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.

FIGURES

TABLES

APPENDICES

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,
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9.0 REFERENCES

R. Allan Freeze and John A. Cherry. 1979. Groundwater.

Ministry of Environment, Conservation and Parks. 2022a. Source Protection Information Atlas. Interactive mapping application on the internet.

Ministry of Environment, Conservation and Parks. 2022b. Water well database listings.

Ministry of the Natural Resources and Forestry. 2022. “Make a Natural Heritage Map”. Interactive mapping application on Internet.

Ontario Geological Survey. 2010. MRD-128. Surficial geology of southern Ontario. Referenced to Google Earth.

Ontario Geological Survey. 2007. MRD-219. Paleozoic geology of southern Ontario. Referenced to Google Earth.

Pinchin Ltd. March 16, 2020. Phase II Environmental Site Assessment. 450 Dufferin Street, Toronto, Ontario. File 268429.001.

J. Patrick Powers, Arthur Corwin, Paul Schmall, Walter Kaeck. 2007. Construction Dewatering and Groundwater Control. Third Edition.

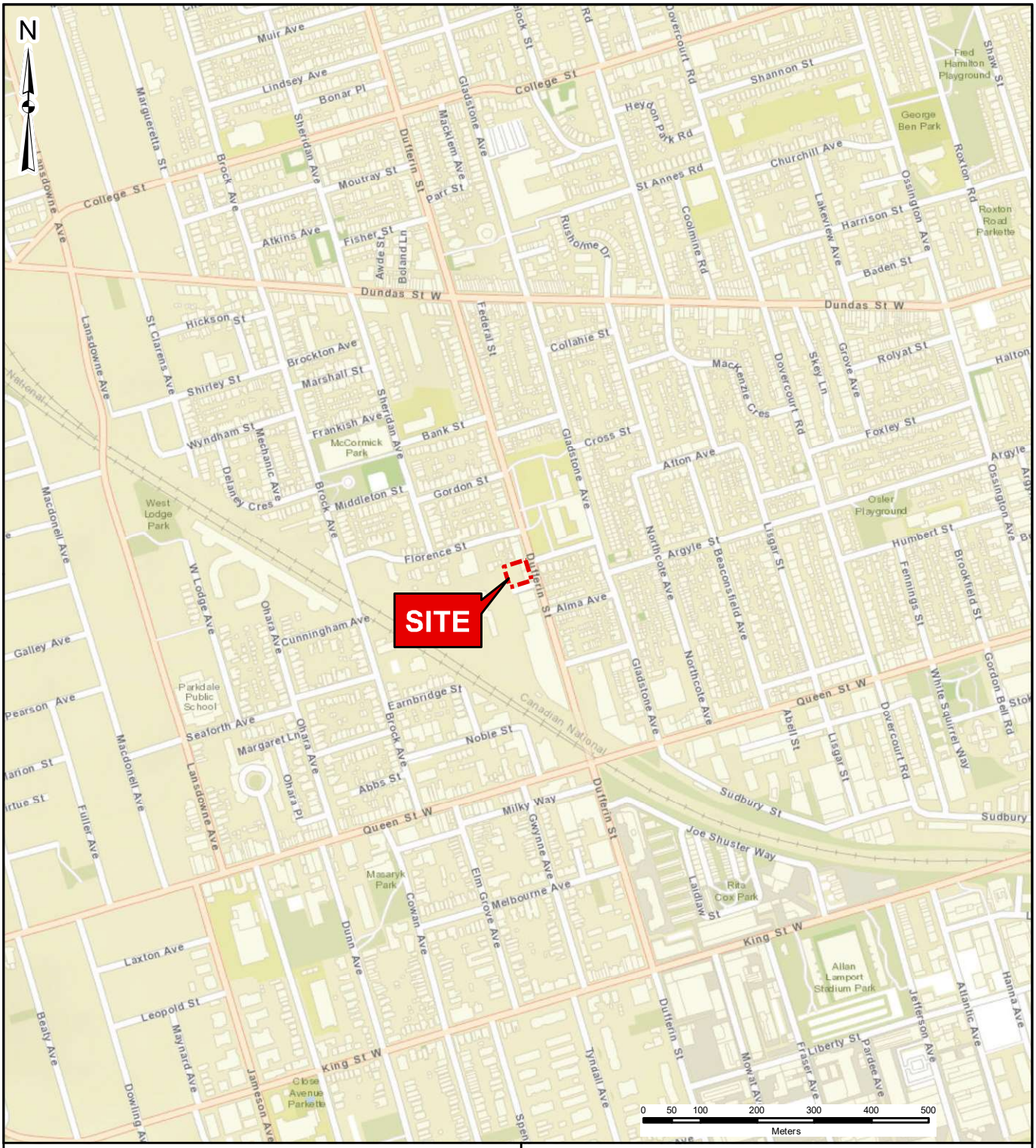
Superkul Inc. September 30, 2022. Architectural Package.

Vumap. 2022. Interactive mapping application on Internet.

Young & Young Surveying [Etobicoke 2006] Inc. February 18, 2011. Survey Report. Project 07-T7137-1.

