

DEWATERING ASSESSMENT – PROPOSED EXCAVATION

1047 Richmond Road
Ottawa, Ontario

CO972.00

REPORT

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**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)
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	-	1.89×10^{-6}
BH22-4	Saturated	Limestone (bedrock)	4.3 to 7.92	-	1.59×10^{-6}
BH21-4	Saturated	Limestone (bedrock)	4.57 to 7.62	-	1.82×10^{-6}
BH21-15A	Saturated	Limestone (bedrock)	3.96 to 7.01	RQD 40% to 80%	1.80×10^{-6}
BH21-22	Saturated	Sand and silt	0.9 to 4.27	-	8.64×10^{-6}
BH21-22	Saturated	Limestone (bedrock)	0.9 to 4.27	-	3.24×10^{-8}
BH22-08	Saturated	Limestone (bedrock)	8.5 to 10	-	1.64×10^{-6}
BH21-01	Saturated	Limestone (bedrock)	8.08 to 9.6	-	1.27×10^{-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 3.24×10^{-8} m/s to 8.64×10^{-6} m/s at the locations and depths tested. The highest measured hydraulic conductivity for the overburden was 8.64×10^{-6} m/s, seen in the sand and silt materials, whereas the highest measured hydraulic conductivity for the bedrock was 1.82×10^{-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 m².

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 m² 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)
	77.67 m x 62 m (~4,815 m ²)
Approximate Ground Surface:	0 mbg datum (approximately 65.0 masl)
Target dewatering depth:	7.24 mbg + 1 m (slab) = 8.24 mbg
Hydraulic conductivity:	8.6 x 10 ⁻⁶ m/s (overburden) 1.8 x 10 ⁻⁶ m/s (bedrock)
Highest measured static groundwater elevation:	1.80 mbg (at BH21-14) (64.39 masl)
Estimated Drawdown:	Total Drawdown: 8.24 mbg – 1.80 mbg = 6.44 m
	Overburden: 65 masl - 61.99 masl – 1.80 mbg = 2.16 m
	Bedrock: 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 = 8.6×10^{-6} m/s	77.67 m / 62 m / 2.16 m	28,282	72,233	100,515	114,656	19
Bedrock K = 1.8×10^{-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 mm² 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. The City will have to review the dewatering discharge and issue the applicable permit(s).

** 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 5.1.4**, the ZOI was calculated to be approximately 19 m within overburden and approximately 17 m within bedrock (**Table 4**, 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 GROUNDWATER AND GEOTECHNICAL MONITORING PROGRAM (GGMP)

In order to monitor and mitigate potential impacts of any dewatering operation, it is recommended that an Groundwater and Geotechnical Monitoring Program (GGMP) be developed. The key points of the proposed recommended GGMP 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 5.1.4**, the Zone of Influence (ZOI) is estimated to be 19m within overburden and approximately 17 m within bedrock (**Table 4**, 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.

A Private Water Discharge Agreement is required for discharge of construction dewatering to City sewers. The City will have to review the dewatering discharge and issue the applicable permit(s).

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.

A Private Water Discharge Agreement is required for discharge of construction dewatering to City sewers. The City will have to review the dewatering discharge and issue the applicable permit(s).

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 contractor 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 8.6×10^{-6} m/s in the overburden, and 1.8×10^{-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



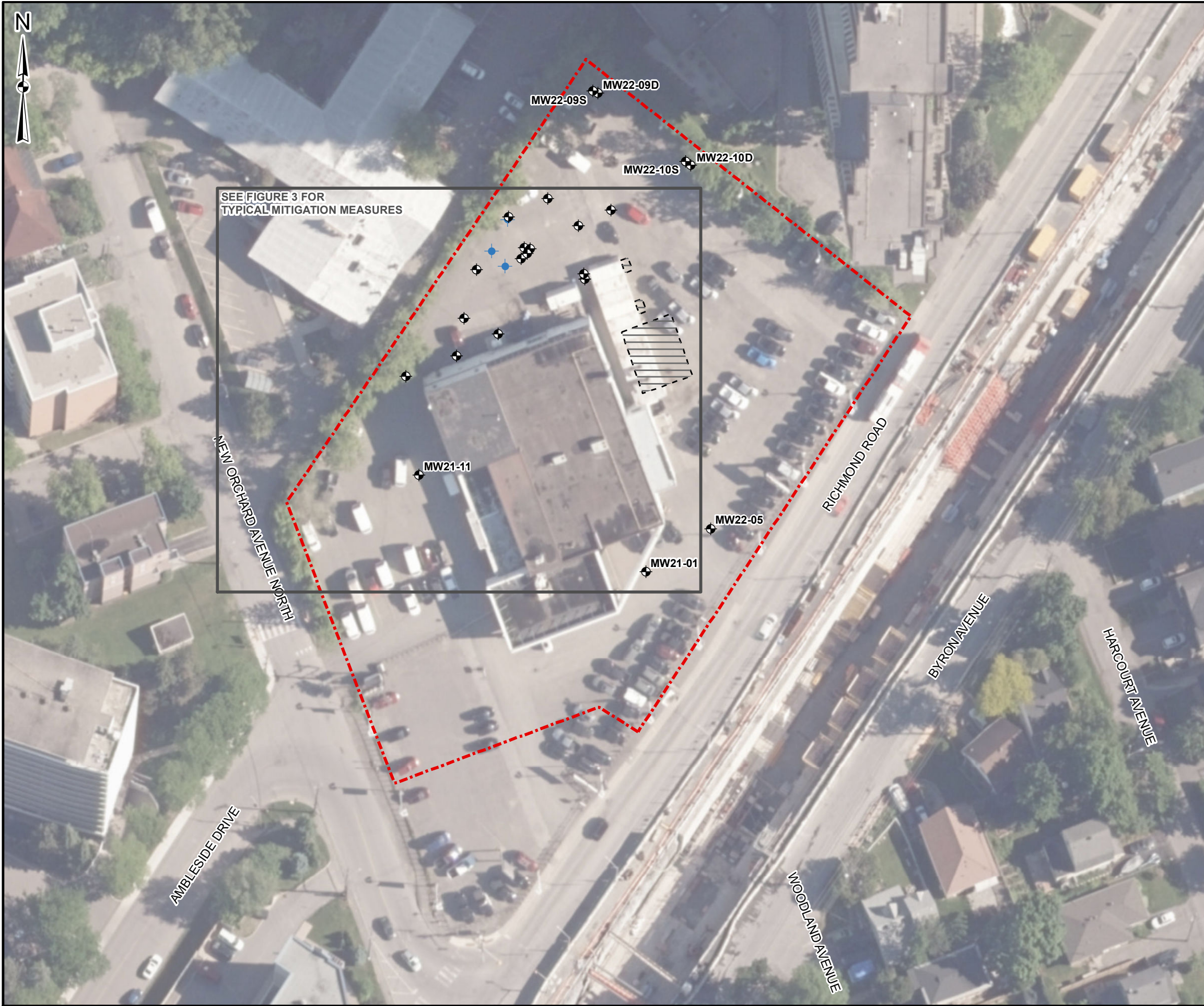
FIGURES



LEGEND  SITE BOUNDARY			CLIENT: FENGATE		
			SITE LOCATION: 1047 RICHMOND ROAD OTTAWA, ONTARIO		
					
			TITLE: SITE LOCATION		
DRAWN BY: JS		PROJECT NO.: CO972.00		CHECKED BY: ZK	
REVISION: 00		DATE: JULY 2024		FIGURE: 1	

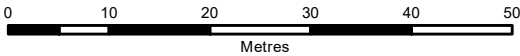
DATA SOURCE: ESRI
MAP PROJECTION: NAD 1983 UTM Zone 18N

C:\Users\jwilliams\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)



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

CLIENT:

FENGATE

SITE LOCATION:

1047 RICHMOND ROAD
OTTAWA, ONTARIO



TITLE:

STUDY AREA

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



Legend

□ c1047Richmond_Buffer

● Water Service Location

w_pipe

Struct_Type

— WATM

— WATS

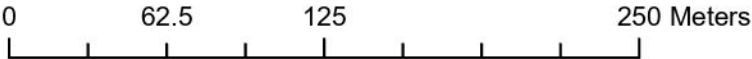


Figure 3

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



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.

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

CLIENT:

FENGATE

SITE LOCATION:

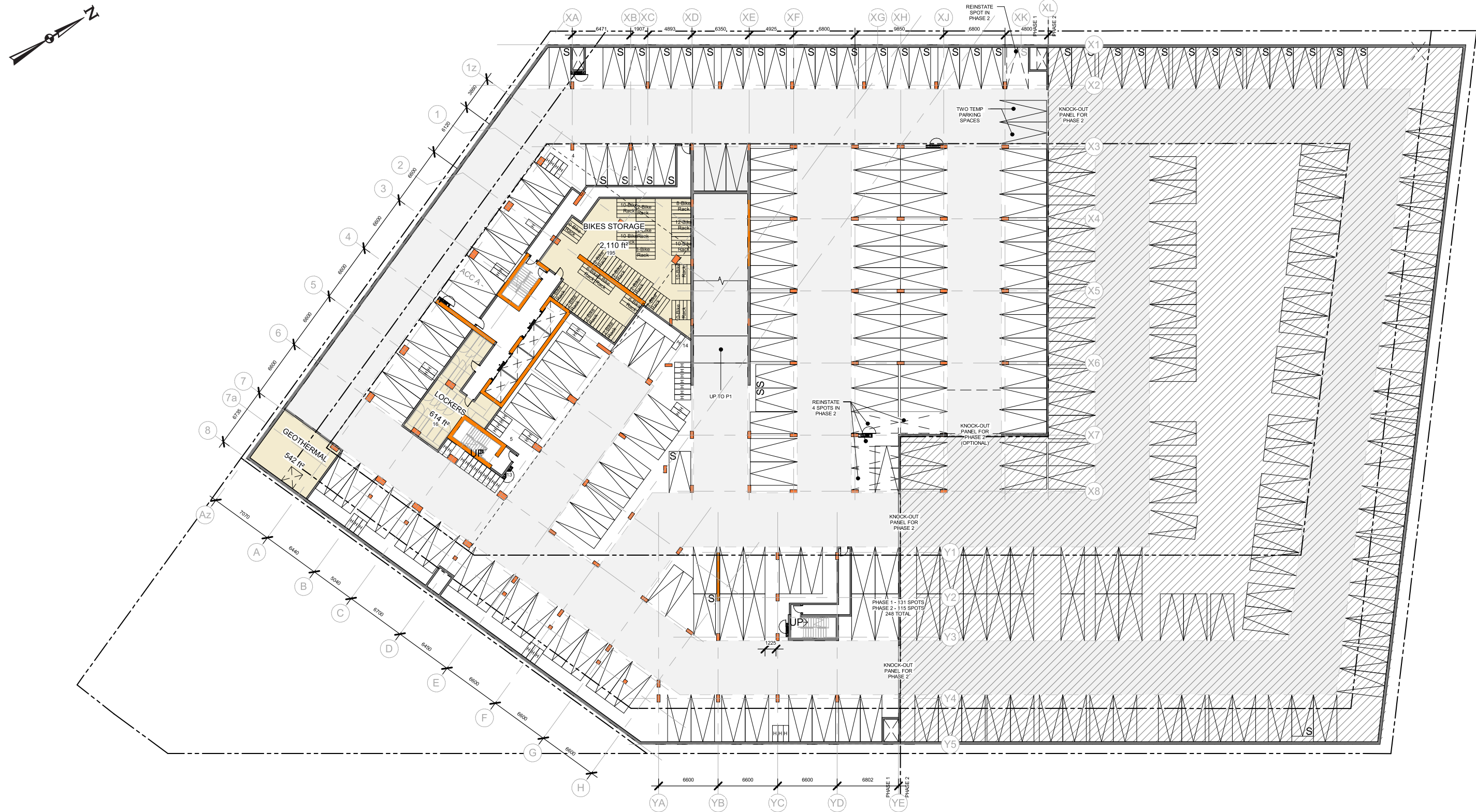
1047 RICHMOND ROAD
OTTAWA, ONTARIO

TERRAPEX

TITLE:

TYPICAL MITIGATION MEASURES

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



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

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

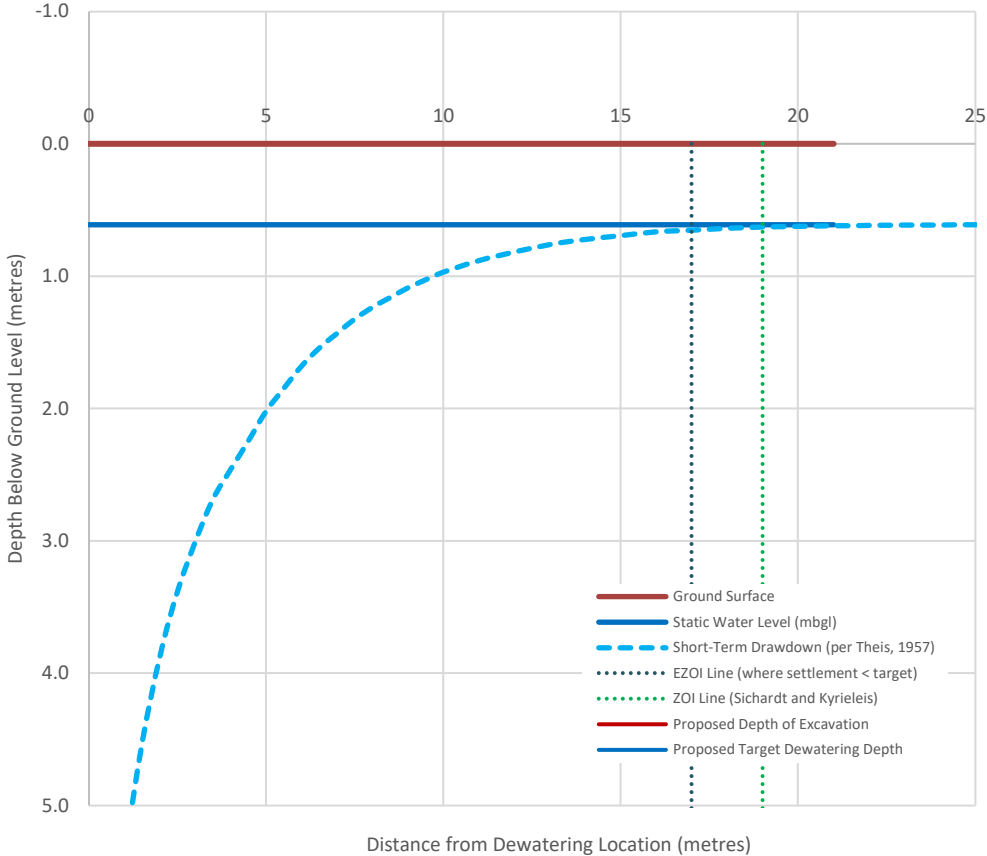
Ground Level	0 mbg
Static Groundwater Level	0.61 mbg
Approximate Depth to Bedrock	62.84 mbg
Target Depth of Proposed Dewatering Operations	63.84 mbg
Maximum Settlement Target	0.05 m
Short-Term EZOI Line (FOS = 2.0)	17.00 m radius
Asymptotic ZOI (Sichardt and Kyrieleis)	19.00 m radius

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



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			SAMPLES		HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.30m	HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □				WATER CONTENT PERCENT					
								ND = Not Detected				Wp ——— W ——— WI					
								ND = Not Detected				20 40 60 80					
0	Power Auger 200 mm Diam. (Hollow Stem)	GROUND SURFACE		65.73													
		ASPHALT		0.00													
		FILL - (SW) gravelly SAND, angular; brown (PAVEMENT STRUCTURE); non-cohesive, moist FILL - (SM) gravelly SILTY SAND; grey to dark brown, trace sand (SP); non-cohesive, moist, compact to very loose		0.10	1	SS	19	ND						Metals	Flush Mount Casing		
				65.43													
1				0.30	2	SS	4	ND									
					3	SS	2	ND						PHCs, VOCs			
2	Air Hammer H Bit	BEDROCK (Auger Refusal) (Air hammer from 1.83 m to 7.62 m)		63.90											Bentonite Seal		
				1.83													
3																	
4															Silica Sand		
5																	
6																	
7																	
8		End of Borehole		58.11											50 mm Diam. PVC #10 Slot Screen		
		Note(s):		7.62													
9		1. Water level at BH21-01 measured at a depth of 7.68 m (Elev. 58.04 m) on October 4, 2021															
10		2. Record of borehole log not prepared for geotechnical engineering purposes															

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

DEPTH SCALE

1 : 50

**GOLDER**

LOGGED: DG

CHECKED: AG

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	SOIL PROFILE		SAMPLES		HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.30m	HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □				WATER CONTENT PERCENT					
								ND = Not Detected				Wp — W — Wi					
								100	200	300	400						
								100	200	300	400						
								10 ⁻⁶	10 ⁻⁵	10 ⁻⁴	10 ⁻³						
								Wp		W		Wi					
								20	40	60	80						
0		GROUND SURFACE		65.46													
	Power Auger 200 mm Diam. (Hollow Stem)	ASPHALT		0.08										Metals	Flush Mount Casing		
		FILL - (SW) gravelly SAND, angular; grey (PAVEMENT STRUCTURE); non-cohesive, moist		65.16	1	SS	22	ND									
				0.30													
1					2	SS	31	ND									
		FILL - (SP) SAND, fine to medium, trace silt; brown; non-cohesive, moist, compact to dense															
			64.24														
				1.22	3	SS	10	ND									
		FILL - (SM/GP) SILTY SAND and GRAVEL; dark brown, contains brick fragments and rootlets; non-cohesive, moist, compact		63.63													
				1.83	4	SS	>84	ND						Bentonite Seal			
2		Highly weathered BEDROCK															
					5	SS	>50	ND						PHCs, VOCs			
3				62.41													
				3.05													
		BEDROCK (Auger Refusal) (Air hammer from 3.05 M TO 7.62 M)															
4																	
	Air Hammer H Bit																
5																	
6																	
7																	

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	SOIL PROFILE		SAMPLES		HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕ ND = Not Detected				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.30m	HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □ ND = Not Detected				WATER CONTENT PERCENT					
								100	200	300	400	10 ⁻⁶	10 ⁻⁵			10 ⁻⁴	10 ⁻³
0		GROUND SURFACE		65.24													
	Power Auger 200 mm Diam. (Hollow Stem)	ASPHALT		0.08	1	SS	43	ND							Flush Mount Casing		
		FILL - (SW) gravelly SAND, angular; grey (PAVEMENT STRUCTURE); non-cohesive, moist		64.63											VOCs		
		FILL - (SP) SAND, fine to medium, trace silt; brown; non-cohesive, moist, dense		64.61	2	SS	31	ND							PHCs		
1		FILL - (SM) SILTY SAND, some topsoil, trace gravel; dark brown, contains shale fragments; non-cohesive, moist, compact		64.02	3	SS	12	ND							Metals		
		Highly weathered BEDROCK		63.41													
2			1.83	4	SS	>94	ND								Bentonite Seal		
				5	SS	52/ 6"											
3			62.19														
		BEDROCK (Auger Refusal) (Air hammer from 3.05 m to 7.62 m)		3.05													
4																	
5	Air Hammer H Bit																
6																	
7																	
8		End of Borehole		57.62													
		Note(s):		7.62													
9		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															
10																	

