PHASE 2 INITIAL BOREHOLE DRILLING AND TESTING, SOUTH BRUCE

WP01: Site Decommissioning Report for SB_BH01

APM-REP-01332-0425 **May 2023**

Geofirma Engineering

nwmo
NUCLEAR WASTE MANAGEMENT ORGANIZATION
SOCIÉTÉ DE GESTION DES DÉCHETS NUCLÉAIRES

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Phase 2 Initial Borehole Drilling and Testing, South Bruce

WP01: Site Decommissioning Report for SB_BH02

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R0A	Apr 20, 2023	Initial Draft Release
R0	May 12, 2023	Final

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APPENDICES

1 INTRODUCTION

The activities described in this report are one component of the geoscientific investigation that were completed by Geofirma as part of the NWMO Phase 2 Initial Borehole Drilling and Testing Program, in South Bruce, Ontario (Figure 1). Specifically, this report describes the activities undertaken to demobilize on-site infrastructure following drilling and testing activities at drill site SB_BH02. These activities were completed under the scope of work associated with Work Package 1 (WP01) (Site Construction and Infrastructure).

1.1 Background

The Initial Borehole Drilling and Testing project in South Bruce, Ontario is part of Phase 2 Geoscientific Preliminary Field Investigations of the NWMO's Adaptive Phased Management (APM) Site Selection Phase. This project involved the drilling and testing of two deep boreholes (SB_BH01 and SB_BH02) in the South Bruce area. The project was carried out by a team led by Geofirma Engineering Ltd. on behalf of the NWMO. The overall program is described in the Initial Borehole Characterization Plan (Geofirma 2021a).

Borehole SB_BH02 is located 5.5 km northwest of the community of Teeswater, Ontario (Figure 1) and was drilled through the entire sedimentary bedrock sequence to approximately 14 m into the Precambrian basement, to a total depth of approximately 900 mBGS.

This report describes the decommissioning activities of temporary field facilities, temporary power and utilities, and perimeter fencing for borehole SB_BH02. Temporary field facilities included drill fluid containment system(s), field offices, washroom facilities, storage containers, portable generators, fuel tanks, lighting, and water tanks. Soil sampling to confirm soil quality and assess potential impacts on soil quality from the drill site activities at SB_BH02 is also described herein.

1.2 Objective

The purpose of this report is to provide a detailed description of activities completed by Geofirma for the decommissioning of infrastructure and confirmatory soil sampling following drilling and testing at SB_BH02.

1.3 Site History

1.3.1 Preliminary Site Visit

Staff from Geofirma and NWMO completed a site visit on June 3, 2020, to inspect potential drilling locations along Concession Road 8, near Teeswater Ontario. Based on findings from this visit, the NWMO selected the second borehole location (SB_BH02) at 1257 Concession Road 8, Teeswater, Ontario. The drill pad for SB_BH02 is located approximately 400 metres south of Concession Road 8 and is situated on a hill above the Teeswater River that is approximately 200 metres to the east.

MUNICIPALITY OF BROCKTON
Riversdale
Little Egypt
Greenock Swamp
F012077
Salem
Kinlough
T003553
Westford
BRUCE ROAD 4
TOWNSHIP OF HURON-KINLOSS
MUNICIPALITY OF SOUTH BRUCE
F012068
Holyrood
BRUCE ROAD 1
BRUCE ROAD 6
CONCESSION 8
Kinloss Creek
SB_BH02
SB_BH01
Culross
Kinloss
Teeswater
Dickies Creek Wetland Complex
F012062
Lower Langside
T004881
Langside
Teeswater Wetland Complex
Anderson Creek Wetland Complex

LEGEND

- SB_BH01 Drill Site
- SB_BH02 Drill Site
- Municipality of South Bruce
- Municipality of Brockton
- Township of Huron-Kinloss
- Provincially Significant Wetland
- Wetland
- Waterbody
- Watercourse
- Major Road
- Local / Street
- OGSRL Well Locations

INSET MAP

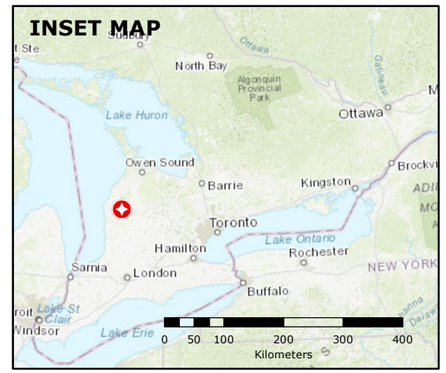


Figure 1
Location of SB_BH02 Drill Site

Scale 1:60,000

0 500 1,000 2,000 3,000 4,000
Meters

N

Projection: NAD 1983 UTM Zone 17N

Source: NWMO, Ontario GeoBase

Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, © OpenStreetMap contributors, and the GIS User Community

PROJECT No. 20-211-1

NWMO South Bruce
Drilling and Testing

DESIGN: ADG
CAD/GIS: ADG
CHECK: SNS
REV: 1

DATE: 2021-05-12

GEOFIRMA ENGINEERING

F:\Data\Project\Bruce\Maps\20-211-1_SouthBruce\20-211-1_Figure1_SB_BH02_TestPlans_R1.mxd

1.3.2 Care and Control of SB_BH02 Drill Site

The NWMO transferred care and control of the SB_BH02 drill site to Geofirma for three days starting on November 17, 2020, so that pre-construction soil sampling could take place. The site was officially handed over to Geofirma on December 7, 2020, so that site construction activities could commence. Included in the care and control area were the access road and proposed drill pad, plus a buffer along the edge of both the road and the pad for facilitation of construction activities. Upon completion of site construction, Geofirma care and control of the construction facilitation area and site access road was returned to NWMO on May 27 and August 13, 2021. The drill pad remained in Geofirma custody until the end of drilling and testing activities.

1.3.3 Site Construction

Prior to site construction, Geofirma completed a baseline soil sampling and topographic survey. The baseline soil sampling program was completed on November 17, 2020, to obtain a record of soil type and quality prior to site construction activities. The topographic survey was completed on October 16, 2020, by Geofirma's subcontractor GM BluePlan and was used to develop a high-resolution site topographic model that could be used to prepare a tender package for the site construction work. Results from the baseline soil sampling program were provided to NWMO as a memorandum (Geofirma 2021b). The topographic survey data was provided to NWMO as a data deliverable on January 27, 2021.

Construction of the access road and drill pad for SB_BH02 started on December 7, 2020. Cedarwell Excavating Ltd. was subcontracted by Geofirma to complete the construction with support from GM BluePlan for survey of construction grades and compaction testing. Construction of the SB_BH02 access road and drill pad was mostly completed by January 21, 2021. Minor reshaping of swales and installation of a culvert under the access road was completed in May 2021.

A separate report has been prepared by Geofirma that outlines the site construction activities completed as part of WP01A at SB_BH02 (Geofirma, 2022). Included in the site construction report are inspections completed during construction, as well as details of the final as-built elevations and site conditions.

1.3.4 Timeline of Site Infrastructure Activities

- **June 03, 2020:** Site visit by NWMO and Geofirma at potential drill sites along Concession Rd 8
- **November 17, 2020:** Baseline soil sampling at SB_BH02
- **December 07, 2020:** Start of site construction at SB_BH02
- **January 21, 2021**: End of site construction at SB_BH02
- **May 26-27, 2021:** Installation of electrical infrastructure at SB_BH02, ESA Inspection
- **July 28, 2021:** Start setup of onsite infrastructure at SB_BH02 for drilling and testing
- **Oct 23, 2021:** Site commissioning inspection completed for SB_BH02
- **December 09, 2022:** Site decommissioning and hand back for SB_BH02

2 DEMOBILIZATION AND DECOMMISSIONING ACTIVITIES

The following section describes the onsite infrastructure that was demobilized from the SB_BH02 site. The configuration of the SB_BH02 drill site is shown in Figure 2.