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

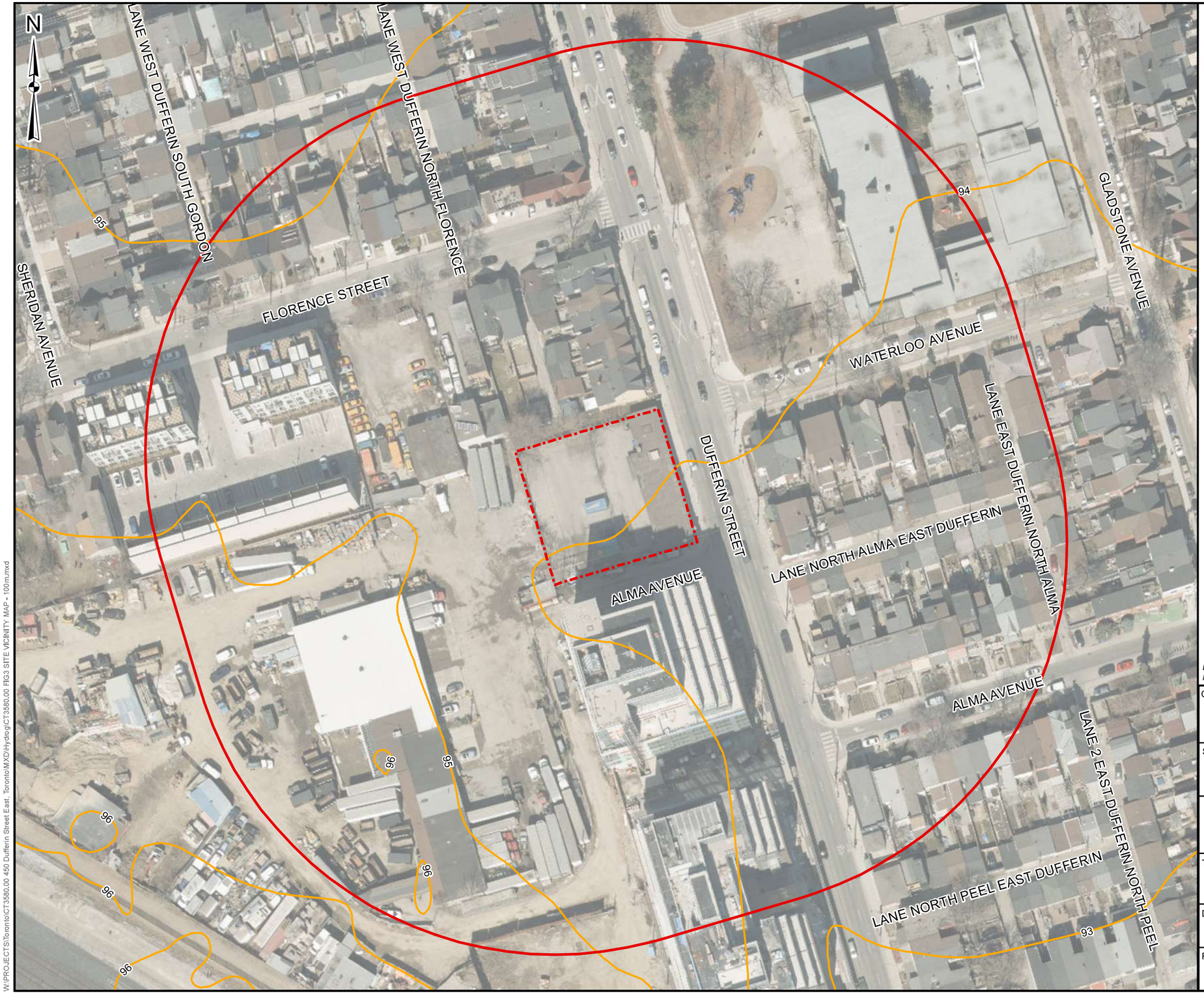
SITE LOCATION:
450 DUFFERIN STREET
TORONTO, ONTARIO

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 Hydrog\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\Hydrog\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

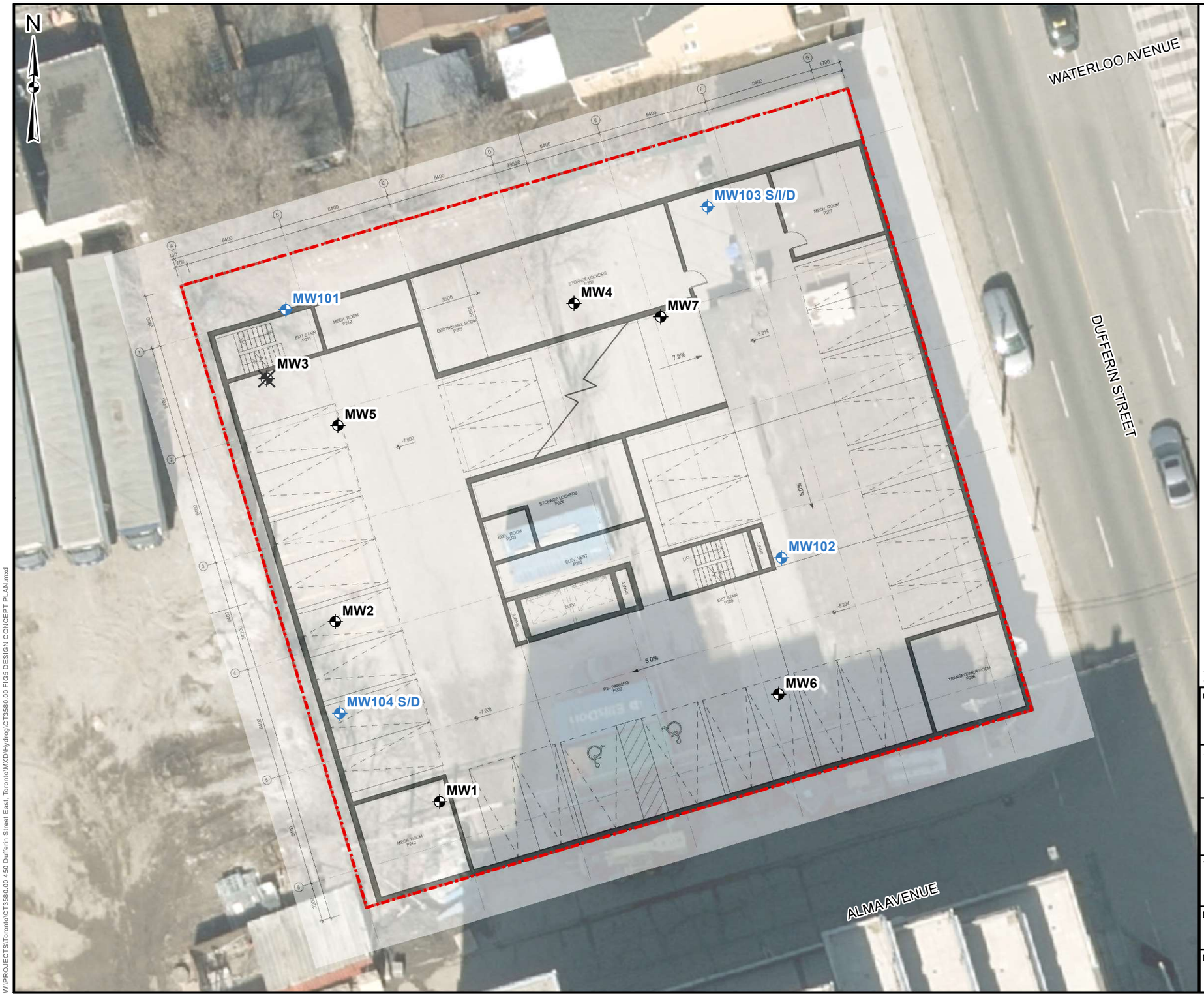
SITE LOCATION:
450 DUFFERIN STREET
TORONTO, ONTARIO

