# DEWATERING ASSESSMENT – PROPOSED EXCAVATION

**1047 Richmond Road**
**Ottawa, Ontario**

**CO972.00**

## REPORT

**March 4, 2025**
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***Prepared for:***

**FENGATE DEVELOPMENT HOLDINGS LP**

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## 1.0 INTRODUCTION

Terrapex Environmental Ltd. (Terrapex) has been retained by Fengate Development Holdings LP to carry out a hydrogeological investigation, including dewatering assessment for the proposed excavation. The purpose of this investigation was to assess estimated dewatering quality and quantity for the proposed excavation.

The area of interest is located on the property of 1047 Richmond Road in Ottawa, Ontario (the Site). The location of the Site is provided on **Figure 1**. It is understood that the proposed footprint, shown on **Figure 2** will be carried out in two phases, with the footprint shaded darker to be carried out at a later date. The dewatering estimates provided in this report are limited to the first phase of excavation.

## 2.0 SITE CHARACTERIZATION

Review of online Ministry of Environment, Conservation and Parks (MECP) mapping (Source Protection Atlas, accessed July 2024) indicated that the area of interest is within a groundwater intake protection zone (Zone 2), which was identified as a groundwater and surface water area that discharges to a river body (i.e., the River of Ottawa). The Site was also reported to overlie a shallow-seated aquifer which is inclined towards infiltration (MECP; Source Protection Atlas, accessed July 2024). Based on historical reporting, the Site is not located in an area designated in a municipal official plan as a well-head protection area (WSP, 2023).

A review of the available well records shows that there are 131 reported wells within approximately 500 metres of the subject property. Of the known wells, two (2) wells within 100 metres are reported to be purposed for water supply use, historically. Based on a Summary of Water Service Connections, provided to Terrapex by the City of Ottawa (**Figure 3**; 27 June 2025), it is understood that no wells within 100 metres of the subject property are presently used for water supply use.

# 3.0 FIELDWORK

## 3.1.1 GROUNDWATER MONITORING WELL CONSTRUCTION

As part of the hydrogeological investigations, monitoring wells constructed by Golder Associates Ltd. (Golder, now WSP Canada Inc.) in September and November 2021, and May and October 2022 were used. The fieldwork for this project was carried out under the supervision of a licensed Professional Hydrogeologist in accordance with the provincial Professional Geoscientists Act (2002). A summary of test well construction specifications is provided in **Table 1**, below. The locations of the monitoring wells are provided in **Figure 2**.

**TABLE 1: SUMMARY OF GROUNDWATER MONITORING CONDITIONS**

| Well ID | Date of Construction | Approximate Location (UTM Zone 18T) | | Approximate Ground Surface Elevation | Measured Screened Interval | Soils at Screened Interval | SPT N-Value at Screened Interval |
|---|---|---|---|---|---|---|---|
| | | metres east | metres north | masl | mbg | | |
| BH21-1 | 24-Sep-2021 | 361274 | 5026290 | 65.73 | 4.57 to 7.62 | Limestone | - |
| BH21-2 | 21-Sep-2021 | 361298 | 5026359 | 65.46 | 3.96 to 7.01 | Limestone | - |
| BH21-3 | 22-Sep-2021 | 361289 | 5026355 | 65.24 | 4.57 to 7.62 | Limestone | - |
| BH21-4 | 21-Sep-2021 | 361314 | 5026370 | 65.09 | 4.57 to 7.62 | Limestone | - |
| BH21-5 | 24-Sep-2021 | 361328 | 5026358 | 65.47 | 4.57 to 7.62 | Limestone | - |
| BH21-11 | 12-Nov-2021 | 439016 | 5024866 | 65.26 | 2.49 to 5.54 | Limestone | - |
| BH21-14 | 12-Nov-2021 | 439036 | 5024909 | 64.84 | 3.05 to 4.57 | Limestone | - |
| BH21-15A | 12-Nov-2021 | 439046 | 5024914 | 64.84 | 3.96 to 7.01 | Limestone | RQD 40% to 80% |
| BH21-15B | 12-Nov-2021 | 439046 | 5024914 | 64.84 | 1.53 to 3.05 | Silty Sand to Sand | - |
| BH21-19 | 25-Nov-2021 | 439039 | 5024882 | 65.95 | 2.70 to 5.13 | Limestone | - |
| BH21-20 | 24-Nov-2021 | 439047 | 5024862 | 65.93 | 3.30 to 5.18 | Limestone | - |
| BH21-21 | 21-Dec-2021 | 439040 | 5024927 | 64.41 | 1.64 to 4.92 | Silty and Sand | - |
| BH21-22 | 21-Dec-2021 | 439033 | 5024915 | 64.62 | 1.31 to 4.59 | Sand | - |
| BH22-1 | 11-May-2022 | 439049 | 5024907 | 65.02 | 8.06 to 9.60 | Limestone | - |
| BH22-2 | 9-May-2022 | 439035 | 5024907 | 64.90 | 4.41 to 7.46 | Limestone | - |
| BH22-3 | 10-May-2022 | 439053 | 5024917 | 64.85 | 5.18 to 6.7 | Limestone | - |
| BH22-4 | 9-May-2022 | 439027 | 5024905 | 64.75 | 4.87 to 7.92 | Limestone | - |
| BH22-5 | 11-May-2022 | 439071 | 5024856 | 65.94 | 7.61 to 10.66 | Limestone | - |
| BH22-6 | 3-Oct-2022 | 439037 | 5024908 | 64.90 | 6.00 to 7.00 | Limestone | - |
| BH22-7 | 3-Oct-2022 | 439047 | 5024904 | 65.11 | 6.00 to 7.01 | Limestone | - |
| BH22-8 | 4-Nov-2022 | 439037 | 5024909 | 64.87 | 9.00 to 10.00 | Limestone | - |
| BH22-9 (S) | 15-May-2023 | 439049 | 5024939 | 64.22 | 4.57 to 7.62 | Limestone | - |
| BH22-9 (D) | 15-May-2023 | 439050 | 5024939 | 64.23 | 9.06 to 10.66 | Limestone | - |
| BH22-10 (S) | 15-May-2023 | 439067 | 5024926 | 64.83 | 4.57 to 7.62 | Limestone | - |
| BH22-10 (D) | 15-May-2023 | 439068 | 5024925 | 64.81 | 9.06 to 10.06 | Limestone | - |

*Information taken from Phase Two Environmental Site Assessment, 1047 Richmond Rd, Ottawa, Ontario; WSP, October 2023*

Based on the information in **Table 1**, above and the appended borehole logs provided in **Appendix I**, the interface between overburden and bedrock ranges from 58.11 masl to

63.92 masl, with an average elevation of 61.99 masl. The average depth-to-bedrock is used as part of the dewatering estimates, below.

### 3.1.2 GROUNDWATER MONITORING

Groundwater measurements were reported during ten (10) site visit events, carried out by Golder/WSP and Terrapex between 4 October 2021 and 27 June 2024. A summary of the groundwater depths is presented in **Table 2**. The recorded water levels reflect the groundwater conditions on the dates they were measured.

The most recent groundwater monitoring visit event was carried out by Terrapex on June 27, 2024. In this visit, groundwater piezometric head measurements were measured manually at locations BH21-1 to BH21-4, BH21-11, BH21-14, BH21-15A, BH21-15B, BH21-20 to BH21-22, BH22-2 to BH22-8, BH22-10(S), and BH22-10(D) by Terrapex.

**TABLE 2: MEASURED GROUNDWATER LEVELS**

| Location Identification | Screened Interval | Depth to Bedrock | Ground Surface Elevation | Groundwater Measurements | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2021 | | | 2022 | | 2023 | | | | 2024 |
| | | | | Oct 4 | Nov 30 | Dec 22 | May 26 | Nov 15 | May 23 | Jun 30 | Jul 19 | Aug 8 | Jun 27 |
| | mbg | | masl | mbg (masl) | mbg (masl) | mbg (masl) | mbg (masl) | mbg (masl) | mbg (masl) | mbg (masl) | mbg (masl) | mbg (masl) | mbg (masl) |
| BH21-1 | 4.57 to 7.62 | 1.83 | 65.73 | *7.69 (58.04)* | *7.63 (58.10)* | *7.66 (58.70)* | NM | NM | NM | NM | NM | 7.54 (58.19) | 4.18 (61.55) |
| BH21-2 | 3.96 to 7.01 | 2.66 | 65.46 | *4.54 (60.92)* | *4.58 (60.88)* | *4.58 (60.88)* | NM | NM | NM | NM | NM | 4.32 (61.14) | 2.89 (62.57) |
| BH21-3 | 4.57 to 7.62 | 3.05 | 65.24 | *4.28 (60.96)* | *3.80 (61.44)* | *3.80 (61.44)* | NM | NM | NM | NM | NM | 3.52 (61.72) | 0.85 (64.39) |
| BH21-4 | 4.57 to 7.62 | 3.66 | 65.09 | *2.65 (62.44)* | *2.83 (62.26)* | *2.83 (62.26)* | *2.44 (62.65)* | *3.17 (61.92)* | *2.64 (62.45)* | *3.09 (62.0)* | *2.55 (62.54)* | 2.03 (63.06) | 2.06 (63.03) |
| BH21-5 | 4.57 to 7.62 | 3.66 | 65.47 | *3.95 (61.52)* | *4.04 (61.43)* | *3.94 (61.53)* | NM | NM | NM | NM | NM | DC | DC |
| BH21-11 | 2.49 to 5.54 | 1.52 | 65.26 | NI | *2.96 (62.30)* | *2.96 (62.30)* | NM | NM | NM | NM | NM | 2.28 (62.98) | 2.10 (63.17) |
| BH21-14 | 3.05 to 4.57 | 1.68 | 64.84 | NI | *2.48 (62.36)* | *2.44 (62.40)* | *2.13 (62.71)* | *2.80 (62.05)* | *2.40 (62.44)* | *2.43 (62.41)* | *2.23 (62.61)* | 1.84 (63.00) | **1.80 (63.04)** |
| BH21-15A | 3.96 to 7.01 | 3.15 | 64.84 | NI | *2.74 (62.10)* | *2.74 (62.10)* | NM | NM | *2.46 (62.38)* | NM | NM | NM | 2.81 (62.03) |
| BH21-15B | 1.53 to 3.05 | 3.15 | 64.84 | NI | *2.59 (62.25)* | *2.59 (62.25)* | NM | NM | *2.38 (62.46)* | NM | NM | NM | 1.83 (63.01) |
| BH21-19 | 2.70 to 5.13 | 2.03 | 65.95 | NI | *3.44 (62.51)* | *3.44 (62.51)* | NM | NM | NM | NM | NM | NM | NM |
| BH21-20 | 3.30 to 5.18 | 2.29 | 65.93 | NI | *3.82 (62.11)* | *3.82 (62.11)* | NM | NM | NM | NM | NM | NM | 2.14 (63.79) |
| BH21-21 | 1.64 to 4.92 | 4.26 | 64.41 | NI | NI | *2.43 (61.98)* | NM | NM | NM | *2.27 (62.14)* | NM | 2.03 (62.38) | 1.67 (62.75) |
| BH21-22 | 1.31 to 4.59 | 2.95 | 64.62 | NI | NI | *2.72 (61.90)* | NM | NM | *2.37 (62.25)* | *2.27 (62.35)* | NM | 1.90 (62.72) | 1.74 (62.88) |
| BH22-1 | 8.06 to 9.60 | 3.40 | 65.02 | NI | NI | NI | *7.87 (57.15)* | *8.20 (56.82)* | *7.57 (57.45)* | *7.72 (57.30)* | *7.84 (57.18)* | NM (-) | NM (-) |
| BH22-2 | 4.41 to 7.46 | 2.90 | 64.90 | NI | NI | NI | *6.98 (57.92)* | *2.98 (61.92)* | *2.37 (62.53)* | *3.10 (61.80)* | *2.58 (62.32)* | NM (-) | 2.10 (62.80) |
| BH22-3 | 5.18 to 6.7 | 2.74 | 64.85 | NI | NI | NI | *2.30 (62.55)* | *6.81 (58.04)* | *7.42 (57.43)* | *7.36 (57.49)* | *6.83 (58.02)* | 6.79 (58.06) | 6.71 (58.14) |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BH22-4 | 4.87 to 7.92 | 2.29 | 64.75 | NI | NI | NI | *6.85 (57.90)* | *7.10 (57.65)* | *7.14 (57.61)* | *7.10 (57.65)* | *6.83 (57.92)* | 6.53 (58.22) | 6.49 (58.26) |
| BH22-5 | 7.61 to 10.66 | 3.35 | 65.94 | NI | NI | NI | *7.79 (58.15)* | NM | *7.95 (57.99)* | *7.86 (58.08)* | NM | 7.84 (58.10) | 7.49 (58.46) |
| BH22-6 | 6.00 to 7.00 | 2.50 | 64.90 | NI | NI | NI | NI | *6.85 (58.05)* | *6.85 (58.05)* | *6.78 (58.12)* | *7.02 (57.88)* | 6.72 (58.18) | 6.19 (58.71) |
| BH22-7 | 6.00 to 7.01 | 3.20 | 65.11 | NI | NI | NI | NI | *6.92 (58.19)* | *6.90 (58.21)* | NM (-) | *6.77 (58.34)* | 6.65 (58.46) | 6.64 (58.47) |
| BH22-8 | 9.00 to 10.00 | 2.65 | 64.87 | NI | NI | NI | NI | *8.11 (56.76)* | *8.00 (56.87)* | *7.83 (57.04)* | *7.87 (57.00)* | 7.66 (57.21) | 7.52 (57.35) |
| BH22-9 (S) | 4.57 to 7.62 | 4.11 | 64.22 | NI | NI | NI | NI | NI | *7.51 (56.71)* | NM | NM | 5.44 (58.78) | NM (-) |
| BH22-9 (D) | 9.06 to 10.66 | 4.11 | 64.23 | NI | NI | NI | NI | NI | *8.56 (55.67)* | NM | NM | 7.85 (56.38) | NM (-) |
| BH22-10 (S) | 4.57 to 7.62 | 3.96 | 64.83 | NI | NI | NI | NI | NI | *7.49 (57.34)* | NM | NM | 7.04 (57.79) | 6.55 (58.28) |
| BH22-10 (D) | 9.06 to 10.06 | 3.96 | 64.81 | NI | NI | NI | NI | NI | ***9.15 (55.66)*** | NM | NM | 7.86 (56.95) | 7.49 (57.33) |

*Elevations taken from Borehole logs released by WSP, 2023*
*masl = metres above sea level*
*mbg = metres below ground*
*NI = not installed*
*NM = not measured*
*DC = decommissioned*
*Italics indicate groundwater measurements carried out by others*
*Shaded cells indicate high/low values.*
*Green cells indicate an aquifer which is generally more shallow, and not connected to the aquifer screened in the others.*

Based on the information above, groundwater appears to within two separate layers, which are not defined by depth of screen or by adjacent materials screened in. Further, these wells are not linked spatially, as seen in BH21-14, BH22-08, BH22-06, and BH22-03, which are clustered in the same general area. Further description is provided below:

- Wells BH21-1, BH22-1, and BH22-3 through BH22-10 have water levels ranging from 4.18 mbg to 9.15 mbg.
- Wells BH21-3 through BH21-5, BH21-11, BH21-14, BH21-15, BH21-19 through BH21-22, and BH22-2 were observed to have water levels ranging from 0.85 mbg to 4.58 mbg.
- It is noted that wells BH21-3 through BH21-5, and BH21-15A are screened deeper, but appear to have piezometric head levels more similar to the 'shallow' aquifer.

This suggests two separate aquifers that are not connected, and controlled by bedrock fractures and other paths-of-least-resistance that do not link. Infiltrated waters are also understood to follow the surface of the bedrock, before penetrating downwards.

These two aquifers were considered separate for the purposes of dewatering estimates.

Based on a visual examination of the measured water levels summarized in **Table 2**, the vertical hydraulic gradient direction is downward, indicating the Site generally functions as a recharge area. Groundwater found within the overburden is assumed to recharge into the bedrock through fractures and other paths-of-least-resistance. This corroborates the aquifer conditions reported by the MECP Source Protection Atlas.

### 3.1.3 HYDROSTRATIGRAPHIC CONCEPT

Based on the measurements summarized in **Table 2** and borehole information, Terrapex has interpreted a hydrostratigraphic concept where unconnected aquifers occupy the same geographical area and are controlled by fracture systems.

For the purpose of the calculations, subsurface conditions are considered to be saturated (with one aquifer or another), from a depth of 1.80 mbg (BH21-14) to the bottom of the excavation. When considering 'saturated', this indicates that water will occupy encountered fractures at those depths, and not uniformly through porosity.

It is noted that a groundwater level of 0.83 mbg was measured at location BH21-3. This value does not corroborate the historical measurements reported for this location, and is presumed to be a result of a damaged flush-mount cap.

### 3.1.4 HYDRAULIC TESTING

To estimate the hydraulic conductivity (K) of the soil and/or bedrock materials adjacent to the screened intervals at the tested monitoring wells, single well response tests were carried out at

locations BH21-14, BH22-4, BH21-4, BH21-15, BH21-22, BH22-08 and BH21-01. Single Well Response test reports are provided in **Appendix II**.

The tests were carried out by rapidly removing a volume of water from the well (Rising Head Test) or adding a volume of water from a well (Falling Head Test) and monitoring the subsequent water level recovery to the static water level conditions. The Bouwer and Rice (1976) method was applied to test data, using the unconfined solution. The data was analyzed using the AQTESOLV™ (v. 4.50). A summary of the single well response tests carried out is presented below in **Table 3**.

**TABLE 3: HYDRAULIC CONDUCTIVITY**

| Location Identification | Description of Soil Moisture Conditions | Soils at Screened Interval | Screened Interval | SPT N-Value at Screened Interval | Estimated Hydraulic Conductivity |
|---|---|---|---|---|---|
| | | | mbg | | K (m/s) |
| BH21-14 | Saturated | Crushed limestone | 2.7 to 4.57 | - | $1.89 \times 10^{-6}$ |
| BH22-4 | Saturated | Limestone (bedrock) | 4.3 to 7.92 | - | $1.59 \times 10^{-6}$ |
| BH21-4 | Saturated | Limestone (bedrock) | 4.57 to 7.62 | - | $1.82 \times 10^{-6}$ |
| BH21-15A | Saturated | Limestone (bedrock) | 3.96 to 7.01 | RQD 40% to 80% | $1.80 \times 10^{-6}$ |
| BH21-22 | Saturated | Sand and silt | 0.9 to 4.27 | - | $8.64 \times 10^{-6}$ |
| BH21-22 | Saturated | Limestone (bedrock) | 0.9 to 4.27 | - | $3.24 \times 10^{-8}$ |
| BH22-08 | Saturated | Limestone (bedrock) | 8.5 to 10 | - | $1.64 \times 10^{-6}$ |
| BH21-01 | Saturated | Limestone (bedrock) | 8.08 to 9.6 | - | $1.27 \times 10^{-7}$ |

*mbg– indicates 'metres below ground.*
*masl– indicates 'metres above sea level.*
*Shaded cell indicates the highest ('fastest') hydraulic conductivities for overburden and bedrock.*

As summarized in **Table 3**, hydraulic conductivities were consistently estimated to be approximately from $3.24 \times 10^{-8}$ m/s to $8.64 \times 10^{-6}$ m/s at the locations and depths tested. The highest measured hydraulic conductivity for the overburden was $8.64 \times 10^{-6}$ m/s, seen in the sand and silt materials, whereas the highest measured hydraulic conductivity for the bedrock was $1.82 \times 10^{-6}$ m/s.

These results are consistent with sand and silt and bedrock, and are considered relatively semi-pervious and impervious, respectively (Bear 1972; Freeze and Cherry, 1979).

## 4.0 HYDROCHEMICAL ANALYSES – DISCHARGE CRITERIA ASSESSMENT

Analytical laboratory investigations were carried out to characterize the hydrochemical conditions of the groundwater at the Site for the purposes of temporary dewatering and long-term foundation drainage operations. One representative non-filtered groundwater sample was collected at location MW202 on 18 March 2025 using low flow draw methods and sent to Bureau Veritas Laboratory (BV) in Mississauga, Ontario under contract with Terrapex. BV is accredited by Standards Council of Canada (SCC) to International Standard ISO/IEC 17025:2005, General Requirement for the Competence of Testing and Calibration Laboratories. Monitoring well MW202 was selected at the time as a "worst-case" for groundwater concentrations at the Site based on previous analytical results prior to remediation.

Based on the analytical laboratory findings, tested parameters complied with the criteria of the City of Ottawa Sewer Use Bylaw for Sanitary and Combined Sewers.

Laboratory Reports for the results are provided in **Appendix III**.

## 5.0 DEWATERING ASSESSMENT

Temporary dewatering estimates were based on provided concept dimensions for the proposed construction excavation, and based on the steady state inflow, which is expected to be consistent through the excavation operations. Estimates for the overburden and bedrock were calculated independently.

The planned development may require buried municipal infrastructure, such as piped sanitary sewer, storm sewer and other utilities. The depths of excavation trenches associated with the construction of that infrastructure 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.

### 5.1.1 BUILDING GEOMETRY AND HYDROGEOLOGY

We understand that it is proposed to redevelop the property with a multi-storey building with two (2) levels of underground (Building A). The provided cross-section (Drawing A300; rla/architecture, 24 March 2025) indicates that the P2 lower surface has an elevation of 57.800 masl. The average ground elevation of all surveyed monitoring well locations in **Table 2** was calculated to be 65.04 masl, which means the P2 lower surface would be approximately 7.24 mbg. As such, the proposed excavation depth is expected to cut into the saturated zone and dewatering will be required during construction.

Provided floor plans (Site Plan SP-1; rla/architecture, 2025-03-24) show an irregular floor plan shape of approximately 4,815.46 $m^2$.

It is understood that the excavation above represents a portion of the total excavation, and that the remaining footprint for Tower B will be excavated at a later date.

### 5.1.2 ESTIMATED CONSTRUCTION DEWATERING VOLUMES

The hydraulic conductivities derived from *in situ* testing were used to estimate a worst-case scenario for temporary construction dewatering rates. It is understood that the area of the P2 subsurface level is approximately 4,815.46 $m^2$ and the longest length of the building is approximately 77.67 m (Drawing #19186 of the Site Plan, sheet SP-1; rla/architecture, 24 March 2025). Dewatering estimates of the irregularly shaped building footprint were simplified to a rectangle with dimensions of 77.67 m by 62 m, representative of the area of the P2 subsurface level, and a depth to the P2 lower surface level of 7.24 mbg. **Figure 5** shows the P2 floor plan provided to Terrapex.

At the time of this report release, designs for Tower B were not available to Terrapex. It is understood that the remaining footprint for Tower B will be excavated at a later date.

The following assumptions were made:

| | |
|---|---|
| Excavation Footprint: | **Phase One ('west side' Tower A)**<br><br>77.67 m x 62 m<br>(~4,815 m²) |
| Approximate Ground Surface: | 0 mbg datum<br>(approximately 65.0 masl) |
| Target dewatering depth: | 7.24 mbg + 1 m (slab)<br>= 8.24 mbg |
| Hydraulic conductivity: | $8.6 \times 10^{-6}$ m/s (overburden)<br>$1.8 \times 10^{-6}$ m/s (bedrock) |
| Highest measured static groundwater elevation: | 1.80 mbg (at BH21-14)<br>(64.39 masl) |
| Estimated Drawdown: | Total Drawdown:<br>8.24 mbg – 1.80 mbg = 6.44 m<br><br>Overburden:<br>65 masl - 61.99 masl – 1.80 mbg = 2.16 m<br>Bedrock:<br>6.44 m – 2.16 m = 4.28 m |

To estimate the steady state dewatering rate, the modified Jacob's equation was applied, as presented in Powers et. al. (2007), using the groundwater conditions summarized above. The dewatering rate was estimated for radial flow and flow to a trench from a line source. The steady state dewatering rate estimates are summarized in **Table 4**, below.

For the purposes of estimating the dewatering rate with variable subsurface flow rates, 'layercake' methodology was used, where the flow rate of the full excavation depth was estimated using the hydraulic conductivity of the overburden. The flow rate considering only the drawdown depth of the bedrock was then subtracted from this estimate using the hydraulic conductivity of the overburden, and replaced with the flow rate estimated for the flow rate for the drawdown depths of the bedrock using the hydraulic conductivity of the bedrock. This method allows for the accurate estimate of complex subsurface conditions, while not 'double counting' the downward zone of influence from the upper layers. The estimates for each 'cake layer' are provided in **Appendix II**, and a Summary Report is provided, showing the contribution of each.

**TABLE 4: SUMMARY OF ESTIMATED CONSTRUCTION DEWATERING VOLUMES FOR CONCEPT DEVELOPMENT**

| | | (A) | (B) | (C) | (D) | |
|---|---|---|---|---|---|---|
| **Excavation Concept** | **Dimensions [2]** | **Estimated Dewatering Volume** | **Incident Precipitation [1]** | **Total Dewatering Volume (A+B)** | **Design Dewatering Volume (A x FOS) + B** | **Zone of Influence (ZOI)** |
| | **(length / width / drawdown)** | **(L/day)** | **(L/day)** | **(L/day)** | **(L/day)** | **(m radius)** |
| Phase One ('west side' Tower A)[3] | | | | | | |
| Overburden $K = 8.6 \times 10^{-6}$ m/s | 77.67 m / 62 m / 2.16 m | 28,282 | 72,233 | 100,515 | 114,656 | 19 |
| Bedrock $K = 1.8 \times 10^{-6}$ m/s | 77.67 m / 62 m / 4.28 m | 128,191 | - | 128,191 | 192,287 | 17 |
| **Total Estimated Dewatering** | **77.67 m / 62 m / 6.44 m** | **156,473** | **72,233** | **228,706** | **306,943** | **19 m within overburden** |

*[1] Based on a storm with a precipitation of 15 mm*
*[2] Dimensions provided in rla/architecture (2025-03-24)*
*FOS = Factor of Safety of 1.5*

### 5.1.3 TOTAL DEWATERING RATE

Water takings in excess of 50,000 L/day are regulated by the Ministry of Environment, Conservation and Parks (MECP). Certain construction dewatering activities up to 400,000 L/day may qualify for a self-registration process under the Environmental Activity Sector Registry ("EASR"). A Category 3 PTTW is required where the proposed water taking is greater than 400,000 L/day.

Temporary construction dewatering calculations, based on the assumption and analyses above, are provided in **Appendix II**. **Table 4** summarizes the anticipated steady state dewatering rate estimates. It is noted that higher dewatering rates may be required initially for short periods of time to remove the volume of groundwater stored within the adjacent pore space and/or bedrock and suppress the groundwater level to 6.44 mbg.

As summarized in **Table 4**, based on the conditions encountered during the hydrogeological field investigations, the excavation is anticipated to required temporary construction dewatering (inclusive of incident rainfall and a Factor of Safety of 1.5) equivalent to approximately 306,943 L/day during the construction of Tower A.

### 5.1.4 ZONE OF INFLUENCE

### 5.1.5 ZONE OF INFLUENCE – SICHART AND KYRIELEIS

The radius of influence is the distance range beyond which the drawdown on groundwater caused by dewatering is not expected to be detectable. The dewatering zone of influence was estimated for the excavation area using the groundwater elevations and hydraulic conductivities provided above and using the empirical Sichart and Kyrieleis relationship described in Powers (2007).

The estimated Zones of Influence are provided in **Table 4**, above, and as part of the analyses provided in **Appendix II**.

**Zone of Influence - Overburden**
Based on the hydraulic conductivity and proposed excavation dimensions, the dewatering operations are anticipated to have a Zone of Influence (ZOI) equivalent to a 19-metre radius from the dewatering locations.

**Zone of Influence - Bedrock**
Based on the hydraulic conductivity and proposed excavation dimensions, the dewatering operations are anticipated to have a Zone of Influence (ZOI) equivalent to a 17-metre radius from the dewatering locations.

It is understood that the zone of influence relies on soil porosity as part of the estimate calculations. Bedrock, by nature, does not have porosity and the ZOI is reliant upon local fracture system connectivity. As such, the ZOI for the bedrock is strictly an estimate.

### 5.1.6 ZONE OF INFLUENCE – THEIS METHOD

The Zone of Influence was estimated using the Theis Method, which accounts for changes in the ZOI which may occur from using different pumping rates and durations of pumping operations. A visual record of the ZOI using the Theis Method is provided in Appendix II.

As shown in the Theis Method Report (**Figure 6**), assuming that dewatering operations are continuous for 60 days at a rate of 156,473 L/day, are anticipated to have a Zone of Influence (ZOI) equivalent to a 17-metre radius from the dewatering locations before drawdown exceeds 0.5 m from static water level.

### 5.1.7 INCIDENT PRECIPITATION

In addition to groundwater inflows, the total dewatering rate needs to consider the removal of incident precipitation that must be handled with the groundwater. Obstructions, berms and/or

grading should be used to direct overland drainage away from the excavations to the extent possible.

A 15 mm precipitation event was used for the estimates provided in **Table 4**, above.

### 5.1.8 PERMITTING

Water takings in excess of 50,000 L/day are regulated by the Ministry of Environment, Conservation and Parks (MECP). Certain construction dewatering activities up to 400,000 L/day may qualify for a self-registration process under the Environmental Activity Sector Registry ("EASR"). A Category 3 Permit to Take Water (PTTW) is required where the proposed water taking is greater than 400,000 L/day. It is understood that permitting with the province no longer requires the contribution of incident rainfall (July 1, 2022).

The volumes summarized above indicate that an Environmental Activity Sector Registration (EASR) will be required during construction for the concept excavation dimensions for Tower A. This assumes that one tower will be excavated at a time. Should both towers be excavated at the same time, a Permit to Take Water (PTTW) would be required.

It is noted that dewatering operations will need to draw the groundwater to at least one meter below the excavation floor (CFEM, 2006).

A Private Water Discharge Agreement is required for discharge of construction dewatering to City sewers.

** It is understood that, as of 1 July 2025, volumetric restrictions for construction dewatering activities have been removed and only require a self-registration process under the online Environmental Activity and Sector Registry (EASR) regardless of the volume of water taking. Additionally, foundation drainage systems used primarily for residential purposes will be exempt from requiring approval or self-registration for takings of up to 379,000 L/day. A Category 3 Permit to Take Water (PTTW) is still required where permanent dewatering volumes exceed 379,000 L/day.

# 6.0 WATER TAKING PLAN

### 6.1.1 NATURAL ENVIRONMENT CONSIDERATIONS

Site dewatering is not anticipated to have any negative impacts on the natural environment as the durations and volumes expected will not have a measurable effect on nearby well levels and all groundwater will pass through an onsite groundwater treatment system before discharging to a sanitary sewer pipe. Specific measures have been recommended to reduce potential risks during excavation dewatering. These best management practices (BMPs) should be followed:

- Appropriate sediment, contamination and erosion control measures must be used by the contractor to regulate stormwater and discharge water. Equipment should not be at risk of contaminating soil or water and flows must be controlled; and,
- Appropriate spill management (location and response procedures) plan will be developed and used by the contractor.

### 6.1.2 POTENTIAL SETTLEMENT ISSUES

As mentioned in **Section 5.4**, the ZOI was calculated to be approximately 19 m within overburden and approximately 17 m within bedrock (**Table 5**, above). As shown in **Figure 6**, assuming that dewatering operations are continuous for 60 days at a rate of 156,473 L/day, are anticipated to have a Zone of Influence (ZOI) equivalent to a 17-metre radius from the dewatering locations before drawdown exceeds 0.5 m from static water level.

Localized subsidence immediately adjacent to the excavation due to a loss of hydrostatic pressure with the soil pore space, and care should be given to operating within the ZOI with machinery. Ground response beyond the limits of the investigation may vary where soil conditions vary; however, assuming conditions are relatively consistent through the dewatering zone of influence, the expected settlement is anticipated to decrease with increasing distance from the excavation.

### 6.1.3 ENVIRONMENTAL MANAGEMENT PLAN (EMP)

In order to monitor and mitigate potential impacts of any dewatering operation, it is recommended that an Environmental Management Plan (EMP) be developed. The key points of the proposed recommended EMP are as follows:

- To monitor groundwater levels;
- To measure and record dewatering volumes;
- To assess groundwater/surface water interactions;
- To assess possible changes in groundwater quality;
- To carry out settlement monitoring inspections; and,

- To provide mitigation and adaptive management, when necessary.

Where a higher level of confidence is required, such as locations where a building structure is nearby, the contractor may implement a settlement monitoring program to confirm that settlements are less than 25 mm or as otherwise specified by utility owners. The settlement monitoring program would include an array of in-ground monitoring points founded on the building, which would be surveyed periodically to confirm that no subsidence is occurring.

Shop drawings indicating the proposed in-ground monitoring point type/construction and the location of each point should be submitted by the contractor and approved by the engineer prior to construction. Monitoring should start prior to excavation to obtain a baseline, then weekly during excavation and dewatering, then monthly after excavation is complete until the groundwater level is permitted to return to static conditions.

### 6.1.4 Expected Area of Influence

As discussed in Section 4.1, the Zone of Influence (ZOI) is estimated to be 19m within overburden and approximately 17 m within bedrock (**Table 5**, above). As shown in **Figure 6**, assuming that dewatering operations are continuous for 60 days at a rate of 156,473 L/day, are anticipated to have a Zone of Influence (ZOI) equivalent to a 17-metre radius from the dewatering locations before drawdown exceeds 0.5 m from static water level.

The nearest potable well to the Site (MOE Well Record 1503902, drilled to a depth of 29 m) is located approximately 150 m from the anticipated dewatering operations. This well was constructed in 1953 and is assumed to not be in use. As such, water supply is not anticipated to be affected by the water taking. Shop drawings indicating the proposed in-ground monitoring point type/construction and the location of each point should be submitted by the contractor and approved by the engineer prior to construction. Monitoring should start prior to excavation to obtain a baseline, then weekly during excavation and dewatering, then monthly after excavation is complete until the groundwater level is permitted to return to static conditions.

# 7.0 DISCHARGE PLAN

### 7.1.1 MAXIMUM QUANTITY TO BE DISCHARGED

The maximum quantity of water to be discharged is estimated to be 306,943 L/day for the 'west side' Tower A. A Specialist Dewatering Contractor will carry out dewatering operations as appropriate using best management practices and will be operated for up to 24 hours per day.

The total dewatering of the excavation is estimated to be 306,943 L/day for the 'west side' Tower A, inclusive of incident precipitation and with a factor of safety of 1.5. The recommended **EASR limit being applied for is 399,000 L/day.**

### 7.1.2 DISCHARGE LOCATION

The proposed discharge location for the excavation is shown on **Figure 4**. Water will be pumped from the excavation to a groundwater treatment system using a pipe or hose. Treated water will be discharged to a sanitary sewer pipe on the Site. Locations are subject to change pending discussion with the contractor.

### 7.1.3 GROUNDWATER TREATMENT AND DISCHARGE

As summarized in **Section 4**, all groundwater quality parameters met the requirements of the City of Ottawa Sewer Use Criteria for Sanitary and Combined Sewers. Based on the results, treatment of the groundwater effluent would not be required prior to discharge to the sanitary sewer, although additional sampling may be required.

### 7.1.4 MONITORING

Dewatering and discharge monitoring will be conducted during dewatering operations in accordance with the requirements detailed below. Monitoring records need to be retained for up to five years after completion of all dewatering activities at the Site and will include the following:

- Visual inspection of the discharge effluent at least once daily to ensure there is no visible oil or sheen;
- Water quantity (i.e., water taking rates) will be metered and recorded by the contractor on a daily basis;
- Discharge activities will be suspended if:
    - Any parameters in the discharge water exceeds the established criteria identified above; or
    - Visible oil or sheen is observed in the discharge water.

Until suitable water quality conditions are restored (either through settling or using the mitigation measures identified above), discharge activities will be postponed, and a filtered water quality sample will be collected and submitted for laboratory analysis of turbidity, TSS, and other parameters regulated under the municipal sanitary sewer permit.

### 7.1.5 QUALIFICATIONS OF QP

The water taking plan was prepared by Zen Keizars, P.Geo. and Andrew Durbano, P.Geo., on June 27, 2025. Copies of both curricula vitae are presented in **Appendix IV**.

## 8.0 REPORTING AND NOTIFICATION REQUIREMENTS

An EASR identifies a number of reporting and notification requirements that need to be undertaken within specific time periods. These reporting requirements include:

- Any changes to the information included in the EASR will be made by the contractor online within 30 days of becoming aware of these changes.
- A request needs to be submitted to remove the registration from the EASR if and once the contractor no longer engaging in the prescribed activity.
- The actual volume of water taken daily shall be reported to the Ministry on or before March 31 in each year. If no water is taken, then a “no taking” report must be entered. The water takings shall be reported online through the Regulatory Self-Reporting System (RSRS) which is accessed through the same online account as the EASR. A record of the water taking must be created and retained by the registrant for a period of five years after the last day of water taking. The record shall state:
    - the dates on which groundwater, storm water or both were taken;
    - for each day on which groundwater, storm water or both were taken, the average rate at which it was taken in litres per second; and
    - the volume of ground water, storm water or both taken each day in litres.
- If the taking of water is intended to continue for more than 365 days, the contractor must provide written notice about the taking to the local municipalities (upper-tier and lower or single tier, if applicable) and any conservation authority within whose jurisdiction the proposed water taking is located prior to commencing dewatering. This notification must include:
    - the name of the person proposing to take and discharge the water;
    - the dates on which the water will be taken;
    - where the water taken from; and
    - the location of the proposed discharge.
- If the taking of water is no longer needed, within 30 days after the day the activity is ceased, the contactor must give notice to the MECP that the water taking is complete by filing that information on EASR online registration.
- If a complaint is received with respect to the taking of water and the complaint relates to the natural environment, the Ministry shall be notified of the complaint immediately after the complaint is received. Notification shall be to the local District Office of the Ministry during normal business hours and after hours to the **Ministry’s Spills Action Centre by calling 416-325-3000 or 1-800-268-6060**. A record of the complaint must be made and retained for a minimum period of five years and have the following minimal information:
    - the date and time the complaint was received;

- a copy of the complaint, if it is a written complaint;
- a summary of the complaint, if it is not a written complaint; and
- a summary of measures taken, if any, to address the complaint.

A record of all water quality measurements and analytical results, as well as daily dewatering rates needs to be retained by the contractor and client and may be requested by the MECP for up to 5 years after dewatering activities have been completed.

## 9.0 CONCLUSIONS AND RECOMMENDATIONS

The following summarizes the information above, obtained during the review of the Site:

- **The subsurface stratigraphy** is generally comprised of compact to very dense sandy silt to sand and silt, very stiff to hard clayey silt, dense to very dense sand and gravel, and very dense silty sand and sand. The soil throughout the Site is overlain by fill materials consisting of loose silty sand, compact sand, loose sandy clay, and firm to stiff clayey silt. All boreholes were covered by asphaltic concrete.
- *In-situ* measurements of **the static groundwater** level ranged from approximately 1.80 mbg to 9.15 mbg.
- **Hydraulic conductivity** maximums were estimated to be approximately $8.6 \times 10^{-6}$ m/s in the overburden, and $1.8 \times 10^{-6}$ m/s in the bedrock.
- **Analytical hydrochemical analyses** indicate that tested groundwater does meet the criteria for the City of Ottawa discharge to sanitary and combined sewers.
- **The temporary construction dewatering volume** was estimated to be **306,943 L/day** for Tower A (inclusive of incident rainfall and with a Factor of Safety of 1.5 for groundwater contributions) and is dependant on the number of fractures encountered.
- **The Zone of Influence for dewatering operations**, assuming that dewatering operations are continuous for 60 days at a rate of 156,473 L/day, are anticipated to have a Zone of Influence (ZOI) equivalent to a 17-metre radius from the dewatering locations before drawdown exceeds 0.5 m from static water level.
- Based on these concepts, the volumes summarized above indicate that **an Environmental Activity Sector Registration (EASR) will be required during construction for the concept** excavation dimensions for Tower A. It is assumed that one tower will be excavated at a time.
- A Private Water Discharge Agreement would be required for discharge of construction dewatering effluent to sewer services.

## 10.0 CLOSURE

This report has been completed in accordance with the terms of reference for this project as agreed upon by Fengate Development Holdings 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 Fengate Development Holdings 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 Fengate Development Holdings LP.

Respectfully submitted,

**TERRAPEX ENVIRONMENTAL LTD.**

Andrew Durbano, M.Sc., P.Geo.
Hydrogeologist

Zen Keizars, P.Geo., FGC.
Senior Hydrogeologist

# FIGURES


**LEGEND**

SITE BOUNDARY

*DATA SOURCE: ESRI*
*MAP PROJECTION: NAD 1983 UTM Zone 18N*

CLIENT: FENGATE

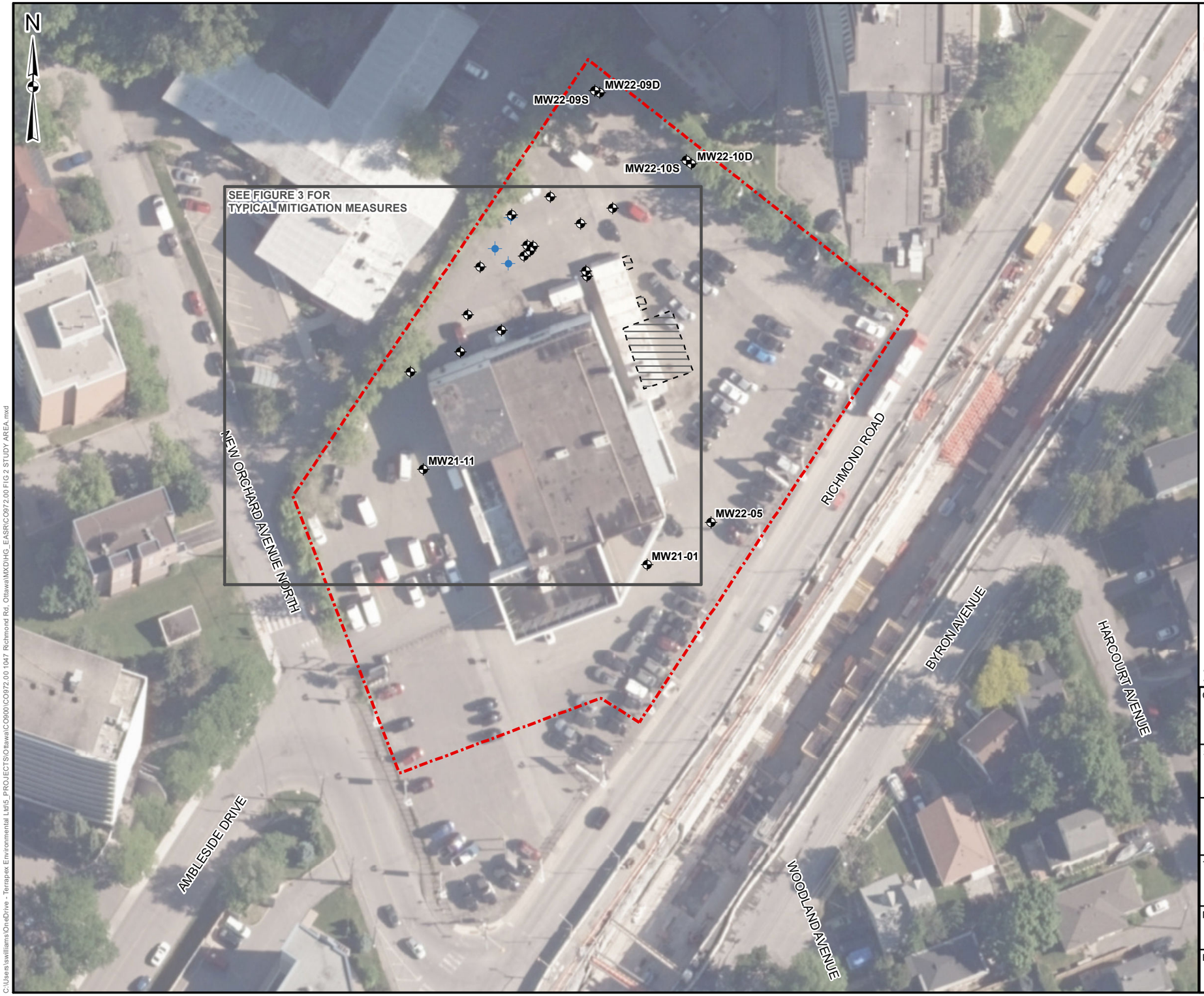
SITE LOCATION: 1047 RICHMOND ROAD
OTTAWA, ONTARIO

TERRAPEX

TITLE: **SITE LOCATION**

| | | |
|---|---|---|
| DRAWN BY: JS | PROJECT NO.: CO972.00 | CHECKED BY: ZK |
| REVISION: 00 | DATE: JULY 2024 | **FIGURE: 1** |

swilliams C:\Users\swilliams\OneDrive - Terrapex Environmental Ltd\5_PROJECTS\Ottawa\CO900\CO972.00 1047 Richmond Rd, Ottawa\MXD\HG_EASR\CO972.00 FIG 1 SITE LOCATION.mxd




C:\Users\swilliams\OneDrive - Terrapex Environmental Ltd\5_PROJECTS\Ottawa\CO900\CO972.00 1047 Richmond Rd, Ottawa\MXD\HG_EASR\CO972.00 FIG 2 STUDY AREA.mxd

**LEGEND**

- SITE BOUNDARY
- EXCAVATION LOCATION
- BOREHOLE (TERRAPEX)
- MONITORING WELL (OTHERS)

0 10 20 30 40 50
Metres

*DATA SOURCE: CITY OF OTTAWA*
*MAP PROJECTION: NAD 1983 UTM ZONE 18N*

CLIENT: FENGATE

SITE LOCATION:
1047 RICHMOND ROAD
OTTAWA, ONTARIO

TERRAPEX

TITLE:
**STUDY AREA**

| DRAWN BY: | PROJECT NO.: | CHECKED BY: |
|---|---|---|
| JS/SW | CO972.00 | ZK |
| REVISION: | DATE: | FIGURE: |
| 00 | JULY 2024 | **2** |


N

## Legend

- c1047Richmond_Buffer
- Water Service Location

w_pipe

Struct_Type

- WATM
- WATS

0 62.5 125 250 Meters

Figure 3

Current Time: 2025-Jun-27 3:11


**LEGEND**

- SITE BOUNDARY
- PROPOSED EXCAVATION FOR UNDERGROUND PARKING
- PROPOSED DISCHARGE TREATMENT SYSTEM LOCATION
- EXISTING SANITARY SEWER LINE

**NOTES:**

1. LOCATION OF DISCHARGE TREATMENT SYSTEM IS TO BE DETERMINED AFTER DISCUSSIONS WITH THE CONTRACTOR.
2. THE DISCHARGE LOCATION TO SANITARY SEWER IS TO BE DETERMINED AFTER DISCUSSIONS WITH THE CONTRACTOR.

0 10 20
Metres

*DATA SOURCE: CITY OF OTTAWA*
*MAP PROJECTION: NAD 1983 UTM ZONE 18N*

CLIENT: FENGATE

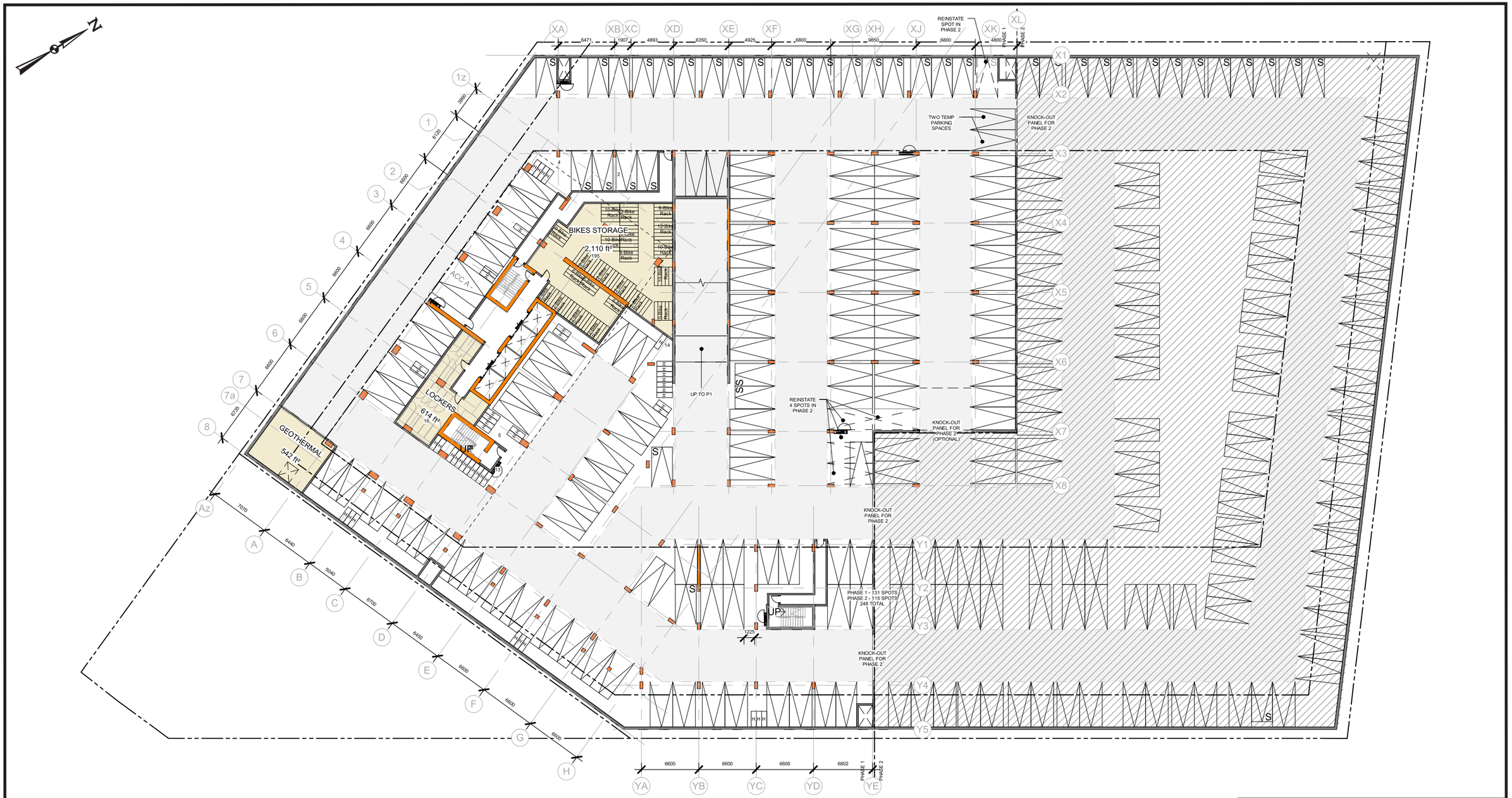
SITE LOCATION: 1047 RICHMOND ROAD OTTAWA, ONTARIO

TERRAPEX

TITLE: **TYPICAL MITIGATION MEASURES**

| DRAWN BY: | PROJECT NO.: | CHECKED BY: |
|---|---|---|
| JS/SW | CO972.00 | ZK |
| REVISION: 00 | DATE: APRIL 2025 | FIGURE: **4** |

C:\Users\jserrou\OneDrive - Terrapex Environmental Ltd\PROJECTS\Ottawa\CO900\CO972.00 1047 Richmond Rd, Ottawa\MXD\HG_EAS\RCO972.00 FIG 3 TYPICAL MITIGATION MEASURES.mxd




## LEGEND

- CISTERN
- AMENITY
- COMMERCIAL
- SERVICES
- COMMON AREA
- TOWNHOMES
- STUDIO
- ONE BED
- ONE BED + DEN
- TWO BED
- TWO BED + DEN
- THREE BED

SCALE: AS SHOWN

NOTE: FLOOR PLAN PROVIDED BY CLIENT.

CLIENT: FENGATE

SITE LOCATION: 1047 RICHMOND ROAD OTTAWA, ONTARIO

TERRAPEX

TITLE: **P2 FLOOR PLAN**

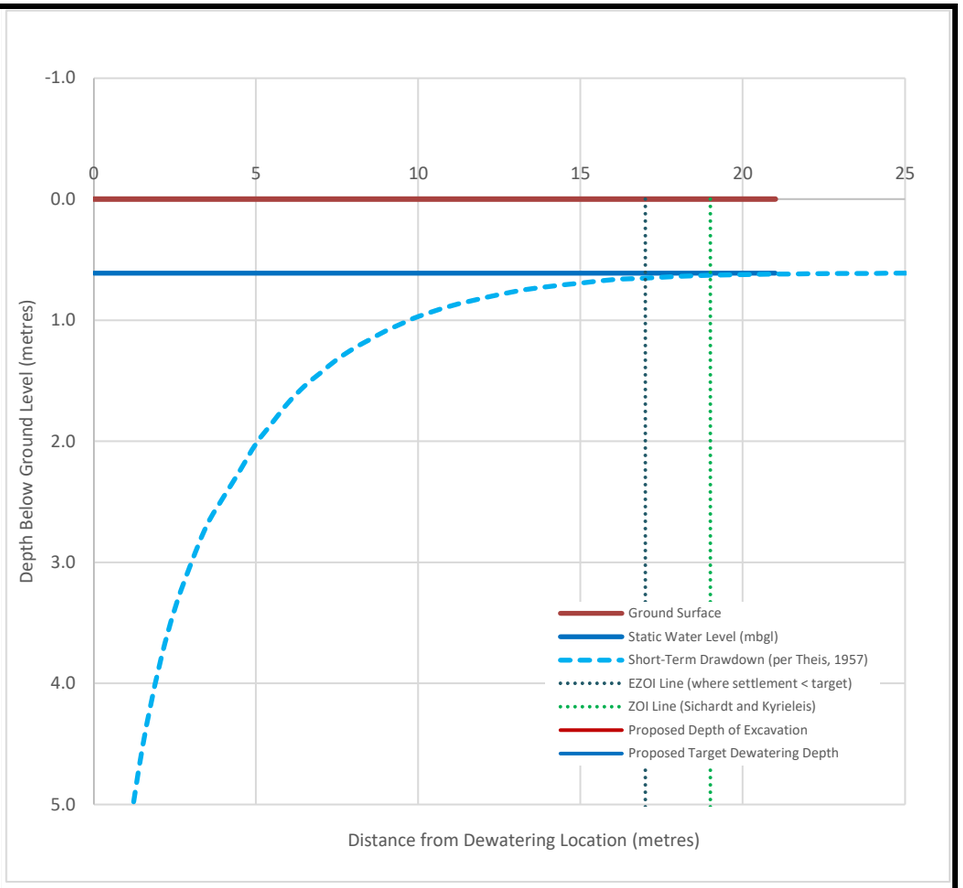
| DRAWN BY: | PROJECT NO.: | CHECKED BY: |
|---|---|---|
| SW | CO972.00 | ZK |
| REVISION: | DATE: | FIGURE: |
| 00 | JANUARY 2025 | 5 |

## Estimated Theis Drawdown from Groundwater Level With Respect to Distance From Proposed Pumping Operations

| | | |
|---|---|---|
| Ground Level | 0 | mbg |
| Static Groundwater Level | 0.61 | mbg |
| Approximate Depth to Bedrock | 62.84 | mbg |
| Target Depth of Proposed Dewatering Operations | 63.84 | mbg |
| Maximum Settlement Target | 0.05 | m |
| Short-Term EZOI Line (FOS = 2.0) | 17.00 | m radius |
| Asymptotic ZOI (Sichardt and Kyrieleis) | 19.00 | m radius |

Parameters:

| | Short-Term Drawdown (per Theis, 1957) | |
|---|---|---|
| K | 8.60E-06 | m/s |
| b | 15 | m |
| T | 1.1E+01 | $m^2$/day |
| $S_s$ | 3.24E-09 | unitless |
| S | 21 | unitless |
| t | 60 | days |
| Q | 156 | $m^3$/day |




TERRAPEX

**Figure** 6
**Project** 1047 Richmond Road, Ottawa
**Project No.** CO972.00
**Excavation** Greater Excavation Area

# APPENDIX I

# BOREHOLE LOG REPORTS

PROJECT: 21494078

# RECORD OF BOREHOLE: 21-01

SHEET 1 OF 1

LOCATION: N 5026314.5 ;E 361326.2

BORING DATE: September 24, 2021

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

| DEPTH SCALE METRES | BORING METHOD | SOIL PROFILE: DESCRIPTION | STRATA PLOT | ELEV. / DEPTH (m) | SAMPLES: NUMBER | TYPE | BLOWS/0.30m | HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕ (ND = Not Detected; 100 200 300 400) / HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □ (ND = Not Detected; 100 200 300 400) | HYDRAULIC CONDUCTIVITY, k, cm/s ($10^{-6}$ $10^{-5}$ $10^{-4}$ $10^{-3}$) / WATER CONTENT PERCENT (Wp — W — Wl; 20 40 60 80) | ADDITIONAL LAB. TESTING | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|
| | | GROUND SURFACE | | 65.73 | | | | | | |
| 0 | Power Auger 200 mm Diam. (Hollow Stem) | ASPHALT | | 0.00 | | | | | | |
| | | FILL - (SW) gravelly SAND, angular; brown (PAVEMENT STRUCTURE); non-cohesive, moist | | 0.10<br>65.43 | | | | | | |
| | | FILL - (SM) gravelly SILTY SAND; grey to dark brown, trace sand (SP); non-coohesive, moist, compact to very loose | | 0.30 | 1 | SS | 19 | ND | | Metals |
| 1 | | | | | 2 | SS | 4 | ND | | |
| | | | | | 3 | SS | 2 | ND | | PHCs, VOCs |
| | | | | 63.90 | | | | | | |
| 2 | Air Hammer H Bit | BEDROCK (Auger Refusal)<br>(Air hammer from 1.83 m to 7.62 m) | | 1.83 | | | | | | |
| 3 | | | | | | | | | | |
| 4 | | | | | | | | | | |
| 5 | | | | | | | | | | |
| 6 | | | | | | | | | | |
| 7 | | | | 58.11 | | | | | | |
| | | End of Borehole | | 7.62 | | | | | | |
| 8 | | Note(s):<br><br>1. Water level at BH21-01 measured at a depth of 7.68 m (Elev. 58.04 m) on October 4, 2021<br><br>2. Record of borehole log not prepared for geotechnical engineering purposes | | | | | | | | |
| 9 | | | | | | | | | | |
| 10 | | | | | | | | | | |

PIEZOMETER OR STANDPIPE INSTALLATION: Flush Mount Casing; Bentonite Seal; Silica Sand; 50 mm Diam. PVC #10 Slot Screen

DEPTH SCALE

1 : 50

GOLDER

LOGGED: DG

CHECKED: AG

MIS-BHS 001 21494078.GPJ GAL-MIS.GDT 3/3/22 ZS

PROJECT: 21494078

# RECORD OF BOREHOLE: 21-02

SHEET 1 OF 1

LOCATION: N 5026359.3 ;E 361297.8

BORING DATE: September 21, 2021

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

| DEPTH SCALE METRES | BORING METHOD | DESCRIPTION | STRATA PLOT | ELEV. DEPTH (m) | NUMBER | TYPE | BLOWS/0.30m | HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕ ND = Not Detected (100 200 300 400) / HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □ ND = Not Detected (100 200 300 400) | HYDRAULIC CONDUCTIVITY, k, cm/s ($10^{-6}$ $10^{-5}$ $10^{-4}$ $10^{-3}$) / WATER CONTENT PERCENT Wp — W — Wl (20 40 60 80) | ADDITIONAL LAB. TESTING | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | GROUND SURFACE | | 65.46 | | | | | | | |
| 0 | Power Auger 200 mm Diam. (Hollow Stem) | ASPHALT | | 0.08 | | | | | | | Flush Mount Casing |
| | | FILL - (SW) gravellyl SAND, angular; grey (PAVEMENT STRUCTURE); non-cohesive, moist | | 65.16 | | | | | | | |
| | | FILL - (SP) SAND, fine to medium, trace silt; brown; non-cohesive, moist, compact to dense | | 0.30 | 1 | SS | 22 | ND | | | |
| 1 | | | | | 2 | SS | 31 | ND | | Metals | |
| | | FILL - (SM/GP) SILTY SAND and GRAVEL; dark brown, contains brick fragments and rootlets; non-cohesive, moist, compact | | 64.24 1.22 | 3 | SS | 10 | ND | | | |
| 2 | | Highly weathered BEDROCK | | 63.63 1.83 | 4 | SS | >84 | ND | | | Bentonite Seal |
| | | | | | 5 | SS | >50 | ND | | PHCs, VOCs | |
| 3 | Air Hammer H Bit | BEDROCK (Auger Refusal) (Air hammer from 3.05 M TO 7.62 M) | | 62.41 3.05 | | | | | | | |
| 4 | | | | | | | | | | | Sllica Sand |
| 5 | | | | | | | | | | | |
| 6 | | | | | | | | | | | 50 mm Diam. PVC #10 Slot Screen |
| 7 | | | | 57.84 | | | | | | | |
| | | End of Borehole | | 7.62 | | | | | | | |
| 8 | | Note(s): | | | | | | | | | |
| | | 1. Water level at BH21-03 measured at a depth of 3.17 m (Elev. 62.28 m) on October 4, 2021 | | | | | | | | | |
| 9 | | 2. Record of borehole log not prepared for geotechnical engineering purposes | | | | | | | | | |
| 10 | | | | | | | | | | | |

DEPTH SCALE

1 : 50

GOLDER

LOGGED: DG

CHECKED: AG

MIS-BHS 001 21494078.GPJ GAL-MIS.GDT 3/3/22 ZS

PROJECT: 21494078

# RECORD OF BOREHOLE: 21-03

SHEET 1 OF 1

LOCATION: N 5026355.1 ;E 361289.2

BORING DATE: September 21 & 22, 2021

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

| DEPTH SCALE METRES | BORING METHOD | DESCRIPTION | STRATA PLOT | ELEV. DEPTH (m) | NUMBER | TYPE | BLOWS/0.30m | HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕ ND = Not Detected (100 200 300 400) / HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □ ND = Not Detected (100 200 300 400) | HYDRAULIC CONDUCTIVITY, k, cm/s ($10^{-6}$ $10^{-5}$ $10^{-4}$ $10^{-3}$) / WATER CONTENT PERCENT Wp W Wl (20 40 60 80) | ADDITIONAL LAB. TESTING | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|
| | | GROUND SURFACE | | 65.24 | | | | | | |
| 0 | Power Auger 200 mm Diam. (Hollow Stem) | ASPHALT | | 0.08 | | | | | | Flush Mount Casing |
| | | FILL - (SW) gravelly SAND, angular; grey (PAVEMENT STRUCTURE); non-cohesive, moist | | 64.63 | 1 | SS | 43 | ND | VOCs | |
| | | FILL - (SP) SAND, fine to medium, trace silt; brown; non-cohesive, moist, dense | | 0.61 | 2 | SS | 31 | ND | PHCs | |
| 1 | | | | 64.02 | | | | | | |
| | | FILL - (SM) SILTY SAND, some topsoil, trace gravel; dark brown, contains shale fragments; non-cohesive, moist, compact | | 1.22 | 3 | SS | 12 | ND | Metals | |
| | | | | 63.41 | | | | | | |
| 2 | | Highly weathered BEDROCK | | 1.83 | 4 | SS | >94 | ND | | Bentonite Seal |
| | | | | | 5 | SS | 52/ 6" | | | |
| 3 | | | | 62.19 | | | | | | |
| | Air Hammer H Bit | BEDROCK (Auger Refusal) (Air hammer from 3.05 m to 7.62 m) | | 3.05 | | | | | | |
| 4 | | | | | | | | | | |
| | | | | | | | | | | Sllica Sand |
| 5 | | | | | | | | | | |
| 6 | | | | | | | | | | 50 mm Diam. PVC #10 Slot Screen |
| 7 | | | | 57.62 | | | | | | |
| | | End of Borehole | | 7.62 | | | | | | |
| 8 | | Note(s): | | | | | | | | |
| | | 1. Water level at BH21-03 measured at a depth of 3.56 m (Elev. 61.68 m) on October 4, 2021 | | | | | | | | |
| | | 2. Record of borehole log not prepared for geotechnical engineering purposes | | | | | | | | |
| 9 | | | | | | | | | | |
| 10 | | | | | | | | | | |

DEPTH SCALE

1 : 50

GOLDER

LOGGED: DG

CHECKED: AG

MIS-BHS 001 21494078.GPJ GAL-MIS.GDT 3/3/22 ZS

PROJECT: 21494078

# RECORD OF BOREHOLE: 21-04

SHEET 1 OF 1

LOCATION: N 5026369.7 ;E 361313.7

BORING DATE: September 21, 2021

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

| DEPTH SCALE METRES | BORING METHOD | DESCRIPTION | STRATA PLOT | ELEV. DEPTH (m) | NUMBER | TYPE | BLOWS/0.30m | HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕ ND = Not Detected (100 200 300 400) / HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □ ND = Not Detected (100 200 300 400) | HYDRAULIC CONDUCTIVITY, k, cm/s ($10^{-6}$ $10^{-5}$ $10^{-4}$ $10^{-3}$) / WATER CONTENT PERCENT Wp W Wl (20 40 60 80) | ADDITIONAL LAB. TESTING | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | GROUND SURFACE | | 65.09 | | | | | | | |
| 0 | Power Auger 200 mm Diam. (Hollow Stem) | ASPHALT | | 0.05 | | | | | | | Flush Mount Casing |
| | | FILL - (SM) SILTY SAND, trace gravel; brown to grey brown, contains wood fragments; non-cohesive, moist, loose to compact | | | 1 | SS | 9 | ND | | VOCs | |
| 1 | | | | | 2 | SS | 10 | ND | | | |
| | | | | | 3 | SS | 7 | ND | | | |
| 2 | | | | | 4 | SS | 14 | ND | | | Bentonite Seal |
| | | | | 62.65 | | | | | | | |
| | | (SM) gravelly SILTY SAND; grey brown, contains cobbles and boulders (GLACIAL TILL); non-cohesive, wet, dense | | 2.44 | 5 | SS | 49 | ND | | | |
| 3 | | | | | 6 | SS | 55/4" | ND | | PHCs | |
| | | | | 61.43 | | | | | | | |
| | Air Hammer H Bit | BEDROCK (Auger Refusal) (Air hammer from 3.66 m to 7.62 m) | | 3.66 | | | | | | | |
| 4 | | | | | | | | | | | Sllica Sand |
| 5 | | | | | | | | | | | |
| 6 | | | | | | | | | | | 50 mm Diam. PVC #10 Slot Screen |
| 7 | | | | 57.47 | | | | | | | |
| | | End of Borehole | | 7.62 | | | | | | | |
| 8 | | Note(s): | | | | | | | | | |
| | | 1. Water level at BH21-01 measured at a depth of 2.50 m (Elev. 62.59 m) on October 4, 2021 | | | | | | | | | |
| | | 2. Record of borehole log not prepared for geotechnical engineering purposes | | | | | | | | | |
| 9 | | | | | | | | | | | |
| 10 | | | | | | | | | | | |

DEPTH SCALE

1 : 50

GOLDER

LOGGED: DG

CHECKED: AG

MIS-BHS 001 21494078.GPJ GAL-MIS.GDT 3/3/22 ZS

PROJECT: 21494078

# RECORD OF BOREHOLE: 21-05

SHEET 1 OF 1

LOCATION: N 5026358.2 ;E 361327.9

BORING DATE: September 22/24, 2021

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

| DEPTH SCALE METRES | BORING METHOD | DESCRIPTION | STRATA PLOT | ELEV. DEPTH (m) | NUMBER | TYPE | BLOWS/0.30m | HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕ ND = Not Detected (100 200 300 400) / HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □ ND = Not Detected (100 200 300 400) | HYDRAULIC CONDUCTIVITY, k, cm/s ($10^{-6}$ $10^{-5}$ $10^{-4}$ $10^{-3}$) / WATER CONTENT PERCENT Wp W Wl (20 40 60 80) | ADDITIONAL LAB. TESTING | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | GROUND SURFACE | | 65.47 | | | | | | |
| | Power Auger 200 mm Diam. (Hollow Stem) | ASPHALT | | 0.08 | | | | | | Flush Mount Casing |
| | | FILL - (SP) SAND, fine to coarse, some gravel, trace silt; brown; non-cohesive, moist, compact | | 64.86 | 1 | SS | 15 | ND | | |
| 1 | | FILL - (SM/GW) SILTY SAND and GRAVEL; dark brown, contains wood fragments; non-cohesive, moist, compact | | 0.61 | 2 | SS | 20 | ND | | PHCs, VOCs |
| | | | | 64.02 | 3 | SS | 52/0" | ND | | PHCs, VOCs |
| | | Possible FILL - (SP) SILTY SAND, fine to coarse, trace silt, trace gravel; grey brown; non-cohesive, moist, compact to dense | | 1.45 | 4 | SS | 20 | ND | | |
| 2 | | | | | 5 | SS | 39 | ND | | Bentonite Seal |
| | | | | 62.73 | | | | | | |
| | | (SM) gravelly SILTY SAND, non-plastic fines; grey brown, contains cobbles (GLACIAL TILL); non-cohesive, moist, dense | | 2.74 | 6 | SS | 46 | ND | | |
| 3 | | | | | 7 | SS | 34/10" | ND | | |
| | | | | 61.82 | | | | | | |
| | Air Hammer H Bit | BEDROCK (Auger Refusal) (Air hammer from 3.65 m to 7.62 m) | | 3.65 | | | | | | |
| 4 | | | | | | | | | | Sllica Sand |
| 5 | | | | | | | | | | |
| 6 | | | | | | | | | | 50 mm Diam. PVC #10 Slot Screen |
| 7 | | | | 57.85 | | | | | | |
| | | End of Borehole | | 7.62 | | | | | | |
| 8 | | Note(s): | | | | | | | | |
| | | 1. Water level at BH21-01 measured at a depth of 3.85 m (Elev 61.62 m) on October 4, 2021 | | | | | | | | |
| 9 | | 2. Record of borehole log not prepared for geotechnical engineering purposes | | | | | | | | |
| 10 | | | | | | | | | | |

DEPTH SCALE

1 : 50

GOLDER

LOGGED: DG

CHECKED: AG

MIS-BHS 001 21494078.GPJ GAL-MIS.GDT 3/3/22 ZS

PROJECT: 21494078

# RECORD OF BOREHOLE: 21-11

SHEET 1 OF 1

LOCATION: N 5026332.1 ;E 361283.0

BORING DATE: November 12, 2021

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

| DEPTH SCALE METRES | BORING METHOD | SOIL PROFILE: DESCRIPTION | STRATA PLOT | ELEV. / DEPTH (m) | SAMPLES: NUMBER | SAMPLES: TYPE | SAMPLES: BLOWS/0.30m | HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕ (ND = Not Detected; 100 200 300 400) / HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □ (ND = Not Detected; 100 200 300 400) | HYDRAULIC CONDUCTIVITY, k, cm/s ($10^{-6}$ $10^{-5}$ $10^{-4}$ $10^{-3}$) / WATER CONTENT PERCENT (Wp — W — Wl; 20 40 60 80) | ADDITIONAL LAB. TESTING | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|
| | | GROUND SURFACE | | 65.26 | | | | | | |
| 0 | Power Auger, Geoprobe | GRAVEL | | 0.00 / 64.96 | | | | | | Flush Mount Casing |
| | | (SP) SAND; brown; non-cohesive, dry | | 0.30 / 64.50 | 1 | SS | | ND | | |
| 1 | | (SM) SILTY SAND; grey-brown; non-cohesive, dry | | 0.76 / 63.74 | 2 | SS | | ND | | Metals, PHCs, VOCs; Bentonite Seal |
| | | Soft, broken, LIMESTONE | | 1.52 | 3 | SS | | ND | | Metals |
| 2 | | | | | | | | | | Sllica Sand |
| 3 | | | | | | | | | | |
| 4 | | | | | | | | | | 50 mm Diam. PVC #10 Slot Screen |
| 5 | | | | 59.72 | | | | | | |
| | | End of Borehole<br>Upon Refusal | | 5.54 | | | | | | |
| 6 | | Note(s):<br><br>1. Water level at BH21-11 measured at a depth of 2.96 m (Elev. 62.30 m) on November 30, 2021<br><br>2. Record of borehole log not prepared for geotechnical engineering purposes | | | | | | | | |
| 7 | | | | | | | | | | |
| 8 | | | | | | | | | | |
| 9 | | | | | | | | | | |
| 10 | | | | | | | | | | |

DEPTH SCALE

1 : 50

GOLDER

LOGGED: AB

CHECKED: DS

MIS-BHS 001 21494078.GPJ GAL-MIS.GDT 3/3/22 ZS

PROJECT: 21494078

# RECORD OF BOREHOLE: 21-12

SHEET 1 OF 1

LOCATION: N 5026352.5 ;E 361280.2

BORING DATE: November 11, 2021

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

| DEPTH SCALE METRES | BORING METHOD | DESCRIPTION | STRATA PLOT | ELEV. DEPTH (m) | SAMPLES NUMBER | SAMPLES TYPE | SAMPLES BLOWS/0.30m | HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕ ND = Not Detected (100 200 300 400) / HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □ ND = Not Detected (100 200 300 400) | HYDRAULIC CONDUCTIVITY, k, cm/s ($10^{-6}$ $10^{-5}$ $10^{-4}$ $10^{-3}$) / WATER CONTENT PERCENT Wp — W — Wl (20 40 60 80) | ADDITIONAL LAB. TESTING | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | GROUND SURFACE | | 64.88 | | | | | | | |
| 0 | Power Auger Geoprobe | GRAVEL | | 0.00 | | | | | | | |
| | | | | 64.58 | | | | | | | |
| | | (SP) SAND; brown; non-cohesive, dry | | 0.30 | 1 | SS | | ND | | | |
| 1 | | | | | 2 | SS | | ND | | Metals | |
| | | | | | 3 | SS | | ND | | Metals, PHCs, VOCs | |
| 2 | | Soft, crushed, LIMESTONE | | 62.90 1.98 | | | | | | | |
| | | | | | 4 | SS | | | | | |
| | | | | 62.34 | | | | | | | |
| | | End of Borehole<br>Upon Refusal | | 2.54 | | | | | | | |
| 3 | | Note(s):<br><br>1. Record of borehole log not prepared for geotechnical engineering purposes | | | | | | | | | |
| 4 | | | | | | | | | | | |
| 5 | | | | | | | | | | | |
| 6 | | | | | | | | | | | |
| 7 | | | | | | | | | | | |
| 8 | | | | | | | | | | | |
| 9 | | | | | | | | | | | |
| 10 | | | | | | | | | | | |

DEPTH SCALE

1 : 50

GOLDER

LOGGED: AB

CHECKED: DS

MIS-BHS 001 21494078.GPJ GAL-MIS.GDT 3/3/22 ZS

PROJECT: 21494078

# RECORD OF BOREHOLE: 21-13

SHEET 1 OF 1

LOCATION: N 5026364.0 ;E 361291.0

BORING DATE: November 11, 2021

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

| DEPTH SCALE METRES | BORING METHOD | SOIL PROFILE: DESCRIPTION | STRATA PLOT | ELEV. / DEPTH (m) | SAMPLES: NUMBER | TYPE | BLOWS/0.30m | HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕ (ND = Not Detected; 100 200 300 400) / HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □ (ND = Not Detected; 100 200 300 400) | HYDRAULIC CONDUCTIVITY, k, cm/s ($10^{-6}$ $10^{-5}$ $10^{-4}$ $10^{-3}$) / WATER CONTENT PERCENT (Wp — W — Wl; 20 40 60 80) | ADDITIONAL LAB. TESTING | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | GROUND SURFACE | | 64.86 | | | | | | | |
| 0 | Power Auger Geoprobe | GRAVEL | | 0.00 | 1 | SS | | ND | | | |
| | | | | 64.56 | | | | | | | |
| | | (SP) SAND; brown; non-cohesive, dry | | 0.30 | | | | | | | |
| 1 | | | | | 2 | SS | | ND | | Metals | |
| | | | | 63.18 | | | | | | | |
| | | Soft, crushed, LIMESTONE | | 1.68 | 3 | SS | | ND | | Metals | |
| 2 | | | | 62.73 | | | | | | | |
| | | End of Borehole<br>Upon Refusal | | 2.13 | | | | | | | |
| | | Note(s):<br><br>1. Record of borehole log not prepared for geotechnical engineering purposes | | | | | | | | | |
| 3 | | | | | | | | | | | |
| 4 | | | | | | | | | | | |
| 5 | | | | | | | | | | | |
| 6 | | | | | | | | | | | |
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| 8 | | | | | | | | | | | |
| 9 | | | | | | | | | | | |
| 10 | | | | | | | | | | | |

DEPTH SCALE

1 : 50

GOLDER

LOGGED: AB

CHECKED: DS

MIS-BHS 001 21494078.GPJ GAL-MIS.GDT 3/3/22 ZS

PROJECT: 21494078

# RECORD OF BOREHOLE: 21-14

SHEET 1 OF 1

LOCATION: N 5026375.7 ;E 361302.2

BORING DATE: November 12, 2021

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

| DEPTH SCALE METRES | BORING METHOD | DESCRIPTION | STRATA PLOT | ELEV. / DEPTH (m) | SAMPLES: NUMBER | SAMPLES: TYPE | SAMPLES: BLOWS/0.30m | HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕ (ND = Not Detected; 100 200 300 400) / HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □ (ND = Not Detected; 100 200 300 400) | HYDRAULIC CONDUCTIVITY, k, cm/s ($10^{-6}$ $10^{-5}$ $10^{-4}$ $10^{-3}$) / WATER CONTENT PERCENT (Wp W Wl; 20 40 60 80) | ADDITIONAL LAB. TESTING | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|
| | | GROUND SURFACE | | 64.84 | | | | | | |
| 0 | Power Auger, Geoprobe | GRAVEL | | 0.00 | | | | | | Flush Mount Casing |
| | | (SP) SAND; brown; non-cohesive, dry | | 0.15 | 1 | SS | | ND | | |
| | | (SM) SILTY SAND; grey-brown; non-cohesive, dry | | 64.08 | | | | | | |
| 1 | | | | | 2 | SS | | ND | | Bentonite Seal |
| | | | | 63.16 | | | | | | |
| | | Soft, crushed, LIMESTONE | | 1.68 | 3 | SS | | ND | | PHCs, VOCs |
| 2 | | | | | | | | | | |
| 3 | | | | | | | | | | Sllica Sand |
| 4 | | | | | | | | | | 50 mm Diam. PVC #10 Slot Screen |
| | | | | 60.27 | | | | | | |
| | | End of Borehole<br>Upon Refusal | | 4.57 | | | | | | |
| 5 | | Note(s):<br><br>1. Water level at BH21-14 measured at a depth of 2.48 m (Elev. 62.36 m) on November 30, 2021<br><br>2. Record of borehole log not prepared for geotechnical engineering purposes | | | | | | | | |
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| 7 | | | | | | | | | | |
| 8 | | | | | | | | | | |
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| 10 | | | | | | | | | | |

DEPTH SCALE

1 : 50

GOLDER

LOGGED: AB

CHECKED: DS

MIS-BHS 001 21494078.GPJ GAL-MIS.GDT 3/3/22 ZS

PROJECT: 21494078

# RECORD OF BOREHOLE: 21-15

SHEET 1 OF 2

LOCATION: N 5026380.1 ;E 361312.4

BORING DATE: November 12, 2021

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

| DEPTH SCALE METRES | BORING METHOD | DESCRIPTION | STRATA PLOT | ELEV. / DEPTH (m) | SAMPLES: NUMBER | SAMPLES: TYPE | SAMPLES: BLOWS/0.30m | HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕ (ND = Not Detected; 100 200 300 400) / HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □ (ND = Not Detected; 100 200 300 400) | HYDRAULIC CONDUCTIVITY, k, cm/s ($10^{-6}$ $10^{-5}$ $10^{-4}$ $10^{-3}$) / WATER CONTENT PERCENT (Wp W Wl; 20 40 60 80) | ADDITIONAL LAB. TESTING | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | GROUND SURFACE | | 64.84 | | | | | | | A B |
| 0 | Power Auger Geoprobe | GRAVEL | | 0.00 | | | | | | | |
| | | (SP) SAND; brown; non-cohesive, dry | | 0.15 | 1 | SS | | ⊕ ND | | | |
| | | | | 64.08 | | | | | | | |
| 1 | | (SM) SILTY SAND; grey-brown; non-cohesive, moist | | 0.76 | 2 | SS | | ⊕ ND | | | |
| | | | | 63.01 | 3 | SS | | □ ND | | PHCs, VOCs | |
| 2 | | (SP) SAND; grey; non-cohesive, wet | | 1.83 | | | | | | | |
| | | | | | 4 | SS | | □⊕ ND | | | |
| 3 | | | | 61.69 | | | | | | | |
| | | Soft, crushed, LIMESTONE | | 3.15 | 5 | SS | | | | | |
| | | | | 61.05 | | | | | | | |
| | | Borehole continued on RECORD OF DRILLHOLE 21-15 | | 3.79 | | | | | | | |
| 4 | | | | | | | | | | | |
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| 8 | | | | | | | | | | | |
| 9 | | | | | | | | | | | |
| 10 | | | | | | | | | | | |

DEPTH SCALE

1 : 50

GOLDER

LOGGED: AB

CHECKED: DS

MIS-BHS 001 21494078.GPJ GAL-MIS.GDT 3/3/22 ZS

PROJECT: 21494078

# RECORD OF DRILLHOLE: 21-15

SHEET 2 OF 2

LOCATION: N 5026380.1 ;E 361312.4

DRILLING DATE: November 12, 2021

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: Geoprobe

DRILLING CONTRACTOR: Marathon

JN - Joint; FLT - Fault; SHR- Shear; VN - Vein; CJ - Conjugate
BD - Bedding; FO- Foliation; CO- Contact; OR- Orthogonal; CL - Cleavage
PL - Planar; CU- Curved; UN- Undulating; ST - Stepped; IR - Irregular
PO- Polished; K - Slickensided; SM- Smooth; Ro - Rough; MB- Mechanical Break
BR - Broken Rock
**NOTE:** For additional abbreviations refer to list of abbreviations & symbols.

| DEPTH SCALE METRES | DRILLING RECORD | DESCRIPTION | SYMBOLIC LOG | ELEV. DEPTH (m) | RUN No. | COLOUR % RETURN | RECOVERY TOTAL CORE % | RECOVERY SOLID CORE % | R.Q.D. % | FRACT. INDEX PER 0.25 m | DISCONTINUITY DATA: DIP w.r.t. CORE AXIS | DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION | Jcon | Jr | Ja | HYDRAULIC CONDUCTIVITY K, cm/sec | Diametral Point Load Index (MPa) | RMC -Q' AVG. | A | B |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | BEDROCK SURFACE | | 60.88 | | | | | | | | | | | | | | | | |
| 4 | Rotary Drill HQ3 Core | Thin-medium bedded, grey, LIMESTONE | | 3.96 | 1 | FLUSH 100 | 80 60 40 20 | 80 60 40 20 | 80 60 40 20 | 5 10 15 20 | 0 30 60 90 | | | | | $10^{-6}$ $10^{-5}$ $10^{-4}$ $10^{-3}$ | 2 4 6 | | | |
| 5 | | | | 59.48 | | | | | | | | | | | | | | | | |
| 6 | | Thin-medium bedded, grey, LIMESTONE | | 5.36 | 2 | FLUSH 100 | | | | | | | | | | | | | | |
| 7 | | | | 57.83 | | | | | | | | | | | | | | | | |
| | | End of Drillhole | | 7.01 | | | | | | | | | | | | | | | | |
| 8 | | Note(s): | | | | | | | | | | | | | | | | | | |
| 9 | | 1. Water level at BH21-15A measured at a depth of 2.74 m (Elev. 62.10 m) on November 30, 2021 | | | | | | | | | | | | | | | | | | |
| 10 | | 2. Water level at BH21-15B measured at a depth of 2.59 m (Elev. 62.25 m) on November 30, 2021 | | | | | | | | | | | | | | | | | | |
| 11 | | 3. Record of borehole log not prepared for geotechnical engineering purposes | | | | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | | | | | | |
| 13 | | | | | | | | | | | | | | | | | | | | |

DEPTH SCALE

1 : 50

GOLDER

LOGGED: AB

CHECKED: DS

MIS-RCK 004 21494078.GPJ GAL-MISS.GDT 3/3/22 ZS

PROJECT: 21494078

# RECORD OF BOREHOLE: 21-16

SHEET 1 OF 1

LOCATION: N 5026367.9 ;E 361324.2

BORING DATE: November 11, 2021

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

| DEPTH SCALE METRES | BORING METHOD | SOIL PROFILE: DESCRIPTION | STRATA PLOT | ELEV. / DEPTH (m) | SAMPLES: NUMBER | TYPE | BLOWS/0.30m | HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕ *ND = Not Detected* 100 200 300 400 / HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □ *ND = Not Detected* 100 200 300 400 | HYDRAULIC CONDUCTIVITY, k, cm/s $10^{-6}$ $10^{-5}$ $10^{-4}$ $10^{-3}$ / WATER CONTENT PERCENT Wp W Wl 20 40 60 80 | ADDITIONAL LAB. TESTING | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|
| | | GROUND SURFACE | | 65.27 | | | | | | |
| 0 | Power Auger Geoprobe | GRAVEL | | 0.00 | | | | | | |
| | | (SM) SILTY SAND; grey-brown; non-cohesive, dry | | 0.15 | 1 | SS | | ND | | |
| 1 | | | | | 2 | SS | | | | PHCs, VOCs |
| | | | | | 3 | SS | | | | |
| 2 | | End of Borehole<br>Upon Refusal | | 63.34<br>1.93 | | | | | | |
| | | Note(s):<br><br>1. Record of borehole log not prepared for geotechnical engineering purposes | | | | | | | | |
| 3 | | | | | | | | | | |
| 4 | | | | | | | | | | |
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| 10 | | | | | | | | | | |

DEPTH SCALE
1 : 50

GOLDER

LOGGED: AB
CHECKED: DS

MIS-BHS 001 21494078.GPJ GAL-MIS.GDT 3/3/22 ZS

PROJECT: 21494078

# RECORD OF BOREHOLE: 21-17

SHEET 1 OF 1

LOCATION: N 5026361.4 ;E 361337.9

BORING DATE: November 11, 2021

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

| DEPTH SCALE METRES | BORING METHOD | SOIL PROFILE: DESCRIPTION | STRATA PLOT | ELEV. / DEPTH (m) | SAMPLES: NUMBER | TYPE | BLOWS/0.30m | HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕ (ND = Not Detected; 100 200 300 400) / HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □ (ND = Not Detected; 100 200 300 400) | HYDRAULIC CONDUCTIVITY, k, cm/s ($10^{-6}$ $10^{-5}$ $10^{-4}$ $10^{-3}$) / WATER CONTENT PERCENT (Wp — W — Wl; 20 40 60 80) | ADDITIONAL LAB. TESTING | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | GROUND SURFACE | | 65.64 | | | | | | | |
| 0 | Power Auger Geoprobe | GRAVEL | | 0.00 | | | | | | | |
| | | (SM) SILTY SAND; grey-brown; non-cohesive, dry | | 0.15 | 1 | SS | | ND | | | |
| 1 | | | | | 2 | SS | | ND | | PHCs, VOCs | |
| 2 | | | | | 3 | SS | | ND | | | |
| | | | | 63.15 | | | | | | | |
| | | End of Borehole<br>Upon Refusal | | 2.49 | | | | | | | |
| 3 | | Note(s):<br><br>1. Record of borehole log not prepared for geotechnical engineering purposes | | | | | | | | | |
| 4 | | | | | | | | | | | |
| 5 | | | | | | | | | | | |
| 6 | | | | | | | | | | | |
| 7 | | | | | | | | | | | |
| 8 | | | | | | | | | | | |
| 9 | | | | | | | | | | | |
| 10 | | | | | | | | | | | |

DEPTH SCALE

1 : 50

GOLDER

LOGGED: AB

CHECKED: DS

MIS-BHS 001 21494078.GPJ GAL-MIS.GDT 3/3/22 ZS

PROJECT: 21494078

# RECORD OF BOREHOLE: 21-18

SHEET 1 OF 1

LOCATION: N 5026348.5 ;E 361331.5

BORING DATE: November 11, 2021

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

| DEPTH SCALE METRES | BORING METHOD | SOIL PROFILE: DESCRIPTION | STRATA PLOT | ELEV. / DEPTH (m) | SAMPLES: NUMBER | TYPE | BLOWS/0.30m | HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕ (ND = Not Detected; 100 200 300 400) / HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □ (ND = Not Detected; 100 200 300 400) | HYDRAULIC CONDUCTIVITY, k, cm/s ($10^{-6}$ $10^{-5}$ $10^{-4}$ $10^{-3}$) / WATER CONTENT PERCENT (Wp — W — Wl; 20 40 60 80) | ADDITIONAL LAB. TESTING | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | GROUND SURFACE | | 65.70 | | | | | | | |
| 0 | Power Auger Geoprobe | GRAVEL | | 0.00 | | | | | | | |
| | | (SP) SAND; brown; non-cohesive, dry | | 0.15 | 1 | SS | | ND | | | |
| 1 | | | | | 2 | SS | | ND | | PHCs, VOCs | |
| | | | | 64.18 | | | | | | | |
| | | (SM) SILTY SAND; grey-brown; non-cohesive, moist to wet | | 1.52 | 3 | SS | | ND | | | |
| 2 | | | | | 4 | SS | | ND | | | |
| | | | | 62.96 | | | | | | | |
| | | End of Borehole<br>Upon Refusal | | 2.74 | | | | | | | |
| 3 | | Note(s):<br><br>1. Record of borehole log not prepared for geotechnical engineering purposes | | | | | | | | | |
| 4 | | | | | | | | | | | |
| 5 | | | | | | | | | | | |
| 6 | | | | | | | | | | | |
| 7 | | | | | | | | | | | |
| 8 | | | | | | | | | | | |
| 9 | | | | | | | | | | | |
| 10 | | | | | | | | | | | |

DEPTH SCALE

1 : 50

GOLDER

LOGGED: AB

CHECKED: DS

MIS-BHS 001 21494078.GPJ GAL-MIS.GDT 3/3/22 ZS

PROJECT: 21494078

# RECORD OF BOREHOLE: 21-19

SHEET 1 OF 1

LOCATION: N 5026348.9 ;E 361305.7

BORING DATE: November 25, 2021

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

| DEPTH SCALE METRES | BORING METHOD | DESCRIPTION | STRATA PLOT | ELEV. DEPTH (m) | SAMPLES NUMBER | SAMPLES TYPE | SAMPLES BLOWS/0.30m | HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕ ND = Not Detected; HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □ ND = Not Detected | HYDRAULIC CONDUCTIVITY, k, cm/s; WATER CONTENT PERCENT Wp W Wl | ADDITIONAL LAB. TESTING | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | GROUND SURFACE | | 65.95 | | | | | | | |
| 0 | Hilti TE 3000 AVR Hammer Drill | CONCRETE pad | | 0.00<br>65.75 | | | | | | | Flush Mount Casing |
| | | FILL - (SP) SAND, fine, trace silt; light brown; non-cohesive, dry, loose | | 0.20 | 1 | SS | | ND | | PHCs, VOCs | |
| 1 | | | | | 2 | SS | | ND | | | |
| | | | | | 3 | SS | | ND | | | Bentonite Seal |
| | | | | 64.32 | | | | | | | |
| | | (CL) SILTY CLAY, trace sand; dark grey; non-cohesive, dry, compact | | 1.63 | | | | | | | |
| 2 | | | | 63.92 | 4 | SS | | ND | | | |
| | | BEDROCK | | 2.03 | | | | | | | |
| | | - Fractured zone from 2.4 m to 3.1 m depth | | | | | | | | | Silica Sand |
| 3 | Power Auger Geoprobe | | | | | | | | | | |
| 4 | | | | | | | | | | | 52 mm Diam. PVC #10 Slot Screen |
| 5 | | | | 60.82 | | | | | | | |
| | | End of Borehole | | 5.13 | | | | | | | |
| | | Note(s):<br>1. Water level at BH21-19 measured at a depth of 3.44 m (Elev. 62.51 m) on November 30, 2021<br>2. Record of borehole log not prepared for geotechnical engineering purposes | | | | | | | | | |
| 6 | | | | | | | | | | | |
| 7 | | | | | | | | | | | |
| 8 | | | | | | | | | | | |
| 9 | | | | | | | | | | | |
| 10 | | | | | | | | | | | |

DEPTH SCALE
1 : 50

GOLDER

LOGGED: GS
CHECKED: DS

MIS-BHS 001 21494078.GPJ GAL-MIS.GDT 3/3/22 ZS

PROJECT: 21494078

# RECORD OF BOREHOLE: 21-20

SHEET 1 OF 1

LOCATION: N 5026328.5 ;E 361313.9

BORING DATE: November 24, 2021

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

| DEPTH SCALE METRES | BORING METHOD | SOIL PROFILE: DESCRIPTION | STRATA PLOT | ELEV. / DEPTH (m) | SAMPLES: NUMBER | TYPE | BLOWS/0.30m | HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕ (ND = Not Detected; 100 200 300 400) / HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □ (ND = Not Detected; 100 200 300 400) | HYDRAULIC CONDUCTIVITY, k, cm/s ($10^{-6}$ $10^{-5}$ $10^{-4}$ $10^{-3}$) / WATER CONTENT PERCENT (Wp — W — Wl; 20 40 60 80) | ADDITIONAL LAB. TESTING | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|
| | | GROUND SURFACE | | 65.93 | | | | | | |
| 0 | Power Auger / Geoprobe | CONCRETE pad | | 0.00 | | | | | | Flush Mount Casing |
| | | FILL - (SP) SAND, fine, trace silt, trace clay, trace gravel; light to dark brown, cobbles; non-cohesive; dry | | 0.13 | 1 | SS | | ND | | |
| 1 | | | | | 2 | SS | | ND | | PHCs, VOCs |
| | | | | 64.41 | | | | | | |
| | | (CL) SILTY CLAY, trace sand, trace gravel; dark grey; non-cohesive, dry | | 1.52 | 3 | SS | | ND | | Bentonite Seal |
| 2 | | | | 63.64 | | | | | | |
| | | BEDROCK | | 2.29 | 4 | SS | | ND | | |
| 3 | | | | | | | | | | Silica Sand |
| 4 | | | | | | | | | | 52 mm Diam. PVC #10 Slot Screen |
| 5 | | | | 60.75 | | | | | | |
| | | End of Borehole | | 5.18 | | | | | | |
| 6 | | Note(s):<br>1. Water level at BH21-20 measured at a depth of 3.82 m (Elev. 62.11 m) on November 30, 2021<br>2. Record of borehole log not prepared for geotechnical engineering purposes | | | | | | | | |
| 7 | | | | | | | | | | |
| 8 | | | | | | | | | | |
| 9 | | | | | | | | | | |
| 10 | | | | | | | | | | |

DEPTH SCALE

1 : 50

GOLDER

LOGGED: GS

CHECKED: DS

MIS-BHS 001 21494078.GPJ GAL-MIS.GDT 3/3/22 ZS

PROJECT: 21494078

# RECORD OF BOREHOLE: 21-21

SHEET 1 OF 1

LOCATION: N 5026393.6 ;E 361305.9

BORING DATE: December 21, 2021

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

| DEPTH SCALE METRES | BORING METHOD | DESCRIPTION | STRATA PLOT | ELEV. DEPTH (m) | SAMPLES NUMBER | SAMPLES TYPE | SAMPLES BLOWS/0.30m | HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕ ND = Not Detected (100 200 300 400) / HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □ ND = Not Detected (100 200 300 400) | HYDRAULIC CONDUCTIVITY, k, cm/s ($10^{-6}$ $10^{-5}$ $10^{-4}$ $10^{-3}$) / WATER CONTENT PERCENT Wp W Wl (20 40 60 80) | ADDITIONAL LAB. TESTING | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | GROUND SURFACE | | 64.41 | | | | | | | |
| 0 | Power Auger / Geoprobe | ASPHALT | | 0.00 | | | | | | | |
| | | SAND; brown; non-cohesive, moist | | 0.15 | 1 | SS | | ND | | | Bentonite |
| | | | | 63.60 | | | | | | | |
| 1 | | SILT, trace sand; grey; cohesive, moidy | | 0.81 | 2 | SS | | ND | | | Silica Sand |
| | | | | 62.89 | | | | | | | |
| | | SAND, trace gravel; brown; non-cohesive | | 1.52 | 3 | SS | | | | | |
| 2 | | | | | 4 | SS | | ND | | | |
| | | | | 61.36 | | | | | | | |
| 3 | | SAND, trace gravel; brown; non-cohesive, wet | | 3.05 | 5 | SS | | | | | #10 Slot Screen |
| | | | | 60.90 | | | | | | | |
| | | BEDROCK | | 3.51 | 6 | SS | | ND | | | |
| | | | | 60.45 | | | | | | | |
| 4 | | End of Borehole | | 3.96 | | | | | | | |
| | | Note(s): | | | | | | | | | |
| | | 1. Water level at BH21-21 measured at a depth of 2.43 m (Elev. 61.98 m) on December 22, 2021 | | | | | | | | | |
| | | 2. Record of borehole log not prepared for geotechnical engineering purposes | | | | | | | | | |
| 5 | | | | | | | | | | | |
| 6 | | | | | | | | | | | |
| 7 | | | | | | | | | | | |
| 8 | | | | | | | | | | | |
| 9 | | | | | | | | | | | |
| 10 | | | | | | | | | | | |

DEPTH SCALE

1 : 50

GOLDER

LOGGED: DS

CHECKED: DS

MIS-BHS 001 21494078.GPJ GAL-MIS.GDT 3/3/22 ZS

PROJECT: 21494078

# RECORD OF BOREHOLE: 21-22

SHEET 1 OF 1

LOCATION: N 5026381.4 ;E 361298.9

BORING DATE: December 21, 2021

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

| DEPTH SCALE METRES | BORING METHOD | DESCRIPTION | STRATA PLOT | ELEV. DEPTH (m) | SAMPLES: NUMBER | SAMPLES: TYPE | SAMPLES: BLOWS/0.30m | HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕ (ND = Not Detected; 100 200 300 400) / HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □ (ND = Not Detected; 100 200 300 400) | HYDRAULIC CONDUCTIVITY, k, cm/s ($10^{-6}$ $10^{-5}$ $10^{-4}$ $10^{-3}$) / WATER CONTENT PERCENT (Wp W Wl; 20 40 60 80) | ADDITIONAL LAB. TESTING | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|
| | | GROUND SURFACE | | 64.62 | | | | | | |
| 0 | Power Auger / Geoprobe | ASPHALT | | 0.00 | | | | | | |
| | | SAND; brown; non-cohesive, moist | | 0.15 | 1 | SS | | ND | | Bentonite |
| 1 | | | | | | | | | | Silica Sand |
| | | | | 63.10 | | | | | | |
| | | SAND; brown; non-cohesive, moist | | 1.52 | 2 | SS | | ND | | |
| 2 | | | | 62.18 | | | | | | |
| | | SILT, trace sand; grey brown; non-cohesive, moist | | 2.44 | 3 | SS | | ND | | PVC #10 Slot Screen |
| | | | | 61.88 | | | | | | |
| | | BEDROCK | | 2.74 | | | | | | |
| 3 | | | | | | | | | | |
| 4 | | | | 60.35 | | | | | | |
| | | End of Borehole | | 4.27 | | | | | | |
| 5 | | Note(s): | | | | | | | | |
| | | 1. Water level at BH21-22 measured at a depth of 2.72 m (Elev. 61.90 m) on December 22, 2021 | | | | | | | | |
| | | 2. Record of borehole log not prepared for geotechnical engineering purposes | | | | | | | | |
| 6 | | | | | | | | | | |
| 7 | | | | | | | | | | |
| 8 | | | | | | | | | | |
| 9 | | | | | | | | | | |
| 10 | | | | | | | | | | |

DEPTH SCALE

1 : 50

GOLDER

LOGGED: DS

CHECKED: DS

MIS-BHS 001 21494078.GPJ GAL-MIS.GDT 3/3/22 ZS

PROJECT: 21494078

# RECORD OF BOREHOLE: 21-23

SHEET 1 OF 1

LOCATION: N 5026359.1 ;E 361327.6

BORING DATE: December 21, 2021

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

| DEPTH SCALE METRES | BORING METHOD | DESCRIPTION | STRATA PLOT | ELEV. DEPTH (m) | SAMPLES NUMBER | SAMPLES TYPE | SAMPLES BLOWS/0.30m | HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕ ND = Not Detected (100 200 300 400) / HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □ ND = Not Detected (100 200 300 400) | HYDRAULIC CONDUCTIVITY, k, cm/s ($10^{-6}$ $10^{-5}$ $10^{-4}$ $10^{-3}$) / WATER CONTENT PERCENT Wp W Wl (20 40 60 80) | ADDITIONAL LAB. TESTING | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | GROUND SURFACE | | 65.50 | | | | | | | |
| 0 | Power Auger / Geoprobe | ASPHALT | | 0.00 | | | | | | | |
| | | SAND; brown; non-cohesive, moist | | 0.15 | 1 | SS | | ND | | | |
| 1 | | | | | | | | | | | |
| | | | | 63.98 | | | | | | | |
| | | SILTY SAND, some coarse sand; brown; non-cohesive, moist | | 1.52 | 2 | SS | | ND | | | |
| 2 | | | | | | | | | | | |
| | | | | | 3 | SS | | ND | | | |
| 3 | | | | | | | | | | | |
| | | | | 62.15 | 4 | SS | | | ⊕ | | |
| | | BEDROCK | | 3.35 | | | | | | | |
| | | | | 61.84 | | | | | | | |
| | | End of Borehole | | 3.66 | | | | | | | |
| 4 | | Note(s): | | | | | | | | | |
| | | 1. Borehole log not for geotechnical purposes. | | | | | | | | | |
| 5 | | | | | | | | | | | |
| 6 | | | | | | | | | | | |
| 7 | | | | | | | | | | | |
| 8 | | | | | | | | | | | |
| 9 | | | | | | | | | | | |
| 10 | | | | | | | | | | | |

DEPTH SCALE

1 : 50

GOLDER

LOGGED: DS

CHECKED: DS

MIS-BHS 001 21494078.GPJ GAL-MIS.GDT 3/3/22 ZS

PROJECT: 21494078

# RECORD OF BOREHOLE: 21-24

SHEET 1 OF 1

LOCATION: N 5026357.1 ;E 361328.2

BORING DATE: December 21, 2021

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

| DEPTH SCALE METRES | BORING METHOD | SOIL PROFILE: DESCRIPTION | STRATA PLOT | ELEV. / DEPTH (m) | SAMPLES: NUMBER | TYPE | BLOWS/0.30m | HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕ *ND = Not Detected* 100 200 300 400 / HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □ *ND = Not Detected* 100 200 300 400 | HYDRAULIC CONDUCTIVITY, k, cm/s $10^{-6}$ $10^{-5}$ $10^{-4}$ $10^{-3}$ / WATER CONTENT PERCENT Wp W Wl 20 40 60 80 | ADDITIONAL LAB. TESTING | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|
| | | GROUND SURFACE | | 65.51 | | | | | | |
| 0 | Power Auger / Geoprobe | ASPHALTIC CONCRETE | | 0.00 | | | | | | |
| | | SAND; dark brown, contains rootlets; non-cohesive, moist | | 0.15 | 1 | SS | | | | |
| 1 | | | | | 2 | SS | | ⊕□ | | |
| | | | | 63.99 | | | | | | |
| | | SILTY SAND; grey; non-cohesive, moist | | 1.52 | 3 | SS | | | | |
| 2 | | | | | | | | | | |
| | | | | | 4 | SS | | ⊕ □ | | |
| 3 | | | | | | | | | | |
| | | | | | 5 | SS | | □ ⊕ | | |
| | | | | 61.85 | | | | | | |
| | | End of Borehole | | 3.66 | | | | | | |
| 4 | | Note(s): | | | | | | | | |
| | | 1. Borehole log not for geotechnical purposes. | | | | | | | | |
| 5 | | | | | | | | | | |
| 6 | | | | | | | | | | |
| 7 | | | | | | | | | | |
| 8 | | | | | | | | | | |
| 9 | | | | | | | | | | |
| 10 | | | | | | | | | | |

DEPTH SCALE

1 : 50

GOLDER

LOGGED: DS

CHECKED: DS

MIS-BHS 001 21494078.GPJ GAL-MIS.GDT 3/3/22 ZS

PROJECT: 21494078

# RECORD OF BOREHOLE: 21-25

SHEET 1 OF 1

LOCATION: N 5026315.8 ;E 361338.3

BORING DATE: December 21, 2021

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

| DEPTH SCALE METRES | BORING METHOD | SOIL PROFILE: DESCRIPTION | STRATA PLOT | ELEV. / DEPTH (m) | SAMPLES: NUMBER | TYPE | BLOWS/0.30m | HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕ (ND = Not Detected; 100 200 300 400) / HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □ (ND = Not Detected; 100 200 300 400) | HYDRAULIC CONDUCTIVITY, k, cm/s ($10^{-6}$ $10^{-5}$ $10^{-4}$ $10^{-3}$) / WATER CONTENT PERCENT (Wp — W — Wl; 20 40 60 80) | ADDITIONAL LAB. TESTING | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|
| | | GROUND SURFACE | | 66.01 | | | | | | |
| 0 | Power Auger / Geoprobe | ASPHALT | | 0.00 | | | | | | |
| | | SAND | | 0.15 | 1 | SS | | ND | | |
| 1 | | | | | | | | | | |
| | | | | | 2 | SS | | ND | | |
| 2 | | | | 63.93 | | | | | | |
| | | SILTY SAND, trace gravel; grey; non-cohesive, moist | | 2.08 | 3 | SS | | | | |
| 3 | | | | 62.96 | | | | | | |
| | | BEDROCK | | 3.05 | 4 | SS | | ND | | |
| | | | | 62.66 | | | | | | |
| | | End of Borehole | | 3.35 | | | | | | |
| | | Note(s): | | | | | | | | |
| 4 | | 1. Borehole log not for geotechnical purposes. | | | | | | | | |
| 5 | | | | | | | | | | |
| 6 | | | | | | | | | | |
| 7 | | | | | | | | | | |
| 8 | | | | | | | | | | |
| 9 | | | | | | | | | | |
| 10 | | | | | | | | | | |

DEPTH SCALE

1 : 50

GOLDER

LOGGED: DS

CHECKED: DS

MIS-BHS 001 21494078.GPJ GAL-MIS.GDT 3/3/22 ZS

PROJECT: 21494078

# RECORD OF BOREHOLE: BH22-01

SHEET 1 OF 2

LOCATION: N 5026373.18; E 361314.80

BORING DATE: May 11, 2022

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

DRILL RIG: Geoprobe

| DEPTH SCALE METRES | BORING METHOD | SOIL PROFILE: DESCRIPTION | STRATA PLOT | ELEV. / DEPTH (m) | SAMPLES: NUMBER | SAMPLES: TYPE | SAMPLES: BLOWS/0.3m | HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕ (ND = Not Detected) 100 200 300 400 | HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □ (ND = Not Detected) 100 200 300 400 | HYDRAULIC CONDUCTIVITY, k, cm/s $10^{-6}$ $10^{-5}$ $10^{-4}$ $10^{-3}$ | WATER CONTENT PERCENT Wp W Wl 20 40 60 80 | ADDITIONAL LAB. TESTING | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | GROUND SURFACE | | 65.02 | | | | | | | | | |
| 0 | Power Auger / Geoprobe | FILL - (SW) SAND and GRAVEL, with asphalt fragments; non-cohesive, dry | | 0.00 / 64.77 | | | | | | | | | Flush Mount Casing |
| | | FILL - (SP) SAND, medium to coarse, trace silt and gravel; brown; non-cohesive, moist | | 0.25 | 1 | DP | - | ND | | | | | |
| 1 | | | | | 2 | DP | - | ND | | | | | |
| | | FILL - (SM) SILTY SAND, medium to coarse, gravelly; grey brown; non-cohesive, moist to wet | | 63.50 / 1.52 | 3 | DP | - | ND | | | | | |
| 2 | | | | | | | | | | | | | |
| | | | | | 4 | DP | - | ND | | | | | |
| 3 | | | | | 5 | DP | - | ND | | | | | |
| | | BEDROCK | | 61.62 / 3.40 | | | | | | | | | |
| 4 | Air Hammer | | | | | | | | | | | | Bentonite Seal |
| 5 | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | D |
| 8 | | | | | | | | | | | | | Silica Sand |
| | | *CONTINUED NEXT PAGE* | | | | | | | | | | | |

DEPTH SCALE

1 : 40

LOGGED: DG

CHECKED:

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PROJECT: 21494078

# RECORD OF BOREHOLE: BH22-01

SHEET 2 OF 2

LOCATION: N 5026373.18; E 361314.80

BORING DATE: May 11, 2022

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

DRILL RIG: Geoprobe

| DEPTH SCALE METRES | BORING METHOD | SOIL PROFILE: DESCRIPTION | STRATA PLOT | ELEV. / DEPTH (m) | SAMPLES: NUMBER | SAMPLES: TYPE | SAMPLES: BLOWS/0.3m | HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕ (ND = Not Detected; 100 200 300 400) / HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □ (ND = Not Detected; 100 200 300 400) | HYDRAULIC CONDUCTIVITY, k, cm/s ($10^{-6}$ $10^{-5}$ $10^{-4}$ $10^{-3}$) / WATER CONTENT PERCENT (Wp — W — Wl; 20 40 60 80) | ADDITIONAL LAB. TESTING | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|
| 8 | | *--- CONTINUED FROM PREVIOUS PAGE ---* | | | | | | | | |
| 8 | Air Hammer | BEDROCK | | 55.42 | | | | | | 52 mm Diam. PVC #10 Slot Screen |
| 9 | | END OF BOREHOLE | | 9.60 | | | | | | |
| 10 | | Notes: 1. Water level at BH22-01 measured at a depth of 8.20 m (Elev. 56.82 m) on May 26, 2022. 2. Borehole log not prepared for geotechnical engineering purposes. | | | | | | | | |
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| 12 | | | | | | | | | | |
| 13 | | | | | | | | | | |
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| 16 | | | | | | | | | | |

DEPTH SCALE

1 : 40

LOGGED: DG

CHECKED:

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PROJECT: 21494078

# RECORD OF BOREHOLE: BH22-02

SHEET 1 OF 2

LOCATION: N 5026383.15; E 361318.50

BORING DATE: May 9, 2022

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

DRILL RIG: Geoprobe

| DEPTH SCALE METRES | BORING METHOD | SOIL PROFILE: DESCRIPTION | STRATA PLOT | ELEV. / DEPTH (m) | SAMPLES: NUMBER | TYPE | BLOWS/0.3m | HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] (ND = Not Detected) 100 200 300 400 / HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] (ND = Not Detected) 100 200 300 400 | HYDRAULIC CONDUCTIVITY, k, cm/s $10^{-6}$ $10^{-5}$ $10^{-4}$ $10^{-3}$ / WATER CONTENT PERCENT Wp W Wl 20 40 60 80 | ADDITIONAL LAB. TESTING | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | GROUND SURFACE | | 64.90 | | | | | | |
| | Direct Push, 130 mm Diam. Casing | FILL - (SP) gravelly SAND, with asphalt fragments; grey brown; moist, non-cohesive, moist | | 0.00 / 64.60 | | | | | | Silica Sand |
| | | FILL - (SP) SAND, medium to coarse, some fines; brown; non-cohesive, moist | | 0.30 | 1 | DP | - | ND | | |
| 1 | | | | | 2 | DP | - | ND | | |
| | | FILL - (SP/SC) SAND to CLAYEY SAND, low to high plastic fines; grey to dark brown; non-cohesive, moist | | 63.61 / 1.29 / 63.38 | | | | | | |
| | | GLACIAL TILL to WEATHERED BEDROCK | | 1.52 | | | | | | |
| 2 | | | | | 3 | DP | - | ND | | Bentonite Seal |
| | | | | | 4 | DP | - | ND | | |
| | | BEDROCK | | 62.00 / 2.90 | | | | | | |
| 3 | | | | | | | | | | |
| 4 | | | | | | | | | | Silica Sand |
| 5 | Air Hammer | | | | | | | | | |
| 6 | | | | | | | | | | 52 mm Diam. PVC #10 Slot Screen |
| 7 | | | | 57.44 | | | | | | |
| | | END OF BOREHOLE | | 7.46 | | | | | | |
| | | Notes: | | | | | | | | |
| | | 1. Water level at BH22-02 measured at a | | | | | | | | |
| 8 | | *CONTINUED NEXT PAGE* | | | | | | | | |

DEPTH SCALE

1 : 40

LOGGED: KG

CHECKED:

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PROJECT: 21494078

# RECORD OF BOREHOLE: BH22-02

SHEET 2 OF 2

LOCATION: N 5026383.15; E 361318.50

BORING DATE: May 9, 2022

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

DRILL RIG: Geoprobe

| DEPTH SCALE METRES | BORING METHOD | SOIL PROFILE: DESCRIPTION | SOIL PROFILE: STRATA PLOT | SOIL PROFILE: ELEV. / DEPTH (m) | SAMPLES: NUMBER | SAMPLES: TYPE | SAMPLES: BLOWS/0.3m | HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕ *ND = Not Detected* 100 200 300 400 / HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □ *ND = Not Detected* 100 200 300 400 | HYDRAULIC CONDUCTIVITY, k, cm/s $10^{-6}$ $10^{-5}$ $10^{-4}$ $10^{-3}$ / WATER CONTENT PERCENT Wp W Wl 20 40 60 80 | ADDITIONAL LAB. TESTING | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 8 | | *--- CONTINUED FROM PREVIOUS PAGE ---* | | | | | | | | | |
| | | depth of 2.98 m (Elev. 61.92 m) on May 26, 2022. | | | | | | | | | |
| | | 2. Borehole log not prepared for geotechnical engineering purposes. | | | | | | | | | |
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DEPTH SCALE

1 : 40

LOGGED: KG

CHECKED:

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PROJECT: 21494078

LOCATION: N 5026373.77; E 361301.53

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

# RECORD OF BOREHOLE: BH22-03

BORING DATE: May 10, 2022

DRILL RIG: Geoprobe

SHEET 1 OF 1

DATUM: Geodetic

| DEPTH SCALE METRES | BORING METHOD | DESCRIPTION | STRATA PLOT | ELEV. / DEPTH (m) | NUMBER | TYPE | BLOWS/0.3m | HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕ ND = Not Detected (100 200 300 400) / HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □ ND = Not Detected (100 200 300 400) | HYDRAULIC CONDUCTIVITY, k, cm/s ($10^{-6}$ $10^{-5}$ $10^{-4}$ $10^{-3}$) / WATER CONTENT PERCENT Wp W Wl (20 40 60 80) | ADDITIONAL LAB. TESTING | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | GROUND SURFACE | | 64.85 | | | | | | |
| | Power Auger / Geoprobe | FILL - (SW) gravelly SAND, asphalt, fragments; grey brown; non-cohesive, dry | | 0.00 | | | | | | Flush Mount Casing |
| | | | | 64.55 | | | | | | |
| | | FILL - (SM) SILTY SAND, medium to coarse, gravelly; brown; non-cohesive, moist | | 0.30 | 1 | DP | - | ND | | |
| 1 | | | | | 2 | DP | - | ND | | |
| | | | | | 3 | DP | - | ND | | |
| 2 | | | | | 4 | DP | - | ND | | Bentonite Seal |
| | | | | 62.11 | | | | | | |
| | Air Hammer | BEDROCK | | 2.74 | | | | | | |
| 3 | | | | | | | | | | |
| 4 | | | | | | | | | | |
| 5 | | | | | | | | | | Silica Sand |
| 6 | | | | | | | | | | 52 mm Diam. PVC #10 Slot Screen |
| | | | | 58.15 | | | | | | |
| | | END OF BOREHOLE | | 6.70 | | | | | | |
| 7 | | Notes:<br>1. Water level at BH22-03 measured at a depth of 7.38 m (Elev. 57.47 m) on May 26, 2022.<br>2. Borehole log not prepared for geotechnical engineering purposes. | | | | | | | | ▽ S |
| 8 | | | | | | | | | | |

DEPTH SCALE

1 : 40

LOGGED: DG

CHECKED:

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PROJECT: 21494078

# RECORD OF BOREHOLE: BH22-04

SHEET 1 OF 2

LOCATION: N 5026371.34; E 361293.22

BORING DATE: May 9, 2022

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

DRILL RIG: Geoprobe

| DEPTH SCALE METRES | BORING METHOD | SOIL PROFILE: DESCRIPTION | STRATA PLOT | ELEV. / DEPTH (m) | SAMPLES: NUMBER | SAMPLES: TYPE | SAMPLES: BLOWS/0.3m | DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) | HYDRAULIC CONDUCTIVITY, k, cm/s ($10^{-6}$ $10^{-5}$ $10^{-4}$ $10^{-3}$) | ADDITIONAL LAB. TESTING | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | GROUND SURFACE | | 64.75 | | | | SHEAR STRENGTH Cu, kPa: nat V. + Q - ● rem V. ⊕ U - ○ (20 40 60 80) | WATER CONTENT PERCENT: Wp W Wl (20 40 60 80) | | |
| 0 | Direct Push 130 mm Diam. Casing | FILL - (SP) gravelly SAND, with asphalt fragments; grey brown; non-cohesive, moist | | 0.00 / 64.45 | | | | | | | |
| | | FILL - (SP) SAND, medium to coarse, some fines; brown; non-cohesive, moist | | 0.30 | 1 | DP | - | | | | Silica Sand |
| 1 | | | | | 2 | DP | - | | | | |
| | | FILL - (SP/SC) SAND to CLAYEY SAND, low plastic fines; brown; non-cohesive, moist | | 63.46 / 1.29 / 63.23 | | | | | | | |
| | | GLACIAL TILL to WEATHERED CRUST | | 1.52 | 3 | DP | - | | | | |
| 2 | | | | 62.46 | | | | | | | Bentonite Seal |
| | | BEDROCK | | 2.29 | | | | | | | |
| 3 | | | | | | | | | | | |
| 4 | | | | | | | | | | | |
| | Air Hammer | | | | | | | | | | Silica Sand |
| 5 | | | | | | | | | | | |
| 6 | | | | | | | | | | | 52 mm Diam. PVC #10 Slot Screen |
| 7 | | | | | | | | | | | ▽ S |
| | | | | 56.83 | | | | | | | |
| 8 | | | | 7.92 | | | | | | | |
| | | *CONTINUED NEXT PAGE* | | | | | | | | | |

DEPTH SCALE

1 : 40

LOGGED: DG

CHECKED:

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PROJECT: 21494078

# RECORD OF BOREHOLE: BH22-04

SHEET 2 OF 2

LOCATION: N 5026371.34; E 361293.22

BORING DATE: May 9, 2022

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

DRILL RIG: Geoprobe

| DEPTH SCALE METRES | BORING METHOD | SOIL PROFILE: DESCRIPTION | SOIL PROFILE: STRATA PLOT | SOIL PROFILE: ELEV. / DEPTH (m) | SAMPLES: NUMBER | SAMPLES: TYPE | SAMPLES: BLOWS/0.3m | DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80) | HYDRAULIC CONDUCTIVITY, k, cm/s ($10^{-6}$ $10^{-5}$ $10^{-4}$ $10^{-3}$) / WATER CONTENT PERCENT (Wp, W, Wl) (20 40 60 80) | ADDITIONAL LAB. TESTING | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 8 | | *--- CONTINUED FROM PREVIOUS PAGE ---* | | | | | | | | | |
| | | END OF BOREHOLE<br><br>Notes:<br><br>1. Water level at BH22-04 measured at a depth of 7.09 m (Elev. 57.66 m) on May 26, 2022.<br><br>2. Borehole log not prepared for geotechnical engineering purposes. | | | | | | | | | |
| 9 | | | | | | | | | | | |
| 10 | | | | | | | | | | | |
| 11 | | | | | | | | | | | |
| 12 | | | | | | | | | | | |
| 13 | | | | | | | | | | | |
| 14 | | | | | | | | | | | |
| 15 | | | | | | | | | | | |
| 16 | | | | | | | | | | | |

DEPTH SCALE

1 : 40

LOGGED: DG

CHECKED:

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PROJECT: 21494078

LOCATION: N 5026323.15; E 361338.38

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

# RECORD OF BOREHOLE: BH22-05

BORING DATE: May 11, 2022

DRILL RIG: Geoprobe

SHEET 1 OF 2

DATUM: Geodetic

| DEPTH SCALE METRES | BORING METHOD | DESCRIPTION | STRATA PLOT | ELEV. / DEPTH (m) | NUMBER | TYPE | BLOWS/0.3m | HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕ ND = Not Detected (100 200 300 400) / HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □ ND = Not Detected (100 200 300 400) | HYDRAULIC CONDUCTIVITY, k, cm/s ($10^{-6}$ $10^{-5}$ $10^{-4}$ $10^{-3}$) / WATER CONTENT PERCENT Wp W Wl (20 40 60 80) | ADDITIONAL LAB. TESTING | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|
| | | GROUND SURFACE | | 65.94 | | | | | | |
| 0 | Power Auger / Geoprobe | FILL - (SW) gravelly SAND, angular; grey, with asphalt fragments; non-cohesive, dry | | 0.00 / 65.64 | | | | | | Flush Mount Casing |
| | | FILL - (SP) SAND, medium to coarse, gravelly; brown; non-cohesive, moist | | 0.30 | 1 | DP | - | ND | | |
| 1 | | | | | 2 | DP | - | ND | | |
| | | FILL - (SM) SILTY SAND, medium to coarse, gravelly; grey brown; non-cohesie, moist | | 64.42 / 1.52 | 3 | DP | - | ND | | |
| 2 | | | | | 4 | DP | - | ND | | |
| 3 | | | | | 5 | DP | - | ND | | |
| | | BEDROCK | | 62.59 / 3.35 | | | | | | Bentonite Seal |
| 4 | Air Hammer | | | | | | | | | |
| 5 | | | | | | | | | | |
| 6 | | | | | | | | | | |
| 7 | | | | | | | | | | Silica Sand |
| | | | | | | | | | | 52 mm Diam. PVC #10 Slot Screen |
| 8 | | *CONTINUED NEXT PAGE* | | | | | | | | |

DEPTH SCALE

1 : 40

LOGGED: DG

CHECKED:

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PROJECT: 21494078

# RECORD OF BOREHOLE: BH22-05

SHEET 2 OF 2

LOCATION: N 5026323.15; E 361338.38

BORING DATE: May 11, 2022

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

DRILL RIG: Geoprobe

| DEPTH SCALE METRES | BORING METHOD | SOIL PROFILE: DESCRIPTION | STRATA PLOT | ELEV. / DEPTH (m) | SAMPLES: NUMBER | SAMPLES: TYPE | SAMPLES: BLOWS/0.3m | HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕ (ND = Not Detected) 100 200 300 400 / HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □ (ND = Not Detected) 100 200 300 400 | HYDRAULIC CONDUCTIVITY, k, cm/s $10^{-6}$ $10^{-5}$ $10^{-4}$ $10^{-3}$ / WATER CONTENT PERCENT Wp W Wl 20 40 60 80 | ADDITIONAL LAB. TESTING | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|
| 8 | | *--- CONTINUED FROM PREVIOUS PAGE ---* | | | | | | | | |
| 8 | Air Hammer | BEDROCK | | | | | | | | 52 mm Diam. PVC #10 Slot Screen |
| 9 | | | | | | | | | | |
| 10 | | | | 55.28 | | | | | | |
| | | END OF BOREHOLE | | 10.66 | | | | | | |
| 11 | | Notes: | | | | | | | | |
| | | 1. Water level at BH22-05 measured at a depth of 7.79 m (Elev. 58.15 m) on May 26, 2022. | | | | | | | | |
| | | 2. Borehole log not prepared for geotechnical engineering purposes. | | | | | | | | |
| 12 | | | | | | | | | | |
| 13 | | | | | | | | | | |
| 14 | | | | | | | | | | |
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| 16 | | | | | | | | | | |

DEPTH SCALE

1 : 40

LOGGED: DG

CHECKED:

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PROJECT: 21494078

# RECORD OF BOREHOLE: BH22-06

SHEET 1 OF 2

LOCATION: N 5026374.80; E 361302.66

BORING DATE: October 3, 2022

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

DRILL RIG:

| DEPTH SCALE METRES | BORING METHOD | SOIL PROFILE: DESCRIPTION | STRATA PLOT | ELEV. / DEPTH (m) | SAMPLES: NUMBER | SAMPLES: TYPE | SAMPLES: BLOWS/0.3m | DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80) | HYDRAULIC CONDUCTIVITY, k, cm/s ($10^{-6}$ $10^{-5}$ $10^{-4}$ $10^{-3}$) / WATER CONTENT PERCENT (Wp, W, Wl) (20 40 60 80) | ADDITIONAL LAB. TESTING | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | GROUND SURFACE | | 64.90 | | | | | | | |
| 0 | | ASPHALT (50 mm) | | 0.00 | | | | | | | |
| | | | | 0.05 | | | | | | | |
| | | FILL - (SP/GP) SAND and GRAVEL | | 64.65 | | | | | | | |
| | | FILL - (SP) SAND, trace gravel; brown; non-cohesive, moist | | 0.25 | | | | | | | Flush Mount Casing |
| 1 | | | | | | | | | | | |
| 2 | | | | 62.85 | | | | | | | |
| | | (SM) SILTY SAND, some fines, trace gravel; brown-grey; non-cohesive, moist | | 2.05 | | | | | | | |
| | | | | 62.40 | | | | | | | |
| | | BEDROCK (Limestone) | | 2.50 | | | | | | | |
| 3 | | | | | | | | | | | Bentonite Seal |
| 4 | | | | | | | | | | | |
| 5 | | | | | | | | | | | |
| 6 | | | | | | | | | | | Sllica Sand |
| | | | | | | | | | | | 50 mm Diam. PVC #10 Slot Screen |
| 7 | | | | 57.90 | | | | | | | |
| | | END OF BOREHOLE | | 7.00 | | | | | | | |
| | | Notes: | | | | | | | | | |
| | | 1. Water level at BH22-06 measured at a depth of 6.08 m (Elev. 58.82 m) on May 26, 2022. | | | | | | | | | |
| | | 2. Borehole log not prepared for geotechnical engineering purposes. | | | | | | | | | |
| 8 | | | | | | | | | | | ▽ |
| | | *CONTINUED NEXT PAGE* | | | | | | | | | |

DEPTH SCALE

1 : 40

LOGGED: JB

CHECKED: DS

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PROJECT: 21494078

# RECORD OF BOREHOLE: BH22-06

SHEET 2 OF 2

LOCATION: N 5026374.80; E 361302.66

BORING DATE: October 3, 2022

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

DRILL RIG:

| DEPTH SCALE METRES | BORING METHOD | SOIL PROFILE: DESCRIPTION | SOIL PROFILE: STRATA PLOT | SOIL PROFILE: ELEV. / DEPTH (m) | SAMPLES: NUMBER | SAMPLES: TYPE | SAMPLES: BLOWS/0.3m | DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80) | HYDRAULIC CONDUCTIVITY, k, cm/s ($10^{-6}$ $10^{-5}$ $10^{-4}$ $10^{-3}$) / WATER CONTENT PERCENT (Wp — W — Wl) (20 40 60 80) | ADDITIONAL LAB. TESTING | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 8 | | *--- CONTINUED FROM PREVIOUS PAGE ---* | | | | | | | | | S |
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| 16 | | | | | | | | | | | |

DEPTH SCALE

1 : 40

LOGGED: JB

CHECKED: DS

PROJECT: 21494078

# RECORD OF BOREHOLE: BH22-07

SHEET 1 OF 1

LOCATION: N 5026370.88; E 361313.48

BORING DATE: October 3, 2022

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

DRILL RIG:

| DEPTH SCALE METRES | BORING METHOD | SOIL PROFILE: DESCRIPTION | STRATA PLOT | ELEV. / DEPTH (m) | SAMPLES: NUMBER | SAMPLES: TYPE | SAMPLES: BLOWS/0.3m | DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) | SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80) | HYDRAULIC CONDUCTIVITY, k, cm/s ($10^{-6}$ $10^{-5}$ $10^{-4}$ $10^{-3}$) | WATER CONTENT PERCENT (Wp, W, Wl) (20 40 60 80) | ADDITIONAL LAB. TESTING | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | GROUND SURFACE | | 65.11 | | | | | | | | | |
| 0 | | ASPHALT (50 mm) | | 0.00 / 0.05 | | | | | | | | | |
| | | FILL - (SP/GP) SAND and GRAVEL | | 64.91 | | | | | | | | | |
| | | FILL - (SM) SILTY SAND, trace gravel; brown; non-cohesive, moist | | 0.20 | | | | | | | | | Flush Mount Casing |
| 1 | | | | | | | | | | | | | |
| 2 | | | | 63.06 | | | | | | | | | |
| | | (SM) Gravelly SILTY SAND, trace cobbles and crushed boulders; brown-grey; non-cohesive, moist | | 2.05 | | | | | | | | | |
| 3 | | | | 61.91 | | | | | | | | | Bentonite Seal |
| | | BEDROCK (Limestone) | | 3.20 | | | | | | | | | |
| 4 | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | Silica Sand |
| | | | | | | | | | | | | | 50 mm Diam. PVC #10 Slot Screen |
| 7 | | | | 58.11 | | | | | | | | | |
| | | END OF BOREHOLE | | 7.00 | | | | | | | | | |
| 8 | | | | | | | | | | | | | |

Notes:

1. Water level at BH22-07 measured at a depth of 6.91 m (Elev. 58.20 m) on May 26, 2022.

2. Borehole log not prepared for geotechnical engineering purposes.

DEPTH SCALE

1 : 40

LOGGED: JB

CHECKED: DS

GTA-BHS 001 S:\CLIENTS\FENGATE\1047_RICHMOND_RD\02_DATA\GINT\21494078.GPJ GAL-MIS.GDT 10/2/23 ZS

PROJECT: 21494078

# RECORD OF BOREHOLE: BH22-08

SHEET 1 OF 2

LOCATION: N 5026375.62; E 361303.08

BORING DATE: October 3, 2022

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

DRILL RIG:

| DEPTH SCALE METRES | BORING METHOD | SOIL PROFILE: DESCRIPTION | STRATA PLOT | ELEV. / DEPTH (m) | SAMPLES: NUMBER | SAMPLES: TYPE | SAMPLES: BLOWS/0.3m | DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) | HYDRAULIC CONDUCTIVITY, k, cm/s ($10^{-6}$ $10^{-5}$ $10^{-4}$ $10^{-3}$) / WATER CONTENT PERCENT (Wp W Wl) | ADDITIONAL LAB. TESTING | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | GROUND SURFACE | | 64.87 | | | | | | | |
| | | ASPHALT (50 mm) | | 0.00 | | | | | | | |
| | | FILL - (SP/GP) SAND and GRAVEL | | 0.05 | | | | | | | |
| | | FILL - (SP) SAND, trace gravel; brown; non-cohesive, moist | | 64.57<br>0.30 | | | | | | | Flush Mount Casing |
| 1 | | | | | | | | | | | |
| 2 | | | | 62.69 | | | | | | | |
| | | (SM) SILTY SAND, some fines, trace gravel; brown-grey; non-cohesive, moist | | 2.18 | | | | | | | |
| | | BEDROCK (Limestone) | | 62.22<br>2.65 | | | | | | | Bentonite Seal |
| 3 | | | | | | | | | | | |
| 4 | | | | | | | | | | | |
| 5 | | | | | | | | | | | |
| 6 | | | | | | | | | | | |
| 7 | | | | | | | | | | | ▽ D |
| 8 | | *CONTINUED NEXT PAGE* | | | | | | | | | |

DEPTH SCALE

1 : 40

LOGGED: JB

CHECKED: DS

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PROJECT: 21494078

# RECORD OF BOREHOLE: BH22-08

SHEET 2 OF 2

LOCATION: N 5026375.62; E 361303.08

BORING DATE: October 3, 2022

DATUM: Geodetic

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

DRILL RIG:

| DEPTH SCALE METRES | BORING METHOD | SOIL PROFILE: DESCRIPTION | STRATA PLOT | ELEV. / DEPTH (m) | SAMPLES: NUMBER | SAMPLES: TYPE | SAMPLES: BLOWS/0.3m | DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80) | HYDRAULIC CONDUCTIVITY, k, cm/s ($10^{-6}$ $10^{-5}$ $10^{-4}$ $10^{-3}$) / WATER CONTENT PERCENT (Wp — W — Wl) (20 40 60 80) | ADDITIONAL LAB. TESTING | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 8 | | *--- CONTINUED FROM PREVIOUS PAGE ---* | | | | | | | | | |
| 8 | | BEDROCK (Limestone) | | | | | | | | | Bentonite Seal |
| 9 | | | | | | | | | | | Silica Sand |
| 10 | | | | 54.87 | | | | | | | 50 mm Diam. PVC #10 Slot Screen |
| 10 | | END OF BOREHOLE | | 10.00 | | | | | | | |
| 11 | | Notes: | | | | | | | | | |
| 12 | | 1. Water level at BH22-08 measured at a depth of 8.11 m (Elev. 56.76 m) on May 26, 2022. | | | | | | | | | |
| 13 | | 2. Borehole log not prepared for geotechnical engineering purposes. | | | | | | | | | |
| 14 | | | | | | | | | | | |
| 15 | | | | | | | | | | | |
| 16 | | | | | | | | | | | |

DEPTH SCALE

1 : 40

LOGGED: JB

CHECKED: DS

PROJECT: 21494078

LOCATION: N 5026404.46; E 361315.65

# RECORD OF BOREHOLE: BH22-09

BORING DATE: May 15 - 16, 2023

DRILL RIG: Massenza MI3

SHEET 1 OF 3

DATUM: Geodetic

| DEPTH SCALE METRES | BORING METHOD | DESCRIPTION | STRATA PLOT | ELEV. / DEPTH (m) | NUMBER | TYPE | BLOWS/0.3m | HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕ (ND = Not Detected) 100 200 300 400 | HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □ (ND = Not Detected) 100 200 300 400 | HYDRAULIC CONDUCTIVITY, k, cm/s $10^{-6}$ $10^{-5}$ $10^{-4}$ $10^{-3}$ | WATER CONTENT PERCENT Wp W Wl 20 40 60 80 | ADDITIONAL LAB. TESTING | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | GROUND SURFACE | | 64.23 | | | | | | | | | |
| 0 | Air Rotary 140 mm Casing | ASPHALTIC CONCRETE | | 0.00 / 0.05 | | | | | | | | | |
| | | FILL - (SW) gravelly SAND, angular; grey; (Pavement Structure) | | 64.03 / 0.20 | | | | | | | | | |
| | | FILL - (SM) SILTY SAND, trace gravel, organic matter; dark brown; non-cohesive, moist | | 0.30 | 1 | | | ND | | | | | Flushmount |
| 1 | | FILL - (SW) gravelly SAND, fine to coarse, trace silt; brown; non-cohesive, moist | | | 2 | | | ND | | | | | |
| | | (SM) gravelly SILTY SAND, thin to thick laminations, fine to coarse, contains cobbles and boulders; brown to grey-brown (TILL); non-cohesive, moist to wet | | 63.16 / 1.07 | 3 | | | ND | | | | | |
| 2 | | | | | 4 | | | ND | | | | | Bentonite Seal |
| 3 | | | | | 5 | | | ND | | | | | |
| | | | | | 6 | | | ND | | | | | |
| 4 | | | | 60.12 | | | | | | | | | |
| | Air Rotary 89 mm Air Hammer | Slightly weathered to fresh, medium to thickly bedded, medium grey, fine grained, non-porous to faintly porous, medium strong, Dolostone interbedded with shale, limestone and sandstone | | 4.11 | | | | | | | | | Sand #2 |
| 5 | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | Screen |
| 7 | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | Bentonite Seal |
| | | *CONTINUED NEXT PAGE* | | | | | | | | | | | |

DEPTH SCALE

1 : 40

LOGGED:

CHECKED: DS

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PROJECT: 21494078

LOCATION: N 5026404.46; E 361315.65

# RECORD OF BOREHOLE: BH22-09

BORING DATE: May 15 - 16, 2023

DRILL RIG: Massenza MI3

SHEET 2 OF 3

DATUM: Geodetic

| DEPTH SCALE METRES | BORING METHOD | SOIL PROFILE: DESCRIPTION | STRATA PLOT | ELEV. / DEPTH (m) | SAMPLES: NUMBER | SAMPLES: TYPE | SAMPLES: BLOWS/0.3m | HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕ (ND = Not Detected; 100 200 300 400) / HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □ (ND = Not Detected; 100 200 300 400) | HYDRAULIC CONDUCTIVITY, k, cm/s ($10^{-6}$ $10^{-5}$ $10^{-4}$ $10^{-3}$) / WATER CONTENT PERCENT (Wp — W — Wl; 20 40 60 80) | ADDITIONAL LAB. TESTING | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|
| 8 | | *--- CONTINUED FROM PREVIOUS PAGE ---* | | | | | | | | |
| 8 | Air Rotary, 89 mm Air Hammer | Slightly weathered to fresh, medium to thickly bedded, medium grey, fine grained, non-porous to faintly porous, medium strong, Dolostone interbedded with shale, limestone and sandstone | | | | | | | | Bentonite Seal; D; Sand #2; Screen |
| 10 | | | | 54.17 | | | | | | |
| 10 | | END OF BOREHOLE | | 10.06 | | | | | | |
| 11 | | | | | | | | | | |
| 12 | | | | | | | | | | |
| 13 | | | | | | | | | | |
| 14 | | | | | | | | | | |
| 15 | | | | | | | | | | |
| 16 | | | | | | | | | | |

DEPTH SCALE

1 : 40

LOGGED:

CHECKED: DS

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PROJECT: 21494078

LOCATION: N 5026390.88; E 361333.63

# RECORD OF BOREHOLE: BH22-10

BORING DATE: May 15 - 16, 2023

DRILL RIG: Massenza MI3

SHEET 1 OF 3

DATUM: Geodetic

| DEPTH SCALE METRES | BORING METHOD | SOIL PROFILE: DESCRIPTION | STRATA PLOT | ELEV. / DEPTH (m) | SAMPLES: NUMBER | SAMPLES: TYPE | SAMPLES: BLOWS/0.3m | HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕ (ND = Not Detected; 100 200 300 400) / HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □ (ND = Not Detected; 100 200 300 400) | HYDRAULIC CONDUCTIVITY, k, cm/s ($10^{-6}$ $10^{-5}$ $10^{-4}$ $10^{-3}$) / WATER CONTENT PERCENT (Wp W Wl; 20 40 60 80) | ADDITIONAL LAB. TESTING | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | GROUND SURFACE | | 64.81 | | | | | | |
| | Air Rotary, 140 mm Casing | ASPHALTIC CONCRETE | | 0.00 | | | | | | |
| | | FILL - (SW) gravelly SAND, angular; grey; (Pavement Structure) | | 0.08 | | | | | | |
| | | FILL - (SP) SAND, fine to medium, some gravel to gravelly, trace silt; brown; non-cohesive, moist | | 0.15 / 64.35 | 1 | | | ND | | Flushmount |
| | | | | 0.46 | | | | | | |
| 1 | | (SM) gravelly SILTY SAND, trace plastic fines, contains cobbles and boulders; grey-brown (TILL); non-cohesive, moist | | | 2 | | | ND | | |
| | | | | 63.29 | 3 | | | ND | | |
| | | (SW) gravelly SAND, fine to coarse, trace silt; brown; non-cohesive, moist | | 1.52 | | | | | | |
| 2 | | | | | 4 | | | ND | | |
| | | | | 62.52 | | | | | | |
| | | (SM) gravelly SILTY SAND, contains cobbles and boulders, thin laminations of sand, fine to coarse; grey-brown (TILL); non-cohesive, wet | | 2.29 | | | | | | Bentonite Seal |
| 3 | | | | | 5 | | | ND | | |
| | | | | | 6 | | | ND | | |
| | | | | | 7 | | | ND | | |
| | | | | 60.85 | | | | | | |
| 4 | Air Rotary, 89 mm Air Hammer | Slightly weathered to fresh, medium to thickly bedded, medium grey, fine grained, non-porous to faintly porous, medium strong, Dolostone, interbeddded witth shale, limestone and sandstone | | 3.96 | | | | | | Sand #2 |
| 5 | | | | | | | | | | |
| 6 | | | | | | | | | | Screen |
| 7 | | | | | | | | | | SP |
| 8 | | | | | | | | | | Bentonite Seal |
| | | *CONTINUED NEXT PAGE* | | | | | | | | |

DEPTH SCALE

1 : 40

LOGGED:

CHECKED: DS

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PROJECT: 21494078

LOCATION: N 5026390.88; E 361333.63

# RECORD OF BOREHOLE: BH22-10

BORING DATE: May 15 - 16, 2023

DRILL RIG: Massenza MI3

SHEET 2 OF 3

DATUM: Geodetic

| DEPTH SCALE METRES | BORING METHOD | SOIL PROFILE: DESCRIPTION | STRATA PLOT | ELEV. / DEPTH (m) | SAMPLES: NUMBER | SAMPLES: TYPE | SAMPLES: BLOWS/0.3m | HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕ (ND = Not Detected; 100 200 300 400) / HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □ (ND = Not Detected; 100 200 300 400) | HYDRAULIC CONDUCTIVITY, k, cm/s ($10^{-6}$ $10^{-5}$ $10^{-4}$ $10^{-3}$) / WATER CONTENT PERCENT (Wp — W — Wl; 20 40 60 80) | ADDITIONAL LAB. TESTING | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|
| 8 | | *--- CONTINUED FROM PREVIOUS PAGE ---* | | | | | | | | |
| 8 | Air Rotary, 89 mm Air Hammer | Slightly weathered to fresh, medium to thickly bedded, medium grey, fine grained, non-porous to faintly porous, medium strong, Dolostone, interbeddded witth shale, limestone and sandstone | | | | | | | | Bentonite Seal; Sand #2; D; Screen; Sand #2 |
| 9 | | | | | | | | | | |
| 10 | | | | 54.45 | | | | | | |
| | | END OF BOREHOLE | | 10.36 | | | | | | |
| 11 | | | | | | | | | | |
| 12 | | | | | | | | | | |
| 13 | | | | | | | | | | |
| 14 | | | | | | | | | | |
| 15 | | | | | | | | | | |
| 16 | | | | | | | | | | |

DEPTH SCALE

1 : 40

LOGGED:

CHECKED: DS

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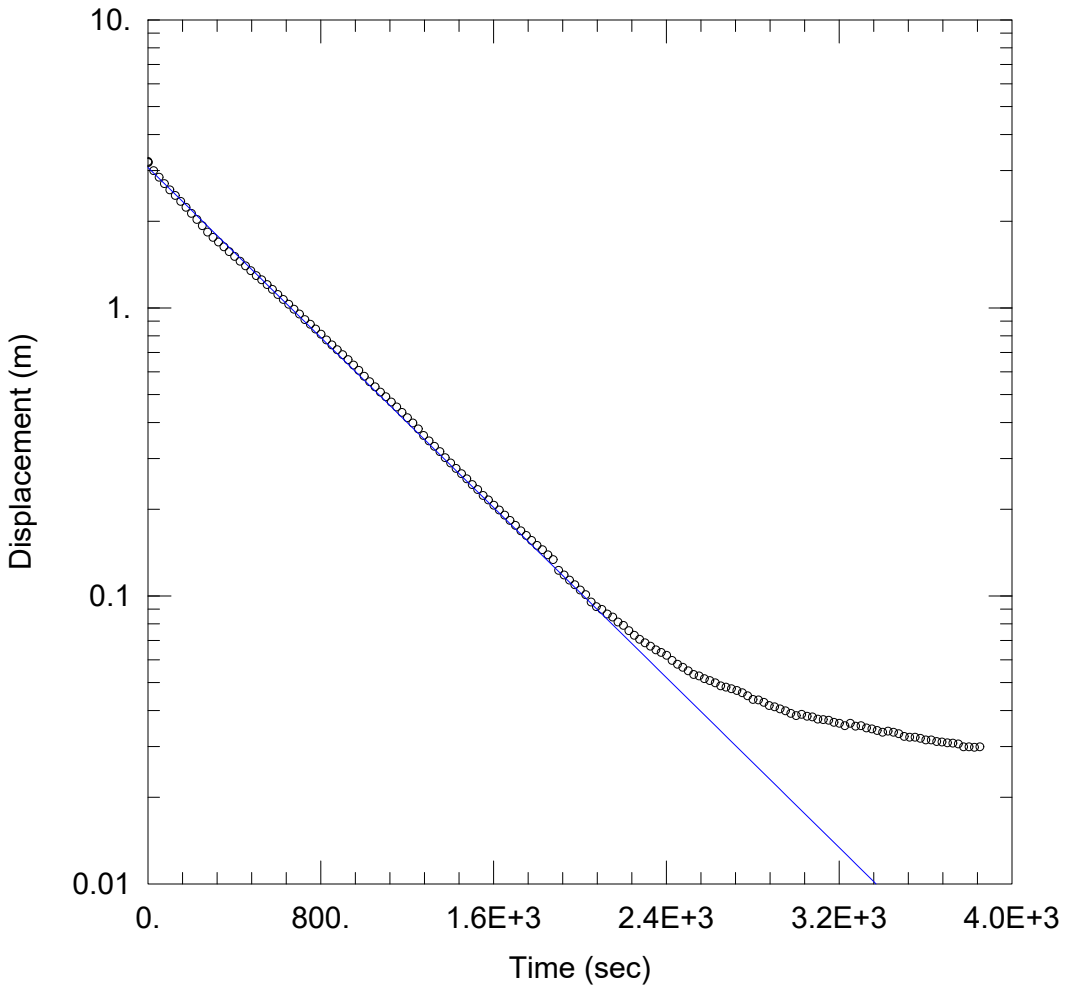
# APPENDIX II

# HYDRAULIC ANALYSES




## WELL TEST ANALYSIS

Data Set: C:\...\ktest_ BH2204_CO972.00.aqt
Date: 07/10/24 Time: 09:34:25

## PROJECT INFORMATION

Company: Terrapex Environmental Limited
Client: 1047 Richmond Nominee Inc.
Project: CT972.00
Location: 1047 Richmond Rd, Ottawa, ON
Test Well: BH 22-04
Test Date: July 2, 2024

## AQUIFER DATA

Saturated Thickness: 0.996 m Anisotropy Ratio (Kz/Kr): 1.

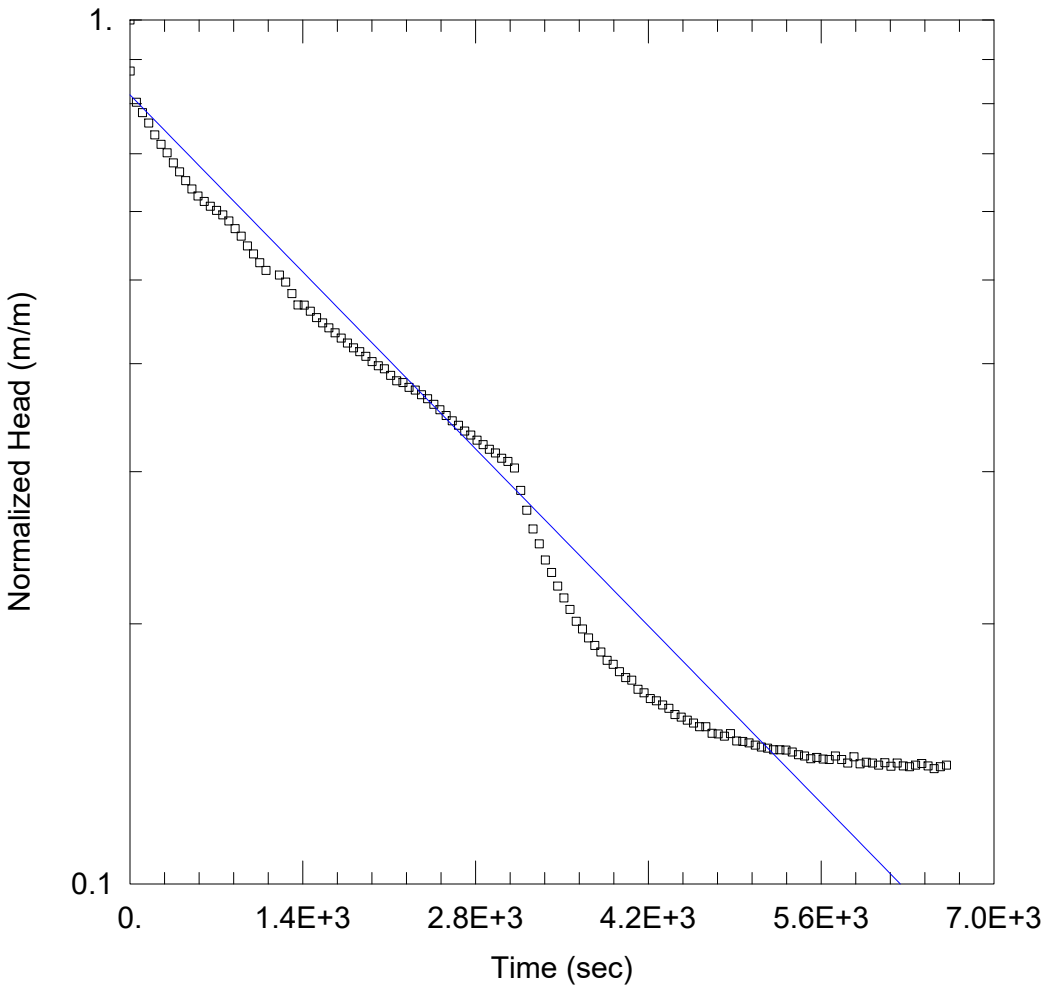
## WELL DATA (BH22-04)

Initial Displacement: 3.225 m
Total Well Penetration Depth: 5.884 m
Casing Radius: 0.026 m
Static Water Column Height: 0.996 m
Screen Length: 3.52 m
Well Radius: 0.033 m

## SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 2.077E-6 m/sec y0 = 3.074 m




## WELL TEST ANALYSIS

Data Set: C:\...\ktest_BH2101_CO972.00.aqt
Date: 07/10/24 Time: 09:38:12

## PROJECT INFORMATION

Company: Terrapex Environmental Limited
Client: 1047 Richmond Nominee Inc.
Project: CO972.00
Location: 1047 Richmond Rd, Ottawa, ON.
Test Well: BH21-01
Test Date: July 2, 2024

## AQUIFER DATA

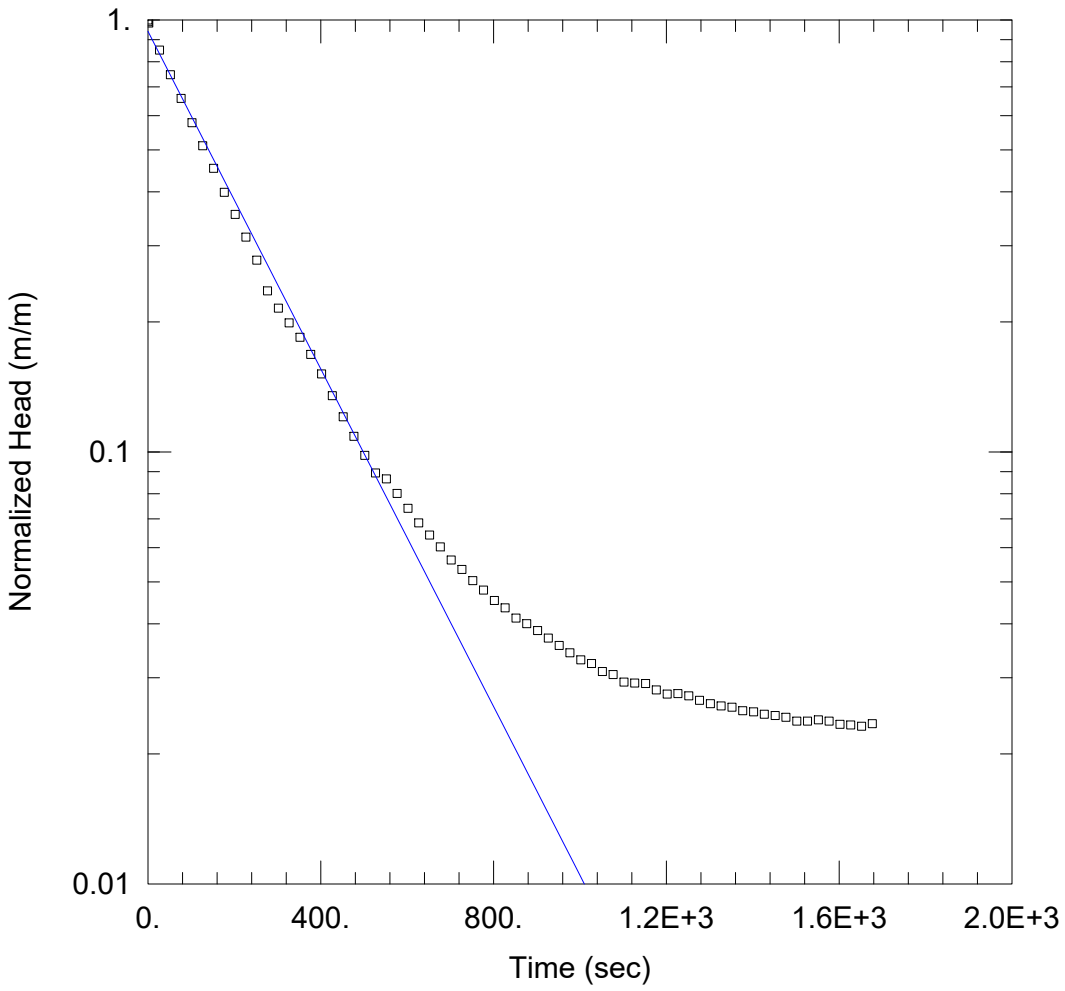
Saturated Thickness: 4.985 m Anisotropy Ratio (Kz/Kr): 1.

## WELL DATA (BH2101)

Initial Displacement: 0.6833 m
Total Well Penetration Depth: 4.065 m
Casing Radius: 0.026 m
Static Water Column Height: 4.985 m
Screen Length: 3.05 m
Well Radius: 0.031 m

## SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 1.267E-7 m/sec
y0 = 0.5595 m




## WELL TEST ANALYSIS

Data Set: C:\...\ktest_BH2104_CO972.00.aqt
Date: 07/10/24 Time: 09:41:47

## PROJECT INFORMATION

Company: Terrapex Enviromental Limited
Client: 1047 Richmond Nominee Inc.
Project: CO972.00
Location: 1047 Richmond Rd, Ottawa, ON.
Test Well: BH21-04
Test Date: July 2, 2024

## AQUIFER DATA

Saturated Thickness: 5.68 m Anisotropy Ratio (Kz/Kr): 1.

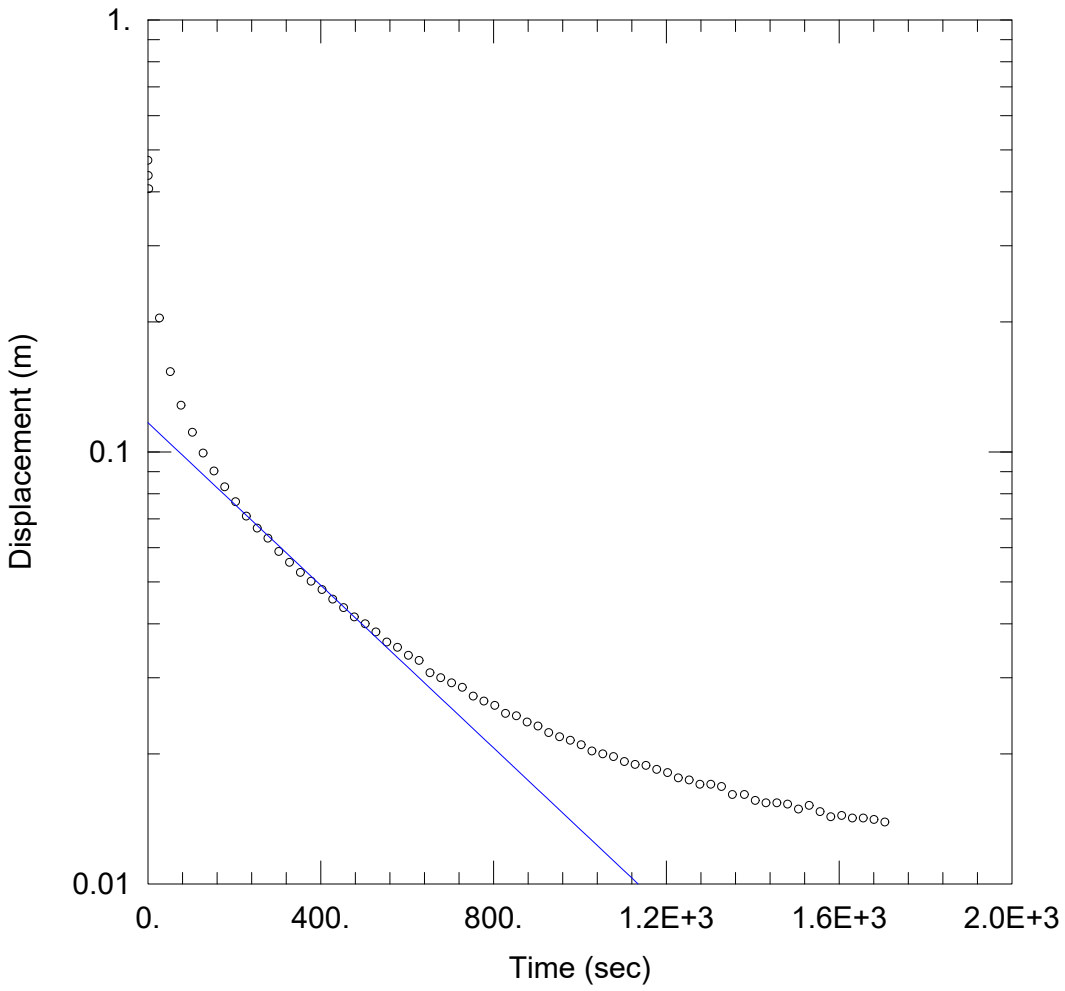
## WELL DATA (BH21-04)

Initial Displacement: 1.251 m
Total Well Penetration Depth: 5.37 m
Casing Radius: 0.026 m
Static Water Column Height: 5.68 m
Screen Length: 3.05 m
Well Radius: 0.031 m

## SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 1.815E-6 m/sec y0 = 1.177 m




## WELL TEST ANALYSIS

Data Set: C:\...\ktest_BH2114 - 1 inch PVC.aqt
Date: 07/10/24 Time: 09:43:23

## PROJECT INFORMATION

Company: Terrapex Environmental Limited
Client: 1047 Richmond Nominee Inc.
Project: CT972.00
Location: 1047 Richmond Rd, Ottawa, ON
Test Well: BH 21-14
Test Date: July 2, 2024

## AQUIFER DATA

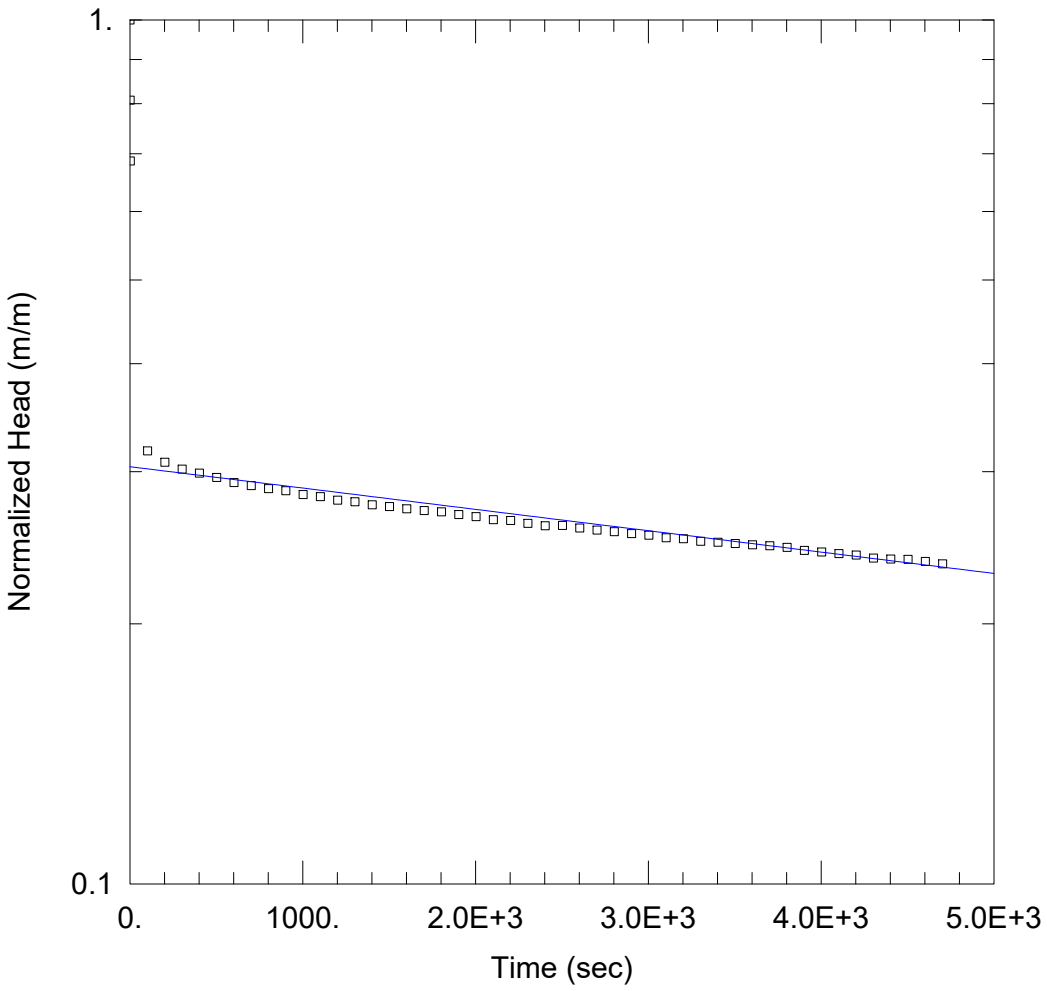
Saturated Thickness: 2.781 m Anisotropy Ratio (Kz/Kr): 1.

## WELL DATA (MW21-14)

Initial Displacement: 0.4731 m
Total Well Penetration Depth: 2.781 m
Casing Radius: 0.01307 m
Static Water Column Height: 2.781 m
Screen Length: 1.845 m
Well Radius: 0.0165 m

## SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 3.909E-7 m/sec
y0 = 0.1168 m




## WELL TEST ANALYSIS

Data Set: C:\...\ktest_BH2122_CO972.00_bedrock.aqt
Date: 07/10/24 Time: 09:48:28

## PROJECT INFORMATION

Company: Terrapex Environmental Limited
Client: 1047 Richmond Nominee Inc.
Project: CO972.00
Location: 1047 Richmond Rd, Ottawa, ON.
Test Well: BH21-22
Test Date: July 2, 2024

## AQUIFER DATA

Saturated Thickness: 2.06 m Anisotropy Ratio (Kz/Kr): 1.

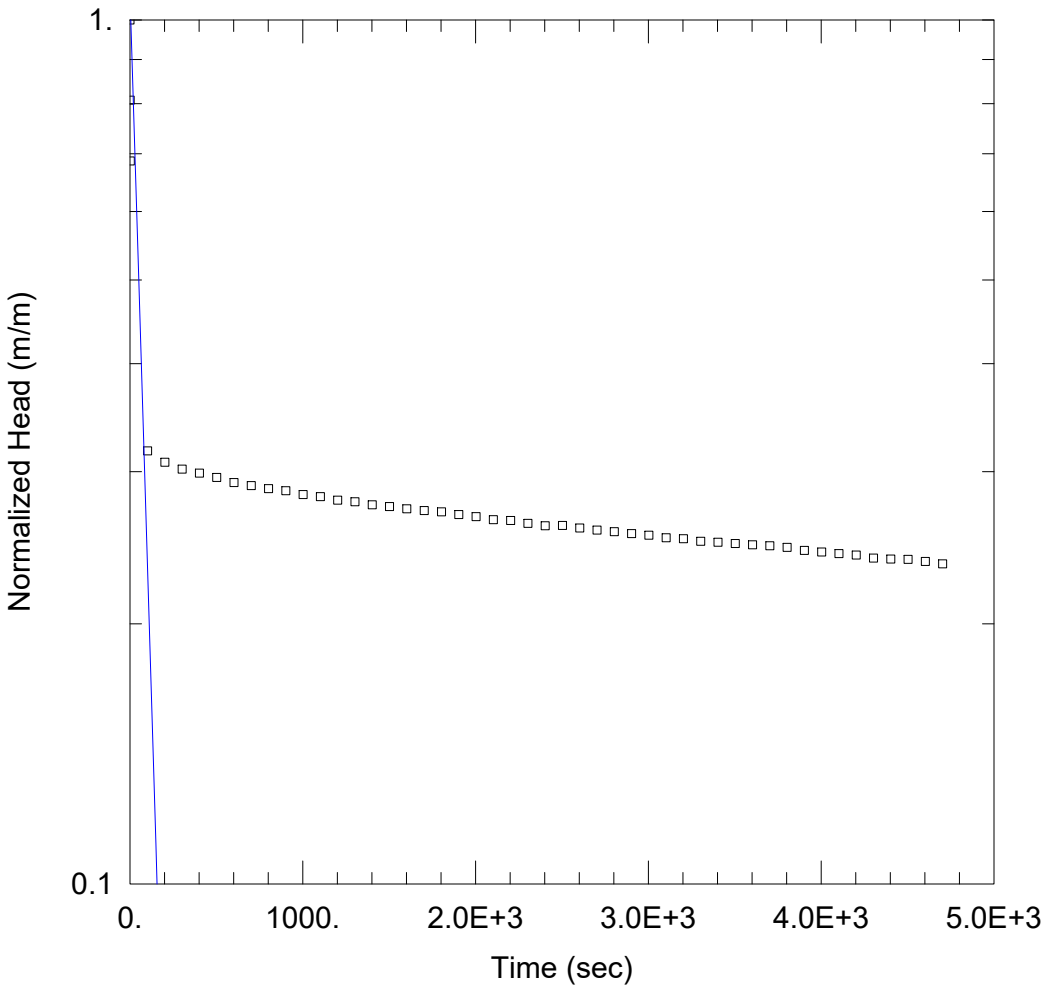
## WELL DATA (BH21-22)

Initial Displacement: 0.4674 m
Total Well Penetration Depth: 3.05 m
Casing Radius: 0.026 m
Static Water Column Height: 2.06 m
Screen Length: 3.05 m
Well Radius: 0.031 m

## SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 3.241E-8 m/sec
y0 = 0.1421 m




## WELL TEST ANALYSIS

Data Set: C:\...\ktest_BH2122_CO972.00_soil.aqt
Date: 07/10/24 Time: 09:49:26

## PROJECT INFORMATION

Company: Terrapex Environmental Limited
Client: 1047 Richmond Nominee Inc.
Project: CO972.00
Location: 1047 Richmond Rd, Ottawa, ON.
Test Well: BH21-22
Test Date: July 2, 2024

## AQUIFER DATA

Saturated Thickness: 2.06 m Anisotropy Ratio (Kz/Kr): 1.

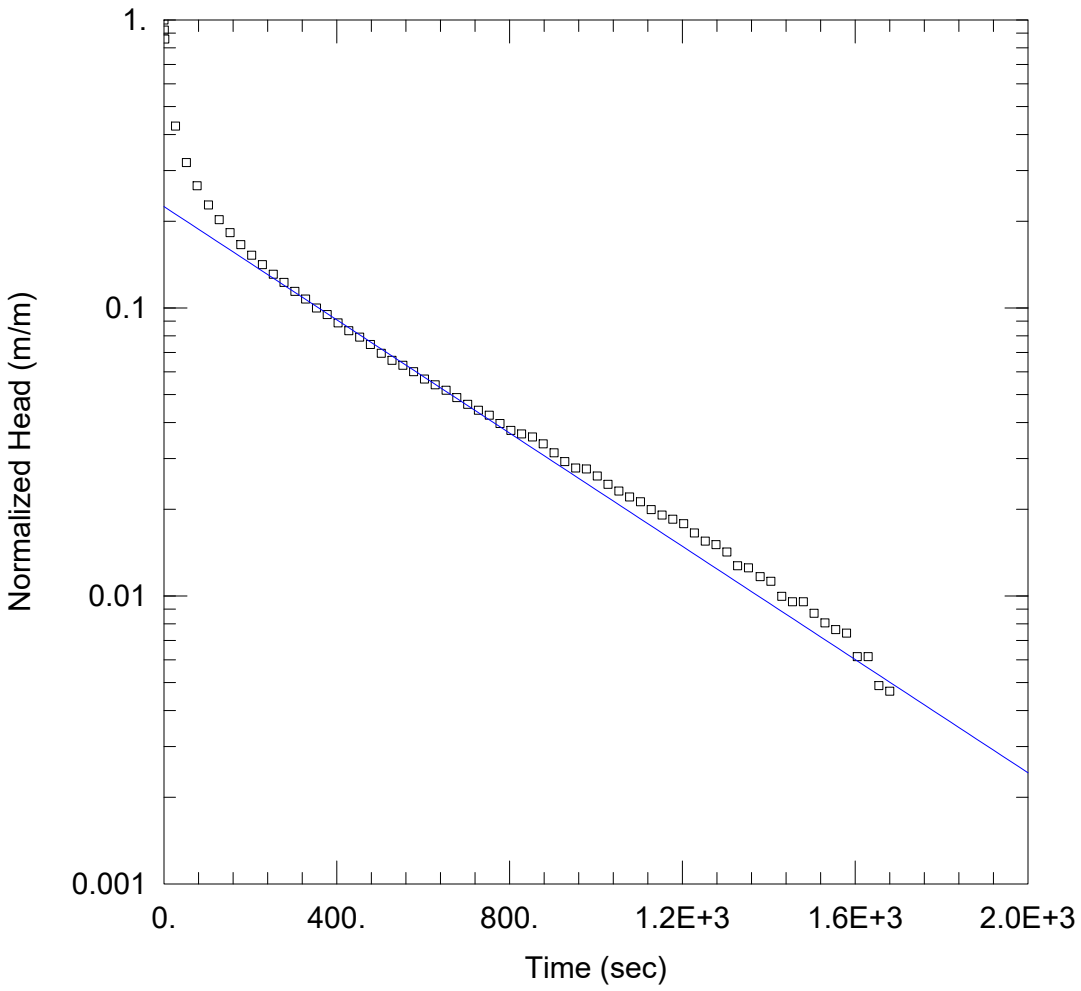
## WELL DATA (BH21-22)

Initial Displacement: 0.4674 m
Total Well Penetration Depth: 3.05 m
Casing Radius: 0.026 m
Static Water Column Height: 2.06 m
Screen Length: 3.05 m
Well Radius: 0.031 m

## SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 8.64E-6 m/sec
y0 = 0.5062 m




## WELL TEST ANALYSIS

Data Set: C:\...\ktest_BH2208_CO972.00.aqt
Date: 07/10/24 Time: 09:50:45

## PROJECT INFORMATION

Company: Terrapex Environmental Limited
Client: 1047 Richmond Nominee Inc.
Project: CO972.00
Location: 1047 Richmond Rd, Ottawa, ON.
Test Well: BH22-08
Test Date: July 2, 2024

## AQUIFER DATA

Saturated Thickness: 2.36 m Anisotropy Ratio (Kz/Kr): 1.

## WELL DATA (BH22-08)

Initial Displacement: 0.4713 m
Total Well Penetration Depth: 2.38 m
Casing Radius: 0.026 m
Static Water Column Height: 2.32 m
Screen Length: 1.52 m
Well Radius: 0.031 m

## SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 1.642E-6 m/sec
y0 = 0.1059 m

# APPENDIX II

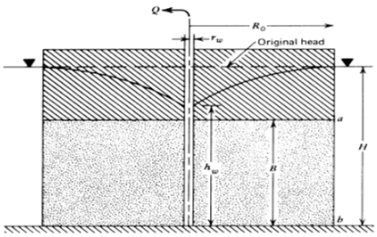
# DEWATERING ANALYSES

## Construction Dewatering Worksheet - Full Excavation

TERRAPEX

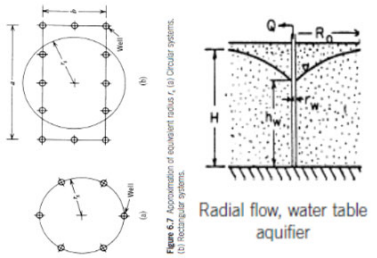
| | |
|---|---|
| **Project:** | 1047 Richmond Road, Ottawa, Ontario |
| **Project Number:** | CO972.00 |
| **Location:** | Provided Excavation Footprint |
| | **Full Excavation** |
| **Date:** | 24 March, 2025 |

### Input Parameters




| | | | | |
|---|---|---|---|---|
| (1) | Aquifer Thickness | (H) | 15 | m |
| (2) | Target Aquifer Thickness | (h) | 8.56 | m |
| (3) | Effective Drawdown | (Δh) | 6.44 | m |
| (4) | Hydraulic Conductivity | (K) | 8.6E-06 | m/s |
| (5) | Hydraulic Conductivity | (K) | 7.4E-01 | m/d |
| (6) | Excavation length | (a) | 77.67 | m |
| (7) | Excavation width | (b) | 62 | m |
| (8) | Excavation Length/Width Ratio | (a/b) | 1.3 | |

### Distance Calculations




| | | | | |
|---|---|---|---|---|
| (9) | **Width of Dewatering** | (L) | 28 | m |
| (10) | **Radius/Zone of Influence (ZOI)** | ($R_o$) | 57 | m |
| (11) | **Equivalent Radius of Well** (where a/b ≤ 1.5) | ($R_s$) | 39 | m |
| (12) | **Equivalent Radius of Well** (where a/b > 1.5) | ($R_s$) | | m |

### Volume Calculations

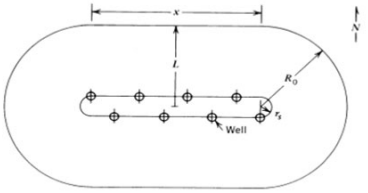



Figure 6.8 Approximate analysis of long, narrow systems.

| | | | | |
|---|---|---|---|---|
| (13) | **Trench Calculation** | (Q) | 308 | m3/day |
| | (where a/b ≤ 1.5) | (Q) | 308,484 | L/day |
| (14) | **Trench Calculation** | (Q) | | m3/day |
| | (where a/b > 1.5) | (Q) | | L/day |
| (15) | **Anticipated Incident Precipitation** | | 72,233 | L/day @ 15mm storm |

### SUMMARY OF VOLUMES

| | | | |
|---|---|---|---|
| **Estimated Dewatering Volume** | (A) | 308,484 | L/day |
| **Incident Precipitation (15mm storm)** | (B) | 72,233 | L/day |
| **Total Dewatering Volume (A+B)** | (C) | 380,717 | L/day |
| **Design Dewatering Volume (Ax1.5+B)** | (D) | 534,959 | L/day |
| **Permiting Calculation (Ax1.5)** | | 462,726 | L/day |
| **Permanent Dewatering (Ax1.5)** | | 462,726 | L/day |

### Relevant Formulae (Powers, 2007)

| | | |
|---|---|---|
| (9) | $R_o$ / 2 | (eq. 6.15, p. 105) |
| (10) | 3000 (H - h) x sqrt (K) | (eq. 6.12, p. 71) |
| (11) | sqrt ((a x b)/ pi) | (eq. 6.9, p. 70) (eq. 6.10, p.102) |
| (12) | (a+b)/pi) | |
| (13) | (pi x K x (H^2 - h^2)) / ln ((Ro+Rs) / Rs) + 2 x (X x K x (H^2 - h^2)) /( 2 x L) | (pg. 66,67,68; eq. 6.1 and 6.2) |
| (14) | (pi x K x (H^2 - h^2)) / ln ((Ro+Rs)/ Rs) + 2 x (X x K x (H^2 - h^2)) / (2 x L) | (pg. 66,67,68; eq. 6.1 and 6.2) |
| (15) | a x b x 25 | |

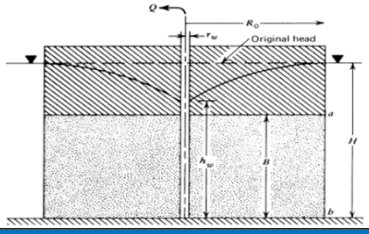
(zk 1Sept2022)

## Construction Dewatering Worksheet - Lower Layer Crop

TERRAPEX

**Project:** 1047 Richmond Road, Ottawa, Ontario
**Project Number:** CO972.00
**Location:** Lower and Middle Layer - Kvalue 1
**Bedrock Layer Removed At K = Overburden**
**Date:** 24 March, 2025

### Input Parameters




| | | | | |
|---|---|---|---|---|
| (1) | Aquifer Thickness | (H) | 12.84 | m |
| (2) | Target Depth | (h) | 8.56 | m |
| (3) | Effective Drawdown | (Δh) | 4.28 | m |
| (4) | Hydraulic Conductivity | (K) | 8.6E-06 | m/s |
| (5) | Hydraulic Conductivity | (K) | 7.4E-01 | m/d |
| (6) | Excavation length | (a) | 77.67 | m |
| (7) | Excavation width | (b) | 62 | m |
| (8) | Excavation Length/Width Ratio | (a/b) | 1.3 | |

### Distance Calculations

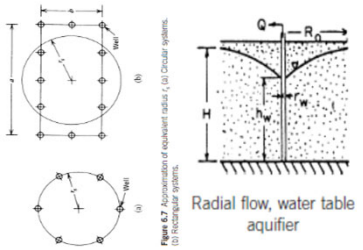



Figure 6.7 Approximation of equivalent radius $r_e$ (a) Circular systems. (b) Rectangular systems.

| | | | | |
|---|---|---|---|---|
| (9) | **Width of Dewatering** | (L) | 19 | m |
| (10) | **Radius/Zone of Influence (ZOI)** | ($R_o$) | 38 | m |
| (11) | **Equivalent Radius of Well** (where a/b ≤ 1.5) | ($R_s$) | 39 | m |
| (12) | **Equivalent Radius of Well** (where a/b > 1.5) | ($R_s$) | | m |

### Volume Calculations

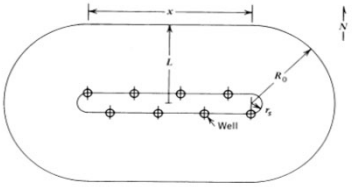



**Figure 6.8** Approximate analysis of long, narrow systems.

| | | | | |
|---|---|---|---|---|
| (13) | **Trench Calculation** | (Q) | 280 | m3/day |
| | (where a/b ≤ 1.5) | (Q) | 280,202 | L/day |
| (14) | **Trench Calculation** | (Q) | | m3/day |
| | (where a/b > 1.5) | (Q) | | L/day |
| (15) | **Anticipated Incident Precipitation** | | | L/day @ 15mm storm |

### Relevant Formulae (Powers, 2007)

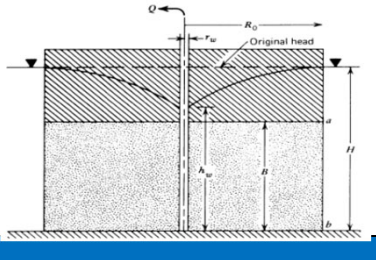
| | | |
|---|---|---|
| (9) | $R_o$ / 2 | (eq. 6.15, p. 105) |
| (10) | 3000 (H - h) x sqrt (K) | (eq. 6.12, p. 71) |
| (11) | sqrt ((a x b)/ pi) | (eq. 6.9, p. 70) (eq. 6.10, p.102) |
| (12) | (a+b)/pi) | |
| (13) | (pi x K x (H^2 - h^2)) / ln (Ro / Rs) + 2 x (X x K x (H^2 - h^2)) /( 2 x L) | (pg. 66,67,68; eq. 6.1 and 6.2) |
| (14) | (pi x K x (H^2 - h^2)) / ln (Ro / Rs) + 2 x (X x K x (H^2 - h^2)) / (2 x L) | (pg. 66,67,68; eq. 6.1 and 6.2) |
| (15) | a x b x 25 | |

## Construction Dewatering Worksheet - Excavation Floor

TERRAPEX

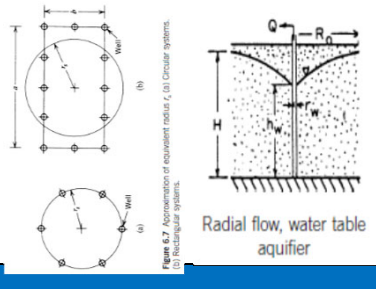
| | |
|---|---|
| **Project:** | 1047 Richmond Road, Ottawa, Ontario |
| **Project Number:** | CO972.00 |
| **Location:** | Lower Layer - Kvalue 3 |
| | **Bedrock Estimated at K = Bedrock** |
| **Date:** | 24 March, 2025 |

### Input Parameters




| | | | | |
|---|---|---|---|---|
| | **Input Parameters** | | | |
| (1) | Aquifer Thickness | (H) | 12.84 | m |
| (2) | Target Depth | (h) | 8.56 | m |
| (3) | Effective Drawdown | (Δh) | 4.28 | m |
| (4) | Hydraulic Conductivity | (K) | 1.8E-06 | m/s |
| (5) | Hydraulic Conductivity | (K) | 1.6E-01 | m/d |
| (6) | Excavation length | (a) | 77.67 | m |
| (7) | Excavation width | (b) | 62 | m |
| (8) | Excavation Length/Width Ratio | (a/b) | 1.3 | |

### Distance Calculations




| | | | | |
|---|---|---|---|---|
| (9) | **Width of Dewatering** | (L) | 9 | m |
| (10) | **Radius/Zone of Influence (ZOI)** | ($R_o$) | 17 | m |
| (11) | **Equivalent Radius of Well** (where a/b ≤ 1.5) | ($R_s$) | 39 | m |
| (12) | **Equivalent Radius of Well** (where a/b > 1.5) | ($R_s$) | | m |

### Volume Calculations

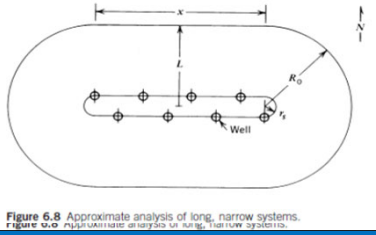



Figure 6.8 Approximate analysis of long, narrow systems.

| | | | | |
|---|---|---|---|---|
| (13) | **Trench Calculation** (where a/b ≤ 1.5) | (Q)<br>(Q) | 128<br>128,191 | m3/day<br>L/day |
| (14) | **Trench Calculation** (where a/b > 1.5) | (Q)<br>(Q) | | m3/day<br>L/day |
| (15) | **Anticipated Incident Precipitation** | | 72,233 | L/day @ 15mm storm |

### SUMMARY OF VOLUMES

| | | | |
|---|---|---|---|
| **Estimated Dewatering Volume** | (A) | 128,191 | L/day |
| **Incident Precipitation (15mm storm)** | (B) | 72,233 | L/day |
| **Total Dewatering Volume (A+B)** | (C) | 200,424 | L/day |
| **Design Dewatering Volume (Ax1.5+B)** | (D) | 264,520 | L/day |
| **Permiting Calculation (Ax1.5)** | | 192,287 | L/day |
| **Permanent Dewatering (Ax1.5)** | | 192,287 | L/day |

### Relevant Formulae (Powers, 2007)

| | | |
|---|---|---|
| (9) | $R_o$ / 2 | (eq. 6.15, p. 105) |
| (10) | 3000 (H - h) x sqrt (K) | (eq. 6.12, p. 71) |
| (11) | sqrt ((a x b)/ pi) | (eq. 6.9, p. 70) (eq. 6.10, p.102) |
| (12) | (a+b)/pi) | |
| (13) | (pi x K x (H^2 - h^2)) / ln ((Ro+Rs) / Rs) + 2 x (X x K x (H^2 - h^2)) /( 2 x L) | (pg. 66,67,68; eq. 6.1 and 6.2) |
| (14) | (pi x K x (H^2 - h^2)) / ln ((Ro+Rs)/ Rs) + 2 x (X x K x (H^2 - h^2)) / (2 x L) | (pg. 66,67,68; eq. 6.1 and 6.2) |
| (15) | a x b x 25 | |

(zk 1Sept2022)

## Construction Dewatering Worksheet - Summary of Estimates

TERRAPEX

| | |
|---|---|
| **Project:** | 1047 Richmond Road, Ottawa, Ontario |
| **Project Number:** | CO972.00 |
| **Location:** | Provided Excavation |
| **Date:** | 24 March, 2025 |

## Dewatering Rate Estimates

### SUMMARY

| | | |
|---|---|---|
| Full Excavation using full excavation @ Kvalue 1 | 308,484 | L/day |
| Cropping Volume from middle and lower layers @ Kvalue 1 | 280,202 | L/day |
| **Resultant Contribution from Upper Layer @ Kvalue 1** | **28,282** | **L/day** |
| Contribution from middle and lower layers @ Kvalue 2 | 181,290 | L/day |
| Cropping volume from lower layer @ Kvalue 2 | 181,290 | L/day |
| **Resultant Contribution from Middle Layer @ Kvalue 2** | **0** | **L/day** |
| **Resultant Contribution from Lower layer @ Kvalue 3 (or floor)** | **128,191** | **L/day** |
| **Total (no factor of safety)** | **156,473** | **L/day** |

### DETAILED BREAKDOWN FOR ASSESSING IMPACT OF IMPERMEABLE EXCAVATION SURFACES (if applicable)

| | Excavation Surface | Perimeter (m) | Relative Dewatering Contribution (L/day) | Is Surface Designed as Permeable? Yes=1 / No=0 | Anticipated Volumes for Surfaces (L/day) |
|---|---|---|---|---|---|
| **Upper Layer** | North Wall | 77.7 | 7,864 | 1 | 7,864 |
| | East Wall | 62.0 | 6,277 | 1 | 6,277 |
| | South Wall | 77.7 | 7,864 | 1 | 7,864 |
| | West Wall | 62.0 | 6,277 | 1 | 6,277 |
| **Middle Layer** | North Wall | 77.7 | 0 | 1 | 0 |
| | East Wall | 62.0 | 0 | 1 | 0 |
| | South Wall | 77.7 | 0 | 1 | 0 |
| | West Wall | 62.0 | 0 | 1 | 0 |
| **Lower Layer (or floor)** | North Wall | 77.7 | 35,643 | 1 | 35,643 |
| | East Wall | 62.0 | 28,452 | 1 | 28,452 |
| | South Wall | 77.7 | 35,643 | 1 | 35,643 |
| | West Wall | 62.0 | 28,452 | 1 | 28,452 |
| | | | | **Total Groundwater Contribution** | **156,473** |
| | | | | Incident PTTN | 72,233 |

### FACTORS OF SAFETY, PERMITTING, AND DESIGN

| | | |
|---|---|---|
| Estimated Dewatering Volume ( A ) | 156,473 | L/day |
| Incident PPTN ( B ) | 72,233 | L/day |
| Total Dewatering Volume ( C ) | 228,706 | L/day |
| Factor of Safety (FOS) | 1.5 | |
| **Design Dewatering Volume (A x FOS + B)(D)** | **306,943** | **L/day** |
| **PTTW Calculation (no rain, just groundwater)** | **234,710** | **L/day** |
| **Permanent Dewatering (A x D), assumes rainwater directed away from foundation** | **234,710** | **L/day** |
| **Permanent Dewatering (A x D), assumes rainwater directed away from foundation** | **43** | **GPM** |

# APPENDIX III

# HYDROCHEMICAL ANALYSES

Your Project #: CO972.00
Site#: 1047 RICHMOND ROAD
Site Location: FERNGATE RICHMOND
Your C.O.C. #: C#1038203-01-01

**Attention: Keith Brown**

Terrapex Environmental Ltd
1-20 Gurdwara Rd.
Ottawa, ON
CANADA K2E 8B3

**Report Date: 2025/04/17**
Report #: R8522057
Version: 3 - Final

# CERTIFICATE OF ANALYSIS

**BUREAU VERITAS JOB #: C529290**
**Received: 2025/03/18, 16:20**

Sample Matrix: Water
# Samples Received: 1

| Analyses | Quantity | Date Extracted | Date Analyzed | Laboratory Method | Analytical Method |
|---|---|---|---|---|---|
| ABN Compounds in Water by GC/MS (1) | 1 | 2025/03/21 | 2025/03/21 | CAM SOP-00301 | EPA 8270E m |
| Sewer Use By-Law Semivolatile Organics (1) | 1 | 2025/03/24 | 2025/03/25 | CAM SOP 00301 | EPA 8270 m |
| Carbonaceous BOD (1) | 1 | 2025/03/20 | 2025/03/25 | CAM SOP-00427 | SM 24 5210B m |
| Total Cyanide (1) | 1 | 2025/03/20 | 2025/03/20 | CAM SOP-00457 | OMOE E3015 5 m |
| Dioxins/Furans in Water (1613B) (1, 2) | 1 | 2025/04/10 | 2025/04/15 | BRL SOP-00410;BRL SOP-00407 & 405 | EPA 1613B m |
| Fluoride (1) | 1 | 2025/03/19 | 2025/03/20 | CAM SOP-00449 | SM 24 4500-F C m |
| Formaldehyde (HPLC) (1) | 1 | 2025/03/20 | 2025/03/21 | CAM SOP-00310 | EPA 8315A m |
| Mercury in Water by CVAA (1) | 1 | 2025/04/01 | 2025/04/01 | CAM SOP-00453 | EPA 7470A m |
| Total Metals Analysis by ICPMS (1) | 1 | 2025/03/24 | 2025/03/24 | CAM SOP-00447 | EPA 6020B m |
| E.coli, (CFU/100mL) (1) | 1 | N/A | 2025/03/19 | CAM SOP-00552 | SM9222B, MECP E3371 |
| Nitrosamines in Water (1, 3) | 1 | 2025/03/27 | 2025/04/09 | BRL SOP-00012 BRL SOP-00401 | EPA M 607/1625B mod |
| Total Nonylphenol in Liquids by HPLC (1) | 1 | 2025/03/22 | 2025/03/24 | CAM SOP-00313 | In-house Method |
| Nonylphenol Ethoxylates in Liquids: HPLC (1) | 1 | 2025/03/22 | 2025/03/24 | CAM SOP-00313 | In-house Method |
| Animal and Vegetable Oil and Grease (1) | 1 | N/A | 2025/03/23 | CAM SOP-00326 | EPA1664B m,SM5520B m |
| Total Oil and Grease (1) | 1 | 2025/03/23 | 2025/03/23 | CAM SOP-00326 | EPA1664B m,SM5520B m |
| OC Pesticides (Selected) & PCB (1, 4) | 1 | 2025/03/24 | 2025/03/25 | CAM SOP-00307 | EPA 8081B/ 8082A |
| OC Pesticides Summed Parameters (1) | 1 | N/A | 2025/03/20 | CAM SOP-00307 | EPA 8081B/ 8082A |
| Phenols (4AAP) (1) | 1 | N/A | 2025/03/20 | CAM SOP-00444 | OMOE E3179 m |
| pH (1) | 1 | 2025/03/19 | 2025/03/20 | CAM SOP-00413 | SM 24th-4500H+ B |
| Sulphate by Automated Turbidimetry (1) | 1 | N/A | 2025/03/20 | CAM SOP-00464 | SM 24 4500-SO42- E m |
| Sulphide (1) | 1 | N/A | 2025/03/20 | CAM SOP-00455 | SM 24 4500-S G m |
| Total Kjeldahl Nitrogen in Water (1) | 1 | 2025/03/19 | 2025/03/20 | CAM SOP-00938 | SM 4500-N B m |
| Total PAHs (Hamilton, Ottawa S.U.B.) (1, 5) | 1 | N/A | 2025/03/26 | CAM SOP - 00301 | |
| Mineral/Synthetic O & G (TPH Heavy Oil) (1, 6) | 1 | 2025/03/23 | 2025/03/23 | CAM SOP-00326 | EPA1664B m,SM5520F m |
| Total Suspended Solids (1) | 1 | 2025/03/20 | 2025/03/20 | CAM SOP-00428 | SM 24 2540D m |
| Volatile Organic Compounds in Water (1) | 1 | N/A | 2025/03/21 | CAM SOP-00228 | EPA 8260D |
| Non-Routine Volatile Organic Compounds (1) | 1 | N/A | 2025/03/24 | CAM SOP-00226 | EPA 8260D m |

**Remarks:**

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau

Your Project #: CO972.00
Site#: 1047 RICHMOND ROAD
Site Location: FERNGATE RICHMOND
Your C.O.C. #: C#1038203-01-01

**Attention: Keith Brown**

Terrapex Environmental Ltd
1-20 Gurdwara Rd.
Ottawa, ON
CANADA K2E 8B3

**Report Date: 2025/04/17**
Report #: R8522057
Version: 3 - Final

# CERTIFICATE OF ANALYSIS

**BUREAU VERITAS JOB #: C529290**
**Received: 2025/03/18, 16:20**

Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, EPA, APHA or the Quebec Ministry of Environment.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by Bureau Veritas Mississauga, 6740 Campobello Rd , Mississauga, ON, L5N 2L8
(2) Confirmatory runs for 2,3,7,8-TCDF are performed only if the primary result is greater than the RDL.
(3) Non-target compounds, if reported, represents the total of all reportable parameters requested with the exception of NDMA.
(4) Chlordane ( Total) = Alpha Chlordane + Gamma Chlordane
(5) Total PAHs include only those PAHs specified in the sewer use by-by-law.
(6) Note: TPH (Heavy Oil) is equivalent to Mineral / Synthetic Oil & Grease

Encryption Key

Please direct all questions regarding this Certificate of Analysis to:
Katherine Szozda, Project Manager
Email: Katherine.Szozda@bureauveritas.com
Phone# (613)274-0573 Ext:7063633
==========
Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Rodney Major, General Manager responsible for Ontario Environmental laboratory operations.

Bureau Veritas Job #: C529290
Report Date: 2025/04/17

Terrapex Environmental Ltd
Client Project #: CO972.00
Site Location: FERNGATE RICHMOND
Sampler Initials: EB

## RESULTS OF ANALYSES OF WATER

| Bureau Veritas ID | | APAK85 | | | APAK85 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2025/03/18 11:00 | | | 2025/03/18 11:00 | | |
| COC Number | | C#1038203-01-01 | | | C#1038203-01-01 | | |
| | **UNITS** | **MW202** | **RDL** | **QC Batch** | **MW202 Lab-Dup** | **RDL** | **QC Batch** |
| **Semivolatile Organics** | | | | | | | |
| N-Nitrosodimethylamine | ng/L | <2.02 | 2.02 | 9904773 | | | |
| **Calculated Parameters** | | | | | | | |
| Total Animal/Vegetable Oil and Grease | mg/L | 1.3 | 0.50 | 9893602 | | | |
| **Inorganics** | | | | | | | |
| Total Carbonaceous BOD | mg/L | <2 | 2 | 9894347 | | | |
| Fluoride (F-) | mg/L | 0.55 | 0.10 | 9894143 | 0.53 | 0.10 | 9894143 |
| Total Kjeldahl Nitrogen (TKN) | mg/L | 1.9 | 0.10 | 9894081 | | | |
| pH | pH | 9.72 | | 9894144 | 9.75 | | 9894144 |
| Phenols-4AAP | mg/L | <0.0010 | 0.0010 | 9894519 | | | |
| Total Suspended Solids | mg/L | <10 | 10 | 9894875 | <10 | 10 | 9894875 |
| Dissolved Sulphate (SO4) | mg/L | 1200 | 5.0 | 9893130 | | | |
| Sulphide | mg/L | <0.020 | 0.020 | 9894449 | | | |
| Total Cyanide (CN) | mg/L | <0.0050 | 0.0050 | 9894264 | | | |
| **Miscellaneous Parameters** | | | | | | | |
| Formaldehyde | ug/L | <10 | 10 | 9894794 | | | |
| **Petroleum Hydrocarbons** | | | | | | | |
| Total Oil & Grease | mg/L | 2.1 | 0.50 | 9896095 | | | |
| Total Oil & Grease Mineral/Synthetic | mg/L | 0.80 | 0.50 | 9896096 | | | |
| **Surrogate Recovery (%)** | | | | | | | |
| D10-N-nitrosodiethylamine | % | 62 | | 9904773 | | | |
| D14-N-Nitrosodi-n-propylamine | % | 68 | | 9904773 | | | |
| D6-N-Nitrosodimethylamine | % | 31 | | 9904773 | | | |
| D8-N-Nitrosomorpholine | % | 48 | | 9904773 | | | |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

## NONYL PHENOL AND NONYL PHENOL ETHOXYLATE (WATER)

| Bureau Veritas ID | | APAK85 | APAK85 | | |
|---|---|---|---|---|---|
| Sampling Date | | 2025/03/18 11:00 | 2025/03/18 11:00 | | |
| COC Number | | C#1038203-01-01 | C#1038203-01-01 | | |
| | **UNITS** | **MW202** | **MW202 Lab-Dup** | **RDL** | **QC Batch** |
| **Miscellaneous Parameters** | | | | | |
| Nonylphenol Ethoxylate (Total) | mg/L | <0.005 | <0.005 | 0.005 | 9895906 |
| Nonylphenol (Total) | mg/L | <0.001 | <0.001 | 0.001 | 9895905 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

## ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

| Bureau Veritas ID | | APAK85 | | |
|---|---|---|---|---|
| Sampling Date | | 2025/03/18 11:00 | | |
| COC Number | | C#1038203-01-01 | | |
| | **UNITS** | **MW202** | **RDL** | **QC Batch** |
| **Metals** | | | | |
| Mercury (Hg) | mg/L | <0.00010 | 0.00010 | 9902107 |
| Total Aluminum (Al) | ug/L | 35 | 4.9 | 9896591 |
| Total Antimony (Sb) | ug/L | <0.50 | 0.50 | 9896591 |
| Total Arsenic (As) | ug/L | <1.0 | 1.0 | 9896591 |
| Total Bismuth (Bi) | ug/L | <1.0 | 1.0 | 9896591 |
| Total Boron (B) | ug/L | 210 | 10 | 9896591 |
| Total Cadmium (Cd) | ug/L | <0.090 | 0.090 | 9896591 |
| Total Chromium (Cr) | ug/L | 7.7 | 5.0 | 9896591 |
| Total Cobalt (Co) | ug/L | <0.50 | 0.50 | 9896591 |
| Total Copper (Cu) | ug/L | <0.90 | 0.90 | 9896591 |
| Total Lead (Pb) | ug/L | <0.50 | 0.50 | 9896591 |
| Total Manganese (Mn) | ug/L | <2.0 | 2.0 | 9896591 |
| Total Molybdenum (Mo) | ug/L | 180 | 0.50 | 9896591 |
| Total Nickel (Ni) | ug/L | <1.0 | 1.0 | 9896591 |
| Total Phosphorus (P) | ug/L | <100 | 100 | 9896591 |
| Total Selenium (Se) | ug/L | 3.1 | 2.0 | 9896591 |
| Total Silver (Ag) | ug/L | <0.090 | 0.090 | 9896591 |
| Total Tin (Sn) | ug/L | <1.0 | 1.0 | 9896591 |
| Total Titanium (Ti) | ug/L | <5.0 | 5.0 | 9896591 |
| Total Vanadium (V) | ug/L | 4.8 | 0.50 | 9896591 |
| Total Zinc (Zn) | ug/L | <5.0 | 5.0 | 9896591 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

## SEMI-VOLATILE ORGANICS BY GC-MS (WATER)

| Bureau Veritas ID | | APAK85 | | | APAK85 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2025/03/18 11:00 | | | 2025/03/18 11:00 | | |
| COC Number | | C#1038203-01-01 | | | C#1038203-01-01 | | |
| | **UNITS** | **MW202** | **RDL** | **QC Batch** | **MW202 Lab-Dup** | **RDL** | **QC Batch** |
| **Semivolatile Organics** | | | | | | | |
| 1-Methylnaphthalene | ug/L | <0.3 | 0.3 | 9896850 | <0.3 | 0.3 | 9896850 |
| 2-Methylnaphthalene | ug/L | <0.3 | 0.3 | 9896850 | <0.3 | 0.3 | 9896850 |
| Fluorene | ug/L | <0.3 | 0.3 | 9896850 | <0.3 | 0.3 | 9896850 |
| Naphthalene | ug/L | <0.3 | 0.3 | 9896850 | <0.3 | 0.3 | 9896850 |
| Di-N-butyl phthalate | ug/L | <2 | 2 | 9896850 | <2 | 2 | 9896850 |
| Bis(2-ethylhexyl)phthalate | ug/L | <2 | 2 | 9896850 | <2 | 2 | 9896850 |
| Phenanthrene | ug/L | <0.2 | 0.2 | 9896850 | <0.2 | 0.2 | 9896850 |
| Anthracene | ug/L | <0.2 | 0.2 | 9896850 | <0.2 | 0.2 | 9896850 |
| Fluoranthene | ug/L | <0.2 | 0.2 | 9896850 | <0.2 | 0.2 | 9896850 |
| Pyrene | ug/L | <0.2 | 0.2 | 9896850 | <0.2 | 0.2 | 9896850 |
| Benzo(a)anthracene | ug/L | <0.2 | 0.2 | 9896850 | <0.2 | 0.2 | 9896850 |
| Chrysene | ug/L | <0.2 | 0.2 | 9896850 | <0.2 | 0.2 | 9896850 |
| Benzo(b/j)fluoranthene | ug/L | <0.2 | 0.2 | 9896850 | <0.2 | 0.2 | 9896850 |
| Benzo(k)fluoranthene | ug/L | <0.2 | 0.2 | 9896850 | <0.2 | 0.2 | 9896850 |
| Benzo(a)pyrene | ug/L | <0.2 | 0.2 | 9896850 | <0.2 | 0.2 | 9896850 |
| Indeno(1,2,3-cd)pyrene | ug/L | <0.2 | 0.2 | 9896850 | <0.2 | 0.2 | 9896850 |
| Dibenzo(a,h)anthracene | ug/L | <0.2 | 0.2 | 9896850 | <0.2 | 0.2 | 9896850 |
| Benzo(g,h,i)perylene | ug/L | <0.2 | 0.2 | 9896850 | <0.2 | 0.2 | 9896850 |
| Dibenzo(a,i)pyrene | ug/L | <0.2 | 0.2 | 9896850 | <0.2 | 0.2 | 9896850 |
| Benzo(e)pyrene | ug/L | <0.2 | 0.2 | 9896850 | <0.2 | 0.2 | 9896850 |
| Perylene | ug/L | <0.2 | 0.2 | 9896850 | <0.2 | 0.2 | 9896850 |
| Dibenzo(a,j) acridine | ug/L | <0.4 | 0.4 | 9896850 | <0.4 | 0.4 | 9896850 |
| 7H-Dibenzo(c,g) Carbazole | ug/L | <0.4 | 0.4 | 9896850 | <0.4 | 0.4 | 9896850 |
| 2,4-Dichlorophenol | ug/L | <0.30 | 0.30 | 9895187 | | | |
| Benzyl butyl phthalate | ug/L | <0.50 | 0.50 | 9895187 | | | |
| Bis(2-chloroethoxy)methane | ug/L | <0.50 | 0.50 | 9895187 | | | |
| di-n-octyl phthalate | ug/L | <0.80 | 0.80 | 9895187 | | | |
| Diethyl phthalate | ug/L | <1.0 | 1.0 | 9895187 | | | |
| Indole | ug/L | <1.0 | 1.0 | 9895187 | | | |
| **Calculated Parameters** | | | | | | | |
| Total PAHs (18 PAHs) | ug/L | <0.96 | 0.96 | 9893886 | | | |
| **Surrogate Recovery (%)** | | | | | | | |
| 2,4,6-Tribromophenol | % | 40 | | 9895187 | | | |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

## SEMI-VOLATILE ORGANICS BY GC-MS (WATER)

| Bureau Veritas ID | | APAK85 | | | APAK85 | | |
|---|---|---|---|---|---|---|---|
| Sampling Date | | 2025/03/18 11:00 | | | 2025/03/18 11:00 | | |
| COC Number | | C#1038203-01-01 | | | C#1038203-01-01 | | |
| | **UNITS** | **MW202** | **RDL** | **QC Batch** | **MW202 Lab-Dup** | **RDL** | **QC Batch** |
| 2-Fluorobiphenyl | % | 45 | | 9895187 | | | |
| 2-Fluorophenol | % | 14 | | 9895187 | | | |
| D14-Terphenyl | % | 71 | | 9895187 | | | |
| D5-Nitrobenzene | % | 48 | | 9895187 | | | |
| D5-Phenol | % | 11 | | 9895187 | | | |
| 2,4,6-Tribromophenol | % | 36 | | 9896850 | 41 | | 9896850 |
| 2-Fluorobiphenyl | % | 42 | | 9896850 | 46 | | 9896850 |
| D14-Terphenyl (FS) | % | 96 | | 9896850 | 98 | | 9896850 |
| D5-Nitrobenzene | % | 57 | | 9896850 | 60 | | 9896850 |
| D8-Acenaphthylene | % | 50 | | 9896850 | 54 | | 9896850 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

## VOLATILE ORGANICS BY GC/MS (WATER)

| Bureau Veritas ID | | APAK85 | | |
|---|---|---|---|---|
| Sampling Date | | 2025/03/18 11:00 | | |
| COC Number | | C#1038203-01-01 | | |
| | **UNITS** | **MW202** | **RDL** | **QC Batch** |
| **Volatile Organics** | | | | |
| Benzene | ug/L | <0.20 | 0.20 | 9894715 |
| Bromodichloromethane | ug/L | <0.50 | 0.50 | 9894715 |
| Bromoform | ug/L | <1.0 | 1.0 | 9894715 |
| Bromomethane | ug/L | <0.50 | 0.50 | 9894715 |
| Carbon Tetrachloride | ug/L | <0.19 | 0.19 | 9894715 |
| Chlorobenzene | ug/L | <0.20 | 0.20 | 9894715 |
| Chloroethane | ug/L | <1.0 | 1.0 | 9894715 |
| Chloroform | ug/L | <0.20 | 0.20 | 9894715 |
| Chloromethane | ug/L | <5.0 | 5.0 | 9894715 |
| Dibromochloromethane | ug/L | <0.50 | 0.50 | 9894715 |
| 1,2-Dichlorobenzene | ug/L | <0.40 | 0.40 | 9894715 |
| 1,3-Dichlorobenzene | ug/L | <0.40 | 0.40 | 9894715 |
| 1,4-Dichlorobenzene | ug/L | <0.40 | 0.40 | 9894715 |
| 1,1-Dichloroethane | ug/L | <0.20 | 0.20 | 9894715 |
| 1,2-Dichloroethane | ug/L | <0.49 | 0.49 | 9894715 |
| 1,1-Dichloroethylene | ug/L | <0.20 | 0.20 | 9894715 |
| cis-1,2-Dichloroethylene | ug/L | <0.50 | 0.50 | 9894715 |
| trans-1,2-Dichloroethylene | ug/L | <0.50 | 0.50 | 9894715 |
| 1,2-Dichloropropane | ug/L | <0.20 | 0.20 | 9894715 |
| cis-1,3-Dichloropropene | ug/L | <0.30 | 0.30 | 9894715 |
| trans-1,3-Dichloropropene | ug/L | <0.40 | 0.40 | 9894715 |
| Ethylbenzene | ug/L | <0.20 | 0.20 | 9894715 |
| Ethylene Dibromide | ug/L | <0.19 | 0.19 | 9894715 |
| Methylene Chloride(Dichloromethane) | ug/L | <2.0 | 2.0 | 9894715 |
| Styrene | ug/L | <0.40 | 0.40 | 9894715 |
| 1,1,2,2-Tetrachloroethane | ug/L | <0.40 | 0.40 | 9894715 |
| Tetrachloroethylene | ug/L | <0.20 | 0.20 | 9894715 |
| 1,3,5-Trimethylbenzene | ug/L | <1.0 | 1.0 | 9894724 |
| Toluene | ug/L | <0.20 | 0.20 | 9894715 |
| 1,1,1-Trichloroethane | ug/L | <0.20 | 0.20 | 9894715 |
| 1,1,2-Trichloroethane | ug/L | <0.40 | 0.40 | 9894715 |
| Trichloroethylene | ug/L | <0.20 | 0.20 | 9894715 |
| Trichlorofluoromethane (FREON 11) | ug/L | <0.50 | 0.50 | 9894715 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

## VOLATILE ORGANICS BY GC/MS (WATER)

| Bureau Veritas ID | | APAK85 | | |
|---|---|---|---|---|
| Sampling Date | | 2025/03/18 11:00 | | |
| COC Number | | C#1038203-01-01 | | |
| | **UNITS** | **MW202** | **RDL** | **QC Batch** |
| Vinyl Chloride | ug/L | <0.20 | 0.20 | 9894715 |
| p+m-Xylene | ug/L | <0.20 | 0.20 | 9894715 |
| o-Xylene | ug/L | <0.20 | 0.20 | 9894715 |
| Total Xylenes | ug/L | <0.20 | 0.20 | 9894715 |
| **Surrogate Recovery (%)** | | | | |
| 4-Bromofluorobenzene | % | 99 | | 9894715 |
| D4-1,2-Dichloroethane | % | 107 | | 9894715 |
| D8-Toluene | % | 91 | | 9894715 |
| 4-Bromofluorobenzene | % | 106 | | 9894724 |
| D4-1,2-Dichloroethane | % | 114 | | 9894724 |
| D8-Toluene | % | 94 | | 9894724 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

## ORGANOCHLORINATED PESTICIDES BY GC-ECD (WATER)

| Bureau Veritas ID | | APAK85 | | |
|---|---|---|---|---|
| Sampling Date | | 2025/03/18 11:00 | | |
| COC Number | | C#1038203-01-01 | | |
| | **UNITS** | **MW202** | **RDL** | **QC Batch** |
| **Calculated Parameters** | | | | |
| Total PCB | ug/L | <0.05 | 0.05 | 9893603 |
| **Pesticides & Herbicides** | | | | |
| Hexachlorobenzene | ug/L | <0.005 | 0.005 | 9896430 |
| **Surrogate Recovery (%)** | | | | |
| 2,4,5,6-Tetrachloro-m-xylene | % | 66 | | 9896430 |
| Decachlorobiphenyl | % | 73 | | 9896430 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

## DIOXINS AND FURANS BY HRMS (WATER)

| Bureau Veritas ID | | APAK85 | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2025/03/18 11:00 | | | | | | |
| COC Number | | C#1038203-01-01 | | | **TOXIC EQUIVALENCY** | | # of | |
| | **UNITS** | **MW202** | **EDL** | **RDL** | **TEF (2005 WHO)** | **TEQ(DL)** | **Isomers** | **QC Batch** |
| **Dioxins & Furans** | | | | | | | | |
| 2,3,7,8-Tetra CDD * | pg/L | <1.03 | 1.03 | 9.43 | 1.00 | 1.03 | 0 | 9907339 |
| 1,2,3,7,8-Penta CDD * | pg/L | <1.47 | 1.47 | 47.2 | 1.00 | 1.47 | 0 | 9907339 |
| 1,2,3,4,7,8-Hexa CDD * | pg/L | <1.20 | 1.20 | 47.2 | 0.100 | 0.120 | 0 | 9907339 |
| 1,2,3,6,7,8-Hexa CDD * | pg/L | <1.06 | 1.06 | 47.2 | 0.100 | 0.106 | 0 | 9907339 |
| 1,2,3,7,8,9-Hexa CDD * | pg/L | <1.09 | 1.09 | 47.2 | 0.100 | 0.109 | 0 | 9907339 |
| 1,2,3,4,6,7,8-Hepta CDD * | pg/L | <1.28 | 1.28 | 47.2 | 0.0100 | 0.0128 | 0 | 9907339 |
| Octa CDD * | pg/L | <1.11 | 1.11 | 94.3 | 0.000300 | 0.000333 | 0 | 9907339 |
| Total Tetra CDD * | pg/L | <1.03 | 1.03 | 9.43 | | | 0 | 9907339 |
| Total Penta CDD * | pg/L | <1.47 | 1.47 | 47.2 | | | 0 | 9907339 |
| Total Hexa CDD * | pg/L | <1.11 | 1.11 | 47.2 | | | 0 | 9907339 |
| Total Hepta CDD * | pg/L | <1.28 | 1.28 | 47.2 | | | 0 | 9907339 |
| 2,3,7,8-Tetra CDF ** | pg/L | <1.15 | 1.15 | 9.43 | 0.100 | 0.115 | 0 | 9907339 |
| 1,2,3,7,8-Penta CDF ** | pg/L | <1.62 | 1.62 | 47.2 | 0.0300 | 0.0486 | 0 | 9907339 |
| 2,3,4,7,8-Penta CDF ** | pg/L | <1.42 | 1.42 | 47.2 | 0.300 | 0.426 | 0 | 9907339 |
| 1,2,3,4,7,8-Hexa CDF ** | pg/L | <1.03 | 1.03 | 47.2 | 0.100 | 0.103 | 0 | 9907339 |
| 1,2,3,6,7,8-Hexa CDF ** | pg/L | <0.888 | 0.888 | 47.2 | 0.100 | 0.0888 | 0 | 9907339 |
| 2,3,4,6,7,8-Hexa CDF ** | pg/L | <0.968 | 0.968 | 47.2 | 0.100 | 0.0968 | 0 | 9907339 |
| 1,2,3,7,8,9-Hexa CDF ** | pg/L | <1.13 | 1.13 | 47.2 | 0.100 | 0.113 | 0 | 9907339 |
| 1,2,3,4,6,7,8-Hepta CDF ** | pg/L | <0.961 | 0.961 | 47.2 | 0.0100 | 0.00961 | 0 | 9907339 |
| 1,2,3,4,7,8,9-Hepta CDF ** | pg/L | <1.06 | 1.06 | 47.2 | 0.0100 | 0.0106 | 0 | 9907339 |
| Octa CDF ** | pg/L | <0.998 | 0.998 | 94.3 | 0.000300 | 0.000299 | 0 | 9907339 |
| Total Tetra CDF ** | pg/L | <2.09 | 2.09 | 9.43 | | | 0 | 9907339 |
| Total Penta CDF ** | pg/L | <1.51 | 1.51 | 47.2 | | | 0 | 9907339 |
| Total Hexa CDF ** | pg/L | <0.997 | 0.997 | 47.2 | | | 0 | 9907339 |
| Total Hepta CDF ** | pg/L | <1.01 | 1.01 | 47.2 | | | 0 | 9907339 |
| TOTAL TOXIC EQUIVALENCY | pg/L | | | | | 3.86 | | |

EDL = Estimated Detection Limit

RDL = Reportable Detection Limit

TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.

WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

QC Batch = Quality Control Batch

* CDD = Chloro Dibenzo-p-Dioxin

** CDF = Chloro Dibenzo-p-Furan

## DIOXINS AND FURANS BY HRMS (WATER)

| Bureau Veritas ID | | APAK85 | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Date | | 2025/03/18 11:00 | | | | | | |
| COC Number | | C#1038203-01-01 | | | **TOXIC EQUIVALENCY** | | # of | |
| | **UNITS** | **MW202** | **EDL** | **RDL** | **TEF (2005 WHO)** | **TEQ(DL)** | **Isomers** | **QC Batch** |
| **Surrogate Recovery (%)** | | | | | | | | |
| 37CL4 2378 Tetra CDD * | % | 71 | | | | | | 9907339 |
| C13-1234678 HeptaCDD * | % | 109 | | | | | | 9907339 |
| C13-1234678 HeptaCDF ** | % | 94 | | | | | | 9907339 |
| C13-123478 HexaCDD * | % | 102 | | | | | | 9907339 |
| C13-123478 HexaCDF ** | % | 87 | | | | | | 9907339 |
| C13-1234789 HeptaCDF ** | % | 101 | | | | | | 9907339 |
| C13-123678 HexaCDD * | % | 102 | | | | | | 9907339 |
| C13-123678 HexaCDF ** | % | 89 | | | | | | 9907339 |
| C13-12378 PentaCDD * | % | 104 | | | | | | 9907339 |
| C13-12378 PentaCDF ** | % | 91 | | | | | | 9907339 |
| C13-123789 HexaCDF ** | % | 89 | | | | | | 9907339 |
| C13-234678 HexaCDF ** | % | 90 | | | | | | 9907339 |
| C13-23478 PentaCDF ** | % | 98 | | | | | | 9907339 |
| C13-2378 TetraCDD * | % | 79 | | | | | | 9907339 |
| C13-2378 TetraCDF ** | % | 79 | | | | | | 9907339 |
| C13-OCDD * | % | 122 | | | | | | 9907339 |

EDL = Estimated Detection Limit

RDL = Reportable Detection Limit

TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.

WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

QC Batch = Quality Control Batch

* CDD = Chloro Dibenzo-p-Dioxin

** CDF = Chloro Dibenzo-p-Furan

## MICROBIOLOGY (WATER)

| Bureau Veritas ID | | APAK85 | | |
|---|---|---|---|---|
| Sampling Date | | 2025/03/18 11:00 | | |
| COC Number | | C#1038203-01-01 | | |
| | **UNITS** | **MW202** | **RDL** | **QC Batch** |
| **Microbiological** | | | | |
| Escherichia coli | CFU/100mL | <10 | 10 | 9894155 |

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Bureau Veritas Job #: C529290
Report Date: 2025/04/17

Terrapex Environmental Ltd
Client Project #: CO972.00
Site Location: FERNGATE RICHMOND
Sampler Initials: EB

## TEST SUMMARY

**Bureau Veritas ID:** APAK85
**Sample ID:** MW202
**Matrix:** Water

**Collected:** 2025/03/18
**Shipped:**
**Received:** 2025/03/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| ABN Compounds in Water by GC/MS | GC/MS | 9895187 | 2025/03/21 | 2025/03/21 | Ahmed Ismail |
| Sewer Use By-Law Semivolatile Organics | GC/MS | 9896850 | 2025/03/24 | 2025/03/25 | Ahmed Ismail |
| Carbonaceous BOD | DO | 9894347 | 2025/03/20 | 2025/03/25 | Gurjot Kaur |
| Total Cyanide | SKAL/CN | 9894264 | 2025/03/20 | 2025/03/20 | Prgya Panchal |
| Dioxins/Furans in Water (1613B) | HRMS/MS | 9907339 | 2025/04/10 | 2025/04/15 | Ravneet Kaur |
| Fluoride | ISE | 9894143 | 2025/03/19 | 2025/03/20 | Nachiketa Gohil |
| Formaldehyde (HPLC) | LC/UV | 9894794 | 2025/03/20 | 2025/03/21 | Kimberley Linde |
| Mercury in Water by CVAA | CV/AA | 9902107 | 2025/04/01 | 2025/04/01 | Maitri PATIL |
| Total Metals Analysis by ICPMS | ICP/MS | 9896591 | 2025/03/24 | 2025/03/24 | Azita Fazaeli |
| E.coli, (CFU/100mL) | PL | 9894155 | N/A | 2025/03/19 | Jessica (Ya Ping) Qiang |
| Nitrosamines in Water | GCTQ/MS | 9904773 | 2025/03/27 | 2025/04/09 | Chau Ting (Ruth) Chan |
| Total Nonylphenol in Liquids by HPLC | LC/FLU | 9895905 | 2025/03/22 | 2025/03/24 | Michael Huynh |
| Nonylphenol Ethoxylates in Liquids: HPLC | LC/FLU | 9895906 | 2025/03/22 | 2025/03/24 | Michael Huynh |
| Animal and Vegetable Oil and Grease | BAL | 9893602 | N/A | 2025/03/23 | Automated Statchk |
| Total Oil and Grease | BAL | 9896095 | 2025/03/23 | 2025/03/23 | Navneet Singh |
| OC Pesticides (Selected) & PCB | GC/ECD | 9896430 | 2025/03/24 | 2025/03/25 | Harish Patel |
| OC Pesticides Summed Parameters | CALC | 9893603 | N/A | 2025/03/20 | Automated Statchk |
| Phenols (4AAP) | TECH/PHEN | 9894519 | N/A | 2025/03/20 | Sachi Patel |
| pH | AT | 9894144 | 2025/03/19 | 2025/03/20 | Nachiketa Gohil |
| Sulphate by Automated Turbidimetry | SKAL | 9893130 | N/A | 2025/03/20 | Alina Dobreanu |
| Sulphide | ISE/S | 9894449 | N/A | 2025/03/20 | Gurparteek KAUR |
| Total Kjeldahl Nitrogen in Water | SKAL | 9894081 | 2025/03/19 | 2025/03/20 | Kruti Jitesh Patel |
| Total PAHs (Hamilton, Ottawa S.U.B.) | CALC | 9893886 | N/A | 2025/03/26 | Automated Statchk |
| Mineral/Synthetic O & G (TPH Heavy Oil) | BAL | 9896096 | 2025/03/23 | 2025/03/23 | Navneet Singh |
| Total Suspended Solids | BAL | 9894875 | 2025/03/20 | 2025/03/20 | Binuja Kodithuwakku Arachchilage |
| Volatile Organic Compounds in Water | GC/MS | 9894715 | N/A | 2025/03/21 | Gabriella Morrone |
| Non-Routine Volatile Organic Compounds | P&T/MS | 9894724 | N/A | 2025/03/24 | Hai Son Tran |

**Bureau Veritas ID:** APAK85 Dup
**Sample ID:** MW202
**Matrix:** Water

**Collected:** 2025/03/18
**Shipped:**
**Received:** 2025/03/18

| Test Description | Instrumentation | Batch | Extracted | Date Analyzed | Analyst |
|---|---|---|---|---|---|
| Sewer Use By-Law Semivolatile Organics | GC/MS | 9896850 | 2025/03/24 | 2025/03/25 | Ahmed Ismail |
| Fluoride | ISE | 9894143 | 2025/03/19 | 2025/03/20 | Nachiketa Gohil |
| Total Nonylphenol in Liquids by HPLC | LC/FLU | 9895905 | 2025/03/22 | 2025/03/24 | Michael Huynh |
| Nonylphenol Ethoxylates in Liquids: HPLC | LC/FLU | 9895906 | 2025/03/22 | 2025/03/24 | Michael Huynh |
| pH | AT | 9894144 | 2025/03/19 | 2025/03/20 | Nachiketa Gohil |
| Total Suspended Solids | BAL | 9894875 | 2025/03/20 | 2025/03/20 | Binuja Kodithuwakku Arachchilage |

## GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

| | |
|---|---|
| Package 1 | 12.7°C |
| Package 2 | 2.7°C |
| Package 3 | 11.7°C |

Mercury bottle submitted sampled on 2025/03/27 12:45 for analysis.

Sample APAK85 [MW202] : VOC Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

**Results relate only to the items tested.**



Bureau Veritas 100 – 36 Antares Dr. Nepean, ON, K2E 7W5 Phone: 613-274-0573 Website: www.bvna.com

## QUALITY ASSURANCE REPORT

| QA/QC Batch | Init | QC Type | Parameter | Date Analyzed | Value | Recovery | UNITS | QC Limits |
|---|---|---|---|---|---|---|---|---|
| 9893130 | ADB | Matrix Spike | Dissolved Sulphate (SO4) | 2025/03/20 | | NC | % | 75 - 125 |
| 9893130 | ADB | Spiked Blank | Dissolved Sulphate (SO4) | 2025/03/20 | | 91 | % | 80 - 120 |
| 9893130 | ADB | Method Blank | Dissolved Sulphate (SO4) | 2025/03/20 | <1.0 | | mg/L | |
| 9893130 | ADB | RPD | Dissolved Sulphate (SO4) | 2025/03/20 | 0.61 | | % | 20 |
| 9894081 | KJP | Matrix Spike | Total Kjeldahl Nitrogen (TKN) | 2025/03/20 | | 104 | % | 80 - 120 |
| 9894081 | KJP | QC Standard | Total Kjeldahl Nitrogen (TKN) | 2025/03/20 | | 97 | % | 80 - 120 |
| 9894081 | KJP | Spiked Blank | Total Kjeldahl Nitrogen (TKN) | 2025/03/20 | | 99 | % | 80 - 120 |
| 9894081 | KJP | Method Blank | Total Kjeldahl Nitrogen (TKN) | 2025/03/20 | <0.10 | | mg/L | |
| 9894081 | KJP | RPD | Total Kjeldahl Nitrogen (TKN) | 2025/03/20 | NC | | % | 20 |
| 9894143 | NGI | Matrix Spike [APAK85-09] | Fluoride (F-) | 2025/03/20 | | 95 | % | 80 - 120 |
| 9894143 | NGI | Spiked Blank | Fluoride (F-) | 2025/03/20 | | 99 | % | 80 - 120 |
| 9894143 | NGI | Method Blank | Fluoride (F-) | 2025/03/20 | <0.10 | | mg/L | |
| 9894143 | NGI | RPD [APAK85-09] | Fluoride (F-) | 2025/03/20 | 3.3 | | % | 20 |
| 9894144 | NGI | Spiked Blank | pH | 2025/03/20 | | 102 | % | 98 - 103 |
| 9894144 | NGI | RPD [APAK85-09] | pH | 2025/03/20 | 0.30 | | % | N/A |
| 9894264 | GYA | Matrix Spike | Total Cyanide (CN) | 2025/03/20 | | 94 | % | 80 - 120 |
| 9894264 | GYA | Spiked Blank | Total Cyanide (CN) | 2025/03/20 | | 93 | % | 80 - 120 |
| 9894264 | GYA | Method Blank | Total Cyanide (CN) | 2025/03/20 | <0.0050 | | mg/L | |
| 9894264 | GYA | RPD | Total Cyanide (CN) | 2025/03/20 | NC | | % | 20 |
| 9894347 | GUJ | QC Standard | Total Carbonaceous BOD | 2025/03/25 | | 96 | % | 80 - 120 |
| 9894347 | GUJ | Method Blank | Total Carbonaceous BOD | 2025/03/25 | <2 | | mg/L | |
| 9894347 | GUJ | RPD | Total Carbonaceous BOD | 2025/03/25 | 0.40 | | % | 30 |
| 9894449 | GTK | Matrix Spike | Sulphide | 2025/03/20 | | 82 | % | 80 - 120 |
| 9894449 | GTK | Spiked Blank | Sulphide | 2025/03/20 | | 97 | % | 80 - 120 |
| 9894449 | GTK | Method Blank | Sulphide | 2025/03/20 | <0.020 | | mg/L | |
| 9894449 | GTK | RPD | Sulphide | 2025/03/20 | 1.6 | | % | 20 |
| 9894519 | SPC | Matrix Spike | Phenols-4AAP | 2025/03/20 | | 100 | % | 80 - 120 |
| 9894519 | SPC | Spiked Blank | Phenols-4AAP | 2025/03/20 | | 102 | % | 80 - 120 |
| 9894519 | SPC | Method Blank | Phenols-4AAP | 2025/03/20 | <0.0010 | | mg/L | |
| 9894519 | SPC | RPD | Phenols-4AAP | 2025/03/20 | NC | | % | 20 |
| 9894715 | GMN | Matrix Spike | 4-Bromofluorobenzene | 2025/03/21 | | 100 | % | 70 - 130 |
| | | | D4-1,2-Dichloroethane | 2025/03/21 | | 103 | % | 70 - 130 |
| | | | D8-Toluene | 2025/03/21 | | 102 | % | 70 - 130 |
| | | | Benzene | 2025/03/21 | | 110 | % | 70 - 130 |
| | | | Bromodichloromethane | 2025/03/21 | | 110 | % | 70 - 130 |
| | | | Bromoform | 2025/03/21 | | 114 | % | 70 - 130 |
| | | | Bromomethane | 2025/03/21 | | 110 | % | 60 - 140 |
| | | | Carbon Tetrachloride | 2025/03/21 | | 112 | % | 70 - 130 |
| | | | Chlorobenzene | 2025/03/21 | | 103 | % | 70 - 130 |
| | | | Chloroethane | 2025/03/21 | | 120 | % | 70 - 130 |
| | | | Chloroform | 2025/03/21 | | 110 | % | 70 - 130 |
| | | | Chloromethane | 2025/03/21 | | 128 | % | 60 - 140 |
| | | | Dibromochloromethane | 2025/03/21 | | 114 | % | 70 - 130 |
| | | | 1,2-Dichlorobenzene | 2025/03/21 | | 109 | % | 70 - 130 |
| | | | 1,3-Dichlorobenzene | 2025/03/21 | | 107 | % | 70 - 130 |
| | | | 1,4-Dichlorobenzene | 2025/03/21 | | 111 | % | 70 - 130 |
| | | | 1,1-Dichloroethane | 2025/03/21 | | 106 | % | 70 - 130 |
| | | | 1,2-Dichloroethane | 2025/03/21 | | 116 | % | 70 - 130 |
| | | | 1,1-Dichloroethylene | 2025/03/21 | | 108 | % | 70 - 130 |
| | | | cis-1,2-Dichloroethylene | 2025/03/21 | | 117 | % | 70 - 130 |
| | | | trans-1,2-Dichloroethylene | 2025/03/21 | | 115 | % | 70 - 130 |
| | | | 1,2-Dichloropropane | 2025/03/21 | | 115 | % | 70 - 130 |
| | | | cis-1,3-Dichloropropene | 2025/03/21 | | 112 | % | 70 - 130 |

## QUALITY ASSURANCE REPORT(CONT'D)

| QA/QC Batch | Init | QC Type | Parameter | Date Analyzed | Value | Recovery | UNITS | QC Limits |
|---|---|---|---|---|---|---|---|---|
| | | | trans-1,3-Dichloropropene | 2025/03/21 | | 125 | % | 70 - 130 |
| | | | Ethylbenzene | 2025/03/21 | | 109 | % | 70 - 130 |
| | | | Ethylene Dibromide | 2025/03/21 | | 112 | % | 70 - 130 |
| | | | Methylene Chloride(Dichloromethane) | 2025/03/21 | | 107 | % | 70 - 130 |
| | | | Styrene | 2025/03/21 | | 111 | % | 70 - 130 |
| | | | 1,1,2,2-Tetrachloroethane | 2025/03/21 | | 107 | % | 70 - 130 |
| | | | Tetrachloroethylene | 2025/03/21 | | NC | % | 70 - 130 |
| | | | Toluene | 2025/03/21 | | 113 | % | 70 - 130 |
| | | | 1,1,1-Trichloroethane | 2025/03/21 | | 106 | % | 70 - 130 |
| | | | 1,1,2-Trichloroethane | 2025/03/21 | | 119 | % | 70 - 130 |
| | | | Trichloroethylene | 2025/03/21 | | 110 | % | 70 - 130 |
| | | | Trichlorofluoromethane (FREON 11) | 2025/03/21 | | 110 | % | 70 - 130 |
| | | | Vinyl Chloride | 2025/03/21 | | 119 | % | 70 - 130 |
| | | | p+m-Xylene | 2025/03/21 | | 110 | % | 70 - 130 |
| | | | o-Xylene | 2025/03/21 | | 115 | % | 70 - 130 |
| 9894715 | GMN | Spiked Blank | 4-Bromofluorobenzene | 2025/03/21 | | 99 | % | 70 - 130 |
| | | | D4-1,2-Dichloroethane | 2025/03/21 | | 99 | % | 70 - 130 |
| | | | D8-Toluene | 2025/03/21 | | 103 | % | 70 - 130 |
| | | | Benzene | 2025/03/21 | | 97 | % | 70 - 130 |
| | | | Bromodichloromethane | 2025/03/21 | | 96 | % | 70 - 130 |
| | | | Bromoform | 2025/03/21 | | 99 | % | 70 - 130 |
| | | | Bromomethane | 2025/03/21 | | 97 | % | 60 - 140 |
| | | | Carbon Tetrachloride | 2025/03/21 | | 101 | % | 70 - 130 |
| | | | Chlorobenzene | 2025/03/21 | | 92 | % | 70 - 130 |
| | | | Chloroethane | 2025/03/21 | | 107 | % | 70 - 130 |
| | | | Chloroform | 2025/03/21 | | 97 | % | 70 - 130 |
| | | | Chloromethane | 2025/03/21 | | 100 | % | 60 - 140 |
| | | | Dibromochloromethane | 2025/03/21 | | 99 | % | 70 - 130 |
| | | | 1,2-Dichlorobenzene | 2025/03/21 | | 99 | % | 70 - 130 |
| | | | 1,3-Dichlorobenzene | 2025/03/21 | | 97 | % | 70 - 130 |
| | | | 1,4-Dichlorobenzene | 2025/03/21 | | 102 | % | 70 - 130 |
| | | | 1,1-Dichloroethane | 2025/03/21 | | 94 | % | 70 - 130 |
| | | | 1,2-Dichloroethane | 2025/03/21 | | 100 | % | 70 - 130 |
| | | | 1,1-Dichloroethylene | 2025/03/21 | | 97 | % | 70 - 130 |
| | | | cis-1,2-Dichloroethylene | 2025/03/21 | | 102 | % | 70 - 130 |
| | | | trans-1,2-Dichloroethylene | 2025/03/21 | | 102 | % | 70 - 130 |
| | | | 1,2-Dichloropropane | 2025/03/21 | | 100 | % | 70 - 130 |
| | | | cis-1,3-Dichloropropene | 2025/03/21 | | 93 | % | 70 - 130 |
| | | | trans-1,3-Dichloropropene | 2025/03/21 | | 101 | % | 70 - 130 |
| | | | Ethylbenzene | 2025/03/21 | | 100 | % | 70 - 130 |
| | | | Ethylene Dibromide | 2025/03/21 | | 96 | % | 70 - 130 |
| | | | Methylene Chloride(Dichloromethane) | 2025/03/21 | | 93 | % | 70 - 130 |
| | | | Styrene | 2025/03/21 | | 101 | % | 70 - 130 |
| | | | 1,1,2,2-Tetrachloroethane | 2025/03/21 | | 92 | % | 70 - 130 |
| | | | Tetrachloroethylene | 2025/03/21 | | 95 | % | 70 - 130 |
| | | | Toluene | 2025/03/21 | | 101 | % | 70 - 130 |
| | | | 1,1,1-Trichloroethane | 2025/03/21 | | 95 | % | 70 - 130 |
| | | | 1,1,2-Trichloroethane | 2025/03/21 | | 104 | % | 70 - 130 |
| | | | Trichloroethylene | 2025/03/21 | | 98 | % | 70 - 130 |
| | | | Trichlorofluoromethane (FREON 11) | 2025/03/21 | | 99 | % | 70 - 130 |
| | | | Vinyl Chloride | 2025/03/21 | | 107 | % | 70 - 130 |
| | | | p+m-Xylene | 2025/03/21 | | 100 | % | 70 - 130 |
| | | | o-Xylene | 2025/03/21 | | 107 | % | 70 - 130 |

## QUALITY ASSURANCE REPORT(CONT'D)

| QA/QC Batch | Init | QC Type | Parameter | Date Analyzed | Value | Recovery | UNITS | QC Limits |
|---|---|---|---|---|---|---|---|---|
| 9894715 | GMN | Method Blank | 4-Bromofluorobenzene | 2025/03/21 | | 102 | % | 70 - 130 |
| | | | D4-1,2-Dichloroethane | 2025/03/21 | | 103 | % | 70 - 130 |
| | | | D8-Toluene | 2025/03/21 | | 92 | % | 70 - 130 |
| | | | Benzene | 2025/03/21 | <0.20 | | ug/L | |
| | | | Bromodichloromethane | 2025/03/21 | <0.50 | | ug/L | |
| | | | Bromoform | 2025/03/21 | <1.0 | | ug/L | |
| | | | Bromomethane | 2025/03/21 | <0.50 | | ug/L | |
| | | | Carbon Tetrachloride | 2025/03/21 | <0.19 | | ug/L | |
| | | | Chlorobenzene | 2025/03/21 | <0.20 | | ug/L | |
| | | | Chloroethane | 2025/03/21 | <1.0 | | ug/L | |
| | | | Chloroform | 2025/03/21 | <0.20 | | ug/L | |
| | | | Chloromethane | 2025/03/21 | <5.0 | | ug/L | |
| | | | Dibromochloromethane | 2025/03/21 | <0.50 | | ug/L | |
| | | | 1,2-Dichlorobenzene | 2025/03/21 | <0.40 | | ug/L | |
| | | | 1,3-Dichlorobenzene | 2025/03/21 | <0.40 | | ug/L | |
| | | | 1,4-Dichlorobenzene | 2025/03/21 | <0.40 | | ug/L | |
| | | | 1,1-Dichloroethane | 2025/03/21 | <0.20 | | ug/L | |
| | | | 1,2-Dichloroethane | 2025/03/21 | <0.49 | | ug/L | |
| | | | 1,1-Dichloroethylene | 2025/03/21 | <0.20 | | ug/L | |
| | | | cis-1,2-Dichloroethylene | 2025/03/21 | <0.50 | | ug/L | |
| | | | trans-1,2-Dichloroethylene | 2025/03/21 | <0.50 | | ug/L | |
| | | | 1,2-Dichloropropane | 2025/03/21 | <0.20 | | ug/L | |
| | | | cis-1,3-Dichloropropene | 2025/03/21 | <0.30 | | ug/L | |
| | | | trans-1,3-Dichloropropene | 2025/03/21 | <0.40 | | ug/L | |
| | | | Ethylbenzene | 2025/03/21 | <0.20 | | ug/L | |
| | | | Ethylene Dibromide | 2025/03/21 | <0.19 | | ug/L | |
| | | | Methylene Chloride(Dichloromethane) | 2025/03/21 | <2.0 | | ug/L | |
| | | | Styrene | 2025/03/21 | <0.40 | | ug/L | |
| | | | 1,1,2,2-Tetrachloroethane | 2025/03/21 | <0.40 | | ug/L | |
| | | | Tetrachloroethylene | 2025/03/21 | <0.20 | | ug/L | |
| | | | Toluene | 2025/03/21 | <0.20 | | ug/L | |
| | | | 1,1,1-Trichloroethane | 2025/03/21 | <0.20 | | ug/L | |
| | | | 1,1,2-Trichloroethane | 2025/03/21 | <0.40 | | ug/L | |
| | | | Trichloroethylene | 2025/03/21 | <0.20 | | ug/L | |
| | | | Trichlorofluoromethane (FREON 11) | 2025/03/21 | <0.50 | | ug/L | |
| | | | Vinyl Chloride | 2025/03/21 | <0.20 | | ug/L | |
| | | | p+m-Xylene | 2025/03/21 | <0.20 | | ug/L | |
| | | | o-Xylene | 2025/03/21 | <0.20 | | ug/L | |
| | | | Total Xylenes | 2025/03/21 | <0.20 | | ug/L | |
| 9894715 | GMN | RPD | Benzene | 2025/03/21 | NC | | % | 30 |
| | | | Bromodichloromethane | 2025/03/21 | NC | | % | 30 |
| | | | Bromoform | 2025/03/21 | NC | | % | 30 |
| | | | Bromomethane | 2025/03/21 | NC | | % | 30 |
| | | | Carbon Tetrachloride | 2025/03/21 | NC | | % | 30 |
| | | | Chlorobenzene | 2025/03/21 | NC | | % | 30 |
| | | | Chloroform | 2025/03/21 | 1.8 | | % | 30 |
| | | | Dibromochloromethane | 2025/03/21 | NC | | % | 30 |
| | | | 1,2-Dichlorobenzene | 2025/03/21 | NC | | % | 30 |
| | | | 1,3-Dichlorobenzene | 2025/03/21 | NC | | % | 30 |
| | | | 1,4-Dichlorobenzene | 2025/03/21 | NC | | % | 30 |
| | | | 1,1-Dichloroethane | 2025/03/21 | NC | | % | 30 |
| | | | 1,2-Dichloroethane | 2025/03/21 | NC | | % | 30 |
| | | | 1,1-Dichloroethylene | 2025/03/21 | NC | | % | 30 |

## QUALITY ASSURANCE REPORT(CONT'D)

| QA/QC Batch | Init | QC Type | Parameter | Date Analyzed | Value | Recovery | UNITS | QC Limits |
|---|---|---|---|---|---|---|---|---|
| | | | cis-1,2-Dichloroethylene | 2025/03/21 | NC | | % | 30 |
| | | | trans-1,2-Dichloroethylene | 2025/03/21 | NC | | % | 30 |
| | | | 1,2-Dichloropropane | 2025/03/21 | NC | | % | 30 |
| | | | cis-1,3-Dichloropropene | 2025/03/21 | NC | | % | 30 |
| | | | trans-1,3-Dichloropropene | 2025/03/21 | NC | | % | 30 |
| | | | Ethylbenzene | 2025/03/21 | NC | | % | 30 |
| | | | Ethylene Dibromide | 2025/03/21 | NC | | % | 30 |
| | | | Methylene Chloride(Dichloromethane) | 2025/03/21 | NC | | % | 30 |
| | | | Styrene | 2025/03/21 | NC | | % | 30 |
| | | | 1,1,2,2-Tetrachloroethane | 2025/03/21 | NC | | % | 30 |
| | | | Tetrachloroethylene | 2025/03/21 | 0 | | % | 30 |
| | | | Toluene | 2025/03/21 | NC | | % | 30 |
| | | | 1,1,1-Trichloroethane | 2025/03/21 | NC | | % | 30 |
| | | | 1,1,2-Trichloroethane | 2025/03/21 | NC | | % | 30 |
| | | | Trichloroethylene | 2025/03/21 | 0.72 | | % | 30 |
| | | | Trichlorofluoromethane (FREON 11) | 2025/03/21 | NC | | % | 30 |
| | | | Vinyl Chloride | 2025/03/21 | NC | | % | 30 |
| | | | p+m-Xylene | 2025/03/21 | NC | | % | 30 |
| | | | o-Xylene | 2025/03/21 | NC | | % | 30 |
| | | | Total Xylenes | 2025/03/21 | NC | | % | 30 |
| 9894724 | HST | Matrix Spike | 4-Bromofluorobenzene | 2025/03/24 | | 102 | % | 70 - 130 |
| | | | D4-1,2-Dichloroethane | 2025/03/24 | | 104 | % | 70 - 130 |
| | | | D8-Toluene | 2025/03/24 | | 102 | % | 70 - 130 |
| | | | 1,3,5-Trimethylbenzene | 2025/03/24 | | 108 | % | 60 - 140 |
| 9894724 | HST | Spiked Blank | 4-Bromofluorobenzene | 2025/03/24 | | 100 | % | 70 - 130 |
| | | | D4-1,2-Dichloroethane | 2025/03/24 | | 102 | % | 70 - 130 |
| | | | D8-Toluene | 2025/03/24 | | 100 | % | 70 - 130 |
| | | | 1,3,5-Trimethylbenzene | 2025/03/24 | | 104 | % | 60 - 140 |
| 9894724 | HST | Method Blank | 4-Bromofluorobenzene | 2025/03/24 | | 104 | % | 70 - 130 |
| | | | D4-1,2-Dichloroethane | 2025/03/24 | | 111 | % | 70 - 130 |
| | | | D8-Toluene | 2025/03/24 | | 95 | % | 70 - 130 |
| | | | 1,3,5-Trimethylbenzene | 2025/03/24 | <0.20 | | ug/L | |
| 9894724 | HST | RPD | 1,3,5-Trimethylbenzene | 2025/03/24 | NC | | % | 30 |
| 9894794 | KIH | Matrix Spike | Formaldehyde | 2025/03/21 | | 107 | % | 40 - 130 |
| 9894794 | KIH | Spiked Blank | Formaldehyde | 2025/03/21 | | 111 | % | 40 - 130 |
| 9894794 | KIH | Method Blank | Formaldehyde | 2025/03/21 | <10 | | ug/L | |
| 9894794 | KIH | RPD | Formaldehyde | 2025/03/21 | NC | | % | 40 |
| 9894875 | BKG | Spiked Blank | Total Suspended Solids | 2025/03/20 | | 101 | % | 80 - 120 |
| 9894875 | BKG | Method Blank | Total Suspended Solids | 2025/03/20 | <10 | | mg/L | |
| 9894875 | BKG | RPD [APAK85-10] | Total Suspended Solids | 2025/03/20 | NC | | % | 20 |
| 9895187 | AHI | Matrix Spike [APAK85-05] | 2,4,6-Tribromophenol | 2025/03/21 | | 59 | % | 10 - 130 |
| | | | 2-Fluorobiphenyl | 2025/03/21 | | 42 | % | 30 - 130 |
| | | | 2-Fluorophenol | 2025/03/21 | | 19 | % | 10 - 130 |
| | | | D14-Terphenyl | 2025/03/21 | | 61 | % | 30 - 130 |
| | | | D5-Nitrobenzene | 2025/03/21 | | 49 | % | 30 - 130 |
| | | | D5-Phenol | 2025/03/21 | | 13 | % | 10 - 130 |
| | | | 2,4-Dichlorophenol | 2025/03/21 | | 49 | % | 10 - 130 |
| | | | Benzyl butyl phthalate | 2025/03/21 | | 76 | % | 30 - 130 |
| | | | Bis(2-chloroethoxy)methane | 2025/03/21 | | 50 | % | 30 - 130 |
| | | | di-n-octyl phthalate | 2025/03/21 | | 94 | % | 30 - 130 |
| | | | Diethyl phthalate | 2025/03/21 | | 61 | % | 30 - 130 |
| | | | Indole | 2025/03/21 | | 31 | % | 30 - 130 |
| 9895187 | AHI | Spiked Blank | 2,4,6-Tribromophenol | 2025/03/21 | | 96 | % | 10 - 130 |

## QUALITY ASSURANCE REPORT(CONT'D)

| QA/QC Batch | Init | QC Type | Parameter | Date Analyzed | Value | Recovery | UNITS | QC Limits |
|---|---|---|---|---|---|---|---|---|
| | | | 2-Fluorobiphenyl | 2025/03/21 | | 66 | % | 30 - 130 |
| | | | 2-Fluorophenol | 2025/03/21 | | 40 | % | 10 - 130 |
| | | | D14-Terphenyl | 2025/03/21 | | 72 | % | 30 - 130 |
| | | | D5-Nitrobenzene | 2025/03/21 | | 72 | % | 30 - 130 |
| | | | D5-Phenol | 2025/03/21 | | 29 | % | 10 - 130 |
| | | | 2,4-Dichlorophenol | 2025/03/21 | | 79 | % | 10 - 130 |
| | | | Benzyl butyl phthalate | 2025/03/21 | | 89 | % | 30 - 130 |
| | | | Bis(2-chloroethoxy)methane | 2025/03/21 | | 84 | % | 30 - 130 |
| | | | di-n-octyl phthalate | 2025/03/21 | | 108 | % | 30 - 130 |
| | | | Diethyl phthalate | 2025/03/21 | | 93 | % | 30 - 130 |
| | | | Indole | 2025/03/21 | | 63 | % | 30 - 130 |
| 9895187 | AHI | Method Blank | 2,4,6-Tribromophenol | 2025/03/21 | | 73 | % | 10 - 130 |
| | | | 2-Fluorobiphenyl | 2025/03/21 | | 70 | % | 30 - 130 |
| | | | 2-Fluorophenol | 2025/03/21 | | 36 | % | 10 - 130 |
| | | | D14-Terphenyl | 2025/03/21 | | 74 | % | 30 - 130 |
| | | | D5-Nitrobenzene | 2025/03/21 | | 75 | % | 30 - 130 |
| | | | D5-Phenol | 2025/03/21 | | 24 | % | 10 - 130 |
| | | | 2,4-Dichlorophenol | 2025/03/21 | <0.30 | | ug/L | |
| | | | Benzyl butyl phthalate | 2025/03/21 | <0.50 | | ug/L | |
| | | | Bis(2-chloroethoxy)methane | 2025/03/21 | <0.50 | | ug/L | |
| | | | di-n-octyl phthalate | 2025/03/21 | <0.80 | | ug/L | |
| | | | Diethyl phthalate | 2025/03/21 | <1.0 | | ug/L | |
| | | | Indole | 2025/03/21 | <1.0 | | ug/L | |
| 9895187 | AHI | RPD | 2,4-Dichlorophenol | 2025/03/21 | NC | | % | 40 |
| | | | Benzyl butyl phthalate | 2025/03/21 | NC | | % | 40 |
| | | | Bis(2-chloroethoxy)methane | 2025/03/21 | NC | | % | 40 |
| | | | di-n-octyl phthalate | 2025/03/21 | NC | | % | 40 |
| | | | Diethyl phthalate | 2025/03/21 | NC | | % | 40 |
| | | | Indole | 2025/03/21 | NC | | % | 40 |
| 9895905 | MHU | Matrix Spike | Nonylphenol (Total) | 2025/03/23 | | 127 | % | 50 - 130 |
| 9895905 | MHU | Spiked Blank | Nonylphenol (Total) | 2025/03/23 | | 112 | % | 50 - 130 |
| 9895905 | MHU | Method Blank | Nonylphenol (Total) | 2025/03/24 | <0.001 | | mg/L | |
| 9895905 | MHU | RPD [APAK85-06] | Nonylphenol (Total) | 2025/03/24 | NC | | % | 40 |
| 9895906 | MHU | Matrix Spike | Nonylphenol Ethoxylate (Total) | 2025/03/23 | | 104 | % | 50 - 130 |
| 9895906 | MHU | Spiked Blank | Nonylphenol Ethoxylate (Total) | 2025/03/23 | | 107 | % | 50 - 130 |
| 9895906 | MHU | Method Blank | Nonylphenol Ethoxylate (Total) | 2025/03/24 | <0.005 | | mg/L | |
| 9895906 | MHU | RPD [APAK85-06] | Nonylphenol Ethoxylate (Total) | 2025/03/24 | NC | | % | 40 |
| 9896095 | NSG | Spiked Blank | Total Oil & Grease | 2025/03/23 | | 99 | % | 80 - 110 |
| 9896095 | NSG | RPD | Total Oil & Grease | 2025/03/23 | 0.25 | | % | 25 |
| 9896095 | NSG | Method Blank | Total Oil & Grease | 2025/03/23 | <0.50 | | mg/L | |
| 9896096 | NSG | Spiked Blank | Total Oil & Grease Mineral/Synthetic | 2025/03/23 | | 96 | % | 65 - 130 |
| 9896096 | NSG | RPD | Total Oil & Grease Mineral/Synthetic | 2025/03/23 | 0 | | % | 25 |
| 9896096 | NSG | Method Blank | Total Oil & Grease Mineral/Synthetic | 2025/03/23 | <0.50 | | mg/L | |
| 9896430 | HP1 | Matrix Spike [APAK85-07] | 2,4,5,6-Tetrachloro-m-xylene | 2025/03/25 | | 76 | % | 50 - 130 |
| | | | Decachlorobiphenyl | 2025/03/25 | | 98 | % | 50 - 130 |
| | | | Hexachlorobenzene | 2025/03/25 | | 88 | % | 50 - 130 |
| 9896430 | HP1 | Spiked Blank | 2,4,5,6-Tetrachloro-m-xylene | 2025/03/25 | | 58 | % | 50 - 130 |
| | | | Decachlorobiphenyl | 2025/03/25 | | 137 (1) | % | 50 - 130 |
| | | | Hexachlorobenzene | 2025/03/25 | | 80 | % | 50 - 130 |
| 9896430 | HP1 | RPD | Hexachlorobenzene | 2025/03/25 | 0.79 | | % | 30 |
| | | | Hexachlorobenzene | 2025/03/25 | NC | | % | 30 |
| 9896430 | HP1 | Method Blank | 2,4,5,6-Tetrachloro-m-xylene | 2025/03/25 | | 51 | % | 50 - 130 |
| | | | Decachlorobiphenyl | 2025/03/25 | | 129 | % | 50 - 130 |

## QUALITY ASSURANCE REPORT(CONT'D)

| QA/QC Batch | Init | QC Type | Parameter | Date Analyzed | Value | Recovery | UNITS | QC Limits |
|---|---|---|---|---|---|---|---|---|
| | | | Hexachlorobenzene | 2025/03/25 | <0.005 | | ug/L | |
| 9896591 | AFZ | Matrix Spike | Total Aluminum (Al) | 2025/03/24 | | NC | % | 80 - 120 |
| | | | Total Antimony (Sb) | 2025/03/24 | | 109 | % | 80 - 120 |
| | | | Total Arsenic (As) | 2025/03/24 | | 108 | % | 80 - 120 |
| | | | Total Bismuth (Bi) | 2025/03/24 | | 97 | % | 80 - 120 |
| | | | Total Boron (B) | 2025/03/24 | | 101 | % | 80 - 120 |
| | | | Total Cadmium (Cd) | 2025/03/24 | | 101 | % | 80 - 120 |
| | | | Total Chromium (Cr) | 2025/03/24 | | 106 | % | 80 - 120 |
| | | | Total Cobalt (Co) | 2025/03/24 | | 104 | % | 80 - 120 |
| | | | Total Copper (Cu) | 2025/03/24 | | 104 | % | 80 - 120 |
| | | | Total Lead (Pb) | 2025/03/24 | | 100 | % | 80 - 120 |
| | | | Total Manganese (Mn) | 2025/03/24 | | 103 | % | 80 - 120 |
| | | | Total Molybdenum (Mo) | 2025/03/24 | | 108 | % | 80 - 120 |
| | | | Total Nickel (Ni) | 2025/03/24 | | 101 | % | 80 - 120 |
| | | | Total Phosphorus (P) | 2025/03/24 | | 113 | % | 80 - 120 |
| | | | Total Selenium (Se) | 2025/03/24 | | 103 | % | 80 - 120 |
| | | | Total Silver (Ag) | 2025/03/24 | | 98 | % | 80 - 120 |
| | | | Total Tin (Sn) | 2025/03/24 | | 105 | % | 80 - 120 |
| | | | Total Titanium (Ti) | 2025/03/24 | | 109 | % | 80 - 120 |
| | | | Total Vanadium (V) | 2025/03/24 | | 108 | % | 80 - 120 |
| | | | Total Zinc (Zn) | 2025/03/24 | | 99 | % | 80 - 120 |
| 9896591 | AFZ | Spiked Blank | Total Aluminum (Al) | 2025/03/24 | | 97 | % | 80 - 120 |
| | | | Total Antimony (Sb) | 2025/03/24 | | 104 | % | 80 - 120 |
| | | | Total Arsenic (As) | 2025/03/24 | | 106 | % | 80 - 120 |
| | | | Total Bismuth (Bi) | 2025/03/24 | | 103 | % | 80 - 120 |
| | | | Total Boron (B) | 2025/03/24 | | 99 | % | 80 - 120 |
| | | | Total Cadmium (Cd) | 2025/03/24 | | 102 | % | 80 - 120 |
| | | | Total Chromium (Cr) | 2025/03/24 | | 102 | % | 80 - 120 |
| | | | Total Cobalt (Co) | 2025/03/24 | | 102 | % | 80 - 120 |
| | | | Total Copper (Cu) | 2025/03/24 | | 102 | % | 80 - 120 |
| | | | Total Lead (Pb) | 2025/03/24 | | 104 | % | 80 - 120 |
| | | | Total Manganese (Mn) | 2025/03/24 | | 100 | % | 80 - 120 |
| | | | Total Molybdenum (Mo) | 2025/03/24 | | 100 | % | 80 - 120 |
| | | | Total Nickel (Ni) | 2025/03/24 | | 101 | % | 80 - 120 |
| | | | Total Phosphorus (P) | 2025/03/24 | | 100 | % | 80 - 120 |
| | | | Total Selenium (Se) | 2025/03/24 | | 105 | % | 80 - 120 |
| | | | Total Silver (Ag) | 2025/03/24 | | 98 | % | 80 - 120 |
| | | | Total Tin (Sn) | 2025/03/24 | | 100 | % | 80 - 120 |
| | | | Total Titanium (Ti) | 2025/03/24 | | 95 | % | 80 - 120 |
| | | | Total Vanadium (V) | 2025/03/24 | | 101 | % | 80 - 120 |
| | | | Total Zinc (Zn) | 2025/03/24 | | 107 | % | 80 - 120 |
| 9896591 | AFZ | Method Blank | Total Aluminum (Al) | 2025/03/24 | <4.9 | | ug/L | |
| | | | Total Antimony (Sb) | 2025/03/24 | <0.50 | | ug/L | |
| | | | Total Arsenic (As) | 2025/03/24 | <1.0 | | ug/L | |
| | | | Total Bismuth (Bi) | 2025/03/24 | <1.0 | | ug/L | |
| | | | Total Boron (B) | 2025/03/24 | <10 | | ug/L | |
| | | | Total Cadmium (Cd) | 2025/03/24 | <0.090 | | ug/L | |
| | | | Total Chromium (Cr) | 2025/03/24 | <5.0 | | ug/L | |
| | | | Total Cobalt (Co) | 2025/03/24 | <0.50 | | ug/L | |
| | | | Total Copper (Cu) | 2025/03/24 | <0.90 | | ug/L | |
| | | | Total Lead (Pb) | 2025/03/24 | <0.50 | | ug/L | |
| | | | Total Manganese (Mn) | 2025/03/24 | <2.0 | | ug/L | |
| | | | Total Molybdenum (Mo) | 2025/03/24 | <0.50 | | ug/L | |

## QUALITY ASSURANCE REPORT(CONT'D)

| QA/QC Batch | Init | QC Type | Parameter | Date Analyzed | Value | Recovery | UNITS | QC Limits |
|---|---|---|---|---|---|---|---|---|
| | | | Total Nickel (Ni) | 2025/03/24 | <1.0 | | ug/L | |
| | | | Total Phosphorus (P) | 2025/03/24 | <100 | | ug/L | |
| | | | Total Selenium (Se) | 2025/03/24 | <2.0 | | ug/L | |
| | | | Total Silver (Ag) | 2025/03/24 | <0.090 | | ug/L | |
| | | | Total Tin (Sn) | 2025/03/24 | <1.0 | | ug/L | |
| | | | Total Titanium (Ti) | 2025/03/24 | <5.0 | | ug/L | |
| | | | Total Vanadium (V) | 2025/03/24 | <0.50 | | ug/L | |
| | | | Total Zinc (Zn) | 2025/03/24 | <5.0 | | ug/L | |
| 9896591 | AFZ | RPD | Total Aluminum (Al) | 2025/03/24 | 0.72 | | % | 20 |
| | | | Total Antimony (Sb) | 2025/03/24 | NC | | % | 20 |
| | | | Total Arsenic (As) | 2025/03/24 | 18 | | % | 20 |
| | | | Total Cadmium (Cd) | 2025/03/24 | NC | | % | 20 |
| | | | Total Chromium (Cr) | 2025/03/24 | 2.4 | | % | 20 |
| | | | Total Cobalt (Co) | 2025/03/24 | 0 | | % | 20 |
| | | | Total Copper (Cu) | 2025/03/24 | 1.4 | | % | 20 |
| | | | Total Lead (Pb) | 2025/03/24 | 1.5 | | % | 20 |
| | | | Total Manganese (Mn) | 2025/03/24 | 3.3 | | % | 20 |
| | | | Total Molybdenum (Mo) | 2025/03/24 | 2.1 | | % | 20 |
| | | | Total Nickel (Ni) | 2025/03/24 | 2.8 | | % | 20 |
| | | | Total Phosphorus (P) | 2025/03/24 | NC | | % | 20 |
| | | | Total Selenium (Se) | 2025/03/24 | NC | | % | 20 |
| | | | Total Silver (Ag) | 2025/03/24 | NC | | % | 20 |
| | | | Total Tin (Sn) | 2025/03/24 | NC | | % | 20 |
| | | | Total Titanium (Ti) | 2025/03/24 | 9.6 | | % | 20 |
| | | | Total Zinc (Zn) | 2025/03/24 | 1.1 | | % | 20 |
| 9896850 | AHI | Matrix Spike | 1-Methylnaphthalene | 2025/03/25 | | 59 | % | 30 - 130 |
| | | | 2,4,6-Tribromophenol | 2025/03/25 | | 55 | % | 10 - 130 |
| | | | 2-Fluorobiphenyl | 2025/03/25 | | 49 | % | 30 - 130 |
| | | | 2-Methylnaphthalene | 2025/03/25 | | 55 | % | 30 - 130 |
| | | | D14-Terphenyl (FS) | 2025/03/25 | | 97 | % | 30 - 130 |
| | | | D5-Nitrobenzene | 2025/03/25 | | 63 | % | 30 - 130 |
| | | | D8-Acenaphthylene | 2025/03/25 | | 55 | % | 30 - 130 |
| | | | Fluorene | 2025/03/25 | | 61 | % | 30 - 130 |
| | | | Naphthalene | 2025/03/25 | | 51 | % | 30 - 130 |
| | | | Di-N-butyl phthalate | 2025/03/25 | | 109 | % | 30 - 130 |
| | | | Bis(2-ethylhexyl)phthalate | 2025/03/25 | | 105 | % | 30 - 130 |
| | | | Phenanthrene | 2025/03/25 | | 70 | % | 30 - 130 |
| | | | Anthracene | 2025/03/25 | | 71 | % | 30 - 130 |
| | | | Fluoranthene | 2025/03/25 | | 110 | % | 30 - 130 |
| | | | Pyrene | 2025/03/25 | | 112 | % | 30 - 130 |
| | | | Benzo(a)anthracene | 2025/03/25 | | 109 | % | 30 - 130 |
| | | | Chrysene | 2025/03/25 | | 92 | % | 30 - 130 |
| | | | Benzo(b/j)fluoranthene | 2025/03/25 | | 92 | % | 30 - 130 |
| | | | Benzo(k)fluoranthene | 2025/03/25 | | 90 | % | 30 - 130 |
| | | | Benzo(a)pyrene | 2025/03/25 | | 94 | % | 30 - 130 |
| | | | Indeno(1,2,3-cd)pyrene | 2025/03/25 | | 106 | % | 30 - 130 |
| | | | Dibenzo(a,h)anthracene | 2025/03/25 | | 105 | % | 30 - 130 |
| | | | Benzo(g,h,i)perylene | 2025/03/25 | | 110 | % | 30 - 130 |
| | | | Dibenzo(a,i)pyrene | 2025/03/25 | | 43 | % | 30 - 130 |
| | | | Benzo(e)pyrene | 2025/03/25 | | 90 | % | 30 - 130 |
| | | | Perylene | 2025/03/25 | | 109 | % | 30 - 130 |
| | | | Dibenzo(a,j) acridine | 2025/03/25 | | 97 | % | 30 - 130 |
| | | | 7H-Dibenzo(c,g) Carbazole | 2025/03/25 | | 85 | % | 30 - 130 |

## QUALITY ASSURANCE REPORT(CONT'D)

| QA/QC Batch | Init | QC Type | Parameter | Date Analyzed | Value | Recovery | UNITS | QC Limits |
|---|---|---|---|---|---|---|---|---|
| 9896850 | AHI | Spiked Blank | 1-Methylnaphthalene | 2025/03/25 | | 79 | % | 30 - 130 |
| | | | 2,4,6-Tribromophenol | 2025/03/25 | | 88 | % | 10 - 130 |
| | | | 2-Fluorobiphenyl | 2025/03/25 | | 74 | % | 30 - 130 |
| | | | 2-Methylnaphthalene | 2025/03/25 | | 74 | % | 30 - 130 |
| | | | D14-Terphenyl (FS) | 2025/03/25 | | 101 | % | 30 - 130 |
| | | | D5-Nitrobenzene | 2025/03/25 | | 95 | % | 30 - 130 |
| | | | D8-Acenaphthylene | 2025/03/25 | | 87 | % | 30 - 130 |
| | | | Fluorene | 2025/03/25 | | 97 | % | 30 - 130 |
| | | | Naphthalene | 2025/03/25 | | 68 | % | 30 - 130 |
| | | | Di-N-butyl phthalate | 2025/03/25 | | 99 | % | 30 - 130 |
| | | | Bis(2-ethylhexyl)phthalate | 2025/03/25 | | 116 | % | 30 - 130 |
| | | | Phenanthrene | 2025/03/25 | | 105 | % | 30 - 130 |
| | | | Anthracene | 2025/03/25 | | 104 | % | 30 - 130 |
| | | | Fluoranthene | 2025/03/25 | | 121 | % | 30 - 130 |
| | | | Pyrene | 2025/03/25 | | 121 | % | 30 - 130 |
| | | | Benzo(a)anthracene | 2025/03/25 | | 113 | % | 30 - 130 |
| | | | Chrysene | 2025/03/25 | | 95 | % | 30 - 130 |
| | | | Benzo(b/j)fluoranthene | 2025/03/25 | | 99 | % | 30 - 130 |
| | | | Benzo(k)fluoranthene | 2025/03/25 | | 85 | % | 30 - 130 |
| | | | Benzo(a)pyrene | 2025/03/25 | | 98 | % | 30 - 130 |
| | | | Indeno(1,2,3-cd)pyrene | 2025/03/25 | | 109 | % | 30 - 130 |
| | | | Dibenzo(a,h)anthracene | 2025/03/25 | | 109 | % | 30 - 130 |
| | | | Benzo(g,h,i)perylene | 2025/03/25 | | 114 | % | 30 - 130 |
| | | | Dibenzo(a,i)pyrene | 2025/03/25 | | 45 | % | 30 - 130 |
| | | | Benzo(e)pyrene | 2025/03/25 | | 93 | % | 30 - 130 |
| | | | Perylene | 2025/03/25 | | 113 | % | 30 - 130 |
| | | | Dibenzo(a,j) acridine | 2025/03/25 | | 102 | % | 30 - 130 |
| | | | 7H-Dibenzo(c,g) Carbazole | 2025/03/25 | | 92 | % | 30 - 130 |
| 9896850 | AHI | Method Blank | 1-Methylnaphthalene | 2025/03/25 | <0.3 | | ug/L | |
| | | | 2,4,6-Tribromophenol | 2025/03/25 | | 69 | % | 10 - 130 |
| | | | 2-Fluorobiphenyl | 2025/03/25 | | 78 | % | 30 - 130 |
| | | | 2-Methylnaphthalene | 2025/03/25 | <0.3 | | ug/L | |
| | | | D14-Terphenyl (FS) | 2025/03/25 | | 101 | % | 30 - 130 |
| | | | D5-Nitrobenzene | 2025/03/25 | | 90 | % | 30 - 130 |
| | | | D8-Acenaphthylene | 2025/03/25 | | 85 | % | 30 - 130 |
| | | | Fluorene | 2025/03/25 | <0.3 | | ug/L | |
| | | | Naphthalene | 2025/03/25 | <0.3 | | ug/L | |
| | | | Di-N-butyl phthalate | 2025/03/25 | <2 | | ug/L | |
| | | | Bis(2-ethylhexyl)phthalate | 2025/03/25 | <2 | | ug/L | |
| | | | Phenanthrene | 2025/03/25 | <0.2 | | ug/L | |
| | | | Anthracene | 2025/03/25 | <0.2 | | ug/L | |
| | | | Fluoranthene | 2025/03/25 | <0.2 | | ug/L | |
| | | | Pyrene | 2025/03/25 | <0.2 | | ug/L | |
| | | | Benzo(a)anthracene | 2025/03/25 | <0.2 | | ug/L | |
| | | | Chrysene | 2025/03/25 | <0.2 | | ug/L | |
| | | | Benzo(b/j)fluoranthene | 2025/03/25 | <0.2 | | ug/L | |
| | | | Benzo(k)fluoranthene | 2025/03/25 | <0.2 | | ug/L | |
| | | | Benzo(a)pyrene | 2025/03/25 | <0.2 | | ug/L | |
| | | | Indeno(1,2,3-cd)pyrene | 2025/03/25 | <0.2 | | ug/L | |
| | | | Dibenzo(a,h)anthracene | 2025/03/25 | <0.2 | | ug/L | |
| | | | Benzo(g,h,i)perylene | 2025/03/25 | <0.2 | | ug/L | |
| | | | Dibenzo(a,i)pyrene | 2025/03/25 | <0.2 | | ug/L | |
| | | | Benzo(e)pyrene | 2025/03/25 | <0.2 | | ug/L | |

## QUALITY ASSURANCE REPORT(CONT'D)

| QA/QC Batch | Init | QC Type | Parameter | Date Analyzed | Value | Recovery | UNITS | QC Limits |
|---|---|---|---|---|---|---|---|---|
| | | | Perylene | 2025/03/25 | <0.2 | | ug/L | |
| | | | Dibenzo(a,j) acridine | 2025/03/25 | <0.4 | | ug/L | |
| | | | 7H-Dibenzo(c,g) Carbazole | 2025/03/25 | <0.4 | | ug/L | |
| 9896850 | AHI | RPD [APAK85-04] | 1-Methylnaphthalene | 2025/03/25 | NC | | % | 40 |
| | | | 2-Methylnaphthalene | 2025/03/25 | NC | | % | 40 |
| | | | Fluorene | 2025/03/25 | NC | | % | 40 |
| | | | Naphthalene | 2025/03/25 | NC | | % | 40 |
| | | | Di-N-butyl phthalate | 2025/03/25 | NC | | % | 40 |
| | | | Bis(2-ethylhexyl)phthalate | 2025/03/25 | NC | | % | 40 |
| | | | Phenanthrene | 2025/03/25 | NC | | % | 40 |
| | | | Anthracene | 2025/03/25 | NC | | % | 40 |
| | | | Fluoranthene | 2025/03/25 | NC | | % | 40 |
| | | | Pyrene | 2025/03/25 | NC | | % | 40 |
| | | | Benzo(a)anthracene | 2025/03/25 | NC | | % | 40 |
| | | | Chrysene | 2025/03/25 | NC | | % | 40 |
| | | | Benzo(b/j)fluoranthene | 2025/03/25 | NC | | % | 40 |
| | | | Benzo(k)fluoranthene | 2025/03/25 | NC | | % | 40 |
| | | | Benzo(a)pyrene | 2025/03/25 | NC | | % | 40 |
| | | | Indeno(1,2,3-cd)pyrene | 2025/03/25 | NC | | % | 40 |
| | | | Dibenzo(a,h)anthracene | 2025/03/25 | NC | | % | 40 |
| | | | Benzo(g,h,i)perylene | 2025/03/25 | NC | | % | 40 |
| | | | Dibenzo(a,i)pyrene | 2025/03/25 | NC | | % | 40 |
| | | | Benzo(e)pyrene | 2025/03/25 | NC | | % | 40 |
| | | | Perylene | 2025/03/25 | NC | | % | 40 |
| | | | Dibenzo(a,j) acridine | 2025/03/25 | NC | | % | 40 |
| | | | 7H-Dibenzo(c,g) Carbazole | 2025/03/25 | NC | | % | 40 |
| 9902107 | MPJ | Reagent Blank | Mercury (Hg) | 2025/04/01 | <0.00010 | | mg/L | |
| 9902107 | MPJ | Matrix Spike | Mercury (Hg) | 2025/04/01 | | 89 | % | 75 - 125 |
| 9902107 | MPJ | Spiked Blank | Mercury (Hg) | 2025/04/01 | | 97 | % | 80 - 120 |
| 9902107 | MPJ | Method Blank | Mercury (Hg) | 2025/04/01 | <0.00010 | | mg/L | |
| 9902107 | MPJ | RPD | Mercury (Hg) | 2025/04/01 | NC | | % | 20 |
| 9904773 | CTC | Spiked Blank | D10-N-nitrosodiethylamine | 2025/04/08 | | 81 | % | 10 - 150 |
| | | | D14-N-Nitrosodi-n-propylamine | 2025/04/08 | | 90 | % | 10 - 150 |
| | | | D6-N-Nitrosodimethylamine | 2025/04/08 | | 38 | % | 10 - 80 |
| | | | D8-N-Nitrosomorpholine | 2025/04/08 | | 64 | % | 10 - 150 |
| | | | N-Nitrosodimethylamine | 2025/04/08 | | 101 | % | 65 - 135 |
| 9904773 | CTC | RPD | N-Nitrosodimethylamine | 2025/04/08 | 3.6 | | % | 25 |
| 9904773 | CTC | Method Blank | D10-N-nitrosodiethylamine | 2025/04/09 | | 85 | % | 10 - 150 |
| | | | D14-N-Nitrosodi-n-propylamine | 2025/04/09 | | 92 | % | 10 - 150 |
| | | | D6-N-Nitrosodimethylamine | 2025/04/09 | | 40 | % | 10 - 80 |
| | | | D8-N-Nitrosomorpholine | 2025/04/09 | | 64 | % | 10 - 150 |
| | | | N-Nitrosodimethylamine | 2025/04/09 | <2.00 | | ng/L | |
| 9907339 | RAK | Spiked Blank | 37CL4 2378 Tetra CDD | 2025/04/15 | | 75 | % | 35 - 197 |
| | | | C13-1234678 HeptaCDD | 2025/04/15 | | 107 | % | 23 - 140 |
| | | | C13-1234678 HeptaCDF | 2025/04/15 | | 89 | % | 28 - 143 |
| | | | C13-123478 HexaCDD | 2025/04/15 | | 95 | % | 32 - 141 |
| | | | C13-123478 HexaCDF | 2025/04/15 | | 83 | % | 26 - 152 |
| | | | C13-1234789 HeptaCDF | 2025/04/15 | | 103 | % | 28 - 138 |
| | | | C13-123678 HexaCDD | 2025/04/15 | | 101 | % | 28 - 130 |
| | | | C13-123678 HexaCDF | 2025/04/15 | | 86 | % | 26 - 123 |
| | | | C13-12378 PentaCDD | 2025/04/15 | | 114 | % | 25 - 181 |
| | | | C13-12378 PentaCDF | 2025/04/15 | | 109 | % | 24 - 185 |
| | | | C13-123789 HexaCDF | 2025/04/15 | | 92 | % | 29 - 147 |

## QUALITY ASSURANCE REPORT(CONT'D)

| QA/QC Batch | Init | QC Type | Parameter | Date Analyzed | Value | Recovery | UNITS | QC Limits |
|---|---|---|---|---|---|---|---|---|
| | | | C13-234678 HexaCDF | 2025/04/15 | | 91 | % | 28 - 136 |
| | | | C13-23478 PentaCDF | 2025/04/15 | | 115 | % | 21 - 178 |
| | | | C13-2378 TetraCDD | 2025/04/15 | | 76 | % | 25 - 164 |
| | | | C13-2378 TetraCDF | 2025/04/15 | | 78 | % | 24 - 169 |
| | | | C13-OCDD | 2025/04/15 | | 127 | % | 17 - 157 |
| | | | 2,3,7,8-Tetra CDD | 2025/04/15 | | 98 | % | 67 - 158 |
| | | | 1,2,3,7,8-Penta CDD | 2025/04/15 | | 100 | % | 25 - 181 |
| | | | 1,2,3,4,7,8-Hexa CDD | 2025/04/15 | | 98 | % | 70 - 164 |
| | | | 1,2,3,6,7,8-Hexa CDD | 2025/04/15 | | 100 | % | 76 - 134 |
| | | | 1,2,3,7,8,9-Hexa CDD | 2025/04/15 | | 101 | % | 64 - 162 |
| | | | 1,2,3,4,6,7,8-Hepta CDD | 2025/04/15 | | 98 | % | 70 - 140 |
| | | | Octa CDD | 2025/04/15 | | 101 | % | 78 - 144 |
| | | | 2,3,7,8-Tetra CDF | 2025/04/15 | | 86 | % | 75 - 158 |
| | | | 1,2,3,7,8-Penta CDF | 2025/04/15 | | 99 | % | 80 - 134 |
| | | | 2,3,4,7,8-Penta CDF | 2025/04/15 | | 99 | % | 68 - 160 |
| | | | 1,2,3,4,7,8-Hexa CDF | 2025/04/15 | | 101 | % | 72 - 134 |
| | | | 1,2,3,6,7,8-Hexa CDF | 2025/04/15 | | 95 | % | 84 - 130 |
| | | | 2,3,4,6,7,8-Hexa CDF | 2025/04/15 | | 97 | % | 70 - 156 |
| | | | 1,2,3,7,8,9-Hexa CDF | 2025/04/15 | | 94 | % | 78 - 130 |
| | | | 1,2,3,4,6,7,8-Hepta CDF | 2025/04/15 | | 101 | % | 82 - 122 |
| | | | 1,2,3,4,7,8,9-Hepta CDF | 2025/04/15 | | 96 | % | 78 - 138 |
| | | | Octa CDF | 2025/04/15 | | 97 | % | 63 - 170 |
| 9907339 | RAK | RPD | 2,3,7,8-Tetra CDD | 2025/04/15 | 3.0 | | % | 25 |
| | | | 1,2,3,7,8-Penta CDD | 2025/04/15 | 3.0 | | % | 25 |
| | | | 1,2,3,4,7,8-Hexa CDD | 2025/04/15 | 1.0 | | % | 25 |
| | | | 1,2,3,6,7,8-Hexa CDD | 2025/04/15 | 2.0 | | % | 25 |
| | | | 1,2,3,7,8,9-Hexa CDD | 2025/04/15 | 2.9 | | % | 25 |
| | | | 1,2,3,4,6,7,8-Hepta CDD | 2025/04/15 | 2.0 | | % | 25 |
| | | | Octa CDD | 2025/04/15 | 0.99 | | % | 25 |
| | | | 2,3,7,8-Tetra CDF | 2025/04/15 | 2.3 | | % | 25 |
| | | | 1,2,3,7,8-Penta CDF | 2025/04/15 | 4.0 | | % | 25 |
| | | | 2,3,4,7,8-Penta CDF | 2025/04/15 | 2.0 | | % | 25 |
| | | | 1,2,3,4,7,8-Hexa CDF | 2025/04/15 | 1.0 | | % | 25 |
| | | | 1,2,3,6,7,8-Hexa CDF | 2025/04/15 | 6.1 | | % | 25 |
| | | | 2,3,4,6,7,8-Hexa CDF | 2025/04/15 | 5.0 | | % | 25 |
| | | | 1,2,3,7,8,9-Hexa CDF | 2025/04/15 | 5.2 | | % | 25 |
| | | | 1,2,3,4,6,7,8-Hepta CDF | 2025/04/15 | 3.9 | | % | 25 |
| | | | 1,2,3,4,7,8,9-Hepta CDF | 2025/04/15 | 5.1 | | % | 25 |
| | | | Octa CDF | 2025/04/15 | 3.1 | | % | 25 |
| 9907339 | RAK | Method Blank | 37CL4 2378 Tetra CDD | 2025/04/15 | | 67 | % | 35 - 197 |
| | | | C13-1234678 HeptaCDD | 2025/04/15 | | 98 | % | 23 - 140 |
| | | | C13-1234678 HeptaCDF | 2025/04/15 | | 80 | % | 28 - 143 |
| | | | C13-123478 HexaCDD | 2025/04/15 | | 102 | % | 32 - 141 |
| | | | C13-123478 HexaCDF | 2025/04/15 | | 84 | % | 26 - 152 |
| | | | C13-1234789 HeptaCDF | 2025/04/15 | | 92 | % | 28 - 138 |
| | | | C13-123678 HexaCDD | 2025/04/15 | | 96 | % | 28 - 130 |
| | | | C13-123678 HexaCDF | 2025/04/15 | | 85 | % | 26 - 123 |
| | | | C13-12378 PentaCDD | 2025/04/15 | | 100 | % | 25 - 181 |
| | | | C13-12378 PentaCDF | 2025/04/15 | | 88 | % | 24 - 185 |
| | | | C13-123789 HexaCDF | 2025/04/15 | | 87 | % | 29 - 147 |
| | | | C13-234678 HexaCDF | 2025/04/15 | | 89 | % | 28 - 136 |
| | | | C13-23478 PentaCDF | 2025/04/15 | | 101 | % | 21 - 178 |
| | | | C13-2378 TetraCDD | 2025/04/15 | | 73 | % | 25 - 164 |

## QUALITY ASSURANCE REPORT(CONT'D)

| QA/QC Batch | Init | QC Type | Parameter | Date Analyzed | Value | Recovery | UNITS | QC Limits |
|---|---|---|---|---|---|---|---|---|
| | | | C13-2378 TetraCDF | 2025/04/15 | | 73 | % | 24 - 169 |
| | | | C13-OCDD | 2025/04/15 | | 109 | % | 17 - 157 |
| | | | 2,3,7,8-Tetra CDD | 2025/04/15 | <0.949, EDL=0.949 | | pg/L | |
| | | | 1,2,3,7,8-Penta CDD | 2025/04/15 | <1.80, EDL=1.80 (2) | | pg/L | |
| | | | 1,2,3,4,7,8-Hexa CDD | 2025/04/15 | <1.19, EDL=1.19 | | pg/L | |
| | | | 1,2,3,6,7,8-Hexa CDD | 2025/04/15 | <1.12, EDL=1.12 | | pg/L | |
| | | | 1,2,3,7,8,9-Hexa CDD | 2025/04/15 | <1.11, EDL=1.11 | | pg/L | |
| | | | 1,2,3,4,6,7,8-Hepta CDD | 2025/04/15 | <1.37, EDL=1.37 | | pg/L | |
| | | | Octa CDD | 2025/04/15 | 1.72, EDL=0.807 | | pg/L | |
| | | | Total Tetra CDD | 2025/04/15 | <0.949, EDL=0.949 | | pg/L | |
| | | | Total Penta CDD | 2025/04/15 | <1.80, EDL=1.80 (2) | | pg/L | |
| | | | Total Hexa CDD | 2025/04/15 | <1.14, EDL=1.14 | | pg/L | |
| | | | Total Hepta CDD | 2025/04/15 | <1.37, EDL=1.37 | | pg/L | |
| | | | 2,3,7,8-Tetra CDF | 2025/04/15 | <0.979, EDL=0.979 | | pg/L | |
| | | | 1,2,3,7,8-Penta CDF | 2025/04/15 | <1.44, EDL=1.44 | | pg/L | |
| | | | 2,3,4,7,8-Penta CDF | 2025/04/15 | <1.18, EDL=1.18 | | pg/L | |
| | | | 1,2,3,4,7,8-Hexa CDF | 2025/04/15 | <1.29, EDL=1.29 | | pg/L | |
| | | | 1,2,3,6,7,8-Hexa CDF | 2025/04/15 | <1.13, EDL=1.13 | | pg/L | |
| | | | 2,3,4,6,7,8-Hexa CDF | 2025/04/15 | <1.19, EDL=1.19 | | pg/L | |
| | | | 1,2,3,7,8,9-Hexa CDF | 2025/04/15 | <1.40, EDL=1.40 | | pg/L | |
| | | | 1,2,3,4,6,7,8-Hepta CDF | 2025/04/15 | <1.13, EDL=1.13 | | pg/L | |
| | | | 1,2,3,4,7,8,9-Hepta CDF | 2025/04/15 | <1.17, EDL=1.17 | | pg/L | |
| | | | Octa CDF | 2025/04/15 | <1.27, EDL=1.27 | | pg/L | |
| | | | Total Tetra CDF | 2025/04/15 | <0.979, EDL=0.979 | | pg/L | |
| | | | Total Penta CDF | 2025/04/15 | <1.30, EDL=1.30 | | pg/L | |
| | | | Total Hexa CDF | 2025/04/15 | <1.24, EDL=1.24 | | pg/L | |

## QUALITY ASSURANCE REPORT(CONT'D)

| QA/QC Batch | Init | QC Type | Parameter | Date Analyzed | Value | Recovery | UNITS | QC Limits |
|---|---|---|---|---|---|---|---|---|
| | | | Total Hepta CDF | 2025/04/15 | <1.15, EDL=1.15 | | pg/L | |

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Reagent Blank: A blank matrix containing all reagents used in the analytical procedure. Used to determine any analytical contamination.

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

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Surrogate recovery was above the upper control limit. This may represent a high bias in some results.

(2) EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.RT>2 seconds - PCDD/DF analysis-Peak maxima of monitored ions exceeds 2 seconds

## VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Angel Guerrero, Supervisor, Ultra Trace Analysis, HRMS and SVOC

Jessica (Ya Ping) Qiang, Analyst II

Louise Harding, Scientific Specialist

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Rodney Major, General Manager responsible for Ontario Environmental laboratory operations.



Bureau Veritas 100 – 36 Antares Dr. Nepean, ON, K2E 7W5 Phone: 613-274-0573 Website: www.bvna.com

# APPENDIX IV

# CURRICULUM VITAE

# Zen Keizars, P.Geo., FGC

| | | |
|---|---|---|
| **Position:** | Senior Hydrogeologist, Durham Office | |
| **Qualifications:** | M.Sc. Geology (Geochemistry) | University of Western Ontario |
| | B.Sc. (Honours) Geology (Geochemistry) | McMaster University |
| **Experience:** | Terrapex Environmental Ltd. – Senior Hydrogeologist | 2020 to present |
| | Trent University – Sessional Professor | 2015 to present |
| | Beacon Environmental Ltd. – Practice Lead, Hydrogeology | 2018 to 2020 |
| | Golder Environmental Ltd. – Hydrogeologist | 2016 to 2018 |
| | Anthropocene Green Inc. – Senior Project Manager | 2015 to 2016 |
| | WSP / Genivar – Project Manager | 2012 to 2015 |

Zen Keizars is a Senior Hydrogeologist with over twenty years of experience leading projects, with a focus on hydrogeological investigations and water-balance assessments. His extensive ground-level experience and broad theoretical skill-set are ideal for providing fast and adaptive multi-disciplinary support at any level.

Mr. Keizars is the current Vice President, and a Past President of Professional Geoscientists Ontario (PGO; previously APGO) and a sessional instructor at Trent University, providing instruction in several non-elective third-year courses. Zen sits on several Municipal Committees, including the Groundwater Strategy Steering Committee (City of Toronto), and the Watershed Characterization Committee (City of Peterborough). In recognition of his professionalism and contributions to geoscience, Zen was awarded a lifetime Fellowship to Geoscientists Canada (FGC) in 2020.

**Representative projects include the following:**

*Fotenn Planning & Design:*
Hydrogeological Investigation, Ontario Place – 955 Lake Shore Boulevard West, Toronto, Ontario

*Corporation of the City of Brampton:*
Hydrogeological Investigation, 125 McLaughlin Road North, Brampton, Ontario

*Township of King:*
Hydrogeological Investigation and Water Balance Assessment, Seneca College - 13990 Dufferin Street, Township of King

*Corporation of the County of Prince Edward:*
Third-party Peer Review: Hydrogeological Investigation, Stinson Block Road Subdivision, Community of Consecon, Prince Edward County, Ontario

*CreateTO :*
Hydrogeological Investigation, Bus Station – 610 Bay Street and 130 Elizabeth Street, Toronto, Ontario

*CreateTO :*
Hydrogeological Investigation, 3586 Lawrence Heights East, Toronto, Ontario

*CreateTO :*
Hydrogeological Investigation, Bus Station – 610 Bay Street and 130 Elizabeth Street, Toronto, Ontario

*CreateTO:*
Hydrogeological Investigation, 1190 York Mills Road, Toronto, Ontario

*CreateTO:*
Hydrogeological Investigation, 1035 Sheppard Avenue West, Toronto, Ontario.

*First Capital Asset Management:*
Hydrogeological Investigation, 3434 Lawrence Avenue East, Toronto, Ontario.

*First Capital Asset Management:*
Hydrogeological Investigation, 34-70 Montgomery Avenue, Toronto, Ontario.

*First Capital Asset Management:*
Hydrogeological Investigation, 2650 Lawrence Avenue East, Toronto, Ontario.

*First Capital Asset Management:*
Hydrogeological Investigation, 245 Morningside Avenue, Toronto, Ontario.

*Hazelview Investments:*
Hydrological Review, Proposed Mixed-Use Development, 1590 and 1650 Dundas Street East, Mississauga, Ontario.

*Daniels High Rise Corporation:*
Hydrogeological Investigation, Proposed Mixed-Use Development, Gerrard Street East and Parliament Street, Toronto, Ontario.

*Daniels High Rise Corporation:*
Hydrogeological Investigation, Dundas Street East and Postridge Drive, Oakville, Ontario

*The MBTW Group:*
Unnamed Park 524 and 525 Hydrogeological Assessment and Feature-based Water Balance.

*Starlight Investments Inc.:*
Hydrogeological Investigation and Water Balance, 37 Johnson Street, Barrie, Ontario.

*LIV Communities:*
Hydrogeological Investigation and Feature-Based Water Balance, 620 Colborne Avenue, Brantford, Ontario.

*GFL:*
Hydrogeological Investigation, Proposed Compost Operations Relocation, 17125 Lafleche Road, Moose Creek, Ontario

*Smart Centres:*
Preliminary Geotechnical and Hydrogeological Investigation, Major Weston Centres Limited Site – Toronto, Ontario.

*Smart Centres:*
Hydrogeological Investigation and Water Balance, 51, 53, 55, & 75 Bradford St. and 20 Checkley St., Barrie, Ontario

# ANDREW DURBANO, M.Sc., P.Geo.

| | | | |
|---|---|---|---|
| **Education:** | M.Sc. Geology | 2014 | University of Saskatchewan, Saskatoon |
| | B.Sc. Honors Specialization in Environmental Geoscience | 2009 | University of Western Ontario, London |
| **Professional Associations:** | Professional Geoscientist (P.Geo), Professional Geoscientists Ontario (PGO) | | |
| **Safety Training:** | Standard First Aid and CPR<br>Petroleum Oriented Safety Training (POST)<br>Workplace Hazardous Materials Information System (WHMIS) | | |

## EXPERIENCE

### 2022 to present – Terrapex Environmental Ltd., Toronto, ON

### Project Manager/ Hydrogeologist

Responsible for planning, coordinating, and executing hydrogeological field work programs, including report writing, data compilation, and analysis.

Duties and responsibilities included:

- Conducting groundwater well drilling and installation, groundwater monitoring, groundwater sampling, and well response tests as part of municipal foundation drainage requirements for clients (e.g., land developers)
- Conducting short-term construction dewatering calculations as part of the groundwater provincial permitting process for clients
- Writing detailed technical reports that summarize the methods, findings, and recommendations produced under the described scope of work
- Troubleshooting equipment and logistical issues over the phone with field technicians on site to complete field work in a timely manner
- Training and mentoring field staff in best fieldwork practices and data analysis to help improve efficiency and foster a more team-oriented workplace

### 2018 to 2022 – Terrapex Environmental Ltd., Toronto, ON

### Geo-Environmental Field Technician

Responsible for coordinating and executing a wide range of field work programs, including collection of field data, data compilation, analysis, and assisting in report writing.

Duties and responsibilities included:

- Conducting groundwater well drilling and installation, soil vapour monitoring, groundwater monitoring, surveying, and groundwater sampling as part of municipal and provincial environmental requirements for clients (e.g., landowners, developers)

- Supervision of the decommissioning of groundwater monitoring wells as part of provincial requirements for clients
- Assisting in the completion of detailed technical reports for the purposes of meeting provincial environmental requirements for clients, which included compiling soil and groundwater laboratory analysis data, analyzing groundwater data, and reviewing maps for bedrock geology and topography
- Training and mentoring new/ junior field staff in conducting safe and efficient fieldwork practices and data collection to help maintain a high standard of safety and fostering teamwork while working on site for clients

**2014 –2017 – Geological Survey of Canada, Calgary, AB**

**Physical Scientist**

Temporary full-time contract position renewed multiple times between 2014 and 2017, responsible for data compilation, analysis, and report writing of deliverables under the direction of Research Scientists.

Duties and responsibilities included:

- Participating as an active member of a fieldwork expedition to Banks Island, Northwest Territories, operating under a strict timeframe to complete research goals
- Compiling and analyzing relevant petroleum geochemistry data and structural geology data in Excel and ArcGIS
- Geologic modelling of petroleum geochemistry data through use of Geospatial Analyst tool in ArcGIS
- Created maps and technical figures for open file reports and scientific research papers
- Assisted in writing open file reports
- Published a research paper from M.Sc. thesis.

**2012 (summer) – Husky Energy, Calgary, AB**

**Geology Summer Student**

Duties and responsibilities included:

- Picking formation tops, created isopach and structure maps, and correlating well log cross-sections using AccuMap and Geographix software
- Logging core for sedimentological analysis
- Participating as part of a team to integrate well log, map data and 3-D seismic to meet project goals within timeframe

**2010 –2012 – Geological Survey of Canada, Calgary, AB**

**Research Affiliate**

Duties and responsibilities included:

- Participating as an active member of two fieldwork expeditions on Victoria Island, Northwest Territories operating under a strict timeframe. Mapping was ground-based with handheld devices loaded with ArcGIS software with additional airborne mapping and outcrop stratigraphy
- Measured sections and collected rock samples for the analysis of trace fossils

- Logged core for the detailed examination of sedimentary structures.

**Publications**


- Durbano, A.M., Hadlari, T., Fallas, K.M., and Jiang, C., 2017. Combined depth and S1 maps from Rock-Eval 6/TOC data of the Canol Formation, northern Mackenzie Valley, Northwest Territories; Geological Survey of Canada, Open File 8206.
- Hadlari, T., Midwinter, D., Galloway, J.M., Dewing, K. and Durbano, A.M., 2016. Mesozoic rift to post-rift tectonostratigraphy of the Sverdrup Basin, Canadian Arctic. Marine and Petroleum Geology 76, 148–158.
- Hadlari, T., MacLean, B.C., Pyle L.J., Fallas, K.M., and Durbano A.M., 2015. A combined depth and thermal maturity map of the Canol Formation, northern Mackenzie Valley, NWT; Geological Survey of Canada, Open File 7865.
- Durbano, A.M., Pratt, B.R., Hadlari, T. and Dewing, K., 2015. Sedimentology of an early Cambrian tide-dominated embayment: Quyuk Formation, Victoria Island, Arctic Canada. Sedimentary Geology 320, 1–18.