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

DEPTH SCALE

1 : 50

**GOLDER**

LOGGED: DG

CHECKED: AG

SHEET 1 OF 1

DATUM: Geodetic

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

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

CHECKED: AG

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

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

DEPTH SCALE

1 : 50



GOLDER

LOGGED: DG

CHECKED: AG

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			SAMPLES			HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.30m	ND = Not Detected				10 ⁻⁶ 10 ⁻⁵ 10 ⁻⁴ 10 ⁻³					
								HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □				WATER CONTENT PERCENT					
								ND = Not Detected				Wp — W — Wi					
								100	200	300	400			20	40	60	80
0		GROUND SURFACE		65.26													
	Power Auger Geoprobe	GRAVEL		0.00													Flush Mount Casing
		(SP) SAND; brown; non-cohesive, dry		0.30	1	SS		ND									
				64.96													
1		(SM) SILTY SAND; grey-brown; non-cohesive, dry		0.76				ND									Metals, PHCs, VOCs
				64.50	2	SS		ND									Bentonite Seal
		Soft, broken, LIMESTONE		1.52	3	SS		ND								Metals	
2				63.74													
3																	
4																	
5																	
6		End of Borehole Upon Refusal		59.72													50 mm Diam. PVC #10 Slot Screen
				5.54													
7		Note(s):															
		1. Water level at BH21-11 measured at a depth of 2.96 m (Elev. 62.30 m) on November 30, 2021															
		2. Record of borehole log not prepared for geotechnical engineering purposes															
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	SOIL PROFILE			SAMPLES		HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.30m	ND = <i>Not Detected</i> 100 200 300 400				10 ⁻⁶ 10 ⁻⁵ 10 ⁻⁴ 10 ⁻³					
								HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □				WATER CONTENT PERCENT					
								ND = <i>Not Detected</i> 100 200 300 400				Wp ———— W ———— Wi 20 40 60 80					
0	Power Auger Geoprobe	GROUND SURFACE		64.88													
		GRAVEL		0.00													
		(SP) SAND; brown; non-cohesive, dry		64.58	1	SS		⊕									
				0.30													
1					2	SS		⊕						Metals			
2		Soft, crushed, LIMESTONE		62.90	3	SS		□						Metals, PHCs, VOCs			
				1.98													
				62.34	4	SS		⊕									
				2.54													
3		End of Borehole Upon Refusal															
		Note(s):															
		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: 21-14

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	SOIL PROFILE			SAMPLES		HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.30m	ND = <i>Not Detected</i> 100 200 300 400				10 ⁻⁶ 10 ⁻⁵ 10 ⁻⁴ 10 ⁻³					
								HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □				WATER CONTENT PERCENT					
								ND = <i>Not Detected</i> 100 200 300 400				Wp — W — Wi 20 40 60 80					
0	Power Auger Geoprobe	GROUND SURFACE		64.84													
		GRAVEL		0.00													
		(SP) SAND; brown; non-cohesive, dry (SM) SILTY SAND; grey-brown; non-cohesive, dry		0.15	1	SS	□ ⊕ ND								Flush Mount Casing		
1				64.08													
					2	SS	□ ⊕ ND										
2		Soft, crushed, LIMESTONE		63.16											Bentonite Seal		
				1.68	3	SS	□ ⊕ ND								PHCs, VOCs		
3																	
4															Silica Sand		
5		End of Borehole Upon Refusal		60.27											50 mm Diam. PVC #10 Slot Screen		
		Note(s):		4.57													
		1. Water level at BH21-14 measured at a depth of 2.48 m (Elev. 62.36 m) on November 30, 2021															
6		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: 21-15

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

SHEET 2 OF 2

DATUM: Geodetic

DRILLING CONTRACTOR: Marathon

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

CHECKED: DS

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		SAMPLES		HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕ ND = Not Detected				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.30m	HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □ ND = Not Detected				WATER CONTENT PERCENT					
												Wp ——— W ——— WI					
0	Power Auger Geoprobe	GROUND SURFACE		65.27													
		GRAVEL		0.00													
		(SM) SILTY SAND; grey-brown; non-cohesive, dry		0.15	1	SS	ND										
1					2	SS											
2		End of Borehole Upon Refusal		63.34													
		Note(s): 1. Record of borehole log not prepared for geotechnical engineering purposes		1.93													
3																	
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: 21-17

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		SAMPLES		HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕ ND = Not Detected				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.30m	HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □ ND = Not Detected				WATER CONTENT PERCENT					
												Wp — W — Wi					
0	Power Auger Geoprobe	GROUND SURFACE		65.64													
		GRAVEL		0.00													
		(SM) SILTY SAND; grey-brown; non-cohesive, dry		0.15	1	SS	ND										
1					2	SS	ND										
2					3	SS	ND										
		End of Borehole Upon Refusal		63.15													
3		Note(s):		2.49													
		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

SHEET 1 OF 1

DATUM: Geodetic

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

[illegible]

DEPTH SCALE

1 : 50



GOLDER

LOGGED: AB

CHECKED: DS

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	SOIL PROFILE			SAMPLES		HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕ <i>ND = Not Detected</i>				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.30m	HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □ <i>ND = Not Detected</i>				WATER CONTENT PERCENT					
								100 200 300 400				10 ⁻⁶ 10 ⁻⁵ 10 ⁻⁴ 10 ⁻³ Wp ———— W ———— Wl					
		GROUND SURFACE		65.95													
0	Hilti TE 3000 AVR Hammer Drill	CONCRETE pad		0.00 65.75											Flush Mount Casing		
		FILL - (SP) SAND, fine, trace silt; light brown; non-cohesive, dry, loose		0.20	1	SS		⊕	<i>ND</i>								PHCs, VOCs
					2	SS		⊕		<i>ND</i>							
1					3	SS		⊕			<i>ND</i>						
		(CL) SILTY CLAY, trace sand; dark grey; non-cohesive, dry, compact		64.32 1.63													
2	4				SS		⊕	<i>ND</i>									
	BEDROCK		63.92 2.03												Silica Sand		
3																	
4	Power Auger Geoprobe														52 mm Diam. PVC #10 Slot Screen		
5		End of Borehole		60.82 5.13													
		Note(s): 1. Water level at BH21-19 measured at a depth of 3.44 m (Elev. 62.51 m) on November 30, 2021 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			SAMPLES		HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕ <i>ND = Not Detected</i>				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.30m	HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □ <i>ND = Not Detected</i>				WATER CONTENT PERCENT					
								100	200	300	400	10 ⁻⁶	10 ⁻⁵	10 ⁻⁴			10 ⁻³
0	Power Auger Geoprobe	GROUND SURFACE		65.93													
		CONCRETE pad		0.00													
		FILL - (SP) SAND, fine, trace silt, trace clay, trace gravel; light to dark brown, cobbles; non-cohesive; dry		0.13	1	SS		□ ⊕ <i>ND</i>								Flush Mount Casing	
1					2	SS		□ ⊕ <i>ND</i>								PHCs, VOCs	
		(CL) SILTY CLAY, trace sand, trace gravel; dark grey; non-cohesive, dry		64.41 1.52	3	SS		□ ⊕ <i>ND</i>								Bentonite Seal	
2		BEDROCK	63.64 2.29	4	SS		□ ⊕ <i>ND</i>										
3																	
4																	
5																	
6		End of Borehole		60.75 5.18													
		Note(s): 1. Water level at BH21-20 measured at a depth of 3.82 m (Elev. 62.11 m) on November 30, 2021 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	SOIL PROFILE		SAMPLES		HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.30m	HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □				WATER CONTENT PERCENT					
								ND = Not Detected				Wp ——— W ——— WI					
								ND = Not Detected				20 40 60 80					
0		GROUND SURFACE		64.41													
	Power Auger Geoprobe	ASPHALT		0.00													
		SAND; brown; non-cohesive, moist		0.15	1	SS	⊕	ND									
				63.60													
1		SILT, trace sand; grey; cohesive, moidy		0.81	2	SS	⊕	ND									
				62.89													
		SAND, trace gravel; brown; non-cohesive		1.52	3	SS	□	⊕									
					4	SS	⊕	ND									
3				61.36													
		SAND, trace gravel; brown; non-cohesive, wet		3.05	5	SS	□	⊕									
				60.90													
		BEDROCK		3.51	6	SS	⊕	□	ND								
4		End of Borehole		60.45													
				3.96													
5		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															
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	SOIL PROFILE			SAMPLES		HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.30m	ND = Not Detected				10 ⁻⁶ 10 ⁻⁵ 10 ⁻⁴ 10 ⁻³					
								HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □				WATER CONTENT PERCENT					
								ND = Not Detected				Wp — W — Wi					
								100	200	300	400			20	40	60	80
0	Power Auger Geoprobe	GROUND SURFACE		64.62													
		ASPHALT		0.00													
		SAND; brown; non-cohesive, moist		0.15													
1					1	SS	⊕	ND									
				63.10													
		SAND; brown; non-cohesive, moist		1.52													
2					2	SS	⊕	ND									
			62.18														
		SILT, trace sand; grey brown; non-cohesive, moist		2.44			⊕										
				61.88		3	SS	⊕	ND								
3		BEDROCK		2.74													
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	SOIL PROFILE			SAMPLES		HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕ <i>ND = Not Detected</i>				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.30m	HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □ <i>ND = Not Detected</i>				WATER CONTENT PERCENT					
												10 ⁻⁶ 10 ⁻⁵ 10 ⁻⁴ 10 ⁻³					
												Wp —————○W————— WI					
							100	200	300	400		20	40	60	80		
0		GROUND SURFACE		65.50													
	Power Auger Geoprobe	ASPHALT		0.00													
		SAND; brown; non-cohesive, moist		0.15													
1					1	SS		ND									
2			SILTY SAND, some coarse sand; brown; non-cohesive, moist		63.98 1.52	2	SS		ND								
					3	SS		ND									
3																	
		BEDROCK		62.15 3.35 61.84 3.66	4	SS				⊕							
4	End of Borehole																
	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		SAMPLES		HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕ ND = Not Detected				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.30m	HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □ ND = Not Detected				WATER CONTENT PERCENT					
												Wp ——— W ——— WI					
0	Power Auger Geoprobe	GROUND SURFACE		65.51													
		ASPHALTIC CONCRETE		0.00													
		SAND; dark brown, contains rootlets; non-cohesive, moist		0.15	1	SS											
1					2	SS	⊕										
		SILTY SAND; grey; non-cohesive, moist		63.99													
2				1.52	3	SS											
					4	SS	⊕ □										
3					5	SS	□ ⊕										
4		End of Borehole		61.85													
		Note(s):		3.66													
5		1. Borehole log not for geotechnical 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: 21-25

