent at MW104.
- *Clayey silt till*. This layer extends from below the fill or sand layer to depths ranging from 6.8 to 7.6 mbg. The texture is clayey silt with minor gravel and sand.
- *Sandy silt till*. This layer's thickness ranges from an upper surface of approximately 6.9 to 7.6 mbg to a lower surface of 7.9 to 11.4 mbg. At MW102 the layer is in contact with the shale bedrock in MW102. The texture is sandy silt with minor gravel and clay.
- *Sandy clayey silt till*. This layer's thickness ranges approximately 2.3 to 4.2 m below the sandy silt till. This layer is absent or a modified texture at MW102.
- *Bedrock*. Shale bedrock was encountered at depths ranging from 11.4 to 13.7 mbg, with corresponding elevations of 81.0 to 82.9 masl. The bedrock is reported be weathered and weak.

The above stratigraphic description is a generalization. Variations could occur in thickness, depth, presence, and texture of units. Constructors and dewatering contractors should review the nearest borehole records for specific locations and if necessary, drill to confirm conditions if critical to their activities. Internal sand lenses and clayey lenses are also possible.

Sieve and hydrometer grain size analyses were carried out on six soil samples. The test results are presented in Appendix V and summarized below.

Borehole Number	Sample Depth (Sample No.)	Sample Description	Gravel %	Sand %	Silt %	Clay %
MW101	2.3 mbg (4A)	Sand, trace silt, trace clay	0	92	6	2
MW101	3.8 mbg (6)	Clayey silt, some sand, some gravel	11	17	49	23
MW101	7.6 mbg (9)	Gravelly sand and silt, some clay	23	33	33	11
MW103	6.9 mbg (10)	Sandy silt, some gravel, some clay	18	26	40	16
MW103	9.9 mbg (13)	Gravelly silty sand, some clay	23	35	27	15
MW104	5.4 mbg (8)	Clayey sandy silt	0	22	48	30

4.2 GROUNDWATER LEVELS

Groundwater level observations are presented as depths and as elevations on Table 2. The monitoring followed Option 1 – Flexible, Year- Round as defined under the City of Toronto Foundation Drainage Guidelines.

On 6 September 2022, the average depth to the water table was 4.3 mbg, with a range from 1.0 mbg at MW1 to 8.6 mbg at MW101. The shallowest depth to the water table observed was 0.9 mbg at MW1.

On 6 September 2022, the average elevation of the water table was 90.2 masl, with a range from 86.1 masl at MW101 to 93.2 masl at MW1. The highest elevation of water table observed was 93.4 masl at MW1. As shown on Figure 6, groundwater elevation generally trends from highest in the southwest corner to lowest along the eastern and northern sides.

A perched water table condition was observed at MW103 that is in the northeastern corner. The intermediate well that is screened in the sandy silt till was dry for the three monitoring events. The shallower well MW103(S) indicates the water table at approximately 89.2 masl and the deepest well MW103(D) has a higher piezometric pressure of approximately 89.7 masl. The base of the shallow well screen and the top of the deep well screen was separated by 5.2 m.

Groundwater levels naturally fluctuate in response to seasons, to annual variations and possibly to major storm events. The measurements reported herein occurred during summer, which is typically the deepest depth and lowest elevation in the annual seasonal cycle. It is possible that the water table elevation could rise further (become shallower depth) to peak during a wetter climatic variability.

While not required, additional monitoring of groundwater levels could be considered for spring 2023 at monthly intervals to determine the maximum groundwater level elevation, which would

be timed for the beginning of April. This information would allow more accuracy in the dewatering calculations that assumed a buffer of 1.5 m above maximum elevations due to measurements occurring in later summer, rather than the maximum phase in spring.

5.0 ANALYSIS

5.1 HYDRAULIC CONDUCTIVITY

Hydraulic conductivity is a parameter for quantifying the ability of a soil unit to transmit water. This parameter is necessary for predicting the rate of seepage into excavations to be intercepted or collected by dewatering efforts during construction.

Analysis curves from single well response tests are presented in Appendix VI. The resulting interpreted hydraulic conductivity values were as follows.

- MW6, 5.3 x 10^{-9} m/s, screened across sandy clayey silt till, trace gravel.
- MW101, 5.3 x 10^{-10} m/s, screened across sandy silt till, some gravel to gravelly, some clay

Grain size analysis can also be used to interpret a hydraulic conductivity using the Hazen formula that is a function of the d_{10} value, which is the size fraction below 10%, by weight. This formula is applicable for silt and coarser sediments. Samples in the saturated zone were too fine for application of the formula.

5.2 HYDRAULIC GRADIENT

The water table is commonly a subdued reflection of the overlying ground surface with shallow groundwater movement parallel to the overlying general grade. Based on this interpretation and local topography, shallow groundwater in the vicinity of the site would be anticipated to move generally southward towards Lake Ontario.

Instead, groundwater levels for wells screened close to the foundation elevation appears to move northeastward, as illustrated on Figure 6. The magnitude of the horizontal hydraulic gradient is approximately 0.08 m/m. The reason for deviation is unknown. This deviation is not significant for construction of the building.

The vertical hydraulic gradient was measured by the monitoring well cluster of MW104. The vertical gradients for 6 and 21 September 2022 were 0.33 and 0.50 m/m respectively. The gradient direction is downward, which indicates the site functions as a recharge area, albeit with limited amounts due to the impervious coverage and the relatively low permeability clayey silt layer. The relatively high vertical gradient corroborates low permeability soils. The well cluster at MW103 could not be assessed for vertical gradient due to the apparent perched conditions.

Local variations in topography, soil type and buried utilities trenches can influence the direction of the horizontal hydraulic gradient.

5.3 GROUNDWATER QUALITY

The reported concentrations of tested parameters for the sample obtained from MW104A are provided in Table 3. The Certificate of Analysis issued by ALS is provided in Appendix IV.

The results indicate the groundwater quality is suitable for discharge to the sanitary / combined sewer without treatment.

The results indicate the groundwater quality is suitable for discharge to the storm sewer with treatment for manganese. The manganese concentration was 0.12 mg/L, as compared to the storm sewer criterion of 0.05 mg/L.

All other reported results for the tested parameters complied with the sanitary/combined sewer and storm sewer criteria.

Dataloggers during hydraulic conductivity testing recorded groundwater temperatures in the range of 11.7 to 12.0 °C, as measured at MW101 and MW6.

5.4 BUILDING GEOMETRY AND HYDROGEOLOGY

The new parking garage will extend to two subsurface levels. The heights of P1 and P2 will be 4.0 m and 3.0 m respectively, resulting in a combined depth of 7.0 mbg. The lowest grade for the walking / driving surface of P2 level is 87.2 masl. The ground floor elevation for the building will be at 94.1 masl.

A building of this design will have a raft slab with a typical thickness of 2.0 to 3.0 m. For calculations, an assumed conservative thickness of 3.0 m will be applied. This design suggests a probable excavation base depth of 10.0 mbg, with a corresponding elevation of approximately 84.1 masl.

The average of depths to water table in September was 4.3 mbg with the shallowest depth being 0.9 mbg. A decrease in depth of 1.0 to 1.5 m would be possible during spring, resulting in depths to water table ranging from 2.8 mbg to close to grade.

The excavation base of 10.0 mbg will extend several metres below the water table into saturated soils, indicating that groundwater seepage should be anticipated into the base and side walls. A dry zone at depth is indicated at the northeast corner at MW103, indicating that some portions of the excavation may not experience seepage.

The saturated soils within the planned depth of excavation consist of silty clay till along the side walls with lower portions consisting of sandy silt till. Sandy silt till will be cut across the base. Variations are possible. The sandy silt till is anticipated to offer higher hydraulic conductivity than the clayey silt till so will issue more seepage. See the hydrostratigraphic profile on Figure 7 that illustrates the geometry.

6.0 DEWATERING

Groundwater will move toward the construction excavation so must be controlled to provide dry and safe working conditions. Disposal of accumulated water generated by incident precipitation will occasionally be required as well.

The Ministry of the Environment, Conservation and Parks (MECP) requires a Permit to Take Water (PTTW) or an Environmental Activity and Sector Registry (EASR) for groundwater takings exceeding 50,000 litres per day (L/day). For the purpose of construction, a PTTW is required for dewatering extraction rates that exceed 400,000 L/day. An EASR is required for a groundwater seepage rate between 50,000 and 400,000 L/day.

6.1 CONSTRUCTION DEWATERING RATE PREDICTIONS

Groundwater seepage was estimated by simplifying the excavation to a mathematical analog of a circular well (Powers et al., 2007). Calculations are based on anticipation of response similar to an unconfined hydraulic aquifer. The results of calculations for groundwater seepage for construction dewatering are summarized on Table 4. These calculations indicate that the maximum amount of groundwater seepage during construction will be 16,800 L/day. The seepage rate during construction will be a maximum of 8,400 L/day without the factor of safety.

Common control measures during construction include by dewatering wells, wellpoints in adjacent soils or by collection and pumping from sumps in the interior of the excavation. The particular method for dewatering of the excavation should be decided by the construction and dewatering contractors.

Open excavations will capture incident precipitation. The volume as produced by a relatively large storm was estimated using the excavation area and a precipitation event of 25 mm. Such precipitation events statistically recur four to five times per year. The excavation will collect 37,400 litres per event. Obviously, larger precipitation events would produce larger amounts to manage, although occurring less frequently. The precipitation amounts must be added to the groundwater seepage amount in the applications to discharge. Stormwater runoff from adjacent lands to excavations should be prevented by means of temporary surface grades, berms or ditches.

The combined rate of maximum amount of groundwater seepage anticipated during construction and the stormwater amount will be 54,200 litres per day. This amount indicates that an EASR will be required for construction.

The calculations are based on conservative assumptions that predict a relatively high rate that is less likely yet remains possible. The highest hydraulic conductivity value was applied. The shallowest water table was used. A factor of safety of 2 was applied to the predicted seepage amount to allow for heterogeneities. A ten times factor of safety was applied for hydraulic conductivity.

The planned development will construct buried municipal infrastructure, such as piped sanitary sewer, storm sewer and other utilities. The depths of excavation trenches are presently not

determined. Where below the water table, seepage management should be anticipated for installing of this infrastructure under dry and safer working conditions.

The cumulative amounts pumped from the excavation should be monitored daily to confirm that the requested pumping rates stated in the EASR and municipal agreements are not exceeded.

The City of Toronto will anticipate receiving a Servicing Report and a Stormwater Management Report, as well as obtaining a Private Water Discharge Agreement (PWDA). The PDWA will be required for short-term construction dewatering discharge to either to the storm sewer or to the sanitary sewer.

We understand that the building garage structure will be constructed using watertight materials, construction methods and designs to last for the lifespan of the building. No foundation drains are planned, so no drainage will be collected to require management or disposal.

6.2 RADIUS OF INFLUENCE AND SENSITIVE RECEIVERS

The radius of influence is the distance range beyond which the drawdown on groundwater caused by dewatering is not expected to be detectable. The radius of influence is commonly estimated using the formula of Sichardt and Kryieleis (Powers et al, 2007), which is noted in Table 4. The maximum radius of influence predicted is approximately 2 m beyond the excavation boundary.

No off-site ecologically sensitive receivers or private water supply wells exist within the radius of influence that could be negatively affected by dewatering. No areas of significant groundwater contamination are known to be present within the radius of influence that would be collected or diverted by dewatering and foundation drains.

6.3 WATER QUALITY OF DISCHARGE

As noted in Section 5.3, groundwater quality can be discharged to the sanitary / combined sewer with no treatment and can be discharged to the storm sewer with treatment for manganese.

The elevated manganese concentration appears to be in dissolved form. The concentration of unfiltered sample was 0.12 mg/L while the concentration of the filtered sample was 0.155 mg/L. That the concentration of the filtered sample was higher than the unfiltered sample is attributed to natural variability in consecutive samples. Chemical treatment methods would need to be applied for discharge to the storm sewer.

6.4 FOUNDATION DRAINAGE REQUIREMENTS AND FURTHER TESTING

The partially completed City of Toronto's Foundation Drainage Summary Form is provided in Appendix VII.

Groundwater was measured for three events under Option 1 of the Foundation Drainage Guidelines (January, 2022). The highest groundwater levels were measured at MW1, with the highest in August being 93.38 masl and the highest in September being 93.22 masl. The fluctuation allowances for August and September are 2.4 and 2.6 m, respectively. Adding these

allowances to the highest groundwater elevations was 95.92 masl, which is the maximum anticipated groundwater level (MAGWL).

7.0 WATER BALANCE

Typically, incident precipitation moves through a sequence beginning with infiltration through a pervious soil surface, moving down through the unsaturated zone and then recharging the shallow groundwater. In turn, this shallow groundwater moves toward watercourses to contribute to baseflow or to replenish aquifers, if present. Impervious surfaces – such as buildings or paving - block infiltration, so diverted precipitation becomes runoff that is directed to the storm sewer.

The pre-construction land use is entirely covered by impervious features that include the existing building and the paved parking lot. The minor lawns along Alma Avenue provide negligible pervious soil. The post-construction land use will similarly be entirely covered by impervious features that include the new building and paved driving and walking lanes. Both pre-construction and post-construction allow virtually no infiltration to recharge the groundwater regime. Thus, there will be negligible change in recharge due to development.

Low impact development (LID) measures that can promote infiltration to recharge groundwater are not feasible due to the underground parking garage spanning essentially the entire site area. Also, the shallow soil horizon that is not fill is clayey silt that would only provide limited recharge capacity.

8.0 CLOSURE

This report has been completed in accordance with the terms of reference for this project as agreed upon by HM RK (450 Dufferin) LP. (the Client) and Terrapex Environmental Ltd. (Terrapex) and generally accepted hydrogeological consulting practices in this area.

The reported information is believed to provide a reasonable representation of the general hydrogeological conditions at the site; however, studies of this nature have inherent limitations. The data were collected at specific locations and conditions may vary at other locations, or with the passage of time. Where applicable, the assessment of the environmental quality of groundwater was limited to a study of those chemical parameters specifically addressed in this report.

Terrapex has relied in good faith on information and representations obtained from the Client and third parties and, except where specifically identified, has made no attempt to verify such information. Terrapex accepts no responsibility for any deficiency or inaccuracy in this report as a result of any misstatement, omission, misrepresentation, or fraudulent act of those providing information. Terrapex shall not be responsible for conditions or consequences arising from relevant facts that were concealed, withheld, or not fully disclosed at the time of the study.

This report has been prepared for the sole use of HM RK (450 Dufferin) LP. Terrapex accepts no liability for claims arising from the use of this report, or from actions taken or decisions made as a result of this report, by parties other than HM RK (450 Dufferin) LP.

Respectfully submitted,
TERRAPEX ENVIRONMENTAL LTD.

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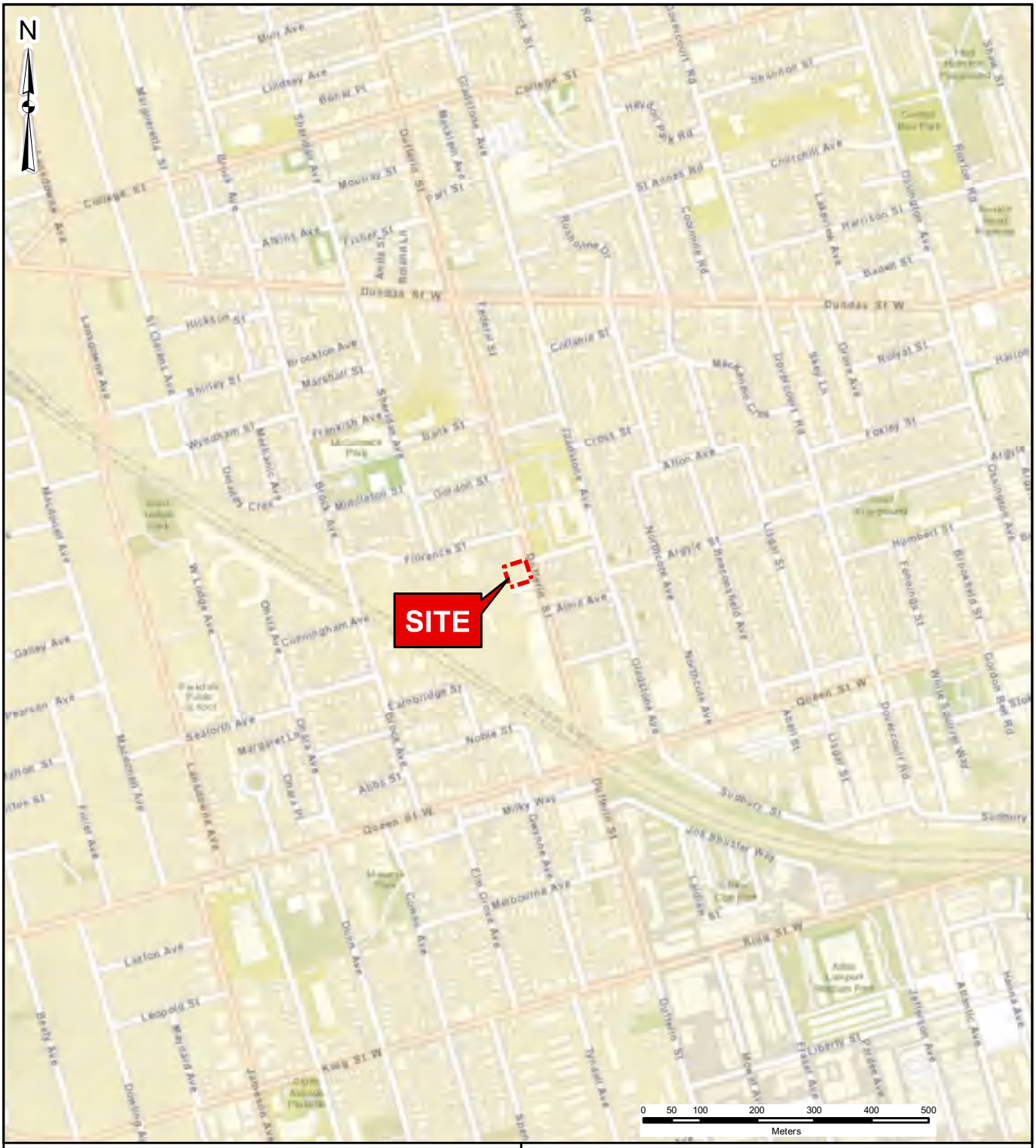
APPENDICES

APPENDIX I
FIGURES



LEGEND

SITE BOUNDARY

DATA SOURCE: ESRI
MAP PROJECTION: NAD 1983 UTM Zone 17N

CLIENT: HM RK (450 DUFFERIN) LP.

SITE LOCATION: 450 DUFFERIN STREET EAST
TORONTO, ONTARIO

TERRAPEX

TITLE: **SITE LOCATION PLAN**

DRAWN BY: SW	PROJECT NO.: CT3580.00	CHECKED BY: AD/BT
REVISION: 00	DATE: OCTOBER 2022	**FIGURE: 1**

swilliams W:\PROJECTS\Toronto\CT3580.00 450 Dufferin Street East, Toronto\MXD\Hydrog\CT3580.00 FIG1 SITE LOCATION.mxd

LEGEND

- SITE BOUNDARY
- 500 m RADIUS FROM SITE BOUNDARY
- TOPOGRAPHIC CONTOURS

0 50 100 150 200
Metres

DATA SOURCE: ESRI, CITY OF TORONTO
MAP PROJECTION: NAD 1983 UTM ZONE 17N

CLIENT:
HM RK (450 DUFFERIN) LP

SITE LOCATION:
450 DUFFERIN STREET
TORONTO, ONTARIO

TERRAPEX

TITLE:
SITE VICINITY MAP - 500 m

DRAWN BY:	PROJECT NO.:	CHECKED BY:
JS/SW/AB	CT3580.00	AD/BT
REVISION:	DATE:	FIGURE:
00	OCTOBER 2022	**2**

W:\PROJECTS\Toronto\CT3580.00 450 Dufferin Street East, Toronto\MXD\Hydro\CT3580.00 FIG2 SITE VICINITY MAP - 500m.mxd

LEGEND

- SITE BOUNDARY
- 100 m RADIUS FROM SITE BOUNDARY
- TOPOGRAPHIC CONTOURS

0 10 20 30 40 50
Metres

DATA SOURCE: CITY OF TORONTO
MAP PROJECTION: NAD 1983 UTM ZONE 17N

CLIENT:
HM RK (450 DUFFERIN) LP

SITE LOCATION:
450 DUFFERIN STREET
TORONTO, ONTARIO

TERRAPEX

TITLE:
SITE VICINITY MAP - 100 m

DRAWN BY:	PROJECT NO.:	CHECKED BY:
JS/SW/AB	CT3580.00	AD/BT
REVISION:	DATE:	FIGURE:
00	OCTOBER 2022	**3**

W:\PROJECTS\Toronto\CT3580.00 450 Dufferin Street East, Toronto\MXD\Hydro\CT3580.00 FIG3 SITE VICINITY MAP - 100m.mxd

LEGEND

- SITE BOUNDARY
- HYDROSTRATIGRAPHIC PROFILE
- MONITORING WELL (BY TERRAPEX)
- MONITORING WELL (BY OTHERS)
- DESTROYED MONITORING WELL

0 2 4 6 8 10
Metres

DATA SOURCE: ESRI, CITY OF TORONTO
MAP PROJECTION: NAD 1983 UTM ZONE 17N

CLIENT:
HM RK (450 DUFFERIN) LP

SITE LOCATION:
450 DUFFERIN STREET
TORONTO, ONTARIO

TERRAPEX

TITLE:
LOCATIONS OF INVESTIGATIONS

DRAWN BY:	PROJECT NO.:	CHECKED BY:
JS/SW/AB	CT3580.00	AD/BT
REVISION:	DATE:	FIGURE:
00	OCTOBER 2022	**4**

W:\PROJECTS\Toronto\CT3580.00 450 Dufferin Street East, Toronto\MXD\Hydrog\CT3580.00 FIG4 LOCATIONS OF INVESTIGATIONS.mxd

LEGEND

- SITE BOUNDARY
- MONITORING WELL (BY TERRAPEX)
- MONITORING WELL (BY OTHERS)
- DESTROYED MONITORING WELL

0 2 4 6 8 10
Metres

DATA SOURCE: ESRI, CITY OF TORONTO, SITE PLAN PROVIDED BY CLIENT
MAP PROJECTION: NAD 1983 UTM ZONE 17N

CLIENT:
HM RK (450 DUFFERIN) LP

SITE LOCATION:
450 DUFFERIN STREET
TORONTO, ONTARIO

TERRAPEX

TITLE:
DESIGN CONCEPT PLAN

DRAWN BY:	PROJECT NO.:	CHECKED BY:
JS/SW/AB	CT3580.00	AD/BT
REVISION:	DATE:	FIGURE:
00	OCTOBER 2022	**5**

W:\PROJECTS\Toronto\CT3580.00 450 Dufferin Street East, Toronto\MXD\Hydrog\CT3580.00 FIG5 DESIGN CONCEPT PLAN.mxd

LEGEND

- SITE BOUNDARY
- MONITORING WELL (BY TERRAPEX)
- MONITORING WELL (BY OTHERS)
- DESTROYED MONITORING WELL
- EQUIPOTENTIAL CONTOUR
- INTERPRETED DIRECTION OF GROUNDWATER MOVEMENT
- 222.86 STATIC WATER LEVEL (21 Sep 2022) (m ASL)

NOTE:

1. Groundwater levels shown are for a single event. Levels are anticipated to vary, with higher elevation typically anticipated during spring.

2. Equipotential contours are interpreted as reasonable from the monitoring well network, with other geometries being possible.

0 2 4 6 8 10
Metres

DATA SOURCE: ESRI, CITY OF TORONTO
MAP PROJECTION: NAD 1983 UTM ZONE 17N

CLIENT:
HM RK (450 DUFFERIN) LP

SITE LOCATION:
450 DUFFERIN STREET
TORONTO, ONTARIO

TERRAPEX

TITLE:
GROUNDWATER REGIME PLAN

DRAWN BY:	PROJECT NO.:	CHECKED BY:
JS/SW/AB	CT3580.00	AD/BT
REVISION:	DATE:	FIGURE:
00	OCTOBER 2022	6

W:\PROJECTS\Toronto\CT3580.00 450 Dufferin Street East, Toronto\MXD\Hydrog\CT3580.00 FIG6 GROUNDWATER REGIME PLAN.mxd

SW

LOOKING NORTH

NE

PROPERTY BOUNDARY

PROPERTY BOUNDARY

DUFFERIN STREET

MW3

MW101D

MW5

MW4

MW7

MW103D

GROUND SURFACE

FILL

SILTY CLAY TILL

SANDY SILT TILL

SHALE

P2 FOUNDATION SLAB

P2 EXCAVATION BASE

ELEVATION (masl)

95m
94m
93m
92m
91m
90m
89m
88m
87m
86m
85m
84m
83m
82m
81m
80m

FL
1.5
SA
2.3
SL(CL) TL
3.8
CL(SL) TL
6.9
SL TL (SA)
8.2

FL
1.5
SAND
2.7
SL(CL) TL
7.6
SL(SA) TL
9.3
SL(SA, CL) TL
12.9
SH
13.0

FL
1.5
SL(SA, CL) TL
7.6
SL(SA) TL
9.1
SL(SA, CL) TL
11.6

FL
1.5
SL(CL) TL
6.1

FL
1.5
SL(CL)-CL(SL) TL
7.6
SA(SL)-SL(SA) TL
12.2

FL
1.5
SA
2.0
SL(CL) TL
7.6
SL(SA, GR, CL) TL
13.8
SH
13.7

LEGEND

GR	GRAVEL
SA	SAND
SL	SILT
CL	CLAY
FL	FILL
TL	TILL
SH	SHALE BEDROCK
X(Y)	X IS A MAIN TEXTURE Y IS A SIGNIFICANT MINOR TEXTURE

MW104 - MONITORING WELL DESIGNATION

STATIC WATER LEVEL (September 21, 2022)

DEPTH OF SOIL INTERFACE(m bg) 3.7

- SCREENED ZONE

- BOREHOLE

HORIZONTAL SCALE:

0 2.5m 5m

(APPROXIMATE)

NOTES:
1. SOIL AND GROUNDWATER KNOWN ONLY AT BOREHOLE LOCATIONS.
2. BOREHOLES ARE PROJECTED ONTO PROFILE.