2.1 Security Perimeter Fencing

A 1.8 m (6ft) high panel fence was installed by Modu-Loc around the perimeter of the SB_BH02 drill pad. The fence dimensions were 120 x 50 m to contain the entire drill pad. The fenced area was setup to contain working areas for all subsequent drilling and testing activities and a secure parking area. All fencing was removed from site by Sunbelt Rentals in October 2022.

2.2 Office Trailers

All office trailers were rented from Alantra Leasing Inc. (Alantra), a trailer rental company based out of Dorchester, Ontario. A total of four office trailers were setup at the site; two outfitted as office space for Geofirma, NWMO, and observers from the Saugeen Ojibway Nation (SON), and two to support technical work activities, including core processing, and a laboratory space. Alantra removed two trailers from site in April 2022, and the remaining two trailers in October 2022.

2.3 Additional Equipment Storage

Three SeaCan storage units were rented from Battlefield Equipment Rentals, Sunbelt Equipment Rentals and ATCO Structures respectively, and setup onsite to house additional equipment and core boxes. A heated container office was also rented from ATCO Structures to store additional equipment, fridges and coolers. The heated container office was removed from site in April, 2022 and all SeaCans were removed from site in May 2022.

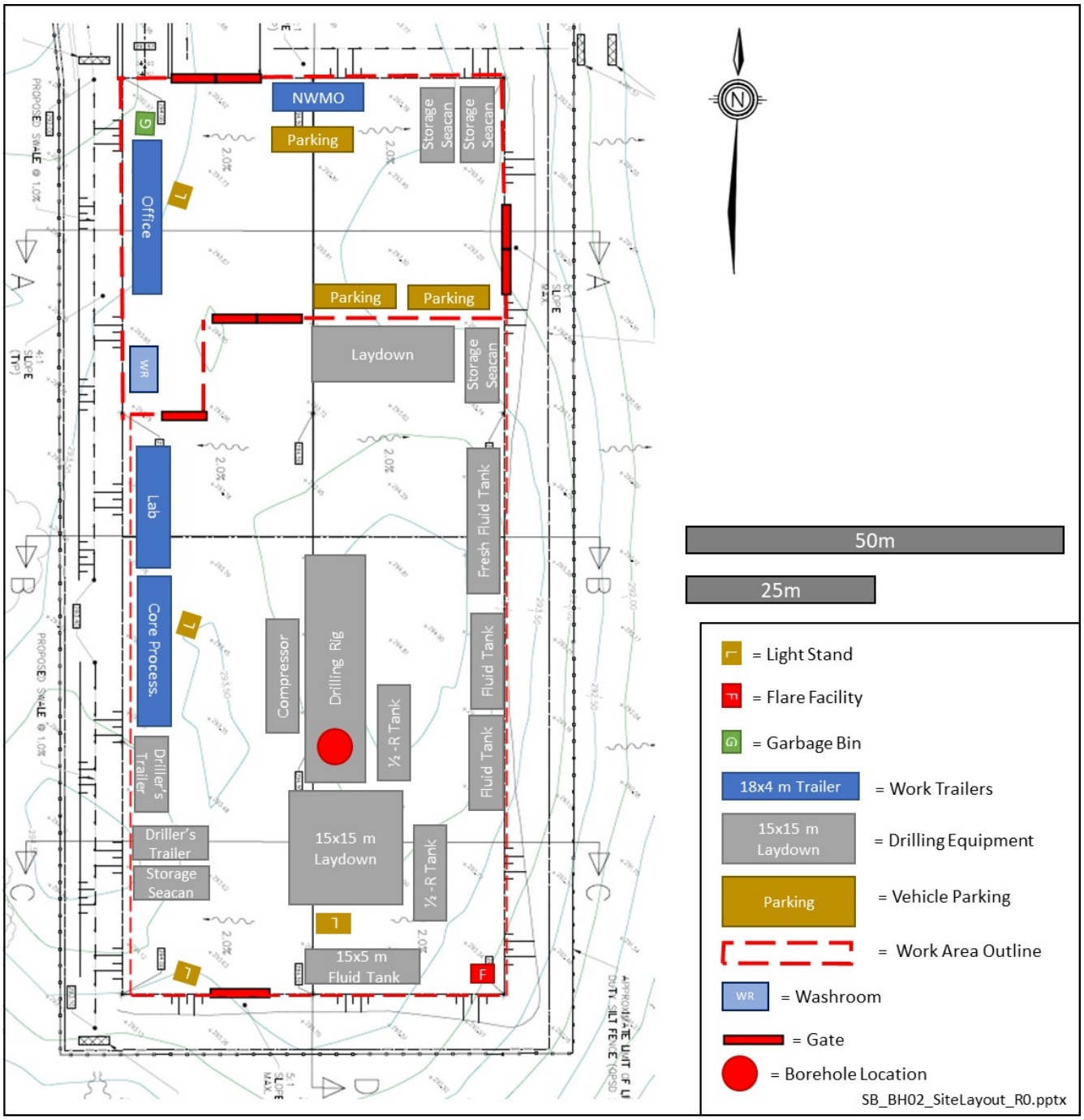
2.4 Potable Water Supply

Potable water for field staff was provided onsite by Culligan with service from Culligan's Hanover office. Rental water coolers were set up in the main office trailer, NWMO trailer, and core logging trailer. The rental water coolers were returned to Culligan prior to demobbing the site trailers.

2.5 Washrooms

A two-unit washroom trailer was rented from C & P Portable Toilets based in Teeswater, Ontario. The washroom trailer was temperature controlled and had two complete washrooms (toilet, faucet, etc.). The washroom trailer was removed by C & P Portables in November 2022.

Figure 2 SB_BH02 Drill Site Layout – Final Layout after Site Commissioning



2.6 Site Communication

Personal cellular phones were used as the primary method of communication and were used to communicate between the onsite field staff and support staff in Geofirma's Ottawa office. An additional "site supervisor" phone was purchased so that there was one consistent number for communication with site, regardless of which staff were onsite. The site phone remained active throughout the entirety of the project.

In the absence of local high-speed internet providers, internet connectivity at the site was enabled through use of Rogers Rocket Hub routers that connect cellular data. Three internet routers were setup in the following locations to ensure adequate internet connectivity across the site: Geofirma office trailer, NWMO office trailer, and the core logging trailer. The Rocket Hubs provided internet connectivity on site until the trailers were demobilized.

2.7 Site Illumination

Onsite illumination was provided by portable light stands and lights affixed to the work trailers. Vital drilling provided a diesel-powered light stand to illuminate the work area around the drill rig. The Vital light stand was demobilized from site in October 2022. The rest of the site was illuminated using three portable electricity-powered LED light stands, which were also demobilized from site in October 2022.

2.8 Primary Power Supply

The primary source of power for the SB_BH02 drill site is electricity suppled by Hydro One. Hays Electric, a licensed electrical contractor based in Teeswater, Ontario was subcontracted by Geofirma to design and install the electrical infrastructure for the site. Hays Electric completed work associated with the electrical hook-up on May 26-27, 2021. A primary electrical line was run underground from a pole along Concession 8 to a transformer that was installed near the northwest corner of the drill pad. Two electrical panels were setup at the drill site and armoured cable was used to run power from the panels to each of the work trailers. Additional outlets were installed near the drill rig and near the water storage tanks. The supplementary outlets, armoured cable, and conduits were removed from site following the completion of drilling and testing activities. The two electrical panels and support infrastructure was left on site, and Geofirma transferred the Hydro One account to the NWMO in October 2022.

2.9 Onsite Generators and Fuel Storage

Whenever practically possible, Geofirma and Vital staff used extension cords to power equipment with electricity sourced from the primary site power supply (e.g. exterior outlets on trailers and main electrical panel): this minimized the use of portable generators, additional fuel consumption, and the potential for accidental fuel spills. However, some field activities required use of external diesel or gasoline powered generators. All gasoline or diesel-powered equipment was owned or rented by Geofirma and Vital and contained within portable spill berms when stored or in use. The majority of generators were demobilised from site in October 2022.