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\Hydro\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\Hydro\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
SAND
2.3
2.7
SL(CL) TL
3.8
CL(SL) TL
6.9
SL TL (SA)
7.6
8.2
SL(SA) TL
9.3
SL(SA, CL) TL
SL(SA) TL
9.1
SL(SA, CL) TL
11.6
SH
12.9
13.0
-1.5
-6.1
SL(CL) TL
SL(CL)-CL(SL) TL
-7.6
-12.2
SA(SL)-SL(SA) TL
-1.5
SA
-2.0
SL(CL) TL
SL(SA, GR, CL) TL
13.8
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									

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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				
		grey, weathered SHALE	13	82	50/75 ▲	13 ■	13		100				
		END OF BOREHOLE											

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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.	RECOVERY (%)	SV/TOV (ppm or %LEL)	LABORATORY TESTING	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

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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	61	7	12		100				
			10	84.5									
			10.5	84									
			11	83.5	87/250	5	13		75				
		grey, weathered SHALE	11.5	83	50/50	11	14		100				
		END OF BOREHOLE											

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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			
		dense to very dense, moist, grey SANDY SILT some gravel to gravelly, some clay (TILL)	7.5	87									
			8	86.5	41	5	11		94				
			8.5	86	56	6	12		92				
			9	85.5									

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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
		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											

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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									

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CLIENT: HM RK (450 Dufferin) LP	PROJECT NO.: CT3580.00	**RECORD OF:**	
ADDRESS: 450 Dufferin Street		**MW103I**	
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											

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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								Sand	
			3	91.5								Screen + Sand	
			3.5	91									
			4	90.5									
			4.5	90									
			5	89.5									
			5.5	89									
			6										
		END OF BOREHOLE											

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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
		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		
						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
		firm to stiff, moist, brown/black clayey silt trace organics (FILL)	1	93.5		19							
					5		2		17	35/0			
			1.5	93		22							
					10		3A		96	<5/1	PHCs/ BTEX		
		firm to stiff, moist CLAYEY SILT trace to some gravel trace to some sand (TILL)	2	92.5		16	3B			5/1			
				92									
			2.5		23	13	4		71	20/0			
		brown/grey	3	91.5									
				91	12	14	5		100	<5/1			
		----------	3.5										
			4	90.5	14	12	6		54	<5/1			
				90									
			4.5										
			5	89.5	6	14	7		100	5/0			
		grey		89									
			5.5			14							
				88.5	9		8		54	<5/1	PHCs/ VOCs		
			6			4							
				88	16		9		33	5/1			
			6.5										
				87.5		7							
		compact to dense, moist, grey SANDY SILT some gravel to gravelly, some clay (TILL)	7		29		10		83				Sand
				87									
			7.5			4							Screen + Sand
				86.5	33		11		100				
			8										
				86									
		hard, moist, grey SANDY CLAYEY SILT some gravel to gravelly (TILL)	8.5			16							
				85.5	50/75		12		44				
			9										

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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**