CLIENT: HM RK (450 DUFFERIN) LP

SITE LOCATION: 450 DUFFERIN STREET TORONTO, ONTARIO

TERRAPEX

TITLE: **HYDROSTRATIGRAPHIC PROFILE: SW-NE**

DRAWN BY:	PROJECT NO.:	CHECKED BY:
SW	CT3580.00	AD/BT
REVISION: 00	DATE: OCTOBER 2022	FIGURE: 7

APPENDIX II
TABLES

TABLE 1
Monitoring Well Construction Details
450 Dufferin Street, Toronto

Position and Depth

Well Desig.	UTM Northing	UTM Easting	Date of Construct	Stick Down	Depth of Borehole	Depth to Well Bottom	Screen Length	Depth to Screen Base	Depth to Screen Top	Depth to Top Sand
(m)	(m)	(m)	dd-mmm-yy	(m)	(m bg)	(m bg)	(m)	(m bg)	(m bg)	(m bg)
MW1	4833653	626600	20-Feb-20	-0.02	9.14	8.70	3.05	8.60	5.65	5.35
MW2	4833664	626594	20-Feb-20	-0.09	8.23	7.62	3.05	7.52	4.57	4.27
MW4	4833682	626608	24-Feb-20	-0.25	6.10	4.80	3.05	4.70	1.75	1.45
MW5	4833676	626594	21-Feb-20	-0.14	11.61	9.14	3.05	9.04	6.09	5.79
MW6	4833658	626621	24-Feb-20	-0.08	12.24	9.14	3.05	9.04	6.09	5.79
MW7	4833681	626613	24-Feb-20	-0.02	12.19	9.14	3.05	9.04	6.09	5.79
MW101	4833679	626596	11-Aug-22	-0.12	12.50	9.14	1.52	9.04	7.62	7.32
MW102	4833666	626619	12-Aug-22	-0.08	11.27	6.50	3.05	6.40	3.45	3.15
MW103D	4833684	626613	15/16-Aug-22	-0.14	13.72	12.80	1.52	12.70	11.28	10.98
MW103I	4833684	626613	16-Aug-22	-0.09	9.14	9.14	1.52	9.04	7.62	7.32
MW103S	4833685	626613	16-Aug-22	-0.13	6.10	6.10	3.05	6.00	3.05	2.75
MW104D	4833657	626599	17-Aug-22	-0.08	10.36	9.14	1.52	9.04	7.62	7.32
MW104S	4833657	626599	17-Aug-22	-0.08	4.00	4.00	3.05	3.90	0.95	0.65

Key Elevations

Well Desig.	Ground Elev.	End of Borehole Elev.	Top of Pipe Elev.	Screen Base Elev.	Screen Top Elev.
	(m asl)	(m asl)	(m asl)	(m asl)	(m asl)
MW1	94.26	85.12	94.25	85.66	88.61
MW2	94.49	86.26	94.40	86.97	89.92
MW4	94.67	88.57	94.41	89.97	92.92
MW5	94.68	83.07	94.54	85.64	88.59
MW6	94.22	81.98	94.14	85.18	88.13
MW7	94.52	82.33	94.49	85.48	88.43
MW101	94.77	82.27	94.65	85.73	87.15
MW102	94.32	83.05	94.25	87.92	90.87
MW103D	94.65	80.93	94.51	81.95	83.37
MW103I	94.60	85.46	94.51	85.56	86.98
MW103S	94.62	88.52	94.49	88.62	91.57
MW104D	94.29	83.93	94.21	85.25	86.67
MW104S	94.30	90.30	94.21	90.40	93.35

Notes:
m asl = metres above sea level
m bg = metres below ground (or grade)

TABLE 2
Observed Groundwater Levels
450 Dufferin Street, Toronto

Well Desig.	Date	Ground Elev. (m asl)	Top Pipe Elev. (m asl)	Groundwater Depth (m bmp)	Groundwater Depth (m bg)	Groundwater Elev. (m asl)
MW1	23-Aug-22	94.26	94.25	0.87	0.88	93.38
	06-Sep-22			1.03	1.04	93.22
	21-Sep-22			1.17	1.19	93.08
MW2	23-Aug-22	94.49	94.40	3.14	3.22	91.27
	06-Sep-22			2.99	3.08	91.41
	21-Sep-22			3.19	3.28	91.21
MW4	23-Aug-22	94.67	94.41	-	-	-
	06-Sep-22			1.99	2.24	92.43
	21-Sep-22			2.16	2.42	92.25
MW5	23-Aug-22	94.68	94.54	4.19	4.32	90.35
	06-Sep-22			4.13	4.27	90.41
	21-Sep-22			4.35	4.48	90.19
MW6	23-Aug-22	94.22	94.14	-	-	-
	06-Sep-22			4.84	4.92	89.30
	21-Sep-22			5.05	5.13	89.09
MW7	23-Aug-22	94.52	94.49	4.55	4.57	89.95
	06-Sep-22			4.36	4.38	90.14
	21-Sep-22			4.40	4.42	90.09
MW101	23-Aug-22	94.77	94.65	8.58	8.69	86.08
	06-Sep-22			8.51	8.63	86.14
	21-Sep-22			7.75	7.86	86.91
MW102	23-Aug-22	94.32	94.25	1.78	1.86	92.47
	06-Sep-22			4.84	4.92	89.41
	21-Sep-22			4.53	4.61	89.72
MW103D	23-Aug-22	94.65	94.51	5.02	5.17	89.49
	06-Sep-22			4.79	4.94	89.72
	21-Sep-22			4.78	4.92	89.73

TABLE 2
Observed Groundwater Levels
450 Dufferin Street, Toronto

Well Desig.	Date	Ground Elev. (m asl)	Top Pipe Elev. (m asl)	Groundwater Depth (m bmp)	Groundwater Depth (m bg)	Groundwater Elev. (m asl)
MW103I	23-Aug-22	94.60	94.51	Dry	-	-
	06-Sep-22			Dry	-	-
	21-Sep-22			Dry	-	-
MW103S	23-Aug-22	94.62	94.49	Dry	-	-
	06-Sep-22			5.99	6.11	88.51
	21-Sep-22			5.29	5.41	89.21
MW104D	23-Aug-22	94.29	94.21	7.99	8.07	86.22
	06-Sep-22			5.09	5.17	89.12
	21-Sep-22			5.01	5.10	89.19
MW104S	23-Aug-22	94.30	94.21	Dry	-	-
	06-Sep-22			2.90	2.98	91.32
	21-Sep-22			1.69	1.78	92.52

Notes
1. m asl = metres above sea level
2. m bmp = metres below measurement point
3. m bg = metres below ground

NA = Not Accessible

TABLE 3 Summary of Groundwater Quality

SANITARY/COMBINED **Sample Location: MW104A - 450 Dufferin Street, Toronto**

Inorganics		Sample Result	Sample Result with upper RDL included	
Parameter	mg/L	mg/L	mg/L	µg/L
BOD	300	3.1	3.1 (2.0)	300,000
Fluoride	10	0.72	0.72 (0.02)	10,000
TKN	100	3.41	3.41 (0.05)	100,000
pH	6.0 - 11.5	8	8 (0.1)	6.0 - 11.5
Phenolics 4AAP	1	<0.0010	<0.0010 (0.001)	1,000
TSS	350	8.1	8.1 (3.0)	350,000
Total Cyanide	2	<0.0020	<0.0020 (0.002)	2,000
Metals				
Chromium Hexavalent	2	<0.00050	<0.00050 (0.0005)	2,000
Mercury	0.01	<0.0000050	<0.0000050 (0.000005)	10
Total Aluminum	50	0.279	0.279 (0.003)	50,000
Total Antimony	5	0.00196	0.00196 (0.0001)	5,000
Total Arsenic	1	0.0069	0.0069 (0.0001)	1,000
Total Cadmium	0.7	<0.0000500	<0.0000500 (0.000005)	700
Total Chromium	4	<0.00500	<0.00500 (0.0005)	4,000
Total Cobalt	5	<0.00100	<0.00100 (0.0001)	5,000
Total Copper	2	<0.00500	<0.00500 (0.0005)	2,000
Total Lead	1	0.000733	0.000733 (0.00005)	1,000
Total Manganese	5	0.12	0.12 (0.0001)	5,000
Total Molybdenum	5	0.0337	0.0337 (0.00005)	5,000
Total Nickel	2	<0.00500	<0.00500 (0.0005)	2,000
Total Phosphorus	10	0.0773	0.0773 (0.002)	10,000
Total Selenium	1	<0.000500	<0.000500 (0.00005)	1,000
Total Silver	5	<0.000100	<0.000100 (0.00001)	5,000
Total Tin	5	0.0017	0.0017 (0.0001)	5,000
Total Titanium	5	0.00332	0.00332 (0.0003)	5,000
Total Zinc	2	<0.0300	<0.0300 (0.003)	2,000
Petroleum Hydrocarbons				
Animal/Vegetable Oil & Grease	150	<5.0	<5.0 (5)	150,000
Mineral/Synthetic Oil & Grease	15	<5.0	<5.0 (5)	15,000

TABLE 3 Summary of Groundwater Quality

Volatile Organics		Sample Result	Sample Result with upper RDL included	
Parameter	mg/L	mg/L	mg/L	µg/L
Benzene	0.01	<0.00050	<0.00050 (0.0005)	10
Chloroform	0.04	<0.00050	<0.00050 (0.0005)	40
1,2-Dichlorobenzene	0.05	<0.00050	<0.00050 (0.0005)	50
1,4-Dichlorobenzene	0.08	<0.00050	<0.00050 (0.0005)	80
Cis-1,2-Dichloroethylene	4	<0.00050	<0.00050 (0.0005)	4,000
Trans-1,3-Dichloropropylene	0.14	<0.00030	<0.00030 (0.0003)	140
Ethyl Benzene	0.16	<0.00050	<0.00050 (0.0005)	160
Methylene Chloride	2	<0.0010	<0.0010 (0.001)	2,000
1,1,2,2-Tetrachloroethane	1.4	<0.00050	<0.00050 (0.0005)	1,400
Tetrachloroethylene	1	<0.00050	<0.00050 (0.0005)	1,000
Toluene	0.016	<0.00050	<0.00050 (0.0005)	16
Trichloroethylene	0.4	<0.00050	<0.00050 (0.0005)	400
Total Xylenes	1.4	<0.00050	<0.00050 (0.0005)	1,400
Semi-Volatile **Organics**				
Di-n-butyl Phthalate	0.08	<0.0010	<0.0010 (0.001)	80
Bis (2-ethylhexyl) Phthalate	0.012	<0.0020	<0.0020 (0.002)	12
3,3'-Dichlorobenzidine	0.002	<0.00040	<0.00040 (0.0004)	2
Pentachlorophenol	0.005	<0.00050	<0.00050 (0.0005)	5
Total PAHs	0.005	<0.00175	<0.00175 (0.00175)	5
Misc **Parameters**				
Nonylphenols	0.02	<0.0010	<0.0010 (0.001)	20
Nonylphenol Ethoxylates	0.2	<0.0020	<0.0020 (0.002)	200

Sample Collected: Sept 21 / Oct 3, 2022

Temperature: 12 °C

TABLE 3 Summary of Groundwater Quality

STORM **Sample Location: MW104A - 450 Dufferin Street, Toronto**

Inorganics		Sample Result	Sample Result with upper RDL included	
Parameter	mg/L	mg/L	mg/L	ug/L
pH	6.0 - 9.5	8	8 (0.1)	
BOD	15	3.1	3.1 (2.0)	15,000
Phenolics 4AAP	0.008	<0.0010	<0.0010 (0.001)	8
TSS	15	8.1	8.1 (3.0)	15,000
Total Cyanide	0.02	<0.0020	<0.0020 (0.002)	20
Metals				
Total Arsenic	0.02	0.0069	0.0069 (0.0001)	20
Total Cadmium	0.008	<0.0000500	<0.0000500 (0.000005)	8
Total Chromium	0.08	<0.00500	<0.00500 (0.0005)	80
Chromium Hexavalent	0.04	<0.00050	<0.00050 (0.0005)	40
Total Copper	0.04	<0.00500	<0.00500 (0.0005)	40
Total Lead	0.12	0.000733	0.000733 (0.00005)	120
Total Manganese	0.05	**0.12**	**0.12 (0.0001)**	50
Total Mercury	0.0004	<0.0000050	<0.0000050 (0.000005)	0.4
Total Nickel	0.08	<0.00500	<0.00500 (0.0005)	80
Total Phosphorus	0.4	0.0773	0.0773 (0.002)	400
Total Selenium	0.02	<0.000500	<0.000500 (0.00005)	20
Total Silver	0.12	<0.000100	<0.000100 (0.00001)	120
Total Zinc	0.04	<0.0300	<0.0300 (0.003)	40
Microbiology				
E.coli	200	35	35 (1)	200,000
Volatile Organics				
Parameter	mg/L	mg/L	mg/L	ug/L
Benzene	0.002	<0.00050	<0.00050 (0.0005)	2
Chloroform	0.002	<0.00050	<0.00050 (0.0005)	2
1,2-Dichlorobenzene	0.0056	<0.00050	<0.00050 (0.0005)	6
1,4-Dichlorobenzene	0.0068	<0.00050	<0.00050 (0.0005)	7
Cis-1,2-Dichloroethylene	0.0056	<0.00050	<0.00050 (0.0005)	6
Trans-1,3-Dichloropropylene	0.0056	<0.00030	<0.00030 (0.0003)	6
Ethyl Benzene	0.002	<0.00050	<0.00050 (0.0005)	2
Methylene Chloride	0.0052	<0.0010	<0.0010 (0.001)	5
1,1,2,2-Tetrachloroethane	0.017	<0.00050	<0.00050 (0.0005)	17
Tetrachloroethylene	0.0044	<0.00050	<0.00050 (0.0005)	4
Toluene	0.002	<0.00050	<0.00050 (0.0005)	2
Trichloroethylene	0.0076	<0.00050	<0.00050 (0.0005)	8
Total Xylenes	0.0044	<0.00050	<0.00050 (0.0005)	4

TABLE 3 Summary of Groundwater Quality

Semi-Volatile Organics		Sample Result	Sample Result with upper RDL included	
Di-n-butyl Phthalate	0.015	<0.0010	<0.0010 (0.001)	5
Bis (2-ethylhexyl) Phthalate	0.0088	<0.0020	<0.0020 (0.002)	8.8
3,3'-Dichlorobenzidine	0.0008	<0.00040	<0.00040 (0.0004)	0.8
Pentachlorophenol	0.002	<0.00050	<0.00050 (0.0005)	2
Total PAHs	0.002	<0.00175	<0.00175 (0.00175)	2
PCBs	0.0004	<0.000060	<0.000060 (0.00006)	0.4
Misc Parameters				
Nonylphenols	0.001	<0.0010	<0.0010 (0.001)	1
Nonylphenol Ethoxylates	0.01	<0.0020	<0.0020 (0.002)	10

Sample Collected: Sept 21 / Oct 3, 2022
Temperature: 12 °C

Table 4
Forecast of Construction Dewatering Rate
450 Dufferin Street, Toronto

Parameter	Value	Units	Symbol	Origin of Value
Aquifer Hydraulic Conditions				
Hydraulic conductivity	5.3E-09			Highest observed in tests for wells
Applied hydraulic conductivity	5.3E-08	m/s	K	Highest observed multiplied by a factor of safety of 10
Hydraulic connection to water table	Unconfined			Interpreted
Analogous Dewatering Array Dimensions				
Analogous simplified shape	Circle			
Internal area to be dewatered	*1,495*	m^2	A	Design plans
Radius of an equivalent well	21.8	m	R_W	= sqrt (A / π)
Subsurface Vertical Dimensions				
Surface grade	94.1	masl	E_G	Average surface elevation of wells on site
Foundation slab (upper surface), elevation	87.1	masl	E_F	= E_G - D_F
Foundation slab (upper surface), depth	7.0	mbg	D_F	Design plans
Elevation difference between foundation slab and raft slab	3.0	m		Typical construction design
Base of excavation, elevation	84.1	masl	E_{EX}	Assumed 3 m lower than foundation slab surface
Base of excavation, depth	10.0	mbg	D_{EX}	Assumed 3 m deeper than foundation slab surface
Elevation difference between foundation drains and reference datum	3.0	m		Assumed
Reference datum (for calculation)	81.1	masl	E_{RD}	Set at 3 m below foundation drains
Dewatering Vertical Levels and Dimensions				
Water table, elevation	93.4	masl	EW_{HIGH}	Highest observed to date
Water table, depth	0.7	m	DW_{SHALL}	= E_G - EW_{HIGH}
Buffer for seasonal fluctuation	1.5	m	B	Based on highest measured during a spring season
Assumed water table elevation (pre-pumping level)	94.9	masl	$EW_{HIGHEST}$	= EW_{HIGH} + B. Allows for seasonal fluctuation
Height of water table above reference datum	13.8	m	H	= $EW_{HIGHEST}$ - E_{RD}
Target dewatering level, elevation	83.1	masl	EW_{TARG}	Target is 1.0 m below excavation base
Target dewatering level, depth	11.0	mbg	DW_{TARG}	Target is 1.0 m below excavation base
Height of target water level above datum	2.0	m	h_T	= EW_{TARG} - E_{RD}
Radius of Influence				
Applied equation	$R_O = 3000 * (H - h_T) * (K)^{0.5}$			Sichardt and Kryieleis (1930)
Radius of Influence for main excavation	8.1	m	R_O	
Stormwater Management				
Design storm	0.025	m/24 hours		Relatively large storm, recurs 4 to 5 times per year
Open excavation area	1,495	m^2		Design plans
Volume captures from one storm	37,375	L		
Estimated Flows to be Managed				
Applied equation from main excavation	$Q_{GW} = K * (H^2 - h_T^2) / (5.31 \times 10^{-6} * \ln((R_O+R_W)/R_W))$			Powers et. al, 2007
Groundwater seepage, with safety factor	5.9	litres/min	Q_{GW}	Calculated from values in this sheet
Change of units	8,424	litres/day	Q_{GW}	
Safety factor	2			Allows for unknown conditions between boreholes or beyond the excavation walls
Groundwater seepage, with safety factor	16,800	litres/day		= Safety Factor x Q_{GW}. Rounded value.
Groundwater seepage, with safety factor and large storm event	54,175	litres/day		
Applicable Regulatory Instrument	**EASR**			MECP, O.Reg 245/11, O.Reg 387/04; OWRA S.41

Table 5
Summary of Stratigraphy
450 Dufferin Street, Toronto

Well ID	MW101	MW102	MW103	MW104
Grade Elev. (masl)	94.8	94.3	94.6	94.3
Base of Fill (mbg)	1.5	1.1	1.5	1.7
Depth (mbg)				
0 - 1	Fill	Fill	Fill	Fill
1 - 2	Fill	Silty sand	Fill	Fill
2 - 3	Silty sand	Silty clay	Silty clay	Silty clay
3 - 4	Silty clay	Silty clay	Silty clay	Silty clay
4 - 5	Silty clay	Silty clay	Silty clay	Silty clay
5 - 6	Silty clay	Silty clay	Silty clay	Silty clay
6 - 7	Silty clay	Silty clay	Silty clay	Silty clay
7 - 8	Silty clay	Silty sand	Silty clay	Sandy silt
8 - 9	Sandy silt	Sandy silt	Sandy silt	Clayey silt
9 - 10	Clayey silt	Sandy silt	Clayey silt	Clayey silt
10 - 11	Clayey silt	Sandy silt	Clayey silt	Clayey silt
11 - 12	Clayey silt	Sandy silt	Clayey silt	-
12 - 13	Sand and silt	-	Clayey silt	-
13 - 14	-	-	Clayey silt	-
Depth of bedrock	12.9	11.4	13.7	-

Notes

1. mbg = metres below ground
2. masl = metres above sea level
3. Any layer with thickness or portion less than 0.5 m is not included.
4. See individual logs for detailed stratigraphy and description. This table is a summary.

APPENDIX III
BOREHOLE RECORDS AND GRAIN SIZE DISTRIBUTIONS

CLIENT: HM RK (450 Dufferin) LP	PROJECT NO.: CT3580.00	**RECORD OF:**	
ADDRESS: 450 Dufferin Street		**MW101**	
CITY/PROVINCE: Toronto, ON	NORTHING (m): 4833678.73	EASTING (m): 626596.23	ELEV. (m) 94.77
CONTRACTOR: Profile Drilling Inc.	METHOD: Hollow Stem Auger + Mud Rotary + Split Spoon Sampling		
BOREHOLE DIAMETER (cm): 20	WELL DIAMETER (cm): 5	SCREEN SLOT #: 10	SAND TYPE: 2	SEALANT TYPE: 2

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

GWL (m)	SOIL SYMBOL	SOIL DESCRIPTION	DEPTH (m)	ELEVATION (m)	SHEAR STRENGTH (kPa) 40 80 120 160 / N-VALUE (Blows/300mm) 20 40 60 80	WATER CONTENT (%) PL W.C. LL 20 40 60 80	SAMPLE NO.	SAMPLE TYPE	RECOVERY (%)	SV/TOV (ppm or %LEL) (new title)	LABORATORY TESTING	WELL INSTALLATION	REMARKS
		Asphalt (50mm)	0	94.5	12	13 25	1A		79	15/1	M&I		Field duplicate: MW1000 (M&I) Field duplicate: MW3000 (PAHs)
		compact to very loose, moist dark brown sand and gravel some organics with construction debris (FILL)	0.5	94			1B			<5/0	PHCs/ BTEX PAHs		
			1		2	44	2		50	<5/1			50mm monitoring well was installed. water level measured on August 23, 2022: 8.70 mbg September 6, 2022: 8.63 mbg September 21, 2022: 7.86 mbg
			1.5	93.5									
		compact, wet, brown SAND trace to some silt, trace clay	2	93	14		3		8	<5/1			
			2.5	92.5	22	21	4A		100	<5/0	PHCs/ BTEX VOCs pH		Field duplicate: MW2000 (PHCs/BTEX, VOCs, pH)
		stiff to hard, moist CLAYEY SILT trace to some gravel trace to some sand (TILL)	3	92		14	4B			<5/1			
			3.5	91.5	19	15	5		83	<5/0			Bentonite
		brown/grey	4	91	13	12	6		71	<5/1			
			4.5	90.5									
			5	90									
		----------	5.5	89.5	12	14	7		100	<5/1			
			6	89									
		grey	6.5	88.5									
			7	88	65/150	14	8		100	30/0			Sand
			7.5	87.5									Screen + Sand
		very dense, moist, grey SANDY SILT some gravel to gravelly, some clay (TILL)	8	87	73/250	7	9		100	15/0			
			8.5	86.5	50/25		10		0				
			9	86									

TERRAPEX

LOGGED BY: EL	DRILLING DATE: 11-Aug-22
INPUT BY: EL/EMZ	MONITORING DATE: 06-September-2022
REVIEWED BY: SJS/KC	PAGE 1 OF 2

CLIENT: HM RK (450 Dufferin) LP	PROJECT NO.: CT3580.00	**RECORD OF: MW101**
ADDRESS: 450 Dufferin Street		
CITY/PROVINCE: Toronto, ON	NORTHING (m): 4833678.73	EASTING (m): 626596.23 ELEV. (m) 94.77
CONTRACTOR: Profile Drilling Inc.	METHOD: Hollow Stem Auger + Mud Rotary + Split Spoon Sampling	
BOREHOLE DIAMETER (cm): 20	WELL DIAMETER (cm): 5	SCREEN SLOT #: 10 SAND TYPE: 2 SEALANT TYPE: 2

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

GWL (m)	SOIL SYMBOL	SOIL DESCRIPTION	DEPTH (m)	ELEVATION (m)	SHEAR STRENGTH (kPa) 40 80 120 160 N-VALUE (Blows/300mm) 20 40 60 80	WATER CONTENT (%) PL W.C. LL 20 40 60 80	SAMPLE NO.	SAMPLE TYPE	RECOVERY (%)	SV/TOV (ppm or %LEL) (new title)	LABORATORY TESTING	WELL INSTALLATION	REMARKS
		hard, moist, grey SANDY CLAYEY SILT some gravel to gravelly (TILL)	9.5	85.5									
			10	85									
			10.5	84.5									
			11	84	50/150	8	11		67				
			11.5	83.5									
			12	83									
			12.5	82.5	50/25	11	12		0				
			13	82	50/75	13	13		100				
		grey, weathered SHALE											
		END OF BOREHOLE											

TERRAPEX

LOGGED BY: EL	DRILLING DATE: 11-Aug-22
INPUT BY: EL/EMZ	MONITORING DATE: 06-September-2022
REVIEWED BY: SJS/KC	PAGE 2 OF 2