2.10 Fuel Storage, Spill Containment, and Spill Response Supplies

All fuel containers and gasoline/diesel powered equipment (including the drill rig) were setup within spill containment structures and protected from vehicular impact. The large spill containment system under the drill rig was demobilized along with most other containment berms in October 2022.

2.11 Fuel Supply and Storage

Vital drilling purchased fuel from Edward Fuels in Teeswater, Ontario. The diesel was stored in a 500-gallon double walled storage tank, set upon a secondary containment berm. The tank and containment berm were demobilized from site in October 2022.

2.12 Solid Waste

Solid waste onsite was stored in two large bins that were rented from Affordable Waste Disposal, based in Teeswater, Ontario. One bin was used to store garbage and the second bin was used to store recyclable carboard and other paper products. The bins were demobilized from site in November 2022.

2.13 Water Storage

An 80,000-litre water storage tank was rented from US Ecology to support drilling activities on site. The tank was demobilized from site in June 2022.

2.14 Drilling Equipment

The Vital drill rig and supporting WP02 equipment (half round tanks, pipe racks, storage trailer, rig substructure, air compressor, telehandler, storage tanks etc.) were demobilized from the SB_BH02 drill site throughout September and October, 2022.

3 CONFIMRATORY SOIL SAMPLING

3.1 Background and Scope of Work

Surficial soil sampling was conducted by Geofirma following the completion of site work and demobilization as an environmental due diligence measure to confirm soil quality at the SB_BH02 drill site.

3.2 Methodology

Soil sampling was completed by Geofirma field staff on October 31, 2022, within the drill site that was to be returned to NWMO custody. The sample locations were selected to provide spatial coverage across the drill pad and in areas where activities of potential environmental concern took place. A composite sample comprised of soil mixed from three discrete sampling locations was submitted for analysis from each area. Sample locations are shown on Figure 3.

- **Sample Area 1:** Sample SB_BH02_SS22-01 was collected from the north parking area of the drill pad.
- **Sample Area 2:** Sample BH02_SS22-02 was collected from the west area of the drill pad, which was utilized as a laydown area.
- **Sample Area 3:** Sample BH02_SS22-03 was collected from the central area of the pad where the drill rig was situated.
- **Sample Area 4:** Sample BH02_SS22-04 was collected from an area east of the drill rig, where the half round tanks and SeaCans were positioned, and brine mixing activities were carried out.
- **Sample Area 5:** Sample BH02_SS22-05 was collected from the south area of the drill pad, where a half round tank and drilling catwalk were positioned.

Soil samples were collected using a hand-shovel and trowel. Disposable nitrile gloves and eye protection were worn by Geofirma staff while sampling. The sampling equipment was decontaminated using Alconox cleaning detergent and distilled water between the collection of each sample. Rinse water produced during decontamination was collected in buckets and disposed of offsite. All sample locations were recorded using a high precision GNSS Trimble Catalyst DA2 surveying receiver.

All soil samples were collected from the constructed surface to a depth of approximately 0.1 m below ground surface (0 - 0.1 mBGS). A total of three sub samples were collected from each designated sample area to form a composite sample, therefore a total of 15 sub samples were collected to form five composite samples. Samples for volatiles were collected directly into laboratory containers and not composited. Figure 3 shows all sub sample locations and sample areas.

3.3 Sample Submission and Laboratory Analysis

Samples were submitted to Paracel Laboratories Ltd. (Paracel), a Canadian Association for Laboratory Accreditation (CALA) accredited laboratory, based in Ottawa, Ontario, using standard laboratory chain-of-custody procedures.

A total of five composite soil samples were collected, one from each of the sample areas and submitted to Paracel for metals, inorganics (pH, conductivity, sodium absorption ratio), Petroleum Hydrocarbons (PHCs). One sample from each area was also submitted for Benzene, Toluene, Ethylbenzene, and Xylene (BTEX) analysis.

3.4 Results

Soil quality results are summarized in Table B.1, Appendix B for metals, inorganics, PHCs and BTEX. All laboratory results are compared against Ontario Regulation (O.Reg.) 153/04 Table 2 for Full Depth Generic Site Condition Standards in a Potable Groundwater Condition, Residential Land-Use.

All samples analysed were below applicable O.Reg. Table 2 Residential Land-Use Standard. An elevated detection of lead was reported for sample SB_BH02_SS-03 of 44.2 µg/g where the standard is 120 µg/g. Therefore each sub sample (SB_BH02_SS-03A, SB_BH02_SS-03B and SB_BH02_SS-03C) was analysed separately as a due diligence measure. All SB_BH02_SS-03 sub samples were also reported below the applicable Table 2 Residential Standard of 120µg/g for lead. Complete laboratory reports are included in Appendix B.

3.5 Conclusions

Geofirma completed a post-demobilization confirmatory soil sampling program at the SB_BH02 drill site as an environmental due diligence measure to confirm soil quality met applicable regulations. A total of five samples were sent to an accredited laboratory for analysis of metals, inorganics (pH, conductivity, SAR), PHCs and BTEX.

All soil samples collected and analysed met applicable Regulations, therefore drill site activities are deemed not to have negatively impacted the surficial soil on site.

LEGEND

- SB_BH02 Drill Pad
- Sample Area 1
- Sample Area 2
- Sample Area 3
- Sample Area 4
- Sample Area 5
- SB_BH02 Post Construction Sample Location

Figure 3
SB_BH02
Soil Sampling Locations

Scale 1:2,200

0 10 20 40 60 80 100
Meters

N

Projection: NAD 1983 UTM Zone 17N

Source: NWMO, Ontario GeoBase

Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar

PROJECT No. 20-211-1

SB_BH02 Handover
Soil Sampling Program

DESIGN: ADG
CAD/GIS: ADG
CHECK: TKG
REV: 0

DATE: 2023-04-18

GEOFIRMA ENGINEERING

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4 SITE DECOMMISSIONING INSPECTION

Geofirma completed a detailed site inspection of the SB_BH02 drill site with NWMO personnel on December 9, 2022. The purpose of the site inspection was to confirm all equipment and infrastructure had been removed, and the site was clear of debris and general waste prior to Geofirma handover of the site to the NWMO. The demobilization and decommissioning activities were documented and a decommissioning checklist was signed off by the Geofirma Site Supervisor and WP01 Lead. A copy of the SB_BH02 site decommissioning checklist is provided in Appendix A.

5 REFERENCES

Geofirma Engineering Ltd., 2021b. Baseline Soil Sampling at SB_BH02, NWMO Phase 2 Initial Borehole Drilling and Testing South Bruce. Memorandum Revision 0. February 17.

Geofirma Engineering Ltd., 2022. WP01: Site Construction Report for SB_BH02. – Phase 2 Initial Borehole Drilling and Testing, South Bruce. Revision 0. November 7.