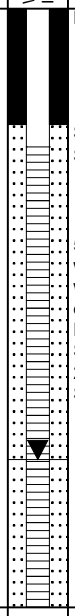
ADDRESS: 450 Dufferin Street

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 |

Log of Borehole: MW1

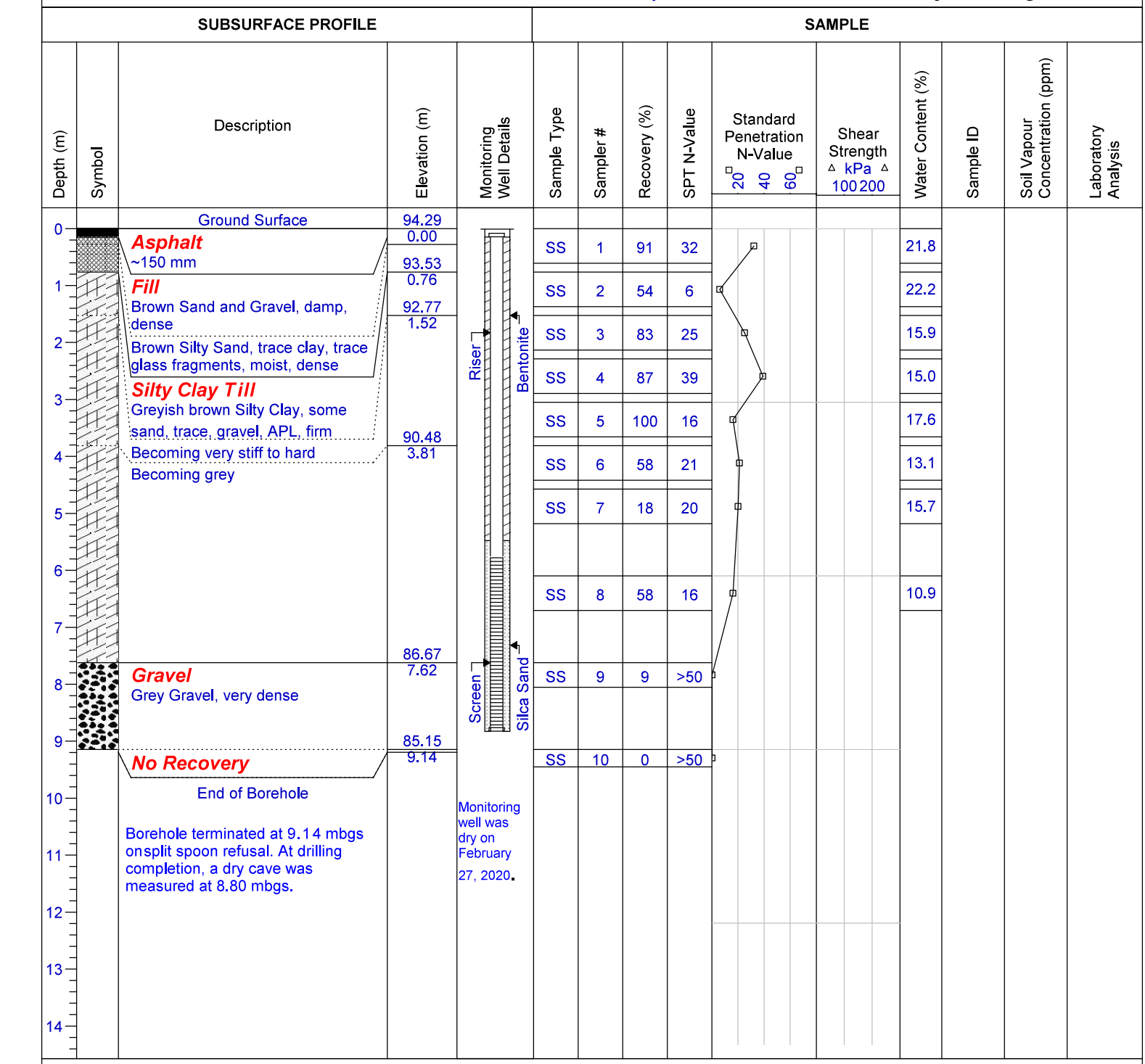
Project #: 268429.002 **Logged By:** MG

Project: Preliminary Geotechnical Investigation

Client: Hullmark Developments

Location: 450 Dufferin Street, Toronto, Ontario

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



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
		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
			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
		Grey-brown, trace gravel, moist						
10 / 3		Orange mottling, trace sand from 2.29 mbgs to 3.05 mbgs			63	SS5	0/0	
		Grey, moist to wet at 3.05 mbgs			33	SS6	0/0	
					43	SS7	0/0	
			89.12					
		Silty Clay Till	5.33		67	SS8	0/0	
6		Grey, trace gravel, moist	88.36					
		Sandy Silt Till	6.10		73	SS9	0/0	
7		Grey, trace gravel, moist to wet						
			86.84		53	SS10	0/0	pH, Grain Size
		Clayey Silt Till	7.62		50	SS11	0/0	
8		Trace gravel and sand, moist	86.22					
		End of Borehole	8.23					

Bentonite
Riser
Silica Sand
Screen
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 – 2 / 1		***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 – 7 / 2		Silty sand fill at 1.52 mbgs, brown, trace gravel and rootlets, moist from 1.52 mbgs	92.38 2.29
7 / 2 – 12 / 3		***Clayey Silt Till*** Brown, trace gravel, damp, brown mottling from 2.29 mbgs, moist	90.86 3.81
12 / 4 – 22 / 6		***Silty Clay Till*** Grey, trace gravel, moist, malleable from 3.81 mbgs to 6.10 mbgs Moist to wet from 6.10 mbgs to 6.86 mbgs	87.81
22 / 7 – 27 / 8		***Silty Sand Till*** Grey, trace gravel, moist	6.86 86.44
27 / 8		End of Borehole	8.23

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

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					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	94.67					
		Asphalt	0.00		47	SS1	75/1	
		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		47	SS2	85/3	PAHs, Metals
			1.52		57	SS3	70/3	PHCs, VOCs
		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			53	SS4	30/3	Grain Size
					70	SS5	0/1	
					30	SS6	0/1	
			90.10			SS7	0/2	
		Silty Clay Till Grey, trace gravel, wet from 4.57	4.57					
			89.34			SS8	0/0	
		Clayey Silt Till Grey, trace gravel, wet	5.33					
			88.57					
		End of Borehole	6.10					

Riser, Bentonite, Screen, Silica Sand

Monitoring well was destroyed at the time of sampling

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)	Monitoring Well Details	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	Riser / Bentonite	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	Becoming grey	3.81 / 90.89		SS	6	70	12	13.5
5				SS	7	75	12	17.5
6				SS	8	50	7	19.9
				SS	9	54	8	15.7
7		87.08						
8	**Sandy Silt Till** Grey Sandy Silt, some gravel, damp, very dense	7.62	Screen / Silca Sand	SS	10	87	>95	5.3
9		85.56						
	Sandy Clayey Silt Till Grey Sandy Clayey Silt, some gravel, hard	9.14	Bentonite	SS	11	100	45	6.8
10								
11				SS	12	100	>50	9.5
		83.09						
	End of Borehole	11.61		SS	13	100	>50	
12			Water level = 6.98 mbgs, as measured on Feb 27, 2020.					
13	Borehole terminated at 11.61 mbgs on split spoon refusal. At drilling completion, a dry cave was measured at 9.45 mbgs.							
14								

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)	Monitoring Well Details	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.		Water level = 5.71 mbgs, as measured on Feb 27, 2020.					
14								

Riser, Bentonite, Screen, Silca Sand, Bentonite

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)	Monitoring Well Details	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	Riser / Bentonite	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	**Silty Clay Till** Becoming Silty Clay	90.77 / 3.81		SS	6	0	11	15.3
5				SS	7	75	6	15.4
6	Becoming grey	88.48 / 6.10		SS	8	83	4	16.3
7		86.96						
8	**Silty Sand Till** Grey Silty Sand, trace clay, some gravel, very dense	7.62	Screen / Silca Sand	SS	9	89	62	5.9
9				SS	10	71	>88	6.0
10		83.91						
11	**Sandy Silt Till** Becoming Sandy Silt	10.67	Bentonite	SS	11	60	>50	8.1
12		82.39						
	No Recovery	12.19		SS	12	0	>50	
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.		Water level = 6.62 mbgs, as measured on Feb 27, 2020.					
14								

Standard Penetration N-Value: 20, 40, 60

Shear Strength: kPa, 100, 200

Sample ID

Soil Vapour Concentration (ppm)