CLIENT: HM RK (450 Dufferin) LP		PROJECT NO.: CT3580.00	**RECORD OF: MW102**
ADDRESS: 450 Dufferin Street			
CITY/PROVINCE: Toronto, ON	NORTHING (m): 4833666.05	EASTING (m): 626618.70	ELEV. (m) 94.32
CONTRACTOR: Profile Drilling Inc.	METHOD: Hollow Stem Auger + Split Spoon Sampling		
BOREHOLE DIAMETER (cm): 20	WELL DIAMETER (cm): 5	SCREEN SLOT #: 10	SAND TYPE: 2	SEALANT TYPE: 2

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

SOIL DESCRIPTION	DEPTH (m)	ELEVATION (m)	SAMPLE NO.	SAMPLE TYPE	RECOVERY (%)	SV/TOV (ppm or %LEL) (new title)	LABORATORY TESTING	WELL INSTALLATION	REMARKS
Asphalt (25mm)	0	94	1A		54	75/0	PHCs/ BTEX PAHs M&I		Bentonite
loose, black/dark brown, moist gravelly sand occasional clay pockets some organics, construction debris (FILL)	0.5		1B		26				50mm monitoring well was installed. water level measured on August 23, 2022: 1.86 mbg September 6, 2022: 4.40 mbg September 21, 2022: 4.61 mbg
loose to compact, moist to wet, brown SAND trace to some silt, trace clay	1	93.5	2		71	40/0			
	1.5	93							
	2	92.5	3		0				
firm to very stiff, moist, grey CLAYEY SILT trace to some gravel trace to some sand (TILL)	2.5	92	4		100	25/0	PHCs/ BTEX VOCs pH		Field Duplicate: MW4000 (PHCs/BTEX, VOCs, pH)
	3	91.5							
	3.5	91	5		33	60/1			Sand
	4	90.5	6		100	30/0			Screen + Sand
	4.5	90							
	5	89.5	7		63	25/1			
	5.5	89							
	6	88.5	8		100	20/0			
	6.5	88	9		54	55/0			
dense, moist, grey SILTY SAND some gravel, trace clay (TILL)	7	87.5	10A		71	35/0			
	7.5	87	10B			35/0			
dense, moist, grey SANDY SILT some gravel to gravelly, some clay (TILL)	8	86.5							
	8.5	86	11		100				
	9	85.5							

SHEAR STRENGTH (kPa) 40 80 120 160 | N-VALUE (Blows/300mm) 20 40 60 80

WATER CONTENT (%) PL W.C. LL 20 40 60 80

TERRAPEX	LOGGED BY: EL	DRILLING DATE: 12-Aug-22
	INPUT BY: EL/EMZ	MONITORING DATE: 06-September-2022
	REVIEWED BY: SJS/KC	PAGE 1 OF 2

CLIENT: HM RK (450 Dufferin) LP	PROJECT NO.: CT3580.00	**RECORD OF: MW102**
ADDRESS: 450 Dufferin Street		
CITY/PROVINCE: Toronto, ON	NORTHING (m): 4833666.05	EASTING (m): 626618.70 ELEV. (m) 94.32
CONTRACTOR: Profile Drilling Inc.	METHOD: Hollow Stem Auger + Split Spoon Sampling	
BOREHOLE DIAMETER (cm): 20	WELL DIAMETER (cm): 5	SCREEN SLOT #: 10 SAND TYPE: 2 SEALANT TYPE: 2

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

GWL (m)	SOIL SYMBOL	SOIL DESCRIPTION	DEPTH (m)	ELEVATION (m)	SHEAR STRENGTH (kPa) 40 80 120 160 N-VALUE (Blows/300mm) 20 40 60 80	WATER CONTENT (%) PL W.C. LL 20 40 60 80	SAMPLE NO.	SAMPLE TYPE	RECOVERY (%)	SV/TOV (ppm or %LEL) (new title)	LABORATORY TESTING	WELL INSTALLATION	REMARKS
		very dense, moist, grey SANDY SILT some gravel to gravelly, some clay (TILL)	9.5	85									
			10	84.5	61	7	12		100				
			10.5	84									
			11	83.5	87/250	5	13		75				
				83		11							
		grey, weathered SHALE	11.5		50/50		14		100				
		END OF BOREHOLE											

TERRAPEX

LOGGED BY: EL	DRILLING DATE: 12-Aug-22
INPUT BY: EL/EMZ	MONITORING DATE: 06-September-2022
REVIEWED BY: SJS/KC	PAGE 2 OF 2

CLIENT: HM RK (450 Dufferin) LP	PROJECT NO.: CT3580.00	**RECORD OF: MW103D**
ADDRESS: 450 Dufferin Street		
CITY/PROVINCE: Toronto, ON	NORTHING (m): 4833683.62	EASTING (m): 626613.52 ELEV. (m) 94.65
CONTRACTOR: Profile Drilling Inc.	METHOD: Hollow Stem Auger + Split Spoon Sampling	
BOREHOLE DIAMETER (cm): 20	WELL DIAMETER (cm): 5	SCREEN SLOT #: 10 SAND TYPE: 2 SEALANT TYPE: 2

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

GWL (m)	SOIL SYMBOL	SOIL DESCRIPTION	DEPTH (m)	ELEVATION (m)	SHEAR STRENGTH (kPa) ● 40 80 120 160 N-VALUE ▲ (Blows/300mm) 20 40 60 80	WATER CONTENT (%) PL W.C. LL 20 40 60 80	SAMPLE NO.	SAMPLE TYPE	RECOVERY (%)	SV/TOV (ppm or %LEL) (new title)	LABORATORY TESTING	WELL INSTALLATION	REMARKS
		Asphalt (40mm)	0	94.5	5	9	1		25	130/1	PHCs/ BTEX PAHs M&I	Bentonite	
		loose, moist, brown gravelly sand trace construction debris (FILL)	0.5	94	8	13 8 9	2A 2B 2C		54	115/0 95/0 110/0			50mm monitoring well was installed. water level measured on August 23, 2022: 5.17 mbg September 6, 2022: 4.93 mbg September 21, 2022: 4.92 mbg
		stiff, moist, brown/dark brown silty clay trace organics (FILL)	1	93.5									
		loose, moist, brown SAND trace to some silt, trace clay	1.5	93	8	20	3		50	125/1			
		soft to very stiff, moist, grey CLAYEY SILT trace to some gravel trace to some sand (TILL)	2	92.5									
			2.5	92	17	18	4		67	135/1	PHCs/ VOCs		
			3	91.5		14							
			3.5	91	13		5		42	90/0			
			4	90.5	6	13	6		75	70/0			
			4.5	90									
			5	89.5	6	13	7		54	50/1			
			5.5	89	6	13	8		54	50/0			
			6	88.5		17							
			6.5	88	2		9		92	<5/0			
			7	87.5	14	9	10		100	65/0			
			7.5	87									
		dense to very dense, moist, grey SANDY SILT some gravel to gravelly, some clay (TILL)	8	86.5	41	5	11		94				
			8.5	86	56	6	12		92				
			9	85.5									

TERRAPEX

LOGGED BY: EL	DRILLING DATE: 15 and 16-Aug-22
INPUT BY: EL/EMZ	MONITORING DATE: 06-September-2022
REVIEWED BY: SJS/KC	PAGE 1 OF 2

CLIENT: HM RK (450 Dufferin) LP | PROJECT NO.: CT3580.00 | **RECORD OF: MW103D**

ADDRESS: 450 Dufferin Street

CITY/PROVINCE: Toronto, ON | NORTHING (m): 4833683.62 | EASTING (m): 626613.52 | ELEV. (m) 94.65

CONTRACTOR: Profile Drilling Inc. | METHOD: Hollow Stem Auger + Split Spoon Sampling

BOREHOLE DIAMETER (cm): 20 | WELL DIAMETER (cm): 5 | SCREEN SLOT #: 10 | SAND TYPE: 2 | SEALANT TYPE: 2

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

GWL (m)	SOIL SYMBOL	SOIL DESCRIPTION	DEPTH (m)	ELEVATION (m)	SHEAR STRENGTH (kPa) / N-VALUE (Blows/300mm)	WATER CONTENT (%) PL W.C. LL	SAMPLE NO.	SAMPLE TYPE	RECOVERY (%)	SV/TOV (ppm or %LEL) (new title)	LABORATORY TESTING	WELL INSTALLATION	REMARKS
		hard, moist, grey SANDY CLAYEY SILT some gravel to gravelly (TILL)	9.5	85									
			10	84.5	50/100	8	13		100				Sand
			10.5	84									Screen + Sand
			11	83.5									
			11.5	83	50/50	1	14		25				
			12	82.5	50/75	1	15		100				
			12.5	82									
			13	81.5	50/50	3	16		100				
			13.5	81	50/100	11	17		100				
		grey, weathered SHALE											
		END OF BOREHOLE											

TERRAPEX

LOGGED BY: EL | DRILLING DATE: 15 and 16-Aug-22

INPUT BY: EL/EMZ | MONITORING DATE: 06-September-2022

REVIEWED BY: SJS/KC |

CLIENT: HM RK (450 Dufferin) LP		PROJECT NO.: CT3580.00	**RECORD OF: MW103I**
ADDRESS: 450 Dufferin Street			
CITY/PROVINCE: Toronto, ON	NORTHING (m): 4833683.93	EASTING (m): 626612.68	ELEV. (m) 94.60
CONTRACTOR: Profile Drilling Inc.	METHOD: Hollow Stem Auger		
BOREHOLE DIAMETER (cm): 20	WELL DIAMETER (cm): 5	SCREEN SLOT #: 10	SAND TYPE: 2	SEALANT TYPE: 2

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

GWL (m)	SOIL SYMBOL	SOIL DESCRIPTION	DEPTH (m)	ELEVATION (m)	SHEAR STRENGTH (kPa) ● 40 80 120 160 N-VALUE (Blows/300mm) ▲ 20 40 60 80	WATER CONTENT (%) PL W.C. LL 20 40 60 80	SAMPLE NO.	SAMPLE TYPE	RECOVERY (%)	SV/TOV (ppm or %LEL) (new title)	LABORATORY TESTING	WELL INSTALLATION	REMARKS
		Straight drilled to 9.14 mbg to install the monitoring well	0	94.5									Bentonite
			0.5	94									50mm monitoring well was installed. water level measured on August 23, 2022: Dry September 6, 2022: Dry September 21, 2022: Dry
			1	93.5									
			1.5	93									
			2	92.5									
			2.5	92									
			3	91.5									
			3.5	91									
			4	90.5									
			4.5	90									
			5	89.5									
			5.5	89									
			6	88.5									
			6.5	88									
			7	87.5									Sand
			7.5	87									Screen + Sand
			8	86.5									
			8.5	86									
			9	85.5									

TERRAPEX

LOGGED BY: EL	DRILLING DATE: 16-Aug-22
INPUT BY: EL/EMZ	MONITORING DATE: 06-September-2022
REVIEWED BY: SJS/KC	PAGE 1 OF 2

CLIENT: HM RK (450 Dufferin) LP		PROJECT NO.: CT3580.00	**RECORD OF: MW103I**
ADDRESS: 450 Dufferin Street			
CITY/PROVINCE: Toronto, ON	NORTHING (m): 4833683.93	EASTING (m): 626612.68	ELEV. (m) 94.60
CONTRACTOR: Profile Drilling Inc.	METHOD: Hollow Stem Auger		
BOREHOLE DIAMETER (cm): 20	WELL DIAMETER (cm): 5	SCREEN SLOT #: 10	SAND TYPE: 2	SEALANT TYPE: 2

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

GWL (m)	SOIL SYMBOL	SOIL DESCRIPTION	DEPTH (m)	ELEVATION (m)	SHEAR STRENGTH (kPa) 40 80 120 160 / N-VALUE (Blows/300mm) 20 40 60 80	WATER CONTENT (%) ▲ PL W.C. LL 20 40 60 80	SAMPLE NO.	SAMPLE TYPE	RECOVERY (%)	SV/TOV (ppm or %LEL) (new title)	LABORATORY TESTING	WELL INSTALLATION	REMARKS
		END OF BOREHOLE											

TERRAPEX	LOGGED BY: EL	DRILLING DATE: 16-Aug-22
	INPUT BY: EL/EMZ	MONITORING DATE: 06-September-2022
	REVIEWED BY: SJS/KC	PAGE 2 OF 2

CLIENT: HM RK (450 Dufferin) LP		PROJECT NO.: CT3580.00	**RECORD OF: MW103S**
ADDRESS: 450 Dufferin Street			
CITY/PROVINCE: Toronto, ON	NORTHING (m): 4833685.09	EASTING (m): 626613.00	ELEV. (m) 94.62
CONTRACTOR: Profile Drilling Inc.	METHOD: Hollow Stem Auger		
BOREHOLE DIAMETER (cm): 20	WELL DIAMETER (cm): 5	SCREEN SLOT #: 10	SAND TYPE: 2	SEALANT TYPE: 2

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

GWL (m)	SOIL SYMBOL	SOIL DESCRIPTION	DEPTH (m)	ELEVATION (m)	SHEAR STRENGTH (kPa) ● 40 80 120 160 / N-VALUE (Blows/300mm) ▲ 20 40 60 80	WATER CONTENT (%) PL W.C. LL 20 40 60 80	SAMPLE NO.	SAMPLE TYPE	RECOVERY (%)	SV/TOV (ppm or %LEL) (new title)	LABORATORY TESTING	WELL INSTALLATION	REMARKS
		Straight drilled to 6.1 mbg to install the monitoring well	0	94.5								Bentonite	
			0.5	94									50mm monitoring well was installed. water level measured on August 23, 2022: Dry September 6, 2022: 5.90 mbg September 21, 2022: 5.41 mbg
			1	93.5									
			1.5	93									
			2	92.5									
			2.5	92									
			3	91.5								Sand	
			3.5	91								Screen + Sand	
			4	90.5									
			4.5	90									
			5	89.5									
			5.5	89									
			6										
		END OF BOREHOLE											

TERRAPEX

LOGGED BY: EL	DRILLING DATE: 16-Aug-22
INPUT BY: EL/EMZ	MONITORING DATE: 06-September-2022
REVIEWED BY: SJS/KC	PAGE 1 OF 1

CLIENT: HM RK (450 Dufferin) LP	PROJECT NO.: CT3580.00	**RECORD OF:**	
ADDRESS: 450 Dufferin Street		**MW104D**	
CITY/PROVINCE: Toronto, ON	NORTHING (m): 4833657.17	EASTING (m): 626599.29	ELEV. (m) 94.29
CONTRACTOR: Profile Drilling Inc.	METHOD: Hollow Stem Auger + Split Spoon Sampling		
BOREHOLE DIAMETER (cm): 20	WELL DIAMETER (cm): 5	SCREEN SLOT #: 10	SAND TYPE: 2	SEALANT TYPE: 2

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

GWL (m)	SOIL SYMBOL	SOIL DESCRIPTION	DEPTH (m)	ELEVATION (m)	SHEAR STRENGTH (kPa) / N-VALUE (Blows/300mm)	WATER CONTENT (%) PL W.C. LL	SAMPLE NO.	SAMPLE TYPE	RECOVERY (%)	SV/TOV (ppm or %LEL) (new title)	LABORATORY TESTING	WELL INSTALLATION	REMARKS
		Asphalt (40mm)	0	94	9	11	1A		79	50/0		Bentonite	
		loose, moist, dark brown gravelly sand with brick fragments (FILL)	0.5				1B			50/0	M&I		
		firm to stiff, moist, brown/black clayey silt trace organics (FILL)	1	93.5	5	16	1C			40/1	PHCs/ BTEX PAHs		50mm monitoring well was installed. water level measured on August 23, 2022: 8.07 mbg September 6, 2022: 5.18 mbg September 21, 2022: 5.10 mbg
			1.5	93	10	19	2		17	35/0			
		firm to stiff, moist CLAYEY SILT trace to some gravel trace to some sand (TILL)	2	92.5	23	22	3A		96	<5/1	PHCs/ BTEX		
			2.5	92		16	3B			5/1			
		brown/grey	3	91.5	12	13	4		71	20/0			
		----------	3.5	91	14	14	5		100	<5/1			
			4	90.5	6	12	6		54	<5/1			
			4.5	90									
		grey	5	89.5	9	14	7		100	5/0			
			5.5	89	16	14	8		54	<5/1	PHCs/ VOCs		
		compact to dense, moist, grey SANDY SILT some gravel to gravelly, some clay (TILL)	6	88.5	29	4	9		33	5/1			
			6.5	88		7	10		83				Sand
			7	87.5	33	4	11		100				Screen + Sand
		hard, moist, grey SANDY CLAYEY SILT some gravel to gravelly (TILL)	7.5	87	50/75	16	12		44				
			8	86.5									
			8.5	86									
			9	85.5									

TERRAPEX

LOGGED BY: EL	DRILLING DATE: 17-Aug-22
INPUT BY: EL/EMZ	MONITORING DATE: 06-September-2022
REVIEWED BY: SJS/KC	PAGE 1 OF 2

CLIENT: HM RK (450 Dufferin) LP		PROJECT NO.: CT3580.00	**RECORD OF: MW104D**
ADDRESS: 450 Dufferin Street			
CITY/PROVINCE: Toronto, ON	NORTHING (m): 4833657.17	EASTING (m): 626599.29	ELEV. (m) 94.29
CONTRACTOR: Profile Drilling Inc.	METHOD: Hollow Stem Auger + Split Spoon Sampling		
BOREHOLE DIAMETER (cm): 20	WELL DIAMETER (cm): 5	SCREEN SLOT #: 10	SAND TYPE: 2	SEALANT TYPE: 2

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

GWL (m)	SOIL SYMBOL	SOIL DESCRIPTION	DEPTH (m)	ELEVATION (m)	SHEAR STRENGTH (kPa) 40 80 120 160 N-VALUE (Blows/300mm) 20 40 60 80	WATER CONTENT (%) ▲ PL W.C. LL 20 40 60 80	SAMPLE NO.	SAMPLE TYPE	RECOVERY (%)	SV/TOV (ppm or %LEL) (new title)	LABORATORY TESTING	WELL INSTALLATION	REMARKS
		hard, moist, grey SANDY CLAYEY SILT some gravel to gravelly (TILL)	9.5	85									
				84.5									
			10		82/275	11	13		76				
				84									
		END OF BOREHOLE											

TERRAPEX

LOGGED BY: EL	DRILLING DATE: 17-Aug-22
INPUT BY: EL/EMZ	MONITORING DATE: 06-September-2022
REVIEWED BY: SJS/KC	PAGE 2 OF 2

CLIENT: HM RK (450 Dufferin) LP		PROJECT NO.: CT3580.00	**RECORD OF: MW104S**
ADDRESS: 450 Dufferin Street			
CITY/PROVINCE: Toronto, ON	NORTHING (m): 4833656.49	EASTING (m): 626599.15	ELEV. (m) 94.30
CONTRACTOR: Profile Drilling Inc.	METHOD: Hollow Stem Auger		
BOREHOLE DIAMETER (cm): 20	WELL DIAMETER (cm): 5	SCREEN SLOT #: 10	SAND TYPE: 2	SEALANT TYPE: 2

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

GWL (m)	SOIL SYMBOL	SOIL DESCRIPTION	DEPTH (m)	ELEVATION (m)	SHEAR STRENGTH (kPa) ● 40 80 120 160 N-VALUE (Blows/300mm) ▲ 20 40 60 80	WATER CONTENT (%) PL W.C. LL 20 40 60 80	SAMPLE NO.	SAMPLE TYPE	RECOVERY (%)	SV/TOV (ppm or %LEL) (new title)	LABORATORY TESTING	WELL INSTALLATION	REMARKS
		Straight drilled to 4.0 mbg to install the monitoring well	0 0.5 1 1.5 2 2.5 3 3.5	94 93.5 93 92.5 92 91.5 91 90.5								Bentonite Sand Screen + Sand	50mm monitoring well was installed. water level measured on August 23, 2022: Dry September 6, 2022: 2.98 mbg September 21, 2022: 1.78 mbg
		END OF BOREHOLE											

TERRAPEX

LOGGED BY: EL	DRILLING DATE: 17-Aug-22
INPUT BY: EL/EMZ	MONITORING DATE: 06-September-2022
REVIEWED BY: SJS/KC	PAGE 1 OF 1

Log of Borehole: MW1

Project #: 268429.002 **Logged By:** MG

Project: Preliminary Geotechnical Investigation

Client: Hullmark Developments

Location: 450 Dufferin Street, Toronto, Ontario

Drill Date: February 20, 2020 **Project Manager:** AJS

Depth (m)	Description	Elevation (m)	Sample Type	Sampler #	Recovery (%)	SPT N-Value	Water Content (%)
0	Ground Surface	94.29					
0	**Asphalt** ~150 mm	0.00	SS	1	91	32	21.8
0.76	**Fill** Brown Sand and Gravel, damp, dense	93.53	SS	2	54	6	22.2
1.52	Brown Silty Sand, trace clay, trace glass fragments, moist, dense	92.77	SS	3	83	25	15.9
	Silty Clay Till Greyish brown Silty Clay, some sand, trace, gravel, APL, firm		SS	4	87	39	15.0
3.81	Becoming very stiff to hard	90.48	SS	5	100	16	17.6
	Becoming grey		SS	6	58	21	13.1
			SS	7	18	20	15.7
			SS	8	58	16	10.9
7.62	**Gravel** Grey Gravel, very dense	86.67	SS	9	9	>50	
9.14	**No Recovery**	85.15	SS	10	0	>50	
	End of Borehole						

Standard Penetration N-Value: 20, 40, 60

Shear Strength △ kPa △: 100, 200

Monitoring Well Details: Riser, Bentonite, Silca Sand, Screen

Monitoring well was dry on February 27, 2020.

Borehole terminated at 9.14 mbgs onsplit spoon refusal. At drilling completion, a dry cave was measured at 8.80 mbgs.

Contractor: Geo-Environmental Drilling Inc.

Grade Elevation: 94.29 masl

Drilling Method: Hollow Stem Auger/ Split Spoon

Top of Casing Elevation: 94.20 masl

Well Casing Size: 51 mm

Sheet: 1 of 1

Log of Borehole: MW02

Project #: 268429.001 **Logged By:** MG

Project: Phase II Environmental Site Assessment

Client: Hullmark Developments

Location: 450 Dufferin Street, Toronto, Ontario

Drill Date: February 20, 2020

SUBSURFACE PROFILE					SAMPLE			
Depth (ft / m)	Symbol	Description	Measured Depth (m)	Monitoring Well Details	Recovery (%)	Sample ID	Soil Vapour Concentration* (ppm) CGI/PID	Laboratory Analysis
0 / 0		Ground Surface	94.46					
		Asphalt	0.00		50	SS1	70/6	Metals
2		***Fill***	93.70					
3 / 1		Sand and gravel fill, brown, trace glass pieces, damp, no odour or staining	0.76		33	SS2	0/0	pH
5			92.94					
		Silty Sand Till	1.52		57	SS3	0/0	
6 / 2		Brown, trace gravel, moist						
		Clayey Silt Till			67	SS4	0/0	PHC, VOC, PAHs
9		Grey-brown, trace gravel, moist						
10 / 3		Orange mottling, trace sand from 2.29 mbgs to 3.05 mbgs			63	SS5	0/0	
12								
13 / 4		Grey, moist to wet at 3.05 mbgs			33	SS6	0/0	
15								
16 / 5					43	SS7	0/0	
17			89.12					
18		***Silty Clay Till***	5.33		67	SS8	0/0	
19 / 6		Grey, trace gravel, moist	88.36					
20		***Sandy Silt Till***	6.10		73	SS9	0/0	
21		Grey, trace gravel, moist to wet						
23 / 7					53	SS10	0/0	pH, Grain Size
24			86.84					
25		***Clayey Silt Till***	7.62		50	SS11	0/0	
26 / 8		Trace gravel and sand, moist	86.22					
27			8.23					
28		End of Borehole						
29 / 9								
32								

Riser, Bentonite, Screen, Silica Sand, Bentonite

Groundwater measured at 5.60 mbgs on March 6, 2020.

Contractor: Geo-Environmental Drilling Inc.

Drilling Method: Split spoon/ Hollow Stem

Well Casing Size: 5.08 cm

Note:
* Soil vapour concentrations measured using a RKI Eagle 2 equipped with a combustible gas indicator (CGI) and a photoionization detector (PID).

Grade Elevation: 94.455

Top of Casing Elevation: 94.366

Sheet: 1 of 1

Log of Borehole: MW03

Project #: 268429.001 **Logged By:** MG

Project: Phase II Environmental Site Assessment

Client: Hullmark Developments

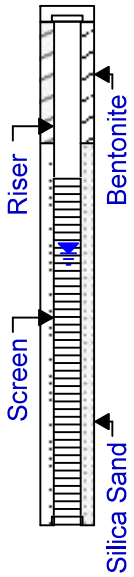
Location: 450 Dufferin Street, Toronto, Ontario

Drill Date: February 21, 2020

SUBSURFACE PROFILE

Depth (ft / m)	Symbol	Description	Measured Depth (m)
0 / 0		Ground Surface	94.67
0 / 0		***Asphalt***	0.00
1 / 0		***Fill*** Sand and gravel fill, brown, trace clay, trace glass and brick fragments, damp, no staining, organic odour from 0.76 mbgs to 1.52 mbgs	
2 / 1			
3 / 1			
4 / 1			
5 / 1			
6 / 2			
7 / 2			92.38
8 / 2		Silty sand fill at 1.52 mbgs, brown, trace gravel and rootlets, moist from 1.52 mbgs	2.29
9 / 2			
10 / 3		***Clayey Silt Till*** Brown, trace gravel, damp, brown mottling from 2.29 mbgs, moist	
11 / 3			
12 / 3			90.86
13 / 4			3.81
14 / 4		***Silty Clay Till*** Grey, trace gravel, moist, malleable from 3.81 mbgs to 6.10 mbgs	
15 / 4			
16 / 5			
17 / 5			
18 / 5			
19 / 6		Moist to wet from 6.10 mbgs to 6.86 mbgs	
20 / 6			
21 / 6			
22 / 6			87.81
23 / 7		***Silty Sand Till*** Grey, trace gravel, moist	6.86
24 / 7			
25 / 7			
26 / 8			
27 / 8			86.44
28 / 8		End of Borehole	8.23
29 / 9			
30 / 9			
31 / 9			
32 / 9			

Monitoring Well Details



Groundwater measured at 2.18 mbgs on February 27, 2020

SAMPLE

Recovery (%)	Sample ID	Soil Vapour Concentration* (ppm) CGI/PID	Laboratory Analysis
67	SS1	45/0	
53	SS2	20/1	PAHs, Metals
43	SS3	0/0	
73	SS4	70/2	PHCs, VOCs
77	SS5	0/0	
60	SS6	0/0	
77	SS7	0/0	
73	SS8	0/0	
63	SS9	0/0	
63	SS10	0/0	
	SS11	0/0	

Contractor: Geo-Environmental Drilling Inc.