Appendix A

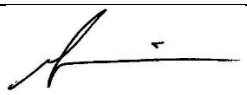
Site Decommissioning Checklist

WP01 Site Decommissioning Checklist – NWMO South Bruce Drilling and Testing

Drill Site: __SB_BH02_____ Date: ___9-Dec-22_____

Item/Description	Item Completion Sign-Off		N/A
	Geofirma Site Supervisor	Geofirma WP01 Lead	
Completion of Drilling and Testing Activities			
WP02 (drilling and coring) through WP09 (Instrumentation) field activities complete	✓	✓	
Borehole XYZ survey complete	✓	✓	
Site Handover Agreement			
Site handover agreement signed by Geofirma and NWMO, returning care and control of the site back to the NMWO	✓	✓	
Access Road and Drill Site			
Access road and drill site left in acceptable condition for future NWMO use	✓	✓	
All roadways free of equipment, powerlines or debris that could be hazardous for vehicle and foot traffic	✓	✓	
Drill site returned to pre-construction conditions, as required. Including: removal of road surface and granular material, replacement of topsoil and regrading			✓
NWMO Equipment and Sample Storage			
NWMO owned equipment returned to NWMO core storage facility	✓	✓	
Completed core boxes transported to NWMO core storage facility	✓	✓	
Archive core samples transported to NWMO core storage facility (according to WP03 test plan requirements)	✓	✓	
Archive drill water and groundwater samples transported to NWMO core storage facility (according to WP02 and WP07 test plan requirements)	✓	✓	
Site Infrastructure			
Trailers unhooked from electrical system and removed from site	✓	✓	
Water storage equipment removed from site	✓	✓	
Generators and light stands removed from site	✓	✓	
Washroom facilities removed from site	✓	✓	
Electrical supply disconnected and safely shut-off (or management/service transferred to NWMO)	✓	✓	
Waste Management			
Drill water properly disposed according to WP02 test plan	✓	✓	
Fresh water properly disposed according to WP02 test plan	✓	✓	
Fuel and fuel storage equipment removed from site	✓	✓	
Solid waste and recycling disposed at suitable waste management facility	✓	✓	
Waste storage containers (e.g. garbage bins) removed from site	✓	✓	
Post-Drilling and Testing Environmental Sampling			
Water well (groundwater) sampling completed (as required)	✓	✓	
Soil sampling completed (as required)	✓	✓	

Comments

Sign-Off				
Completed by Geofirma Site Supervisor:	Tim Galt		Date:	9-Dec-22
Approved by Geofirma WP01 Lead:	Glen Briscoe		Date:	9-Dec-22

Appendix B

Analytical Results and Laboratory Certificate of Analysis

Table B.1 - Analytical Soil Results

Parameter	Units	MDL	Reg 153/04 (2011)- Table 2 Residential	Sample							
				SB_BH02_SS 22-01	SB_BH02_SS 22-02	SB_BH02_SS 22-03	SB_BH02_SS 22-03A *Subsample*	SB_BH02_SS 22-03B *Subsample*	SB_BH02_SS 22-03C *Subsample*	SB_BH02_SS 22-04	SB_BH02_SS 22-05
Sample Date (m/d/y)				**31-Oct-22**	**31-Oct-22**	**31-Oct-22**	**31-Oct-22**	**31-Oct-22**	**31-Oct-22**	**31-Oct-22**	**31-Oct-22**
Metals											
SAR	N/A	0.01	5 N/A	1.62	1.02	1.61	--	--	--	1.62	0.18
Antimony	ug/g dry	1.0	7.5 ug/g dry	<1.0	<1.0	<1.0	--	--	--	<1.0	<1.0
Arsenic	ug/g dry	1.0	18 ug/g dry	2.2	2.3	2.5	--	--	--	2.3	2.5
Barium	ug/g dry	1.0	390 ug/g dry	17.1	17.8	21.3	--	--	--	15.5	23.4
Beryllium	ug/g dry	0.5	4 ug/g dry	<0.5	<0.5	<0.5	--	--	--	<0.5	<0.5
Boron	ug/g dry	5.0	120 ug/g dry	10	10.6	11.6	--	--	--	9.2	11.8
Boron, available	ug/g dry	0.5	1.5 ug/g dry	<0.5	<0.5	<0.5	--	--	--	<0.5	<0.5
Cadmium	ug/g dry	0.5	1.2 ug/g dry	<0.5	<0.5	<0.5	--	--	--	<0.5	<0.5
Chromium (VI)	ug/g dry	0.2	8 ug/g dry	<0.2	<0.2	<0.2	--	--	--	<0.2	<0.2
Chromium	ug/g dry	5.0	160 ug/g dry	9	9.9	30.1	--	--	--	10.2	14
Cobalt	ug/g dry	1.0	22 ug/g dry	2.7	3.1	3.5	--	--	--	2.9	4.1
Conductivity	uS/cm	5	700 uS/cm	278	189	336	--	--	--	299	92
Copper	ug/g dry	5.0	140 ug/g dry	6.5	8	15.7	--	--	--	8.9	21.4
Lead	ug/g dry	1.0	120 ug/g dry	4.1	4.4	44.2	8	5	110	7.7	24.4
Mercury	ug/g dry	0.1	0.27 ug/g dry	<0.1	<0.1	<0.1	--	--	--	<0.1	<0.1
Molybdenum	ug/g dry	1.0	6.9 ug/g dry	<1.0	<1.0	<1.0	--	--	--	<1.0	<1.0
Nickel	ug/g dry	5.0	100 ug/g dry	6.6	7.8	15.9	--	--	--	7.8	10.7
pH	pH units	0.05	NV	7.9	7.78	7.93	--	--	--	7.91	7.91
Selenium	ug/g dry	1.0	2.4 ug/g dry	<1.0	<1.0	<1.0	--	--	--	<1.0	<1.0
Silver	ug/g dry	0.3	20 ug/g dry	<0.3	<0.3	<0.3	--	--	--	0.5	0.8
Thallium	ug/g dry	1.0	1 ug/g dry	<1.0	<1.0	<1.0	--	--	--	<1.0	<1.0
Uranium	ug/g dry	1.0	23 ug/g dry	<1.0	<1.0	<1.0	--	--	--	<1.0	<1.0
Vanadium	ug/g dry	10.0	86 ug/g dry	13.1	13.3	14	--	--	--	12.4	15.5
Zinc	ug/g dry	20.0	340 ug/g dry	<20.0	<20.0	56.5	--	--	--	21.3	31.1
Volatiles											
Benzene	ug/g dry	0.02	0.21 ug/g dry	<0.02	<0.02	<0.02	--	--	--	<0.02	<0.02
Ethylbenzene	ug/g dry	0.05	1.1 ug/g dry	<0.05	<0.05	<0.05	--	--	--	<0.05	<0.05
Toluene	ug/g dry	0.05	2.3 ug/g dry	<0.05	<0.05	<0.05	--	--	--	<0.05	<0.05
m/p-Xylene	ug/g dry	0.05	NV	<0.05	<0.05	<0.05	--	--	--	<0.05	<0.05
o-Xylene	ug/g dry	0.05	NV	<0.05	<0.05	<0.05	--	--	--	<0.05	<0.05
Xylenes, total	ug/g dry	0.05	3.1 ug/g dry	<0.05	<0.05	<0.05	--	--	--	<0.05	<0.05
Hydrocarbons											
F1 PHCs (C6-C10)	ug/g dry	7	55 ug/g dry	<7	<7	<7	--	--	--	<7	<7
F2 PHCs (C10-C16)	ug/g dry	4	98 ug/g dry	<4	<4	<4	--	--	--	<4	<4
F3 PHCs (C16-C34)	ug/g dry	8	300 ug/g dry	<8	<8	30	--	--	--	44	<8
F4 PHCs (C34-C50)	ug/g dry	6	2800 ug/g dry	<6	<6	13	--	--	--	33	<6

Notes:

1. Highlight indicates parameter concentration exceeds applicable residential criteria.
2. NV = No Value
3. -- = Parameter not analysed

Prepared by: ADG
Reviewed by: TKG
Date: 08-Dec-22
20-211_WP01_BH02_DrillPad_Table B.1_SoilQuality.xlsx

GEOFIRMA ENGINEERING

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Certificate of Analysis

Geofirma Engineering Ltd.

