



TECHNICAL MEMORANDUM

DATE October 29, 2024

Project No. CA-GLD-19126620

TO Mr. Phil White, Quality Control
Thomas Cavanagh Construction Limited

FROM Brian Henderson, M.A.Sc., P.Eng.
Kris Marentette, M.Sc., P.Geo.

INVESTIGATION PROGRAM TO ASSESS POTENTIAL PRESENCE OF URANIUM AND THORIUM IN BEDROCK, OVERBURDEN MATERIALS, SURFACE WATER AND THE SHALLOW GROUNDWATER SYSTEM AT HIGHLAND LINE PROPERTY, TOWNSHIP OF LANARK HIGHLANDS, ONTARIO

The purpose of this technical memorandum is to present the results of the investigation conducted at the Thomas Cavanagh Construction Limited (Cavanagh) proposed Highland Line Pit property (refer to Figure 1) to assess the potential presence of uranium and thorium in the bedrock, overburden materials, surface water and the shallow groundwater flow system. The investigation was developed for the purpose of addressing concerns raised by the public and regulators related to the proposed aggregate pit development at the site.

The reader is referred to the “Important Information and Limitations of This Report” included in Attachment A which follows the text but forms an integral part of this document.

Portions of the proposed Highland Line Pit are underlain by the Barbers Lake granitic pluton. Parts of the pluton are known to have anomalously elevated uranium and thorium contents as compared to other granites in central and eastern Ontario as discussed in the August 21, 2023 letter prepared by Michael Easton, PhD, P.Geo. of the Ontario Geological Survey for the Ministry of Natural Resources and Forestry (refer to Attachment B). The primary objective of the investigation was to determine the implications that the radioactive nature of the granite beneath the site (compared to other granites) could potentially have on the aggregate material proposed for extraction on the proposed Cavanagh Highland Line property, and potential impacts to surface water and groundwater in the area.

1.0 GEOLOGICAL SETTING

The bedrock geology mapped beneath the proposed Highland Line Pit property is shown on Figure 2 which was derived from Ontario Geological Survey Map 2512 (Precambrian Geology – Dalhousie Lake Area, Frontenac and Lanark Counties, 1989).

Two bedrock units exist below the Highland Line property. Map Unit 12a (light pink on Figure 2) is the Barbers Lake Intrusion and consists of pink, leucocratic, medium-grained biotite ± muscovite granite. Map Unit 5a (light blue) consists of white, creamy, medium to coarse-grained calcitic marble which is not part of the Barbers Lake Intrusion. With reference to the specific parts of the Highland Line property, in this submission, these two geological units are referred to as the areas of the site underlain by “granite” and the areas of the site underlain by “marble”.

The overburden deposits, as mapped on the site, are described as ice-contact stratified deposits and coarse textured glaciolacustrine deposits. In both cases, the material was brought to the site during glaciation and deposited when the glaciers were receding. The overburden materials are therefore widely sourced and not exclusively derived from the on-site bedrock.

2.0 FIELD INVESTIGATION

The investigation program consisted of an overburden (aggregate resource material) and bedrock sampling and testing program and a surface water and groundwater sampling and testing program.

2.1 Bedrock and Overburden Investigation Program

The overburden investigation program included the following components:

- Excavation of 10 test pits across the property in areas mapped to be underlain by both the granite and the marble.
- Test pits were excavated in areas of the site underlain by thick overburden and were terminated in the overburden materials. Other test pits were excavated in areas of the site underlain by thinner overburden such that the test pits would be terminated by refusal on the bedrock surface. This approach permitted the collection of test pit samples from overburden materials closer to ground surface and well above the bedrock surface while other test pit samples would be collected from overburden that has been deposited on, or in close proximity to, the bedrock surface.
- The geological and groundwater conditions encountered in each test pit were logged by a field technician from WSP Canada Inc. (WSP).
- Samples of the overburden were collected from each test pit at approximately one metre intervals.
- Bedrock samples were collected at three outcrop locations across the site.
- Test pit overburden and bedrock samples were submitted to an accredited laboratory for analyses of uranium and thorium

The location of the test pits and the bedrock sampling locations are shown on Figure 1.

2.2 Surface Water and Shallow Groundwater Sampling Program

The surface water and shallow groundwater sampling program was developed for the purpose of assessing concentrations of uranium and thorium in the on-site groundwater and surface water.

The sampling program included the following components:

- 1) Development and sampling of the existing six monitoring wells on the property (i.e., MW20-1 to MW20-6, inclusive);
- 2) Collection of a water sample from the groundwater seep(s) (SG1) in the area between the proposed extraction limit and Barbers Lake;
- 3) Collection of a surface water sample from Barbers Lake (SG3) and a surface water sample from the on-site pond (POND);

- 4) During the groundwater and surface water sampling programs, field measurements of temperature, pH and conductivity were recorded; and,
- 5) All groundwater and surface water samples were submitted to an accredited laboratory for analyses of uranium and thorium.

The locations of the shallow groundwater and surface water sampling locations are shown on Figure 1.

3.0 RESULTS

3.1 Bedrock and Overburden Investigation Program

On April 18, 2024, representatives from WSP visited the proposed Highland Line Pit site to complete a site reconnaissance and to collect bedrock samples for analysis of uranium and thorium. A total of three bedrock samples were collected from the site. The locations of where the samples were collected are shown on Figure 1 (BR1, BR2 and BR3). Samples BR1 and BR2 were collected from the part of the site mapped to be underlain by marble whereas Sample BR3 was collected from the part of the site mapped to be underlain by granite. The three bedrock samples were not marble and no marble was observed on the site during the site visit.

The bedrock samples were shipped to the analytical laboratory for analysis of thorium and uranium concentrations. All laboratory chemical and physical analyses on the bedrock samples were performed by SGS Canada Inc. in Lakefield, Ontario. Following crushing, the bedrock samples were analyzed using sodium peroxide fusion, ICP-MS. The results of the laboratory analyses on the bedrock samples are presented in Table 1 and in Attachment C.

Table 1: Uranium and Thorium Concentrations in Bedrock Samples

Bedrock Sample	Rock Type	Thorium Concentration (ppm)	Uranium Concentration (ppm)
BR1	Quartz-rich Bedrock	3.9	0.7
BR2	Granitic Bedrock	5.1	1.7
BR3	Granitic Bedrock	43.3	11.6

Note: ppm – Parts per million

A total of 10 test pits labelled as TP24-1 through TP24-10 were excavated across the site on May 14 and 15, 2024. The test pit locations are shown on Figure 1. Test pit excavations for the present investigation was carried out using a PC450LC Komatsu excavator supplied and operated by Cavanagh. The fieldwork was supervised by experienced personnel from WSP who located the test pits, directed the excavation, logged the test pits and samples, and took custody of the soil samples retrieved. On completion of the test pit operations, samples of the soil encountered in the test pits were transported to the WSP laboratory in Ottawa, Ontario for examination by the project engineer. A summary of the test pits is provided in Table 2 and further details are provided in the test pit logs in Attachment D.

Table 2: Test Pit Summary

Test Pit	General Soil Description	Final Depth (mbgs)	Notes
TP24-1	Sand	4.70	Test pit terminated upon refusal. Water level at 4.65 mbgs.
TP24-2	Sand	4.70	Test pit terminated upon refusal.
TP24-3	Sand and Gravel to Sand	6.70	Test pit terminated at maximum reach of excavator.
TP24-4	Sand over Glacial Till	6.30	Test pit terminated at maximum reach of excavator.
TP24-5	Silty Sand to Sand	4.10	Test pit terminated due to sloughing and groundwater. Water level at 2.20 mbgs.
TP24-6	Glacial Till	1.30	Test pit terminated upon refusal.
TP24-7	Sand and Silty Sand	6.75	Test pit terminated at maximum reach of excavator.
TP24-8	Sand	4.80	Test pit terminated due to sloughing and groundwater. Water level at 4.0 mbgs.
TP24-9	Sand	5.00	Test pit terminated due to sloughing.
TP24-10	Sand	6.50	Test pit terminated due to sloughing and maximum reach of excavator. Water level at 4.7 mbgs.

Notes: mbgs – metres below ground surface

Test pits TP24-1 through TP24-4 and TP24-6 are mapped as being located in the area of the site mapped to be underlain by granite and the remaining test pits (TP24-5 and TP24-7 to TP24-10) are mapped as being in the area of the site underlain by marble. Test pits TP24-1, TP24-2 and TP24-6 were all terminated upon refusal either on bedrock or boulders. The remaining test pits (TP24-3 through TP24-5 and TP24-7 though TP24-10) were terminated due to sloughing of the test pit sides, or once the maximum reach of the excavator was attained.

Samples of the overburden material were collected at approximately one metre intervals. Details of the depths of the samples collected at each test pit location are included in Attachment D. Generally, the test pits were excavated through a thin topsoil layer 0.20 to 0.30 metres thick overlying a sand unit. Across the site, the sand unit had occurrences of gravel and silt. At TP24-4, a 0.30 metre thick unit of glacial till was encountered at the bottom of the test pit underneath the sand. The total thickness of the glacial till at this location is unknown as bedrock was not encountered in the test pit before the maximum reach of the excavator was encountered. Sand was not encountered at TP24-6, where glacial till was present below the topsoil layer to the bedrock. It should be noted that TP24-6 was only 1.30 metres deep as bedrock was near to surface at the test pit location.

The deepest sample of sand was selected from each test pit location for analysis of thorium and uranium concentrations. All laboratory chemical and physical analyses on the soil samples were performed by SGS

Canada Inc. in Lakefield, Ontario. Samples were analyzed using sodium peroxide fusion, ICP-MS. The results of the laboratory analyses on the soil samples are presented in Table 3 and in Attachment C.

Table 3: Uranium and Thorium Concentrations in Overburden Samples

Test Pit	Depth of Sample (Metres)	Thorium Concentration (ppm)	Uranium Concentration (ppm)
TP24-1 Sample 5	4.25 – 4.70	16.3	2.6
TP24-2 Sample 5	4.20 – 4.70	18.7	3.2
TP24-3 Sample 6	5.70 – 6.70	1.5	<0.5
TP24-4 Sample 6	5.30 – 6.00	1.6	<0.5
TP24-5 Sample 4	3.30 – 4.10	1.9	<0.5
TP24-6 Sample 2	1.00 – 1.30	9.9	1.6
TP24-7 Sample 7	6.00 – 6.75	2.1	<0.5
TP24-8 Sample 5	4.30 – 4.80	1.2	<0.5
TP24-9 Sample 5	4.20 – 5.00	1.2	1.3
TP24-10 Sample 7	5.50 – 6.50	2.3	<0.5

Note: ppm – Parts per million

3.2 Groundwater and Surface Water Investigation Program

Groundwater samples were collected from the six existing monitoring wells (MW20-1 to MW20-6) and three surface water locations (SG1, SG3 and POND) for the analysis of thorium and uranium on June 13, 2024. Record of borehole logs for the monitoring wells are included in Attachment D. The locations of the monitoring wells and the surface water locations are shown on Figure 1.

Prior to the collection of a groundwater sample, each monitoring well was purged through the removal of at least three standing volumes of water using dedicated samplers. Generally, sampling of groundwater was performed immediately after purging.

The temperature, pH and conductivity of the groundwater samples were measured by WSP in the field at the time of sample collection using equipment that was calibrated prior to use. All samples were logged on a chain of custody form and placed in coolers with ice packs until they were delivered in person by WSP to Bureau Veritas in Ottawa, Ontario for analysis of uranium and thorium.

The groundwater samples for the specific analyses were collected, prepared and preserved in the field in plastic bottles. Two bottles were collected for each sample; one filtered for dissolved metals analysis and the other unfiltered for total metals analysis. Both bottles were preserved to pH<2 with nitric acid.

The results of the field and laboratory analyses conducted on the collected groundwater samples are presented in Table 4 and included in Attachment C.

Table 4: Uranium and Thorium Concentrations in Groundwater Samples

Parameter	MW20-1	MW20-2	MW20-3	MW20-4	MW20-5	MW20-6
Field Temperature (C)	8.9	9.4	9.3	8.8	9.5	8.9
Field pH	7.23	7.92	8.05	8.00	7.87	7.21
Field Conductivity (µS/cm)	778	350	323	273	491	387
Total Thorium (µg/L)	3.10	<2.0	<2.0	<2.0	<2.0	20
Dissolved Thorium (µg/L)	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Total Uranium (µg/L)	0.90	0.38	0.35	0.54	1.70	7.5
Dissolved Uranium (µg/L)	0.33	0.29	0.19	0.20	1.10	1.60

Notes: µS/cm – microSiemens per centimetre
 µg/L – micrograms per litre

The temperature, pH and conductivity of the surface water samples were measured by WSP in the field at the time of sample collection. The field measurements were obtained using a meter that was calibrated prior to use. All samples were entered on a Chain of Custody form and placed in coolers with ice packs until they were delivered in person by WSP to the private analytical laboratory for analysis of thorium and uranium.