Drilling Method: Split spoon/ Hollow Stem

Well Casing Size: 5.08 cm

Note:
* Soil vapour concentrations measured using a RKI Eagle 2 equipped with a combustible gas indicator (CGI) and a photoionization detector (PID).

Grade Elevation: 94.668

Top of Casing Elevation: 94.602

Sheet: 1 of 1

Log of Borehole: MW04

Project #: 268429.001 **Logged By:** MG

Project: Phase II Environmental Site Assessment

Client: Hullmark Developments

Location: 450 Dufferin Street, Toronto, Ontario

Drill Date: February 24, 2020

SUBSURFACE PROFILE

Depth (ft / m)	Symbol	Description	Measured Depth (m)
0 / 0		Ground Surface	94.67
		Asphalt	0.00
1 / 1		***Fill*** Sand and gravel fill, brown, moist, no odour or staining Trace brick fragments and rootlets at 0.76 mbgs, moist, organic odour from 0.76 mbgs to 1.52 mbgs	92.15
2 / 2		***Clayey Silt Till*** Brown, trace gravel, moist from 1.52 mbgs to 2.29 mbgs Grey at 3.05 mbgs, moist to wet from 3.05	1.52
3 / 4			90.10
5 / 5		***Silty Clay Till*** Grey, trace gravel, wet from 4.57	4.57 89.34
6 / 6		***Clayey Silt Till*** Grey, trace gravel, wet	5.33 88.57
		End of Borehole	6.10

Monitoring Well Details: Riser, Bentonite, Screen, Silica Sand

Monitoring well was destroyed at the time of sampling

SAMPLE

Recovery (%)	Sample ID	Soil Vapour Concentration* (ppm) CGI/PID	Laboratory Analysis
47	SS1	75/1	
47	SS2	85/3	PAHs, Metals
57	SS3	70/3	PHCs, VOCs
53	SS4	30/3	Grain Size
70	SS5	0/1	
30	SS6	0/1	
	SS7	0/2	
	SS8	0/0	

Contractor: Geo-Environmental Drilling Inc.

Drilling Method: Split spoon/ Hollow Stem

Well Casing Size: 5.08 cm

Note:
* Soil vapour concentrations measured using a RKI Eagle 2 equipped with a combustible gas indicator (CGI) and a photoionization detector (PID).

Grade Elevation: 94.668

Top of Casing Elevation: NM

Sheet: 1 of 1

Log of Borehole: MW5

Project #: 268429.002 **Logged By:** MG

Project: Preliminary Geotechnical Investigation

Client: Hullmark Developments

Location: 450 Dufferin Street, Toronto, Ontario

Drill Date: February 21, 2020 **Project Manager:** AJS

Depth (m)	Description	Elevation (m)	Sample Type	Sampler #	Recovery (%)	SPT N-Value	Water Content (%)
0	Ground Surface	94.70					
	Asphalt ~150 mm	0.00 / 93.94	SS	1	95	15	17.3
1	**Fill** Brown Sand and Gravel, trace silt, trace glass and brick fragments, damp, compact	0.76 / 93.18	SS	2	66	6	38.6
2	Brown Sandy Silt, trace gravel, trace brick fragments, damp, loose	1.52	SS	3	75	7	22.5
			SS	4	79	10	16.5
3	**Sandy Clayey Silt Till** Brown Sandy Clayey Silt, some gravel, APL, firm to very stiff		SS	5	92	16	17.3
4		90.89 / 3.81	SS	6	70	12	13.5
	Becoming grey						
5			SS	7	75	12	17.5
			SS	8	50	7	19.9
6			SS	9	54	8	15.7
7		87.08					
8	**Sandy Silt Till** Grey Sandy Silt, some gravel, damp, very dense	7.62	SS	10	87	>95	5.3
9		85.56					
	Sandy Clayey Silt Till Grey Sandy Clayey Silt, some gravel, hard	9.14	SS	11	100	45	6.8
10							
11			SS	12	100	>50	9.5
		83.09					
12	End of Borehole	11.61	SS	13	100	>50	
13	Borehole terminated at 11.61 mbgs on split spoon refusal. At drilling completion, a dry cave was measured at 9.45 mbgs.						
14							

Monitoring Well Details: Riser; Bentonite; Screen; Silica Sand; Bentonite

Water level = 6.98 mbgs, as measured on Feb 27, 2020.

Standard Penetration N-Value: 20, 40, 60

Shear Strength: kPa 100 200

Sample ID

Soil Vapour Concentration (ppm)

Laboratory Analysis

Contractor: Geo-Environmental Drilling Inc. **Grade Elevation:** 94.70 masl

Drilling Method: Hollow Stem Auger/ Split Spoon **Top of Casing Elevation:** 94.53 masl

Well Casing Size: 51 mm **Sheet:** 1 of 1

Log of Borehole: MW6

Project #: 268429.002 **Logged By:** MG

Project: Preliminary Geotechnical Investigation

Client: Hullmark Developments

Location: 450 Dufferin Street, Toronto, Ontario

Drill Date: February 24, 2020 **Project Manager:** AJS

Depth (m)	Description	Elevation (m)	Sample Type	Sampler #	Recovery (%)	SPT N-Value	Water Content (%)
0	Ground Surface	94.25					
	Asphalt ~50 mm	0.00 / 93.49	SS	1	87	4	30.9
1	**Fill** Brown Sand, trace gravel, some silt, trace asphalt fragments, trace rootlets, damp, loose	0.76 / 92.73	SS	2	70	5	20.8
2	Brown Silty Sand, moist, loose	1.52 / 91.96	SS	3	62	18	14.9
	Brown Silt, some clay, very moist, compact	2.29	SS	4	87	30	15.4
3	**Clayey Silt Till** Clayey Silt, trace to some sand, trace gravel, APL, stiff to very stiff	90.44	SS	5	25	13	14.8
4		3.81 / 89.83	SS	6	0	17	
	No Recovery	4.42	SS	7	75	14	10.9
5	**Clayey Silt Till** Clayey Silt, trace to some sand, trace gravel, APL, stiff	88.15					
6	**Silty Clay Till** Becoming Silty Clay	6.10	SS	8	83	25	14.9
7	**Sandy Silt Till** Brown Sandy Silt, trace clay, trace gravel, moist, compact	86.63					
8	Becoming dense	7.62	SS	9	91	42	7.9
9		85.11					
	Sandy Clayey Silt Till Grey Sandy Clayey Silt, trace gravel, hard	9.14	SS	10	66	62	10.6
10							
11			SS	11	88	>90	9.0
12		82.01	SS	12	100	>50	10.6
	End of Borehole	12.24					
13	Borehole terminated at 12.24 mbgson split spoon refusal. At drillingcompletion, a dry cave was measured at 10.82 mbgs.						
14							

Monitoring Well Details: Riser, Bentonite, Screen, Silca Sand, Bentonite

Water level = 5.71 mbgs, as measured on Feb 27, 2020.

Standard Penetration N-Value: 20, 40, 60

Shear Strength △ kPa △: 100 200

Sample ID

Soil Vapour Concentration (ppm)

Laboratory Analysis

Contractor: Geo-Environmental Drilling Inc.

Grade Elevation: 94.25 masl

Drilling Method: Hollow Stem Auger/ Split Spoon

Top of Casing Elevation: 94.17 masl

Well Casing Size: 51 mm

Sheet: 1 of 1

Log of Borehole: MW7

Project #: 268429.002 **Logged By:** MG

Project: Preliminary Geotechnical Investigation

Client: Hullmark Developments

Location: 450 Dufferin Street, Toronto, Ontario

Drill Date: February 24, 2020 **Project Manager:** AJS

Depth (m)	Description	Elevation (m)	Sample Type	Sampler #	Recovery (%)	SPT N-Value	Water Content (%)
0	Ground Surface	94.58					
	Asphalt ~25 mm	0.00 / 93.82	SS	1	87	4	39.2
1	**Fill** Brown Sand and Gravel, trace asphalt fragments, damp, loose	0.76 / 93.06	SS	2	70	8	15.6
2	Brown Sand, trace silt, moist, loose	1.52	SS	3	62	8	17.6
	Clayey Silt Till Brown Clayey Silt, trace to some sand, trace gravel, APL, firm to very stiff		SS	4	87	18	15.8
3			SS	5	25	14	13.5
4		90.77 / 3.81	SS	6	0	11	15.3
	Silty Clay Till Becoming Silty Clay		SS	7	75	6	15.4
5							
6		88.48 / 6.10	SS	8	83	4	16.3
	Becoming grey						
7		86.96 / 7.62					
	Silty Sand Till Grey Silty Sand, trace clay, some gravel, very dense		SS	9	89	62	5.9
8							
9			SS	10	71	>88	6.0
10		83.91 / 10.67					
	Sandy Silt Till Becoming Sandy Silt		SS	11	60	>50	8.1
11							
12		82.39 / 12.19	SS	12	0	>50	
	No Recovery						
13	End of Borehole Borehole terminated at 12.22 mbgs on split spoon refusal. At drilling completion, a dry cave was measured at 9.75 mbgs.						
14							

Monitoring Well Details: Riser, Bentonite, Screen, Silca Sand, Bentonite

Water level = 6.62 mbgs, as measured on Feb 27, 2020.

Standard Penetration N-Value: 20, 40, 60

Shear Strength: kPa, 100, 200

Sample ID

Soil Vapour Concentration (ppm)

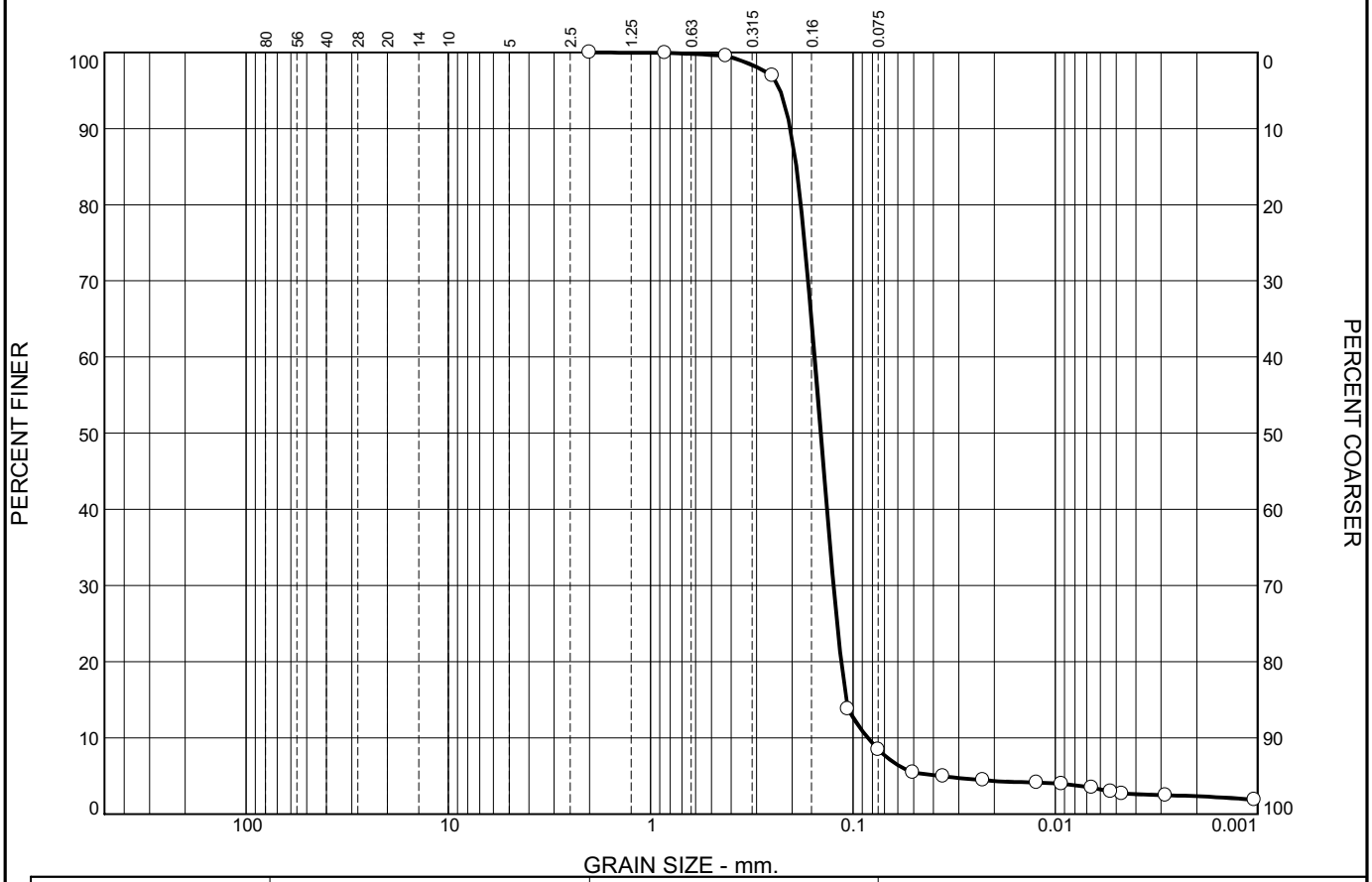
Laboratory Analysis

Contractor: Geo-Environmental Drilling Inc **Grade Elevation:** 94.58 masl

Drilling Method: Hollow Stem Auger/ Split Spoon **Top of Casing Elevation:** 94.48 masl

Well Casing Size: 51 mm **Sheet:** 1 of 1

Particle Size Distribution Report



	% +3"	% Gravel	% Sand		% Fines	
			Coarse	Fine	Silt	Clay
○	0	0	0	92	6	2

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			0.1906	0.1546	0.1442	0.1247	0.1078	0.0844	1.19	1.83

Material Description	USCS	AASHTO
○ SAND trace silt trace clay		

Project No. CT3580 **Client:** Hullmark

Project: 450 Dufferin St

○ **Sample Number:** MW 101, Sample 4A

Terrapex

Toronto, Ontario

Remarks:

○HYDROMETER DETAILS: Spec. Grav. 2.75(assumed);Vb=53cm^3; L2=13.8cm; L1=10.7cm; hs= 0.16cm/Div; A=30.2cm^2; Mass of Disp. Agent=24g/1 Test Date: Sept.21, 2022

Figure 4

Tested By: AM/CM

Particle Size Distribution Report

	% +3"	% Gravel	% Sand		% Fines	
			Coarse	Fine	Silt	Clay
○	0	11	5	12	49	23

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	26.3	14.6	0.5650	0.0266	0.0140	0.0038				

Material Description	USCS	AASHTO
○ CLAYEY SILT some sand some gravel	CL	A-6(5)

Project No. CT3580 **Client:** Hullmark

Project: 450 Dufferin St

○ **Sample Number:** MW 101, Sample 6

Terrapex

Toronto, Ontario

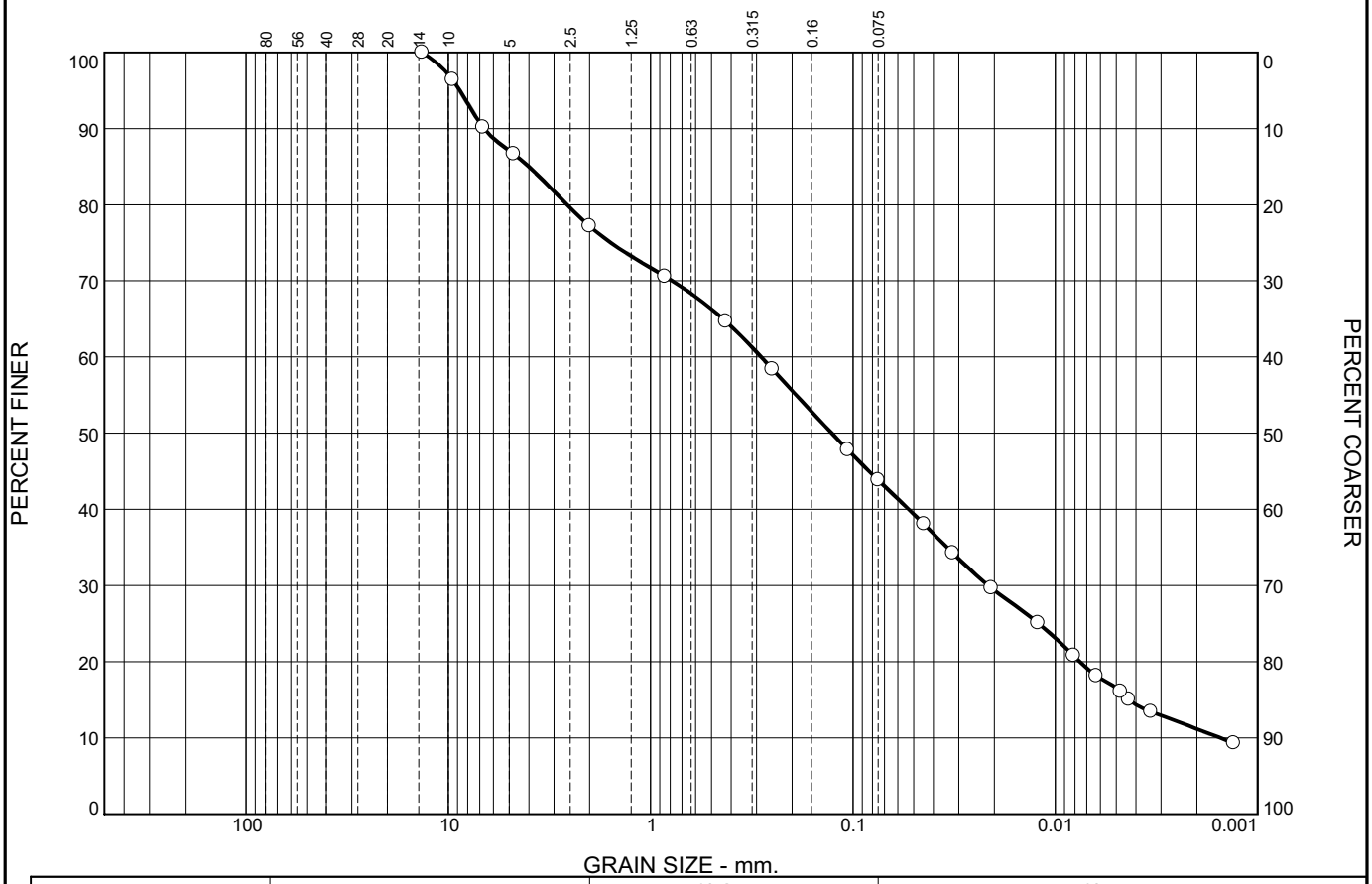
Remarks:

○HYDROMETER DETAILS: Spec. Grav. 2.75(assumed);Vb=53cm^3; L2=13.8cm; L1=10.7cm; hs= 0.16cm/Div; A=30.2cm^2; Mass of Disp. Agent=40g/1 Test Date: Sept.20, 2022

Figure 1

Tested By: AM/CM

Particle Size Distribution Report



	% +3"	% Gravel	% Sand		% Fines	
			Coarse	Fine	Silt	Clay
○	0	23	12	21	33	11

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	17.0	11.7	3.9991	0.2842	0.1272	0.0214	0.0043	0.0015	1.05	185.80

Material Description	USCS	AASHTO
○ GRAVELLY SAND AND SILT some clay	SC-SM	A-4(0)

Project No. CT3580 **Client:** Hullmark

Project: 450 Dufferin St

○ **Sample Number:** MW 101, Sample 9

Terrapex

Toronto, Ontario

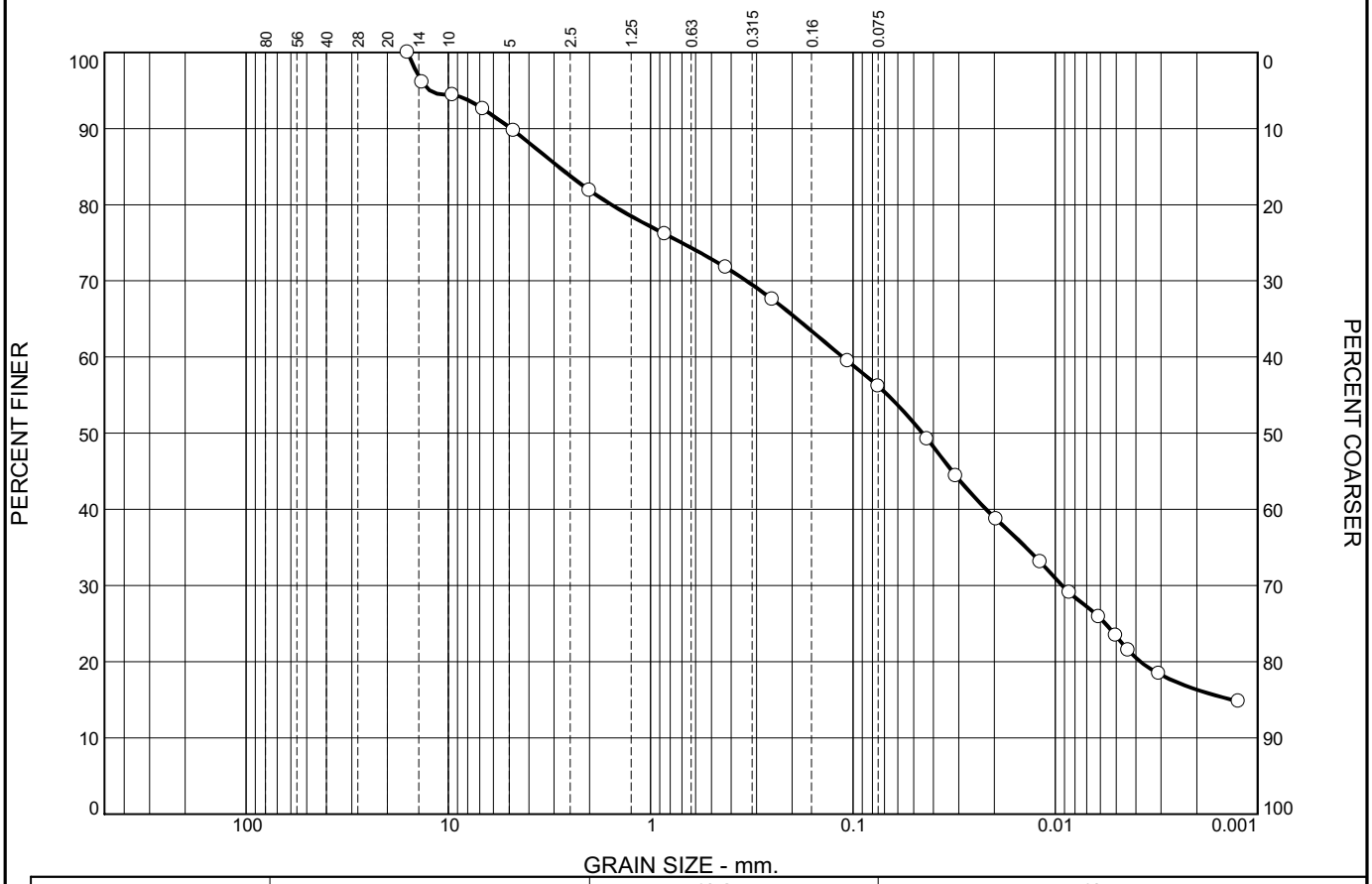
Remarks:

○HYDROMETER DETAILS: Spec. Grav. 2.75(assumed);Vb=53cm^3; L2=13.8cm; L1=10.7cm; hs= 0.16cm/Div; A=30.2cm^2; Mass of Disp. Agent=40g/1 Test Date: Sept.20, 2022

Figure 2

Tested By: AM/CM

Particle Size Distribution Report



	% +3"	% Gravel	% Sand		% Fines	
			Coarse	Fine	Silt	Clay
○	0	18	10	16	40	16

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			2.8543	0.1122	0.0453	0.0093	0.0013			

Material Description	USCS	AASHTO
○ SANDY SILT some gravel some clay		

Project No. CT3580 **Client:** Hullmark

Project: 450 Dufferin St

○ **Sample Number:** MW 103, Sample 10

Terrapex

Toronto, Ontario

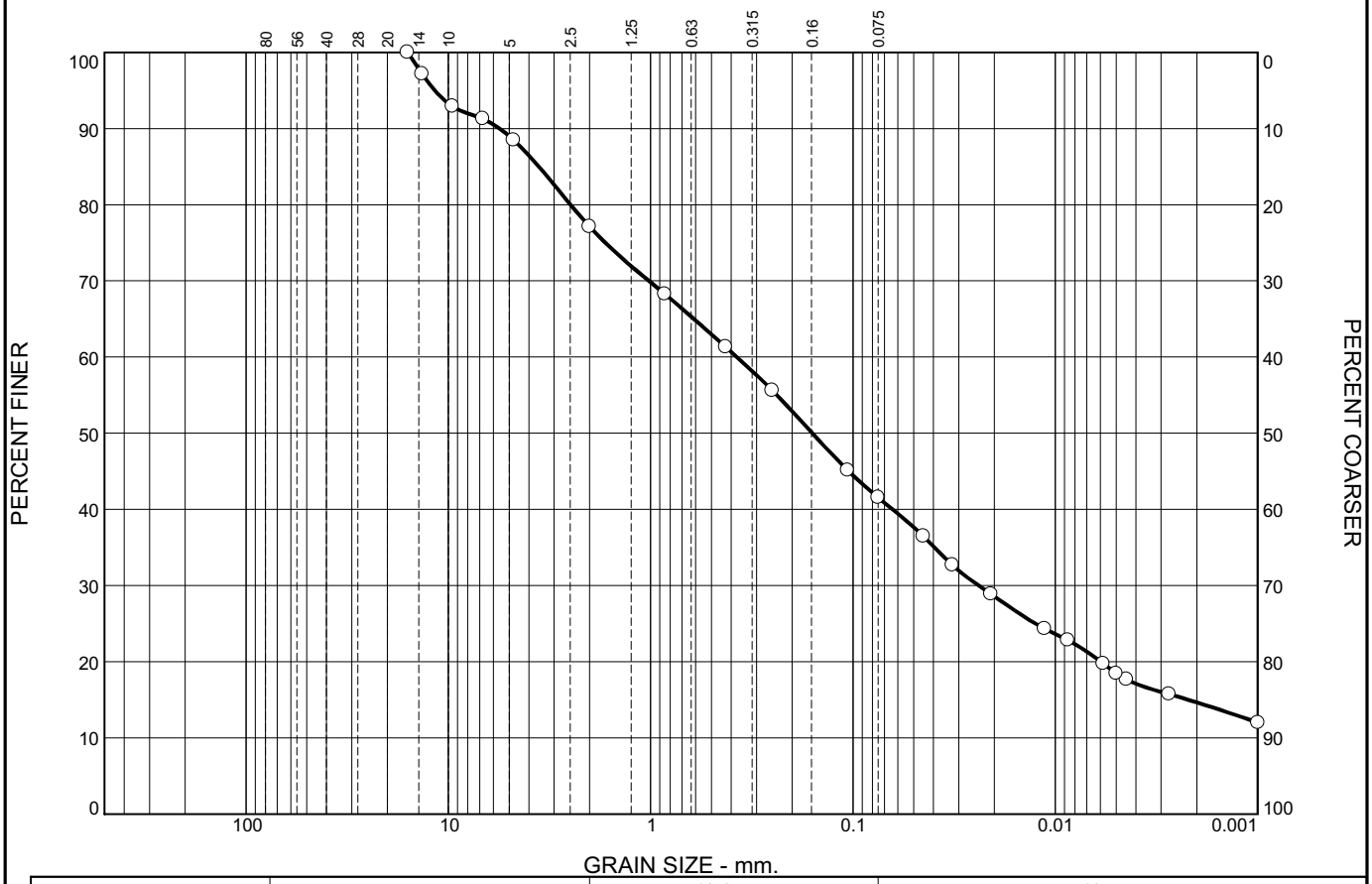
Remarks:

○HYDROMETER DETAILS: Spec. Grav. 2.75(assumed);Vb=53cm^3; L2=13.8cm; L1=10.7cm; hs= 0.16cm/Div; A=30.2cm^2; Mass of Disp. Agent=40g/1 Test Date: Sept.28, 2022

Figure 5

Tested By: AM/CM

Particle Size Distribution Report



	% +3"	% Gravel	% Sand		% Fines	
			Coarse	Fine	Silt	Clay
○	0	23	16	19	27	15

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	19.9	12.3	3.5668	0.3748	0.1588	0.0239	0.0022			

Material Description	USCS	AASHTO
○ GRAVELLY SILTY SAND some clay	SC	A-4(0)

Project No. CT3580 **Client:** Hullmark

Project: 450 Dufferin St

○ **Sample Number:** MW 103, Sample 13

Terrapex

Toronto, Ontario

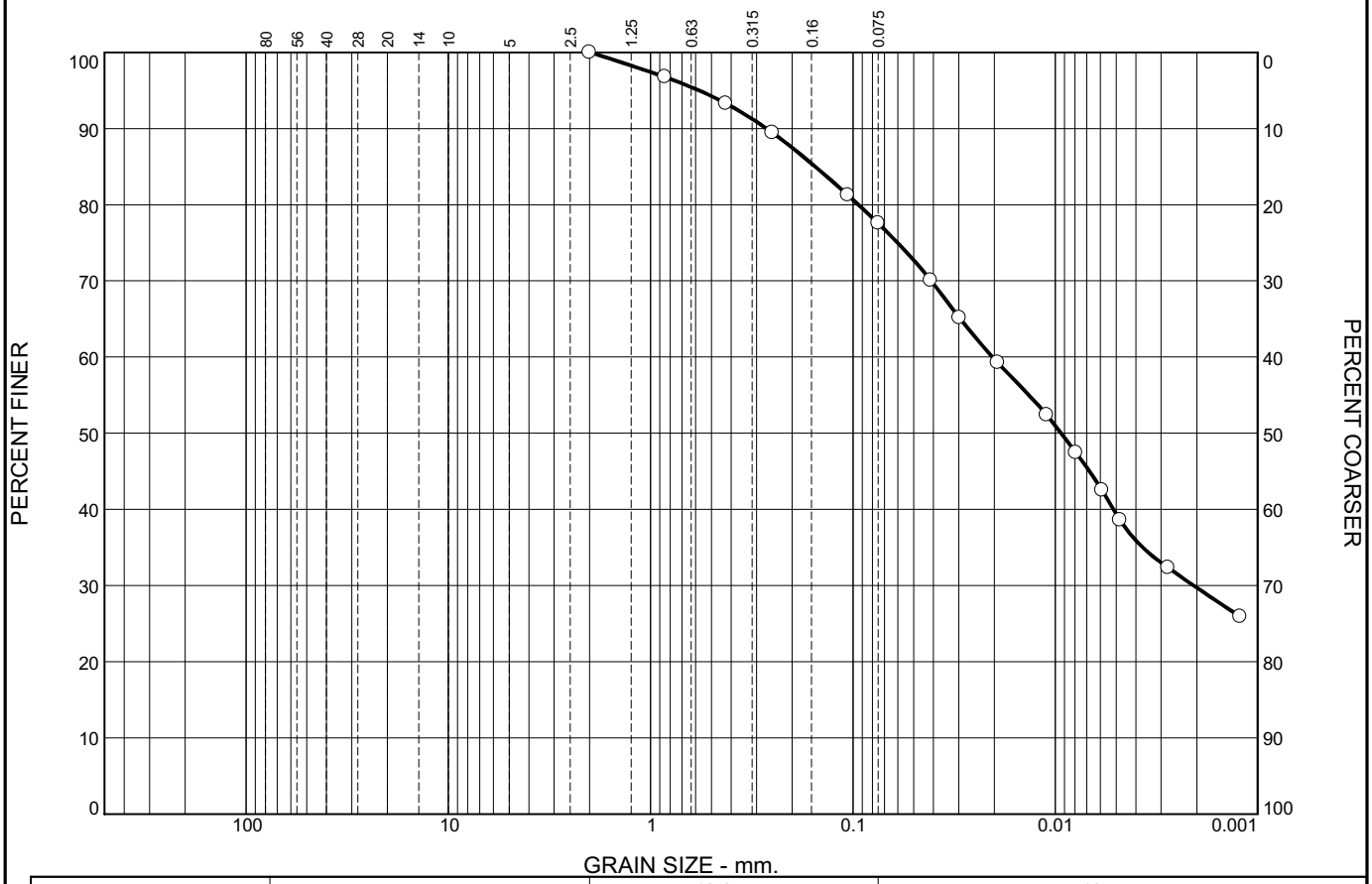
Remarks:

○HYDROMETER DETAILS: Spec. Grav. 2.75(assumed);Vb=53cm^3; L2=13.8cm; L1=10.7cm; hs= 0.16cm/Div; A=30.2cm^2; Mass of Disp. Agent=40g/1 Test Date: Sept.21, 2022

Figure 3

Tested By: AM/CM

Particle Size Distribution Report



	% +3"	% Gravel	% Sand		% Fines	
			Coarse	Fine	Silt	Clay
○	0	0	7	15	48	30

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			0.1535	0.0204	0.0094	0.0021				

Material Description	USCS	AASHTO
○ CLAYEY SANDY SILT		

Project No. CT3580 **Client:** Hullmark

Project: 450 Dufferin St

○ **Sample Number:** MW 104, Sample 8

Terrapex

Toronto, Ontario

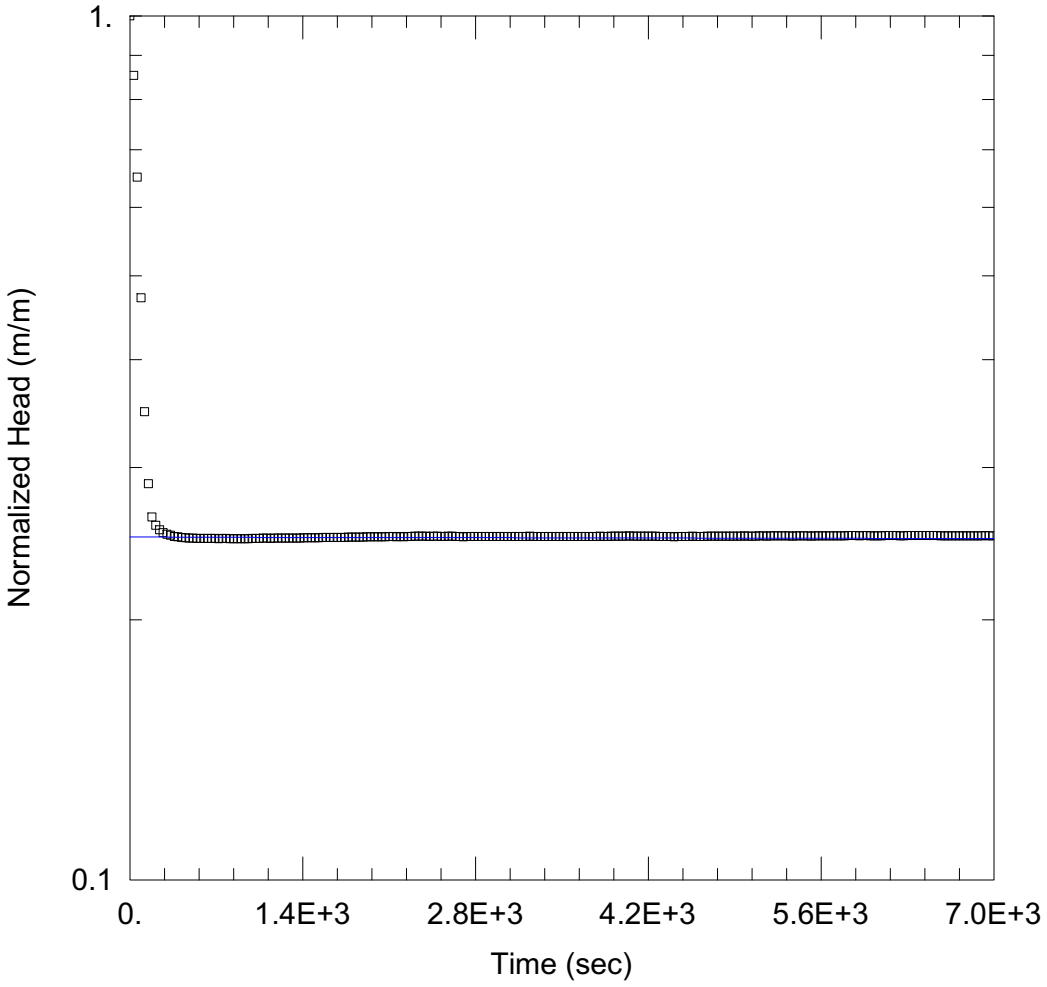
Remarks:

○HYDROMETER DETAILS: Spec. Grav. 2.75(assumed);Vb=53cm^3; L2=13.8cm; L1=10.7cm; hs= 0.16cm/Div; A=30.2cm^2; Mass of Disp. Agent=40g/1 Test Date: Sept.28, 2022

Figure 6

Tested By: AM/CM

APPENDIX IV
HYDRAULIC CONDUCTIVITY



HYDROGEOLOGICAL ASSESSMENT

Data Set: I:\...\MW101.aqt
Date: 10/12/22 Time: 16:32:05

PROJECT INFORMATION

Company: Terrapex Environmental Ltd.
Client: HM RK (450 Dufferin) LP
Project: CT3580.00
Location: 450 Dufferin Street, Toronto
Test Well: MW101
Test Date: September 29, 2022

AQUIFER DATA

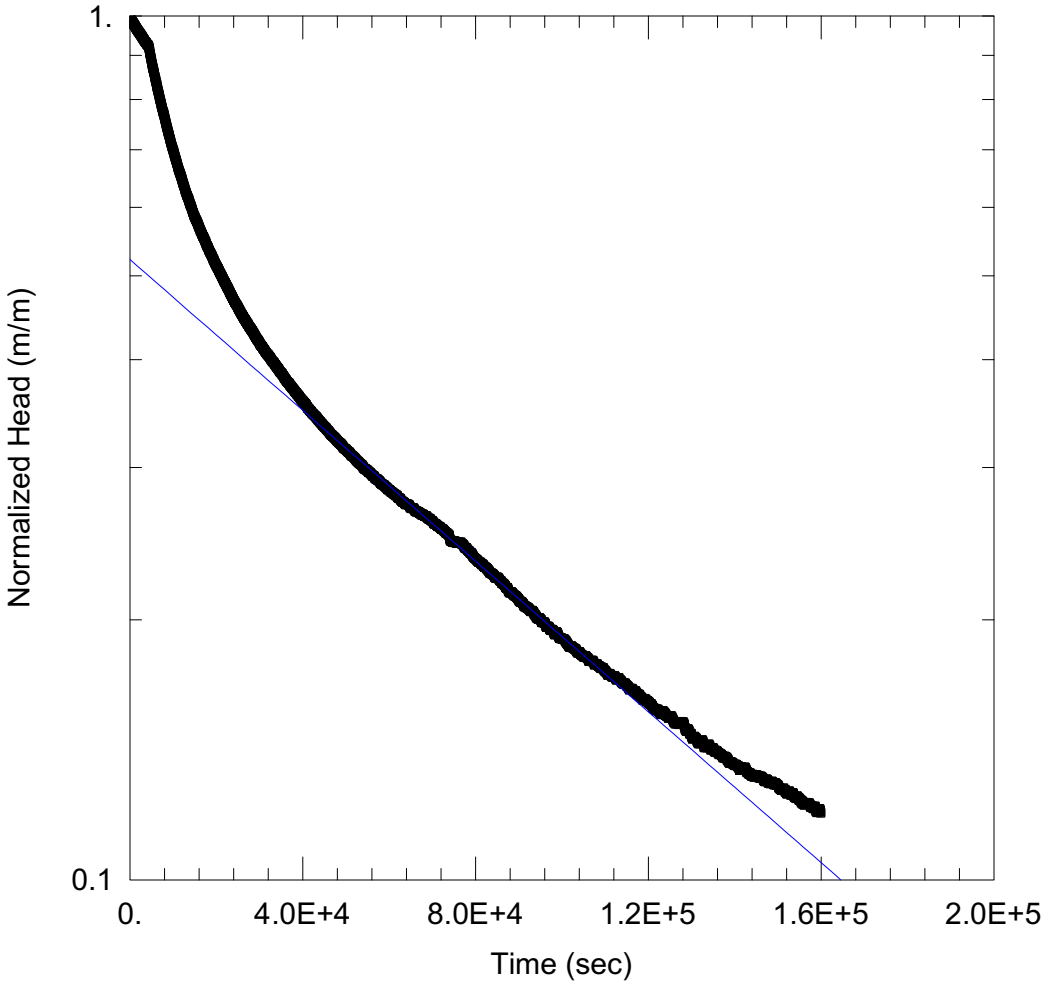
Saturated Thickness: 1.6 m Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (MW101)

Initial Displacement: 3.396 m
Total Well Penetration Depth: 1.62 m
Casing Radius: 0.026 m
Static Water Column Height: 1.6 m
Screen Length: 1.52 m
Well Radius: 0.031 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 5.329E-10 m/sec
y0 = 0.8467 m



HYDROGEOLOGICAL ASSESSMENT

Data Set: I:\...\MW6.aqt
Date: 10/12/22 Time: 16:31:48

PROJECT INFORMATION

Company: Terrapex Environmental Ltd.
Client: HM RK (450 Dufferin) LP
Project: CT3580.00
Location: 450 Dufferin Street, Toronto
Test Well: MW6
Test Date: September 29, 2022

AQUIFER DATA

Saturated Thickness: 4.2 m Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (MW6)

Initial Displacement: 1.422 m
Total Well Penetration Depth: 4.21 m
Casing Radius: 0.026 m
Static Water Column Height: 4.2 m
Screen Length: 3.05 m
Well Radius: 0.031 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 5.311E-9 m/sec
y0 = 0.7427 m

APPENDIX V
FOUNDATION DRAINAGE FORM

FOUNDATION DRAINAGE SUMMARY FORM

General Information
Applicant Name:
Development Address:
Development Application #:
Available Sewer Servicing: □ Storm Sewers □ Combined Sewers □ Sanitary Sewers
Groundwater Level Assessment
GW Monitoring Approach: □ 1. Flexible Year-Round □ 2. Peak Season □ 3. Alternate (Attach Justification)
Monitoring Length [weeks]:
Monitoring Months: □ Jan □ Feb □ Mar □ Apr □ May □ Jun □ Jul □ Aug □ Sept □ Oct □ Nov □ Dec
# of Measurements:
Peak Observed GWL [masl]:
Estimated Maximum Anticipated GWL [masl]:
Lowest Elevation of Proposed Structure [masl]:
Proposed Condition and Measures *(Complete all)*
On-site Management Provided? □ Yes (Describe) □ No (Provide Rationale)
Infrastructure Required for Future Emergency Repair? □ Yes □ No
Foundation Drainage Expected to Contain Only Infiltrated Stormwater? □ Yes □ No
Site Condition: □ Non-Brownfield with no RSC □ Brownfield with RSC + Risk Management □ Other (Describe)
Proposed Foundation Drainage Management *(Select one)*
□ **On-site Management** (no long-term discharge to sewers)
□ **On-site Management with Infrastructure for Future Emergency Repair** (in accordance with *Policy 4.4*)
□ **Long-term Discharge to Storm or Combined Sewers** (in accordance with *Policy Statement 4.3*)
□ Request for Exemption of Policy to apply for Long-Term Discharge Agreement (in accordance with *Policy Sec 5.0*)
Description/Attachments in Foundation Drainage Technical Brief *(Select all that apply)*
□ On-site Management Description/Rationale for Technological Infeasibility
□ GWL Monitoring Well Plan, including Monitoring Methodology and Justification (where alternate is proposed)
□ GWL Monitoring and Peak Flow Estimation Results, Analysis & Interpretation
□ Building Elevation Plan
□ Site Condition Supporting Documentation (e.g., Brownfield/RSC Status, Soil Quality)
□ Exemption Rationale and Documentation for Technical Infeasibility and/or Extenuating Circumstances. Describe physical and design constraints to substantiate that a technical solution was not feasible; include documentation to substantiate that there are extenuating circumstances (e.g., application submission timeline and milestones) that may warrant an exemption, where applicable.
□ Other Documentation; *Specify* -
Qualified Professional Sign-Off
Name: Designation:
Signature: Date:

Form to accompany *Foundation Drainage Technical Brief* document prepared in accordance with the *Foundation Drainage Policy* and *Guidelines*.

November 1, 2021

APPENDIX VI
LABORATORY RECORD OF GROUNDWATER QUALITY

CERTIFICATE OF ANALYSIS (GUIDELINE EVALUATION)

Work Order	: **WT2215311**	Page	: 1 of 6
Client	: **Terrapex Environmental Ltd.**	Laboratory	: Waterloo - Environmental
Contact	: Brian Theimer	Account Manager	: Gayle Braun
Address	: 90 Scarsdale Rd. Toronto ON Canada M3B2R7	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	: 416 245 0011	Telephone	: +1 519 886 6910
Project	: CT3580.00	Date Samples Received	: 21-Sep-2022 15:00
PO	: ----	Date Analysis Commenced	: 23-Sep-2022
C-O-C number	: 20-999848	Issue Date	: 04-Oct-2022 14:51
Sampler	: VS/BS		
Site	: ----		
Quote number	: SOA		
No. of samples received	: 1		
No. of samples analysed	: 1		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Guideline Comparison

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Adam Boettger	Team Leader - LCMS	LCMS, Waterloo, Ontario
Amanda Ganouri-Lumsden	Department Manager - Microbiology and Prep	Microbiology, Waterloo, Ontario
Jeremy Gingras	Team Leader - Semi-Volatile Instrumentation	Organics, Waterloo, Ontario
Jon Fisher	Department Manager - Inorganics	Inorganics, Waterloo, Ontario
Jon Fisher	Department Manager - Inorganics	Metals, Waterloo, Ontario
Joseph Scharbach		Organics, Waterloo, Ontario
Rachel Cameron	Team Leader - Semi-Volatile Organics	Organics, Waterloo, Ontario
Sarah Birch	Team Leader - Volatiles	Organics, Waterloo, Ontario
Stephanie Pinheiro	Analyst	LCMS, Waterloo, Ontario

General Comments

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

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

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

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

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

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

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

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

Qualifiers

Qualifier	*Description*
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).*
NDOGN	*No Data-Total Coliform and/or E.Coli plate overgrown with non-target.*

Analytical Results

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

Analyte	Method	LOR	Unit	Client sample ID: MW104A Sampling date/time: 21-Sep-2022 15:00 WT2215311-001		TORSUB Guideline Limit	TORSUB SAN	TORSUB STM			
Physical Tests											
pH	E108	0.10	pH units	8.00		**6 - 9.5 pH units**	**6 - 11.5 pH units**	**6 - 9.5 pH units**	--	--	--
solids, total suspended [TSS]	E160	3.0	mg/L	11.4		**15 mg/L**	**350 mg/L**	**15 mg/L**	--	--	--
Anions and Nutrients											
chloride	E235.Cl	0.50	mg/L	411	DLDS	--	--	--	--	--	--
fluoride	E235.F	0.020	mg/L	0.720	DLDS	--	10 mg/L	--	--	--	--
Kjeldahl nitrogen, total [TKN]	E318	0.050	mg/L	3.41		--	100 mg/L	--	--	--	--
phosphorus, total	E372-U	0.0020	mg/L	0.0773		**0.4 mg/L**	**10 mg/L**	**0.4 mg/L**	--	--	--
sulfate (as SO4)	E235.SO4	0.30	mg/L	50.6	DLDS	--	--	--	--	--	--
Cyanides											
cyanide, strong acid dissociable (total)	E333	0.0020	mg/L	<0.0020		**0.02 mg/L**	**2 mg/L**	**0.02 mg/L**	--	--	--
Microbiological Tests											
coliforms, Escherichia coli [E. coli]	E012A.EC	1	CFU/100mL	NR	NDOGN	**200 CFU/100mL**	**--**	**200 CFU/100mL**	--	--	--
Total Metals											
aluminum, total	E420	0.0030	mg/L	0.279	DLHC	--	50 mg/L	--	--	--	--
antimony, total	E420	0.00010	mg/L	0.00196	DLHC	--	5 mg/L	--	--	--	--
arsenic, total	E420	0.00010	mg/L	0.00690	DLHC	**0.02 mg/L**	**1 mg/L**	**0.02 mg/L**	--	--	--
cadmium, total	E420	0.0000050	mg/L	<0.0000500	DLHC	**0.008 mg/L**	**0.7 mg/L**	**0.008 mg/L**	--	--	--
chromium, total	E420	0.00050	mg/L	<0.00500	DLHC	**0.08 mg/L**	**4 mg/L**	**0.08 mg/L**	--	--	--
cobalt, total	E420	0.00010	mg/L	<0.00100	DLHC	--	5 mg/L	--	--	--	--
copper, total	E420	0.00050	mg/L	<0.00500	DLHC	**0.04 mg/L**	**2 mg/L**	**0.04 mg/L**	--	--	--
lead, total	E420	0.000050	mg/L	0.000733	DLHC	**0.12 mg/L**	**1 mg/L**	**0.12 mg/L**	--	--	--
manganese, total	E420	0.00010	mg/L	0.120	DLHC	**0.05 mg/L**	**5 mg/L**	**0.05 mg/L**	--	--	--
mercury, total	E508	0.0000050	mg/L	<0.0000050		**0.0004 mg/L**	**0.01 mg/L**	**0.0004 mg/L**	--	--	--
molybdenum, total	E420	0.000050	mg/L	0.0337	DLHC	--	5 mg/L	--	--	--	--
nickel, total	E420	0.00050	mg/L	<0.00500	DLHC	**0.08 mg/L**	**2 mg/L**	**0.08 mg/L**	--	--	--
selenium, total	E420	0.000050	mg/L	<0.000500	DLHC	**0.02 mg/L**	**1 mg/L**	**0.02 mg/L**	--	--	--
silver, total	E420	0.000010	mg/L	<0.000100	DLHC	**0.12 mg/L**	**5 mg/L**	**0.12 mg/L**	--	--	--
tin, total	E420	0.00010	mg/L	0.00170	DLHC	--	5 mg/L	--	--	--	--
titanium, total	E420	0.00030	mg/L	0.00332	DLHC	--	5 mg/L	--	--	--	--
zinc, total	E420	0.0030	mg/L	<0.0300	DLHC	**0.04 mg/L**	**2 mg/L**	**0.04 mg/L**	--	--	--

Analyte	Method	LOR	Unit	WT2215311-001 (Continued)	TORSUB Guideline Limit	TORSUB SAN	TORSUB STM			
Speciated Metals										
chromium, hexavalent [Cr VI], total	E532	0.00050	mg/L	<0.00050	--	--	--	--	--	--
Aggregate Organics										
biochemical oxygen demand [BOD]	E550	2.0	mg/L	4.3	**15 mg/L**	**300 mg/L**	**15 mg/L**	--	--	--
oil & grease (gravimetric)	E567	5.0	mg/L	<5.0	--	--	--	--	--	--
oil & grease, animal/vegetable (gravimetric)	EC567A.SG	5.0	mg/L	<5.0	--	150 mg/L	--	--	--	--
oil & grease, mineral (gravimetric)	E567SG	5.0	mg/L	<5.0	--	15 mg/L	--	--	--	--
phenols, total (4AAP)	E562	0.0010	mg/L	<0.0010	**0.008 mg/L**	**1 mg/L**	**0.008 mg/L**	--	--	--
Volatile Organic Compounds										
benzene	E611D	0.00050	mg/L	<0.00050	**0.002 mg/L**	**0.01 mg/L**	**0.002 mg/L**	--	--	--
chloroform	E611D	0.00050	mg/L	<0.00050	**0.002 mg/L**	**0.04 mg/L**	**0.002 mg/L**	--	--	--
dichlorobenzene, 1,2-	E611D	0.00050	mg/L	<0.00050	**0.0056 mg/L**	**0.05 mg/L**	**0.0056 mg/L**	--	--	--
dichlorobenzene, 1,4-	E611D	0.00050	mg/L	<0.00050	**0.0068 mg/L**	**0.08 mg/L**	**0.0068 mg/L**	--	--	--
dichloroethylene, cis-1,2-	E611D	0.00050	mg/L	<0.00050	**0.0056 mg/L**	**4 mg/L**	**0.0056 mg/L**	--	--	--
dichloromethane	E611D	0.0010	mg/L	<0.0010	**0.0052 mg/L**	**2 mg/L**	**0.0052 mg/L**	--	--	--
dichloropropylene, trans-1,3-	E611D	0.00030	mg/L	<0.00030	**0.0056 mg/L**	**0.14 mg/L**	**0.0056 mg/L**	--	--	--
ethylbenzene	E611D	0.00050	mg/L	<0.00050	**0.002 mg/L**	**0.16 mg/L**	**0.002 mg/L**	--	--	--
tetrachloroethane, 1,1,2,2-	E611D	0.00050	mg/L	<0.00050	**0.017 mg/L**	**1.4 mg/L**	**0.017 mg/L**	--	--	--
tetrachloroethylene	E611D	0.00050	mg/L	<0.00050	**0.0044 mg/L**	**1 mg/L**	**0.0044 mg/L**	--	--	--
toluene	E611D	0.00050	mg/L	<0.00050	**0.002 mg/L**	**0.016 mg/L**	**0.002 mg/L**	--	--	--
trichloroethylene	E611D	0.00050	mg/L	<0.00050	**0.0076 mg/L**	**0.4 mg/L**	**0.0076 mg/L**	--	--	--
xylene, m+p-	E611D	0.00040	mg/L	<0.00040	--	--	--	--	--	--
xylene, o-	E611D	0.00030	mg/L	<0.00030	--	--	--	--	--	--
xylenes, total	E611D	0.00050	mg/L	<0.00050	**0.0044 mg/L**	**1.4 mg/L**	**0.0044 mg/L**	--	--	--
Volatile Organic Compounds Surrogates										
bromofluorobenzene, 4-	E611D	1.0	%	87.3	--	--	--	--	--	--
difluorobenzene, 1,4-	E611D	1.0	%	97.9	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons										
anthracene	E641A-L	0.000010	mg/L	<0.000010	--	--	--	--	--	--
benz(a)anthracene	E641A-L	0.000010	mg/L	<0.000010	--	--	--	--	--	--
benzo(a)pyrene	E641A-L	0.0000050	mg/L	<0.0000050	--	--	--	--	--	--
benzo(b+j)fluoranthene	E641A-L	0.000010	mg/L	<0.000010	--	--	--	--	--	--
benzo(e)pyrene	E641A-L	0.000010	mg/L	<0.000010	--	--	--	--	--	--
benzo(g,h,i)perylene	E641A-L	0.000010	mg/L	<0.000010	--	--	--	--	--	--

Analyte	Method	LOR	Unit	WT2215311-001 (Continued)	TORSUB Guideline Limit	TORSUB SAN	TORSUB STM			
Polycyclic Aromatic Hydrocarbons - Continued										
benzo(k)fluoranthene	E641A-L	0.000010	mg/L	<0.000010	--	--	--	--	--	--
chrysene	E641A-L	0.000010	mg/L	<0.000010	--	--	--	--	--	--
dibenz(a,h)acridine	E642D	0.000050	mg/L	<0.000056	--	--	--	--	--	--
dibenz(a,h)anthracene	E641A-L	0.0000050	mg/L	<0.0000050	--	--	--	--	--	--
dibenz(a,j)acridine	E642D	0.000050	mg/L	<0.000056	--	--	--	--	--	--
dibenzo(a,i)pyrene	E642D	0.000050	mg/L	<0.000056	--	--	--	--	--	--
dibenzo(c,g)carbazole, 7H-	E642D	0.000050	mg/L	<0.000056	--	--	--	--	--	--
dinitropyrene, 1,3-	E642D	0.0010	mg/L	<0.0010	--	--	--	--	--	--
dinitropyrene, 1,6-	E642D	0.0010	mg/L	<0.0010	--	--	--	--	--	--
dinitropyrene, 1,8-	E642D	0.0010	mg/L	<0.0010	--	--	--	--	--	--
fluoranthene	E641A-L	0.000010	mg/L	0.000012	--	--	--	--	--	--
indeno(1,2,3-c,d)pyrene	E641A-L	0.000010	mg/L	<0.000010	--	--	--	--	--	--
methylcholanthrene, 3-	E642D	0.000050	mg/L	<0.000056	--	--	--	--	--	--
perylene	E641A-L	0.000010	mg/L	<0.000010	--	--	--	--	--	--
phenanthrene	E641A-L	0.000010	mg/L	0.000021	--	--	--	--	--	--
pyrene	E641A-L	0.000010	mg/L	<0.000010	--	--	--	--	--	--
PAHs, total (ON Sewer Use)	EC640A	0.00175	mg/L	<0.00175	**0.002 mg/L**	**0.005 mg/L**	**0.002 mg/L**	--	--	--
Phthalate Esters										
bis(2-ethylhexyl) phthalate [DEHP]	E655F	0.0020	mg/L	<0.0020	**0.0088 mg/L**	**0.012 mg/L**	**0.0088 mg/L**	--	--	--
di-n-butyl phthalate	E655F	0.0010	mg/L	<0.0010	**0.015 mg/L**	**0.08 mg/L**	**0.015 mg/L**	--	--	--
Semi-Volatile Organics										
dichlorobenzidine, 3,3'-	E655F	0.00040	mg/L	<0.00040	**0.0008 mg/L**	**0.002 mg/L**	**0.0008 mg/L**	--	--	--
Chlorinated Phenolics										
pentachlorophenol [PCP]	E655F	0.00050	mg/L	<0.00050	**0.002 mg/L**	**0.005 mg/L**	**0.002 mg/L**	--	--	--
Nonylphenols										
nonylphenol diethoxylates [NP2EO]	E749B	0.00010	mg/L	<0.00010	--	--	--	--	--	--
nonylphenol ethoxylates, total	E749B	0.0020	mg/L	<0.0020	**0.01 mg/L**	**0.2 mg/L**	**0.01 mg/L**	--	--	--
nonylphenol monoethoxylates [NP1EO]	E749B	0.0020	mg/L	<0.0020	--	--	--	--	--	--
nonylphenols [NP]	E749A	0.0010	mg/L	<0.0010	**0.001 mg/L**	**0.02 mg/L**	**0.001 mg/L**	--	--	--
Polychlorinated Biphenyls										
Aroclor 1016	E687	0.000020	mg/L	<0.000020	--	--	--	--	--	--
Aroclor 1221	E687	0.000020	mg/L	<0.000020	--	--	--	--	--	--
Aroclor 1232	E687	0.000020	mg/L	<0.000020	--	--	--	--	--	--
Aroclor 1242	E687	0.000020	mg/L	<0.000020	--	--	--	--	--	--

Analyte	Method	LOR	Unit	WT2215311-001 (Continued)	TORSUB Guideline Limit	TORSUB SAN	TORSUB STM			
Polychlorinated Biphenyls - Continued										
Aroclor 1248	E687	0.000020	mg/L	<0.000020	--	--	--	--	--	--
Aroclor 1254	E687	0.000020	mg/L	<0.000020	--	--	--	--	--	--
Aroclor 1260	E687	0.000020	mg/L	<0.000020	--	--	--	--	--	--
Aroclor 1262	E687	0.000020	mg/L	<0.000020	--	--	--	--	--	--
Aroclor 1268	E687	0.000020	mg/L	<0.000020	--	--	--	--	--	--
polychlorinated biphenyls [PCBs], total	E687	0.000060	mg/L	<0.000060	**0.0004 mg/L**	**0.001 mg/L**	**0.0004 mg/L**	--	--	--
decachlorobiphenyl	E687	0.1	%	92.8	--	--	--	--	--	--
tetrachloro-m-xylene	E687	0.1	%	92.7	--	--	--	--	--	--

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

Summary of Guideline Breaches by Sample

SampleID/Client ID	Matrix	Analyte	Analyte Summary	Guideline	Category	Result	Limit
MW104A	Water	manganese, total		TORSUB	Guideline Limit	0.120 mg/L	0.05 mg/L
	Water	manganese, total		TORSUB	STM	0.120 mg/L	0.05 mg/L

Key:

TORSUB	Ontario Toronto Sanitary Discharge Sewer By-Law 100-2016 (FEB 4,2016)
Guideline Limit	Ontario Toronto Storm Sewer By-Law
SAN	Toronto Sanitary Discharge Sewer By-Law
STM	Toronto Storm Discharge Sewer By-Law

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **WT2215311**	Page	: 1 of 12
Client	: **Terrapex Environmental Ltd.**	Laboratory	: Waterloo - Environmental
Contact	: Brian Theimer	Account Manager	: Gayle Braun
Address	: 90 Scarsdale Rd. Toronto ON Canada M3B2R7	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	: 416 245 0011	Telephone	: +1 519 886 6910
Project	: CT3580.00	Date Samples Received	: 21-Sep-2022 15:00
PO	: ----	Issue Date	: 04-Oct-2022 14:51
C-O-C number	: 20-999848		
Sampler	: VS/BS		
Site	: ----		
Quote number	: SOA		
No. of samples received	: 1		
No. of samples analysed	: 1		

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

Key

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

Workorder Comments

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

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Matrix Spike outliers occur.
- Laboratory Control Sample (LCS) outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Water**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Laboratory Control Sample (LCS) Recoveries								
Polycyclic Aromatic Hydrocarbons	QC-662255-002	----	methylcholanthrene, 3-	56-49-5	E642D	164 % LCS-H	60.0-130%	Recovery greater than upper control limit
Semi-Volatile Organics	QC-MRG4-662256002	----	dichlorobenzidine, 3,3'-	91-94-1	E655F	39.9 % RRQC	50.0-140%	Recovery less than lower control limit
Chlorinated Phenolics	QC-MRG4-662256002	----	pentachlorophenol [PCP]	87-86-5	E655F	148 % LCS-H	50.0-140%	Recovery greater than upper control limit

Result Qualifiers

Qualifier	Description
LCS-H	*Lab Control Sample recovery was above ALS DQO. Non-detected sample results are considered reliable. Other results, if reported, have been qualified.*
RRQC	*Refer to report comments for information regarding this QC result.*

Analysis Holding Time Compliance

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

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

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

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

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT-4d]										
MW104A	E550	21-Sep-2022	----	----	----		23-Sep-2022	4 days	1 days	✓
Aggregate Organics : Mineral Oil & Grease by Gravimetry										
Amber glass (hydrochloric acid)										
MW104A	E567SG	21-Sep-2022	25-Sep-2022	28 days	4 days	✓	28-Sep-2022	40 days	3 days	✓
Aggregate Organics : Oil & Grease by Gravimetry										
Amber glass (hydrochloric acid)										
MW104A	E567	21-Sep-2022	25-Sep-2022	28 days	4 days	✓	28-Sep-2022	40 days	3 days	✓
Aggregate Organics : Phenols (4AAP) in Water by Colorimetry										
Amber glass total (sulfuric acid) [ON MECP]										
MW104A	E562	21-Sep-2022	27-Sep-2022	28 days	6 days	✓	28-Sep-2022	22 days	1 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE [ON MECP]										
MW104A	E235.Cl	21-Sep-2022	28-Sep-2022	----	----		28-Sep-2022	28 days	7 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE [ON MECP]										
MW104A	E235.F	21-Sep-2022	28-Sep-2022	----	----		28-Sep-2022	28 days	7 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE [ON MECP]										
MW104A	E235.SO4	21-Sep-2022	28-Sep-2022	----	----		28-Sep-2022	28 days	7 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) [ON MECP]										
MW104A	E318	21-Sep-2022	28-Sep-2022	----	----		28-Sep-2022	28 days	7 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) [ON MECP]										
MW104A	E372-U	21-Sep-2022	28-Sep-2022	----	----		29-Sep-2022	28 days	8 days	✓
Chlorinated Phenolics : BNA (Ontario Sanitary Sewer SVOC Target List) by GC-MS										
Amber glass/Teflon lined cap [ON MECP]										
MW104A	E655F	21-Sep-2022	23-Sep-2022	----	----		26-Sep-2022	----	----	
Cyanides : Total Cyanide										
HDPE - total (sodium hydroxide)										
MW104A	E333	21-Sep-2022	26-Sep-2022	----	----		26-Sep-2022	14 days	5 days	✓
Microbiological Tests : E. coli (MF-mFC-BCIG)										
Sterile HDPE (Sodium thiosulphate) [ON MECP]										
MW104A	E012A.EC	21-Sep-2022	----	----	----		23-Sep-2022	48 hrs	47 hrs	✓
Nonylphenols : Nonylphenol Ethoxylates in Water by LC-MS-MS Positive Mode										
Amber glass/Teflon lined cap - LCMS										
MW104A	E749B	21-Sep-2022	27-Sep-2022	7 days	6 days	✓	28-Sep-2022	7 days	1 days	✓
Nonylphenols : Nonylphenol, Octylphenol and BPA in Water by LC-MS-MS Negative Mode										
Amber glass/Teflon lined cap - LCMS										
MW104A	E749A	21-Sep-2022	27-Sep-2022	7 days	6 days	✓	28-Sep-2022	7 days	1 days	✓
Phthalate Esters : BNA (Ontario Sanitary Sewer SVOC Target List) by GC-MS										
Amber glass/Teflon lined cap [ON MECP]										
MW104A	E655F	21-Sep-2022	23-Sep-2022	----	----		26-Sep-2022	----	----	
Physical Tests : pH by Meter										
HDPE [ON MECP]										
MW104A	E108	21-Sep-2022	28-Sep-2022	----	----		28-Sep-2022	14 days	7 days	✓

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : TSS by Gravimetry										
HDPE [ON MECP]										
MW104A	E160	21-Sep-2022	----	----	----		25-Sep-2022	7 days	4 days	✓
Polychlorinated Biphenyls : PCB Aroclors by GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
MW104A	E687	21-Sep-2022	26-Sep-2022	14 days	5 days	✓	27-Sep-2022	40 days	1 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs (ON Special List) by GC-MS										
Amber glass/Teflon lined septa cap [ON MECP]										
MW104A	E642D	21-Sep-2022	23-Sep-2022	14 days	2 days	✓	26-Sep-2022	40 days	3 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs by Hexane LVI GC-MS (Low Level)										
Amber glass/Teflon lined cap (sodium bisulfate)										
MW104A	E641A-L	21-Sep-2022	23-Sep-2022	14 days	2 days	✓	28-Sep-2022	40 days	5 days	✓
Semi-Volatile Organics : BNA (Ontario Sanitary Sewer SVOC Target List) by GC-MS										
Amber glass/Teflon lined cap [ON MECP]										
MW104A	E655F	21-Sep-2022	23-Sep-2022	14 days	2 days	✓	26-Sep-2022	40 days	3 days	✓
Speciated Metals : Total Hexavalent Chromium (Cr VI) by IC										
HDPE - total (sodium hydroxide)										
MW104A	E532	21-Sep-2022	----	----	----		26-Sep-2022	28 days	5 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) [ON MECP]										
MW104A	E508	21-Sep-2022	26-Sep-2022	----	----		26-Sep-2022	28 days	5 days	✓
Total Metals : Total metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
MW104A	E420	21-Sep-2022	25-Sep-2022	----	----		25-Sep-2022	180 days	4 days	✓
Volatile Organic Compounds : VOCs (Eastern Canada List) by Headspace GC-MS										
Glass vial (sodium bisulfate)										
MW104A	E611D	21-Sep-2022	26-Sep-2022	----	----		26-Sep-2022	14 days	5 days	✓

Legend & Qualifier Definitions

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

Quality Control Parameter Frequency Compliance

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

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Biochemical Oxygen Demand - 5 day	E550	662436	1	13	7.6	5.0	✓
Chloride in Water by IC	E235.Cl	669272	1	5	20.0	5.0	✓
E. coli (MF-mFC-BCIG)	E012A.EC	662803	1	9	11.1	5.0	✓
Fluoride in Water by IC	E235.F	669271	1	3	33.3	5.0	✓
Nonylphenol Ethoxylates in Water by LC-MS-MS Positive Mode	E749B	665347	1	20	5.0	5.0	✓
Nonylphenol, Octylphenol and BPA in Water by LC-MS-MS Negative Mode	E749A	665346	1	20	5.0	5.0	✓
pH by Meter	E108	669275	1	15	6.6	5.0	✓
Phenols (4AAP) in Water by Colorimetry	E562	666017	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	669273	1	5	20.0	5.0	✓
Total Cyanide	E333	666273	1	10	10.0	5.0	✓
Total Hexavalent Chromium (Cr VI) by IC	E532	665904	1	14	7.1	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	666023	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	665474	1	14	7.1	5.0	✓
Total metals in Water by CRC ICPMS	E420	664619	1	18	5.5	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	666038	1	20	5.0	5.0	✓
TSS by Gravimetry	E160	664754	1	20	5.0	4.7	✓
VOCs (Eastern Canada List) by Headspace GC-MS	E611D	665343	1	20	5.0	5.0	✓
Laboratory Control Samples (LCS)							
Biochemical Oxygen Demand - 5 day	E550	662436	1	13	7.6	5.0	✓
BNA (Ontario Sanitary Sewer SVOC Target List) by GC-MS	E655F	662259	1	1	100.0	5.0	✓
Chloride in Water by IC	E235.Cl	669272	1	5	20.0	5.0	✓
Fluoride in Water by IC	E235.F	669271	1	3	33.3	5.0	✓
Mineral Oil & Grease by Gravimetry	E567SG	665272	1	19	5.2	5.0	✓
Nonylphenol Ethoxylates in Water by LC-MS-MS Positive Mode	E749B	665347	1	20	5.0	5.0	✓
Nonylphenol, Octylphenol and BPA in Water by LC-MS-MS Negative Mode	E749A	665346	1	20	5.0	5.0	✓
Oil & Grease by Gravimetry	E567	665271	1	19	5.2	5.0	✓
PAHs (ON Special List) by GC-MS	E642D	662255	1	1	100.0	5.0	✓
PAHs by Hexane LVI GC-MS (Low Level)	E641A-L	662341	1	1	100.0	5.0	✓
PCB Aroclors by GC-MS	E687	666138	1	16	6.2	4.7	✓
pH by Meter	E108	669275	1	15	6.6	5.0	✓
Phenols (4AAP) in Water by Colorimetry	E562	666017	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	669273	1	5	20.0	5.0	✓
Total Cyanide	E333	666273	1	10	10.0	5.0	✓
Total Hexavalent Chromium (Cr VI) by IC	E532	665904	1	14	7.1	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	666023	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	665474	1	14	7.1	5.0	✓
Total metals in Water by CRC ICPMS	E420	664619	1	18	5.5	5.0	✓

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS) - Continued							
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	666038	1	20	5.0	5.0	✓
TSS by Gravimetry	E160	664754	1	20	5.0	4.7	✓
VOCs (Eastern Canada List) by Headspace GC-MS	E611D	665343	1	20	5.0	5.0	✓
Method Blanks (MB)							
Biochemical Oxygen Demand - 5 day	E550	662436	1	13	7.6	5.0	✓
BNA (Ontario Sanitary Sewer SVOC Target List) by GC-MS	E655F	662259	1	1	100.0	5.0	✓
Chloride in Water by IC	E235.Cl	669272	1	5	20.0	5.0	✓
E. coli (MF-mFC-BCIG)	E012A.EC	662803	1	9	11.1	5.0	✓
Fluoride in Water by IC	E235.F	669271	1	3	33.3	5.0	✓
Mineral Oil & Grease by Gravimetry	E567SG	665272	1	19	5.2	5.0	✓
Nonylphenol Ethoxylates in Water by LC-MS-MS Positive Mode	E749B	665347	1	20	5.0	5.0	✓
Nonylphenol, Octylphenol and BPA in Water by LC-MS-MS Negative Mode	E749A	665346	1	20	5.0	5.0	✓
Oil & Grease by Gravimetry	E567	665271	1	19	5.2	5.0	✓
PAHs (ON Special List) by GC-MS	E642D	662255	1	1	100.0	5.0	✓
PAHs by Hexane LVI GC-MS (Low Level)	E641A-L	662341	1	1	100.0	5.0	✓
PCB Aroclors by GC-MS	E687	666138	1	16	6.2	4.7	✓
Phenols (4AAP) in Water by Colorimetry	E562	666017	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	669273	1	5	20.0	5.0	✓
Total Cyanide	E333	666273	1	10	10.0	5.0	✓
Total Hexavalent Chromium (Cr VI) by IC	E532	665904	1	14	7.1	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	666023	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	665474	1	14	7.1	5.0	✓
Total metals in Water by CRC ICPMS	E420	664619	1	18	5.5	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	666038	1	20	5.0	5.0	✓
TSS by Gravimetry	E160	664754	1	20	5.0	4.7	✓
VOCs (Eastern Canada List) by Headspace GC-MS	E611D	665343	1	20	5.0	5.0	✓
Matrix Spikes (MS)							
Chloride in Water by IC	E235.Cl	669272	1	5	20.0	5.0	✓
Fluoride in Water by IC	E235.F	669271	1	3	33.3	5.0	✓
Nonylphenol Ethoxylates in Water by LC-MS-MS Positive Mode	E749B	665347	1	20	5.0	5.0	✓
Nonylphenol, Octylphenol and BPA in Water by LC-MS-MS Negative Mode	E749A	665346	1	20	5.0	5.0	✓
Phenols (4AAP) in Water by Colorimetry	E562	666017	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	669273	1	5	20.0	5.0	✓
Total Cyanide	E333	666273	1	10	10.0	5.0	✓
Total Hexavalent Chromium (Cr VI) by IC	E532	665904	1	14	7.1	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	666023	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	665474	1	14	7.1	5.0	✓
Total metals in Water by CRC ICPMS	E420	664619	1	18	5.5	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	666038	1	20	5.0	5.0	✓
VOCs (Eastern Canada List) by Headspace GC-MS	E611D	665343	1	20	5.0	5.0	✓

Methodology References and Summaries

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

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
E. coli (MF-mFC-BCIG)	E012A.EC Waterloo - Environmental	Water	ON E3433 (mod)	Following filtration (0.45 µm), and incubation at 44.5±0.2°C for 24 hours, colonies exhibiting characteristic morphology of the target organism are enumerated.
pH by Meter	E108 Waterloo - Environmental	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
TSS by Gravimetry	E160 Waterloo - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
Chloride in Water by IC	E235.Cl Waterloo - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F Waterloo - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 Waterloo - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318 Waterloo - Environmental	Water	Method Fialab 100, 2018	TKN in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021).
Total Cyanide	E333 Waterloo - Environmental	Water	ISO 14403 (mod)	Total or Strong Acid Dissociable (SAD) Cyanide is determined by Continuous Flow Analyzer (CFA) with in-line UV digestion followed by colourmetric analysis. Method Limitation: High levels of thiocyanate (SCN) may cause positive interference (up to 0.5% of SCN concentration).
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U Waterloo - Environmental	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Total metals in Water by CRC ICPMS	E420 Waterloo - Environmental	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Total Mercury in Water by CVAAS	E508 Waterloo - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Total Hexavalent Chromium (Cr VI) by IC	E532 Waterloo - Environmental	Water	APHA 3500-Cr C (Ion Chromatography)	Hexavalent Chromium is measured by Ion chromatography-Post column reaction and UV detection. Results are based on an un-filtered, field-preserved sample.
Biochemical Oxygen Demand - 5 day	E550 Waterloo - Environmental	Water	APHA 5210 B (mod)	Samples are diluted and incubated for a specified time period, after which the oxygen depletion is measured using a dissolved oxygen meter. Free chlorine is a negative interference in the BOD method; please advise ALS when free chlorine is present in samples.
Phenols (4AAP) in Water by Colorimetry	E562 Waterloo - Environmental	Water	EPA 9066	This automated method is based on the distillation of phenol and subsequent reaction of the distillate with alkaline ferricyanide ($K_3Fe(CN)_6$) and 4-amino-antipyrine (4-AAP) to form a red complex which is measured colorimetrically.
Oil & Grease by Gravimetry	E567 Waterloo - Environmental	Water	BC MOE Lab Manual (Oil & Grease) (mod)	The entire water sample is extracted with hexane and the extract is evaporated to dryness. The residue is then weighed to determine Oil and Grease.
Mineral Oil & Grease by Gravimetry	E567SG Waterloo - Environmental	Water	BC MOE Lab Manual (Oil & Grease) (mod)	The entire water sample is extracted with hexane, followed by silica gel treatment after which the extract is evaporated to dryness. The residue is then weighed to determine Mineral Oil and Grease.
VOCs (Eastern Canada List) by Headspace GC-MS	E611D Waterloo - Environmental	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
PAHs by Hexane LVI GC-MS (Low Level)	E641A-L Waterloo - Environmental	Water	EPA 8270E (mod)	Polycyclic Aromatic Hydrocarbons (PAHs) are analyzed by large volume injection (LVI) GC-MS.
PAHs (ON Special List) by GC-MS	E642D Waterloo - Environmental	Water	EPA 8270E (mod)	Polycyclic Aromatic Hydrocarbons (PAHs) are analyzed by GC-MS.
BNA (Ontario Sanitary Sewer SVOC Target List) by GC-MS	E655F Waterloo - Environmental	Water	EPA 8270E (mod)	BNA are analyzed by GC-MS.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
PCB Aroclors by GC-MS	E687 Waterloo - Environmental	Water	EPA 8270E (mod)	PCB Aroclors are analyzed by GC-MS
Nonylphenol, Octylphenol and BPA in Water by LC-MS-MS Negative Mode	E749A Waterloo - Environmental	Water	J. Chrom A849 (1999) p.467-482	An aliquot of 5.0 ± 0.10 mL of filtered sample is spiked with Nonylphenol-D4, Nonylphenol Diethoxylate 13C6, and Bisphenol A 13C12 internal standards and analyzed by LC-MS/MS.
Nonylphenol Ethoxylates in Water by LC-MS-MS Positive Mode	E749B Waterloo - Environmental	Water	J. Chrom A849 (1999) p.467-482	Water samples are filtered and analyzed on LCMS/MS by direct injection.
Animal & Vegetable Oil & Grease by Gravimetry	EC567A.SG Waterloo - Environmental	Water	APHA 5520 (mod)	Animal & vegetable oil and grease is calculated as follows: Oil & Grease (gravimetric) minus Mineral Oil & Grease (gravimetric)
Total PAH (Ontario Sewer Use Extended List)	EC640A Waterloo - Environmental	Water	Calculation (Sum of the Squares)	Total PAH (Ontario Sewer Use) is the sum of the following PAHs: anthracene, benz(a)anthracene, benzo(a)pyrene, benzo(b+j)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, fluoranthene, indeno(1,2,3-c,d)pyrene, phenanthrene, pyrene, benzo(e)pyrene, perylene, 3-methylcholanthrene, 1,3-dinitropyrene, 1,6-dinitropyrene, 1,8-dinitropyrene, 7H-dibenzo(c,g)carbazole, dibenzo(a,i)pyrene, dibenz(a,j)acridine, and dibenz(a,h)acridine. When the PAH is less than LOR, zero is used for calculation.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Digestion for TKN in water	EP318 Waterloo - Environmental	Water	APHA 4500-Norg D (mod)	Samples are digested at high temperature using Sulfuric Acid with Copper catalyst, which converts organic nitrogen sources to Ammonia, which is then quantified by the analytical method as TKN. This method is unsuitable for samples containing high levels of nitrate. If nitrate exceeds TKN concentration by ten times or more, results may be biased low.
Digestion for Total Phosphorus in water	EP372 Waterloo - Environmental	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Oil & Grease Extraction for Gravimetry	EP567 Waterloo - Environmental	Water	BC MOE Lab Manual (Oil & Grease) (mod)	The entire water sample is extracted with hexane by liquid-liquid extraction.
VOCs Preparation for Headspace Analysis	EP581 Waterloo - Environmental	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into the GC/MS-FID system.
PHCs and PAHs Hexane Extraction	EP601 Waterloo - Environmental	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
PAHs DCM Extraction	EP642 Waterloo - Environmental	Water	EPA 3510C (mod)	PAH are extracted from aqueous sample using DCM liquid-liquid extraction.
BNA Extraction	EP655 Waterloo - Environmental	Water	EPA 3510C (mod)	SVOCs are extracted from aqueous sample using DCM liquid-liquid extraction.
Pesticides, PCB, and Neutral Extractable Chlorinated Hydrocarbons Extraction	EP660 Waterloo - Environmental	Water	EPA 3511 (mod)	Samples are extracted from aqueous sample using an organic solvent liquid-liquid extraction.
Preparation of Nonylphenol and Nonylphenol Ethoxylates	EP749 Waterloo - Environmental	Water	J. Chrom A849 (1999) p.467-482	An aliquot of 5.0 ± 0.10 mL of filtered sample is spiked with Nonylphenol-D4, Nonylphenol Diethoxylate 13C6, and Bisphenol A 13C12 internal standards and analyzed by LC-MS/MS.

QUALITY CONTROL REPORT

Work Order	: **WT2215311**	Page	: 1 of 14
Client	: Terrapex Environmental Ltd.	Laboratory	: Waterloo - Environmental
Contact	: Brian Theimer	Account Manager	: Gayle Braun
Address	: 90 Scarsdale Rd. Toronto ON Canada M3B2R7	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	: 416 245 0011	Telephone	: +1 519 886 6910
Project	: CT3580.00	Date Samples Received	: 21-Sep-2022 15:00
PO	: ----	Date Analysis Commenced	: 23-Sep-2022
C-O-C number	: 20-999848	Issue Date	: 04-Oct-2022 14:51
Sampler	: VS/BS		
Site	: ----		
Quote number	: SOA		
No. of samples received	: 1		
No. of samples analysed	: 1		

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
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Jon Fisher	Department Manager - Inorganics	Waterloo Inorganics, Waterloo, Ontario
Jon Fisher	Department Manager - Inorganics	Waterloo Metals, Waterloo, Ontario
Joseph Scharbach		Waterloo Organics, Waterloo, Ontario
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Sarah Birch	Team Leader - Volatiles	Waterloo Organics, Waterloo, Ontario
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General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

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

Workorder Comments

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 664754)											
WT2214813-001	Anonymous	solids, total suspended [TSS]	----	E160	3.0	mg/L	<3.0	<3.0	0	Diff <2x LOR	----
Physical Tests (QC Lot: 669275)											
WT2215239-009	Anonymous	pH	----	E108	0.10	pH units	7.98	8.00	0.250%	4%	----
Anions and Nutrients (QC Lot: 666023)											
WT2214791-021	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	0.050	mg/L	1.01	1.01	0.436%	20%	----
Anions and Nutrients (QC Lot: 666038)											
WT2214892-001	Anonymous	phosphorus, total	7723-14-0	E372-U	0.0400	mg/L	14.9	14.8	0.378%	20%	----
Anions and Nutrients (QC Lot: 669271)											
WT2215239-009	Anonymous	fluoride	16984-48-8	E235.F	0.020	mg/L	0.100	0.099	0.0010	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 669272)											
WT2215239-009	Anonymous	chloride	16887-00-6	E235.Cl	0.50	mg/L	43.3	43.2	0.205%	20%	----
Anions and Nutrients (QC Lot: 669273)											
WT2215239-009	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	29.1	29.0	0.355%	20%	----
Cyanides (QC Lot: 666273)											
WT2215061-004	Anonymous	cyanide, strong acid dissociable (total)	----	E333	0.0020	mg/L	<0.0020	<0.0020	0	Diff <2x LOR	----
Microbiological Tests (QC Lot: 662803)											
WT2215273-002	Anonymous	coliforms, Escherichia coli [E. coli]	----	E012A.EC	1	CFU/100mL	<1	<1	0	Diff <2x LOR	----
Total Metals (QC Lot: 664619)											
WT2215061-001	Anonymous	aluminum, total	7429-90-5	E420	0.0030	mg/L	0.0065	0.0074	0.0008	Diff <2x LOR	----
		antimony, total	7440-36-0	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		arsenic, total	7440-38-2	E420	0.00010	mg/L	0.00024	0.00024	0.000007	Diff <2x LOR	----
		cadmium, total	7440-43-9	E420	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
		chromium, total	7440-47-3	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		cobalt, total	7440-48-4	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		copper, total	7440-50-8	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		lead, total	7439-92-1	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		manganese, total	7439-96-5	E420	0.00010	mg/L	0.0177	0.0177	0.217%	20%	----
		molybdenum, total	7439-98-7	E420	0.000050	mg/L	0.000089	0.000088	0.000001	Diff <2x LOR	----
		nickel, total	7440-02-0	E420	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		selenium, total	7782-49-2	E420	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		silver, total	7440-22-4	E420	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 664619) - continued											
WT2215061-001	Anonymous	tin, total	7440-31-5	E420	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		titanium, total	7440-32-6	E420	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		zinc, total	7440-66-6	E420	0.0030	mg/L	<0.0030	<0.0030	0	Diff <2x LOR	----
Total Metals (QC Lot: 665474)											
WT2215311-001	MW104A	mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Speciated Metals (QC Lot: 665904)											
CG2212991-006	Anonymous	chromium, hexavalent [Cr VI], total	18540-29-9	E532	0.00050	mg/L	0.00051	<0.00050	0.000006	Diff <2x LOR	----
Aggregate Organics (QC Lot: 662436)											
WT2215224-002	Anonymous	biochemical oxygen demand [BOD]	----	E550	3.0	mg/L	<3.0	<3.0	0.0%	30%	----
Aggregate Organics (QC Lot: 666017)											
TY2201891-001	Anonymous	phenols, total (4AAP)	----	E562	0.0010	mg/L	0.0074	0.0079	0.0004	Diff <2x LOR	----
Volatile Organic Compounds (QC Lot: 665343)											
TY2201905-001	Anonymous	benzene	71-43-2	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		chloroform	67-66-3	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		dichlorobenzene, 1,2-	95-50-1	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		dichlorobenzene, 1,4-	106-46-7	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		dichloroethylene, cis-1,2-	156-59-2	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		dichloromethane	75-09-2	E611D	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		dichloropropylene, trans-1,3-	10061-02-6	E611D	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
		ethylbenzene	100-41-4	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		tetrachloroethane, 1,1,2,2-	79-34-5	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		tetrachloroethylene	127-18-4	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		toluene	108-88-3	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		trichloroethylene	79-01-6	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		xylene, m+p-	179601-23-1	E611D	0.40	µg/L	<0.40	<0.40	0	Diff <2x LOR	----
		xylene, o-	95-47-6	E611D	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
Nonylphenols (QC Lot: 665346)											
WT2215084-001	Anonymous	nonylphenols [NP]	84852-15-3	E749A	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
Nonylphenols (QC Lot: 665347)											
WT2215084-001	Anonymous	nonylphenol diethoxylates [NP2EO]	n/a	E749B	0.10	µg/L	<0.10	<0.10	0	Diff <2x LOR	----
		nonylphenol monoethoxylates [NP1EO]	n/a	E749B	2.0	µg/L	<2.0	<2.0	0	Diff <2x LOR	----

Method Blank (MB) Report

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

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 664754)						
solids, total suspended [TSS]	----	E160	3	mg/L	<3.0	----
Anions and Nutrients (QCLot: 666023)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 666038)						
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 669271)						
fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 669272)						
chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 669273)						
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Cyanides (QCLot: 666273)						
cyanide, strong acid dissociable (total)	----	E333	0.002	mg/L	<0.0020	----
Microbiological Tests (QCLot: 662803)						
coliforms, Escherichia coli [E. coli]	----	E012A.EC	1	CFU/100mL	<1	----
Total Metals (QCLot: 664619)						
aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----
titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
Total Metals (QCLot: 665474)						

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 665474) - continued						
mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Speciated Metals (QCLot: 665904)						
chromium, hexavalent [Cr VI], total	18540-29-9	E532	0.0005	mg/L	<0.00050	----
Aggregate Organics (QCLot: 662436)						
biochemical oxygen demand [BOD]	----	E550	2	mg/L	<2.0	----
Aggregate Organics (QCLot: 665271)						
oil & grease (gravimetric)	----	E567	5	mg/L	<5.0	----
Aggregate Organics (QCLot: 665272)						
oil & grease, mineral (gravimetric)	----	E567SG	5	mg/L	<5.0	----
Aggregate Organics (QCLot: 666017)						
phenols, total (4AAP)	----	E562	0.001	mg/L	<0.0010	----
Volatile Organic Compounds (QCLot: 665343)						
benzene	71-43-2	E611D	0.5	µg/L	<0.50	----
chloroform	67-66-3	E611D	0.5	µg/L	<0.50	----
dichlorobenzene, 1,2-	95-50-1	E611D	0.5	µg/L	<0.50	----
dichlorobenzene, 1,4-	106-46-7	E611D	0.5	µg/L	<0.50	----
dichloroethylene, cis-1,2-	156-59-2	E611D	0.5	µg/L	<0.50	----
dichloromethane	75-09-2	E611D	1	µg/L	<1.0	----
dichloropropylene, trans-1,3-	10061-02-6	E611D	0.3	µg/L	<0.30	----
ethylbenzene	100-41-4	E611D	0.5	µg/L	<0.50	----
tetrachloroethane, 1,1,2,2-	79-34-5	E611D	0.5	µg/L	<0.50	----
tetrachloroethylene	127-18-4	E611D	0.5	µg/L	<0.50	----
toluene	108-88-3	E611D	0.5	µg/L	<0.50	----
trichloroethylene	79-01-6	E611D	0.5	µg/L	<0.50	----
xylene, m+p-	179601-23-1	E611D	0.4	µg/L	<0.40	----
xylene, o-	95-47-6	E611D	0.3	µg/L	<0.30	----
Polycyclic Aromatic Hydrocarbons (QCLot: 662255)						
dibenz(a,h)acridine	226-36-8	E642D	0.05	µg/L	<0.050	----
dibenz(a,j)acridine	224-42-0	E642D	0.05	µg/L	<0.050	----
dibenzo(a,i)pyrene	189-55-9	E642D	0.05	µg/L	<0.050	----
dibenzo(c,g)carbazole, 7H-	194-59-2	E642D	0.05	µg/L	<0.050	----
dinitropyrene, 1,3-	75321-20-9	E642D	1	µg/L	<1.0	----
dinitropyrene, 1,6-	42397-64-8	E642D	1	µg/L	<1.0	----
dinitropyrene, 1,8-	42397-65-9	E642D	1	µg/L	<1.0	----
methylcholanthrene, 3-	56-49-5	E642D	0.05	µg/L	<0.050	----
Polycyclic Aromatic Hydrocarbons (QCLot: 662341)						

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 662341) - continued						
anthracene	120-12-7	E641A-L	0.01	µg/L	<0.010	----
benz(a)anthracene	56-55-3	E641A-L	0.01	µg/L	<0.010	----
benzo(a)pyrene	50-32-8	E641A-L	0.005	µg/L	<0.0050	----
benzo(b+j)fluoranthene	n/a	E641A-L	0.01	µg/L	<0.010	----
benzo(e)pyrene	192-97-2	E641A-L	0.01	µg/L	<0.010	----
benzo(g,h,i)perylene	191-24-2	E641A-L	0.01	µg/L	<0.010	----
benzo(k)fluoranthene	207-08-9	E641A-L	0.01	µg/L	<0.010	----
chrysene	218-01-9	E641A-L	0.01	µg/L	<0.010	----
dibenz(a,h)anthracene	53-70-3	E641A-L	0.005	µg/L	<0.0050	----
fluoranthene	206-44-0	E641A-L	0.01	µg/L	<0.010	----
indeno(1,2,3-c,d)pyrene	193-39-5	E641A-L	0.01	µg/L	<0.010	----
perylene	198-55-0	E641A-L	0.01	µg/L	<0.010	----
phenanthrene	85-01-8	E641A-L	0.01	µg/L	<0.010	----
pyrene	129-00-0	E641A-L	0.01	µg/L	<0.010	----
Phthalate Esters (QCLot: 662259)						
bis(2-ethylhexyl) phthalate [DEHP]	117-81-7	E655F	2	µg/L	<2.0	----
di-n-butyl phthalate	84-74-2	E655F	1	µg/L	<1.0	----
Semi-Volatile Organics (QCLot: 662259)						
dichlorobenzidine, 3,3'-	91-94-1	E655F	0.4	µg/L	<0.40	----
Chlorinated Phenolics (QCLot: 662259)						
pentachlorophenol [PCP]	87-86-5	E655F	0.5	µg/L	<0.50	----
Nonylphenols (QCLot: 665346)						
nonylphenols [NP]	84852-15-3	E749A	1	µg/L	<1.0	----
Nonylphenols (QCLot: 665347)						
nonylphenol diethoxylates [NP2EO]	n/a	E749B	0.1	µg/L	<0.10	----
nonylphenol monoethoxylates [NP1EO]	n/a	E749B	2	µg/L	<2.0	----
Polychlorinated Biphenyls (QCLot: 666138)						
Aroclor 1016	12674-11-2	E687	0.02	µg/L	<0.020	----
Aroclor 1221	11104-28-2	E687	0.02	µg/L	<0.020	----
Aroclor 1232	11141-16-5	E687	0.02	µg/L	<0.020	----
Aroclor 1242	53469-21-9	E687	0.02	µg/L	<0.020	----
Aroclor 1248	12672-29-6	E687	0.02	µg/L	<0.020	----
Aroclor 1254	11097-69-1	E687	0.02	µg/L	<0.020	----
Aroclor 1260	11096-82-5	E687	0.02	µg/L	<0.020	----
Aroclor 1262	37324-23-5	E687	0.02	µg/L	<0.020	----
Aroclor 1268	11100-14-4	E687	0.02	µg/L	<0.020	----

Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 664754)									
solids, total suspended [TSS]	----	E160	3	mg/L	150 mg/L	110	85.0	115	----
Physical Tests (QCLot: 669275)									
pH	----	E108	----	pH units	7 pH units	101	98.0	102	----
Anions and Nutrients (QCLot: 666023)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	100	75.0	125	----
Anions and Nutrients (QCLot: 666038)									
phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.53 mg/L	98.8	80.0	120	----
Anions and Nutrients (QCLot: 669271)									
fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 669272)									
chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 669273)									
sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	102	90.0	110	----
Cyanides (QCLot: 666273)									
cyanide, strong acid dissociable (total)	----	E333	0.002	mg/L	0.25 mg/L	88.3	80.0	120	----
Total Metals (QCLot: 664619)									
aluminum, total	7429-90-5	E420	0.003	mg/L	0.1 mg/L	102	80.0	120	----
antimony, total	7440-36-0	E420	0.0001	mg/L	0.05 mg/L	99.1	80.0	120	----
arsenic, total	7440-38-2	E420	0.0001	mg/L	0.05 mg/L	99.8	80.0	120	----
cadmium, total	7440-43-9	E420	0.000005	mg/L	0.005 mg/L	102	80.0	120	----
chromium, total	7440-47-3	E420	0.0005	mg/L	0.0125 mg/L	100	80.0	120	----
cobalt, total	7440-48-4	E420	0.0001	mg/L	0.0125 mg/L	101	80.0	120	----
copper, total	7440-50-8	E420	0.0005	mg/L	0.0125 mg/L	99.3	80.0	120	----
lead, total	7439-92-1	E420	0.00005	mg/L	0.025 mg/L	99.3	80.0	120	----
manganese, total	7439-96-5	E420	0.0001	mg/L	0.0125 mg/L	99.3	80.0	120	----
molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.0125 mg/L	93.7	80.0	120	----
nickel, total	7440-02-0	E420	0.0005	mg/L	0.025 mg/L	101	80.0	120	----
selenium, total	7782-49-2	E420	0.00005	mg/L	0.05 mg/L	101	80.0	120	----
silver, total	7440-22-4	E420	0.00001	mg/L	0.005 mg/L	98.4	80.0	120	----
tin, total	7440-31-5	E420	0.0001	mg/L	0.025 mg/L	92.6	80.0	120	----
titanium, total	7440-32-6	E420	0.0003	mg/L	0.0125 mg/L	95.3	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Total Metals (QCLot: 664619) - continued									
zinc, total	7440-66-6	E420	0.003	mg/L	0.025 mg/L	98.6	80.0	120	----
Total Metals (QCLot: 665474)									
mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	102	80.0	120	----
Speciated Metals (QCLot: 665904)									
chromium, hexavalent [Cr VI], total	18540-29-9	E532	0.0005	mg/L	0.025 mg/L	99.3	80.0	120	----
Aggregate Organics (QCLot: 662436)									
biochemical oxygen demand [BOD]	----	E550	2	mg/L	198 mg/L	88.7	85.0	115	----
Aggregate Organics (QCLot: 665271)									
oil & grease (gravimetric)	----	E567	5	mg/L	200 mg/L	82.8	70.0	130	----
Aggregate Organics (QCLot: 665272)									
oil & grease, mineral (gravimetric)	----	E567SG	5	mg/L	100 mg/L	77.9	70.0	130	----
Aggregate Organics (QCLot: 666017)									
phenols, total (4AAP)	----	E562	0.001	mg/L	0.02 mg/L	111	85.0	115	----
Volatile Organic Compounds (QCLot: 665343)									
benzene	71-43-2	E611D	0.5	µg/L	100 µg/L	106	70.0	130	----
chloroform	67-66-3	E611D	0.5	µg/L	100 µg/L	102	70.0	130	----
dichlorobenzene, 1,2-	95-50-1	E611D	0.5	µg/L	100 µg/L	94.2	70.0	130	----
dichlorobenzene, 1,4-	106-46-7	E611D	0.5	µg/L	100 µg/L	96.6	70.0	130	----
dichloroethylene, cis-1,2-	156-59-2	E611D	0.5	µg/L	100 µg/L	99.8	70.0	130	----
dichloromethane	75-09-2	E611D	1	µg/L	100 µg/L	116	70.0	130	----
dichloropropylene, trans-1,3-	10061-02-6	E611D	0.3	µg/L	100 µg/L	93.0	70.0	130	----
ethylbenzene	100-41-4	E611D	0.5	µg/L	100 µg/L	96.9	70.0	130	----
tetrachloroethane, 1,1,2,2-	79-34-5	E611D	0.5	µg/L	100 µg/L	106	70.0	130	----
tetrachloroethylene	127-18-4	E611D	0.5	µg/L	100 µg/L	90.3	70.0	130	----
toluene	108-88-3	E611D	0.5	µg/L	100 µg/L	99.5	70.0	130	----
trichloroethylene	79-01-6	E611D	0.5	µg/L	100 µg/L	90.3	70.0	130	----
xylene, m+p-	179601-23-1	E611D	0.4	µg/L	200 µg/L	96.2	70.0	130	----
xylene, o-	95-47-6	E611D	0.3	µg/L	100 µg/L	97.2	70.0	130	----
Polycyclic Aromatic Hydrocarbons (QCLot: 662255)									
dibenz(a,h)acridine	226-36-8	E642D	0.05	µg/L	1.6 µg/L	106	60.0	130	----
dibenz(a,j)acridine	224-42-0	E642D	0.05	µg/L	1.6 µg/L	110	60.0	130	----
dibenzo(a,i)pyrene	189-55-9	E642D	0.05	µg/L	1.6 µg/L	86.8	60.0	130	----
dibenzo(c,g)carbazole, 7H-	194-59-2	E642D	0.05	µg/L	1.6 µg/L	110	60.0	130	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 662255) - continued									
dinitropyrene, 1,3-	75321-20-9	E642D	1	µg/L	1.6 µg/L	114	60.0	130	----
dinitropyrene, 1,6-	42397-64-8	E642D	1	µg/L	1.6 µg/L	78.9	60.0	130	----
dinitropyrene, 1,8-	42397-65-9	E642D	1	µg/L	1.6 µg/L	93.3	60.0	130	----
methylcholanthrene, 3-	56-49-5	E642D	0.05	µg/L	1.6 µg/L	# 164	60.0	130	LCS-H
Polycyclic Aromatic Hydrocarbons (QCLot: 662341)									
anthracene	120-12-7	E641A-L	0.01	µg/L	0.5263 µg/L	93.9	50.0	140	----
benz(a)anthracene	56-55-3	E641A-L	0.01	µg/L	0.5263 µg/L	123	50.0	140	----
benzo(a)pyrene	50-32-8	E641A-L	0.005	µg/L	0.5263 µg/L	113	50.0	140	----
benzo(b+j)fluoranthene	n/a	E641A-L	0.01	µg/L	0.5263 µg/L	118	50.0	140	----
benzo(e)pyrene	192-97-2	E641A-L	0.01	µg/L	0.5263 µg/L	120	50.0	140	----
benzo(g,h,i)perylene	191-24-2	E641A-L	0.01	µg/L	0.5263 µg/L	130	50.0	140	----
benzo(k)fluoranthene	207-08-9	E641A-L	0.01	µg/L	0.5263 µg/L	116	50.0	140	----
chrysene	218-01-9	E641A-L	0.01	µg/L	0.5263 µg/L	128	50.0	140	----
dibenz(a,h)anthracene	53-70-3	E641A-L	0.005	µg/L	0.5263 µg/L	126	50.0	140	----
fluoranthene	206-44-0	E641A-L	0.01	µg/L	0.5263 µg/L	133	50.0	140	----
indeno(1,2,3-c,d)pyrene	193-39-5	E641A-L	0.01	µg/L	0.5263 µg/L	129	50.0	140	----
perylene	198-55-0	E641A-L	0.01	µg/L	0.5263 µg/L	129	50.0	140	----
phenanthrene	85-01-8	E641A-L	0.01	µg/L	0.5263 µg/L	120	50.0	140	----
pyrene	129-00-0	E641A-L	0.01	µg/L	0.5263 µg/L	136	50.0	140	----
Phthalate Esters (QCLot: 662259)									
bis(2-ethylhexyl) phthalate [DEHP]	117-81-7	E655F	2	µg/L	6.4 µg/L	112	50.0	140	----
di-n-butyl phthalate	84-74-2	E655F	1	µg/L	6.4 µg/L	114	50.0	140	----
Semi-Volatile Organics (QCLot: 662259)									
dichlorobenzidine, 3,3'-	91-94-1	E655F	0.4	µg/L	1.6 µg/L	# 39.9	50.0	140	RRQC
Chlorinated Phenolics (QCLot: 662259)									
pentachlorophenol [PCP]	87-86-5	E655F	0.5	µg/L	4.8 µg/L	# 148	50.0	140	LCS-H
Nonylphenols (QCLot: 665346)									
nonylphenols [NP]	84852-15-3	E749A	1	µg/L	10 µg/L	107	75.0	125	----
Nonylphenols (QCLot: 665347)									
nonylphenol diethoxylates [NP2EO]	n/a	E749B	0.1	µg/L	1 µg/L	104	75.0	125	----
nonylphenol monoethoxylates [NP1EO]	n/a	E749B	2	µg/L	20 µg/L	108	75.0	125	----
Polychlorinated Biphenyls (QCLot: 666138)									
Aroclor 1016	12674-11-2	E687	0.02	µg/L	0.2 µg/L	107	60.0	140	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Polychlorinated Biphenyls (QCLot: 666138) - continued									
Aroclor 1221	11104-28-2	E687	0.02	µg/L	0.2 µg/L	107	60.0	140	----
Aroclor 1232	11141-16-5	E687	0.02	µg/L	0.2 µg/L	107	60.0	140	----
Aroclor 1242	53469-21-9	E687	0.02	µg/L	0.2 µg/L	107	60.0	140	----
Aroclor 1248	12672-29-6	E687	0.02	µg/L	0.2 µg/L	90.5	60.0	140	----
Aroclor 1254	11097-69-1	E687	0.02	µg/L	0.2 µg/L	110	60.0	140	----
Aroclor 1260	11096-82-5	E687	0.02	µg/L	0.2 µg/L	104	60.0	140	----
Aroclor 1262	37324-23-5	E687	0.02	µg/L	0.2 µg/L	104	60.0	140	----
Aroclor 1268	11100-14-4	E687	0.02	µg/L	0.2 µg/L	104	60.0	140	----

Qualifiers

Qualifier	Description
LCS-H	*Lab Control Sample recovery was above ALS DQO. Non-detected sample results are considered reliable. Other results, if reported, have been qualified.*
RRQC	*Refer to report comments for information regarding this QC result.*

Matrix Spike (MS) Report

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

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 666023)										
WT2214791-021	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	2.46 mg/L	2.5 mg/L	98.4	70.0	130	----
Anions and Nutrients (QCLot: 666038)										
WT2214892-001	Anonymous	phosphorus, total	7723-14-0	E372-U	ND mg/L	0.1 mg/L	ND	70.0	130	----
Anions and Nutrients (QCLot: 669271)										
WT2215239-009	Anonymous	fluoride	16984-48-8	E235.F	0.989 mg/L	1 mg/L	98.9	75.0	125	----
Anions and Nutrients (QCLot: 669272)										
WT2215239-009	Anonymous	chloride	16887-00-6	E235.Cl	100 mg/L	100 mg/L	100	75.0	125	----
Anions and Nutrients (QCLot: 669273)										
WT2215239-009	Anonymous	sulfate (as SO4)	14808-79-8	E235.SO4	98.7 mg/L	100 mg/L	98.7	75.0	125	----
Cyanides (QCLot: 666273)										
WT2215061-004	Anonymous	cyanide, strong acid dissociable (total)	----	E333	0.224 mg/L	0.25 mg/L	89.5	75.0	125	----
Total Metals (QCLot: 664619)										
WT2215061-002	Anonymous	aluminum, total	7429-90-5	E420	0.103 mg/L	0.1 mg/L	103	70.0	130	----
		antimony, total	7440-36-0	E420	0.0529 mg/L	0.05 mg/L	106	70.0	130	----
		arsenic, total	7440-38-2	E420	0.0509 mg/L	0.05 mg/L	102	70.0	130	----
		cadmium, total	7440-43-9	E420	0.00531 mg/L	0.005 mg/L	106	70.0	130	----
		chromium, total	7440-47-3	E420	0.0129 mg/L	0.0125 mg/L	103	70.0	130	----
		cobalt, total	7440-48-4	E420	0.0127 mg/L	0.0125 mg/L	102	70.0	130	----
		copper, total	7440-50-8	E420	0.0125 mg/L	0.0125 mg/L	99.9	70.0	130	----
		lead, total	7439-92-1	E420	0.0254 mg/L	0.025 mg/L	102	70.0	130	----
		manganese, total	7439-96-5	E420	0.0122 mg/L	0.0125 mg/L	97.4	70.0	130	----
		molybdenum, total	7439-98-7	E420	0.0125 mg/L	0.0125 mg/L	100	70.0	130	----
		nickel, total	7440-02-0	E420	0.0256 mg/L	0.025 mg/L	102	70.0	130	----
		selenium, total	7782-49-2	E420	0.0519 mg/L	0.05 mg/L	104	70.0	130	----
		silver, total	7440-22-4	E420	0.00521 mg/L	0.005 mg/L	104	70.0	130	----
		tin, total	7440-31-5	E420	0.0248 mg/L	0.025 mg/L	99.2	70.0	130	----
		titanium, total	7440-32-6	E420	0.0124 mg/L	0.0125 mg/L	99.1	70.0	130	----
		zinc, total	7440-66-6	E420	0.0241 mg/L	0.025 mg/L	96.3	70.0	130	----
Total Metals (QCLot: 665474)										
WT2215346-001	Anonymous	mercury, total	7439-97-6	E508	0.0000964 mg/L	0.0001 mg/L	96.4	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Speciated Metals (QCLot: 665904)										
CG2212991-006	Anonymous	chromium, hexavalent [Cr VI], total	18540-29-9	E532	0.0406 mg/L	0.04 mg/L	102	70.0	130	----
Aggregate Organics (QCLot: 666017)										
TY2201891-001	Anonymous	phenols, total (4AAP)	----	E562	0.0212 mg/L	0.02 mg/L	106	75.0	125	----
Volatile Organic Compounds (QCLot: 665343)										
TY2201905-001	Anonymous	benzene	71-43-2	E611D	95.1 µg/L	100 µg/L	95.1	60.0	140	----
		chloroform	67-66-3	E611D	91.2 µg/L	100 µg/L	91.2	60.0	140	----
		dichlorobenzene, 1,2-	95-50-1	E611D	86.8 µg/L	100 µg/L	86.8	60.0	140	----
		dichlorobenzene, 1,4-	106-46-7	E611D	90.0 µg/L	100 µg/L	90.0	60.0	140	----
		dichloroethylene, cis-1,2-	156-59-2	E611D	88.3 µg/L	100 µg/L	88.3	60.0	140	----
		dichloromethane	75-09-2	E611D	102 µg/L	100 µg/L	102	60.0	140	----
		dichloropropylene, trans-1,3-	10061-02-6	E611D	84.9 µg/L	100 µg/L	84.9	60.0	140	----
		ethylbenzene	100-41-4	E611D	89.5 µg/L	100 µg/L	89.5	60.0	140	----
		tetrachloroethane, 1,1,2,2-	79-34-5	E611D	95.1 µg/L	100 µg/L	95.1	60.0	140	----
		tetrachloroethylene	127-18-4	E611D	82.4 µg/L	100 µg/L	82.4	60.0	140	----
		toluene	108-88-3	E611D	91.4 µg/L	100 µg/L	91.4	60.0	140	----
		trichloroethylene	79-01-6	E611D	80.7 µg/L	100 µg/L	80.7	60.0	140	----
		xylene, m+p-	179601-23-1	E611D	179 µg/L	200 µg/L	89.5	60.0	140	----
		xylene, o-	95-47-6	E611D	89.7 µg/L	100 µg/L	89.7	60.0	140	----
Nonylphenols (QCLot: 665346)										
WT2215084-001	Anonymous	nonylphenols [NP]	84852-15-3	E749A	9.6 µg/L	10 µg/L	95.7	60.0	140	----
Nonylphenols (QCLot: 665347)										
WT2215084-001	Anonymous	nonylphenol diethoxylates [NP2EO]	n/a	E749B	1.05 µg/L	1 µg/L	105	60.0	140	----
		nonylphenol monoethoxylates [NP1EO]	n/a	E749B	15.1 µg/L	20 µg/L	75.4	60.0	140	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 20 - 999848

Page

Canada Toll Free: 1 800 668 9878

ALS www.alsglobal.com

Environmental Division Waterloo
Work Order Reference
WT2215311

Telephone : +1 519 886 6910

Report To	Contact and company name below will appear on the final report
Company:	Terrapex Environmental LTD
Contact:	Brian Theimer
Phone:	647-464-1511
	Company address below will appear on the final report
Street:	90 Scarsdale Road
City/Province:	Toronto ON
Postal Code:	M3B 2R7
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of invoice with Report ☐ YES ☑ NO
Company:	
Contact:	

Project Information

ALS Account # / Quote #:	
Job #:	CT3580.00
PO / AFE:	
LSD:	
ALS Lab Work Order # (ALS use only):	WT2215311

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A
☑ Compare Results to Criteria on Report - provide details below if box checked
Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: b.theimer@terrapex.com
Email 2: s.sutherland@terrapex.com
Email 3: r.subhan@terrapex.com

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: accounts.payable@terrapex.com
Email 2: b.theimer@terrapex.com

Oil and Gas Required Fields (client use)

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

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
☐ Same day [E2] if received by 10am M-S - 200% rush surcharge. Additional fees may apply to rush requests on weekends, statutory holidays and non-routine tests

Date and Time Required for all E&P TATs:

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

Analysis Request

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

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS: City of Toronto Storm/Sewer Discharge	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	MW104A	21-Sep-22	15:00	GW	✓			

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

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

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

City of Toronto Storm and Sanitary Discharge

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☑ ICE ☐ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED
Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO
Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C	FINAL COOLER TEMPERATURES °C
	2.1

SHIPMENT RELEASE (client use)

Released by:	Date:	Time:
Ravi Subhan		

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (ALS use only)

Received by:	Date:	Time:
	09/22/22	6:00

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

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**

CERTIFICATE OF ANALYSIS (GUIDELINE EVALUATION)

Work Order	: **WT2216451**	Page	: 1 of 3
Client	: **Terrapex Environmental Ltd.**	Laboratory	: Waterloo - Environmental
Contact	: Brian Theimer	Account Manager	: Gayle Braun
Address	: 90 Scarsdale Rd. Toronto ON Canada M3B2R7	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	: 416 245 0011	Telephone	: +1 519 886 6910
Project	: CT3580.00	Date Samples Received	: 03-Oct-2022 14:45
PO	: ----	Date Analysis Commenced	: 04-Oct-2022
C-O-C number	: 20-1007992	Issue Date	: 12-Oct-2022 11:33
Sampler	: WN/ PB		
Site	: ----		
Quote number	: SOA		
No. of samples received	: 1		
No. of samples analysed	: 1		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Guideline Comparison

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Amanda Ganouri-Lumsden	Department Manager - Microbiology and Prep	Microbiology, Waterloo, Ontario
Greg Pokocky	Supervisor - Inorganic	Inorganics, Waterloo, Ontario

General Comments

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

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

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

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

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

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

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

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

Analytical Results

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

	Client sample ID	MW104A							
	Sampling date/time	03-Oct-2022 12:15							
Analyte	*Method*	*LOR*	*Unit*	WT2216451-001	**TORSUB SAN**	**TORSUB STM**				
Physical Tests										
solids, total suspended [TSS]	E160	3.0	mg/L	8.1	350 mg/L	15 mg/L	--	--	--	--
Microbiological Tests										
coliforms, Escherichia coli [E. coli]	E012A.EC	1	CFU/100mL	35	--	200 CFU/100mL	--	--	--	--
Aggregate Organics										
biochemical oxygen demand [BOD]	E550	2.0	mg/L	3.1	300 mg/L	15 mg/L	--	--	--	--

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

No Breaches Found

Key:

TORSUB	Ontario Toronto Sanitary Discharge Sewer By-Law 100-2016 (FEB 4,2016)
SAN	Toronto Sanitary Discharge Sewer By-Law
STM	Toronto Storm Discharge Sewer By-Law

CERTIFICATE OF ANALYSIS (GUIDELINE EVALUATION)

Work Order	: **WT2216451**	Page	: 1 of 3
Client	: **Terrapex Environmental Ltd.**	Laboratory	: Waterloo - Environmental
Contact	: Brian Theimer	Account Manager	: Gayle Braun
Address	: 90 Scarsdale Rd. Toronto ON Canada M3B2R7	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	: 416 245 0011	Telephone	: +1 519 886 6910
Project	: CT3580.00	Date Samples Received	: 03-Oct-2022 14:45
PO	: ----	Date Analysis Commenced	: 04-Oct-2022
C-O-C number	: 20-1007992	Issue Date	: 12-Oct-2022 11:33
Sampler	: WN/ PB		
Site	: ----		
Quote number	: SOA		
No. of samples received	: 1		
No. of samples analysed	: 1		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Guideline Comparison

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Amanda Ganouri-Lumsden	Department Manager - Microbiology and Prep	Microbiology, Waterloo, Ontario
Greg Pokocky	Supervisor - Inorganic	Inorganics, Waterloo, Ontario

No Breaches Found

General Comments

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

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

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

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

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

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

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

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

Analytical Results Evaluation

Matrix: **Groundwater**

Analyte	CAS Number	Unit	Client sample ID	MW104A	----	----	----	----	----	----
			Sampling date/time	03-Oct-2022 12:15	----	----	----	----	----	----
			Sub-Matrix	Groundwater	----	----	----	----	----	----
				WT2216451-001	--------	--------	--------	--------	--------	--------
Physical Tests										
solids, total suspended [TSS]	----	mg/L		8.1	----	----	----	----	----	----
Microbiological Tests										
coliforms, Escherichia coli [E. coli]	----	CFU/100mL		35	----	----	----	----	----	----
Aggregate Organics										
biochemical oxygen demand [BOD]	----	mg/L		3.1	----	----	----	----	----	----

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

Summary of Guideline Limits

Analyte	CAS Number	Unit	TORSUB SAN	TORSUB STM					
Physical Tests									
solids, total suspended [TSS]	----	mg/L	**350 mg/L**	**15 mg/L**					
Microbiological Tests									
coliforms, Escherichia coli [E. coli]	----	CFU/100mL		**200 CFU/100mL**					
Aggregate Organics									
biochemical oxygen demand [BOD]	----	mg/L	**300 mg/L**	**15 mg/L**					

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

Key:

TORSUB — Ontario Toronto Sanitary Discharge Sewer By-Law 100-2016 (FEB 4,2016)

SAN — Toronto Sanitary Discharge Sewer By-Law

STM — Toronto Storm Discharge Sewer By-Law

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **WT2216451**	Page	: 1 of 5
Client	: **Terrapex Environmental Ltd.**	Laboratory	: Waterloo - Environmental
Contact	: Brian Theimer	Account Manager	: Gayle Braun
Address	: 90 Scarsdale Rd. Toronto ON Canada M3B2R7	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	: 416 245 0011	Telephone	: +1 519 886 6910
Project	: CT3580.00	Date Samples Received	: 03-Oct-2022 14:45
PO	: ----	Issue Date	: 12-Oct-2022 11:34
C-O-C number	: 20-1007992		
Sampler	: WN/ PB		
Site	: ----		
Quote number	: SOA		
No. of samples received	: 1		
No. of samples analysed	: 1		

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

Key

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

Workorder Comments

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

Summary of Outliers

Outliers : Quality Control Samples

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

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

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

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

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

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

Matrix: **Water**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT-4d] MW104A	E550	03-Oct-2022	----	----	----		05-Oct-2022	4 days	1 days	✓
Microbiological Tests : E. coli (MF-mFC-BCIG)										
Sterile HDPE (Sodium thiosulphate) [ON MECP] MW104A	E012A.EC	03-Oct-2022	----	----	----		04-Oct-2022	48 hrs	21 hrs	✓
Physical Tests : TSS by Gravimetry										
HDPE [ON MECP] MW104A	E160	03-Oct-2022	----	----	----		07-Oct-2022	7 days	4 days	✓

Legend & Qualifier Definitions

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

Quality Control Parameter Frequency Compliance

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

Matrix: **Water**

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

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Biochemical Oxygen Demand - 5 day	E550	681368	1	12	8.3	5.0	✓
E. coli (MF-mFC-BCIG)	E012A.EC	679158	1	15	6.6	5.0	✓
TSS by Gravimetry	E160	685672	1	20	5.0	4.7	✓
Laboratory Control Samples (LCS)							
Biochemical Oxygen Demand - 5 day	E550	681368	1	12	8.3	5.0	✓
TSS by Gravimetry	E160	685672	1	20	5.0	4.7	✓
Method Blanks (MB)							
Biochemical Oxygen Demand - 5 day	E550	681368	1	12	8.3	5.0	✓
E. coli (MF-mFC-BCIG)	E012A.EC	679158	1	15	6.6	5.0	✓
TSS by Gravimetry	E160	685672	1	20	5.0	4.7	✓

Methodology References and Summaries

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

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
E. coli (MF-mFC-BCIG)	E012A.EC Waterloo - Environmental	Water	ON E3433 (mod)	Following filtration (0.45 µm), and incubation at 44.5±0.2°C for 24 hours, colonies exhibiting characteristic morphology of the target organism are enumerated.
TSS by Gravimetry	E160 Waterloo - Environmental	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
Biochemical Oxygen Demand - 5 day	E550 Waterloo - Environmental	Water	APHA 5210 B (mod)	Samples are diluted and incubated for a specified time period, after which the oxygen depletion is measured using a dissolved oxygen meter. Free chlorine is a negative interference in the BOD method; please advise ALS when free chlorine is present in samples.

QUALITY CONTROL REPORT

Work Order	: **WT2216451**	Page	: 1 of 4
Client	: Terrapex Environmental Ltd.	Laboratory	: Waterloo - Environmental
Contact	: Brian Theimer	Account Manager	: Gayle Braun
Address	: 90 Scarsdale Rd. Toronto ON Canada M3B2R7	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	: 416 245 0011	Telephone	: +1 519 886 6910
Project	: CT3580.00	Date Samples Received	: 03-Oct-2022 14:45
PO	: ----	Date Analysis Commenced	: 04-Oct-2022
C-O-C number	: 20-1007992	Issue Date	: 12-Oct-2022 11:33
Sampler	: WN/ PB		
Site	: ----		
Quote number	: SOA		
No. of samples received	: 1		
No. of samples analysed	: 1		

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Amanda Ganouri-Lumsden	Department Manager - Microbiology and Prep	Waterloo Microbiology, Waterloo, Ontario
Greg Pokocky	Supervisor - Inorganic	Waterloo Inorganics, Waterloo, Ontario

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

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

Workorder Comments

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 685672)											
WT2216451-001	MW104A	solids, total suspended [TSS]	----	E160	3.0	mg/L	8.1	8.5	0.4	Diff <2x LOR	----
Microbiological Tests (QC Lot: 679158)											
WT2216451-001	MW104A	coliforms, Escherichia coli [E. coli]	----	E012A.EC	1	CFU/100mL	35	27	25.8%	65%	----
Aggregate Organics (QC Lot: 681368)											
WT2216451-001	MW104A	biochemical oxygen demand [BOD]	----	E550	2.0	mg/L	3.1	2.9	5.0%	30%	----

Method Blank (MB) Report

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

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 685672)						
solids, total suspended [TSS]	----	E160	3	mg/L	<3.0	----
Microbiological Tests (QCLot: 679158)						
coliforms, Escherichia coli [E. coli]	----	E012A.EC	1	CFU/100mL	<1	----
Aggregate Organics (QCLot: 681368)						
biochemical oxygen demand [BOD]	----	E550	2	mg/L	<2.0	----

Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 685672)									
solids, total suspended [TSS]	----	E160	3	mg/L	150 mg/L	106	85.0	115	----
Aggregate Organics (QCLot: 681368)									
biochemical oxygen demand [BOD]	----	E550	2	mg/L	198 mg/L	102	85.0	115	----

Chain of Custody (COC) / Analytical Request Form

COC Number: 20-1007992

Canada Toll Free: 1 800 668 9878

Environmental Division Waterloo

Work Order Reference WT2216451

Report To: Company	Tatsumi Environmental Ltd.
Contact	Brian Tatsumi
Phone:	647-668-1511
Company address below will appear on the final report	
Street:	90 Scarsdale Road
City/Province:	Toronto, ON
Postal Code:	M3B 2R7
Invoice To: Same as Report To	YES / NO
Copy of Invoice with Report	YES / NO
Company:	
Contact:	

Project Information	
ALS Account # / Quote #:	
Job #:	CT25%.00
PO / AFE:	
LSD:	

Reports / Recipients	
Select Report Format:	PDF / EXCEL / EDD (DIGITAL)
Merge QC/QCI Reports with COA	YES / NO
Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	EMAIL / MAIL / FAX
Email 1 or Fax	[illegible]
Email 2	[illegible]
Email 3	[illegible]
Invoice Recipients	
Select Invoice Distribution:	EMAIL / MAIL / FAX
Email 1 or Fax	[illegible]
Email 2	[illegible]
Specify Criteria to add on report by drop-down below	
Criteria:	
Additional Comments:	PO#
Legal Sample:	Routing Code:
Requisitioner:	
Location:	
ALS Contact: Gayle	Sampler: WN/PB

Turnaround Time (TAT) Requested	
Regular (R) if received by 3pm M-F - no surcharges apply	
4 day [P4] if received by 3pm M-F - 20% rush surcharge will apply	
3 day [P3] if received by 3pm M-F - 25% rush surcharge will apply	
2 day [P2] if received by 3pm M-F - 50% rush surcharge will apply	
1 day [P1] if received by 3pm M-F - 100% rush surcharge will apply	
Saturday [S0] if received by 3pm M-F - 200% rush surcharge will apply	
Date and Time required for all E&P TAT:	
For tests that can not be performed according to the service level selected, you will be contacted.	

Analysis Request

Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	TSS	BOD	E. Coli	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SPECIAL INSTRUCTIONS / Specify Dilution Factor, Detection Limit, Hazardous Material, Special Handling, Storage or Disposal
HW104A	03-Oct-22	13:15	GW	3	X	X	X			M

Drinking Water (DW) Samples? (select one)

Are samples taken from a Regulated DW System? YES / NO

Are samples for human consumption/use? YES / NO

Please analyze for selected parameters and compare results to City of Toronto Storm and Sanitary Sewer Criteria.

SHIPMENT RELEASE (client use)

Released by: Andrew Durham — Date: Oct. 3, 2022 — Time: 17:15

SHIPMENT RECEPTION (ALS use only)

Received by: — Date: — Time:

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

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 this white report/copy.

1. If samples are taken from a Regulated Drinking Water (DW) System, please indicate by an X in the box.

B-162, EC-478

HM RK (450 Dufferin) Ltd.
474 Wellington Street West
Toronto, ON M5V 1E3
t: 416.510.1700
www.hullmark.ca

11/3/2022

Attention: Executive Director, Engineering and Construction Services
c/o Manager, Development Engineering
Toronto City Hall
100 Queen Street West, 24th Floor
Toronto, ON M5H 2N2

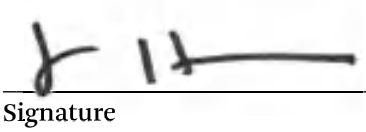
cc: General Manager, Toronto Water
c/o Manager, Environmental Monitoring and Protection Unit
30 Dee Avenue
Toronto, ON M9N 1S9

Dear Sir or Madam,

I, **JEFF HULL**, confirm and undertake that I will construct and maintain all building(s) on the subject lands **450-458 DUFFERIN STREET** in a manner which shall be completely water-tight below grade and resistant to hydrostatic pressure without any necessity for Private Water Drainage System (subsurface drainage system) consisting of but 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 directly or indirectly or drainage system for disposal directly or indirectly in a municipal sewer.

Jeff Hull, ASO
Name (printed) and Title

jeff@hullmark.ca
Email


Signature

I, **JEFF HULL**, have the authority to bind the corporation

November 3, 2022

Attention:
Executive Director, Engineering and Construction Services
c/o Manager, Development Engineering
55 John Street, 16th Floor
Toronto ON M5V 3C6

cc:
General Manager, Toronto Water
c/o Manager, Environmental Monitoring and Protection Unit
30 Dee Ave, Toronto ON M9N 1S9

Re: 450 Dufferin Street

Dear Sir or Madam,

I, Anthony Mirvish, confirm that all buildings on the subject lands at 450 Dufferin Street, Toronto ON can be constructed completely water-tight below grade in a manner that will resist hydrostatic pressure without any necessity for Private Water Drainage System (subsurface drainage system) consisting of but 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 directly or indirectly or drainage system for disposal directly or indirectly in a municipal sewer.

Regards,
Honeycomb Group Inc.

Anthony Mirvish, P. Eng.
Principal
anthony.mirvish@honeycombgroup.ca
416-451-9806