1 Raymond St, Suite 200
Ottawa, ON K1R 1A2
Attn: Tim Galt

Client PO: 202111-013
Project: 20-211-1
Custody:

Report Date: 9-Nov-2022
Order Date: 3-Nov-2022

Order #: 2245365

This Certificate of Analysis contains analytical data applicable to the following samples as submitted :

Paracel ID	Client ID
2245365-01	SB_BH01_SS22-01
2245365-02	SB_BH01_SS22-02
2245365-03	SB_BH01_SS22-03
2245365-04	SB_BH01_SS22-04
2245365-05	SB_BH01_SS22-05
2245365-06	SB_BH01_SS22-06
2245365-07	SB_BH01_SS22-07
2245365-08	SB_BH02_SS22-01
2245365-09	SB_BH02_SS22-02
2245365-10	SB_BH02_SS22-03
2245365-11	SB_BH02_SS22-04
2245365-12	SB_BH02_SS22-05

Approved By:

Dale Robertson, BSc
Laboratory Director

Certificate of Analysis
Client: **Geofirma Engineering Ltd.**
Client PO: **202111-013**

Report Date: 09-Nov-2022
Order Date: 3-Nov-2022
Project Description: 20-211-1

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Boron, available	MOE (HWE), EPA 200.8 - ICP-MS	7-Nov-22	7-Nov-22
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	4-Nov-22	6-Nov-22
Chromium, hexavalent - soil	MOE E3056 - Extraction, colourimetric	4-Nov-22	9-Nov-22
Conductivity	MOE E3138 - probe @25 °C, water ext	7-Nov-22	8-Nov-22
Mercury by CVAA	EPA 7471B - CVAA, digestion	7-Nov-22	7-Nov-22
pH, soil	EPA 150.1 - pH probe @ 25 °C, CaCl buffered ext.	4-Nov-22	4-Nov-22
PHC F1	CWS Tier 1 - P&T GC-FID	4-Nov-22	6-Nov-22
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	4-Nov-22	5-Nov-22
REG 153: Metals by ICP/MS, soil	EPA 6020 - Digestion - ICP-MS	7-Nov-22	7-Nov-22
SAR	Calculated	7-Nov-22	8-Nov-22
Solids, %	CWS Tier 1 - Gravimetric	4-Nov-22	7-Nov-22

Certificate of Analysis

Client: **Geofirma Engineering Ltd.**

Client PO: **202111-013**

Report Date: 09-Nov-2022

Order Date: 3-Nov-2022

Project Description: 20-211-1

	Client ID:	SB_BH01_SS22-01	SB_BH01_SS22-02	SB_BH01_SS22-03	SB_BH01_SS22-04
	Sample Date:	31-Oct-22 11:15	31-Oct-22 11:10	31-Oct-22 11:25	31-Oct-22 12:30
	Sample ID:	2245365-01	2245365-02	2245365-03	2245365-04
	MDL/Units	Soil	Soil	Soil	Soil
Physical Characteristics					
% Solids	0.1 % by Wt.	95.4	94.6	93.6	94.5
General Inorganics					
SAR	0.01 N/A	0.47	0.08	0.11	0.50
Conductivity	5 uS/cm	119	90	85	126
pH	0.05 pH Units	7.70	7.71	7.78	7.83
Metals					
Antimony	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Arsenic	1.0 ug/g dry	2.0	2.1	2.0	2.1
Barium	1.0 ug/g dry	14.4	15.8	14.3	14.2
Beryllium	0.5 ug/g dry	<0.5	<0.5	<0.5	<0.5
Boron	5.0 ug/g dry	9.5	9.4	8.7	8.9
Boron, available	0.5 ug/g dry	<0.5	<0.5	<0.5	<0.5
Cadmium	0.5 ug/g dry	<0.5	<0.5	<0.5	<0.5
Chromium	5.0 ug/g dry	8.2	8.9	8.3	8.9
Chromium (VI)	0.2 ug/g dry	<0.2	<0.2	<0.2	<0.2
Cobalt	1.0 ug/g dry	2.6	2.8	2.7	2.8
Copper	5.0 ug/g dry	6.7	7.4	7.3	7.7
Lead	1.0 ug/g dry	3.4	3.7	4.6	4.7
Mercury	0.1 ug/g dry	<0.1	<0.1	<0.1	<0.1
Molybdenum	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Nickel	5.0 ug/g dry	6.5	7.3	6.6	7.1
Selenium	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Silver	0.3 ug/g dry	<0.3	<0.3	<0.3	<0.3
Thallium	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Uranium	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Vanadium	10.0 ug/g dry	12.0	12.7	11.9	12.3
Zinc	20.0 ug/g dry	<20.0	<20.0	<20.0	<20.0
Volatiles					
Benzene	0.02 ug/g dry	<0.02	<0.02	<0.02	<0.02
Ethylbenzene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Toluene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
m,p-Xylenes	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
o-Xylene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Xylenes, total	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Toluene-d8	Surrogate	109%	107%	111%	105%

Certificate of Analysis

Client: **Geofirma Engineering Ltd.**

Client PO: **202111-013**

Report Date: 09-Nov-2022

Order Date: 3-Nov-2022

Project Description: 20-211-1

	Client ID:	SB_BH01_SS22-01	SB_BH01_SS22-02	SB_BH01_SS22-03	SB_BH01_SS22-04
	Sample Date:	31-Oct-22 11:15	31-Oct-22 11:10	31-Oct-22 11:25	31-Oct-22 12:30
	Sample ID:	2245365-01	2245365-02	2245365-03	2245365-04
	MDL/Units	Soil	Soil	Soil	Soil
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	<7	<7	<7	<7
F2 PHCs (C10-C16)	4 ug/g dry	<4	<4	<4	<4
F3 PHCs (C16-C34)	8 ug/g dry	<8	<8	<8	<8
F4 PHCs (C34-C50)	6 ug/g dry	<6	<6	<6	<6

Certificate of Analysis

Client: **Geofirma Engineering Ltd.**

Client PO: **202111-013**

Report Date: 09-Nov-2022

Order Date: 3-Nov-2022

Project Description: **20-211-1**

	Client ID:	SB_BH01_SS22-05	SB_BH01_SS22-06	SB_BH01_SS22-07	SB_BH02_SS22-01
	Sample Date:	31-Oct-22 12:27	31-Oct-22 11:30	31-Oct-22 12:20	31-Oct-22 09:15
	Sample ID:	2245365-05	2245365-06	2245365-07	2245365-08
	MDL/Units	Soil	Soil	Soil	Soil
Physical Characteristics					
% Solids	0.1 % by Wt.	94.1	93.9	84.8	95.2
General Inorganics					
SAR	0.01 N/A	0.19	0.24	0.16	1.62
Conductivity	5 uS/cm	356	92	193	278
pH	0.05 pH Units	7.86	7.86	7.73	7.90
Metals					
Antimony	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Arsenic	1.0 ug/g dry	1.8	2.1	4.7	2.2
Barium	1.0 ug/g dry	10.9	14.6	49.8	17.1
Beryllium	0.5 ug/g dry	<0.5	<0.5	0.6	<0.5
Boron	5.0 ug/g dry	7.6	9.2	9.5	10.0
Boron, available	0.5 ug/g dry	<0.5	<0.5	<0.5	<0.5
Cadmium	0.5 ug/g dry	<0.5	<0.5	<0.5	<0.5
Chromium	5.0 ug/g dry	7.3	9.2	19.5	9.0
Chromium (VI)	0.2 ug/g dry	<0.2	<0.2	<0.2	<0.2
Cobalt	1.0 ug/g dry	2.4	2.9	5.6	2.7
Copper	5.0 ug/g dry	6.9	10.3	10.1	6.5
Lead	1.0 ug/g dry	4.1	6.0	10.5	4.1
Mercury	0.1 ug/g dry	<0.1	<0.1	<0.1	<0.1
Molybdenum	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Nickel	5.0 ug/g dry	6.0	7.1	12.8	6.6
Selenium	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Silver	0.3 ug/g dry	<0.3	0.4	<0.3	<0.3
Thallium	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Uranium	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Vanadium	10.0 ug/g dry	10.9	13.0	30.4	13.1
Zinc	20.0 ug/g dry	<20.0	<20.0	49.7	<20.0
Volatiles					
Benzene	0.02 ug/g dry	<0.02	<0.02	<0.02	<0.02
Ethylbenzene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Toluene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
m,p-Xylenes	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
o-Xylene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Xylenes, total	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Toluene-d8	Surrogate	106%	107%	109%	104%