The surface water samples for the specific analyses were collected, prepared and preserved in the field in plastic bottles. Two bottles were collected for each sample; one filtered for dissolved metals analysis and the other unfiltered for total metals analysis. Both bottles were preserved to pH<2 with nitric acid.

All laboratory chemical and physical analyses on surface water samples were performed by Bureau Veritas in Ottawa, Ontario. The results of the field and laboratory analyses conducted on the collected groundwater samples are presented in Table 5 and included in Attachment C.

Table 5: Uranium and Thorium Concentrations in Surface Water Samples

Parameter	SG1	SG3	Pond
Field Temperature (C)	14	16	19
Field pH	8.21	8.00	7.33
Field Conductivity (µS/cm)	502	371	132
Total Thorium (µg/L)	<2.0	<2.0	<2.0
Dissolved Thorium (µg/L)	<2.0	<2.0	<2.0
Total Uranium (µg/L)	2.2	0.29	<0.10

Parameter	SG1	SG3	Pond
Dissolved Uranium ($\mu\text{g/L}$)	2.1	0.28	<0.10

Notes: $\mu\text{S/cm}$ – microSiemens per centimetre
 $\mu\text{g/L}$ – micrograms per litre

4.0 DISCUSSION

4.1 Bedrock and Overburden

4.1.1 Bedrock

The concentrations of thorium and uranium in the three bedrock samples collected from the site ranged from 3.9 to 43.3 parts per million (ppm) and 0.7 to 11.6 ppm respectively (Table 1). In comparison, as per the letter from the OGS (refer to Attachment B), average concentrations of thorium and uranium globally in granite are 12 to 20 ppm and 4 ppm, respectively. The results from the bedrock samples show that the thorium and uranium concentrations in BR3 are above the average global granite concentrations. For bedrock samples BR1 and BR2, the results show that the thorium and uranium concentrations are below the average global granite concentrations.

4.1.2 Overburden

The concentrations of thorium and uranium in the ten (10) overburden samples collected from the site that were submitted for laboratory analyses ranged from 1.2 to 18.7 ppm and <0.5 to 3.2 ppm (Table 3). All of the reported uranium concentrations in all of the overburden samples were below the global average for granite whereas the reported thorium concentrations in all of the overburden samples were within or below the average global thorium concentrations for granite. As discussed previously, the sand that is found on site was deposited by glaciers onto the bedrock and, as such, is likely not derived from the local bedrock.

The Canadian Council of Ministers of the Environment (CCME) have developed a soil quality guideline for uranium for the protection of environmental and human health (CCME, 2007). Depending on the land use, the guideline ranges from 23 to 300 ppm. The uranium concentrations in all the analyzed soil samples are below the most stringent guideline (for agricultural soils) of 23 ppm. There is no CCME Soil Quality Guideline for thorium.

The Province of Ontario has developed soil and sediment standards under Part XV.1 of the Environmental Protection Act for use on contaminated sites (Ontario Ministry of the Environment, 2011). The proposed Highland Line Pit is not a contaminated site, but the standards can be used for comparison with the analytical soil results. The applicable standard table to be used for comparison is "Table 2: Full Depth Generic Site Condition Standards in a Potable Groundwater Condition". Depending on the land use, the Table 2 standard for uranium varies from 23 to 33 ppm. The uranium concentrations in all the analyzed soil samples are below the most stringent guideline (for agricultural soils) of 23 ppm. There is no Table 2 standard for thorium.

It is interesting to note that the highest thorium and uranium concentrations in the soil samples were collected from test pits that were limited in depth due to the presence of bedrock (TP24-1, TP24-2 and TP24-6). These elevated concentrations (though still below or within the global average) may be due to small fragments of bedrock being included in the collected overburden soil samples, thus resulting in higher concentrations than the other soil samples. Even though the interface between the bedrock and overburden may have the highest

thorium and uranium concentrations in the soil samples tested, the concentrations of uranium are below the most stringent guideline/standard (for agricultural soils) of 23 ppm.

4.1.3 Summary

Results from the bedrock and overburden sampling program show that there can be elevated uranium and thorium concentrations in the bedrock under the site, but these elevated concentrations are not present in the unconsolidated overburden deposits above the bedrock.

The results from the overburden sampling program indicate that the uranium concentrations in the analyzed overburden samples were all below the CCME soil quality guidelines and the Ontario Ministry of the Environment full depth generic site condition standards in a potable groundwater condition. There are no CCME soil quality guidelines or Ontario Ministry of the Environment full depth generic site condition standards in a potable groundwater condition for thorium.

4.2 Groundwater and Surface Water

4.2.1 Groundwater

The concentrations of thorium and uranium in the six (6) groundwater samples collected from the monitoring wells on the site ranged from <2 to 20 micrograms/Litre (ug/L) for thorium and from 0.19 to 7.5 ug/L for uranium (Table 4). For comparison, the Ontario Drinking Water Quality Standard (ODWQS; Ontario Ministry of the Environment, 2006) for uranium is 20 ug/L, thus the results of all samples were below the ODWQS. Health Canada has developed Guidelines for Canadian Drinking Water Quality (2024) that includes a maximum acceptable concentration of uranium of 20 ug/L. The results of all the groundwater samples were below the Health Canada guideline. There is no ODWQS or Health Canada Guideline for thorium.

There were only two groundwater samples (MW20-1 and MW20-6) where thorium was detected above the method detection limit of the laboratory and both were in the total (i.e., not filtered) thorium concentration. It is likely that there was particulate matter in the sample that caused the elevated concentrations of thorium since the results of the dissolved thorium for the same samples were below the analytical detection limit.

4.2.2 Surface Water

The concentrations of thorium and uranium in the three (3) surface water samples collected from the site were all <2 ug/L for thorium and ranged from <0.1 to 2.2 ug/L for uranium (Table 5). For comparison, the Provincial Water Quality Objective (PWQO; Ontario Ministry of the Environment, 1994) for uranium is 5 ug/L, thus the results of all surface water samples were below the PWQO. There is no PWQO for thorium. The CCME have developed a guideline for uranium for the protection of aquatic life (CCME, 2011) of 15 ug/L for long term exposure and 33 ug/L for short term exposure. The uranium concentrations of all the surface water samples were below these guidelines.

It is noted that the sample with the greatest concentration of uranium (2.2 ug/L) was sample SG1 which was collected where the groundwater seeps into Barber Lake, and the surface water sample collected at the margin of the lake (SG3) was an order of magnitude lower.

4.2.3 Summary

The results from the groundwater sampling program indicate that the uranium concentrations in the groundwater samples collected on-site were all below the ODWQS (Ontario Ministry of the Environment, 2006) and the Health

Canada Guidelines for Canadian Drinking Water Quality (Health Canada, 2024). There is no ODWQS or Health Canada Guidelines for Canadian Drinking Water Quality for thorium. There is no evidence to suggest that the presence of uranium and thorium in the underlying granitic bedrock has adversely impacted groundwater quality at the site since the levels of uranium in the groundwater samples were below established drinking water quality standards.

The results from the surface water sampling program indicate that the uranium concentrations in the surface water samples collected on-site were all below the PWQO (Ontario Ministry of the Environment, 1994) and the CCME guideline for the protection of aquatic life (CCME, 2011). There is no PWQO or CCME guideline for the protection of aquatic life for thorium. There is no evidence to suggest that the presence of uranium and thorium in the underlying granitic bedrock has adversely impacted surface water quality at the site since the levels of uranium in the surface water samples were below established surface water quality objectives/guidelines.

5.0 CONCLUSIONS

The following conclusions are provided based on the results of the work program:

- 1) The analytical results from the bedrock and overburden sampling program show that there can be elevated uranium and thorium concentrations in the bedrock under the site, but these elevated concentrations are not present in the unconsolidated overburden deposits above the bedrock based on the sampling that was completed.
- 2) The analytical results from the overburden sampling program indicate that the uranium concentrations in the overburden samples were all below the most stringent of the CCME soil quality guidelines.
- 3) Concentrations of uranium in the analyzed soil samples were all below the most conservative Ontario Ministry of the Environment full depth generic site condition standards in a potable groundwater condition.
- 4) There are no CCME soil quality guidelines or Ontario Ministry of the Environment full depth generic site condition standards in a potable groundwater condition for thorium.
- 5) The concentrations of uranium in the groundwater samples collected from the monitoring wells on the site are below the ODWQS of 20 ug/L.
- 6) The analytical results of all the groundwater samples were below the Health Canada guideline of 20 ug/L.
- 7) There are no ODWQS or Health Canada guidelines for thorium.
- 8) The concentrations of uranium in the surface water samples collected from the site were all below the PWQO guidelines.
- 9) The uranium concentrations in all the surface water samples were below the CCME guidelines (both long term and short-term exposure) for uranium for the protection of aquatic life.
- 10) PWQO or CCME guidelines for the protection of aquatic life have not been developed for thorium.

In summary, the analytical results of the soil, groundwater and surface water samples did not exceed applicable guidelines. There is no evidence to suggest that the presence of uranium and thorium in the underlying granitic

bedrock has adversely impacted groundwater or surface water quality at the site. As operations at the proposed Highland Line Pit will not result in alteration of the bedrock (i.e., no bedrock extraction/crushing/drilling, etc.), it is not expected that groundwater or surface water quality will be adversely impacted as a result of pit operation and rehabilitation.

6.0 CLOSURE

We trust this information serves your purposes and any inquires, or clarifications are welcome.

WSP Canada Inc.



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Reviewed by Sean McFarland, P.Geo., Senior Hydrogeologist

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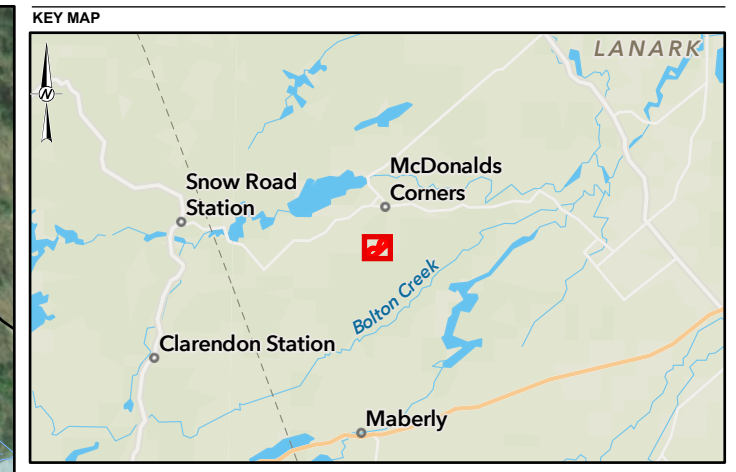
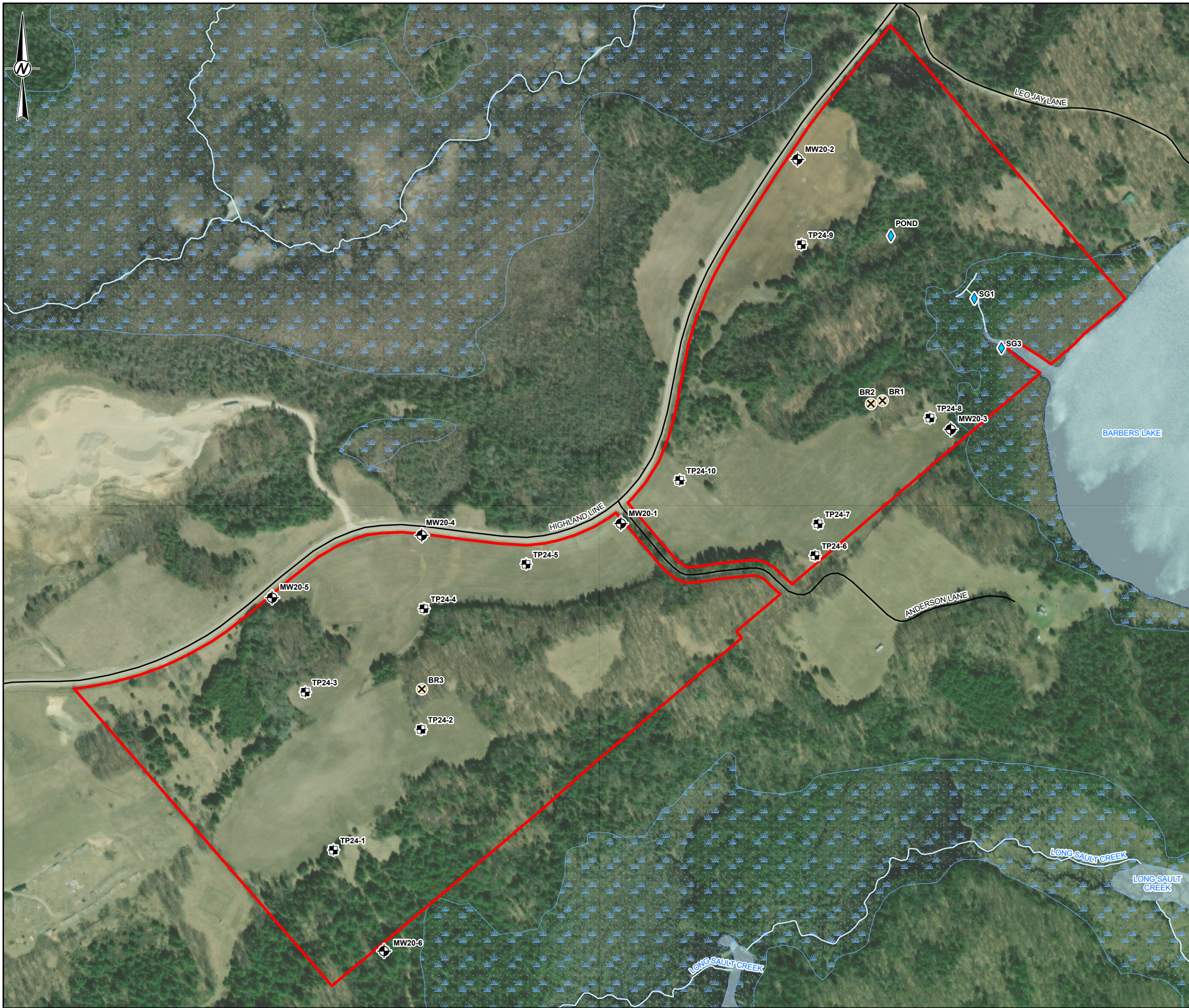
Distribution: Neal DeRuyter, MHBC

Attachments: Figures 1 and 2
Attachment A – Important Information and Limitations of Report
Attachment B – Ontario Geological Survey Letter Dated August 21, 2023
Attachment C – Analytical Laboratory Reports
Attachment D – Test Pit and Monitoring Well Logs

[https://wsonline.sharepoint.com/sites/gld-112126/project files/6 deliverables/uranium study/final/19126620-tm-rev0-highland line uranium study_29oct2024.docx](https://wsonline.sharepoint.com/sites/gld-112126/project%20files/6%20deliverables/uranium%20study/final/19126620-tm-rev0-highland%20line%20uranium%20study_29oct2024.docx)

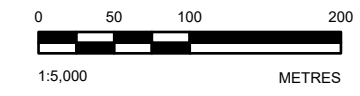
REFERENCES

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SCALE: 1:450,000

- LEGEND**
- MONITORING WELL LOCATION
 - TEST PIT LOCATION
 - BEDROCK SAMPLE LOCATION
 - SURFACE WATER SAMPLING LOCATION
 - PROPOSED LICENSED BOUNDARY (AS OF DECEMBER 2022)
 - ROADWAY
 - WATERCOURSE
 - WATERBODY
- WETLAND SIGNIFICANCE**
- UNEVALUATED PROVINCIAL WETLAND



NOTE(S)
1. ALL LOCATIONS ARE APPROXIMATE

REFERENCE(S)
1. CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENCE - ONTARIO
2. BASE MAP: SOURCES: ESRI, TOMTOM, GARMIN, FAO, NOAA, USGS, © OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY, MAXAR
3. COORDINATE SYSTEM: NAD 1983 CSRS UTM ZONE 18N

CLIENT
THOMAS CAVANAGH CONSTRUCTION LIMITED

PROJECT
HIGHLAND LINE PIT PROPERTY, PART OF LOTS 4 & 5,
CONCESSION 10, DALHOUSIE TOWNSHIP, LANARK COUNTY,
ONTARIO

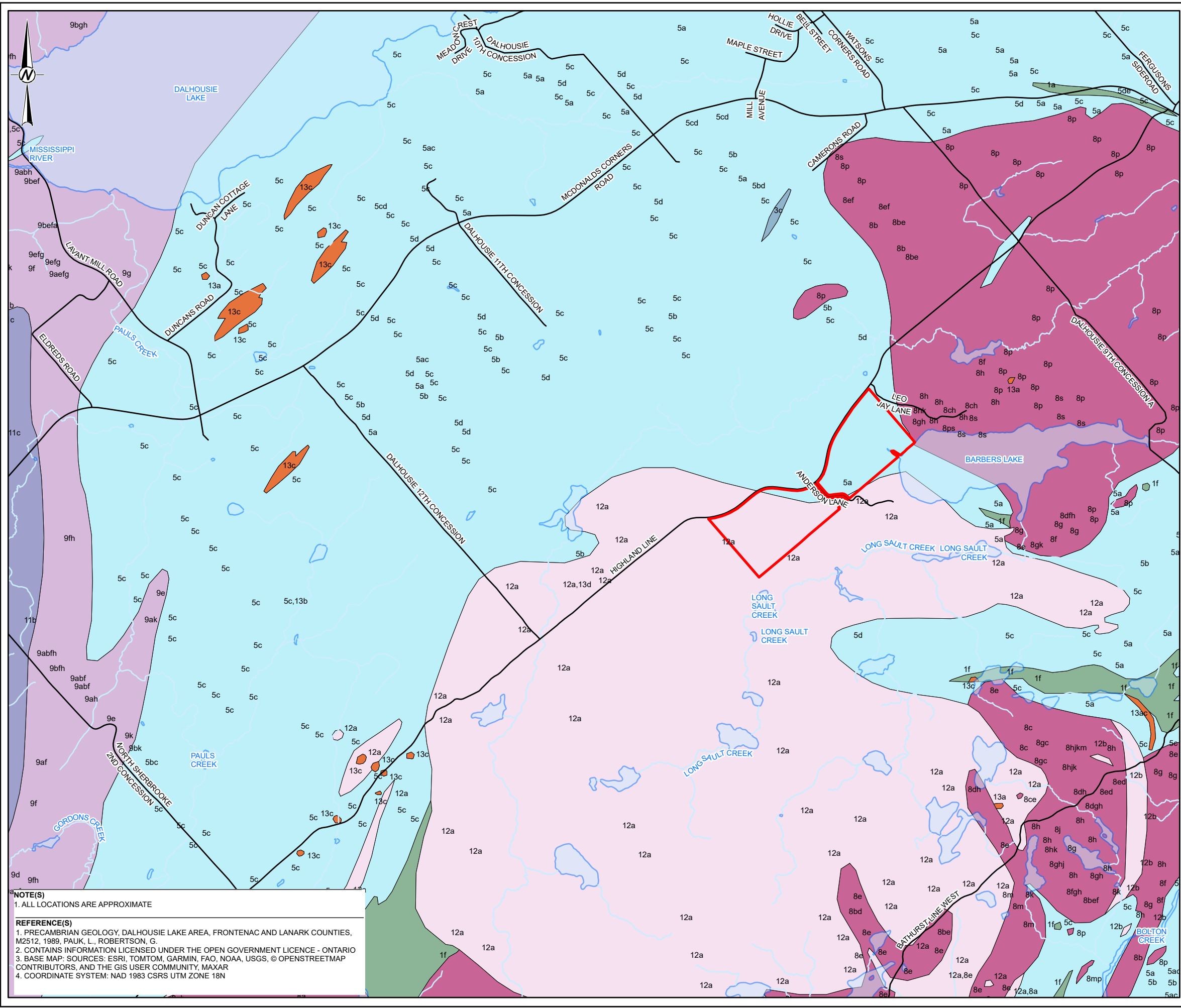
TITLE
SITE PLAN

CONSULTANT	YYYY-MM-DD	2024-07-31
	DESIGNED	BH
	PREPARED	BR
	REVIEWED	BH
	APPROVED	KAM

PROJECT NO.	CONTROL	REV.	FIGURE
19126620	0026	A	1

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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B



LEGEND

- PROPOSED LICENSED BOUNDARY (AS OF DECEMBER 2022)
- ROADWAY
- WATERCOURSE
- WATERBODY

PRECAMBRIAN

LATE PRECAMBRIAN

LATE INTRUSIVE ROCKS

LATE TECTONIC FELSIC INTRUSIVE ROCKS

- 13A PINK PEGMATITE SILLS
- 13B PINK PEGMATITE DIKES
- 13C WHITE PEGMATITE SILLS
- 13D WHITE PEGMATITE DIKES
- BARBERS LAKE INTRUSION

- 12A PINK, LEUCOCRATIC, MEDIUM-GRAINED BIOTITE ± MUSCOVITE GRANITE
- 12B FINE-GRAINED BIOTITE ± MUSCOVITE GRANITE

ELPHIN INTRUSION

- 11A DIORITE TO GRANODIORITE WITH PINK GRANITE VEINS
- 11B HYBRID PHASES: GABBRO-DIORITE CONTAINING POTASSIUM FELDSPAR
- 11C PINK, MEDIUM-GRAINED, BIOTITE GRANITE; LOCALLY BIOTITE MONZONITE TO SYENITE (ELPHIN INTRUSION PROPER)

EARLY INTRUSIVE ROCKS

EARLY TECTONIC TO SYNTECTONIC MAFIC AND INTERMEDIATE INTRUSIVE ROCKS

LAVANT GABBRO COMPLEX

- 9A PINK, LEUCOCRATIC GRANITE-PEGMATITE
- 9B WHITE APLITE
- 9C HORNBLÉNDE ± PYROXENE GRANITE AND SYENITE
- 9D HYBRID PHASES: GABBRO-DIORITE CONTAINING POTASSIUM FELDSPAR
- 9E MEDIUM-GRAINED BIOTITE GRANODIORITE AND QUARTZ DIORITE; LOCALLY FINE-GRAINED, BIOTITE GRANODIORITE
- 9F MEDIUM- TO COARSE-GRAINED GABBRO-DIORITE TO DIORITE
- 9G MEDIUM- TO COARSE-GRAINED GABBRO
- 9H FINE-GRAINED GABBRO, GABBRO-DIORITE, AND DIORITE
- 9J COARSE-GRAINED TO PEGMATITIC GABBRO; LOCALLY COARSE-GRAINED SEGREGATIONS OF HORNBLÉNDE AND/OR PYROXENE
- 9K FINE-GRAINED, FOLIATED BIOTITE-HORNBLÉNDE-PLAGIOCLASE ROCKS (THESE MAY BE INCLUSIONS OF METAVOLCANICS)
- 9M UNITS 9A TO 9K IN SHEAR ZONE
- 9N FINE-GRAINED DIABASE DIKE WITH GRANITIC VEINS

DALHOUSIE AMPHIBOLITE COMPLEX

GRANODIORITE AND QUARTZ DIORITE

- 8A PINK, MEDIUM-GRAINED BIOTITE ± HORNBLÉNDE-QUARTZ DIORITE GNEISS
- 8B LIGHT GREY, MEDIUM-GRAINED BIOTITE ± HORNBLÉNDE GRANODIORITE GNEISS
- 8C FINE- TO MEDIUM-GRAINED AMPHIBOLITE WITH PINK TO VIOLET PLAGIOCLASE
- 8D LAYERS AND PATCHES OF FINE- TO MEDIUM-GRAINED, WHITE TO LIGHT GREY, LEUCOCRATIC BIOTITE GRANODIORITE GNEISS; LOCALLY PINK, BIOTITE GRANITE GNEISS
- 8E MEDIUM-GRAINED HORNBLÉNDE-BIOTITE PLAGIOCLASE DIORITE GNEISS
- 8F FINE-GRAINED AMPHIBOLITE (±BIOTITE)
- 8G MEDIUM-GRAINED AMPHIBOLITE; LOCALLY STRONGLY FOLIATED AND/OR LINEATED
- 8H COARSE-GRAINED AMPHIBOLITE; LOCALLY STRONGLY FOLIATED AND/OR LINEATED
- 8I VERY COARSE GRAINED TO PEGMATITIC GABBRO AMPHIBOLITE SET IN A MATRIX OF COARSE- TO MEDIUM-GRAINED HORNBLÉNDE SCHIST
- 8K LAYERS AND PATCHES OF FINE- TO MEDIUM GRAINED HORNBLÉNDE ± BIOTITE ± MAGNETITE SCHIST ANORTHOSITE
- 8M FINE- TO MEDIUM-GRAINED ANORTHOSITIC GNEISS (PLAGIOCLASE/HORNBLÉNDE 70-80%/30-20%); LOCALLY EXTREMELY FOLIATED/LINEATED
- 8N PYROXENITE
- 8P COARSE-GRAINED PYROXENITE
- 8S PYROXENE-HORNBLÉNDE GABBRO-AMPHIBOLITE

METASEDIMENTS AND METAVOLCANICS

CARBONATE METASEDIMENTS

- 5A WHITE, CREAMY, MEDIUM- TO COARSE-GRAINED CALCITIC MARBLE
- 5B WHITE, GREY, CREAMY DOLOMITIC MARBLE; FINEGRAINED, SILTY DOLOMITIC MARBLE
- 5C GREY, CALCITIC MARBLE, GREY AND WHITE BANDED CALCITIC MARBLE; LOCALLY SMALL AMOUNTS OF PHLOGOPITE, GRAPHITE, AND PYRITE
- 5D CALCITIC MARBLE AND DOLOMITIC MARBLE WITH CALC-SILICATE MINERALS: TREMOLITE, ACTINOLITE, DIOPSIDE, AND PHLOGOPITE
- 5E CALCITIC MARBLE AND DOLOMITIC MARBLE WITH LAYERS AND LENSES OF QUARTZITE; LOCAL TREMOLITE REACTION RIMS AT THE CONTACT OF MARBLE WITH QUARTZITE; LOCAL CHERTY LAYERS
- 5F DIOPSIDE-CALCITE GNEISS
- 5G FRACTURED MARBLE (IN SHEAR ZONE)
- 5H PYROXENE-GARNET-CALCITE ± MAGNETITE ROCK
- 5J TREMOLITE-TALC ROCK

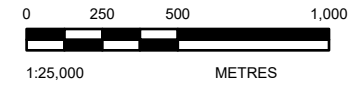
CLASSIC METASEDIMENTS

CALCEROUS CLASTIC METASEDIMENTS

- 3A LIMY MUDSTONE
- 3B CALCEROUS WACKE
- 3C HORNBLÉNDE-BIOTITE-PAGIOCLASE±CARBONATE SCHIST; FREQUENTLY RUSTY BIOTITE-HORNBLÉNDE SCHIST
- 3D SHEAR ZONE PHASES OF UNITS 3A TO 3C

MAFIC TO INTERMEDIATE METAVOLCANICS

- 1A FINE- TO MEDIUM-GRAINED HORNBLÉNDEPLAGIOCLASE ± GARNET GNEISS
- 1B COARSE- TO MEDIUM-GRAINED HORNBLÉNDEPLAGIOCLASE ± GARNET GNEISS
- 1C PORPHYROBLASTIC HORNBLÉNDE-PLAGIOCLASE ± BIOTITE GNEISS (PORPHYROBLASTS OF HORNBLÉNDE OR BIOTITE)
- 1D MEDIUM- TO FINE-GRAINED QUARTZ-BIOTITEHORNBLÉNDE-PLAGIOCLASE GNEISS; LOCALLY LAMINATED, BIOTITE-HORNBLÉNDE-PLAGIOCLASE ± QUARTZ GNEISS (METATUFF)
- 1E MYLONITIZED METAVOLCANICS IN SHEAR ZONE; UNSUBDIVIDED
- 1F DARK, FINE-GRAINED HORNBLÉNDE-BIOTITEPLAGIOCLASE SCHIST (METAVOLCANICS AND/OR CHILLED GABBRO)



NOTE(S)

- ALL LOCATIONS ARE APPROXIMATE

REFERENCE(S)

- PRECAMBRIAN GEOLOGY, DALHOUSIE LAKE AREA, FRONTENAC AND LANARK COUNTIES, M2512, 1989, PAUK, L., ROBERTSON, G.
- CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENCE - ONTARIO
- BASE MAP: SOURCES: ESRI, TOMTOM, GARMIN, FAO, NOAA, USGS, © OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY, MAXAR
- COORDINATE SYSTEM: NAD 1983 CSRS UTM ZONE 18N

CLIENT
THOMAS CAVANAGH CONSTRUCTION LIMITED

PROJECT
**HIGHLAND LINE PIT PROPERTY, PART OF LOTS 4 & 5,
CONCESSION 10, DALHOUSIE TOWNSHIP, LANARK COUNTY,
ONTARIO**

TITLE
BEDROCK GEOLOGY

CONSULTANT
wsp

YYYY-MM-DD	2024-07-31
DESIGNED	BH
PREPARED	BR
REVIEWED	BH
APPROVED	KAM

PROJECT NO. 19126620 CONTROL 0026 REV. A FIGURE 2

PRINTED: 2024-07-31 11:15 AM
 PROJECT: 19126620_Cavanagh_Construction
 DRAWING: 19126620_Bedrock_Geology
 SCALE: 1:25,000
 SHEET: 2 OF 2
 IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

ATTACHMENT A

**Important Information and
Limitations of Report**



ATTACHMENT A

Important Information and Limitations of Report

WSP Canada Inc. (“WSP”) prepared this report solely for the use of the intended recipient, Thomas Cavanagh Construction Limited, in accordance with the professional services agreement between the parties. In the event a contract has not been executed, the parties agree that the WSP General Terms for Consultant shall govern their business relationship which was provided to you prior to the preparation of this report.

The report is intended to be used in its entirety. No excerpts may be taken to be representative of the findings in the assessment.

The conclusions presented in this report are based on work performed by trained, professional and technical staff, in accordance with their reasonable interpretation of current and accepted engineering and scientific practices at the time the work was performed.

The content and opinions contained in the present report are based on the observations and/or information available to WSP at the time of preparation, using investigation techniques and engineering analysis methods consistent with those ordinarily exercised by WSP and other engineering/scientific practitioners working under similar conditions, and subject to the same time, financial and physical constraints applicable to this project.

WSP disclaims any obligation to update this report if, after the date of this report, any conditions appear to differ significantly from those presented in this report; however, WSP reserves the right to amend or supplement this report based on additional information, documentation or evidence.

WSP makes no other representations whatsoever concerning the legal significance of its findings.

The intended recipient is solely responsible for the disclosure of any information contained in this report. If a third party makes use of, relies on, or makes decisions in accordance with this report, said third party is solely responsible for such use, reliance or decisions. WSP does not accept responsibility for damages, if any, suffered by any third party as a result of decisions made or actions taken by said third party based on this report.

WSP has provided services to the intended recipient in accordance with the professional services agreement between the parties and in a manner consistent with that degree of care, skill and diligence normally provided by members of the same profession performing the same or comparable services in respect of projects of a similar nature in similar circumstances. It is understood and agreed by WSP and the recipient of this report that WSP provides no warranty, express or implied, of any kind. Without limiting the generality of the foregoing, it is agreed and understood by WSP and the recipient of this report that WSP makes no representation or warranty whatsoever as to the sufficiency of its scope of work for the purpose sought by the recipient of this report.

In preparing this report, WSP has relied in good faith on information provided by others, as noted in the report. WSP has reasonably assumed that the information provided is correct and WSP is not responsible for the accuracy or completeness of such information.

Benchmark and elevations used in this report are primarily to establish relative elevation differences between the specific testing and/or sampling locations and should not be used for other purposes, such as grading, excavating, construction, planning, development, etc.



Overall conditions can only be extrapolated to an undefined limited area around these testing and sampling locations. The conditions that WSP interprets to exist between testing and sampling points may differ from those that actually exist. The accuracy of any extrapolation and interpretation beyond the sampling locations will depend on natural conditions, the history of Site development and changes through construction and other activities. In addition, analysis has been carried out for the identified chemical and physical parameters only, and it should not be inferred that other chemical species or physical conditions are not present. WSP cannot warrant against undiscovered environmental liabilities or adverse impacts off-Site.

The original of this digital file will be kept by WSP for a period of not less than 10 years. As the digital file transmitted to the intended recipient is no longer under the control of WSP, its integrity cannot be assured. As such, WSP does not guarantee any modifications made to this digital file subsequent to its transmission to the intended recipient.

This limitations statement is considered an integral part of this report.

ATTACHMENT B

**Ontario Geological Survey Letter
Dated August 21, 2023**

Mines and Minerals Division

Ontario Geological Survey
933 Ramsey Lake Road, Level B7
Sudbury ON P3E 6B5 Tel.:
705-670-5758
Toll Free: 1-888-415-9845 ext 5758

Division des mines et des minéraux

Commission Géologique de l'Ontario
933, chemin du lac Ramsey, 7ème étage
Sudbury ON P3E 6B5
Tél.: 705-670-5758
Tél Sans frais: 1-888-415-9845 ext 5758

Dear Carolee

August 21, 2023

Thank you for your query regarding the Barbers Lake granite and the associated aggregate resources in the vicinity of Barbers Lake. I'm familiar with the area in question. Although I have not done a lot of detailed mapping around Barbers Lake itself, in the past I have sampled it for whole-rock geochemistry. In addition, in the last decade I have been doing detailed mapping in the areas just to the east (the Perth, Lanark and Carleton Place areas), and have collected information on a variety of rock units in those areas.

Some of my response is a bit technical, but some of the detail that I am supplying is needed in order to understand the strength and weaknesses of the available data.

First, in reviewing both Ontario Geological Survey Open File Report 5550 (p.15-16) and Aggregate Assessment Report 189, it is clear why the aggregate resources near Barbers Lake are of interest to multiple companies. These reports, especially the earlier report (OFR 5550; http://www.geologyontario.mndm.gov.on.ca/mndmaccess/mndm_dir.asp?type=pub&id=OFR5550), both indicate that these are among the best aggregate sources in Lanark County, with the proximity to main roads making them even more attractive. Thus, it is not a surprise that proposals for more extraction are being put forward.

Second, with respect to your main question. As you have already determined, the Barbers Lake granite is unusual among eastern Ontario granites in that has anomalous contents of uranium and thorium. The following sections provide details on the nature and extent of this radioactivity.

These anomalous contents of uranium and thorium are evident in the Federal gamma-ray spectrometric maps of the area (Geological Survey of Canada Open Files 4559 and 4560, respectively, links attached).

<https://geoscan.nrcan.gc.ca/starweb/geoscan/servlet.starweb?path=geoscan/download.web&search1=R=215115>

<https://geoscan.nrcan.gc.ca/starweb/geoscan/servlet.starweb?path=geoscan/download.web&search1=R=215116>

Both the Barbers Lake granite and the radioactive pegmatites located west of Highway 509 are clearly indicated on these maps. The shape of the Barbers Lake granite is well-defined on the map, and it does not look like radioactive debris from the granite has been more widely dispersed. Note that uranium and thorium contents are estimated values and are expressed as equivalent uranium and equivalent thorium. This is because the gamma-ray spectrometry measures a bismuth isotope generated during the decay of radioactive uranium and thorium isotopes, rather than directly measuring uranium and thorium content. Thus, they are estimates of U and Th content, not exact values.

Nonetheless, the gamma-ray results are supported by direct analysis of uranium and thorium on samples from the Barbers Lake granite itself. These have been reported in Ontario Geological Survey Miscellaneous Release—Data 311 (Cutts 2014). I have attached a data table from that document which shows the Barbers Lake data in yellow highlight. Uranium contents range from approximately 6 to 95 parts per million (ppm), with thorium contents ranging from 25 to 171 ppm. For comparison, contents for an average granite (global) are approximately 4 ppm uranium and 12-20 ppm (estimate of Kyser and

Cuney 2009). I have found that most granites in central and eastern Ontario do indeed have uranium and thorium contents near these average values. Although not a complete data set, this can be seen in the table from MRD 311, where most of the other granites sampled have close to average values.

Note that uranium and thorium values in the table are reported by 2 different methods – x-ray fluorescence spectrometry (XRF) and inductively-coupled plasma mass spectrometry (IMC). The XRF method uses 10 g of crushed rock, has a higher upper detection limit, and is more representative in that it uses more material. The IMC method uses less than 1 g of powder which is then dissolved using acid into a solution that is then analyzed. It has a lower upper detection limit (why some Th values are indicated as >109 ppm), but has a much lower detection limit than XRF, which is better for samples with low U and/or Th contents. Using both methods provide a check that the sample dissolution process worked. This is seen in the data table by the fact that the results by both methods are the same within analytical error (approximately 5%).

Not all the Barbers Lake samples are highly anomalous, a few are close to the average granite values. Nonetheless, five samples collected along Highland Lane, including 3 samples that I collected personally on 12th Concession Road just north of Highland Lane, all have anomalous U and Th contents (31-90 ppm U, 38-171 ppm Th; none of the 3 samples I collected were pegmatitic). These five samples are all located 1 to 3 km southwest of the current Arnott Bros. pit.

Why the Barbers Lake granite has anomalous U and Th contents is unknown. Most other intrusions of the same age in eastern Ontario have average granite values (e.g., the Wolfe Lake, Rideau Lake and Foley Mountain intrusions near Westport, see the MRD 311 table). I can only speculate that it is related to the composition of the lower crust where the magma was produced, which subsequently rose toward the surface and crystallized as the Barbers Lake granite (pluton) a billion years ago.

Thirdly, estimating radon production and migration through various materials is difficult because it is a gas. Obviously, since it is produced by radioactive decay, having more U and Th around will result in greater radon gas production. This is probably why there are higher radon readings in the area.

Fourth, in terms of water quality, it is likely that there are 2 different water sources in the area to consider. The first would be deeper groundwaters, accessed by wells drilled into bedrock. The second would be shallow groundwater sources, likely hosted in aquifers in the Quaternary deposits that are part of the aggregate resources in the area. The below water table extraction referred to in the company proposals likely refers to these groundwater sources.

These 2 different sources make it harder to determine how the radioactivity in the Barbers Lake granite might interact with ground and surface waters. Regional lake sediment data for the area is limited to an old Geological Survey of Canada Survey from the late 1970s (Open File 747), and only includes uranium.

<https://geoscan.nrcan.gc.ca/starweb/geoscan/servlet.starweb?path=geoscan/download.web&search1=R=129708>

The Barbers Lake area does not stand out as particularly anomalous in this study, although it is higher than some adjacent areas. Certainly, in areas where there are abundant carbonate rocks around, such as the host rocks to the Barbers Lake granite, uranium can more easily go into solution and be more mobile. That being said, in the Gooderham and Bancroft areas to the west, where there are more lake sediment data and more studies of uranium in water, uranium mobility is mostly clearly observed in areas where mining activities have occurred that have resulted in crushing of the radioactive host rock, and/or the creation of tailing areas. This makes sense, in that creation of greater surface area (breaking up of the original rock), allows for greater water-rock interaction and thus more uranium going into solution.

Thorium behaves differently and is less susceptible to mobilization into groundwater.

As a result of these complexities, additional (sic) local data would be needed to more address the effect of the granite on groundwater sources more fully, regardless of any aggregate extraction activity.

Fifth, and probably most important, is trying to answer the question of determining any effects that the radioactive nature of the granite might have on the aggregate resource proposed for extraction. Some factors to consider are:

- The granite was glaciated approximately 10,000 years ago. This would have removed any in-situ weathering zones that had developed atop of the granite and would have exposed unaltered rock at surface. This would have reduced the risk of subsequent migration of unconsolidated radioactive materials.

[I was not sure if the excerpts from Dugdale's thesis related to weathered clay being developed on the granite was a generalized statement or was related only to the nature of the units at the bottom of Barber's Lake. Although in temperate and tropical climates granites can weather relatively quickly, geologically speaking, the fact that the area was recently (geologically) glaciated would suggest that no significant weathering zones (>5 cm thick) are present.]

- The aggregate deposits themselves are widely sourced and would not be expected to contain significant amounts of locally derived bedrock. Thus, they would not necessarily be radioactive even if situated near the granite. ***This would need to be confirmed, however.*** Examination of the deposits present in the lowermost parts of the Arnott Bros. pit using a portable gamma-ray spectrometer would be a quick way of identifying if there are any areas of anomalous radioactivity in the aggregate material. Any anomalous deposits could be sampled and sent for geochemistry to determine the actual amount of uranium and thorium present.
- Even if the aggregate deposits themselves are not anomalous in terms of U and Th content, the interface between the granite and the aggregate deposits would still be an area of concern. Mechanical scraping of the bedrock, as well as exposure of the bedrock surface to air and water, could create dust and/or water hazards. This could be addressed relatively easily in the proposed plans by leaving a buffer zone a few metres thick above the bedrock. This zone would be excluded from any extraction or pit development activities.

In terms of next steps, assessing the aggregate materials directly for radioactivity levels would seem to be the next, most logical, step. As I suggested, this could be done relatively quickly and easily by a handheld gamma-ray spectrometer survey of materials in the existing pit. One would hope that the company(ies) would be interested in supporting such a survey, both as a means of establishing that their product is indeed safe, as well as meeting their obligations under the Ontario Occupational Health and Safety Act to ensure that their workers are not exposed to any potential hazards.

Obviously, the Barbers Lake area presents a distinct challenge compared to aggregate development elsewhere in Ontario. Typically, one can evaluate the aggregate (Quaternary) resource separately from the character of the underlying bedrock (in this case Precambrian). This would be why the company proposals do not consider the nature of the bedrock. The fact that the underlying bedrock is radioactive,

however, does mean that additional investigation is needed to determine what, if any, influence the bedrock may have on the potential aggregate resource. Without additional information, one cannot fully answer that question.

Yours truly

Robert Michael Easton, PhD, PGeo

Michael Easton, PhD, PGeo
*Senior Geoscience Leader, Proterozoic
Earth Resources and Geoscience Mapping Section
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933 Ramsey Lake Road
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References

- Cutts, J.A. 2014. Geological, geochemical, geophysical and petrographic data related to a study of plutons intruded *circa* 1090 to 1065 Ma in the southeastern Central Metasedimentary Belt, Grenville Province; Ontario Geological Survey, Miscellaneous Release—Data 311
- Kyser, K. and Cuney, M. 2009. Geochemical characteristics of uranium and analytical methodologies; *in* Recent and not-so-recent developments in uranium deposits and implications for exploration; Mineralogical Association of Canada, Short Course Volume 39, p.23-55.

ATTACHMENT C

Analytical Laboratory Reports



SGS Canada Inc.

P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2HO
Phone: 705-652-2000 FAX: 705-652-6365

WSP Canada Inc.

Attn : Brian Henderson

2611 Queensway Drive Suite 300
Ottawa, ON
K2B 8K2, Canada

Phone: 613-690-3932
Fax:

17-June-2024

Date Rec. : 06 June 2024
LR Report : CA02111-JUN24
Client Ref : OI 19126620/13000
CA-GLD-1926620 Highland
Line

CERTIFICATE OF ANALYSIS

Final Report

Sample ID	Weight g	Th g/t	U g/t
2: TP24-1 SA05	989	16.3	2.6
3: TP24-2 SA05	862	18.7	3.2
4: TP24-3 SA06	789	1.5	< 0.5
5: TP24-4 SA06	942	1.6	< 0.5
6: TP24-5 SA04	1256	1.9	< 0.5
7: TP24-6 SA02	979	9.9	1.6
8: TP24-7 SA07	726	2.1	< 0.5
9: TP24-8 SA05	1280	1.2	< 0.5
10: TP24-9 SA05	706	1.2	1.3
11: TP24-10 SA07	1014	2.3	< 0.5
12: R-1	761	3.9	0.7
13: R-2	309	5.1	1.7
14: R-3	395	43.3	11.6

Control Quality Analysis - not suitable for commercial exchange

Neha Shah
Project Coordinator Minerals Services

Email: brian.henderson@wsp.com



Your Project #: 19126620
 Site Location: HIGHLAND PIT
 Your C.O.C. #: NONT-2024-06-1483

Attention: Brian Henderson

WSP Canada Inc.
 1931 Robertson Rd
 Ottawa, ON
 CANADA K2H 5B7

Report Date: 2024/08/14
 Report #: R8275938
 Version: 4 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BUREAU VERITAS JOB #: C411950

Received: 2024/06/14, 10:12

Sample Matrix: Water
 # Samples Received: 6

Analyses	Quantity	Date	Date	Laboratory Method	Analytical Method
		Extracted	Analyzed		
Dissolved Metals by ICPMS	6	N/A	2024/06/22	CAM SOP-00447	EPA 6020B m
Total Metals Analysis by ICPMS	6	2024/06/20	2024/06/21	CAM SOP-00447	EPA 6020B m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, EPA, APHA or the Quebec Ministry of Environment.

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

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

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested. This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.



Your Project #: 19126620
Site Location: HIGHLAND PIT
Your C.O.C. #: NONT-2024-06-1483

Attention: Brian Henderson

WSP Canada Inc.
1931 Robertson Rd
Ottawa, ON
CANADA K2H 5B7

Report Date: 2024/08/14
Report #: R8275938
Version: 4 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BUREAU VERITAS JOB #: C411950

Received: 2024/06/14, 10:12

Encryption Key

Katherine Szozda
Project Manager
14 Aug 2024 13:09:46

Please direct all questions regarding this Certificate of Analysis to:
Katherine Szozda, Project Manager
Email: Katherine.Szozda@bureauveritas.com
Phone# (613)274-0573 Ext:7063633

=====

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



BUREAU
VERITAS

Bureau Veritas Job #: C4I1950
Report Date: 2024/08/14

WSP Canada Inc.
Client Project #: 19126620
Site Location: HIGHLAND PIT
Sampler Initials: CA

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID		ZLT758	ZLT759			ZLT759		
Sampling Date		2024/06/13 12:00	2024/06/13 01:00			2024/06/13 01:00		
COC Number		NONT-2024-06-1483	NONT-2024-06-1483			NONT-2024-06-1483		
	UNITS	MW-1	MW-2	RDL	QC Batch	MW-2 Lab-Dup	RDL	QC Batch

Metals								
Dissolved Thorium (Th)	ug/L	<2.0	<2.0	2.0	9467788	<2.0	2.0	9467788
Total Thorium (Th)	ug/L	3.1	<2.0	2.0	9467283			
Dissolved Uranium (U)	ug/L	0.33	0.29	0.10	9467788	0.24	0.10	9467788
Total Uranium (U)	ug/L	0.90	0.38	0.10	9467283			

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

Bureau Veritas ID		ZLT760	ZLT761	ZLT762	ZLT763		
Sampling Date		2024/06/13 02:00	2024/06/13 03:00	2024/06/13 04:00	2024/06/13 05:00		
COC Number		NONT-2024-06-1483	NONT-2024-06-1483	NONT-2024-06-1483	NONT-2024-06-1483		
	UNITS	MW-3	MW-4	MW-5	MW-6	RDL	QC Batch

Metals							
Dissolved Thorium (Th)	ug/L	<2.0	<2.0	<2.0	<2.0	2.0	9467788
Total Thorium (Th)	ug/L	<2.0	<2.0	<2.0	2.0	2.0	9467283
Dissolved Uranium (U)	ug/L	0.19	0.20	1.1	1.6	0.10	9467788
Total Uranium (U)	ug/L	0.35	0.54	1.7	7.5	0.10	9467283

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch



BUREAU
VERITAS

Bureau Veritas Job #: C411950
Report Date: 2024/08/14

WSP Canada Inc.
Client Project #: 19126620
Site Location: HIGHLAND PIT
Sampler Initials: CA

TEST SUMMARY

Bureau Veritas ID: ZLT758
Sample ID: MW-1
Matrix: Water

Collected: 2024/06/13
Shipped:
Received: 2024/06/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Metals by ICPMS	ICP/MS	9467788	N/A	2024/06/22	Thuy Linh Nguyen
Total Metals Analysis by ICPMS	ICP/MS	9467283	2024/06/20	2024/06/21	Nan Raykha

Bureau Veritas ID: ZLT759
Sample ID: MW-2
Matrix: Water

Collected: 2024/06/13
Shipped:
Received: 2024/06/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Metals by ICPMS	ICP/MS	9467788	N/A	2024/06/22	Thuy Linh Nguyen
Total Metals Analysis by ICPMS	ICP/MS	9467283	2024/06/20	2024/06/21	Nan Raykha

Bureau Veritas ID: ZLT759 Dup
Sample ID: MW-2
Matrix: Water

Collected: 2024/06/13
Shipped:
Received: 2024/06/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Metals by ICPMS	ICP/MS	9467788	N/A	2024/06/22	Thuy Linh Nguyen

Bureau Veritas ID: ZLT760
Sample ID: MW-3
Matrix: Water

Collected: 2024/06/13
Shipped:
Received: 2024/06/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Metals by ICPMS	ICP/MS	9467788	N/A	2024/06/22	Thuy Linh Nguyen
Total Metals Analysis by ICPMS	ICP/MS	9467283	2024/06/20	2024/06/21	Nan Raykha

Bureau Veritas ID: ZLT761
Sample ID: MW-4
Matrix: Water

Collected: 2024/06/13
Shipped:
Received: 2024/06/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Metals by ICPMS	ICP/MS	9467788	N/A	2024/06/22	Thuy Linh Nguyen
Total Metals Analysis by ICPMS	ICP/MS	9467283	2024/06/20	2024/06/21	Nan Raykha

Bureau Veritas ID: ZLT762
Sample ID: MW-5
Matrix: Water

Collected: 2024/06/13
Shipped:
Received: 2024/06/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Metals by ICPMS	ICP/MS	9467788	N/A	2024/06/22	Thuy Linh Nguyen
Total Metals Analysis by ICPMS	ICP/MS	9467283	2024/06/20	2024/06/21	Nan Raykha



BUREAU
VERITAS

Bureau Veritas Job #: C4I1950
Report Date: 2024/08/14

WSP Canada Inc.
Client Project #: 19126620
Site Location: HIGHLAND PIT
Sampler Initials: CA

TEST SUMMARY

Bureau Veritas ID: ZLT763
Sample ID: MW-6
Matrix: Water

Collected: 2024/06/13
Shipped:
Received: 2024/06/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Metals by ICPMS	ICP/MS	9467788	N/A	2024/06/22	Thuy Linh Nguyen
Total Metals Analysis by ICPMS	ICP/MS	9467283	2024/06/20	2024/06/21	Nan Raykha



GENERAL COMMENTS

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

Package 1	6.0°C
Package 2	9.7°C

Revised Report [2024/08/13]: Split report for total and dissolved uranium and thorium per client request.

Revised Report [2024/07/23]: Toggling for metals complete as per client request.

Unacidified dissolved metals run from field filtered bottles and reported as received.

Results relate only to the items tested.



BUREAU
VERITAS

Bureau Veritas Job #: C4I1950

Report Date: 2024/08/14

QUALITY ASSURANCE REPORT

WSP Canada Inc.

Client Project #: 19126620

Site Location: HIGHLAND PIT

Sampler Initials: CA

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9467283	Total Thorium (Th)	2024/06/21	97	80 - 120	95	80 - 120	<2.0	ug/L		
9467283	Total Uranium (U)	2024/06/21	99	80 - 120	96	80 - 120	<0.10	ug/L		
9467788	Dissolved Thorium (Th)	2024/06/22	98	80 - 120	98	80 - 120	<2.0	ug/L	NC	20
9467788	Dissolved Uranium (U)	2024/06/22	98	80 - 120	97	80 - 120	<0.10	ug/L	NC	20

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

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

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

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

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



BUREAU
VERITAS

Bureau Veritas Job #: C4I1950
Report Date: 2024/08/14

WSP Canada Inc.
Client Project #: 19126620
Site Location: HIGHLAND PIT
Sampler Initials: CA

VALIDATION SIGNATURE PAGE

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

Cristina Carriere

Cristina Carriere, Senior Scientific Specialist

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



Bureau Veritas
6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel: (905) 817-5700 Toll-free 800-563-6266 Fax: (905) 817-5777 www.bvna.com



NONT-2024-06-1483

Page 1 of 1

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:		Only:	
Company Name: #14090 WSP Canada Inc.		Company Name:		Quotation #: C41731		Bottle Order #:	
Attention: Central Accounting		Attention:		P.O. #:		994478	
Address: 1931 Robertson Rd		Address:		Project: 19126620		Barcode	
Ottawa ON K2H 5B7				Project Name: Highland P.t		COC #: Project Manager:	
Tel: (613) 592-9600 Fax: (613) 592-9601		Tel:		Site #:		Katherine Szozda	
Email: capayablesinvoice@wsp.com		Email:		Sampled By: C. Albert		Barcode: CA994478-01-01	

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BUREAU VERITAS DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011) <input type="checkbox"/> Table 1 <input type="checkbox"/> Res/Park <input type="checkbox"/> Medium/Fine <input type="checkbox"/> Table 2 <input type="checkbox"/> Ind/Comm <input type="checkbox"/> Coarse <input type="checkbox"/> Table 3 <input type="checkbox"/> Agri/Other <input type="checkbox"/> For RSC <input type="checkbox"/> Table ____			Other Regulations <input type="checkbox"/> CCME <input type="checkbox"/> Sanitary Sewer Bylaw <input type="checkbox"/> Reg 558 <input type="checkbox"/> Storm Sewer Bylaw <input type="checkbox"/> MISA Municipality _____ <input type="checkbox"/> PWQO <input type="checkbox"/> Reg 406 Table _____ <input type="checkbox"/> Other _____			Special Instructions			
Include Criteria on Certificate of Analysis (Y/N)? _____						ANALYSIS REQUESTED (PLEASE BE SPECIFIC) Field Filtered (please circle): Metals / Hg / Cr VI Subdivision Package - Groundwater Acidified Total Metals Subdivision Package - Surface Water Unacidified Total Metals Unacidified Dissolved Metals TSS, Uranium Thorium		Turnaround Time (TAT) Required: Please provide advance notice for rush projects Regular (Standard) TAT: (will be applied if Rush TAT is not specified): Standard TAT = 5-7 Working days for most tests. Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details. <input checked="" type="checkbox"/> Job Specific Rush TAT (if applies to entire submission) Date Required: _____ Time Required: _____ Rush Confirmation Number: _____ (call lab for #)	

Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle): Metals / Hg / Cr VI	Subdivision Package - Groundwater	Acidified Total Metals	Subdivision Package - Surface Water	Unacidified Total Metals	Unacidified Dissolved Metals	TSS, Uranium	Thorium	# of Bottles	Comments
1	MW-1	Jun 13/24	12	GW		/	/	/	/	/	/	/	12	
2	MW-2		1			/	/	/	/	/	/	/		
3	MW-3		2			/	/	/	/	/	/	/		
4	MW-4		3			/	/	/	/	/	/	/		
5	MW-5		4			/	/	/	/	/	/	/		
6	MW-6		5			/	/	/	/	/	/	/		
7														
3														
9														
10														

Received in Ottawa

* RELINQUISHED BY: (Signature/Print)		Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)		Date: (YY/MM/DD)	Time	# jars used and not submitted	Laboratory Use Only				
<i>C. Albert</i>		Jun 11/24	10am	<i>Angelica Santiago</i>		2024/06/14	10:12		Time Sensitive	Temperature (°C) on Recept	Custody Seal	Yes	No
				<i>YUMIHI PAISE</i>		2024/06/15	8:21			66.6/11.9.9 ice	Present		
											Intact		

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BUREAU VERITAS'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVNA.COM/ENVIRONMENTAL-LABORATORIES/RESOURCES/COCS-TERMS-AND-CONDITIONS.

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT WWW.BVNA.COM/ENVIRONMENTAL-LABORATORIES/RESOURCES/CHAIN-CUSTODY-FORMS-COCS.

SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BUREAU VERITAS

White: Bureau Veritas Yellow: Client

2/2/24 } 2/2/24



Your Project #: 19126620
 Site Location: HIGHLAND PIT
 Your C.O.C. #: C#994478-02-01

Attention: Brian Henderson

WSP Canada Inc.
 1931 Robertson Rd
 Ottawa, ON
 CANADA K2H 5B7

Report Date: 2024/08/14
 Report #: R8276181
 Version: 4 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BUREAU VERITAS JOB #: C411944

Received: 2024/06/14, 10:12

Sample Matrix: Water
 # Samples Received: 3

Analyses	Quantity	Date		Laboratory Method	Analytical Method
		Extracted	Analyzed		
Dissolved Metals by ICPMS	2	N/A	2024/06/19	CAM SOP-00447	EPA 6020B m
Dissolved Metals by ICPMS	1	N/A	2024/06/28	CAM SOP-00447	EPA 6020B m
Total Metals Analysis by ICPMS	2	2024/06/19	2024/06/21	CAM SOP-00447	EPA 6020B m
Total Metals Analysis by ICPMS	1	2024/06/27	2024/06/27	CAM SOP-00447	EPA 6020B m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, EPA, APHA or the Quebec Ministry of Environment.

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

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

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

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

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.



Your Project #: 19126620
Site Location: HIGHLAND PIT
Your C.O.C. #: C#994478-02-01

Attention: Brian Henderson

WSP Canada Inc.
1931 Robertson Rd
Ottawa, ON
CANADA K2H 5B7

Report Date: 2024/08/14
Report #: R8276181
Version: 4 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

BUREAU VERITAS JOB #: C411944

Received: 2024/06/14, 10:12

Encryption Key

Katherine Szozda
Project Manager
14 Aug 2024 15:06:02

Please direct all questions regarding this Certificate of Analysis to:
Katherine Szozda, Project Manager
Email: Katherine.Szozda@bureauveritas.com
Phone# (613)274-0573 Ext:7063633

=====

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BUREAU
VERITAS

Bureau Veritas Job #: C411944
Report Date: 2024/08/14

WSP Canada Inc.
Client Project #: 19126620
Site Location: HIGHLAND PIT
Sampler Initials: CA

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID		ZLT684	ZLT685		ZLT686		
Sampling Date		2024/06/13 09:00	2024/06/13 10:00		2024/06/13 11:00		
COC Number		C#994478-02-01	C#994478-02-01		C#994478-02-01		
	UNITS	POND	SG1	QC Batch	SG3	RDL	QC Batch
Metals							
Dissolved Thorium (Th)	ug/L	<2.0	<2.0	9464627	<2.0	2.0	9484657
Total Thorium (Th)	ug/L	<2.0	<2.0	9464909	<2.0	2.0	9481587
Dissolved Uranium (U)	ug/L	<0.10	2.1	9464627	0.28	0.10	9484657
Total Uranium (U)	ug/L	<0.10	2.2	9464909	0.29	0.10	9481587
RDL = Reportable Detection Limit QC Batch = Quality Control Batch							



BUREAU
VERITAS

Bureau Veritas Job #: C411944
Report Date: 2024/08/14

WSP Canada Inc.
Client Project #: 19126620
Site Location: HIGHLAND PIT
Sampler Initials: CA

TEST SUMMARY

Bureau Veritas ID: ZLT684
Sample ID: POND
Matrix: Water

Collected: 2024/06/13
Shipped:
Received: 2024/06/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Metals by ICPMS	ICP/MS	9464627	N/A	2024/06/19	Indira HarryPaul
Total Metals Analysis by ICPMS	ICP/MS	9464909	2024/06/19	2024/06/21	Indira HarryPaul

Bureau Veritas ID: ZLT685
Sample ID: SG1
Matrix: Water

Collected: 2024/06/13
Shipped:
Received: 2024/06/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Metals by ICPMS	ICP/MS	9464627	N/A	2024/06/19	Indira HarryPaul
Total Metals Analysis by ICPMS	ICP/MS	9464909	2024/06/19	2024/06/21	Indira HarryPaul

Bureau Veritas ID: ZLT686
Sample ID: SG3
Matrix: Water

Collected: 2024/06/13
Shipped:
Received: 2024/06/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Metals by ICPMS	ICP/MS	9484657	N/A	2024/06/28	Nan Raykha
Total Metals Analysis by ICPMS	ICP/MS	9481587	2024/06/27	2024/06/27	Azita Fazaeli



GENERAL COMMENTS

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

Package 1	3.3°C
-----------	-------

Revised Report [2024/08/13]: Split report for total and dissolved uranium and thorium per client request.
Revised Report [2024/07/23]: Total phosphorus added to samples per client request.

Sample ZLT686 [SG3] : Result for dissolved Aluminum and Manganese are greater than Total Aluminum and Manganese. Results have been confirmed by re-analysis.

Results relate only to the items tested.



BUREAU
VERITAS

Bureau Veritas Job #: C411944

Report Date: 2024/08/14

QUALITY ASSURANCE REPORT

WSP Canada Inc.

Client Project #: 19126620

Site Location: HIGHLAND PIT

Sampler Initials: CA

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9464627	Dissolved Thorium (Th)	2024/06/19	99	80 - 120	96	80 - 120	<2.0	ug/L		
9464627	Dissolved Uranium (U)	2024/06/19	98	80 - 120	95	80 - 120	<0.10	ug/L	5.8	20
9464909	Total Aluminum (Al)	2024/06/21	93	80 - 120	100	80 - 120	<4.9	ug/L	2.2	20
9464909	Total Antimony (Sb)	2024/06/21	104	80 - 120	101	80 - 120	<0.50	ug/L	NC	20
9464909	Total Arsenic (As)	2024/06/21	97	80 - 120	97	80 - 120	<1.0	ug/L	NC	20
9464909	Total Barium (Ba)	2024/06/21	94	80 - 120	94	80 - 120	<2.0	ug/L	3.7	20
9464909	Total Beryllium (Be)	2024/06/21	103	80 - 120	99	80 - 120	<0.40	ug/L	NC	20
9464909	Total Bismuth (Bi)	2024/06/21	94	80 - 120	97	80 - 120	<1.0	ug/L	NC	20
9464909	Total Boron (B)	2024/06/21	103	80 - 120	99	80 - 120	<10	ug/L	2.3	20
9464909	Total Cadmium (Cd)	2024/06/21	97	80 - 120	97	80 - 120	<0.090	ug/L	NC	20
9464909	Total Calcium (Ca)	2024/06/21	NC	80 - 120	102	80 - 120	<200	ug/L	0.46	20
9464909	Total Chromium (Cr)	2024/06/21	91	80 - 120	94	80 - 120	<5.0	ug/L	NC	20
9464909	Total Cobalt (Co)	2024/06/21	96	80 - 120	97	80 - 120	<0.50	ug/L	NC	20
9464909	Total Copper (Cu)	2024/06/21	102	80 - 120	96	80 - 120	<0.90	ug/L	2.2	20
9464909	Total Iron (Fe)	2024/06/21	96	80 - 120	98	80 - 120	<100	ug/L	NC	20
9464909	Total Lead (Pb)	2024/06/21	95	80 - 120	96	80 - 120	<0.50	ug/L	NC	20
9464909	Total Lithium (Li)	2024/06/21	106	80 - 120	102	80 - 120	<5.0	ug/L	NC	20
9464909	Total Magnesium (Mg)	2024/06/21	94	80 - 120	95	80 - 120	<50	ug/L	4.9	20
9464909	Total Manganese (Mn)	2024/06/21	93	80 - 120	97	80 - 120	<2.0	ug/L	2.4	20
9464909	Total Molybdenum (Mo)	2024/06/21	96	80 - 120	93	80 - 120	<0.50	ug/L	1.4	20
9464909	Total Nickel (Ni)	2024/06/21	93	80 - 120	95	80 - 120	<1.0	ug/L	3.3	20
9464909	Total Phosphorus (P)	2024/06/21	99	80 - 120	94	80 - 120	<100	ug/L		
9464909	Total Potassium (K)	2024/06/21	93	80 - 120	100	80 - 120	<200	ug/L	3.5	20
9464909	Total Selenium (Se)	2024/06/21	99	80 - 120	104	80 - 120	<2.0	ug/L	NC	20
9464909	Total Silicon (Si)	2024/06/21	93	80 - 120	97	80 - 120	<50	ug/L	1.4	20
9464909	Total Silver (Ag)	2024/06/21	92	80 - 120	92	80 - 120	<0.090	ug/L	NC	20
9464909	Total Sodium (Na)	2024/06/21	NC	80 - 120	97	80 - 120	<100	ug/L	6.0	20
9464909	Total Strontium (Sr)	2024/06/21	95	80 - 120	96	80 - 120	<1.0	ug/L	5.2	20
9464909	Total Tellurium (Te)	2024/06/21	97	80 - 120	99	80 - 120	<1.0	ug/L	NC	20
9464909	Total Thallium (Tl)	2024/06/21	99	80 - 120	96	80 - 120	<0.050	ug/L	NC	20
9464909	Total Thorium (Th)	2024/06/21	97	80 - 120	99	80 - 120	<2.0	ug/L		



BUREAU
VERITAS

Bureau Veritas Job #: C411944

Report Date: 2024/08/14

QUALITY ASSURANCE REPORT(CONT'D)

WSP Canada Inc.

Client Project #: 19126620

Site Location: HIGHLAND PIT

Sampler Initials: CA

QC Batch	Parameter	Date	Matrix Spike		SPIKED BLANK		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9464909	Total Tin (Sn)	2024/06/21	100	80 - 120	98	80 - 120	<1.0	ug/L	NC	20
9464909	Total Titanium (Ti)	2024/06/21	95	80 - 120	98	80 - 120	<5.0	ug/L	NC	20
9464909	Total Tungsten (W)	2024/06/21	101	80 - 120	98	80 - 120	<1.0	ug/L	5.6	20
9464909	Total Uranium (U)	2024/06/21	97	80 - 120	97	80 - 120	<0.10	ug/L	1.7	20
9464909	Total Vanadium (V)	2024/06/21	92	80 - 120	93	80 - 120	<0.50	ug/L	8.0	20
9464909	Total Zinc (Zn)	2024/06/21	96	80 - 120	101	80 - 120	<5.0	ug/L	NC	20
9464909	Total Zirconium (Zr)	2024/06/21	103	80 - 120	100	80 - 120	<1.0	ug/L	NC	20
9481587	Total Thorium (Th)	2024/06/27	98	80 - 120	99	80 - 120	<2.0	ug/L	NC	20
9481587	Total Uranium (U)	2024/06/27	97	80 - 120	99	80 - 120	<0.10	ug/L	6.8	20
9484657	Dissolved Thorium (Th)	2024/06/28	98	80 - 120	95	80 - 120	<2.0	ug/L		
9484657	Dissolved Uranium (U)	2024/06/28	99	80 - 120	96	80 - 120	<0.10	ug/L		

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

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

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

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

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

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



BUREAU
VERITAS

Bureau Veritas Job #: C411944
Report Date: 2024/08/14

WSP Canada Inc.
Client Project #: 19126620
Site Location: HIGHLAND PIT
Sampler Initials: CA

VALIDATION SIGNATURE PAGE

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

Cristina Carriere

Cristina Carriere, Senior Scientific Specialist

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Bureau Veritas
6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel: (905) 817-5700 Toll-free: 800-563-6266 Fax: (905) 817-5777 www.bvna.com



NONT-2024-06-1482

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:		Client:	
Company Name: #14090 WSP Canada Inc.		Company Name:		Quotation #: C41731		Bottle Order #:	
Attention: Central Accounting		Attention:		P.O. #:		994478	
Address: 1931 Robertson Rd		Address:		Project: 19126620		Project Manager:	
Ottawa ON K2H 5B7		Ottawa ON K2H 5B7		Project Name: Highland Pit		Katherine Szozda	
Tel: (613) 592-9600 Fax: (613) 592-9601		Tel: Fax:		Site #: C. Albert		COC #:	
Email: capayablesinvoice@wsp.com		Email: Fax:		Sampled By:		C#994478-02-01	

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BUREAU VERITAS DRINKING WATER CHAIN OF CUSTODY						ANALYSIS REQUESTED (PLEASE BE SPECIFIC)										Turnaround Time (TAT) Required: Please provide advance notice for rush projects		
Regulation 153 (2011)			Other Regulations			Special Instructions	Field Filtered (please circle): Metals / Hg / Cr VI	Subdivision Package - Groundwater	Acidified Total Metals	Subdivision Package - Surface Water	Unacidified Total Metals	Unacidified Dissolved Metals	TSS	Uranium	Thorium	Regular (Standard) TAT: (will be applied if Rush TAT is not specified)	Job Specific Rush TAT (if applies to entire submission)	
<input type="checkbox"/> Table 1	<input type="checkbox"/> Res/Park	<input type="checkbox"/> Medium/Fine	<input type="checkbox"/> CCME	<input type="checkbox"/> Sanitary Sewer Bylaw											Standard TAT = 5-7 Working days for most tests. Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details			
<input type="checkbox"/> Table 2	<input type="checkbox"/> Ind/Comm	<input type="checkbox"/> Coarse	<input type="checkbox"/> Reg 558	<input type="checkbox"/> Storm Sewer Bylaw											Date Required: _____ Times Required: <input type="checkbox"/>			
<input type="checkbox"/> Table 3	<input type="checkbox"/> Agr/Other	<input type="checkbox"/> For RSC	<input type="checkbox"/> MISA	Municipality _____											Rush Confirmation Number: _____ (call in for #)			
<input type="checkbox"/> Table _____	<input type="checkbox"/> PWQO	<input type="checkbox"/> Reg 406 Table	<input type="checkbox"/> Other _____												Comments			
Include Criteria on Certificate of Analysis (Y/N)?																# of Bottles	Comments	
Sample Barcode Label	Sample (Location) Identifier	Date Sampled	Time Sampled	Matrix														
Pard	Pard	Jun 13/24	9:00	SW													12	
SG1	SG1	↓	10:00	↓													↓	
SG2	SG2	↓	11:00	↓													↓	

Received in Ottawa

* RELINQUISHED BY: (Signature/Print)		Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)		Date: (YY/MM/DD)	Time	# jars used and not submitted	Laboratory Use Only				
C. Albert				Angelica Santiago DSA		2024/06/14	10:12		Time Sensitive	Temperature (°C) on Receipt	Custody Seal Present	Yes	No
				Bryon Beer		2024/06/15	08:21			6.13	1°C		

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BUREAU VERITAS'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVNA.COM/ENVIRONMENTAL-LABORATORIES/RESOURCES/COG-TERMS-AND-CONDITIONS.

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT WWW.BVNA.COM/ENVIRONMENTAL-LABORATORIES/RESOURCES/CHAIN-CUSTODY-FORMS-COCS.

SAMPLES MUST BE KEPT COOL (< 10° C.) FROM TIME OF SAMPLING UNTIL DELIVERY TO BUREAU VERITAS

White: Bureau Veritas Yellow: Client
2/2 VRC
11/015 2024/06/15


ATTACHMENT D

Test Pit and Monitoring Well Logs

TP24-1

Date:	2024-05-14	Client:	Cavanagh	Contractor:	Cavanagh
Project:	19126620	Location:	Highland Line, MacDonald's Corners, Ontario	Method:	Excavator-PC450LC-Komatsu
Start Time:	8:40			Operator:	Doug Sturgess
End Time:	9:30	Weather:	Cloudy	Temperature:	15°C

Depth (m)		Soil Description	Samples		Notes:
Start	End		#	Depth (m)	
0.0	0.25	Topsoil			
0.25	1.25	(SP/SM) SAND fine, some silt to SILTY SAND, some gravel, contains cobbles and boulders (~30%); brown; non-cohesive, moist	SA01	0.25 - 1.25	
1.25	4.70	(SW) SAND, medium, some gravel, trace silt, contains cobbles and boulders (~25%); light-brown; non-cohesive, moist, wet by 4.60m	SA02	1.25 - 2.25	
			SA03	2.25 - 3.25	
			SA04	3.25 - 4.25	
			SA05	4.25 - 4.70	
4.70		Refusal, likely boulders, possibly bedrock, very hard			

<p style="text-align: center;">Test Pit Photo:</p> 	Water Level:	4.65
	Special Notes:	
	Test Pit Dimensions (L x W x H) [m]	4.9 x 2.0 x 4.7

WSP Representative:

J. Sullivan

Review:

BH

Date:


2024-06-04



TP24-2

Date:	2024-05-14	Client:	Cavanagh	Contractor:	Cavanagh
Project:	19126620	Location:	Highland Line, MacDonald's Corners, Ontario	Method:	Excavator-PC450LC-Komatsu
Start Time:	9:40			Operator:	Doug Sturgess
End Time:	10:40	Weather:	Cloudy	Temperature:	16°C

Depth (m)		Soil Description	Samples		Notes:
Start	End		#	Depth (m)	
0.0	0.20	Topsoil			
0.20	0.50	Brown gravelly SAND, some silt, organics, 'B' Horizon			
0.50	2.20	(SW) SAND, fine to medium, some gravel to gravelly SAND, trace to some silt; light-brown, non-cohesive, moist, cobbles present	SA01	0.50 - 1.50	
			SA02	1.50 - 2.20	
2.20	4.70	(SP) SAND, fine-medium, trace coarse, some gravel, trace silt, contains cobbles and boulders; light-brown; non-cohesive, moist; contains pockets of (SW) gravelly SAND	SA03	2.20 - 3.20	
			SA04	3.20 - 4.20	
			SA05	4.20 - 4.70	
4.70		Refusal, likely bedrock, very hard, pink granite			

Test Pit Photo:		Water Level:	N/A
			
		Test Pit Dimensions (L x W x H) [m]	4.5 x 2.0 x 4.7

WSP Representative:

J. Sullivan

Review:

BH

Date:


2024-06-04



TP24-3

Date:	2024-05-14	Client:	Cavanagh	Contractor:	Cavanagh
Project:	19126620	Location:	Highland Line, MacDonald's Corners, Ontario	Method:	Excavator-PC450LC-Komatsu
Start Time:	10:45			Operator:	Doug Sturgess
End Time:	11:40	Weather:	Cloudy	Temperature:	16°C

Depth (m)		Soil Description	Samples		Notes:
Start	End		#	Depth (m)	
0.0	0.25	Topsoil			
0.25	1.70	Layers of (SW/GW) medium to coarse SAND and GRAVEL; brown; non-cohesive, moist	SA01	0.25 - 1.25	
1.70	6.70	(SP/SM) SAND, fine, some silt to SILTY SAND, fine, with pockets of fine-medium sand; light-brown; non-cohesive, moist	SA02	1.70 - 2.70	
			SA03	2.70 - 3.70	
			SA04	3.70 - 4.70	
			SA05	4.70 - 5.70	
			SA06	5.70 - 6.70	
6.70	Maximum reach with excavator				

Test Pit Photo:		Water Level:	N/A
	Special Notes:		
	Test Pit Dimensions (L x W x H) [m]	5.2 x 2.1 x 6.7	

WSP Representative:

J. Sullivan

Review:

BH

Date:


2024-06-04



TP24-4

Date:	2024-05-14	Client:	Cavanagh	Contractor:	Cavanagh
Project:	19126620	Location:	Highland Line, MacDonald's Corners, Ontario	Method:	Excavator-PC450LC-Komatsu
Start Time:	11:45			Operator:	Doug Sturgess
End Time:	13:00	Weather:	Cloudy	Temperature:	19°C

Depth (m)		Soil Description	Samples		Notes:
Start	End		#	Depth (m)	
0.0	0.30	Topsoil			
0.30	2.30	(SP) SAND, fine some silt, trace clay; light-brown; non-cohesive, pockets of SAND, fine to medium, trace gravel, cobbles	SA01	0.30 - 1.30	
			SA02	1.30 - 2.30	
2.30	6.00	(SP) SAND, fine to medium; light- brown; non-cohesive, moist	SA03	2.30 - 3.30	
			SA04	3.30 - 4.30	
			SA05	4.30 - 5.30	
			SA06	5.30 - 6.00	
6.00	6.30	(SM) SILTY SAND, some gravel, contains cobbles and boulders yellowish-brown (GLACIAL TILL); non- cohesive, moist	SA07	6.00 - 6.30	Hard digging
6.30		Refusal due to hard digging and maximum reach			

Test Pit Photo:		Water Level:	N/A
	Special Notes:		
	Test Pit Dimensions (L x W x H) [m]		5.5 x 2.1 x 6.3

WSP Representative:

J. Sullivan

Review:

BH

Date:


2024-06-04



TP24-5

Date:	2024-05-14	Client:	Cavanagh	Contractor:	Cavanagh
Project:	19126620	Location:	Highland Line, MacDonald's Corners, Ontario	Method:	Excavator-PC450LC-Komatsu
Start Time:	13:10			Operator:	Doug Sturgess
End Time:	13:50	Weather:	Cloudy	Temperature:	19°C

Depth (m)		Soil Description	Samples		Notes:
Start	End		#	Depth (m)	
0.0	0.30	Topsoil			
0.30	2.30	(SM/SP) SILTY SAND to SAND, fine, some silt; light-brown; non-cohesive, moist to wet, wet by 2.2m	SA01	0.30 - 1.30	
			SA02	1.30 - 2.30	
2.30	4.10	(SW) SAND, medium to coarse, trace to some silt; brown; non-cohesive, wet	SA03	2.30 - 3.30	Water percolating from bottom of pit, very rusty in colour, causing sloughing
			SA04	3.30 - 4.10	
4.10		End TP due to sloughing and groundwater			

Test Pit Photo:		Water Level:	2.20
		Special Notes:	
		Test Pit Dimensions (L x W x H) [m] 4.0 x 2.0 x 4.1	

WSP Representative:

J. Sullivan

Review:

BH




Date:

2024-06-04

TP24-6

Date:	2024-05-14	Client:	Cavanagh	Contractor:	Cavanagh
Project:	19126620	Location:	Highland Line, MacDonald's Corners, Ontario	Method:	Excavator-PC450LC-Komatsu
Start Time:	14:15			Operator:	Doug Sturgess
End Time:	15:00	Weather:	Cloudy	Temperature:	19°C

Depth (m)		Soil Description	Samples		Notes:
Start	End		#	Depth (m)	
0.0	0.30	Topsoil			
0.30	1.30	(SM) SILTY SAND, with gravel, contains cobbles and boulders (GLACIAL TILL); brown; non-cohesive, moist to wet	SA01	0.30 - 1.00	
			SA02	1.00 - 1.30	
1.30		Refusal on pink granite bedrock, sloping down from south to north			

Test Pit Photo:		Water Level:	N/A
		Special Notes:	
		Test Pit Dimensions (L x W x H) [m]	4.0 x 4.0 x 1.3 to 1.6

WSP Representative:

J. Sullivan

Review:

BH

Date:


2024-06-04



TP24-7

Date:	2024-05-14	Client:	Cavanagh	Contractor:	Cavanagh
Project:	19126620	Location:	Highland Line, MacDonald's Corners, Ontario	Method:	Excavator-PC450LC-Komatsu
Start Time:	15:00			Operator:	Doug Sturgess
End Time:	16:00	Weather:	Cloudy	Temperature:	19°C

Depth (m)		Soil Description	Samples		Notes:
Start	End		#	Depth (m)	
0.00	0.25	Topsoil			
0.25	1.00	(SW) SAND, fine to medium, trace gravel; light-brown; non-cohesive, moist	SA01	0.25 - 1.00	
1.00	2.00	(SM/SP) SILTY SAND fine, pockets of SAND, fine-medium; grey-brown to light-brown; non-cohesive, moist	SA02	1.00 - 2.00	
2.00	6.75	(SP) SAND, fine-medium, trace silt; light-brown; non-cohesive, moist	SA03	2.00 - 3.00	
			SA04	3.00 - 4.00	
			SA05	4.00 - 5.00	
			SA06	5.00 - 6.00	
			SA07	6.00 - 6.75	
6.75		Maximum reach with excavator			

Test Pit Photo:		Water Level:	N/A
			
		Test Pit Dimensions (L x W x H) [m]	

WSP Representative:

J. Sullivan

Review:

BH




Date:

2024-06-04

TP24-8

Date:	2024-05-15	Client:	Cavanagh	Contractor:	Cavanagh
Project:	19126620	Location:	Highland Line, MacDonald's Corners, Ontario	Method:	Excavator-PC450LC-Komatsu
Start Time:	8:15			Operator:	Doug Sturgess
End Time:	9:10	Weather:	Cloudy	Temperature:	10°C

Depth (m)		Soil Description	Samples		Notes:
Start	End		#	Depth (m)	
0.00	0.30	Topsoil			
0.30	3.30	(SW) SAND, medium to coarse, trace to some gravel; light-brown; non-cohesive, moist	SA01	0.30 - 1.30	
			SA02	1.30 - 2.30	
			SA03	2.30 - 3.30	
3.30	4.80	(SW) medium to coarse gravelly SAND; light-brown; non-cohesive, moist to wet	SA04	3.30 - 4.30	wet @ 4.0m, sloughing on all sides
			SA05	4.30 - 4.80	
4.80	End TP, sloughing, saturated sands				

Test Pit Photo:		Water Level:	4.0 m
		Special Notes:	
		Test Pit Dimensions (L x W x H) [m]	5.2 x 3.0 x 4.8

WSP Representative:

J. Sullivan

Review:

BH

Date:


2024-06-04



TP24-9

Date:	2024-05-15	Client:	Cavanagh	Contractor:	Cavanagh
Project:	19126620	Location:	Highland Line, MacDonald's Corners, Ontario	Method:	Excavator-PC450LC-Komatsu
Start Time:	9:15			Operator:	Doug Sturgess
End Time:	10:10	Weather:	Cloudy	Temperature:	13°C

Depth (m)		Soil Description	Samples		Notes:
Start	End		#	Depth (m)	
0.00	0.20	Topsoil			
0.20	5.00	(SW) SAND, fine to coarse, some to trace gravel; light-brown; non-cohesive, moist	SA01	0.20 - 1.20	
			SA02	1.20 - 2.20	
			SA03	2.20 - 3.20	
			SA04	3.20 - 4.20	
			SA05	4.20 - 5.00	
5.00		End TP, sloughing on all sides, moist sands, undermining all around, unable to achieve greater depths			

Test Pit Photo:		Water Level:	N/A
		Special Notes:	
		Test Pit Dimensions (L x W x H) [m]	5.0 x 5.0 x 5.0

WSP Representative:

J. Sullivan

Review:

BH

Date:


2024-06-04



TP24-10

Date:	2024-05-15	Client:	Cavanagh	Contractor:	Cavanagh
Project:	19126620	Location:	Highland Line, MacDonald's Corners, Ontario	Method:	Excavator-PC450LC-Komatsu
Start Time:	10:15			Operator:	Doug Sturgess
End Time:	11:30	Weather:	Cloudy	Temperature:	15°C

Depth (m)		Soil Description	Samples		Notes:
Start	End		#	Depth (m)	
0.0	0.30	Topsoil			
0.30	0.90	(SP/SM) SAND, fine-medium, to SILTY SAND; brown; non-cohesive, moist	SA01	0.30 - 0.90	
0.90	1.50	(ML) CLAYEY SILT, trace sand; brown; cohesive, w~pl	SA02	0.90 - 1.50	
1.50	2.50	(SP/SM) layers of SAND, fine-medium, trace silt, to SILTY SAND, fine, trace clay; light-brown; non-cohesive, moist	SA03	1.50 - 2.50	
2.50	4.50	(SP/SW) layers of SAND, fine, trace silt and SAND; light-brown; non-cohesive, moist	SA04	2.50 - 3.50	
			SA05	3.50 - 4.50	
4.50	6.50	(SP/SM) SAND, fine, some silt to SILTY SAND, fine; brown; non-cohesive, moist, wet by 4.7m	SA06	4.50 - 5.50	
			SA07	5.50 - 6.50	
6.50		END TP, sloughing and near max depth			

Test Pit Photo:	Water Level:	4.7 m
	Special Notes:	
	Test Pit Dimensions (L x W x H) [m]	4.5 x 2.2 x 6.5

WSP Representative:

J. Sullivan

Review:

BH

Date:

2024-06-04



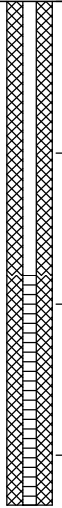
PROJECT: 19126620
 LOCATION: N 4976956.88; E 379191.89

RECORD OF BOREHOLE: MW20-1

BORING DATE: April 22, 2020

SHEET 1 OF 1
 DATUM: Geodetic

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT PERCENT					
								Cu, kPa		nat V. + rem V. ⊕ ⊙		Wp				W	
0	Excavator Open Hole	GROUND SURFACE		189.60													
		SILTY SAND, fine; brown		0.00													
3.40		End of Test Pit		186.20													
3.40				3.40													



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PROJECT: 19126620
 LOCATION: N 4977427.72; E 379420.18

RECORD OF BOREHOLE: MW20-2

BORING DATE: April 22, 2020

SHEET 1 OF 1
 DATUM: Geodetic

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT PERCENT					
								Cu, kPa		nat V. +	rem V. ⊕	Q - ●	U - ○			Wp	W
0	Excavator Open Hole	GROUND SURFACE		191.15													
		SAND, fine to medium, some silt; brown		0.00													
3		Not Sampled		188.00	3.15												
4		End of Test Pit		186.56	4.59												

Cuttings

50 mm Diam. PVC #10 Slot Screen

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DEPTH SCALE

1 : 50



LOGGED: CJA

CHECKED: BH

PROJECT: 19126620
 LOCATION: N 4977078.70; E 379618.53

RECORD OF BOREHOLE: MW20-3

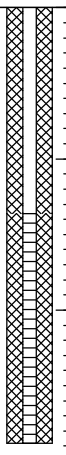
SHEET 1 OF 1
 DATUM: Geodetic

BORING DATE: April 22, 2020

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT PERCENT					
								Cu, kPa		nat V. rem V.		+				Q - U -	
0	Excavator Open Hole	GROUND SURFACE		184.45													
0.00		SAND, fine to medium, some gravel and cobbles; brown															
3		End of Test Pit		181.45													
3.00				3.00													

Cuttings

50 mm Diam. PVC #10 Slot Screen



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DEPTH SCALE

1 : 50



LOGGED: CJA

CHECKED: BH

PROJECT: 19126620
 LOCATION: N 4976941.77; E 378934.40

RECORD OF BOREHOLE: MW20-4

SHEET 1 OF 1
 DATUM: Geodetic

BORING DATE: April 22, 2020

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT PERCENT					
								Cu, kPa		nat V. rem V.		+				Q - U -	
0	Excavator Open Hole	GROUND SURFACE		189.50 0.00													
1		SAND and GRAVEL, trace cobbles; brown		188.50 1.00											Cuttings		
2		SAND, fine, some silt, trace cobbles; brown		186.00 3.50											50 mm Diam. PVC #10 Slot Screen		
3		End of Test Pit															
4																	
5																	
6																	
7																	
8																	
9																	
10																	

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PROJECT: 19126620
 LOCATION: N 4976861.27; E 378740.84

RECORD OF BOREHOLE: MW20-5

BORING DATE: April 22, 2020

SHEET 1 OF 1
 DATUM: Geodetic

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT PERCENT					
								Cu, kPa		nat V. rem V.		+				Q - U	
0	Excavator Open Hole	GROUND SURFACE		191.59													
0.00		SAND, fine to coarse with gravel, some cobble layers; brown		0.00													
1																	
2																	
3																	
3.40		End of Test Pit		188.19													
3.40				3.40													
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Cuttings

50 mm Diam. PVC #10 Slot Screen

GTA-BHS 001 S:\CLIENTS\THOMAS CAVANAGH CONSTRUCTION\IDUNCAN_PIT02 DATA\GINT\19126620.GPJ GAL-MIS.GDT 12/13/22 ZS

DEPTH SCALE

1 : 50



LOGGED: CJA

CHECKED: BH

PROJECT: 19126620
 LOCATION: N 4976404.08; E 378885.52

RECORD OF BOREHOLE: MW20-6

SHEET 1 OF 1
 DATUM: Geodetic

BORING DATE: April 22, 2020

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT PERCENT					
								Cu, kPa		nat V. rem V.		+				Q - U -	
0	Excavator Open Hole	GROUND SURFACE		196.52													
		SAND, fine to medium with gravel, cobbles and boulders; brown		0.00													
2				194.02													
		End of Test Pit		2.50													
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Cuttings

50 mm Diam. PVC #10 Slot Screen

GTA-BHS 001 S:\CLIENTS\THOMAS CAVANAGH - CONSTRUCTION\IDUNCAN_PIT02 DATA\GINT\19126620.GPJ GAL-MIS.GDT 12/13/22 ZS

DEPTH SCALE

1 : 50



LOGGED: CJA

CHECKED: BH

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