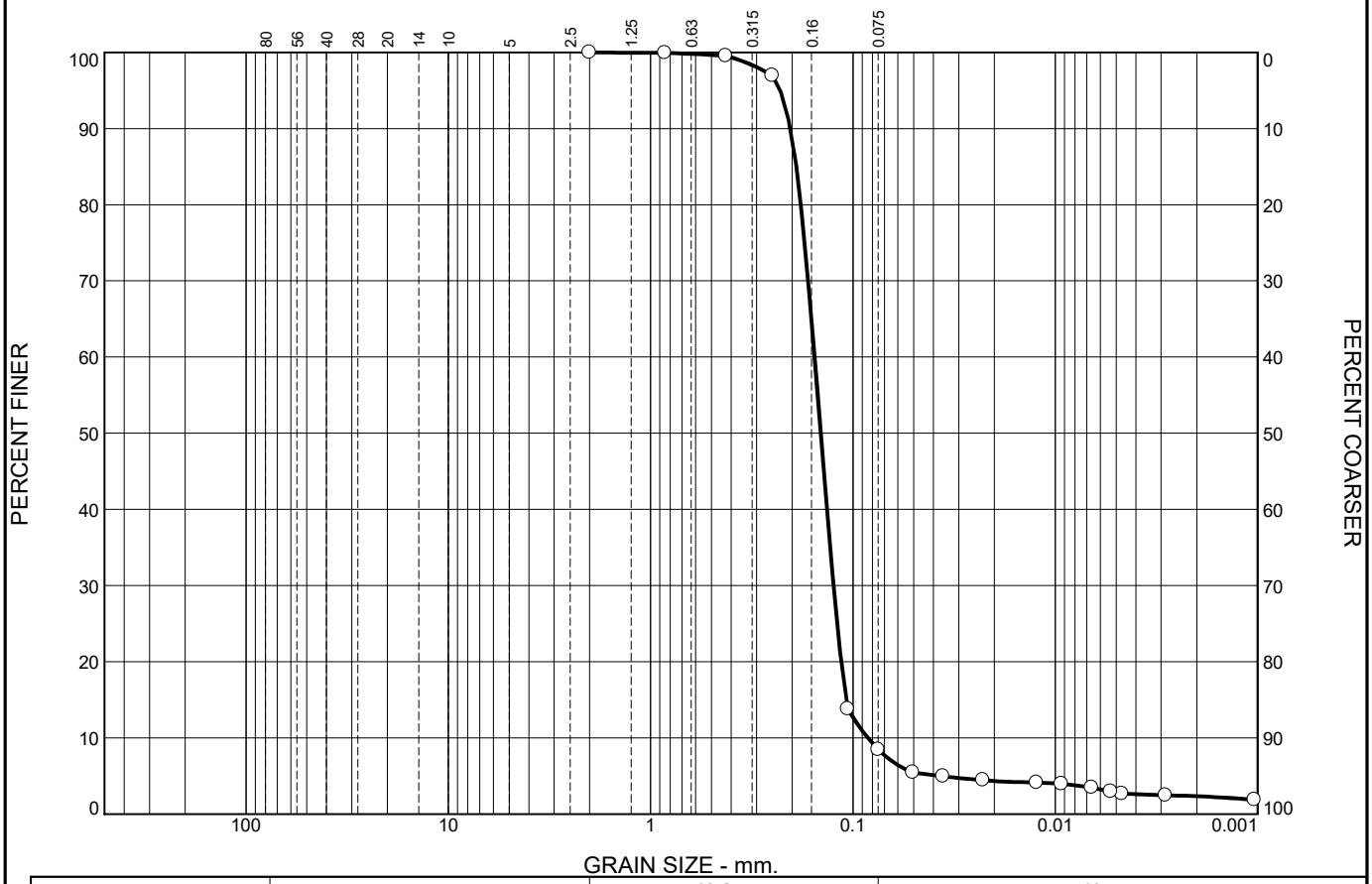
Laboratory Analysis

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

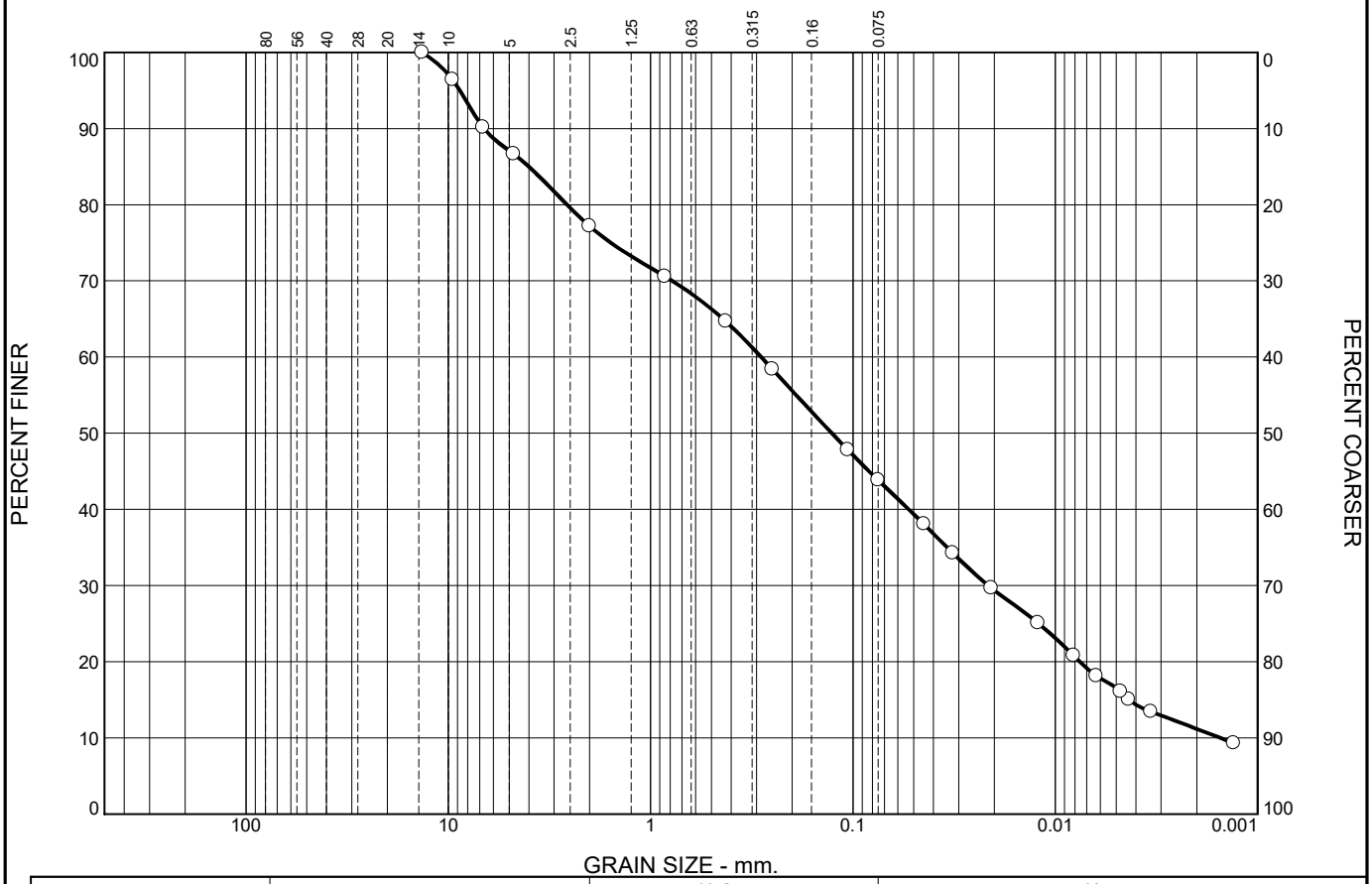
Remarks:

○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

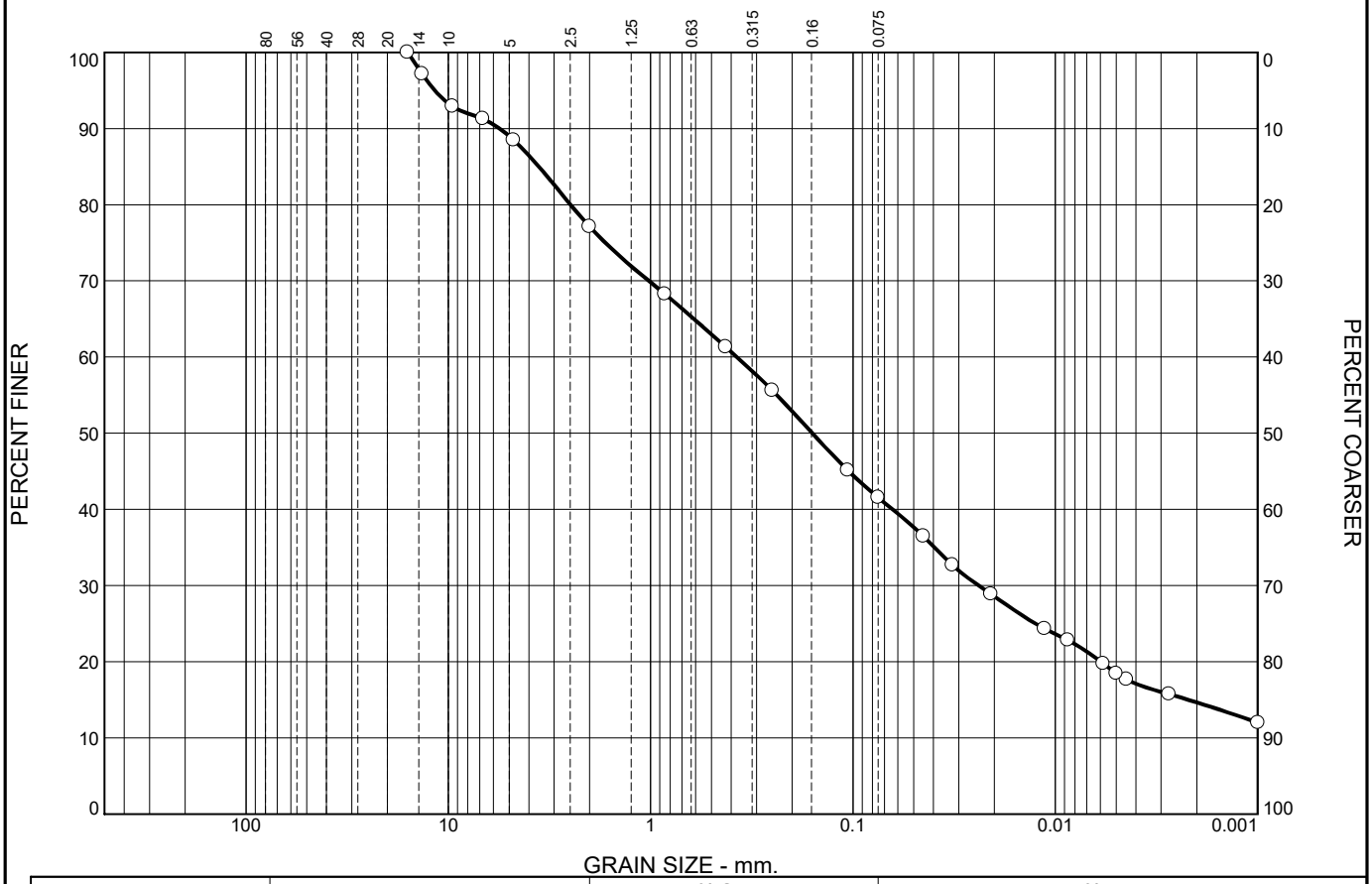
Remarks:

○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

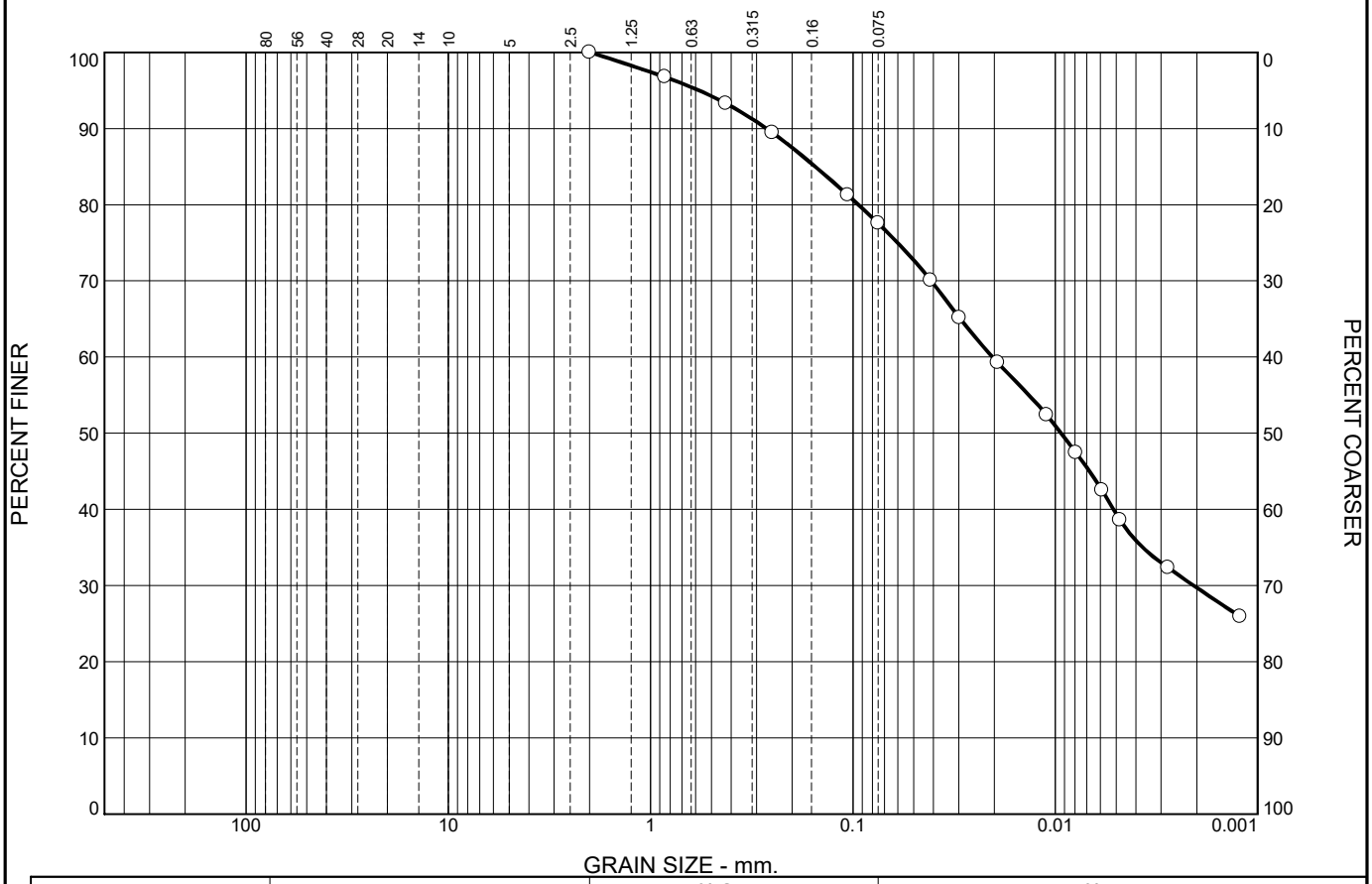
Remarks:

○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

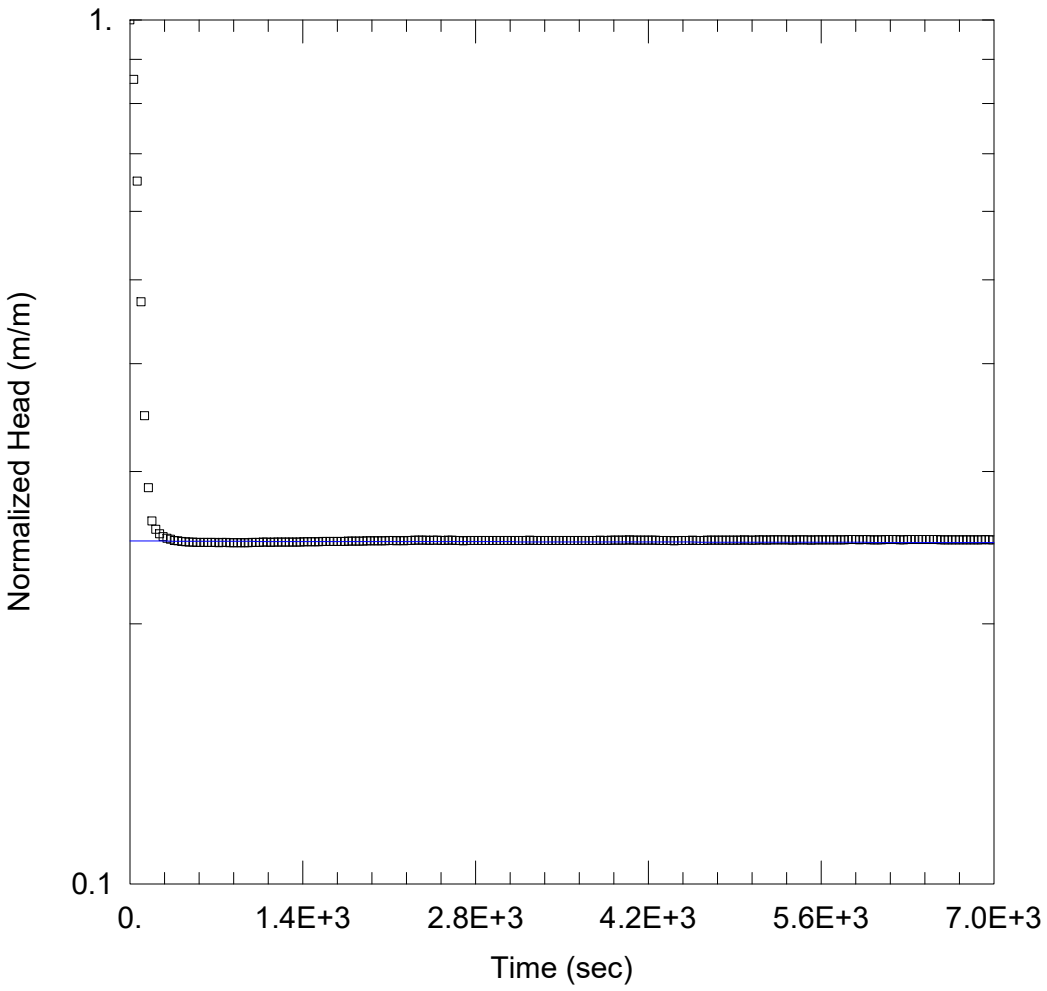
Remarks:

○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

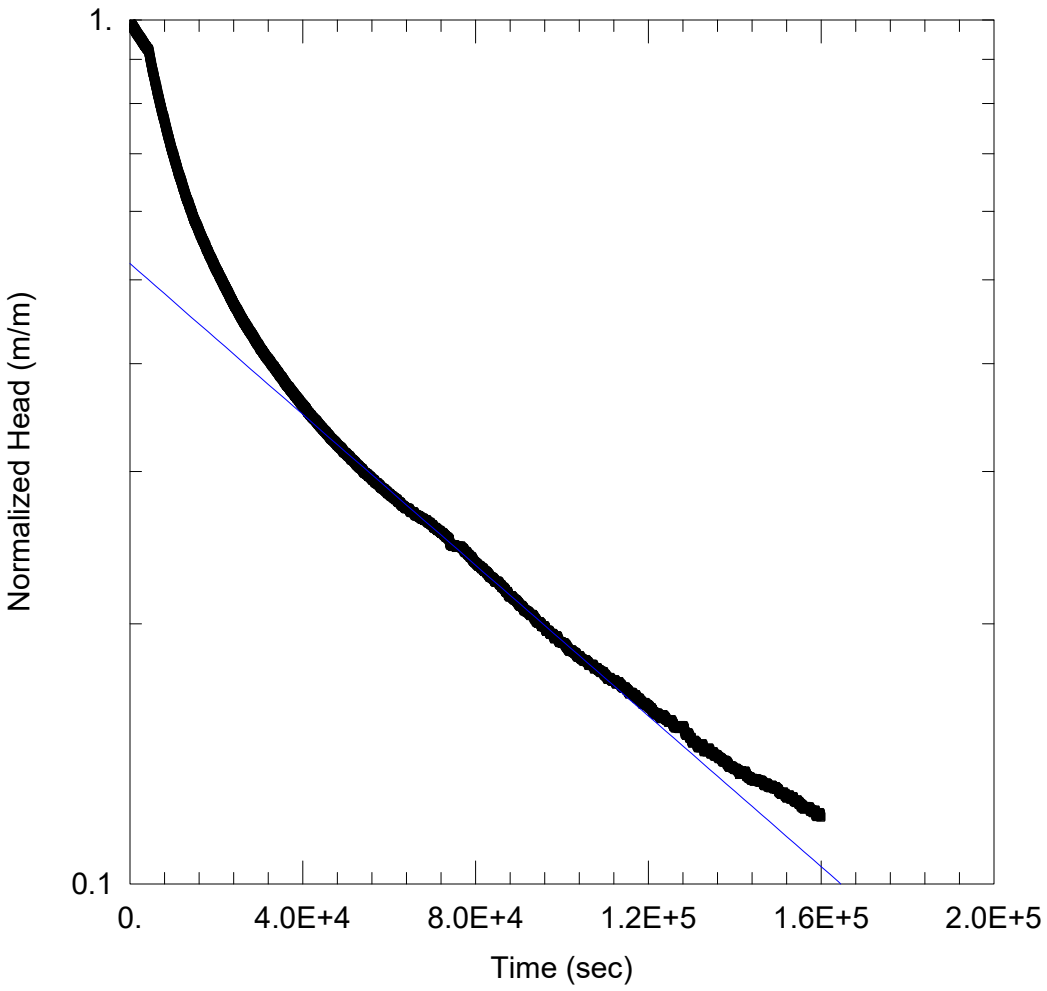
WELL DATA (MW101)

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 (K3Fe(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*
Adam Boettger	Team Leader - LCMS	Waterloo LCMS, Waterloo, Ontario
Amanda Ganouri-Lumsden	Department Manager - Microbiology and Prep	Waterloo Microbiology, Waterloo, Ontario
Jeremy Gingras	Team Leader - Semi-Volatile Instrumentation	Waterloo Organics, Waterloo, Ontario
Jon Fisher	Department Manager - Inorganics	Waterloo Inorganics, Waterloo, Ontario
Jon Fisher	Department Manager - Inorganics	Waterloo Metals, Waterloo, Ontario
Joseph Scharbach		Waterloo Organics, Waterloo, Ontario
Rachel Cameron	Team Leader - Semi-Volatile Organics	Waterloo Organics, Waterloo, Ontario
Sarah Birch	Team Leader - Volatiles	Waterloo Organics, Waterloo, Ontario
Stephanie Pinheiro	Analyst	Waterloo LCMS, 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: 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**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	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

ALS www.alsglobal.com

Canada Toll Free: 1 800 668 9878

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:	

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: V.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

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 may apply to rush requests on weekends, statutory holidays and non-routine

Date and Time Required for all E&P TATs:

For all tests with rush TATs requested, please contact

Project Information

ALS Account # / Quote #:

Job #: CT3580.00

PO / AFE:

LSD:

Oil and Gas Required Fields (client use)

AFE/Cost Center: PO#

Major/Minor Code: Routing Code:

Requisitioner:

Location:

ALS Lab Work Order # (ALS use only): WT2215311

ALS Contact: Gayle Braun

Sampler: VS / BS

Analysis Reque

Indicate Filtered (F), Preserved (P) or Filtered and Pres...(F,P) below

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

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 Package

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)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by: Vivo Subhan	Date:	Time:	Received by:	Date:	Time:	Received by:	Date: 09/22/22	Time: 6:00

AUG 2020 FRONT

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.

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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

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

COC Number: 20 - 1007992

Page 1 of 1

Environmental Division Waterloo

Work Order Reference WT2216451

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:	

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: a.durbano@terrapex.com

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: accounts.payable@terrapex.com

Email 2: b.theimer@terrapex.com

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. Addtl may apply to rush requests on weekends, statutory holidays and non-ro

Date and Time Required for all E&P TATs:

For all tests with rush TATs requested, please

Project Information

ALS Account # / Quote #:

Job #: CT3580.00

PO / AFE:

LSD:

Oil and Gas Required Fields (client use)

AFE/Cost Center: PO#:

Major/Minor Code: Routing Code:

Requisitioner:

Location:

ALS Lab Work Order # (ALS use only):

ALS Contact: Gayle Sampler: WN/PB

Analysis Request

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

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	TSS	BOD	E.Coli	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	MW104A	03-Oct-22	12:15	GW	3	X	X	X			N

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)

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

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			
8.8				1.7			

SHIPMENT RELEASE (client use)

Released by: Andrew Durbano Date: Oct. 3, 2022 Time: 14:15

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by: Date: Oct 3/22 Time: 14:45

FINAL SHIPMENT RECEPTION (ALS use only)

Received by: Date: 5 Oct 22 Time: 7:30

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 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**.

AUG 2020 FRONT

B-162, GC-478