Certificate of Analysis

Client: **Geofirma Engineering Ltd.**

Client PO: **202111-013**

Report Date: 09-Nov-2022

Order Date: 3-Nov-2022

Project Description: 20-211-1

	Client ID:	SB_BH01_SS22-05	SB_BH01_SS22-06	SB_BH01_SS22-07	SB_BH02_SS22-01
	Sample Date:	31-Oct-22 12:27	31-Oct-22 11:30	31-Oct-22 12:20	31-Oct-22 09:15
	Sample ID:	2245365-05	2245365-06	2245365-07	2245365-08
	MDL/Units	Soil	Soil	Soil	Soil
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	<7	<7	<7	<7
F2 PHCs (C10-C16)	4 ug/g dry	<4	<4	<4	<4
F3 PHCs (C16-C34)	8 ug/g dry	<8	<8	<8	<8
F4 PHCs (C34-C50)	6 ug/g dry	<6	<6	<6	<6

Certificate of Analysis

Client: **Geofirma Engineering Ltd.**

Client PO: **202111-013**

Report Date: 09-Nov-2022

Order Date: 3-Nov-2022

Project Description: 20-211-1

	Client ID:	SB_BH02_SS22-02	SB_BH02_SS22-03	SB_BH02_SS22-04	SB_BH02_SS22-05
	Sample Date:	31-Oct-22 09:30	31-Oct-22 09:08	31-Oct-22 08:57	31-Oct-22 08:49
	Sample ID:	2245365-09	2245365-10	2245365-11	2245365-12
	MDL/Units	Soil	Soil	Soil	Soil
Physical Characteristics					
% Solids	0.1 % by Wt.	94.9	94.0	94.8	94.6
General Inorganics					
SAR	0.01 N/A	1.02	1.61	1.62	0.18
Conductivity	5 uS/cm	189	336	299	92
pH	0.05 pH Units	7.78	7.93	7.91	7.91
Metals					
Antimony	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Arsenic	1.0 ug/g dry	2.3	2.5	2.3	2.5
Barium	1.0 ug/g dry	17.8	21.3	15.5	23.4
Beryllium	0.5 ug/g dry	<0.5	<0.5	<0.5	<0.5
Boron	5.0 ug/g dry	10.6	11.6	9.2	11.8
Boron, available	0.5 ug/g dry	<0.5	<0.5	<0.5	<0.5
Cadmium	0.5 ug/g dry	<0.5	<0.5	<0.5	<0.5
Chromium	5.0 ug/g dry	9.9	30.1	10.2	14.0
Chromium (VI)	0.2 ug/g dry	<0.2	<0.2	<0.2	<0.2
Cobalt	1.0 ug/g dry	3.1	3.5	2.9	4.1
Copper	5.0 ug/g dry	8.0	15.7	8.9	21.4
Lead	1.0 ug/g dry	4.4	44.2	7.7	24.4
Mercury	0.1 ug/g dry	<0.1	<0.1	<0.1	<0.1
Molybdenum	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Nickel	5.0 ug/g dry	7.8	15.9	7.8	10.7
Selenium	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Silver	0.3 ug/g dry	<0.3	<0.3	0.5	0.8
Thallium	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Uranium	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Vanadium	10.0 ug/g dry	13.3	14.0	12.4	15.5
Zinc	20.0 ug/g dry	<20.0	56.5	21.3	31.1
Volatiles					
Benzene	0.02 ug/g dry	<0.02	<0.02	<0.02	<0.02
Ethylbenzene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Toluene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
m,p-Xylenes	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
o-Xylene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Xylenes, total	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Toluene-d8	Surrogate	107%	105%	106%	107%

Certificate of Analysis

Client: **Geofirma Engineering Ltd.**

Client PO: **202111-013**

Report Date: 09-Nov-2022

Order Date: 3-Nov-2022

Project Description: 20-211-1

	Client ID:	SB_BH02_SS22-02	SB_BH02_SS22-03	SB_BH02_SS22-04	SB_BH02_SS22-05
	Sample Date:	31-Oct-22 09:30	31-Oct-22 09:08	31-Oct-22 08:57	31-Oct-22 08:49
	Sample ID:	2245365-09	2245365-10	2245365-11	2245365-12
	MDL/Units	Soil	Soil	Soil	Soil
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	<7	<7	<7	<7
F2 PHCs (C10-C16)	4 ug/g dry	<4	<4	<4	<4
F3 PHCs (C16-C34)	8 ug/g dry	<8	30	44	<8
F4 PHCs (C34-C50)	6 ug/g dry	<6	13	33	<6

Certificate of Analysis

Client: **Geofirma Engineering Ltd.**

Client PO: **202111-013**

Report Date: 09-Nov-2022

Order Date: 3-Nov-2022

Project Description: 20-211-1

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
Conductivity	ND	5	uS/cm						
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g						
F2 PHCs (C10-C16)	ND	4	ug/g						
F3 PHCs (C16-C34)	ND	8	ug/g						
F4 PHCs (C34-C50)	ND	6	ug/g						
Metals									
Antimony	ND	1.0	ug/g						
Arsenic	ND	1.0	ug/g						
Barium	ND	1.0	ug/g						
Beryllium	ND	0.5	ug/g						
Boron, available	ND	0.5	ug/g						
Boron	ND	5.0	ug/g						
Cadmium	ND	0.5	ug/g						
Chromium (VI)	ND	0.2	ug/g						
Chromium	ND	5.0	ug/g						
Cobalt	ND	1.0	ug/g						
Copper	ND	5.0	ug/g						
Lead	ND	1.0	ug/g						
Mercury	ND	0.1	ug/g						
Molybdenum	ND	1.0	ug/g						
Nickel	ND	5.0	ug/g						
Selenium	ND	1.0	ug/g						
Silver	ND	0.3	ug/g						
Thallium	ND	1.0	ug/g						
Uranium	ND	1.0	ug/g						
Vanadium	ND	10.0	ug/g						
Zinc	ND	20.0	ug/g						
Volatiles									
Benzene	ND	0.02	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: Toluene-d8	*8.79*		*ug/g*		*110*	*50-140*			

