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GEOTECHNICAL & HYDROGEOLOGY REPORT

AT

0TH BENOIR LAKE ROAD, DYSART ET AL, ON

PREPARED FOR:

2463756 Ontario Inc.

Dated: Jan 04, 2024

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1. BACKGROUND

King EPCM (the Engineer) was retained by 2463756 Ontario Inc. (the Client) to carry out a geotechnical and hydrogeology investigation for a proposed residential sub-division at 0th Benoir Lake Rd, Township of Dysart et al, County of Haliburton, Ontario (the site).

A pre-application consultation checklist was received by the Engineer via email on Jan 18th, 2021, from Charlsey White of County of Haliburton and Jeff Isles of Municipality of Dysart et al.

The purpose of this report is to review the existing site conditions and recommendations for the design and construction of a residential sub-division. This report details King EPCM's borehole drilling program, fieldwork and testing, development constraints mapping, and design recommendations.

This report was prepared for the Client, 2463756 Ontario Inc, for the property owners, and any related site-specific engineers, designers, and contractors. This report is considered an intellectual property of King EPCM, and third party use of this report, including reliance, in-part or full, is prohibited without written consent from King EPCM.

2. SITE DESCRIPTION

2.1.Site Location

The site is located at the municipal address of 0th Benoir Lake Rd, in the municipality of Dysart et al. The site can also be referenced as:

Parts or whole of:
Con 8 Lot 27–31,
Con 9 Lot 27-33,
Con 10 Lot 27-31,
Con 11 27-31, and
Con 12 Lot 32-33
Township of Harcourt
Municipality of Dysart et al
County of Haliburton, Ontario

The site property is considered rural and non-developed, generally bound by Benoir Lake Rd along the west and Elephant Lake along the south. The property has a wide variety of landscapes, including wetlands, rocky cliff escarpments, sandy valley lands, clay slopes, and sandy beaches.

2.2.Proposed Project

The purpose of this report is to provide review of existing geotechnical and hydrogeological formations, and provide recommendations on development constraints and other design information.

Additionally, this report reviews the feasibility and recommendations of on-site sewage disposal (private septic systems), foundation designs & recommendations, and potable water wells.

The project proposes two phases: Phase 1 - 25 lots along the east side of Benoir Lake Road (Lot 1 – Lot 25), and Phase 2, 38 seasonal waterfront residences along the north shore of Elephant Lake (Lot 26 – 63), and one public community boat launch area (Block B). See Appendix I for detailed Site Plans.

3. SURFACE INVESTIGATIONS

Surface investigation is separated into three parts:

- Topographic survey
- Survey slope evaluation
- Site visit and field inspections

3.1. Topographic Survey

A topographic survey was conducted via aerial drone LiDAR by sub-contractor Drone Services Canada Inc. on June 1st and 2nd, 2021 (Appendix III). The elevations are considered geodetic and based on NAD83 (Canada) and are derived from GPS real time network observations using the "can-net" VRS network in UTM Zone 17N.

Based on the obtained LiDAR topographic survey of the property, it is overlaid on top of the Ontario Base Map (OBM) for interior elevations of the site, to be later used for stormwater management and flooding review.

3.2. Survey Slope Evaluation

Based on the topographic survey, the Engineered reviewed and identified any localized areas of slopes steeper than 25%, as similarly described in Dysart et al May 2018 Official Plan, Section 9.1.2 Areas of use Limitation:

- *Slopes of 25% or more, measured over a horizontal distance inland of 45 metres (148 feet) from the high water mark, along a continuous shoreline frontage of 25 metres (82 feet).*
- *Eroding or unstable slopes.*
- *Water tables within 1.5 metres (4.9 feet) of the surface, including areas of organic soils and all wetlands.*

Although several localized areas within the subject property were identified to be steeper than the 25% slope as described in Section 9.1.2, these localized areas were generally further away than 45m away from the nominal high water mark of 352.00m.

In the opinion of the Engineer, the proposed development (proposed Lot 1 – Lot 63) are not restricted by the Official Plan, Section 9.1.2 Areas of use Limitation regarding slopes of 25% near high water mark.

3.3. Site Visit and Field Inspections

Multiple site visits were conducted for field inspections of the subject property, and to confirm that the proposed waterfront residences would not negatively impact any natural slopes, and that proposed development does not occur on naturally eroding or unstable slopes.

The Engineer conducted the site visit and field inspection based on the 2002 OMNR – Technical Guide – River and Stream System: Erosion Hazard Limit, Table 4.2 Slope Stability Rating Chart. See detailed ratings chart in Appendix IV. In the opinion of the Engineer, the proposed developments (proposed Phase 1 Lot 1 – Lot 25, and Phase 2 Lot 26 – Lot 53) are not restricted by the Official Plan, Section 9.1.2 Areas of use Limitation regarding eroding or unstable slopes.

4. SUB-SURFACE INVESTIGATIONS

Three separate sub-surface investigation program was conducted between April 2021 and June 2022. The surveyed locations of each borehole can be found in Appendix I, while detailed borehole drill logs are found in Appendix II.

4.1.BOREHOLE PROGRAM

Three groups of geotechnical boreholes were drilled at the site, with the following locations:

Table 1 - Borehole Program Summary

Borehole Name	Located in Lot #	Easting	Northing	Depth	Groundwater m below grade	Description
BH101	Lot 5	724,148	5,007,290	4.6m	2.1m	Upland
BH102	Lot 42	725,656	5,004,632	3.7m	none found	Upland
BH201	Lot 53	726,516	5,004,449	1.5m	1.1m	Detailed Lot Drilling
BH202	Lot 60	726,860	5,004,672	1.2m	none found	Detailed Lot Drilling
BH203	Lot 49	726,115	5,004,615	1.5m	none found	Detailed Lot Drilling
BH204	Lot 34	725,227	5,004,773	1.5m	none found	Detailed Lot Drilling
BH205	Lot 9	724,070	5,006,939	1.5m	none found	Detailed Lot Drilling
BH206	Lot 5	723,950	5,007,155	1.5m	none found	Detailed Lot Drilling
BH301	Lot 10	724,091	5,006,934	79.86	various	Potable Water Well, Well Tag A348258
BH302	Lot 53	726,537	5,004,485	36.82	various	Potable Water Well, Well Tag A339195

4.2.STRATIGRAPHY & SOIL PHYSICAL PROPERTIES

In general, the stratigraphy can be described as the following:

Phase 1 Lot 1 – Lot 25

- 0 – 0.3 topsoil
- 0.3 – 4.6m gravelly sand, coarse gravel and dry at top, fine wet sands at bottom
- 4.6 – 24m dense sandy silt clay and cobbles, glacial till, dense
- 24m – below granite bedrock, red, transitioning to gray at depths
- Groundwater between 1.0 ~ 2.0m below grade, depending on local elevation

Phase 2 Lot 26 – 63

- 0 – 0.15 topsoil
- 0.15 – 0.5m red sand
- 0.5 – 1.5m gray, yellow sand
- 1.5 – 14m dense sandy silt clay and cobbles, glacial till, dense
- 14m – below granite bedrock, grey
- Groundwater between 1.0 ~ 2.0m below grade, depending on local elevation
- Presence of large boulders & rocks in upland areas

4.3.IN-SITU INFILTRATION TESTING

Three in-situ permeability test was conducted at the subject property, in order to estimate the "field-saturated" hydraulic conductivity, Kfs, using the "Constant Head Well Permeameter" (CHWP) method. This test was done in near borehole BH201, BH203 and BH206 at the study area using ETC Standard soils permeameter apparatus.

The "Constant Head Well Permeameter" (CHWP) method (Reynolds, 1993; Elrick and Reynolds, 1986) is based on the observation that when a constant height or "head" of water is ponded in a borehole or "well" augured into unsaturated soil, a "bulb" of field-saturated soil is gradually established around the base of the well. The Kfs value achieved through this method can be less than or equal to half of Ks (Saturated hydraulic conductivity) due to partial blocking of soil pores by air bubbles and it is preferred over Ks in the design of on-site stormwater LID infiltration design, because drainage through the soil should be designed to occur at less than complete soil saturation.

The in-situ measurements were done by the ETC Standard Soils Pask Permeameter, is an extended single-head analysis method and calculations procedure used here are based on the work of W.D. Reynolds and D.E. Elrick formerly of the University of Guelph, Ontario, Canada.

The ETC Pask Permeameter is a convenient and easy to use apparatus for ponding a constant head of water in a well, and simultaneously measuring the flow into the soil. The rate of fall (R) of the water level in the permeameter reservoir and reservoir cross-sectional area (X) allows determination of quasi steady water flow Irate (Q) into the soil (i.e Q = XR). Kfs is then calculated using Equation 1 (Reynolds, 1993):

$Kfs = CQ / [2\pi H2 + C\pi a2 + (2\pi H/\alpha^*)]$ (Eq. 1)

In which:

Kfs = the calculated permeability from the field test

Table 1. Parameters used

Soil Texture Factor (α^*)	Most structured soils from clays through loams; Also includes unstructured medium and fine sands. The first choice for most soils.	0.12 cm-1
R	Quasi steady state (constant) rate of fall of water in permeameter reservoir (Measured in the site)	XXX cm/min
µk/µa	Temperature Correction Factor (t=3°c)	1.00
X	Cross-sectional area of permeameter reservoir	53.46 cm2
C	Shape factor	1.36
H	Height of air inlet hole from bottom of the test hole	15 cm
a	Well hole radius	8.3 cm

Based on data described in the above table and using Pask Permeameter ETC Quick Field Reference Tables for Standard Soils (See Appendix V for look-up chart and detailed field logs), the Kfs was calculated as:

- BH201-Kfs= 4.8 x 10^-6 m/sec = 4.8 x 10^-4 cm/sec
- BH203-Kfs= 2.7 x 10^-5 m/sec = 2.7 x 10^-3 cm/sec
- BH206-Kfs= 1.1 x 10^-5 m/sec = 1.1 x 10^-3 cm/sec

And then the temperature corrected permeability would be calculated using equation 2 as follows:

$Ka = Kfs \times \mu k/\mu a$ (Eq. 2)

In which:
Ka = corrected permeability adjusted for design temperature conditions. Testing condition was around 3 degrees Celsius, and thus no correction was required.

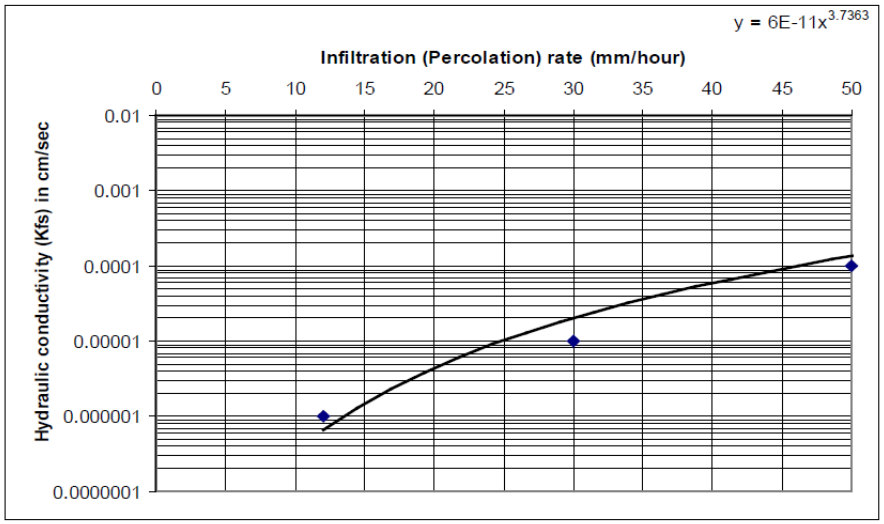
Based on 1997 OMMAH extrapolation from Table C2 and Figure C11 below, the measured Kfs may be interpolated as:

Table C 2: Approximate relationships between hydraulic conductivity, percolation time and infiltration rate

Hydraulic Conductivity, K_{fs} (centimetres/second)	Percolation Time, T (minutes/centimetre)	Infiltration Rate, 1/T (millimetres/hour)
0.1	2	300
0.01	4	150
0.001	8	75
0.0001	12	50
0.00001	20	30
0.000001	50	12

***Source**: Ontario Ministry of Municipal Affairs and Housing (OMMAH). 1997. Supplementary Guidelines to the Ontario Building Code 1997. SG-6 Percolation Time and Soil Descriptions. Toronto, Ontario.*

Figure C 11: Approximate relationship between infiltration rate and hydraulic conductivity



***Source**: Ontario Ministry of Municipal Affairs and Housing (OMMAH). 1997. Supplementary Guidelines to the Ontario Building Code 1997. SG-6 Percolation Time and Soil Descriptions. Toronto, Ontario.*

- PT BH201 = 8.6 min / cm (Infiltration Rate = 70 mm/hour)
- PT BH203 = 5.4 min / cm (Infiltration Rate = 112 mm/hour)
- PT BH206 = 6.8 min / cm (Infiltration Rate = 88 mm/hour)

In summary, the soils at the site is generally considered sandy soil, with varying non-factored infiltration rate of 70 – 112mm/hour, average of 91mm/hour. In terms of residential on-site sanitary sewage design (septic systems), the T-time ranges between 5.4 – 8.6 min/cm, average of 7.0min/cm.

For stormwater management infiltration design, it is recommended that a factor of safety to be applied based on the soil conditions at site. The soil is considered to be consistently sand to depths, and it is recommended to have a Factor of Safety = 2.5.

Therefore, the factored infiltration rate for engineering design of stormwater management infiltration structures is 36.4mm/hour.

5. DESIGN RECOMMENDATIONS

5.1. GEOTECHNICAL MODEL

Based on the borehole information and the static cone penetration tests performed within each borehole, the following geotechnical model are stated:

- Layer #1, 0 - 1.5m,
- Native non-disturbed sands, yellow, dry to wet at bottom
- Presence of large boulders & rocks at depths, and especially in upland areas
- Groundwater depending on local depths relative to nearby surface water
- SLS = 100kPa
- ULS = 150kPa
- Dense glacial sands, unit weight 21kN/m3, cohesion = 0kPa, phi = 30 degrees
- Ka = 0.33
- Kp = 3.00

5.2. POTENTIAL ISSUES DURING CONSTRUCTION

The proposed building is initially proposed to use concrete cast-in-place piles foundation without any basement structures, especially due to the possible presence of large boulders and rocks that make trench footing difficult. It is recommended that footings should be designed at 1.5m or deeper at the native non-disturbed soil elevation. The Serviceability Limit State (SLS) bearing capacity at 1.5m is estimated at 100kPa, while Ultimate Limit State (ULS) bearing capacity is estimated at 150kPa. Localized groundwater is expected at depths, depending on the relative depths between the proposed foundation and the nearest wetland or waterbody elevation.

Certain specific lots may have local global stability issues, but based on topographic LiDAR survey, most slopes within the sub-division are at or below 1:4 slope ratio (25%). Only a few lots have slopes approaching 1:3 slope ratio (33%), which is further discussed in Section 6 below. These lots would need a more detailed site plan, especially regarding the driveway, dwelling, and septic bed locations. In general, it is the Engineer's opinion that where local slopes are steeper than 1:3 ratio, that a minimum of 6m horizontal is maintained as a buffer between top of slope and edge of development.

5.3. FROST PROTECTION

Based on the coarse grained soils of the property and the relatively high groundwater elevation based on local elevations, it is recommended that bottom of footings to be extended at minimum 1.8m below grade, potentially below any local groundwater. Based on OPSD 3090.101, Rev 1 Nov 2010, the subject property has an estimated frost penetration depth of 1.8m below grade. For the proposed piles design, frost heave (upward pressure) should be expected due to skin friction on the sides of the concrete pile.

5.4.PILE FOUNDATION

At the time of preparation of this report, design loading requirements have not been made available. After investigation of the soils found at site, structural footings may be designed on the basis of a geotechnical soil bearing capacity of 100kPa at the serviceability limit state (SLS), and ultimate limit state (ULS) of 150kPa.

Additionally, concrete piles should be designed for frost heave due to skin friction forces, via the following concepts:

- The soil is primarily open coarse grained sand, with relatively low frost susceptibility
- The soil is in close proximity to groundwater, especially where shallow groundwater may be above the frost penetration depth of 1.8m
- Deeper piles allow for better anchoring below the frost penetration depth
- Bell-shaped concrete piles with wide footing allows for greater anchoring
- Small diameter piles combined with larger bell-shaped concrete pile footings allow for less upheave skin contact area and less upheave pressures
- Possibility of using rigid insulation (laid horizontally) to reduce the maximum frost depth

5.5.SETTLEMENT CONSIDERATIONS

In general, soils within the “stress influence zone” beneath all foundation elements of a proposed structure will be consolidated after an extended period of time. This is an important factor to realize, since the SLS is highly impacted by the potential for settlement.

The primary soil layer impacted by the proposed foundation elements are composed of dense compacted coarse glacial till sands with potential for groundwater between 1.0m ~ 2.0m below grade. Due to the nature of the dense compacted sands, it is critical that over-excavation does not occur as that would permanently disturb the internal cohesion of glacial till sands.

Areas of shallow groundwater combined with coarse sands of low compaction also has the potential to form flowing sand conditions with very low bearing capacity, and thus all foundations must be reviewed and checked by a geotechnical engineer or supervised technician.

Low spots within excavations should be cover completely with concrete (after confirmation from structural engineer for rebar vertical positions), or backfilled with OPSS 1010 Granular B compacted to above 98% SPMDD.

5.6.SEIZEMIC LOADING

Using the information provided by the site investigation, the general soil profile comprises of two different locations:

- In close proximity to wetlands / Elephant Lake “Soft Soil – Site Class E” as defined by Table 4.1.8.4.A “Site Classification for Seismic Site Response” of the Ontario Building Code.
- In upland locations near bedrock / top of slopes “Rock – Site Class B” as defined by Table 4.1.8.4.A “Site Classification for Seismic Site Response” of the Ontario Building Code.

5.7.OHSA SOIL TYPE & TRENCH SUPPORT

Using the information provided by the site investigation, the general soil profile comprises of "Type 3 Soil" as defined Occupational Health and Safety Act (OHSA) O.Reg 213/91, section 226 "Soil Types".

Type 3 Soil is described as follows:

- Stiff to firm, compact to loose in consistency. May be backfill or previously excavated soil.
- Signs of surface cracking and water seepage.
- When dry, it may run easily into a well-defined conical pile.
- Low degree of internal strength.

When dry, the sides of the trench will not stand vertically and will cave in to a natural slope (45°). When wet, the soil will stand for a short period. However, it dries quickly and chunks or slabs will start to fall into the trench.

Where personnel must enter a trench greater than 1.2m in depth, appropriate temporary shoring solutions must be installed. Possible temporary shoring solutions include an appropriate 1:1 gradient of excavation sloping, or the installation of a steel trench box.

5.8.BACKFILL

Compaction of fill surrounding the outside of any foundation element or during the construction of the roadway should be compacted to at least 98% of the material's Standard Proctor Maximum Dry Density (SPMDD) within 1.0m of the final subgrade elevation, and then compacted to 98% SPMDD up to final grade. Compaction should be completed in multiple layers, using an appropriately sized steel vibrating roller machine. Smaller vibratory compacting machines must compact thinner layers (and thus more total layers), while larger machines allow for thicker layers of compaction. Small, confined locations not suitable for roller machines must be compacted by hand-held compaction equipment, such as jumping-jack style compactor. Small-scale asphalt compaction plates are not suitable for compaction of local clay soils.

5.9.DRIVEWAY DESIGN

In consideration to the sub-surface investigation, the main subgrade soil would be primarily composed of coarse sands in close proximity to groundwater. Due to the proposed residential land-use after development, there does not expect to be any extremely high traffic count or any industrial heavy-duty loading requirements.

The proposed private shared driveway and individual lot driveways are all designed as rural unpaved gravel roads. The road construction would consist of:

1. Grubbing, stripping, and removal of tree roots
2. Stripping of topsoil and other organic matter

3. Raise or cut the existing grade using native soil, as well as fill and compaction of proposed granular sub-base, compacted to at least 98% SPMDD
4. Lay and compact final surface granular material, compacted to 100% SPMDD, taking care of final finished grade, crowning, or superelevation requirements

Appropriate moisture control is paramount to the amount of compaction achieved based on compaction effort and available machinery. Table 3 shows the recommended pavement structures, which will support cars and light trucks, with occasional delivery vehicles. All granular thicknesses are based on virgin materials, and if recycled materials are to be used, then thicknesses should be increased appropriately as according to Table 3.

It is a requirement that appropriate quality assurance and quality control be conducted during all phases of the roadway and pavement construction process. Specific testing requirements include: Standard Proctor Maximum Dry Density (SPMDD), compaction %, moisture %, and material validation.

Table 2 – Driveway Design Recommendations

	Roadway Layer	Material	Specification	Thickness
Option #1 (new granular material on competent soils)	Surface	19mm (3/4 inch)	OPSS 1010 Granular A (new), or 19mm crusher run	75mm (3 inch)
	Base	50mm (2 inch)	OPSS 1010 Granular B Type II (new), or 50mm crusher run	210mm (7 inch)
	Sub-Base	Native Soil	Sandy soil (Native)	Cut or fill to sub-grade
Option #2 (new granular material on poor soils)	Surface	19mm (3/4 inch)	OPSS 1010 Granular A (new), or 19mm crusher run	150mm (6 inch)
	Base	50mm (2 inch)	OPSS 1010 Granular B Type II (new), or 50mm crusher run	300mm (12 inch)
	Sub-Base	Native Soil	Sandy soil (Native)	Cut or fill to sub-grade
Option #3 (recycle granular material on competent soils)	Surface	19mm (3/4 inch)	OPSS 1010 Granular A (recycle)	150mm (6 inch)
	Base	50mm (2 inch)	OPSS 1010 Granular B Type III (recycle)	300mm (12 inch)
	Sub-Base	Native Soil	Sandy soil (Native)	Cut or fill to sub-grade

6. GLOBAL SLOPE STABILITY

In general, the proposed residential sub-division for Phase 1 Lot 1 – Lot 25 is located on glacial valley land erosional soils below an escarpment and does not have any global stability issues. However, Lot 26 – 63 is generally located near rocky sand slopes, with local grades up to 1:3 ratio (33% grade). Based on generally acceptable engineering design principals for sand soils, slopes steeper than 1:3 ratio should be considered for long-term slope stability review, while all slopes below 1:3 ratio are generally considered as safe.

After review of the proposed Phase 2 Lot 26 – 63 using the LiDAR topographic survey, it is recommended that the following Lots to be considered for future detailed engineering slope review:

- Lot 27, Lot 28, Lot 32, Lot 33, Lot 62, Lot 63
- Lot 33 specifically found exposed bedrock near surface

In general, it is the Engineer's opinion that where local slopes are steeper than 1:3 ratio, that a minimum of 6m horizontal offset is maintained from the crest of slope and edge of development.

7. ON-SITE SANITARY SEWAGE

7.1.INITIAL SIZING REVIEW

Based on the results from Section 4.3 In-situ Infiltration Testing, the native soil characteristic of all of the proposed lots (Phase 1 and Phase 2, Lot 1 – Lot 63) all have an average septic T-time of 7.0min/cm. This generally corresponds well to traditional non-filled absorption trench style septic beds, as per OBC 8.7.3. Alternatively, in-ground filter beds as per OBC 8.7.5 may be adequately used.

Additional septic design requirements that must be checked on a case-by-case basis is OBC 8.7.3.2 (1) (e), where the bottom of absorption trench must be at minimum 900mm higher than the high groundwater table, rock (bedrock), or soil with percolation time more than 50 minutes / cm.

This requirement does not appear to have any significant issues, as all boreholes drilled have groundwater at 1.2m or deeper. Additionally, moving the septic bed upland usually resolves this issue, and can be individual addressed on a site-plan application / plan of sub-division level.

- Modest residence estimated daily flow rate (Q) of 3000 L/day
- Modest residence estimated septic bed size = 170m2 footprint (absorption trench)
- Large residence estimated daily flow rate (Q) of 6000 L/day
- Large residence estimated septic bed size = 340m2 footprint (absorption trench)
- Additional offset requirements such as 15m from waterbodies, 5m offset from structures, 15m from drilled water wells, and 30m from dug water wells

7.2. WATER QUALITY IMPACT RISK ASSESSMENT

This Section of the report is based on the MECP (Ministry of Environment, Conservation and Parks) Procedure D-5-4 "Technical Guideline for Individual On-Site Sewage System: Water Quality Impact Risk Assessment". The proposed developments and the associated septic systems are assessed for the potential for impact on drinking water quality.

The assessment involves a three (3) step process, where fulfillment of conditions may conclude the assessment, or, if unfulfilled, proceed to the next step:

1. Minimum Lot Sizing
2. Evaluate on-site sewage system and groundwater
3. Detailed examination of contaminant loading to groundwater

7.2.1. MINIMUM LOT SIZING

As per Procedure D-5-4, developments where the lot size for each private residence within the development is one hectare or larger, the risk that the boundary limits imposed by these guidelines may be exceeded by the individual system is considered acceptable in most cases. Developments consisting of lots which average 1 hectare (with no lot being smaller than 0.8 Ha), may not require a detailed hydrogeological assessment, provided that it can be demonstrated that the area is not hydrogeologically sensitive.

Based on the proposed developments, Lot 1 – Lot 26, within Phase 1 and along the public road of Benoir Lake Road has a minimum area of 1 Hectares with frontage (widths) of 60m minimum, with exception to Lot 8 which is greater than 0.8 Hectares, and Lot 9 which has 0.65 Hectares. Based on the above guidelines as per D-5-4 for area sizing, Lot 1 – 8 and Lot 10 – 26 would post minimum risks at the boundary limits and does not need further evaluation.

Lot 9 in Phase 1 and Lot 27 – Lot 63 in Phase 2 would be accessed by the private condominium laneway generally have an area between 0.4 ~ 1.0+ Hectare, and does not meet the Minimum Lot Sizing recommendations.

7.2.2. EVALUATING ON-SITE SEWAGE AND GROUNDWATER

Lot 9 and Lot 27 - Lot 63 has a site area between 0.4 ~ 1.0+ Hecatre, and the proposed dwellings (and the associated on-site sewage septic system) are generally near Elephant Lake (between 30 ~ 100m away from the water edge, but no closer than 30m).

One (1) water well was drilled within Phase 2 area, Lot 43, with the following soil profile:

- BH302 Well Tag #A339195
- 0 – 0.15 topsoil
- 0.15 – 0.5m red sand
- 0.5 – 1.5m gray, yellow sand
- 1.5 – 14m dense sandy silt clay and cobbles, glacial till, dense
- 14m – below granite bedrock, grey
- Porous bedrock bearing groundwater found at 56m below grade

As per Procedure D-5-4, where proposed development sizes are less than one hectare, the project must consider the risk to groundwater. The proposed development may be considered as "low risk" when two criteria are demonstrated:

- Evaluate the most probable groundwater receiver for sewage effluent
- Define the most probable lower hydraulic or physical boundary of the groundwater receiving the sewage effluent

Based on Table 1 – Borehole Program Summary above, multiple different shallow boreholes within the Phase 2 Lot 16 – Lot 53 area were drilled, mostly showing red sand near surface and yellow sand at depths down to 1.5m below grade. Based on the proposed location of dwellings, topographic slope, and the proximity to wetlands / Elephant Lake, Phase 2 proposed lots can be further divided into two groups:

- Group #1 - Upland dwellings
    - Proposed dwelling and septic system is relatively far away from watercourse (100m+), located at the top of any localized slopes
    - Sand soil near surface, with bedrock or clay and boulders (hardpan) at depths
    - Lot 27, 28, 32, 33, 62, 63
    - Proposed septic effluents would to flow as shallow groundwater downhill, and be:
        - Absorbed by the significant trees and vegetation along the slopes, or
        - Discharged as shallow groundwater into the local wetland, then further downstream to Elephant Lake
- Group #2 - Waterfront dwellings
    - Proposed dwelling and septic system is relatively close to watercourse / wetlands (30 – 50m), located in a generally flat or shallowly graded area
    - Groundwater is estimated to be shallow perched on top of the glacial till aquitard, at 2 – 5m below grade, primarily driven by the local topographic surface relative to the closet waterbody (wetland or Elephant Lake)
    - Proposed septic effluent would be discharged vertically into the shallow groundwater, and then discharged into Elephant Lake based on topographic contours

In both groups of proposed dwellings and on-site sewage systems:

- The most probable groundwater receiver for the sewage effluent is Elephant Lake, which specific impacts discussed in the Lakeshore Capacity Model Report by King EPCM
- The most probable lower hydraulic or physical boundary of the groundwater receiving the sewage effluent is 350m above seas level:
    - Group #1 is expected to have effluent discharge flowing downhill (from a much higher elevation), and merging into surface water (wetland or the Lake)
    - Group #2 lowest topographic surface elevation of Lot 43 of 353m, and an estimated groundwater of 3m below surface = 350m above sea level
    - The current screen depth of potable water well is at +/- 318m above sea level.

In summary, it is in the Engineer's opinion that Lot 9 and Lot 27 – 63 can be considered as "low risk" as both the criteria of probable groundwater receiver and lower hydraulic boundary does not impact any potable groundwater or aquifers.

8. PRIVATE WATER WELLS

The County of Haliburton Official Plan requires any development application, including Zoning Bylaw Amendments for future residential sub-division of seasonal and permanent homes to be supported by a hydrogeology report, specifically for the availability of groundwater supply at the subject area. This Section of the report is based on the MECP (Ministry of Environment, Conservation and Parks) Procedure D-5-5 "Technical Guideline for Private Wells: Water Supply Assessment".

The subject property and proposed development can be separated into two (2) separate parts:

- Phase 1 Lot 1 – Lot 25, and Phase 2 Lot 26 for residential dwellings, located near existing waterfront residences, which are all fully serviced via potable private water wells
- Phase 2 Lot 27 – Lot 63 are all located along the northern shoreline of Elephant Lake, and does not have existing services as baseline reference for potable private water wells

Two (2) new water wells are drilled for the purposes of water quantity and quality testing based on Procedure D-5-5:

- BH301 at Lot 10, Well Tag #A348258
- BH302 at Lot 53, Well Tag #A339195

It is understood that as per Procedure D-5-5, a specific number of potable water wells must be drilled and tested based on the number of proposed lots / Hectares of development. It is in the intention of the Client and the Engineer that BH301 and BH302 is representative of the overall conditions at site, and that additional wells will be drilled as part of conditional approval of development.

8.1. BH301 (Lot 1 – 26)

The water quantity and quality for BH301 (for Lot 1-26) are as follows:

- Borehole was drilled down to 79.86m, with bedrock at approximately 30m below grade
- Neighbours to the west historically drilled down to 30m, and set well at boundary between clay and bedrock
- Water quantity testing was conducted for 5 hours and 45 minutes
- BH301 has low transmissivity, with steady-state discharge of 8.5L/min and draw-down to 32mbgl
- Recharge rate is approx. 13.5m in 30 minutes (from 31mbgl to 18.4mbgl)
- Assuming that the water well pumps for only 12 hours per day, and services a single dwelling, it would produce 6,120L / day
- As these dwellings are all serviced with private on-site sewage systems (private septics), most of the water demand will be limited by the amount of maximum acceptance by each private septic system
- It is recommended that Lot 1 – 16 require the use of storage of potable groundwater on site to meet peak demand. These storage units would be filled during non-peak hours and then relied upon during peak demand.
- Figure 1 for BH301 drawdown versus pumping duration

8.2. BH302 (Lot 27 – 63)

The water quantity and quality for BH302 (for Lot 27-63) are as follows:

- Borehole was drilled down to 36.82m, with boulders and estimated bedrock at 35m
- Water quantity testing was conducted for 7 hours and 25 minutes
- BH301 has high transmissivity, with steady-state discharge of 18L/min and essentially no drawdown (from 2.3m down to 2.37m)
- Assuming that the water well pumps for only 12 hours per day, and services a single dwelling, it would produce 12,960L / day
- Figure 2 for BH302 drawdown versus pumping duration

8.3. Long-term Safe Yield

The long-term safe yield of each private potable water well (BH301 and BH302) is calculated using the Farvolden Method (1961). This method uses the transmissivity (T – m2/day) and the available drawdown to calculate the twenty-year long-term safe yield of the private water well.

$$T = (2.303\ Q) / (4\ \pi\ \Delta S)$$ (Straight Line Pumping Test Analysis, Cooper and Jacob 1946)

T_{BH301} = (2.303) (12.24m3/day) / (4 * 3.14159 * 25m) = 0.09 m2/day
T_{BH302} = (2.303) (25.92m3/day) / (4 * 3.14159 * 0.05m) = 95 m2/day

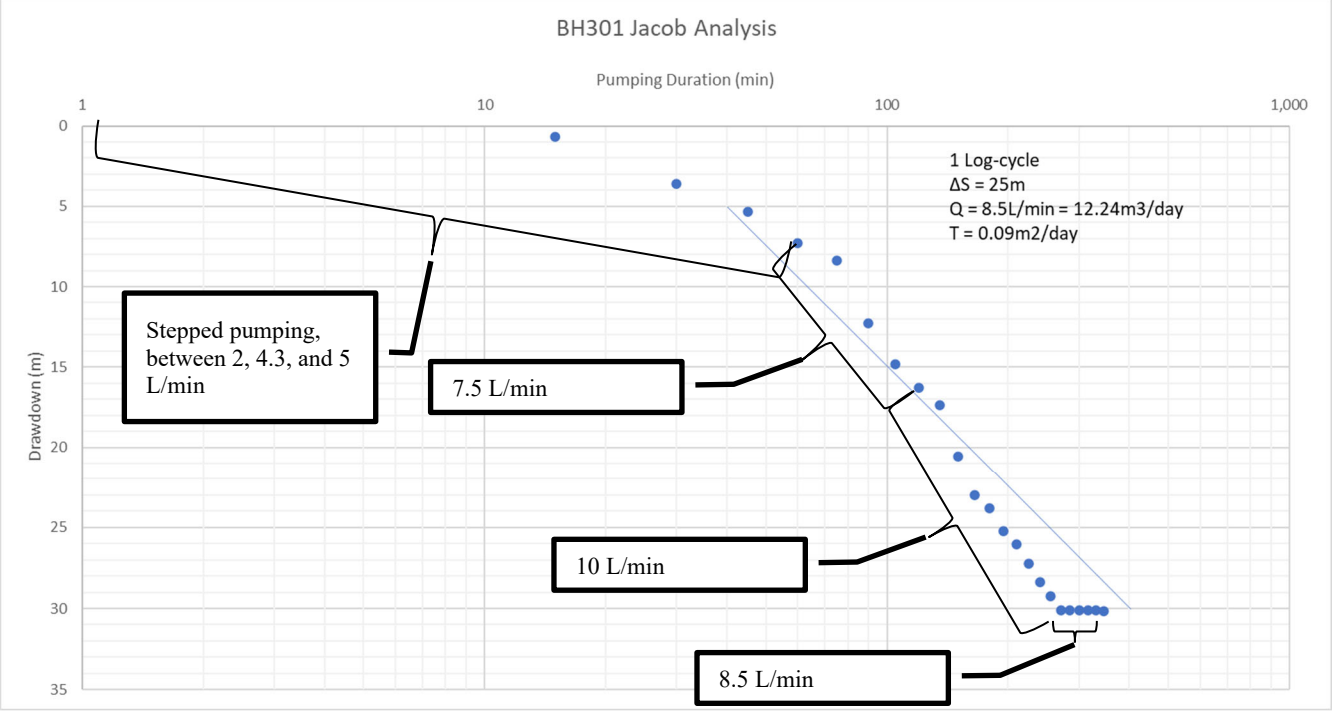


Figure 1 - BH301 Jacob Analysis for Drawdown vs Pumping Duration

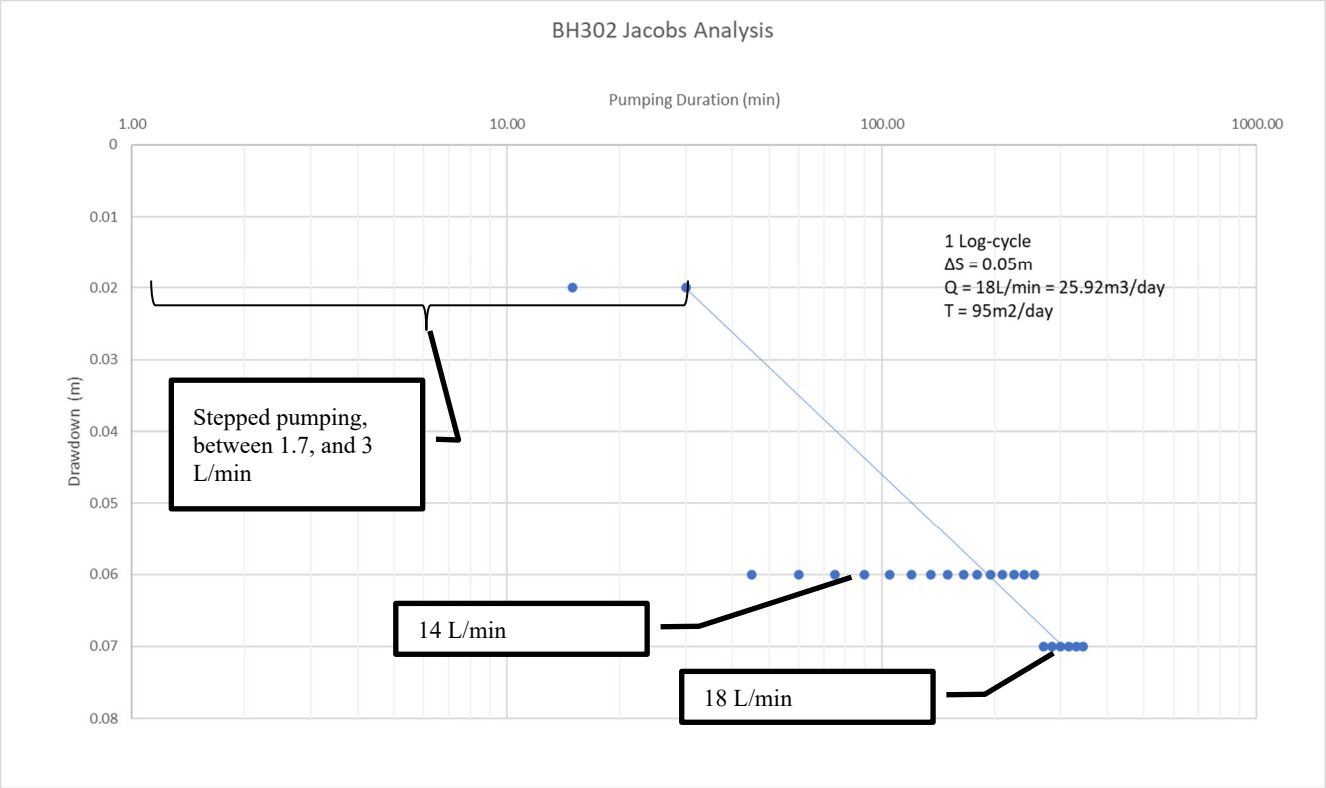


Figure 2 - BH302 Jacob Analysis for Drawdown vs Pumping Duration

The Farvolden Method (1959) is as follows:

$$Q20 = (0.68)\ (T)\ (Ha)\ (FS)$$

Q20 = 20-year safe yield of water well (m3/day)
T = transmissivity (m2/day)
Ha = available drawdown (m)
FS = factor of safety

		BH301	BH302
Hydraulic conductivity	K (m/day)	0.003	9.5
aquifer thickness	b (m)	30	10
Transmissivity Higher	T (m2/day)	0.09	95
Available Drawdown	Ha (m)	79.8	36.8
Factor of Safety	FS = 1.5	0.67	0.67
Q20 Safe Yield	m3/day	3.27	1,593

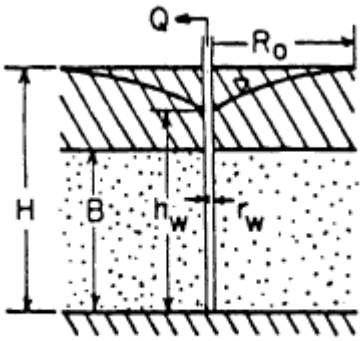
Based on the Farvolden Method, BH301 representing Lot 1 - 26, has a long-term safe yield of 3.27m3/day. Based on MECP D-5-5 guidelines, the per-capita demand of domestic water is 450L/day, and this means that the current long-term safe yield can support a minimum of seven (7) individuals per

water well. Additionally, peak water demand shall be 120 minutes of 3.75L/min per capita and a minimum of 13.7L/min. It is unlikely that the long-term safe yield can sustain the minimum requirement, and thus it is recommend to have a potable water storage tank to manage peak demands.

BH302 representing Lot 27 - 63 has a long-term safe yield of 1593m3/day, and generally considered sufficient for all uses, including peak demand as well as total daily demand.

8.4. Zone of Influence

Based on an equilibrium steady-state assumption of radial flow of confined aquifer:



Radial flow, confined aquifer

$$Qw = \frac{K\ B\ (H - hw)}{2.65\ x\ 10\text{^}{-6}\ ln(Ro/rw)}$$

Table 3 - Steady-state equilibrium pumping and Zone of Influence review

		BH301	BH302
Qw - Steady State pumping rate	L/min	8.5	18
K - hydraulic conductivity	m/sec	3.47222E-08	0.000109954
B - aquifer thickness	m	30	15
H - static groundwater height	m	78.07	34.52
hw - steady-state pumped height	m	47.93	34.45
Ro - zone of influence	m	0.809	2.25
rw - radius of water well	m	0.2	0.2

Based on Table 3, under a steady-state equilibrium assumption:

- BH301 can sustain a pumping rate of 8.5L/min and have a Zone of Influence of only 0.809m
- BH302 can sustain a pumping rate of 18L/min and have a Zone of Influence 2.25m

The above evaluation confirms that there will be minimal off-site impacts based on potable groundwater usage from BH301 and BH302, with extremely small Zone of Influence that generally does not extend off the property boundary.

8.5. GROUNDWATER CHEMISTRY

Groundwater samples for chemical testing was obtained on June 15th, 2022, with two samples per monitoring well (at mid-point of monitoring well quantity test and end-point of quantity test), for a total of four (4) samples. Groundwater samples were submitted to ALS Environmental for third-party laboratory testing, and received on the same day of June 15th, 2022.

Groundwater samples were analyzed for a suite of water quality parameters, such as TDS, turbidity, total coliforms, physical tests, anions / nutrients, metals, and other parameters. The results were compared with the Ontario Drinking Water Quality Standards (ODWS) – the Aesthetic and Operational Guidelines, as well as the Microbiological/Chemical Standards. Based on MECP D-5-5 groundwater sampling procedures, chemical analysis should only be conducted on groundwater obtained near the end of the purging program. Although all four (4) samples were analyzed and reviewed by the engineer, only Sample ID WW1 630 and WW2 1000 are discussed within this report.

Aesthetic and Operational Guidelines considers non health-related parameters, such as taste, colour and odour. Microbiological/Chemical Standards only considers health-related parameters.

There are no exceedances within the Microbiological/Chemical Standards of ODWS.

Within the Aesthetic and Operational Guidelines of ODWS:

- Sample ID WW1 630 exceedances include:
    - Sample hardness (as CaCO3) of 101mg/L versus guideline of 80-100mg/L
    - Turbidity of 7.79 NTU versus guideline of 5 NTU
    - Iron of 2440 ug/L versus guideline of 300 ug/L

- Sample ID WW2 1000 exceedances include:
    - Dissolved Organic Carbon of 6.29mg/L versus guideline of 5 mg/L
    - Iron of 2890 ug/L versus guideline of 300 ug/L
    - Manganese of 105 ug/L versus guideline of 50 ug/L

In summary, the groundwater samples from the two potable water wells did not have any exceedances from a health-related parameter, and several parameters exceeded the recommended Aesthetics and Operational Guidelines of ODWS. See Appendix VI for full details of laboratory testing results.

9. SUMMARY

The soil conditions at the subject property is varied with several areas of steep slopes that require specific site investigation and detailed site plan review. Otherwise, the subject property and the proposed developments within Phase 1 Lot 1-26 and Phase 2 Lot 27 - 63 are founded on solid soils and do not expect to any shallow groundwater issues.

Potable groundwater for each proposed lot may be adequately serviced via private water wells, and preliminary drilling of two water wells show that both the quality and quantity pass the required standards. Potable water storage may be required to meet short term peak demands, as well as secondary potable water treatment systems for better aesthetic and operational concerns.

King EPCM appreciates the opportunity to be of service for this project, and trusts that this report provides sufficient geotechnical engineering information for a detailed design of the project. King EPCM looks forward to providing continued service during the construction stage. Please do not hesitate to contact King EPCM at any time if there are any questions regarding this project.

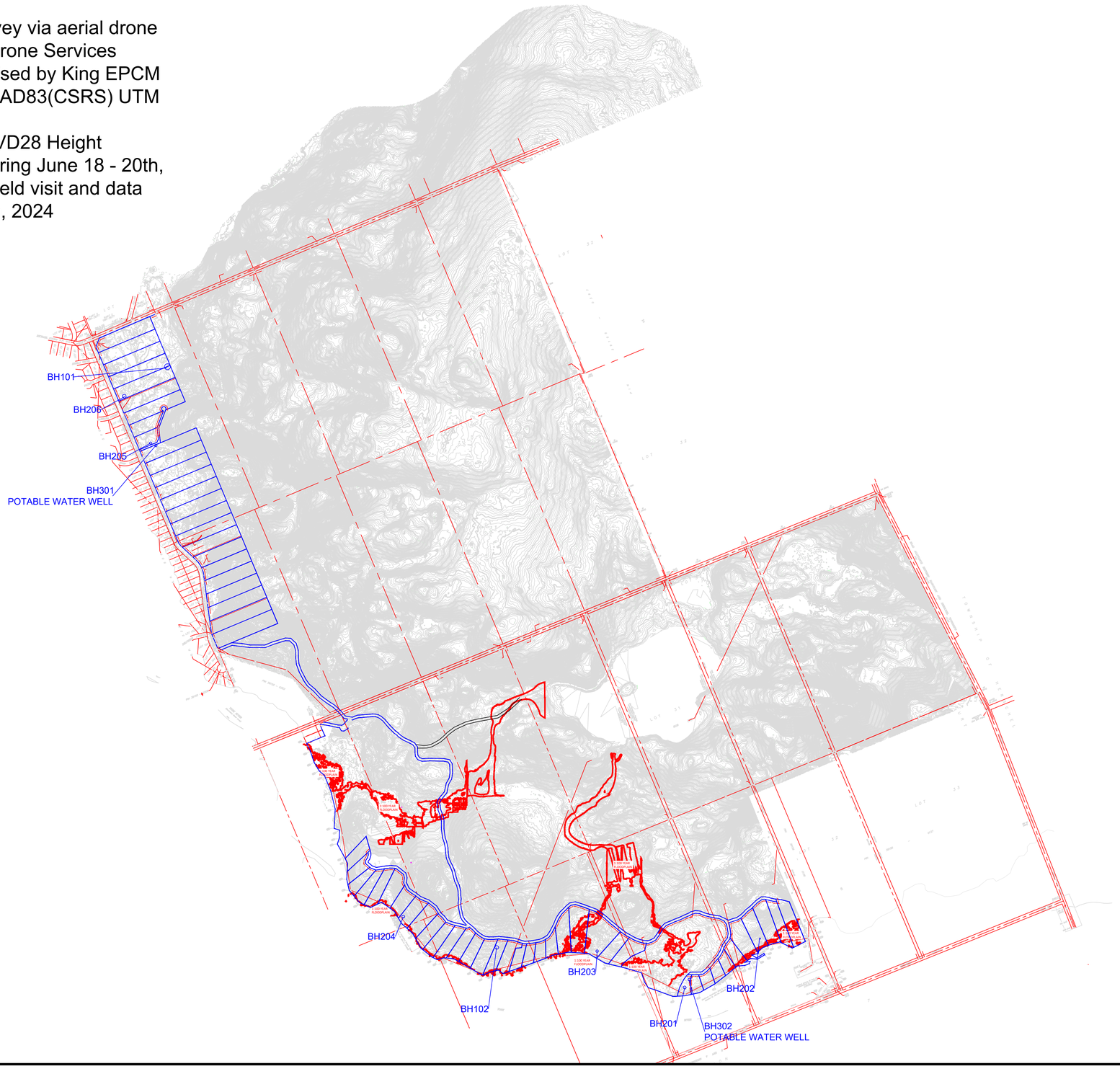
Sincerely,

Tony Wang, P. Eng
Principal Engineer

APPENDIX I – SITE PLAN

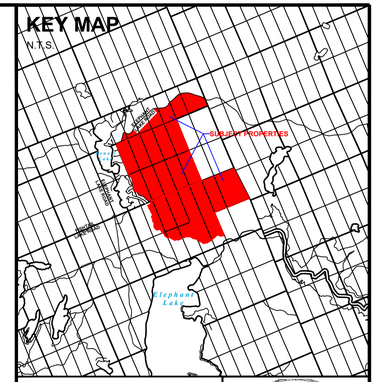
GENERAL NOTES:

- Topographic LiDAR survey via aerial drone was sub-contracted to Drone Services Canada Inc. and supervised by King EPCM
- Horizontal Projection - NAD83(CSRS) UTM Zone 17N
- Vertical Projection - CGVD28 Height
- Field work completed during June 18 - 20th, 2024, with King EPCM field visit and data verification on June 19th, 2024



SCALE 1:10,000
1cm = 100m
0m 500m 1000m

KEY MAP
N.T.S.



DRAWN
TW

DATE
DEC 18, 2024

LICENSED PROFESSIONAL ENGINEER
Y. T. WANG
100224076
PROVINCE OF ONTARIO
12/18/2024

KING EPCM

King EPCM
211-3780 14th Ave,
Markham, ON, L3R 9Y5
www.KingEPCM.com
647-459-5647
General@KingEPCM.com

CLIENT
95 DEVELOPMENT

PROJECT NAME
ELEPHANT LAKE - NORTH AND SOUTH PHASE

PROJECT LOCATION
ELEPHANT LAKE, HARCOURT, DYSART ET AL

PRINT TITLE
GEOTECH BOREHOLE SITE PLAN

FILE No.
EGR-2.1

No.	ISSUED FOR:	DATE	DRAW BY	CHECK
V25	ISSUED FOR SUBMISSIONS	DEC 11, 2024	TW	TW

APPENDIX II – BOREHOLE DRILL LOG

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GROUNDWATER LOG BH101

PROJECT NUMBER	**DRILLING DATE** APR 12, 2021	**COORDINATES** 724,148N, 5,007,290E
PROJECT NAME ELEPHANT LAKE SUB-DIVISC	**TOTAL DEPTH** 4.6M	**COORD SYS** UTM-17
CLIENT 95 DEVELOPMENT INC.	**DIAMETER** 4.5 INCH	**COMPLETION**
ADDRESS ELEPHANT LAKE, DYSART ET AL	**CASING** 2" PVC	**SURFACE ELEVATION**
LICENCE NO. 7691	**SCREEN** uPVC Factory Slotted	**WELL TOC**

COMMENTS IN PROPOSED LOT A3

LOGGED BY TW
CHECKED BY

Depth (m)	SPT	Graphic Log	Material Description	Well Diagram
0.2			brown, black, clay silt topsoil	bentonite
0.4				
0.6				
0.8				
1			bright brown sand, coarse & granular, damp near surface and wet at depths	
1.2				
1.4	10,25,23			
1.6				
1.8				
2				
2.2				
2.4				
2.6				
2.8				
3	10,14,15		gray silty sand, wet, coarse & granular, flowing sand conditions at depths	well sand
3.2				
3.4				
3.6				
3.8				
4				
4.2				
4.4	N/A - flowing sand conditions			
4.6			Termination Depth at: 4.6m	
4.8				

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GROUNDWATER LOG BH102

PROJECT NUMBER	**DRILLING DATE** APR 12, 2021	**COORDINATES** 725,656N, 5,004,632E
PROJECT NAME ELEPHANT LAKE SUB-DIVISC	**TOTAL DEPTH** 3.7M	**COORD SYS** UTM-17
CLIENT 95 DEVELOPMENT INC.	**DIAMETER** 4.5 INCH	**COMPLETION**
ADDRESS ELEPHANT LAKE, DYSART ET AL	**CASING** 2" PVC	**SURFACE ELEVATION**
LICENCE NO. 7691	**SCREEN** uPVC Factory Slotted	**WELL TOC**

COMMENTS IN PROPOSED LOT B17, UPLAND

LOGGED BY TW
CHECKED BY

Depth (m)	SPT	Graphic Log	Material Description	Well Diagram
0.2			topsoil	
0.4			gray silty sand, damp / dry	
0.6				
0.8				
1				bentonite
1.2				
1.4	3,25(rock),10			
1.6			gray silty sand, damp	
1.8				
2				
2.2				
2.4				
2.6				
2.8				
3	14, 30+ (rock, stop early), stop			well sand
3.2				
3.4				
3.6				
3.8			Termination Depth at: 3.7m due to auger refusal on boulder / rock	
4				
4.2				
4.4				
4.6				
4.8				

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GROUNDWATER LOG BH201

PROJECT NUMBER	**DRILLING DATE** NOV 15, 2021	**COORDINATES** 726,516N, 5,004,449E
PROJECT NAME ELEPHANT LAKE SUB-DIVISC	**TOTAL DEPTH** 1.5M	**COORD SYS** UTM-17
CLIENT 95 DEVELOPMENT INC.	**DIAMETER** 2.5 INCH	**COMPLETION**
ADDRESS ELEPHANT LAKE, DYSART ET AL	**CASING**	**SURFACE ELEVATION**
LICENCE NO. 7691	**SCREEN**	**WELL TOC**

COMMENTS IN PROPOSED LOT B28

LOGGED BY TW
CHECKED BY

Depth (m)	MANUAL CONE PENETROMETER	Graphic Log	Material Description
0.2	1000kPa at <0.5cm displacement		topsoil
0.4			brown yellow sand
0.6			
0.8			
1	1400kPa at <0.5cm displacement		
1.2			
1.4			Termination Depth at: 1.5m
1.6			
1.8			
2			
2.2			
2.4			
2.6			
2.8			

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GROUNDWATER LOG BH202

PROJECT NUMBER	**DRILLING DATE** NOV 15, 2021	**COORDINATES** 726,860N, 5,004,672E
PROJECT NAME ELEPHANT LAKE SUB-DIVISC	**TOTAL DEPTH** 1.2M	**COORD SYS** UTM-17
CLIENT 95 DEVELOPMENT INC.	**DIAMETER** 2.5 INCH	**COMPLETION**
ADDRESS ELEPHANT LAKE, DYSART ET AL	**CASING**	**SURFACE ELEVATION**
LICENCE NO. 7691	**SCREEN**	**WELL TOC**

COMMENTS IN PROPOSED LOT B35

LOGGED BY TW
CHECKED BY

Depth (m)	MANUAL CONE PENETROMETER	Graphic Log	Material Description
0			topsoil
0.2			red sand
0.4			yellow sand
0.6			
0.8			
1			
1.2	1200kPa at <0.5cm displacement		Termination Depth at: 1.2m
1.4			
1.6			
1.8			
2			
2.2			
2.4			
2.6			
2.8			

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GROUNDWATER LOG BH203

PROJECT NUMBER	**DRILLING DATE** NOV 15, 2021	**COORDINATES** 726,115N, 5,004,615E
PROJECT NAME ELEPHANT LAKE SUB-DIVISC	**TOTAL DEPTH** 1.5M	**COORD SYS** UTM-17
CLIENT 95 DEVELOPMENT INC.	**DIAMETER** 2.5 INCH	**COMPLETION**
ADDRESS ELEPHANT LAKE, DYSART ET AL	**CASING**	**SURFACE ELEVATION**
LICENCE NO. 7691	**SCREEN**	**WELL TOC**

COMMENTS IN PROPOSED LOT B25

LOGGED BY TW
CHECKED BY

Depth (m)	MANUAL CONE PENETROMETER	Graphic Log	Material Description
0			topsoil
0.2			red sand
0.4	1200kPa at <0.5cm displacement		brown yellow sand
0.6			
0.8			
1			
1.2			
1.4	1200kPa at <0.5cm displacement		
1.6			Termination Depth at: 1.5m
1.8			
2			
2.2			
2.4			
2.6			
2.8			

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GROUNDWATER LOG BH204

PROJECT NUMBER	**DRILLING DATE** NOV 15, 2021	**COORDINATES** 725,227N, 5,004,773E
PROJECT NAME ELEPHANT LAKE SUB-DIVISC	**TOTAL DEPTH** 1.5M	**COORD SYS** UTM-17
CLIENT 95 DEVELOPMENT INC.	**DIAMETER** 2.5 INCH	**COMPLETION**
ADDRESS ELEPHANT LAKE, DYSART ET AL	**CASING**	**SURFACE ELEVATION**
LICENCE NO. 7691	**SCREEN**	**WELL TOC**

COMMENTS IN PROPOSED LOT B9

LOGGED BY TW
CHECKED BY

Depth (m)	MANUAL CONE PENETROMETER	Graphic Log	Material Description
0			topsoil
0.2			red sand
0.4	1200kPa at <0.5cm displacement		
0.6			
0.8			
1			
1.2			gray yellow sand
1.4	1200kPa with 1.0cm displacement		
1.6			Termination Depth at: 1.5m
1.8			
2			
2.2			
2.4			
2.6			
2.8			

Disclaimer

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GROUNDWATER LOG BH205

PROJECT NUMBER	**DRILLING DATE** NOV 15, 2021	**COORDINATES** 724,070N, 5,006,939E
PROJECT NAME ELEPHANT LAKE SUB-DIVISC	**TOTAL DEPTH** 1.5M	**COORD SYS** UTM-17
CLIENT 95 DEVELOPMENT INC.	**DIAMETER** 2.5 INCH	**COMPLETION**
ADDRESS ELEPHANT LAKE, DYSART ET AL	**CASING**	**SURFACE ELEVATION**
LICENCE NO. 7691	**SCREEN**	**WELL TOC**

COMMENTS IN PROPOSED LOT A6

LOGGED BY TW
CHECKED BY

Depth (m)	MANUAL CONE PENETROMETER	Graphic Log	Material Description
0			topsoil
0.2			red sand
0.4	1400kPa at <0.5cm displacement		
0.6			
0.8			
1			gray sand, dry
1.2			
1.4	1200kPa at <0.5cm displacement		
1.6			Termination Depth at: 1.5m
1.8			
2			
2.2			
2.4			
2.6			
2.8			

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GROUNDWATER LOG BH206

PROJECT NUMBER	**DRILLING DATE** NOV 15, 2021	**COORDINATES** 723,950N, 5,007,155E
PROJECT NAME ELEPHANT LAKE SUB-DIVISC	**TOTAL DEPTH** 1.5M	**COORD SYS** UTM-17
CLIENT 95 DEVELOPMENT INC.	**DIAMETER** 2.5 INCH	**COMPLETION**
ADDRESS ELEPHANT LAKE, DYSART ET AL	**CASING**	**SURFACE ELEVATION**
LICENCE NO. 7691	**SCREEN**	**WELL TOC**

COMMENTS IN PROPOSED LOT A4

LOGGED BY TW
CHECKED BY

Depth (m)	MANUAL CONE PENETROMETER	Graphic Log	Material Description
0			topsoil
0.2			red sand
0.4	1200kPa at <0.5cm displacement		
0.6			gray yellow sand, significant amounts of small granular gravel
0.8			
1			
1.2			
1.4	1200kPa at <0.5cm displacement		
1.6			Termination Depth at: 1.5m
1.8			
2			
2.2			
2.4			
2.6			
2.8			

BH301

Ontario Ministry of Conservation and Parks

Regulation 903 Ontario Water Resources Act

Measurements recorded in: ☐ Metric ☒ Imperial

A348258

Page 1 of

Well Owner's Information

First Name	Last Name/Organization	E-mail Address	☐ Well Contractor by Well Owner
	95 Development Inc.		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
201-1571 Sandhurst Circle	Scarborough	ON	M1V1V8	6473958888

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
6th Benoir Lake Rd.	Harcourt		

County/District/Municipality	City/Town/Village	Province	Postal Code
Dysart et al		Ontario	K0L

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	17	724091	5069936		

Overburden and Bedrock Materials/Abandonment Sealing Record (see instructions on the back of this form)

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
Dark Brown	Topsoil		Loose	0	1.5
Brown	Sand, Silt	clay, Cobble	Dense	1.5	80
Red	Granite		Hard	80	150
Grey	Granite		Hard	150	278

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m^3/ft^3)
0	90	Bentonite	11.7

Method of Construction

☐ Cable Tool ☐ Diamond
☒ Rotary (Conventional) ☐ Jetting
☐ Rotary (Reverse) ☐ Driving
☐ Boring ☐ Digging
☒ Air percussion
☐ Other, specify

Well Use

☐ Public ☐ Commercial ☐ Not used
☐ Domestic ☐ Municipal ☐ Dewatering
☐ Livestock ☐ Test Hole ☒ Monitoring
☐ Irrigation ☐ Cooling & Air Conditioning
☐ Industrial
☐ Other, specify

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
4	Steel	.250	+2	90
4	Open Hole		90	278

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To

Status of Well

☐ Water Supply
☐ Replacement Well
☐ Test Hole
☐ Recharge Well
☐ Dewatering Well
☒ Observation and/or Monitoring Hole
☐ Alteration (Construction)
☐ Abandoned, Insufficient Supply
☐ Abandoned, Poor Water Quality
☐ Abandoned, other, specify
☐ Other, specify

Water Details

Water found at Depth (m/ft)	Gas	Kind of Water	Fresh	Untested	Other, specify
	☐		☐	☐	
	☐		☐	☐	
	☐		☐	☐	

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)
0	90	6
90	278	4

Results of Well Yield Testing

After test of well yield, water was:
☐ Clear and sand free
☐ Other, specify

If pumping discontinued, give reason:

Pump intake set at (m/ft)

Pumping rate (l/min / GPM)

Duration of pumping ____ hrs + ____ min

Final water level end of pumping (m/ft)

If flowing give rate (l/min/GPM)

Recommended pump depth (m/ft)

Recommended pump rate (l/min/GPM)

Well production (l/min/GPM)

Disinfected? ☐ Yes ☐ No

Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level			
1		1	
2		2	
3		3	
4		4	
5		5	
10		10	
15		15	
20		20	
25		25	
30		30	
40		40	
50		50	
60		60	

Map of Well Location

Please provide a map below following instructions on the back.

Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor | Well Contractor's Licence No.

Terra Firma Environmental Services Ltd.
Well Contractor Licence #: 6946
84 Martin Ross Ave. Toronto, ON M3J 2L4
Bus #: 416.450.6244, E: info@terrafirmaservices.com
Well Tech & Licence #: Welch, David, #: 4129

Bus

Pro

Bus

Well Technician's Licence No. 4129 | Signature of Technician and/or Contractor | Date Submitted YYYY MM DD

Well owner's information package delivered ☒ Yes ☐ No

Date Package Delivered

Date Work Completed 2022/04/28

Ministry Use Only

Audit No. Z409375

Received

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Ministry's Copy

BH302

Ontario — Ministry of the Environment, Conservation and Parks

Well Record

Regulation 903 Ontario Water Resources Act

Page ___ of ___

Measurements recorded in: ☐ Metric ☒ Imperial

Well Tag No. (Place Sticker and/or Print Below): A339195

Well Owner's Information

First Name | Last Name/Organization: 95 Development Inc. | E-mail Address | ☐ Well Constructed by Well Owner

Mailing Address (Street Number/Name): 201-1571 Sandhurst Circle | Municipality: Scarborough | Province: ON | Postal Code: M1V1V2 | Telephone No. (inc. area code): 6473952888

Well Location

Address of Well Location (Street Number/Name): 0th Marquis Drive | Township: Harcourt | Lot | Concession

County/District/Municipality: Dysart et al | City/Town/Village | Province: Ontario | Postal Code: K0L

UTM Coordinates: NAD 83 | Zone: 17 | Easting: 726515 | Northing: 5044460 | Municipal Plan and Sublot Number | Other

Overburden and Bedrock Materials/Abandonment Sealing Record (see instructions on the back of this form)

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	To
Dark Brown	Top Soil		Loose	0	1
Brown	Silt, Clay, Boulders	Cobbles	Hard	1	45
Grey	Granite		Hard	45	148
Grey	Granite		Porous, Hard	148	185

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
0	170	Bentonite	22.1
170	185	Sand	1.95

Method of Construction

☐ Cable Tool ☒ Rotary (Conventional) ☐ Rotary (Reverse) ☐ Boring ☐ Air percussion ☐ Other, specify

☐ Diamond ☐ Jetting ☐ Driving ☐ Digging

Well Use

☐ Public ☐ Domestic ☐ Livestock ☐ Irrigation ☐ Industrial ☐ Other, specify

☐ Commercial ☐ Municipal ☐ Test Hole ☐ Cooling & Air Conditioning

☐ Not used ☐ Dewatering ☒ Monitoring

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	To
4	St. Plastic	.250	+2	175
X				

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	To
4.5	Plastic	10	175	185

Status of Well

☐ Water Supply ☐ Replacement Well ☐ Test Hole ☐ Recharge Well ☐ Dewatering Well ☒ Observation and/or Monitoring Hole ☐ Alteration (Construction) ☐ Abandoned, Insufficient Supply ☐ Abandoned, Poor Water Quality ☐ Abandoned, other, specify ☐ Other, specify

Results of Well Yield Testing

After test of well yield, water was: ☐ Clear and sand free ☐ Other, specify

If pumping discontinued, give reason:

Pump intake set at (m/ft)

Pumping rate (l/min / GPM)

Duration of pumping ___ hrs + ___ min

Final water level end of pumping (m/ft)

If flowing give rate (l/min/GPM)

Recommended pump depth (m/ft)

Recommended pump rate (l/min/GPM)

Well production (l/min/GPM)

Disinfected? ☐ Yes ☐ No

Draw Down Time (min)	Water Level (m/ft)	Recovery Time (min)	Water Level (m/ft)
Static Level			
1		1	
2		2	
3		3	
4		4	
5		5	
10		10	
15		15	
20		20	
25		25	
30		30	
40		40	
50		50	
60		60	

Water Details

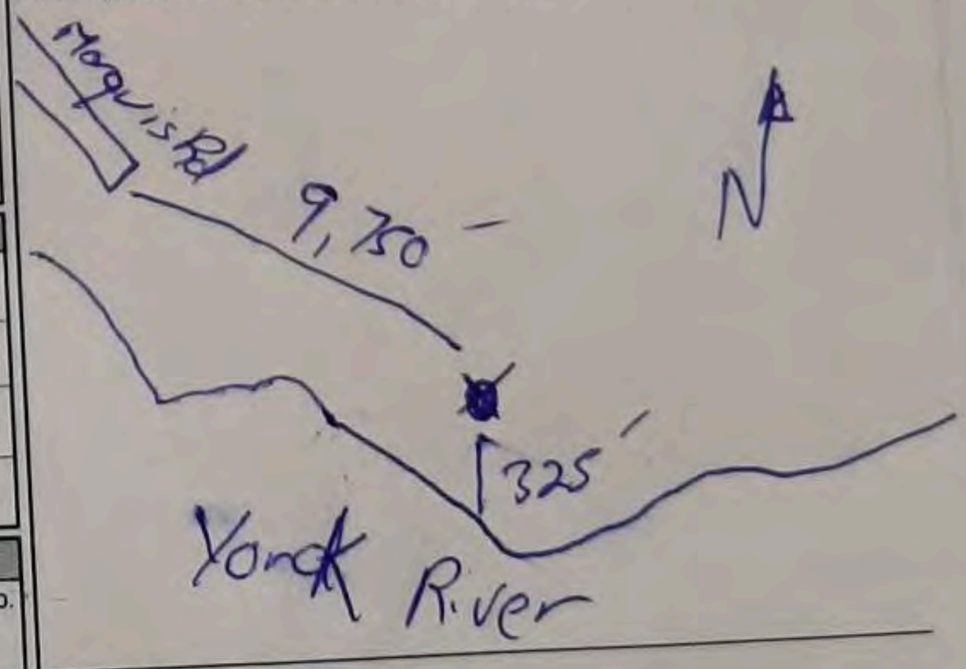
Water found at Depth (m/ft)	Kind of Water	
	☐ Gas	☐ Fresh ☐ Untested ☐ Other, specify
	☐ Gas	☐ Fresh ☐ Untested ☐ Other, specify
	☐ Gas	☐ Fresh ☐ Untested ☐ Other, specify

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)
0	185	6

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor | Well Contractor's Licence No.

Terra Firma Environmental Services Ltd.
Well Contractor Licence #: 6946
84 Martin Ross Ave. Toronto, ON M3J 2L4
Bus #: 416.450.6244, E: info@terrafirmaservices.com
Well Tech & Licence #: Welch, David, #: 4129

Well Technician's Licence No.: 4129 | Signature of Technician and/or Contractor | Date Submitted: ____

Well owner's information package delivered: ☒ Yes ☐ No

Date Package Delivered: ____

Date Work Completed: 2021/11/24

Ministry Use Only

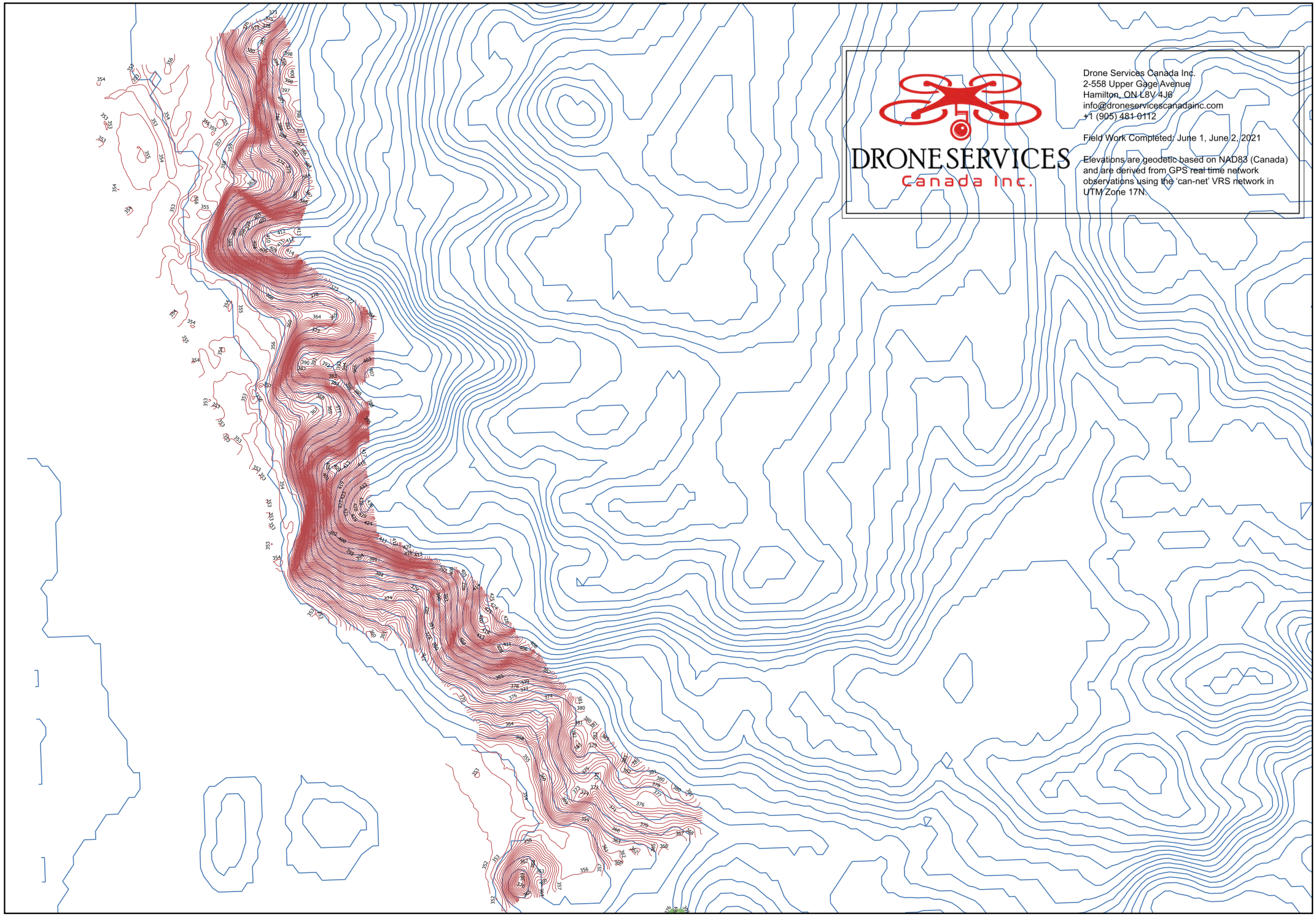
Audit No. Z409376

Received

0506E (2020/06)

Ministry's Copy

APPENDIX III – LiDAR TOPOGRAPHIC SURVEY

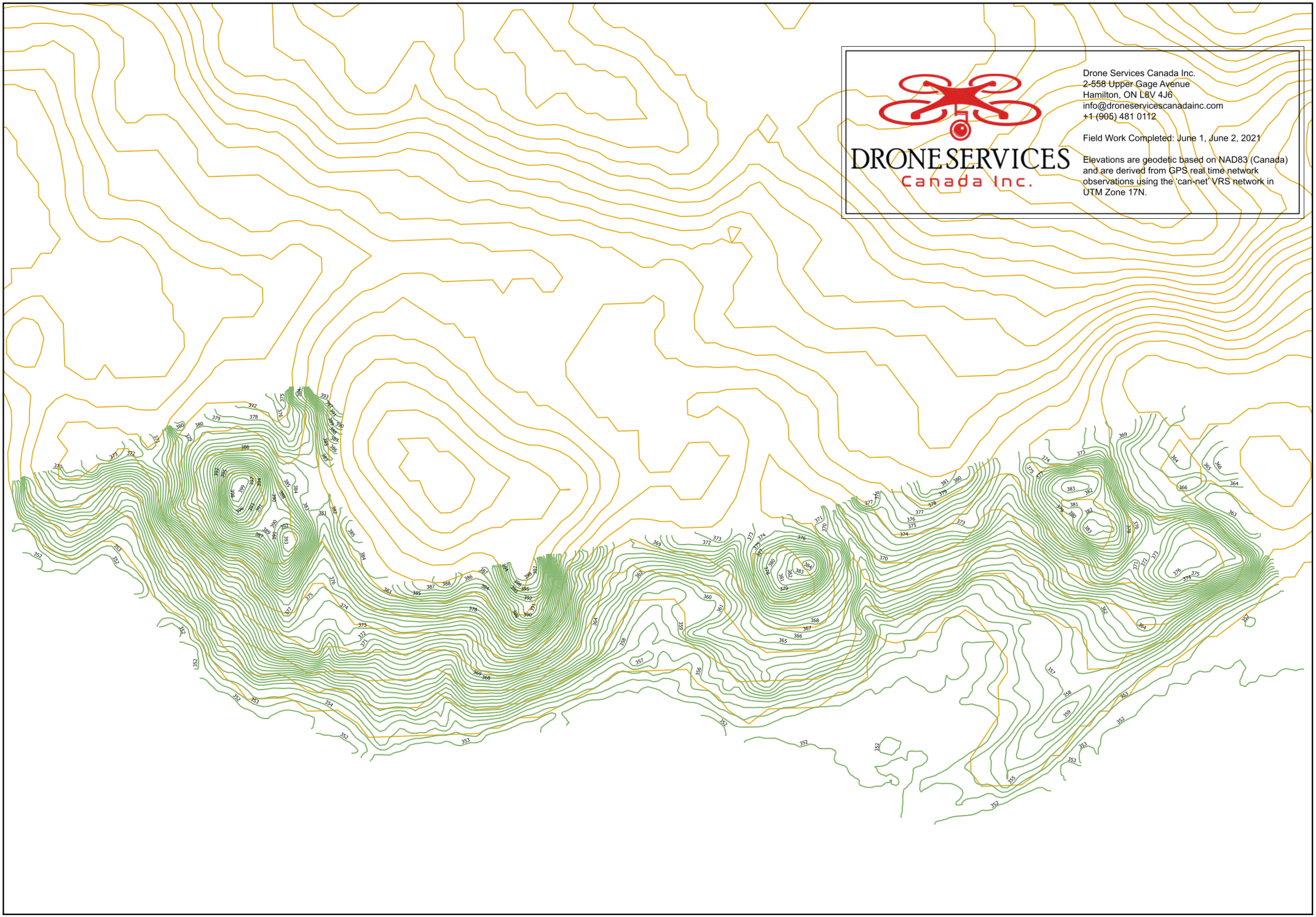


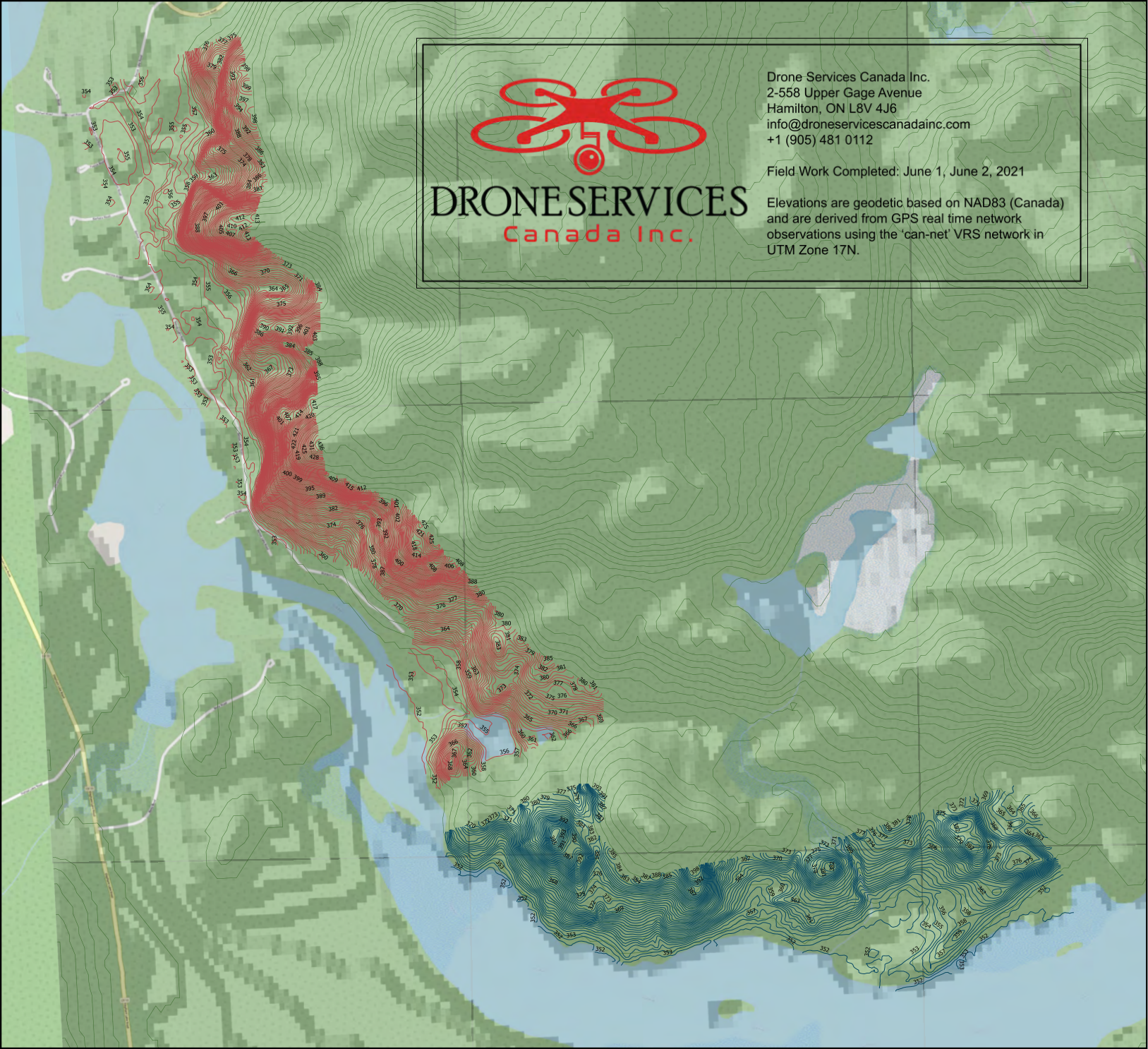
DRONE SERVICES
Canada Inc.

Drone Services Canada Inc.
2-558 Upper Gage Avenue
Hamilton, ON L8V 4J6
info@droneservicescanadainc.com
+1 (905) 481-0112

Field Work Completed: June 1, June 2, 2021

Elevations are geodetic based on NAD83 (Canada) and are derived from GPS real time network observations using the 'can-net' VRS network in UTM Zone 17N.


DRONE SERVICES
Canada Inc.
Drone Services Canada Inc.
2-558 Upper Gage Avenue
Hamilton, ON L8V 4J6
info@droneservicescanadainc.com
+1 (905) 481 0112
Field Work Completed: June 1, June 2, 2021
Elevations are geodetic based on NAD83 (Canada) and are derived from GPS real time network observations using the 'can-net' VRS network in UTM Zone 17N.


DRONE SERVICES
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+1 (905) 481 0112
Field Work Completed: June 1, June 2, 2021
Elevations are geodetic based on NAD83 (Canada) and are derived from GPS real time network observations using the 'can-net' VRS network in UTM Zone 17N.

APPENDIX IV – SLOPE STABILITY & EROSION SITE INSPECTION

TABLE 4.2 - SLOPE STABILITY RATING CHART

Site Location: LOT B1 - B38, ELEPHANT LAKE PROJECT File No.
Property Owner: 95 DEVELOPMENT INC Inspection Date: OCT 6TH, 2021
Inspected By: TONY WANG, P. ENG Weather: SUNNY, COOL WEATHER

1. SLOPE INCLINATION	MAJORITY OF PROPERTY IS 3:1 OR FLATTER, ONLY CERTAIN AREAS ARE STEEPER		
	degrees	**horiz. : vert.**	
a)	18 or less	3 : 1 or flatter	0
b)	18 - 26	2 : 1 to more than 3 : 1	6
c)	more than 26	steeper than 2 : 1	16
2. SOIL STRATIGRAPHY			
a)	Shale, Limestone, Granite (Bedrock)		0
b)	Sand, Gravel	LOWER ELEVATIONS ARE SAND & GRAVEL, UPLAND AREAS	6
c)	Glacial Till	MAY BE BEDROCK OR GLACIAL TILL (HARD-PAN)	9
d)	Clay, Silt		12
e)	Fill		16
f)	Leda Clay		24
3. SEEPAGE FROM SLOPE FACE			
a)	None or Near bottom only		0
b)	Near mid-slope only		6
c)	Near crest only or, From several levels		12
4. SLOPE HEIGHT			
a)	2 m or less		0
b)	2.1 to 5 m		2
c)	5.1 to 10 m		4
d)	more than 10 m		8
5. VEGETATION COVER ON SLOPE FACE			
a)	Well vegetated; heavy shrubs or forested with mature trees		0
b)	Light vegetation; Mostly grass, weeds, occasional trees, shrubs		4
c)	No vegetation, bare		8
6. TABLE LAND DRAINAGE	THERE IS NO TABLE LAND, PROPERTY IS COMPOSED OF ROLLING HILLS AND DRAINAGE INTO VALLEYS		
a)	Table land flat, no apparent drainage over slope		0
b)	Minor drainage over slope, no active erosion		2
c)	Drainage over slope, active erosion, gullies		4
7. PROXIMITY OF WATERCOURSE TO SLOPE TOE			
a)	15 metres or more from slope toe		0
b)	Less than 15 metres from slope toe		6
8. PREVIOUS LANDSLIDE ACTIVITY			
a)	No		0
b)	Yes		6

SLOPE INSTABILITY RATING VALUES INVESTIGATION RATING SUMMARY 14-29 DEPENDING ON EXACT LOCATION **TOTAL**

SUMMARY OF RATING VALUES AND RESULTING INVESTIGATION REQUIREMENTS

1. Low potential	< 24	Site inspection only, confirmation, report letter.
2. Slight potential	25-35	Site inspection and surveying, preliminary study, detailed report.
3. Moderate potential	> 35	Boreholes, piezometers, lab tests, surveying, detailed report.

NOTES:
a) Choose only one from each category; compare total rating value with above requirements.
b)If there is a water body (stream, creek, river, pond, bay, lake) at the slope toe; the potential for toe erosion and undercutting should be evaluated in detail and, protection provided if required.

The Rating Chart identifies 3 levels of stability and associated investigation requirements. The three levels are:

1. Stable / Site Inspection Only
A rating of 24 or less, suggests stable slope conditions,

- no toe erosion,
- good vegetation cover
- no evidence of past instability
- no structures within (slope height) of the crest

and that no further investigation (beyond visual inspection) is needed. This should be simply confirmed through a visual site inspection and estimate of the slope configuration and slope stratigraphy and drainage (i.e. no measurements). Confirmation of the slope stability should be provided in the form of a letter (signed and sealed with A.P.E.O. stamp) from an experienced and qualified geotechnical engineer. The letter should include a summary of the site inspection observations which could be recorded on a Slope Inspection Form (see enclosed) and should clearly identify;

- slope height and inclination,
- vegetation cover on slope face,
- toe erosion, or surface erosion on slope,
- structures near slope crest or on slope,
- drainage features near slope crest, on slope face, or near slope toe.

2. Slight Potential / Site Inspection, Preliminary Study
A rating between 25-35 suggests the presence of several surface features that could create an unstable slope situation. The stability of the slope should be confirmed through a visual site inspection only, without boreholes. In addition to recording the visual observations outlined in the section above, some direct measurements of site features are required.

The slope height and inclination should be determined either with a hand inclinometer, or by 'breaking slope', or from mapping, or by surveying. As well, more information about the soil stratigraphy of the slope, should be obtained (without drilling boreholes) based on either previous or nearby subsurface investigations, or geologic mapping, or hand augering or test pits to determine shallow depth soil type(s). Measurements should be taken (by hand tape or surveying) of the locations of structures relative to the crest, and other features such as vegetation, past slide features (tension cracks, scarps, slumps, bulges, ridges), and erosion features. If available, historical air photographs should be examined for evidence of any past instability over the long-term. Confirmation of the slope stability should be provided in the form of a detailed report (signed and sealed with A.P.E.O. stamp) from an experienced and qualified geotechnical engineer.

This report will include:

- Slope Inspection Record (Appendix)
- a Site Plan and a Slope Profile indicating the positions of the various measurements taken on site (slope crest, slope toe, location of structures relative to crest, drainage features, erosion features, vegetation cover, indicators of past instability or movements)
- photographs of the site and slope conditions
- a discussion of the site inspection and measurements taken, review of previous information
- preliminary engineering analysis of slope stability (i.e., calculation of Factor of Safety) based on the above information and measurements, but utilizing conservative soil strength parameters and groundwater conditions since boreholes were not carried out.

3. Moderate Potential / Borehole Investigation
A rating of more than 35 suggests a moderate potential for instability. This may result if the slope is either steep, high and/or has several features that could create an unstable slope situation. The stability of the slope should be assessed more precisely through topographic survey of slope configuration and boreholes for slope stratigraphy and penetration resistance tests. Piezometers must be installed in the boreholes and measurements must be taken for groundwater levels. Laboratory testing on the borehole samples must be conducted to measure Basic Index Properties (water contents, unit weights, grain size distribution, Atterberg Limits) described in Appendix D, or other properties as required.

A detailed engineering stability analysis must be conducted to determine if the Factor of Safety for the original slope conditions equals or exceeds a design minimum Factor of Safety. The analysis should be based on the information obtained from the site survey and the borehole information. Historical data such as air photographs should also be reviewed. Confirmation of the slope stability or instability (and the stable slope inclination) should be provided in the form of a detailed report (signed and sealed with A.P.E.O. stamp) from an experienced and qualified geotechnical engineer. This

APPENDIX V – IN-SITU INFILTRATION TEST FIELD LOGS

DYNAMIC MONITORS.COM

Toll Free 1-888-747-7645 (SOIL)

ETC STANDARD PASK CONSTANT HEAD WELL PERMEAMETER SINGLE PONDED HEIGHT METHOD

Most structured soils from clays through loams;
Also includes unstructured medium and fine sands.
The first choice for most soils.

d – well hole diameter (cm)	8.3	**α* - sat/unsat flow ratio (cm-1)**	0.12
H – height of water in well (cm)	15.0	**C – shape factor**	1.36

R(cm/min)	Kfs (m/sec)
0.01	5.3E-08
0.02	1.1E-07
0.03	1.6E-07
0.04	2.1E-07
0.05	2.7E-07
0.06	3.2E-07
0.07	3.7E-07
0.08	4.3E-07
0.09	4.8E-07
0.10	5.3E-07
0.15	8.0E-07
0.20	1.1E-06
0.25	1.3E-06
0.30	1.6E-06
0.35	1.9E-06
0.40	2.1E-06
0.45	2.4E-06
0.50	2.7E-06
0.55	2.9E-06
0.60	3.2E-06
0.65	3.5E-06
0.70	3.7E-06
0.75	4.0E-06
0.80	4.3E-06
0.85	4.5E-06
0.90	4.8E-06
0.95	5.1E-06
1.0	5.3E-06
1.1	5.9E-06
1.2	6.4E-06
1.3	6.9E-06
1.4	7.5E-06
1.5	8.0E-06
1.6	8.5E-06
1.7	9.0E-06
1.8	9.6E-06
1.9	1.0E-05
2.0	1.1E-05
2.1	1.1E-05
2.2	1.2E-05
2.3	1.2E-05
2.4	1.3E-05
2.5	1.3E-05
2.6	1.4E-05

King EPCM: BH201

King EPCM: BH206

R(cm/min)	Kfs (m/sec)
2.7	1.4E-05
2.8	1.5E-05
2.9	1.5E-05
3.0	1.6E-05
3.1	1.6E-05
3.2	1.7E-05
3.3	1.8E-05
3.4	1.8E-05
3.5	1.9E-05
3.6	1.9E-05
3.7	2.0E-05
3.8	2.0E-05
3.9	2.1E-05
4.0	2.1E-05
4.1	2.2E-05
4.2	2.2E-05
4.3	2.3E-05
4.4	2.3E-05
4.5	2.4E-05
4.6	2.4E-05
4.7	2.5E-05
4.8	2.6E-05
4.9	2.6E-05
5.0	2.7E-05
5.5	2.9E-05
6.0	3.2E-05
6.5	3.5E-05
7.0	3.7E-05
7.5	4.0E-05
8.0	4.3E-05
8.5	4.5E-05
9.0	4.8E-05
9.5	5.1E-05
10.0	5.3E-05
11.0	5.9E-05
12.0	6.4E-05
13.0	6.9E-05
14.0	7.5E-05
15.0	8.0E-05
16.0	8.5E-05
17.0	9.0E-05
18.0	9.6E-05
19.0	1.0E-04
20.0	1.1E-04

King EPCM: BH203

R(cm/min)	Kfs (m/sec)
21.0	1.1E-04
22.0	1.2E-04
23.0	1.2E-04
24.0	1.3E-04
25.0	1.3E-04
26.0	1.4E-04
27.0	1.4E-04
28.0	1.5E-04
29.0	1.5E-04
30.0	1.6E-04
31.0	1.6E-04
32.0	1.7E-04
33.0	1.8E-04
34.0	1.8E-04
35.0	1.9E-04
36.0	1.9E-04
37.0	2.0E-04
38.0	2.0E-04
39.0	2.1E-04
40.0	2.1E-04
41.0	2.2E-04
42.0	2.2E-04
43.0	2.3E-04
44.0	2.3E-04
45.0	2.4E-04
46.0	2.4E-04
47.0	2.5E-04
48.0	2.6E-04
49.0	2.6E-04
50.0	2.7E-04
52.0	2.8E-04
54.0	2.9E-04
56.0	3.0E-04
58.0	3.1E-04
60.0	3.2E-04
62.0	3.3E-04
64.0	3.4E-04
66.0	3.5E-04
68.0	3.6E-04
70.0	3.7E-04
72.0	3.8E-04
74.0	3.9E-04
76.0	4.0E-04
78.0	4.2E-04

R – quasi steady-state rate of fall

Kfs – field saturated hydraulic conductivity

Caution: These tables were generated based on the dimensions and characteristics of the Standard ETC Pask Permeameter Kit only. They should not be used with other constant head permeameters or when the well hole diameter is significantly different than indicated above. Calculate Kfs from first principles instead.

Field Permeability Test Sheet

KING EPCM - BH201

Engineering Technologies Canada Ltd.

OWNER'S NAME: KING EPCM

SITE LOCATION: ELEPHANT LAKE

PID #:

TEST PIT #: ~~MW2 — BH2~~

TECHNICIAN: YOUNG / TONY

DATE: NOV-15-2021

WEATHER/TEMPERATURE: 3°C

FIELD PERMEABILITY TEST #:

D – reservoir diameter (cm)	STANDARD	Soil Texture	
d – well hole diameter (cm)		Soil Structure	
H – height of water in well (cm)		α* (cm-1)	
Depth below ground surface (cm)	0.5	C – Factor	

TIME (min)	(1) CHANGE IN TIME (min)	RESERVOIR WATER LEVEL (WL) (cm)	(2) CHANGE IN WL (cm)	(2) ÷ (1) RATE OF FALL (R) (cm/min)
0		37		
20	20	36	1	3.03
40	20	35	1	3.03
1 m	20	34.7	0.3	0.9
1.20	20	34.5	0.2	0.6
1.40	20	33.9	0.6	1.8
2 m	20	33.5	0.4	1.2
2.20	20	33.	0.5	1.5
2.40	20	32.8	0.2	0.6
3 m	20	32.5	0.3	0.9
4 m	1	31.6	0.4	0.4
5 m	1	30.7	0.9	0.9

Revision Date: May 2018

KING EPCM - BH203

Engineering Technologies Canada Ltd.

OWNER'S NAME: KING EPCM
SITE LOCATION: ELEPHANT LAKE
PID #:
TEST PIT #: BH2-MW2
TECHNICIAN: YOUNG / TONY
DATE: NOV-15-2021
WEATHER/TEMPERATURE: 3°C

FIELD PERMEABILITY TEST #:

D – reservoir diameter (cm)	STANDARD	Soil Texture	
d – well hole diameter (cm)		Soil Structure	
H – height of water in well (cm)		α* (cm-1)	
Depth below ground surface (cm)	0.5	C – Factor	

TIME (min)	(1) CHANGE IN TIME (min)	RESERVOIR WATER LEVEL (WL) (cm)	(2) CHANGE IN WL (cm)	(2) ÷ (1) RATE OF FALL (R) (cm/min)
20	20	26.5		
40	20	24.	1.5	4.5
1m	20	22.	2	6
2m	1	16.5	5.5	5.5
3m	1	11.7	5.3	5.3
4m	1	7.5	4.2	4.2
5m	1	2.5	5.	5

KING EPCM - BH206

Engineering Technologies Canada Ltd.

OWNER'S NAME: KING EPCM
SITE LOCATION: ELEPHANT LAKE
PID #:
TEST PIT #: MW6-BH4
TECHNICIAN: YOUNG / TONY
DATE: NOV-15-2021
WEATHER/TEMPERATURE: 3°C

FIELD PERMEABILITY TEST #:

D – reservoir diameter (cm)	STANDARD	Soil Texture	SANDY CLAY
d – well hole diameter (cm)		Soil Structure	LOOSE
H – height of water in well (cm)		α* (cm-1)	
Depth below ground surface (cm)	0.5m	C – Factor	

TIME (min)	(1) CHANGE IN TIME (min)	RESERVOIR WATER LEVEL (WL) (cm)	(2) CHANGE IN WL (cm)	(2) ÷ (1) RATE OF FALL (R) (cm/min)
0		20		
20	20	18.5	1.5	4.5
40	20	17.	1.5	4.5
1m	20	16	1	3.03
2m	1m	14	2	2
3m	1m	12	2	2
4m	1m	10.7	1.3	1.3
5m	1m	9	0.3	0.3
6m	1m	7	2	2

APPENDIX VI – GROUNDWATER CHEMESTRY & CHAIN OF CUSTODY

FISHER ENVIRONMENTAL
ATTN: CLIVE
15-400 ESNA PARK DRIVE
MARKHAM ON NA

Date Received: 15-JUN-22
Report Date: 30-JUN-22 15:17 (MT)
Version: FINAL

Client Phone: 905-475-7755

Certificate of Analysis

Lab Work Order #: L2715365

Project P.O. #: NOT SUBMITTED
Job Reference: 22-12233
C of C Numbers: 20-893713
Legal Site Desc:

Emily Hansen
Account Manager

ANALYTICAL REPORT

Summary of Guideline Exceedances

Guideline ALS ID	Client ID	Grouping	Analyte	Result	Guideline Limit	Unit
Ontario Drinking Water Regulation (ODWQS) JAN.1,2020 - Schedule 1 (Microbiological) and 2 (Chemical) Standards (JAN,2020)						
L2715365-1	WW1 330	Bacteriological Tests	Total Coliforms	10	0	CFU/100mL
Ontario Drinking Water Regulation (ODWQS) JAN.1,2020 - Ontario DW Aesthetic and Operational Guidelines (June, 2006)						
L2715365-1	WW1 330	Physical Tests	Turbidity	29.2	5	NTU
		Total Metals	Iron (Fe)-Total	3550	300	ug/L
			Manganese (Mn)-Total	58.2	50	ug/L
L2715365-2	WW1 630	Physical Tests	Hardness (as CaCO3)	101	80-100	mg/L
			Turbidity	7.79	5	NTU
		Anions and Nutrients	Hardness (as CaCO3)	101	80-100	mg/L
		Total Metals	Iron (Fe)-Total	2440	300	ug/L
L2715365-3	WW2 100	Physical Tests	Hardness (as CaCO3)	43.7	80-100	mg/L
		Anions and Nutrients	Hardness (as CaCO3)	43.7	80-100	mg/L
		Total Metals	Iron (Fe)-Total	3280	300	ug/L
			Manganese (Mn)-Total	98.5	50	ug/L
L2715365-4	WW2 1000	Physical Tests	Hardness (as CaCO3)	49.4	80-100	mg/L
		Anions and Nutrients	Hardness (as CaCO3)	49.4	80-100	mg/L
		Organic / Inorganic Carbon	Dissolved Organic Carbon	6.29	5	mg/L
		Total Metals	Iron (Fe)-Total	2890	300	ug/L
			Manganese (Mn)-Total	105	50	ug/L

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Physical Tests - WATER

Analyte	Unit	Guide Limits #1	Guide Limits #2	Lab ID: L2715365-1	Lab ID: L2715365-2	Lab ID: L2715365-3	Lab ID: L2715365-4
				Sample Date: 15-JUN-22	Sample Date: 15-JUN-22	Sample Date: 15-JUN-22	Sample Date: 15-JUN-22
				Sample ID: WW1 330	Sample ID: WW1 630	Sample ID: WW2 100	Sample ID: WW2 1000
Color, True	T.C.U.	-	-	6.1	8.1	68.7	57.9
Conductivity	umhos/cm	-	-	273	286	111	119
Hardness (as CaCO3)	mg/L	-	80-100	100 HTC	101 HTC	43.7 HTC	49.4 HTC
pH	pH units	-	6.5-8.5	7.95	7.81	7.51	7.44
Total Dissolved Solids	mg/L	-	500	170 DLDS	165 DLDS	81 DLDS	84 DLDS
Turbidity	NTU	-	5	29.2	7.79	1.87	1.15

Guide Limit #1: Schedule 1 (Microbiological) and 2 (Chemical) Standards (JAN,2020)
Guide Limit #2: Ontario DW Aesthetic and Operational Guidelines (June, 2006)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Anions and Nutrients - WATER

		Guide Limits					
Lab ID				L2715365-1	L2715365-2	L2715365-3	L2715365-4
Sample Date				15-JUN-22	15-JUN-22	15-JUN-22	15-JUN-22
Sample ID				WW1 330	WW1 630	WW2 100	WW2 1000
Analyte	**Unit**	**#1**	**#2**				
Alkalinity, Total (as CaCO3)	mg/L	-	30-500	85	92	49	52
Ammonia, Total (as N)	mg/L	-	-	<0.010	0.016	0.035	0.032
Chloride (Cl)	mg/L	-	250	1.77	2.82	<0.50	0.53
Computed Conductivity	uS/cm	-	-	278	287	101	110
Conductivity % Difference	%	-	-	2	0	-10	-8
Fluoride (F)	mg/L	1.5	-	0.73	0.73	0.25	0.24
Hardness (as CaCO3)	mg/L	-	80-100	100	101	43.7	49.4
Ion Balance	%	-	-	100	96	108	119
Langelier Index		-	-	0	0	-1	-1
Nitrate (as N)	mg/L	10	-	<0.020	<0.020	<0.020	<0.020
Nitrite (as N)	mg/L	1	-	<0.010	<0.010	<0.010	<0.010
Total Kjeldahl Nitrogen	mg/L	-	-	<0.15	0.40	0.19	<0.15
Saturation pH	pH	-	-	7.90	7.87	8.54	8.45
TDS (Calculated)	mg/L	-	-	167	174	57.3	62.2
Sulfate (SO4)	mg/L	-	500	58.2	58.8	7.68	6.73
Anion Sum	me/L	-	-	2.71	2.86	0.97	1.02
Cation Sum	me/L	-	-	2.70	2.75	1.05	1.21
Cation - Anion Balance	%	-	-	0	-2	4	9

Guide Limit #1: Schedule 1 (Microbiological) and 2 (Chemical) Standards (JAN,2020)
Guide Limit #2: Ontario DW Aesthetic and Operational Guidelines (June, 2006)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Organic / Inorganic Carbon - WATER

Analyte	Unit	Guide Limits #1	Guide Limits #2	Lab ID	Sample Date	Sample ID	
				L2715365-1	L2715365-2	L2715365-3	L2715365-4
				15-JUN-22	15-JUN-22	15-JUN-22	15-JUN-22
				WW1 330	WW1 630	WW2 100	WW2 1000
Dissolved Carbon Filtration Location		-	-	LAB	LAB	LAB	LAB
Dissolved Organic Carbon	mg/L	-	5	0.84	1.51	2.52	6.29

Guide Limit #1: Schedule 1 (Microbiological) and 2 (Chemical) Standards (JAN,2020)
Guide Limit #2: Ontario DW Aesthetic and Operational Guidelines (June, 2006)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Bacteriological Tests - WATER

			Lab ID	L2715365-1	L2715365-2	L2715365-3	L2715365-4
			Sample Date	15-JUN-22	15-JUN-22	15-JUN-22	15-JUN-22
			Sample ID	WW1 330	WW1 630	WW2 100	WW2 1000
Analyte	**Unit**	**Guide Limits #1**	**#2**				
E. Coli	CFU/100mL	0	-	0	0	0	0
Fecal Coliforms	CFU/100mL	0	-	0	0	0	0
Heterotrophic Plate Count	CFU/mL	-	-	NR NDOG HPC	NR NDOG HPC	41	88
Total Coliforms	CFU/100mL	0	-	10 DLM	NR NDOG TC	0	0

Guide Limit #1: Schedule 1 (Microbiological) and 2 (Chemical) Standards (JAN,2020)
Guide Limit #2: Ontario DW Aesthetic and Operational Guidelines (June, 2006)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Total Metals - WATER

Analyte	Unit	Guide Limits #1	Guide Limits #2	Lab ID L2715365-1	L2715365-2	L2715365-3	L2715365-4
				Sample Date 15-JUN-22	15-JUN-22	15-JUN-22	15-JUN-22
				Sample ID WW1 330	WW1 630	WW2 100	WW2 1000
Aluminum (Al)-Total	ug/L	-	100	78	91	11	23
Antimony (Sb)-Total	ug/L	6	-	0.87	0.65	<0.60	<0.60
Arsenic (As)-Total	ug/L	10.0	-	<1.0	<1.0	<1.0	<1.0
Barium (Ba)-Total	ug/L	1000	-	34	33	50	54
Beryllium (Be)-Total	ug/L	-	-	<0.50	<0.50	<0.50	<0.50
Bismuth (Bi)-Total	ug/L	-	-	<1.0	<1.0	<1.0	<1.0
Boron (B)-Total	ug/L	5000	-	63	65	<50	<50
Cadmium (Cd)-Total	ug/L	5	-	<0.10	<0.10	<0.10	<0.10
Calcium (Ca)-Total	mg/L	-	-	35.2	35.4	12.5	14.4
Cesium (Cs)-Total	ug/L	-	-	0.014	0.013	<0.010	<0.010
Chromium (Cr)-Total	ug/L	50	-	<1.0	1.3	<1.0	<1.0
Cobalt (Co)-Total	ug/L	-	-	<0.50	<0.50	<0.50	<0.50
Copper (Cu)-Total	ug/L	-	1000	<1.0	5.5	<1.0	<1.0
Iron (Fe)-Total	ug/L	-	300	3550	2440	3280	2890
Lead (Pb)-Total	ug/L	10	-	<1.0	<1.0	<1.0	<1.0
Lithium (Li)-Total	ug/L	-	-	<100	<100	<100	<100
Magnesium (Mg)-Total	mg/L	-	-	2.98	3.05	3.04	3.25
Manganese (Mn)-Total	ug/L	-	50	58.2	46.9	98.5	105
Molybdenum (Mo)-Total	ug/L	-	-	7.54	7.64	<0.50	<0.50
Nickel (Ni)-Total	ug/L	-	-	<1.0	1.4	<1.0	<1.0
Phosphorus (P)-Total	mg/L	-	-	<0.050	<0.050	<0.050	<0.050
Potassium (K)-Total	mg/L	-	-	1.6	2.3	1.6	1.6
Rubidium (Rb)-Total	ug/L	-	-	1.65	2.14	0.76	0.76
Selenium (Se)-Total	ug/L	50	-	<1.0	<1.0	<1.0	<1.0
Silicon (Si)-Total	ug/L	-	-	3300	3400	9400	9200
Silver (Ag)-Total	ug/L	-	-	<0.050	<0.050	<0.050	<0.050
Sodium (Na)-Total	mg/L	20	200	15.1	15.4	3.19	4.18
Strontium (Sr)-Total	ug/L	-	-	1150	1180	190	228
Sulfur (S)-Total	ug/L	-	-	20300	20400	2540	2270
Tellurium (Te)-Total	ug/L	-	-	<0.20	<0.20	<0.20	<0.20

Guide Limit #1: Schedule 1 (Microbiological) and 2 (Chemical) Standards (JAN,2020)
Guide Limit #2: Ontario DW Aesthetic and Operational Guidelines (June, 2006)

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Total Metals - WATER

Analyte	Unit	Guide Limits #1	Guide Limits #2	Lab ID L2715365-1	L2715365-2	L2715365-3	L2715365-4
				Sample Date 15-JUN-22	15-JUN-22	15-JUN-22	15-JUN-22
				Sample ID WW1 330	WW1 630	WW2 100	WW2 1000
Thallium (Tl)-Total	ug/L	-	-	<0.060	<0.060	<0.060	<0.060
Thorium (Th)-Total	ug/L	-	-	<0.10	<0.10	0.16	0.17
Tin (Sn)-Total	ug/L	-	-	<1.0	<1.0	<1.0	<1.0
Titanium (Ti)-Total	ug/L	-	-	5.6	4.6	<2.0	<2.0
Tungsten (W)-Total	ug/L	-	-	<6.0	<6.0	<6.0	<6.0
Uranium (U)-Total	ug/L	20	-	6.3	6.5	<2.0	<2.0
Vanadium (V)-Total	ug/L	-	-	0.77	1.28	1.03	1.09
Zinc (Zn)-Total	ug/L	-	5000	3.6	17.2	<3.0	<3.0
Zirconium (Zr)-Total	ug/L	-	-	<0.80	<0.80	<0.80	<0.80

Guide Limit #1: Schedule 1 (Microbiological) and 2 (Chemical) Standards (JAN,2020)
Guide Limit #2: Ontario DW Aesthetic and Operational Guidelines (June, 2006)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Extractable Metals - WATER

		Guide Limits					
				Lab ID	L2715365-1	L2715365-2	L2715365-3	L2715365-4
				Sample Date	15-JUN-22	15-JUN-22	15-JUN-22	15-JUN-22
				Sample ID	WW1 330	WW1 630	WW2 100	WW2 1000
Analyte	Unit	#1	#2					
Mercury	ug/L	1	-		<0.10	<0.10	<0.10	<0.10

Guide Limit #1: Schedule 1 (Microbiological) and 2 (Chemical) Standards (JAN,2020)
Guide Limit #2: Ontario DW Aesthetic and Operational Guidelines (June, 2006)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Aggregate Organics - WATER

Analyte	Unit	Guide Limits #1	Guide Limits #2	Lab ID	Sample Date	Sample ID
				L2715365-1	15-JUN-22	WW1 330
				L2715365-2	15-JUN-22	WW1 630
				L2715365-3	15-JUN-22	WW2 100
				L2715365-4	15-JUN-22	WW2 1000
Phenols (4AAP)	ug/L	-	-		1.4	<1.0	<1.0
Tannin & Lignin	mg/L	-	-	<1.0	<1.0	<1.0	<1.0

Guide Limit #1: Schedule 1 (Microbiological) and 2 (Chemical) Standards (JAN,2020)
Guide Limit #2: Ontario DW Aesthetic and Operational Guidelines (June, 2006)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Organochlorine Pesticides - WATER

			Lab ID	L2715365-1	L2715365-2	L2715365-3	L2715365-4
			Sample Date	15-JUN-22	15-JUN-22	15-JUN-22	15-JUN-22
			Sample ID	WW1 330	WW1 630	WW2 100	WW2 1000
Analyte	Unit	Guide Limits #1	#2				
a-chlordane	ug/L	-	-	<0.0080	<0.0080	<0.0080	<0.0080
g-chlordane	ug/L	-	-	<0.0080	<0.0080	<0.0080	<0.0080
pp-DDD	ug/L	-	-	<0.004	<0.004	<0.004	<0.004
pp-DDE	ug/L	-	-	<0.004	<0.004	<0.004	<0.004
op-DDT	ug/L	-	-	<0.0040	<0.0040	<0.0040	<0.0040
pp-DDT	ug/L	-	-	<0.0040	<0.0040	<0.0040	<0.0040
Oxychlordane	ug/L	-	-	<0.0080	<0.0080	<0.0080	<0.0080
Surrogate: Decachlorobiphenyl	%	-	-	94.4	125.3	125.0	129.5

Guide Limit #1: Schedule 1 (Microbiological) and 2 (Chemical) Standards (JAN,2020)
Guide Limit #2: Ontario DW Aesthetic and Operational Guidelines (June, 2006)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Herbicides - WATER

		Guide Limits					
				Lab ID	L2715365-1	L2715365-2	L2715365-3	L2715365-4
				Sample Date	15-JUN-22	15-JUN-22	15-JUN-22	15-JUN-22
				Sample ID	WW1 330	WW1 630	WW2 100	WW2 1000
Analyte	**Unit**	**#1**	**#2**					
Bromoxynil	mg/L	0.005	-		<0.00010	<0.00010	<0.00010	<0.00010
Clopyralid	mg/L	-	-		<0.00010	<0.00010	<0.00010	<0.00010
2,4-D	mg/L	0.1	-		<0.00010	<0.00010	<0.00010	<0.00010
Dicamba	mg/L	0.12	-		<0.00010	<0.00010	<0.00010	<0.00010
2,4-DB	mg/L	-	-		<0.00010	<0.00010	<0.00010	<0.00010
2,4-DP	mg/L	-	-		<0.00010	<0.00010	<0.00010	<0.00010
Dinoseb	mg/L	0.01	-		<0.00010	<0.00010	<0.00010	<0.00010
MCPA	mg/L	0.1	-		<0.00010	<0.00010	<0.00010	<0.00010
MCPB	mg/L	-	-		<0.00010	<0.00010	<0.00010	<0.00010
Mecoprop	mg/L	-	-		<0.00010	<0.00010	<0.00010	<0.00010
Picloram	mg/L	0.19	-		<0.00010	<0.00010	<0.00010	<0.00010
2,4,5-T	mg/L	0.28	0.02		<0.00010	<0.00010	<0.00010	<0.00010
2,4,5-TP	mg/L	-	-		<0.00010	<0.00010	<0.00010	<0.00010
Triclopyr	mg/L	-	-		<0.00010	<0.00010	<0.00010	<0.00010
Surrogate: 2,4-Dichlorophenylacetic Acid	%	-	-		104.0	100.0	96.0	114.0

Guide Limit #1: Schedule 1 (Microbiological) and 2 (Chemical) Standards (JAN,2020)
Guide Limit #2: Ontario DW Aesthetic and Operational Guidelines (June, 2006)

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
NDOGHPC	NO DATA: Overgrown with HPC
HTC	Hardness was calculated from Total Ca and/or Mg concentrations and may be biased high (dissolved Ca/Mg results unavailable).
NDOGTC	NO DATA: Overgrown with Total Coliform
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-ONT-DW-WT	Water	Alkalinity, Total (as CaCO3)	EPA 310.2
CL-IC-N-ONT-DW-WT	Water	Chloride by IC	EPA 300.1 (mod)
		Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.	
COLOUR-ONT-DW-WT	Water	Colour, True Drinking Water	APHA 2120C
		True Colour is measured spectrophotometrically by comparison to platinum-cobalt standards using the single wavelength method . Colour measurements can be highly pH dependent, and apply to the pH of the sample as received (at time of testing), without pH adjustment. Concurrent measurement of sample pH is recommended.	
DOC-ONT-DW-WT	Water	Dissolved Organic Carbon	APHA 5310B
		Sample is filtered through a 0.45um filter, then injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic carbon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.	
EC-MF-DW-WT	Water	E. coli	SM 9222D
		A 100 mL volume of sample is filtered through a membrane, the membrane is placed on mFC-BCIG agar and incubated at 44.5 –0 .2 °C for 24 – 2 h. Method ID: WT-TM-1200	
EC-ONT-DW-WT	Water	Conductivity	APHA 2510 B
		Water samples can be measured directly by immersing the conductivity cell into the sample.	
EC-SCREEN-WT	Water	Conductivity Screen (Internal Use Only)	APHA 2510
		Qualitative analysis of conductivity where required during preparation of other tests - e.g. TDS, metals, etc.	
F-DW-IC-WT	Water	Fluoride in Water by IC	EPA 300.1 (mod)
		Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.	
FC-DW-WT	Water	Fecal Coliforms	SM 9222D
		A 100mL volume of sample is filtered through a membrane, the membrane is placed on mFC agar and incubated at 24–2h@44.5–0.2°C. Method ID: WT-TM-1200	
HARDNESS-DW-CALC-WT	Water	Hardness	APHA 2340 B
		Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.	
HERBSCR-ONT-DW-WT	Water	Herbicides in Water	E3552

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**
		Water samples are analyzed by direct injection without sample preparation using liquid chromatography tandem mass spectrometry (LC-MS/MS).	
HG-T-ONT-DW-WT	Water	Mercury (Hg)	EPA 1631E (mod)
HPC-DW-MF-WT	Water	Heterotrophic Plate Count	SM 9215D
		A 1mL volume of sample is filtered through a membrane, the membrane is placed on mHPC agar and incubated for 48–2h@35–0.5°C. Method ID: WT-TM-1200	
IONBALANCE-OP03-WT	Water	Detailed Ion Balance Calculation	APHA 1030E, 2330B, 2510A
MET-ONT-DW-DIG-WT	Water	Metals in Water by ICPMS	EPA 200.8
		This analysis involves preliminary sample treatment by hotblock acid digestion (APHA 3030E). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).	
NH3-F-ONT-DW-WT	Water	Ammonia in Water by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC
		This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.	
NO2-DW-IC-WT	Water	Nitrite in Water by IC	EPA 300.1 (mod)
		Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.	
NO3-DW-IC-WT	Water	Nitrate in Water by IC	EPA 300.1 (mod)
		Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.	
OCP-ROUTINE-DW-WT	Water	Pesticides, Organochlorine in Water	SW846 8270
		Samples are extracted using a solvent mixture and the resulting extracts are analyzed on GC/MSD	
PH-ONT-DW-WT	Water	pH	APHA 4500 H-Electrode
		Water samples are analyzed directly by a calibrated pH meter.	
		Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011). Holdtime for samples under this regulation is 28 days	
PHENOLS4AAP-ONTDW-WT	Water	Phenol (4AAP)	EPA 9066
		An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.	
SO4-IC-N-ONT-DW-WT	Water	Sulfate in Water by IC	EPA 300.1 (mod)
		Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.	
SOLIDS-TDS-ONT-DW-WT	Water	Total Dissolved Solids	APHA 2540C
		This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.	

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**
TAN,LIG-ONT-DW-WT	Water	Tannins & Lignins	APHA 5550 B-Colorimetry

This analysis is carried out using procedures adapted from APHA Method 5550 B. "Tannin & Lignin ". Both lignin and tannin contain aromatic hydroxyl groups that react with Folin phenol reagent (tungstophosphoric and molybdophosphoric acids) to form a blue color suitable for the estimation of tannin and lignin concentrations. However, the reaction is not specific for lignin or tannin, nor for compounds containing aromatic hydroxyl groups, in as much as many other reducing materials, both organic and inorganic, respond similarly.

Interferences: Any substance able to reduce Folin phenol reagent will produce a false positive response. Organic chemicals known to interfere include hydroxylated aromatics, proteins, humic substances, nucleic acid bases, fructose, and amines. Inorganic substances known to interfere include iron (II), manganese (II), nitrite, cyanide, bisulfite, sulfite, sulfide, hydrazine, and hydroxylamine hydrochloride. Both 2 mg ferrous iron/L and 125 mg sodium sulfite/L individually produce a color equivalent to 1 mg tannic acid/L.

TC-MF-DW-WT	Water	Total Coliforms	SM 9222B

A 100mL volume of sample is filtered through a membrane, the membrane is placed on mENDO LES agar and incubated at 35–0.5°C for 24–2h. Method ID: WT-TM-1200

TKN-ONT-DW-WT	Water	Total Kjeldahl Nitrogen	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

TURBIDITY-ONT-DW-WT	Water	Turbidity	APHA 2130 B

Sample result is based on a comparison of the intensity of the light scattered by the sample under defined conditions with the intensity of light scattered by a standard reference suspension under the same conditions. Sample readings are obtained from a Nephelometer.

**ALS test methods may incorporate modifications from specified reference methods to improve performance.

Chain of Custody Numbers:

20-893713

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

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

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

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

Quality Control Report

Workorder: L2715365 Report Date: 30-JUN-22

Client: FISHER ENVIRONMENTAL
15-400 ESNA PARK DRIVE
MARKHAM ON NA

Contact: CLIVE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-ONT-DW-WT	**Water**							
Batch R5805303								
WG3741652-4 DUP		**WG3741652-3**						
Alkalinity, Total (as CaCO3)		72	74		mg/L	2.6	20	20-JUN-22
WG3741652-2 LCS								
Alkalinity, Total (as CaCO3)			111.1		%		85-115	20-JUN-22
WG3741652-1 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	20-JUN-22
CL-IC-N-ONT-DW-WT	**Water**							
Batch R5806019								
WG3742598-4 DUP		**WG3742598-3**						
Chloride (Cl)		2.82	2.83		mg/L	0.2	25	22-JUN-22
WG3742598-2 LCS								
Chloride (Cl)			100.2		%		70-130	22-JUN-22
WG3742598-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	22-JUN-22
WG3742598-5 MS		**WG3742598-3**						
Chloride (Cl)			100.9		%		70-130	22-JUN-22
COLOUR-ONT-DW-WT	**Water**							
Batch R5803284								
WG3740669-3 DUP		**L2715365-1**						
Color, True		6.1	5.8		T.C.U.	5.8	20	16-JUN-22
WG3740669-2 LCS								
Color, True			110.9		%		70-130	16-JUN-22
WG3740669-1 MB								
Color, True			<2.0		T.C.U.		2	16-JUN-22
DOC-ONT-DW-WT	**Water**							
Batch R5805934								
WG3741117-3 DUP		**WG3741117-5**						
Dissolved Organic Carbon		15.0	14.2		mg/L	5.4	20	22-JUN-22
WG3741117-2 LCS								
Dissolved Organic Carbon			99.2		%		80-120	22-JUN-22
WG3741117-1 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	22-JUN-22
WG3741117-4 MS		**WG3741117-5**						
Dissolved Organic Carbon			N/A	MS-B	%		-	22-JUN-22
EC-MF-DW-WT	**Water**							

Quality Control Report

Client: FISHER ENVIRONMENTAL
15-400 ESNA PARK DRIVE
MARKHAM ON NA

Contact: CLIVE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
EC-MF-DW-WT	**Water**							
Batch R5804567								
WG3740875-1 MB								
E. Coli			0		CFU/100mL		1	17-JUN-22
EC-ONT-DW-WT	**Water**							
Batch R5805303								
WG3741652-4 DUP		**WG3741652-3**						
Conductivity		324	324		umhos/cm	0.0	25	20-JUN-22
WG3741652-2 LCS								
Conductivity			99.1		%		70-130	20-JUN-22
WG3741652-1 MB								
Conductivity			<3.0		umhos/cm		3	20-JUN-22
F-DW-IC-WT	**Water**							
Batch R5806019								
WG3742598-4 DUP		**WG3742598-3**						
Fluoride (F)		0.73	0.73		mg/L	0.1	20	22-JUN-22
WG3742598-2 LCS								
Fluoride (F)			101.7		%		90-110	22-JUN-22
WG3742598-1 MB								
Fluoride (F)			<0.10		mg/L		0.1	22-JUN-22
WG3742598-5 MS		**WG3742598-3**						
Fluoride (F)			102.1		%		75-125	22-JUN-22
FC-DW-WT	**Water**							
Batch R5804565								
WG3740874-1 MB								
Fecal Coliforms			0		CFU/100mL		1	17-JUN-22
HERBSCR-ONT-DW-WT	**Water**							
Batch R5808316								
WG3741311-3 DUP		**L2715365-1**						
Clopyralid		<0.00010	<0.00010	RPD-NA	mg/L	N/A	30	20-JUN-22
Dicamba		<0.00010	<0.00010	RPD-NA	mg/L	N/A	30	20-JUN-22
Mecoprop		<0.00010	<0.00010	RPD-NA	mg/L	N/A	30	20-JUN-22
MCPA		<0.00010	<0.00010	RPD-NA	mg/L	N/A	30	20-JUN-22
2,4-D		<0.00010	<0.00010	RPD-NA	mg/L	N/A	30	20-JUN-22
Bromoxynil		<0.00010	<0.00010	RPD-NA	mg/L	N/A	30	20-JUN-22
Triclopyr		<0.00010	<0.00010	RPD-NA	mg/L	N/A	30	20-JUN-22

Quality Control Report

Client: FISHER ENVIRONMENTAL
15-400 ESNA PARK DRIVE
MARKHAM ON NA
Contact: CLIVE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HERBSCR-ONT-DW-WT	**Water**							
Batch R5808316								
WG3741311-3 DUP		**L2715365-1**						
2,4,5-T		<0.00010	<0.00010	RPD-NA	mg/L	N/A	30	20-JUN-22
2,4,5-TP		<0.00010	<0.00010	RPD-NA	mg/L	N/A	30	20-JUN-22
Picloram		<0.00010	<0.00010	RPD-NA	mg/L	N/A	30	20-JUN-22
2,4-DB		<0.00010	<0.00010	RPD-NA	mg/L	N/A	30	20-JUN-22
2,4-DP		<0.00010	<0.00010	RPD-NA	mg/L	N/A	30	20-JUN-22
Dinoseb		<0.00010	<0.00010	RPD-NA	mg/L	N/A	30	20-JUN-22
MCPB		<0.00010	<0.00010	RPD-NA	mg/L	N/A	30	20-JUN-22
WG3741311-2 LCS								
Clopyralid			113.2		%		50-150	20-JUN-22
Dicamba			115.0		%		65-130	20-JUN-22
Mecoprop			111.8		%		65-130	20-JUN-22
MCPA			104.5		%		65-130	20-JUN-22
2,4-D			106.3		%		65-130	20-JUN-22
Bromoxynil			105.7		%		65-130	20-JUN-22
Triclopyr			109.3		%		65-130	20-JUN-22
2,4,5-T			114.9		%		65-130	20-JUN-22
2,4,5-TP			119.9		%		65-130	20-JUN-22
Picloram			118.8		%		50-150	20-JUN-22
2,4-DB			102.3		%		65-130	20-JUN-22
2,4-DP			128.8		%		65-130	20-JUN-22
Dinoseb			93.2		%		50-150	20-JUN-22
MCPB			128.9		%		65-130	20-JUN-22
WG3741311-1 MB								
Clopyralid			<0.00010		mg/L		0.0001	20-JUN-22
Dicamba			<0.00010		mg/L		0.0001	20-JUN-22
Mecoprop			<0.00010		mg/L		0.0001	20-JUN-22
MCPA			<0.00010		mg/L		0.0001	20-JUN-22
2,4-D			<0.00010		mg/L		0.0001	20-JUN-22
Bromoxynil			<0.00010		mg/L		0.0001	20-JUN-22
Triclopyr			<0.00010		mg/L		0.0001	20-JUN-22
2,4,5-T			<0.00010		mg/L		0.0001	20-JUN-22
2,4,5-TP			<0.00010		mg/L		0.0001	20-JUN-22
Picloram			<0.00010		mg/L		0.0001	20-JUN-22
2,4-DB			<0.00010		mg/L		0.0001	20-JUN-22

Quality Control Report

Client: FISHER ENVIRONMENTAL
15-400 ESNA PARK DRIVE
MARKHAM ON NA

Contact: CLIVE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HERBSCR-ONT-DW-WT	**Water**							
Batch R5808316								
WG3741311-1 MB								
2,4-DP			<0.00010		mg/L		0.0001	20-JUN-22
Dinoseb			<0.00010		mg/L		0.0001	20-JUN-22
MCPB			<0.00010		mg/L		0.0001	20-JUN-22
Surrogate: 2,4-Dichlorophenylacetic Acid			90.0		%		50-130	20-JUN-22
WG3741311-4 MS		**L2715365-1**						
Clopyralid			109.6		%		50-150	20-JUN-22
Dicamba			103.4		%		50-130	20-JUN-22
Mecoprop			102.2		%		50-130	20-JUN-22
MCPA			96.6		%		50-130	20-JUN-22
2,4-D			87.8		%		50-130	20-JUN-22
Bromoxynil			101.2		%		50-130	20-JUN-22
Triclopyr			82.2		%		50-130	20-JUN-22
2,4,5-T			110.6		%		50-130	20-JUN-22
2,4,5-TP			119.5		%		50-130	20-JUN-22
Picloram			105.3		%		50-150	20-JUN-22
2,4-DB			79.5		%		50-130	20-JUN-22
2,4-DP			118.9		%		50-130	20-JUN-22
Dinoseb			100.3		%		50-150	20-JUN-22
MCPB			103.4		%		50-130	20-JUN-22
HG-T-ONT-DW-WT	**Water**							
Batch R5803936								
WG3740774-3 DUP		**WG3740774-5**						
Mercury		<1.0	<1.0	RPD-NA	ug/L	N/A	20	17-JUN-22
WG3740774-2 LCS								
Mercury			99.6		%		80-120	17-JUN-22
WG3740774-1 MB								
Mercury			<0.10		ug/L		0.1	17-JUN-22
WG3740774-4 MS		**WG3740774-6**						
Mercury			99.0		%		70-130	17-JUN-22
HPC-DW-MF-WT	**Water**							
Batch R5804598								
WG3740877-1 MB								
Heterotrophic Plate Count			0		CFU/mL		1	17-JUN-22
MET-ONT-DW-DIG-WT	**Water**							

Quality Control Report

Client: FISHER ENVIRONMENTAL
15-400 ESNA PARK DRIVE
MARKHAM ON NA
Contact: CLIVE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-ONT-DW-DIG-WT	**Water**							
Batch R5804119								
WG3740695-4 DUP		**WG3740695-3**						
Aluminum (Al)-Total		22	21		ug/L	1.7	25	17-JUN-22
Antimony (Sb)-Total		<0.60	<0.60	RPD-NA	ug/L	N/A	25	17-JUN-22
Arsenic (As)-Total		<1.0	<1.0	RPD-NA	ug/L	N/A	25	17-JUN-22
Barium (Ba)-Total		38	38		ug/L	0.2	25	17-JUN-22
Beryllium (Be)-Total		<0.50	<0.50	RPD-NA	ug/L	N/A	25	17-JUN-22
Bismuth (Bi)-Total		<1.0	<1.0	RPD-NA	ug/L	N/A	25	17-JUN-22
Boron (B)-Total		69	70		ug/L	2.2	25	17-JUN-22
Cadmium (Cd)-Total		<0.10	<0.10	RPD-NA	ug/L	N/A	25	17-JUN-22
Calcium (Ca)-Total		135	132		mg/L	2.1	25	17-JUN-22
Cesium (Cs)-Total		<0.010	<0.010	RPD-NA	ug/L	N/A	25	17-JUN-22
Chromium (Cr)-Total		<1.0	<1.0	RPD-NA	ug/L	N/A	25	17-JUN-22
Cobalt (Co)-Total		<0.50	<0.50	RPD-NA	ug/L	N/A	25	17-JUN-22
Copper (Cu)-Total		4.2	4.3		ug/L	1.3	25	17-JUN-22
Iron (Fe)-Total		<50	<50	RPD-NA	ug/L	N/A	25	17-JUN-22
Lead (Pb)-Total		<1.0	<1.0	RPD-NA	ug/L	N/A	25	17-JUN-22
Lithium (Li)-Total		<100	<100	RPD-NA	ug/L	N/A	25	17-JUN-22
Magnesium (Mg)-Total		12.5	12.2		mg/L	2.6	25	17-JUN-22
Manganese (Mn)-Total		2.8	2.8		ug/L	2.2	25	17-JUN-22
Molybdenum (Mo)-Total		0.99	0.96		ug/L	3.7	25	17-JUN-22
Nickel (Ni)-Total		<1.0	<1.0	RPD-NA	ug/L	N/A	25	17-JUN-22
Phosphorus (P)-Total		0.066	0.055		mg/L	19	25	17-JUN-22
Potassium (K)-Total		5.0	4.9		mg/L	1.9	25	17-JUN-22
Rubidium (Rb)-Total		1.69	1.77		ug/L	4.5	25	17-JUN-22
Selenium (Se)-Total		<1.0	<1.0	RPD-NA	ug/L	N/A	25	17-JUN-22
Silicon (Si)-Total		6100	5900		ug/L	3.0	25	17-JUN-22
Silver (Ag)-Total		<0.050	<0.050	RPD-NA	ug/L	N/A	25	17-JUN-22
Sodium (Na)-Total		37.4	36.8		mg/L	1.5	25	17-JUN-22
Strontium (Sr)-Total		297	298		ug/L	0.5	25	17-JUN-22
Sulfur (S)-Total		10600	10600		ug/L	0.3	25	17-JUN-22
Tellurium (Te)-Total		<0.20	<0.20	RPD-NA	ug/L	N/A	25	17-JUN-22
Thallium (Tl)-Total		<0.060	<0.060	RPD-NA	ug/L	N/A	25	17-JUN-22
Thorium (Th)-Total		<0.10	<0.10	RPD-NA	ug/L	N/A	25	17-JUN-22
Tin (Sn)-Total		<1.0	<1.0		ug/L			17-JUN-22

Quality Control Report

Client: FISHER ENVIRONMENTAL
15-400 ESNA PARK DRIVE
MARKHAM ON NA
Contact: CLIVE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-ONT-DW-DIG-WT	**Water**							
Batch R5804119								
WG3740695-4 DUP		**WG3740695-3**						
Tin (Sn)-Total		<1.0	<1.0	RPD-NA	ug/L	N/A	25	17-JUN-22
Titanium (Ti)-Total		<2.0	<2.0	RPD-NA	ug/L	N/A	25	17-JUN-22
Tungsten (W)-Total		<6.0	<6.0	RPD-NA	ug/L	N/A	25	17-JUN-22
Uranium (U)-Total		<2.0	<2.0	RPD-NA	ug/L	N/A	25	17-JUN-22
Vanadium (V)-Total		0.61	0.61		ug/L	0.0	25	17-JUN-22
Zinc (Zn)-Total		51.3	53.6		ug/L	4.3	25	17-JUN-22
Zirconium (Zr)-Total		<0.80	<0.80	RPD-NA	ug/L	N/A	25	17-JUN-22
WG3740695-2 LCS								
Aluminum (Al)-Total			104.8		%		70-130	17-JUN-22
Antimony (Sb)-Total			99.5		%		70-130	17-JUN-22
Arsenic (As)-Total			99.2		%		70-130	17-JUN-22
Barium (Ba)-Total			102.6		%		70-130	17-JUN-22
Beryllium (Be)-Total			104.1		%		70-130	17-JUN-22
Bismuth (Bi)-Total			99.4		%		70-130	17-JUN-22
Boron (B)-Total			100.9		%		70-130	17-JUN-22
Cadmium (Cd)-Total			99.8		%		70-130	17-JUN-22
Calcium (Ca)-Total			101.4		%		70-130	17-JUN-22
Cesium (Cs)-Total			104.7		%		70-130	17-JUN-22
Chromium (Cr)-Total			98.0		%		70-130	17-JUN-22
Cobalt (Co)-Total			98.8		%		70-130	17-JUN-22
Copper (Cu)-Total			97.4		%		70-130	17-JUN-22
Iron (Fe)-Total			102.1		%		70-130	17-JUN-22
Lead (Pb)-Total			104.0		%		70-130	17-JUN-22
Lithium (Li)-Total			106.3		%		70-130	17-JUN-22
Magnesium (Mg)-Total			103.6		%		70-130	17-JUN-22
Manganese (Mn)-Total			100.2		%		70-130	17-JUN-22
Molybdenum (Mo)-Total			101.3		%		70-130	17-JUN-22
Nickel (Ni)-Total			99.1		%		70-130	17-JUN-22
Phosphorus (P)-Total			109.1		%		70-130	17-JUN-22
Potassium (K)-Total			100.4		%		70-130	17-JUN-22
Rubidium (Rb)-Total			105.2		%		70-130	17-JUN-22
Selenium (Se)-Total			97.5		%		70-130	17-JUN-22
Silicon (Si)-Total			101.0		%		60-140	17-JUN-22

Quality Control Report

Client: FISHER ENVIRONMENTAL
15-400 ESNA PARK DRIVE
MARKHAM ON NA
Contact: CLIVE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-ONT-DW-DIG-WT	**Water**							
Batch R5804119								
WG3740695-2 LCS								
Silver (Ag)-Total			93.4		%		70-130	17-JUN-22
Sodium (Na)-Total			102.3		%		70-130	17-JUN-22
Strontium (Sr)-Total			101.3		%		70-130	17-JUN-22
Sulfur (S)-Total			100.3		%		70-130	17-JUN-22
Tellurium (Te)-Total			99.6		%		70-130	17-JUN-22
Thallium (Tl)-Total			103.7		%		70-130	17-JUN-22
Thorium (Th)-Total			103.3		%		70-130	17-JUN-22
Tin (Sn)-Total			99.6		%		70-130	17-JUN-22
Titanium (Ti)-Total			98.5		%		70-130	17-JUN-22
Tungsten (W)-Total			103.6		%		70-130	17-JUN-22
Uranium (U)-Total			105.0		%		70-130	17-JUN-22
Vanadium (V)-Total			100.6		%		70-130	17-JUN-22
Zinc (Zn)-Total			98.9		%		70-130	17-JUN-22
Zirconium (Zr)-Total			99.3		%		70-130	17-JUN-22
WG3740695-1 MB								
Aluminum (Al)-Total			<10		ug/L		10	17-JUN-22
Antimony (Sb)-Total			<0.60		ug/L		0.6	17-JUN-22
Arsenic (As)-Total			<1.0		ug/L		1	17-JUN-22
Barium (Ba)-Total			<10		ug/L		10	17-JUN-22
Beryllium (Be)-Total			<0.50		ug/L		0.5	17-JUN-22
Bismuth (Bi)-Total			<1.0		ug/L		1	17-JUN-22
Boron (B)-Total			<50		ug/L		50	17-JUN-22
Cadmium (Cd)-Total			<0.10		ug/L		0.1	17-JUN-22
Calcium (Ca)-Total			<0.50		mg/L		0.5	17-JUN-22
Cesium (Cs)-Total			<0.010		ug/L		0.01	17-JUN-22
Chromium (Cr)-Total			<1.0		ug/L		1	17-JUN-22
Cobalt (Co)-Total			<0.50		ug/L		0.5	17-JUN-22
Copper (Cu)-Total			<1.0		ug/L		1	17-JUN-22
Iron (Fe)-Total			<50		ug/L		50	17-JUN-22
Lead (Pb)-Total			<1.0		ug/L		1	17-JUN-22
Lithium (Li)-Total			<100		ug/L		100	17-JUN-22
Magnesium (Mg)-Total			<0.50		mg/L		0.5	17-JUN-22
Manganese (Mn)-Total			<1.0		ug/L		1	17-JUN-22
Molybdenum (Mo)-Total			<0.50		ug/L		0.5	17-JUN-22

Quality Control Report

Client: FISHER ENVIRONMENTAL
15-400 ESNA PARK DRIVE
MARKHAM ON NA
Contact: CLIVE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-ONT-DW-DIG-WT	**Water**							
Batch R5804119								
WG3740695-1 MB								
Nickel (Ni)-Total			<1.0		ug/L		1	17-JUN-22
Phosphorus (P)-Total			<0.050		mg/L		0.05	17-JUN-22
Potassium (K)-Total			<1.0		mg/L		1	17-JUN-22
Rubidium (Rb)-Total			<0.20		ug/L		0.2	17-JUN-22
Selenium (Se)-Total			<1.0		ug/L		1	17-JUN-22
Silicon (Si)-Total			<1000		ug/L		1000	17-JUN-22
Silver (Ag)-Total			<0.050		ug/L		0.05	17-JUN-22
Sodium (Na)-Total			<0.50		mg/L		0.5	17-JUN-22
Strontium (Sr)-Total			<1.0		ug/L		1	17-JUN-22
Sulfur (S)-Total			<500		ug/L		500	17-JUN-22
Tellurium (Te)-Total			<0.20		ug/L		0.2	17-JUN-22
Thallium (Tl)-Total			<0.060		ug/L		0.06	17-JUN-22
Thorium (Th)-Total			<0.10		ug/L		0.1	17-JUN-22
Tin (Sn)-Total			<1.0		ug/L		1	17-JUN-22
Titanium (Ti)-Total			<2.0		ug/L		2	17-JUN-22
Tungsten (W)-Total			<6.0		ug/L		6	17-JUN-22
Uranium (U)-Total			<2.0		ug/L		2	17-JUN-22
Vanadium (V)-Total			<0.50		ug/L		0.5	17-JUN-22
Zinc (Zn)-Total			<3.0		ug/L		3	17-JUN-22
Zirconium (Zr)-Total			<0.80		ug/L		0.8	17-JUN-22
WG3740695-5 MS		**WG3740695-3**						
Aluminum (Al)-Total			107.2		%		70-130	17-JUN-22
Antimony (Sb)-Total			104.4		%		70-130	17-JUN-22
Arsenic (As)-Total			104.0		%		70-130	17-JUN-22
Barium (Ba)-Total			N/A	MS-B	%		-	17-JUN-22
Beryllium (Be)-Total			101.7		%		70-130	17-JUN-22
Bismuth (Bi)-Total			95.4		%		70-130	17-JUN-22
Boron (B)-Total			N/A	MS-B	%		-	17-JUN-22
Cadmium (Cd)-Total			97.8		%		70-130	17-JUN-22
Calcium (Ca)-Total			N/A	MS-B	%		-	17-JUN-22
Cesium (Cs)-Total			109.2		%		70-130	17-JUN-22
Chromium (Cr)-Total			102.5		%		70-130	17-JUN-22
Cobalt (Co)-Total			100.3		%		70-130	17-JUN-22
Copper (Cu)-Total			92.7		%		70-130	17-JUN-22

Quality Control Report

Client: FISHER ENVIRONMENTAL
15-400 ESNA PARK DRIVE
MARKHAM ON NA
Contact: CLIVE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-ONT-DW-DIG-WT	**Water**							
Batch R5804119								
WG3740695-5 MS		**WG3740695-3**						
Iron (Fe)-Total			107.4		%		70-130	17-JUN-22
Lead (Pb)-Total			99.1		%		70-130	17-JUN-22
Lithium (Li)-Total			101.4		%		70-130	17-JUN-22
Magnesium (Mg)-Total			N/A	MS-B	%		-	17-JUN-22
Manganese (Mn)-Total			103.1		%		70-130	17-JUN-22
Molybdenum (Mo)-Total			107.9		%		70-130	17-JUN-22
Nickel (Ni)-Total			97.6		%		70-130	17-JUN-22
Phosphorus (P)-Total			108.8		%		70-130	17-JUN-22
Potassium (K)-Total			N/A	MS-B	%		-	17-JUN-22
Rubidium (Rb)-Total			108.6		%		70-130	17-JUN-22
Selenium (Se)-Total			102.3		%		70-130	17-JUN-22
Silicon (Si)-Total			N/A	MS-B	%		-	17-JUN-22
Silver (Ag)-Total			91.3		%		70-130	17-JUN-22
Sodium (Na)-Total			N/A	MS-B	%		-	17-JUN-22
Strontium (Sr)-Total			N/A	MS-B	%		-	17-JUN-22
Sulfur (S)-Total			N/A	MS-B	%		-	17-JUN-22
Tellurium (Te)-Total			94.2		%		70-130	17-JUN-22
Thallium (Tl)-Total			98.8		%		70-130	17-JUN-22
Thorium (Th)-Total			102.7		%		70-130	17-JUN-22
Tin (Sn)-Total			101.9		%		70-130	17-JUN-22
Titanium (Ti)-Total			104.0		%		70-130	17-JUN-22
Tungsten (W)-Total			104.1		%		70-130	17-JUN-22
Uranium (U)-Total			N/A	MS-B	%		-	17-JUN-22
Vanadium (V)-Total			106.6		%		70-130	17-JUN-22
Zinc (Zn)-Total			N/A	MS-B	%		-	17-JUN-22
Zirconium (Zr)-Total			102.9		%		70-130	17-JUN-22
NH3-F-ONT-DW-WT	**Water**							
Batch R5804387								
WG3740982-3 DUP		**WG3740982-5**						
Ammonia, Total (as N)		0.016	0.016		mg/L	4.4	20	17-JUN-22
WG3740982-2 LCS								
Ammonia, Total (as N)			104.9		%		85-115	17-JUN-22
WG3740982-1 MB								
Ammonia, Total (as N)			<0.010		mg/L		0.01	17-JUN-22

Quality Control Report

Client: FISHER ENVIRONMENTAL
15-400 ESNA PARK DRIVE
MARKHAM ON NA
Contact: CLIVE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH3-F-ONT-DW-WT	**Water**							
Batch R5804387								
WG3740982-4 MS		**WG3740982-5**						
Ammonia, Total (as N)			100.0		%		75-125	17-JUN-22
Batch R5805083								
WG3741412-3 DUP		**WG3741412-5**						
Ammonia, Total (as N)		0.120	0.116		mg/L	3.1	20	20-JUN-22
WG3741412-2 LCS								
Ammonia, Total (as N)			91.6		%		85-115	20-JUN-22
WG3741412-1 MB								
Ammonia, Total (as N)			<0.010		mg/L		0.01	20-JUN-22
WG3741412-4 MS		**WG3741412-5**						
Ammonia, Total (as N)			N/A	MS-B	%		-	20-JUN-22
NO2-DW-IC-WT	**Water**							
Batch R5806019								
WG3742598-4 DUP		**WG3742598-3**						
Nitrite (as N)		<0.010	<0.010	RPD-NA	mg/L	N/A	20	22-JUN-22
WG3742598-2 LCS								
Nitrite (as N)			99.5		%		90-110	22-JUN-22
WG3742598-1 MB								
Nitrite (as N)			<0.010		mg/L		0.01	22-JUN-22
WG3742598-5 MS		**WG3742598-3**						
Nitrite (as N)			100.7		%		75-125	22-JUN-22
NO3-DW-IC-WT	**Water**							
Batch R5806019								
WG3742598-4 DUP		**WG3742598-3**						
Nitrate (as N)		<0.020	<0.020	RPD-NA	mg/L	N/A	20	22-JUN-22
WG3742598-2 LCS								
Nitrate (as N)			98.9		%		90-110	22-JUN-22
WG3742598-1 MB								
Nitrate (as N)			<0.020		mg/L		0.02	22-JUN-22
WG3742598-5 MS		**WG3742598-3**						
Nitrate (as N)			98.7		%		75-125	22-JUN-22
OCP-ROUTINE-DW-WT	**Water**							
Batch R5809939								
WG3744467-2 LCS								
a-chlordane			99.1		%		50-150	29-JUN-22
g-chlordane			104.7		%		50-150	29-JUN-22

Quality Control Report

Client: FISHER ENVIRONMENTAL
15-400 ESNA PARK DRIVE
MARKHAM ON NA

Contact: CLIVE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
OCP-ROUTINE-DW-WT	**Water**							
Batch R5809939								
WG3744467-2 LCS								
op-DDT			99.6		%		50-150	29-JUN-22
pp-DDD			106.8		%		50-150	29-JUN-22
pp-DDE			108.7		%		50-150	29-JUN-22
pp-DDT			86.9		%		50-150	29-JUN-22
Oxychlordane			107.4		%		50-150	29-JUN-22
WG3744467-1 MB								
a-chlordane			<0.0080		ug/L		0.008	29-JUN-22
g-chlordane			<0.0080		ug/L		0.008	29-JUN-22
op-DDT			<0.0040		ug/L		0.004	29-JUN-22
pp-DDD			<0.004		ug/L		0.004	29-JUN-22
pp-DDE			<0.004		ug/L		0.004	29-JUN-22
pp-DDT			<0.0040		ug/L		0.004	29-JUN-22
Oxychlordane			<0.0080		ug/L		0.008	29-JUN-22
Surrogate: Decachlorobiphenyl			122.8		%		50-150	29-JUN-22
Batch R5809983								
WG3744983-2 LCS								
a-chlordane			103.6		%		50-150	30-JUN-22
g-chlordane			101.8		%		50-150	30-JUN-22
op-DDT			101.5		%		50-150	30-JUN-22
pp-DDD			97.3		%		50-150	30-JUN-22
pp-DDE			97.3		%		50-150	30-JUN-22
pp-DDT			112.7		%		50-150	30-JUN-22
Oxychlordane			90.2		%		50-150	30-JUN-22
WG3744983-1 MB								
a-chlordane			<0.0080		ug/L		0.008	29-JUN-22
g-chlordane			<0.0080		ug/L		0.008	29-JUN-22
op-DDT			<0.0040		ug/L		0.004	29-JUN-22
pp-DDD			<0.004		ug/L		0.004	29-JUN-22
pp-DDE			<0.004		ug/L		0.004	29-JUN-22
pp-DDT			<0.0040		ug/L		0.004	29-JUN-22
Oxychlordane			<0.0080		ug/L		0.008	29-JUN-22
Surrogate: Decachlorobiphenyl			113.9		%		50-150	29-JUN-22
PH-ONT-DW-WT	**Water**							

Quality Control Report

Workorder: L2715365 Report Date: 30-JUN-22

Client: FISHER ENVIRONMENTAL
15-400 ESNA PARK DRIVE
MARKHAM ON NA

Contact: CLIVE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH-ONT-DW-WT	**Water**							
Batch R5805303								
WG3741652-4 DUP		**WG3741652-3**						
pH		7.72	7.72	J	pH units	0.00	0.2	20-JUN-22
WG3741652-2 LCS								
pH			7.07		pH units		6.9-7.1	20-JUN-22
PHENOLS4AAP-ONTDW-WT	**Water**							
Batch R5806025								
WG3741690-11 DUP		**WG3741690-13**						
Phenols (4AAP)		1.2	1.4		ug/L	15	25	22-JUN-22
WG3741690-10 LCS								
Phenols (4AAP)			95.8		%		70-130	22-JUN-22
WG3741690-9 MB								
Phenols (4AAP)			<1.0		ug/L		1	22-JUN-22
WG3741690-12 MS		**WG3741690-13**						
Phenols (4AAP)			96.2		%		70-130	22-JUN-22
SO4-IC-N-ONT-DW-WT	**Water**							
Batch R5806019								
WG3742598-4 DUP		**WG3742598-3**						
Sulfate (SO4)		59.2	59.2		mg/L	0.1	20	22-JUN-22
WG3742598-2 LCS								
Sulfate (SO4)			100.7		%		90-110	22-JUN-22
WG3742598-1 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	22-JUN-22
WG3742598-5 MS		**WG3742598-3**						
Sulfate (SO4)			100.7		%		75-125	22-JUN-22
SOLIDS-TDS-ONT-DW-WT	**Water**							
Batch R5804338								
WG3740504-3 DUP		**WG3740504-4**						
Total Dissolved Solids		256	263		mg/L	2.5	25	16-JUN-22
WG3740504-2 LCS								
Total Dissolved Solids			98.9		%		70-130	16-JUN-22
WG3740504-1 MB								
Total Dissolved Solids			<10		mg/L		10	16-JUN-22
TAN,LIG-ONT-DW-WT	**Water**							
Batch R5803217								
WG3740571-3 DUP		**WG3740571-5**						
Tannin & Lignin		<1.0	<1.0	RPD-NA	mg/L	N/A	20	16-JUN-22
WG3740571-2 LCS								

Quality Control Report

Workorder: L2715365 Report Date: 30-JUN-22

Client: FISHER ENVIRONMENTAL
15-400 ESNA PARK DRIVE
MARKHAM ON NA

Contact: CLIVE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TAN,LIG-ONT-DW-WT	**Water**							
Batch R5803217								
WG3740571-2 LCS								
Tannin & Lignin			100.6		%		85-115	16-JUN-22
WG3740571-1 MB								
Tannin & Lignin			<1.0		mg/L		1	16-JUN-22
WG3740571-4 MS		**WG3740571-5**						
Tannin & Lignin			102.9		%		70-130	16-JUN-22
TC-MF-DW-WT	**Water**							
Batch R5804762								
WG3740876-1 MB								
Total Coliforms			0		CFU/100mL		1	17-JUN-22
TKN-ONT-DW-WT	**Water**							
Batch R5805575								
WG3740992-7 DUP		**WG3740992-9**						
Total Kjeldahl Nitrogen		<0.15	<0.15	RPD-NA	mg/L	N/A	20	21-JUN-22
WG3740992-6 LCS								
Total Kjeldahl Nitrogen			109.2		%		75-125	20-JUN-22
WG3740992-5 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	20-JUN-22
WG3740992-8 MS		**WG3740992-9**						
Total Kjeldahl Nitrogen			121.9		%		70-130	21-JUN-22
Batch R5805603								
WG3741594-3 DUP		**WG3741594-5**						
Total Kjeldahl Nitrogen		0.37	0.35		mg/L	3.3	20	21-JUN-22
WG3741594-2 LCS								
Total Kjeldahl Nitrogen			108.7		%		75-125	21-JUN-22
WG3741594-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	21-JUN-22
WG3741594-4 MS		**WG3741594-5**						
Total Kjeldahl Nitrogen			118.6		%		70-130	21-JUN-22
TURBIDITY-ONT-DW-WT	**Water**							
Batch R5804002								
WG3740930-3 DUP		**L2715365-1**						
Turbidity		29.2	29.7		NTU	1.7	15	17-JUN-22
WG3740930-2 LCS								
Turbidity			96.0		%		85-115	17-JUN-22
WG3740930-1 MB								
							0.1	

Quality Control Report

Client: FISHER ENVIRONMENTAL
15-400 ESNA PARK DRIVE
MARKHAM ON NA
Contact: CLIVE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TURBIDITY-ONT-DW-WT	**Water**							
Batch R5804002								
WG3740930-1 MB								
Turbidity			<0.10		NTU		0.1	17-JUN-22

Quality Control Report

Workorder: L2715365 Report Date: 30-JUN-22

Client: FISHER ENVIRONMENTAL
15-400 ESNA PARK DRIVE
MARKHAM ON NA
Contact: CLIVE

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

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

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

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

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

L2715365-COFC

# of Custody (COC) / Analytical Request Form

COC Number: 20 - 893713

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Canada Toll Free: 1 800 668 9878

Page of

Report To	Contact and company name below will appear on the final report	Reports / Recipients	Turnaround Time (TAT) Requested
Company:	Fisher Environmental	Select Report Format: ☑ PDF ☐ EXCEL ☐ EDD (DIGITAL)	☑ Routine [R] if received by 3pm M-F - no surcharges apply
Contact:	Clwe	Merge QC/QCI Reports with COA ☐ YES ☐ NO ☐ N/A	☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
Phone:	416 605-9722	☑ Compare Results to Criteria on Report - provide details below if box checked	☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
	Company address below will appear on the final report	Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX	☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
Street:		Email 1 or Fax Clwe	☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
City/Province:		Email 2	☐ Same day [E2] if received by 10am M-S - 200% rush surcharge. Additional fees may apply to rush requests on weekends, statutory holidays and non-routine tests
Postal Code:		Email 3	AFFIX ALS BARCODE LABEL HERE (ALS use only)

Invoice To	Same as Report To ☑ YES ☐ NO	Invoice Recipients	Date and Time Required for all E&P TATs:
	Copy of Invoice with Report ☐ YES ☐ NO	Select Invoice Distribution: ☐ EMAIL ☐ MAIL ☐ FAX	For all tests with rush TATs requested, please contact your AM to confirm availability.
Company:	Fisher Environmental	Email 1 or Fax	
Contact:	Clwe	Email 2	

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:		AFE/Cost Center:	PO#:
Job #:		Major/Minor Code:	Routing Code:
PO / AFE:		Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (ALS use only):	L2715365	ALS Contact:	Sampler:

Analysis Request

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

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	Ontario drinking water Schedules 1 x 2	Ontario DW Aesthetics and operational guidelines	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	Harcourt Elephant Lake, ON Drinking Water Wells.	15/06/22		Water						
	Project No 22-12233									

Drinking Water (DW) Samples[1] (client use)	Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)
Are samples taken from a Regulated DW System? ☐ YES ☑ NO	Please compare to schedules 1 & 2 microbiological & chemical standards & ON DW Aesthetics & operational
Are samples for human consumption/ use? ☑ YES ☐ NO	

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☑ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
5.3			9.4		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by: Nnamdi	Date: 15/06/22	Time:	Received by: CS	Date: June 15/22	Time: 11:00	Received by:	Date: 15/06/22	Time: 17:15

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

ALS 2021 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form.**

5.3, 5.1