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			SAMPLES		HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕ <i>ND = Not Detected</i>				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION			
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.30m	HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □ <i>ND = Not Detected</i>				WATER CONTENT PERCENT							
												10 ⁻⁶ 10 ⁻⁵ 10 ⁻⁴ 10 ⁻³							
												Wp ——— W ——— Wi							
								100	200	300	400			20	40	60	80		
0		GROUND SURFACE		66.01															
	Power Auger Geoprobe	ASPHALT		0.00															
		SAND		0.15															
1					1	SS	63	ND											
2					2	SS	63	ND											
		SILTY SAND, trace gravel; grey; non-cohesive, moist		63.93 2.08															
3					3	SS													
		BEDROCK		62.96 3.05															
				62.66 3.35	4	SS	63	ND											
	End of Borehole																		
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

SHEET 1 OF 2

DATUM: Geodetic

DRILL RIG: Geoprobe

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES		HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □				WATER CONTENT PERCENT					
								ND = Not Detected				Wp —○— WI					
								100	200	300	400						
0	Power Auger Geoprobe	GROUND SURFACE		65.02													
		FILL - (SW) SAND and GRAVEL, with asphalt fragments; non-cohesive, dry		0.00													
		FILL - (SP) SAND, medium to coarse, trace silt and gravel; brown; non-cohesive, moist		64.77 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																	
8															Silica Sand		
		CONTINUED NEXT PAGE															

LOGGED: DG

CHECKED:

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PROJECT: 21494078

LOCATION: N 5026373.18; E 361314.80

RECORD OF BOREHOLE: BH22-01

SHEET 2 OF 2

BORING DATE: May 11, 2022

DATUM: Geodetic

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

DRILL RIG: Geoprobe

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] $\oplus$				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] $\square$				WATER CONTENT PERCENT					
								ND = Not Detected 100 200 300 400				Wp — W — Wi 20 40 60 80					
8	Air Hammer	— CONTINUED FROM PREVIOUS PAGE — BEDROCK													52 mm Diam. PVC #10 Slot Screen		
9																	
10		END OF BOREHOLE															
11		Notes:															
12		1. Water level at BH22-01 measured at a depth of 8.20 m (Elev. 56.82 m) on May 26, 2022.															
13		2. Borehole log not prepared for geotechnical engineering purposes.															
14																	
15																	
16																	

DEPTH SCALE

1 : 40



LOGGED: DG

CHECKED:

LOCATION: N 5026383.15; E 361318.50

RECORD OF BOREHOLE: BH22-02

SHEET 1 OF 2

BORING DATE: May 9, 2022

DATUM: Geodetic

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

DRILL RIG: Geoprobe

[illegible]

DEPTH SCALE

1 : 40



LOGGED: KG

CHECKED:

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PROJECT: 21494078

LOCATION: N 5026383.15; E 361318.50

RECORD OF BOREHOLE: BH22-02

SHEET 2 OF 2

BORING DATE: May 9, 2022

DATUM: Geodetic

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

DRILL RIG: Geoprobe

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES		HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] $\oplus$ <i>ND = Not Detected</i>				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] $\square$ <i>ND = Not Detected</i>				WATER CONTENT PERCENT					
								100	200	300	400	Wp	W	Wi			20
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.															
9																	
10																	
11																	
12																	
13																	
14																	
15																	
16																	

DEPTH SCALE

1 : 40



LOGGED: KG

CHECKED:

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PROJECT: 21494078

LOCATION: N 5026373.77; E 361301.53

RECORD OF BOREHOLE: BH22-03

SHEET 1 OF 1

BORING DATE: May 10, 2022

DATUM: Geodetic

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

DRILL RIG: Geoprobe

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

DEPTH SCALE

1 : 40



LOGGED: DG

CHECKED:

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PROJECT: 21494078
LOCATION: N 5026371.34; E 361293.22

RECORD OF BOREHOLE: BH22-04

SHEET 1 OF 2
DATUM: Geodetic

BORING DATE: May 9, 2022

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

DRILL RIG: Geoprobe

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

DEPTH SCALE

1 : 40



LOGGED: DG

CHECKED:

PROJECT: 21494078

LOCATION: N 5026371.34; E 361293.22

RECORD OF BOREHOLE: BH22-04

SHEET 2 OF 2

BORING DATE: May 9, 2022

DATUM: Geodetic

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

DRILL RIG: Geoprobe

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

RECORD OF BOREHOLE: BH22-05

SHEET 1 OF 2

BORING DATE: May 11, 2022

DATUM: Geodetic

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

DRILL RIG: Geoprobe

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □				WATER CONTENT PERCENT					
								ND = Not Detected				Wp — W — Wi					
								100	200	300	400						
								100	200	300	400						
								10 ⁻⁶	10 ⁻⁵	10 ⁻⁴	10 ⁻³						
								Wp		W		Wi					
								20	40	60	80						
0		GROUND SURFACE		65.94													
	Power Auger Geoprobe	FILL - (SW) gravelly SAND, angular; grey, with asphalt fragments; non-cohesive, dry		0.00											Flush Mount Casing		
		FILL - (SP) SAND, medium to coarse, gravelly; brown; non-cohesive, moist		65.64 0.30	1	DP	-	ND									
1																	
	</																

DEPTH SCALE

1 : 40



LOGGED: DG

CHECKED:

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PROJECT: 21494078

LOCATION: N 5026323.15; E 361338.38

RECORD OF BOREHOLE: BH22-05

SHEET 2 OF 2

BORING DATE: May 11, 2022

DATUM: Geodetic

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

DRILL RIG: Geoprobe

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] $\oplus$				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] $\square$				WATER CONTENT PERCENT					
								ND = Not Detected 100 200 300 400				Wp — W — Wi 20 40 60 80					
8	Air Hammer	— CONTINUED FROM PREVIOUS PAGE — BEDROCK															
9																	
10																	
11		END OF BOREHOLE															
		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																	
15																	
16																	

DEPTH SCALE

1 : 40



LOGGED: DG

CHECKED:

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PROJECT: 21494078

LOCATION: N 5026374.80; E 361302.66

RECORD OF BOREHOLE: BH22-06

SHEET 1 OF 2

BORING DATE: October 3, 2022

DATUM: Geodetic

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

DRILL RIG:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	RESISTANCE, BLOWS/0.3m				CONDUCTIVITY, k, cm/s					
								SHEAR STRENGTH Cu, kPa		nat V. + Q - rem V. ⊕ ⊗ ○		WATER CONTENT PERCENT					
								20	40	60	80	10 ⁻⁶	10 ⁻⁵	10 ⁻⁴	10 ⁻³		
0		GROUND SURFACE		64.90													
		ASPHALT (50 mm)		64.88													
		FILL - (SP/GP) SAND and GRAVEL		64.65													
		FILL - (SP) SAND, trace gravel; brown; non-cohesive, moist		0.25													
1																	
2																	
		(SM) SILTY SAND, some fines, trace gravel; brown-grey; non-cohesive, moist		62.85 2.05													
				62.40													
		BEDROCK (Limestone)		2.50													
3																	
4																	
5																	
6																	
7																	
		END OF BOREHOLE		57.90 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
LOCATION: N 5026374.80; E 361302.66

RECORD OF BOREHOLE: BH22-06

SHEET 2 OF 2
DATUM: Geodetic

BORING DATE: October 3, 2022

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

DRILL RIG:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH Cu, kPa		nat V. + Q - rem V. U -		WATER CONTENT PERCENT					
								20	40	60	80	10 ⁻⁶	10 ⁻⁵	10 ⁻⁴			10 ⁻³
								20	40	60	80	20	40	60			80
8		-- CONTINUED FROM PREVIOUS PAGE --													S		
9																	
10																	
11																	
12																	
13																	
14																	
15																	
16																	

DEPTH SCALE

1 : 40



LOGGED: JB

CHECKED: DS

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PROJECT: 21494078

LOCATION: N 5026370.88; E 361313.48

RECORD OF BOREHOLE: BH22-07

SHEET 1 OF 1

BORING DATE: October 3, 2022

DATUM: Geodetic

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

DRILL RIG:

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

DEPTH SCALE

1 : 40



LOGGED: JB

CHECKED: DS

GTA-BHS 001 S:\CLIENTS\FENGATE\1047 RICHMOND RD\02 DATA\INT21494078.GPJ GAL-MIS.GDT 10/2/23 ZS

SHEET 1 OF 2

DATUM: Geodetic

DRILL RIG:

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m										
								SHEAR STRENGTH Cu, kPa		nat V. + Q - rem V. ⊕ U - ●		WATER CONTENT PERCENT					
								20	40	60	80	10 ⁻⁶	10 ⁻⁵	10 ⁻⁴			10 ⁻³
0		GROUND SURFACE		64.87													
		ASPHALT (50 mm)		64.86													
		FILL - (SP/GP) SAND and GRAVEL		64.57													
		FILL - (SP) SAND, trace gravel; brown; non-cohesive, moist		0.30													
1																	
2																	
		(SM) SILTY SAND, some fines, trace gravel; brown-grey; non-cohesive, moist		62.69													
				2.18													
		BEDROCK (Limestone)		62.22													
				2.65													
3																	
4																	
5																	
6																	
7																	
8																	
		CONTINUED NEXT PAGE															

DEPTH SCALE

1 : 40



LOGGED: JB

CHECKED: DS

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

PROJECT: 21494078

LOCATION: N 5026375.62; E 361303.08

RECORD OF BOREHOLE: BH22-08

SHEET 2 OF 2

BORING DATE: October 3, 2022

DATUM: Geodetic

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

DRILL RIG:

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

Bentonite Seal

Silica Sand

50 mm Diam. PVC
#10 Slot Screen

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

LOCATION: N 5026404.46: E 361315.65

SHEET 1 OF 3

DATUM: Geodetic

BORING DATE: May 15 - 16, 2023

DRILL RIG: Massenza MI3

1 : 40

LOGGED:

CHECKED: DS

PROJECT: 21494078
LOCATION: N 5026404.46; E 361315.65

RECORD OF BOREHOLE: BH22-09

SHEET 2 OF 3
DATUM: Geodetic

BORING DATE: May 15 - 16, 2023

DRILL RIG: Massenza MI3

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □				WATER CONTENT PERCENT					
								ND = Not Detected				Wp — W — Wi					
								100	200	300	400						
8	Air Rotary 89 mm Air Hammer	— CONTINUED FROM PREVIOUS PAGE —															
		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															
9																	
10		END OF BOREHOLE		54.17 10.06													
11																	
12																	
13																	
14																	
15																	
16																	

DEPTH SCALE

1 : 40



LOGGED:
CHECKED: DS

LOCATION: N 5026390.88: E 361333.63

SHEET 1 OF 3

DATUM: Geodetic

BORING DATE: May 15 - 16, 2023

DRILL RIG: Massenza MI3

1 : 40

LOGGED:

CHECKED: DS

PROJECT: 21494078
LOCATION: N 5026390.88; E 361333.63

RECORD OF BOREHOLE: BH22-10

SHEET 2 OF 3
DATUM: Geodetic

BORING DATE: May 15 - 16, 2023

DRILL RIG: Massenza MI3

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [PPM] ⊕				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] □				WATER CONTENT PERCENT						
								ND = Not Detected				Wp — W — Wi						
								100	200	300	400		10 ⁻⁶	10 ⁻⁵	10 ⁻⁴	10 ⁻³		
8	Air Rotary 89 mm Air Hammer	— CONTINUED FROM PREVIOUS PAGE —																
		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																
9																		
10																		
		END OF BOREHOLE		54.45 10.36														
11																		
12																		
13																		
14																		
15																		
16																		

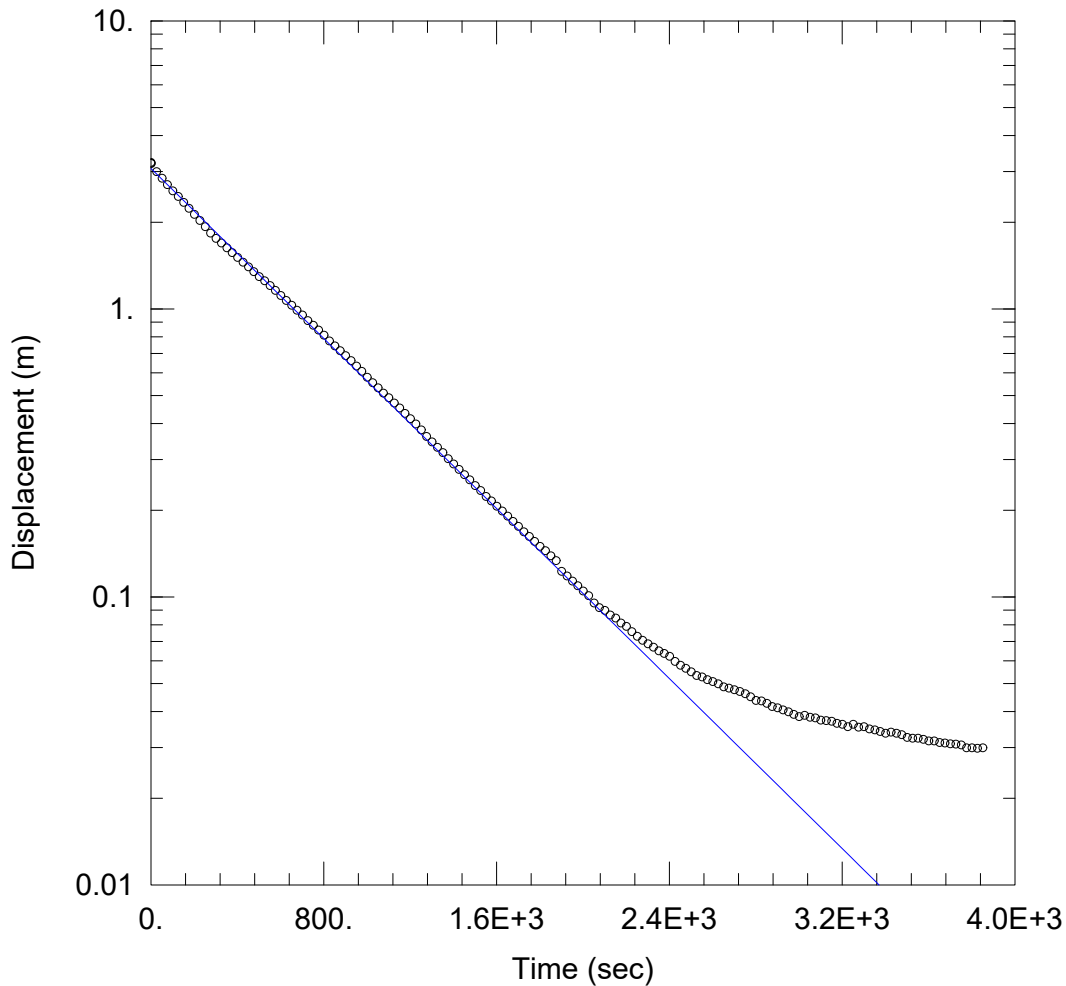
DEPTH SCALE

1 : 40



LOGGED:
CHECKED: DS

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 (K_z/K_r): 1.

WELL DATA (BH22-04)

Initial Displacement: 3.225 m

Static Water Column Height: 0.996 m

Total Well Penetration Depth: 5.884 m

Screen Length: 3.52 m

Casing Radius: 0.026 m

Well Radius: 0.033 m

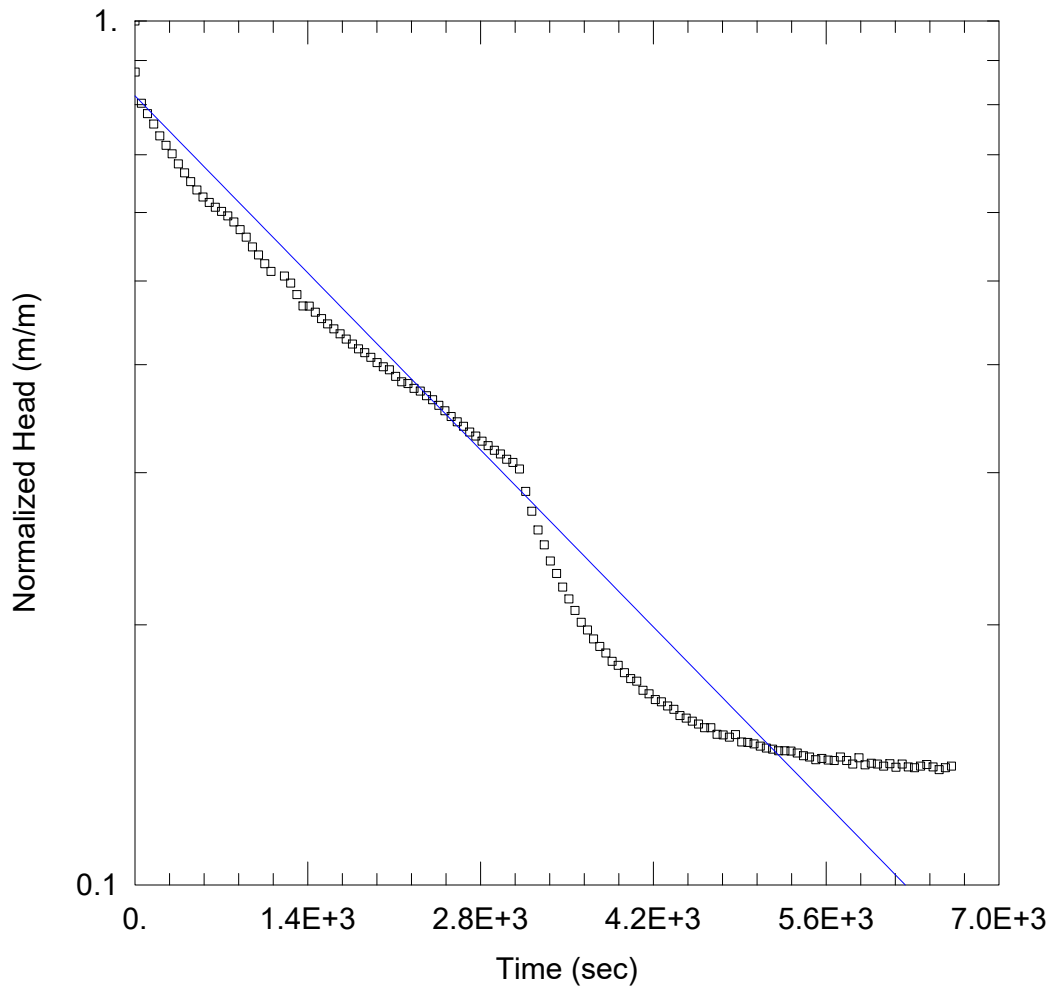
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

$K = 2.077E-6$ m/sec

$y_0 = 3.074$ 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 (K_z/K_r): 1.

WELL DATA (BH2101)

Initial Displacement: 0.6833 m

Static Water Column Height: 4.985 m

Total Well Penetration Depth: 4.065 m

Screen Length: 3.05 m

Casing Radius: 0.026 m

Well Radius: 0.031 m

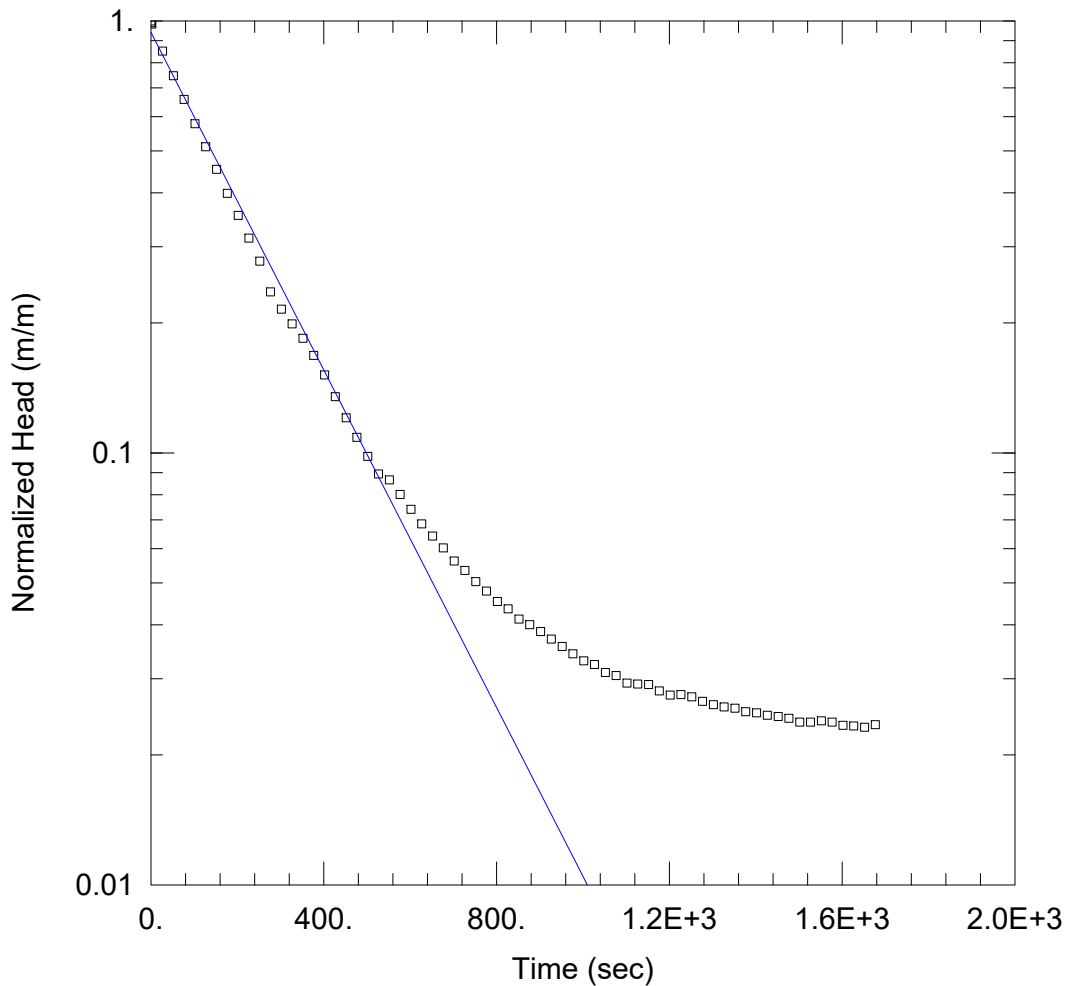
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

$K = 1.267E-7$ m/sec

$y_0 = 0.5595$ 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 (K_z/K_r): 1.

WELL DATA (BH21-04)

Initial Displacement: 1.251 m

Static Water Column Height: 5.68 m

Total Well Penetration Depth: 5.37 m

Screen Length: 3.05 m

Casing Radius: 0.026 m

Well Radius: 0.031 m

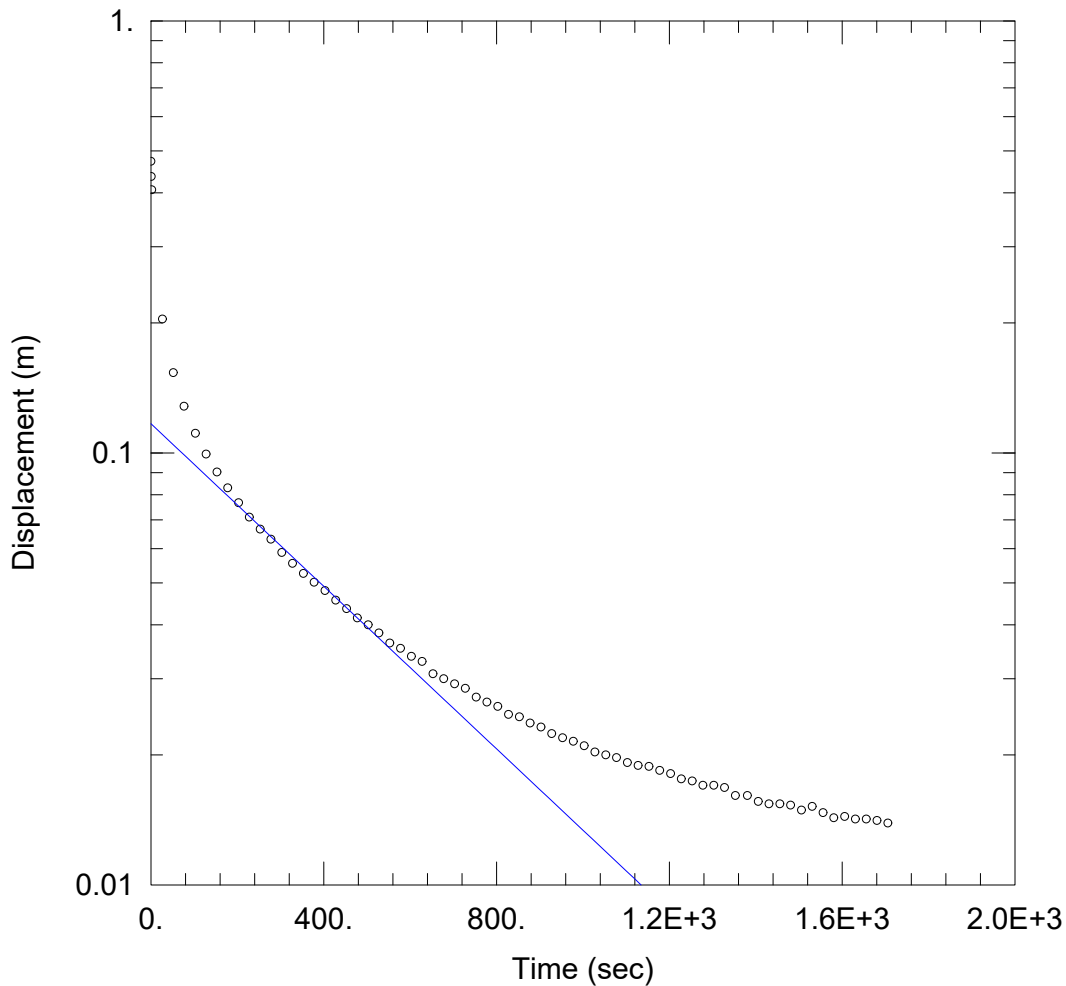
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

$K = 1.815E-6$ m/sec

$y_0 = 1.177$ 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 (K_z/K_r): 1.

WELL DATA (MW21-14)

Initial Displacement: 0.4731 m

Static Water Column Height: 2.781 m

Total Well Penetration Depth: 2.781 m

Screen Length: 1.845 m

Casing Radius: 0.01307 m

Well Radius: 0.0165 m

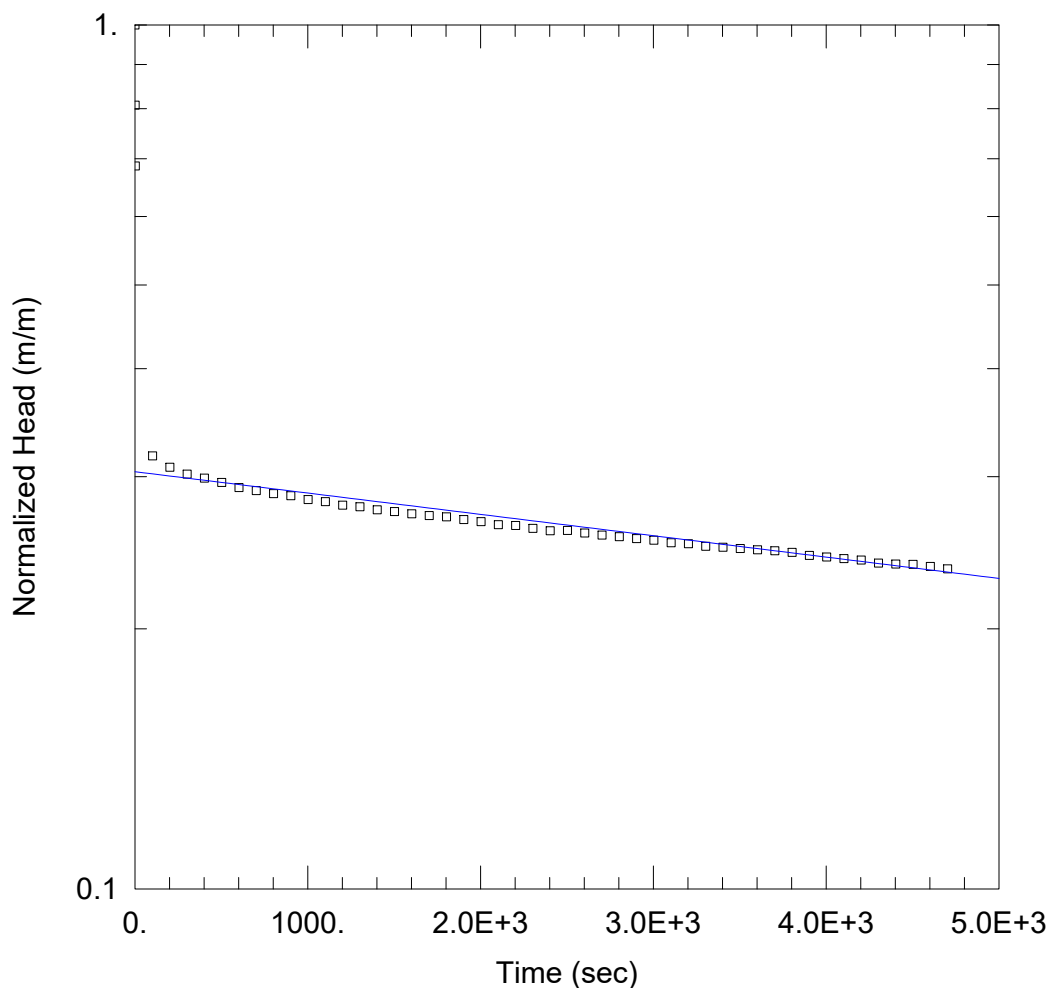
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

$K = 3.909E-7$ m/sec

$y_0 = 0.1168$ 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

Static Water Column Height: 2.06 m

Total Well Penetration Depth: 3.05 m

Screen Length: 3.05 m

Casing Radius: 0.026 m

Well Radius: 0.031 m

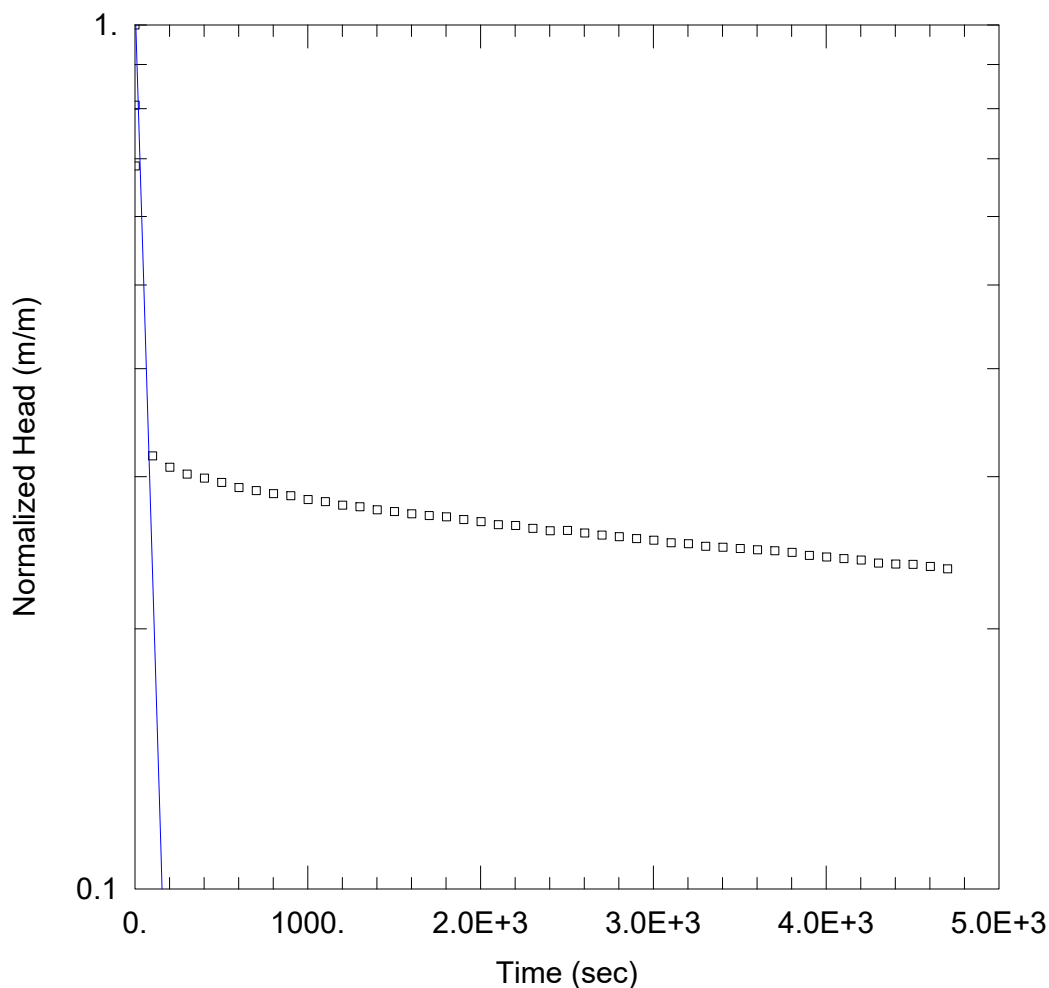
SOLUTION

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 (K_z/K_r): 1.

WELL DATA (BH21-22)

Initial Displacement: 0.4674 m

Static Water Column Height: 2.06 m

Total Well Penetration Depth: 3.05 m

Screen Length: 3.05 m

Casing Radius: 0.026 m

Well Radius: 0.031 m

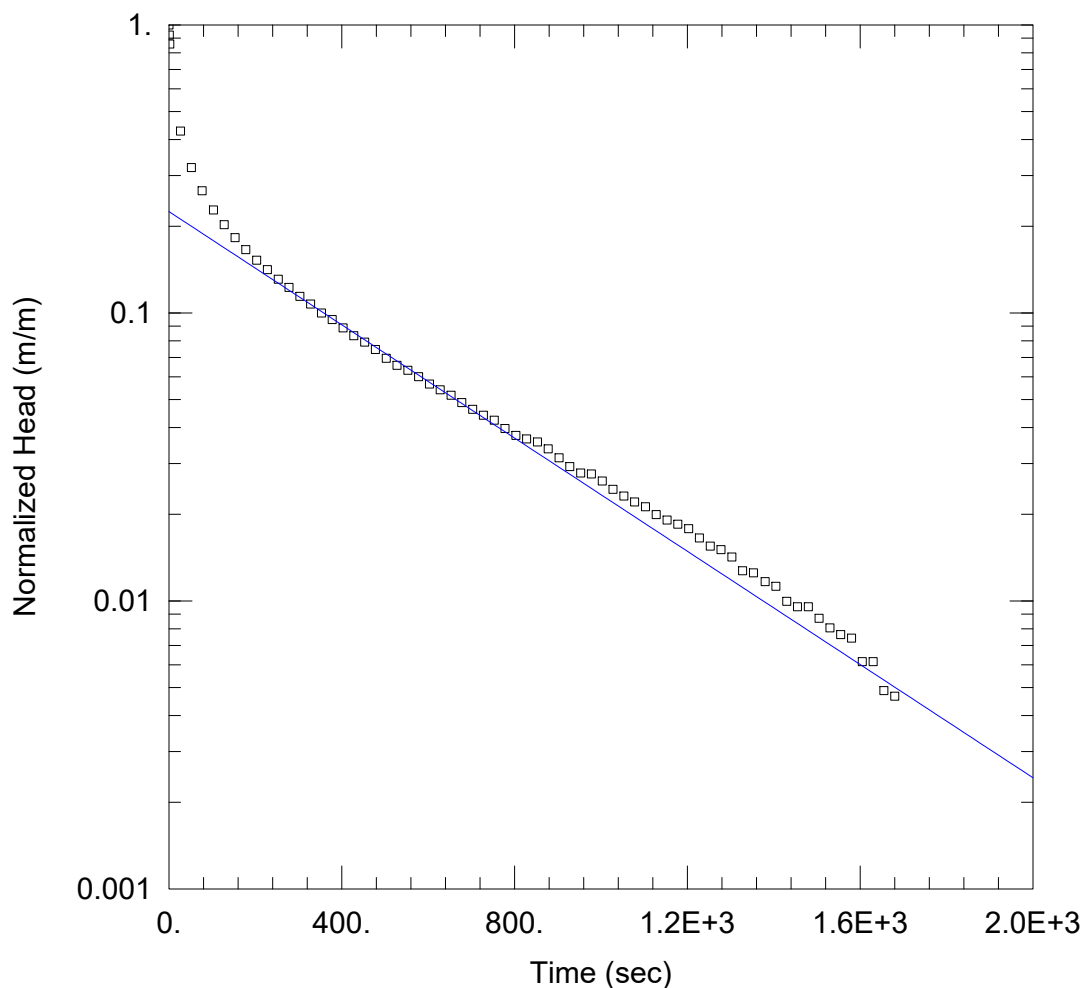
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

$K = 8.64E-6$ m/sec

$y_0 = 0.5062$ 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 (K_z/K_r): 1.

WELL DATA (BH22-08)

Initial Displacement: 0.4713 m

Static Water Column Height: 2.32 m

Total Well Penetration Depth: 2.38 m

Screen Length: 1.52 m

Casing Radius: 0.026 m

Well Radius: 0.031 m

SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

$K = 1.642E-6$ m/sec

$y_0 = 0.1059$ m

APPENDIX II

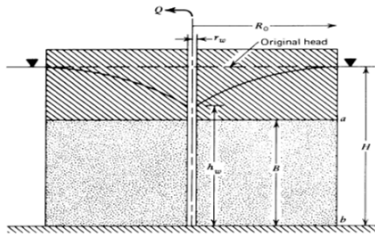
DEWATERING ANALYSES

Construction Dewatering Worksheet - Full Excavation



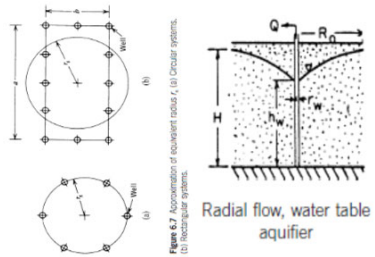
Project: 1047 Richmond Road,
Ottawa, Ontario
Project Number: CO972.00
Location: Provided Excavation Footprint
Full Excavation
Date: 24 March, 2025

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 ₀)	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

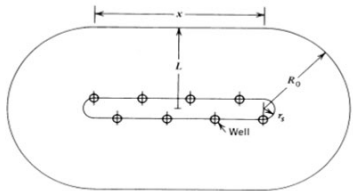


Figure 6.8 Approximate analysis of long, narrow systems.

(13)	Trench Calculation (where a/b ≤ 1.5)	(Q)	308 m3/day
		(Q)	308,484 L/day
(14)	Trench Calculation (where a/b > 1.5)	(Q)	m3/day
		(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
Permitting Calculation (Ax1.5)		462,726 L/day
Permanent Dewatering (Ax1.5)		462,726 L/day

Relevant Formulae (Powers, 2007)

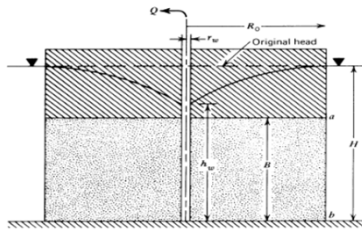
(9)	$R_w / 2$	(eq. 6.15, p. 105)
(10)	$3000 (H - h) \times \text{sqrt}(K)$	(eq. 6.12, p. 71)
(11)	$\text{sqrt}((a \times b) / \pi)$	(eq. 6.9, p. 70) (eq. 6.10, p. 102)
(12)	$(a+b)/\pi$	
(13)	$(\pi \times K \times (H^2 - h^2)) / \ln((R_0 + R_s) / R_s) + 2 \times (X \times K \times (H^2 - h^2)) / (2 \times L)$	(pg. 66,67,68; eq. 6.1 and 6.2)
(14)	$(\pi \times K \times (H^2 - h^2)) / \ln((R_0 + R_s) / R_s) + 2 \times (X \times K \times (H^2 - h^2)) / (2 \times L)$	(pg. 66,67,68; eq. 6.1 and 6.2)
(15)	$a \times b \times 25$	(ok 15Sept2022)

Construction Dewatering Worksheet - Lower Layer Crop



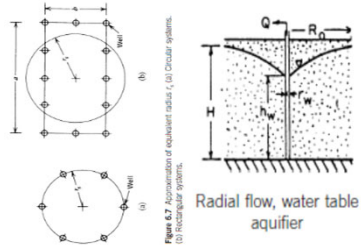
Project: 1047 Richmond Road,
Ottawa, Ontario
Project Number: CO972.00
Location: Lower and Middle Layer - Kvalue 1
Bedrock Layer Removed At K = Overburden
Date: 24 March, 2025

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



(9)	Width of Dewatering	(L)	19 m
(10)	Radius/Zone of Influence (ZOI)	(R ₀)	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

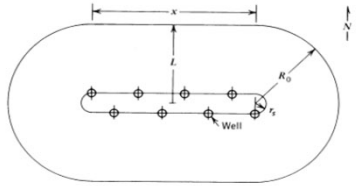


Figure 6.8 Approximate analysis of long, narrow systems.

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

Relevant Formulae (Powers, 2007)

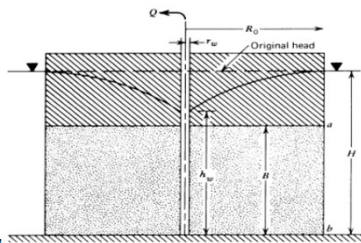
(9)	$R_0 / 2$	(eq. 6.15, p. 105)
(10)	$3000 (H - h) \times \text{sqrt}(K)$	(eq. 6.12, p. 71)
(11)	$\text{sqrt}((a \times b) / \pi)$	(eq. 6.9, p. 70) (eq. 6.10, p.102)
(12)	$(a+b)/\pi$	
(13)	$(\pi \times K \times (H^2 - h^2)) / \ln(R_0 / R_s) + 2 \times (X \times K \times (H^2 - h^2)) / (2 \times L)$	(pg. 66,67,68; eq. 6.1 and 6.2)
(14)	$(\pi \times K \times (H^2 - h^2)) / \ln(R_0 / R_s) + 2 \times (X \times K \times (H^2 - h^2)) / (2 \times L)$	(pg. 66,67,68; eq. 6.1 and 6.2)
(15)	$a \times b \times 25$	



Construction Dewatering Worksheet - Excavation Floor

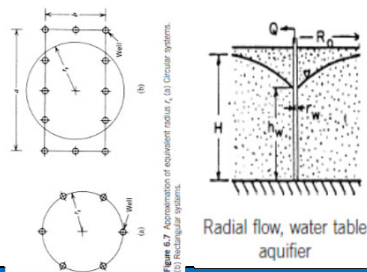
Project: 1047 Richmond Road,
 Ottawa, Ontario
Project Number: CO972.00
Location: Lower Layer - Kvalue 3
Bedrock Estimated at K = Bedrock
Date: 24 March, 2025

Input Parameters



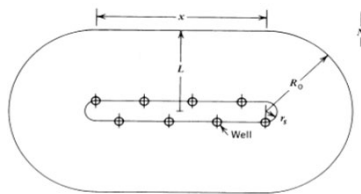
Input Parameters			
(1)	Aquifer Thickness	(H)	12.84 m
(2)	Target Depth	(h)	8.56 m
(3)	Effective Drawdown	(Δh)	4.28 m
(4)	Hydraulic Conductivity	(K)	1.8E-06 m/s
(5)	Hydraulic Conductivity	(K)	1.6E-01 m/d
(6)	Excavation length	(a)	77.67 m
(7)	Excavation width	(b)	62 m
(8)	Excavation Length/Width Ratio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



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

Figure 6.8 Approximate analysis of long, narrow systems.

Figure 6.9 Approximate analysis of long, narrow systems.

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
Permitting 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) $3000 (H - h) \times \text{sqrt}(K)$	(eq. 6.12, p. 71)
(11) $\text{sqrt}((a \times b) / \pi)$	(eq. 6.9, p. 70) (eq. 6.10, p. 102)
(12) $(a+b)/\pi$	
(13) $(\pi \times K \times (H^2 - h^2)) / \ln((R_o + R_s) / R_s) + 2 \times (X \times K \times (H^2 - h^2)) / (2 \times L)$	(pg. 66,67,68; eq. 6.1 and 6.2)
(14) $(\pi \times K \times (H^2 - h^2)) / \ln((R_o + R_s) / R_s) + 2 \times (X \times K \times (H^2 - h^2)) / (2 \times L)$	(pg. 66,67,68; eq. 6.1 and 6.2)
(15) $a \times b \times 25$	

(zk 15Sept2022)

Construction Dewatering Worksheet - Summary of Estimates



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.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

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-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.



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							



BUREAU
VERITAS

Bureau Veritas Job #: C529290

Report Date: 2025/04/17

Terrapex Environmental Ltd

Client Project #: CO972.00

Site Location: FERNGATE RICHMOND

Sampler Initials: EB

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				



BUREAU
VERITAS

Bureau Veritas Job #: C529290

Report Date: 2025/04/17

Terrapex Environmental Ltd

Client Project #: CO972.00

Site Location: FERNGATE RICHMOND

Sampler Initials: EB

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							



BUREAU
VERITAS

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

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

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				



BUREAU
VERITAS

Bureau Veritas Job #: C529290

Report Date: 2025/04/17

Terrapex Environmental Ltd

Client Project #: CO972.00

Site Location: FERNGATE RICHMOND

Sampler Initials: EB

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								



BUREAU
VERITAS

Bureau Veritas Job #: C529290

Report Date: 2025/04/17

Terrapex Environmental Ltd

Client Project #: CO972.00

Site Location: FERNGATE RICHMOND

Sampler Initials: EB

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								



BUREAU
VERITAS

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

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

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**

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	Gurpartee KAUAR
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**

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

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

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



BUREAU
VERITAS

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

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

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
9894715	GMN	Spiked Blank	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
			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



**BUREAU
VERITAS**

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

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

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



BUREAU
VERITAS

Bureau Veritas Job #: C529290

Report Date: 2025/04/17

Terrapex Environmental Ltd

Client Project #: CO972.00

Site Location: FERNGATE RICHMOND

Sampler Initials: EB

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



**BUREAU
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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
9895187	AHI	Method Blank	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
			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	
9895187	AHI	RPD	Diethyl phthalate	2025/03/21	<1.0		ug/L	
			Indole	2025/03/21	<1.0		ug/L	
			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
			2,4,5,6-Tetrachloro-m-xylene	2025/03/25		58	%	50 - 130
9896430	HP1	Spiked Blank	Decachlorobiphenyl	2025/03/25		137 (1)	%	50 - 130
			Hexachlorobenzene	2025/03/25		80	%	50 - 130
			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



**BUREAU
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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
9896591	AFZ	Matrix Spike	Hexachlorobenzene	2025/03/25	<0.005		ug/L	
			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	



**BUREAU
VERITAS**

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Client Project #: CO972.00
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Sampler Initials: EB

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
9896591	AFZ	RPD	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	
			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



**BUREAU
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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	



BUREAU
VERITAS

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

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

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
9896850	AHI	RPD [APAK85-04]	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	
			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



**BUREAU
VERITAS**

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

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

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
9907339	RAK	RPD	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
			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



BUREAU
VERITAS

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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.

APPENDIX IV
CURRICULUM VITAE

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

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 Petroleum Oriented Safety Training (POST) 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.
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