Certificate of Analysis
Client: Geofirma Engineering Ltd.
Client PO: 202111-013

Report Date: 09-Nov-2022
Order Date: 3-Nov-2022
Project Description: 20-211-1

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
SAR	1.38	0.01	N/A	1.28			7.5	30	
Conductivity	433	5	uS/cm	447			3.2	5	
pH	7.73	0.05	pH Units	7.70			0.4	2.3	
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g	ND			NC	40	
F2 PHCs (C10-C16)	ND	4	ug/g	ND			NC	30	
F3 PHCs (C16-C34)	ND	8	ug/g	ND			NC	30	
F4 PHCs (C34-C50)	ND	6	ug/g	ND			NC	30	
Metals									
Antimony	ND	1.0	ug/g	ND			NC	30	
Arsenic	1.9	1.0	ug/g	2.0			4.0	30	
Barium	13.5	1.0	ug/g	14.4			6.2	30	
Beryllium	ND	0.5	ug/g	ND			NC	30	
Boron, available	ND	0.5	ug/g	ND			NC	35	
Boron	8.8	5.0	ug/g	9.5			7.2	30	
Cadmium	ND	0.5	ug/g	ND			NC	30	
Chromium (VI)	ND	0.2	ug/g	ND			NC	35	
Chromium	7.9	5.0	ug/g	8.2			3.6	30	
Cobalt	2.4	1.0	ug/g	2.6			6.4	30	
Copper	6.9	5.0	ug/g	6.7			3.1	30	
Lead	3.1	1.0	ug/g	3.4			7.7	30	
Mercury	ND	0.1	ug/g	ND			NC	30	
Molybdenum	ND	1.0	ug/g	ND			NC	30	
Nickel	6.3	5.0	ug/g	6.5			3.1	30	
Selenium	ND	1.0	ug/g	ND			NC	30	
Silver	ND	0.3	ug/g	ND			NC	30	
Thallium	ND	1.0	ug/g	ND			NC	30	
Uranium	ND	1.0	ug/g	ND			NC	30	
Vanadium	11.6	10.0	ug/g	12.0			3.7	30	
Zinc	ND	20.0	ug/g	ND			NC	30	
Physical Characteristics									
% Solids	79.6	0.1	% by Wt.	80.8			1.5	25	
Volatiles									
Benzene	ND	0.02	ug/g	ND			NC	50	
Ethylbenzene	ND	0.05	ug/g	ND			NC	50	
Toluene	ND	0.05	ug/g	ND			NC	50	
m,p-Xylenes	ND	0.05	ug/g	ND			NC	50	
o-Xylene	ND	0.05	ug/g	ND			NC	50	
Surrogate: Toluene-d8	*9.24*		*ug/g*		*109*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	192	7	ug/g	ND	96.1	80-120			
F2 PHCs (C10-C16)	98	4	ug/g	ND	106	60-140			
F3 PHCs (C16-C34)	233	8	ug/g	ND	103	60-140			
F4 PHCs (C34-C50)	168	6	ug/g	ND	118	60-140			
Metals									
Antimony	36.7	1.0	ug/g	ND	73.3	70-130			
Arsenic	46.5	1.0	ug/g	ND	91.4	70-130			
Barium	47.0	1.0	ug/g	5.8	82.4	70-130			
Beryllium	44.5	0.5	ug/g	ND	88.8	70-130			
Boron, available	3.63	0.5	ug/g	ND	72.7	70-122			
Boron	46.3	5.0	ug/g	ND	84.9	70-130			
Cadmium	40.7	0.5	ug/g	ND	81.3	70-130			
Chromium (VI)	4.5	0.2	ug/g	ND	86.0	70-130			
Chromium	52.5	5.0	ug/g	ND	98.4	70-130			
Cobalt	48.7	1.0	ug/g	1.0	95.3	70-130			
Copper	45.8	5.0	ug/g	ND	86.3	70-130			
Lead	41.5	1.0	ug/g	1.3	80.3	70-130			
Molybdenum	44.6	1.0	ug/g	ND	88.9	70-130			
Nickel	47.7	5.0	ug/g	ND	90.3	70-130			
Selenium	41.6	1.0	ug/g	ND	82.9	70-130			
Silver	43.7	0.3	ug/g	ND	87.4	70-130			
Thallium	44.0	1.0	ug/g	ND	87.9	70-130			
Uranium	44.8	1.0	ug/g	ND	89.2	70-130			
Vanadium	55.2	10.0	ug/g	ND	101	70-130			
Zinc	46.0	20.0	ug/g	ND	81.0	70-130			
Volatiles									
Benzene	4.47	0.02	ug/g	ND	112	60-130			
Ethylbenzene	4.14	0.05	ug/g	ND	104	60-130			
Toluene	4.36	0.05	ug/g	ND	109	60-130			
m,p-Xylenes	8.51	0.05	ug/g	ND	106	60-130			
o-Xylene	4.22	0.05	ug/g	ND	106	60-130			
Surrogate: Toluene-d8	*6.98*		*ug/g*		*87.2*	*50-140*			

Qualifier Notes:

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable
ND: Not Detected
MDL: Method Detection Limit
Source Result: Data used as source for matrix and duplicate samples
%REC: Percent recovery.
RPD: Relative percent difference.
NC: Not Calculated

Soil results are reported on a dry weight basis when the units are denoted with 'dry'.
Where %Solids is reported, moisture loss includes the loss of volatile hydrocarbons.

CCME PHC additional information:

- The method for the analysis of PHCs complies with the Reference Method for the CWS PHC and is validated for use in the laboratory. All prescribed quality criteria identified in the method has been met.
- F1 range corrected for BTEX.
- F2 to F3 ranges corrected for appropriate PAHs where available.
- The gravimetric heavy hydrocarbons (F4G) are not to be added to C6 to C50 hydrocarbons.
- In the case where F4 and F4G are both reported, the greater of the two results is to be used for comparison to CWS PHC crite
- When reported, data for F4G has been processed using a silica gel cleanup.

PARACE LABORATORIES

Paracel ID: 2245365

Office
[illegible] St. Laurent Blvd
[illegible], Ontario K1G 4J8
(613) 731-9577
[illegible]@paracelabs.com
paracelabs.com

Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2245365	

Client Name: Geofirma Engineering	Project Ref: 20-211-1	Page 1 of 2	
Contact Name: Tim Galt	Quote #:	Turnaround Time	
Address: 1 Raymond St Suite 200, Ottawa, ON K1R 1A2	PO #: 202111-013	☐ 1 day	☐ 3 day
Telephone: 613-858-0169	E-mail: ssterling@geofirma.com, gbriscoe@geofirma.com, tgalt@geofirma.com	☐ 2 day	☒ Regular
		Date Required:	

Regulation 153/04	Other Regulation
☐ Table 1 ☐ Res/Park ☐ Med/Fine	☐ REG 558 ☐ PWQO
☐ Table 2 ☐ Ind/Comm ☐ Coarse	☐ CCME ☐ MISA
☐ Table 3 ☐ Agri/Other	☐ SU - Sani ☐ SU - Storm
☐ Table ___	Mun:
For RSC: ☐ Yes ☐ No	☐ Other:

Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	Required Analysis: Metals (Full)	PHCs F1-F4	BTEX	pH	Conductivity	SAR						
1	SB_BH01_SS22-01	S		2	31-Oct-31	11:15	✓	✓	✓	✓	✓	✓						
2	SB_BH01_SS22-02	S		2	31-Oct-31	11:10	✓	✓	✓	✓	✓	✓						
3	SB_BH01_SS22-03	S		2	31-Oct-31	11:25	✓	✓	✓	✓	✓	✓						
4	SB_BH01_SS22-04	S		2	31-Oct-31	12:30	✓	✓	✓	✓	✓	✓						
5	SB_BH01_SS22-05	S		2	31-Oct-31	12:27	✓	✓	✓	✓	✓	✓						
6	SB_BH01_SS22-06	S		2	31-Oct-31	11:30	✓	✓	✓	✓	✓	✓						
7	SB_BH01_SS22-07	S		2	31-Oct-31	12:20	✓	✓	✓	✓	✓	✓						
8																		
9																		
10																		

Comments: Metals including B by HWE

Method of Delivery: Walk-in

Relinquished By (Sign):	Received By Driver/Depot:	Received at Lab:	Verified By:
Relinquished By (Print): Morgan de Kroon	Date/Time:	Date/Time: Nov 3/22 2:28pm	Date/Time: Nov 4/22 10:54
Date/Time: 03-Nov-22 / 11:30	Temperature: °C	Temperature: 6	pH Verified: ☐ By:

PARACEL LABORATORIES LTD

Paracel ID: 2245365

Paracel Order Number (Lab Use Only)	**Chain Of Custody** (Lab Use Only)

Client Name: Geofirma Engineering	Project Ref: 20-211-1	Page 2 of 2
Contact Name: Tim Galt	Quote #:	**Turnaround Time**
Address: 1 Raymond St Suite 200 Ottawa, ON K1R 1A2	PO #: 202111-013	☐ 1 day ☐ 3 day
Telephone: 613-858-0169	E-mail: ssterling@geofirma.com, gbriscoe@geofirma.com tgalt@geofirma.com	☐ 2 day ☒ Regular Date Required:

Regulation 153/04	Other Regulation
☐ Table 1 ☐ Res/Park ☐ Med/Fine	☐ REG 558 ☐ PWQO
☐ Table 2 ☐ Ind/Comm ☐ Coarse	☐ CCME ☐ MISA
☐ Table 3 ☐ Agri/Other	☐ SU - Sani ☐ SU - Storm
☐ Table ___	Mun:
For RSC: ☐ Yes ☐ No	☐ Other:

Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	Metals Full	PHCs F1-F4	BTEX	pH	Conductivity	SAR						
1	SB_BH02_SS22-01	S		2	31-Oct-31	9:15	✓	✓	✓	✓	✓	✓						✓
2	SB_BH02_SS22-02	S		2	31-Oct-31	9:30	✓	✓	✓	✓	✓	✓						✓
3	SB_BH02_SS22-03	S		2	31-Oct-31	9:08	✓	✓	✓	✓	✓	✓						✓
4	SB_BH02_SS22-04	S		2	31-Oct-31	8:57	✓	✓	✓	✓	✓	✓						✓
5	SB_BH02_SS22-05	S		2	31-Oct-31	8:49	✓	✓	✓	✓	✓	✓						✓
6																		
7																		
8																		
9																		
10																		

Comments: Metals including B by HWE

Method of Delivery: Walkin

Relinquished By (Sign):	Received By Driver/Depot:	Received at Lab:	Verified By:
Relinquished By (Print): Morgan de Kroon	Date/Time:	Date/Time: Nov 3/22 2:28	Date/Time: Nov 4 2022 10:57
Date/Time: 03-Nov-22 / 11:30	Temperature: °C	Temperature: 6	pH Verified: ☐ By:

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Ottawa, ON, K1G 4J8
1-800-749-1947
www.paracellabs.com

Certificate of Analysis

Geofirma Engineering Ltd.

1 Raymond St, Suite 200
Ottawa, ON K1R 1A2
Attn: Kyle McCrea

Client PO:
Project: 20-211
Custody:

Report Date: 7-Dec-2022
Order Date: 6-Dec-2022

Order #: 2250181

This Certificate of Analysis contains analytical data applicable to the following samples as submitted :

Paracel ID	Client ID
2250181-01	SB_BH02-SS22-03A
2250181-02	SB_BH02-SS22-03B
2250181-03	SB_BH02-SS22-03C

Approved By:

Mark Foto, M.Sc.
Lab Supervisor

Certificate of Analysis

Client: Geofirma Engineering Ltd.

Client PO:

Report Date: 07-Dec-2022

Order Date: 6-Dec-2022

Project Description: 20-211

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Metals, ICP-MS	EPA 6020 - Digestion - ICP-MS	7-Dec-22	7-Dec-22
Solids, %	CWS Tier 1 - Gravimetric	7-Dec-22	7-Dec-22

Certificate of Analysis

Report Date: 07-Dec-2022

Client: Geofirma Engineering Ltd.

Order Date: 6-Dec-2022

Client PO:

Project Description: 20-211

	Client ID:	SB_BH02-SS22-03A	SB_BH02-SS22-03B	SB_BH02-SS22-03C	-
	Sample Date:	31-Oct-22 00:00	31-Oct-22 00:00	31-Oct-22 00:00	-
	Sample ID:	2250181-01	2250181-02	2250181-03	-
	MDL/Units	Soil	Soil	Soil	-
Physical Characteristics					
% Solids	0.1 % by Wt.	94.6	94.0	94.8	-
Metals					
Lead	1 ug/g dry	8	5	110	-

Certificate of Analysis

Client: Geofirma Engineering Ltd.

Client PO:

Report Date: 07-Dec-2022

Order Date: 6-Dec-2022

Project Description: 20-211

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Lead	ND	1	ug/g						

Certificate of Analysis

Client: Geofirma Engineering Ltd.

Client PO:

Report Date: 07-Dec-2022

Order Date: 6-Dec-2022

Project Description: 20-211

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Lead	17.2	1	ug/g	1.7			164.0	30	QR-05
Physical Characteristics									
% Solids	94.5	0.1	% by Wt.	94.8			0.3	25	

Certificate of Analysis

Client: Geofirma Engineering Ltd.

Client PO:

Report Date: 07-Dec-2022

Order Date: 6-Dec-2022

Project Description: 20-211

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Lead	42.7	1	ug/g	ND	84.0	70-130			

Qualifier Notes:

QC Qualifiers :

QR-05 Duplicate RPDs higher than normally accepted. Remaining batch QA\QC was acceptable. May be sample effect.

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable
ND: Not Detected
MDL: Method Detection Limit
Source Result: Data used as source for matrix and duplicate samples
%REC: Percent recovery.
RPD: Relative percent difference.
NC: Not Calculated

Soil results are reported on a dry weight basis when the units are denoted with 'dry'.
Where %Solids is reported, moisture loss includes the loss of volatile hydrocarbons.

PARACEL LABORATORIES LTD.

Paracel ID: 2250181

Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)

Client Name: Geofirma Engineering	Project Ref: 20-211	Page 1 of 1
Contact Name: Kyle McCrea	Quote #:	Turnaround Time
Address: 1 Raymond Street, Suite 200, Ottawa, Ont.	PO #:	☑ 1 day ☐ 3 day ☐ 2 day ☐ Regular
Telephone: 613 720 0079	E-mail: tgalt@geofirma.com	Date Required: ASAP

☑ REG 153/04 ☐ REG 406/19

☐ Table 1 ☐ Res/Park ☐ Med/Fine
☑ Table 2 ☐ Ind/Comm ☐ Coarse
☐ Table 3 ☐ Agri/Other
☐ Table

For RSC: ☐ Yes ☐ No

Other Regulation

☐ REG 558 ☐ PWQO
☐ CCME ☐ MISA
☐ SU - Sani ☐ SU - Storm
Mun:
☐ Other:

Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)

Required Analysis

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken: Date	Sample Taken: Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)	Lead				
1	SB_BH02-SS22_03A	S		1	31 Oct 22	NA								✓				
2	SB_BH02-SS22_03B	S		1	↓	↓								✓				
3	SB_BH02_SS22_03C	S		1	↓	↓								✓				
4																		
5																		
6																		
7																		
8																		
9																		
10																		

Comments:

Method of Delivery: Walk in

Relinquished By (Sign):	Received By Driver/Depot:	Received at Lab:	Verified By: Sandra Demonias
Relinquished By (Print): Kyle McCrea	Date/Time:	Date/Time: Dec. 6. 4:10pm	Date/Time: Dec 6 4:32
Date/Time: 6 Dec 22	Temperature: °C	Temperature: 29.0	pH Verified: ☐ By:

PARACEL LABORATORIES LTD

Paracel ID: 2250181

Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)

Client Name: Geofirma Engineering
Contact Name: Kyle McCrea
Address: 1 Raymond Street, Suite 200, Ottawa, Ont.
Telephone: 613 720 0079

Project Ref: 20-211
Quote #:
PO #:
E-mail: tgalt@geofirma.com

Page 1 of 1

Turnaround Time

- ☑ 1 day
- ☐ 3 day
- ☐ 2 day
- ☐ Regul

Date Required: ASAP

- ☑ REG 153/04 ☐ REG 406/19
- ☐ Table 1 ☐ Res/Park ☐ Med/Fine
- ☑ Table 2 ☐ Ind/Comm ☐ Coarse
- ☐ Table 3 ☐ Agri/Other
- ☐ Table
- For RSC: ☐ Yes ☐ No

Other Regulation

- ☐ REG 558 ☐ PWQO
- ☐ CCME ☐ MISA
- ☐ SUB - Sani ☐ SUB - Storm
- Mun:
- ☐ Other:

Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)

Required Analysis

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken: Date	Sample Taken: Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)	Lead				
1	SB_BH02-SS22_03 A	S		1	31 Oct 22	NA								✓				
2	SB_BH02-SS22_03 B	S		1	↓	↓								✓				
3	SB_BH02-SS22_03 C	S		1	↓	↓								✓				
4																		
5																		
6																		
7																		
8																		
9																		
10																		

Comments:

Method of Delivery: Walk in

Relinquished By (Sign):	Received By Driver/Depot:	Received at Lab:	Verified By: Scarlett Desrosiers
Relinquished By (Print): Kyle McCrea	Date/Time:	Date/Time: Dec. 6 4:10pm	Date/Time: Dec 6 4:32
Date/Time: 6 Dec 22	Temperature: °C	Temperature: 29.0	pH Verified: ☐ By: