PHASE 2 INITIAL BOREHOLE DRILLING AND TESTING - SOUTH BRUCE

WP01: Site Construction Report for SB_BH02

APM-REP-01332-0327 **November 2022**

Geofirma Engineering Ltd.

nwmo
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Phase 2 Initial Borehole Drilling and Testing, South Bruce

WP01: Site Construction Report for SB_BH02

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Revision Tracking Table

Revision	Revision Release Date	Description of Modifications/Edits
R0A	Oct 27, 2022	Initial Draft Released
R0	Nov 7, 2022	Final Released

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1 INTRODUCTION

The activities described in this report are one component of the geoscientific investigation that was 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 construct the access road and drill pad for SB_BH02. These activities were completed under the scope of work associated with Work Package 1 (WP01) (Site Infrastructure and Roads).

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 involves the drilling and testing of two deep boreholes (SB_BH01 and SB_BH02) in the South Bruce area. The project will be 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). A similar overall scope of work is planned for each of the two boreholes.

Borehole SB_BH02 is located 5.5 km northwest of the community of Teeswater, Ontario (Figure 1) and will be drilled vertically to a total target depth of approximately 900 metres below ground surface (mBGS) through the entire sedimentary bedrock sequence down to the Cambrian sandstone (or Precambrian bedrock if Cambrian is absent).

1.2 Objective

The purpose of this report is to provide a detailed description of the equipment and project-specific activities that were completed by Geofirma and Geofirma's subcontractors for construction of the access road and drill pad for SB_BH02. Testing results and final construction specifications for the site from the construction activities are included as appendices.

1.3 Site History

1.3.1 Preliminary Site Visit

Staff from Geofirma, GM BluePlan, and NWMO completed a site visit on June 3, 2020, to inspect potential drill sites 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.

1.3.2 Care and Control of SB_BH02 Drill Site

The NWMO transferred care and control of the SB_BH02 site to Geofirma on November 17, 2020, for approximately four days 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 construction

facilitation area along the edge of both the road and the pad. Upon completion of site construction, Geofirma care and control of the site access road and construction facilitation area was returned to NWMO on May 27, 2021. The drill pad will remain in Geofirma custody until the end of drilling and testing activities.

1.3.3 Timeline of Site Construction Activities

A timeline providing a summary of site construction activities at SB_BH02 is provided below. Most construction activities, including stripping, grading, and compaction were completed in between December 7, 2020, and January 21, 2021. A detailed description of site construction activities is provided in the Section 2 of this this report. A general timeline of the SB_BH02 site construction activities is provided below.

- **June 03, 2020:** Site visit by NWMO and Geofirma at potential drill sites along Concession Rd 8
- **October 16, 2020:** Initial topographic survey at SB_BH02
- **November 17, 2020:** Baseline soil sampling at SB_BH02
- **November 18, 2020:** Test holes excavated 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

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

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: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster

PROJECT No. 20-211-1

NWMO South Bruce
Drilling and Testing

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

DATE: 2022-11-08

GEOFIRMA ENGINEERING

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

2 SITE CONSTRUCTION ACTIVITITES AND RESULTS

Site construction was completed in accordance with the approved test plan WP01 Test Plan: Site Infrastructure and Access Road Construction for SB_BH02 (Geofirma, 2020). All site construction activities were supervised by Geofirma field staff. GM BluePlan (GMBP), an engineering consultant based in Owen Sound, Ontario, provided technical support to Geofirma throughout site construction activities. GMBP completed all surveying and site design work, aided in preparation of the tender documents, and coordinated testing of imported materials and soil compaction.

Final CAD drawings for the site construction were prepared by GMBP and are provided in Appendix A. Reports from GMBP for surveying, field reviews, and testing activities are provided in Appendix B.

2.1 Pre-Construction Soil Characterization

2.1.1 Pre-Construction Soil Sampling

Geofirma completed a soil sampling program at the SB_BH02 site on November 17, 2020, to establish a record of soil quality for the shallow soil prior to construction and drilling activities. A total of 18 samples were collected, photographed, screened for contamination, and logged in the field. The 18 samples were sent to an accredited commercial laboratory for analysis of metals, PHCs, VOCs, PAHs, and inorganics (pH, conductivity, SAR).

Details of the field methodology and results from the pre-construction soil sampling program are found in a separate Baseline Soil Sampling at SB_BH02 report that was prepared by Geofirma (Geofirma 2021b).

2.1.2 Pre-Construction Test Holes

Four test holes were excavated on November 18, 2020, under supervision of GMBP field staff. The purpose of the test holes was to characterize the subgrade material at the site and refine the estimated topsoil stripping volume. The test holes were logged and surveyed by GMBP. Records of the test holes are provided with the site design (Appendix A).

2.2 Pre-Construction Survey and Tender Preparation

GMBP completed a pre-construction topographic survey on October 16, 2020 to obtain data required for the preparation of a preliminary site design and tender documents. The data was used to estimate the quantities of topsoil to be handled and granular materials that would need to be imported. The survey was completed using a Trimble R10 GPS, and Trimble S7 Robotic Total Station. Onsite datums were established during the survey and are documented in the survey report letter that was prepared by GMBP (Appendix B.1).

With the data from the pre-construction topographic survey, Geofirma and GMBP prepared site construction work tender that was provided to Cedarwell.

2.3 Mobilization and Onsite Construction Facilities

Geofirma retained Cedarwell Excavating Ltd, based in Hanover, Ontario, as the primary contractor for the site construction activities at SB_BH02. Geofirma and Cedarwell started site construction activities at SB_BH02 on December 7, 2020. Geofirma established a temporary site office trailer at SB_BH02, which was used for pre-job safety briefings and storage of field equipment. A porta-potty was rented from Bluewater Sanitation for onsite restroom facilities during site construction.

A turnaround area near the top of the gravel access road at SB_BH02 was selected as the staging area for Cedarwell excavation equipment during site construction. All gasoline/diesel powered equipment was parked in this area when it was not in operation.

2.4 Setup of Silt Fencing

Prior to the start of excavation, Cedarwell staff installed silt fencing along the boundaries of the site, including along the access road and the perimeter of the drill pad area. The silt fencing was installed to prevent disturbed sediment from being transported onto adjacent farm fields.

Installation of the silt fencing was supervised by Geofirma field staff, who also completed periodic inspections of the fencing throughout the remainder of site construction activities. Any damage to silt fencing was promptly reported to Cedarwell who would repair or replace the damaged fencing segments.

NWMO subsequently requested the silt fence be removed from site, which was completed on July 20, 2021 by Cedarwell and supervised by Geofirma personnel.

2.5 Stripping of Topsoil

Cedarwell used a combination of Caterpillar™ D6 and D8 dozers to strip topsoil from along the access road and drill pad area. All topsoil with organic material was stripped until a suitable subgrade material was unearthed. The thickness of topsoil that was stripped at the site varied from 10-20 centimetres to over two metres.

2.5.1 Storage of Topsoil

All topsoil was stored onsite and used to form a stockpile/berm along the northern edge of the drill pad that sloped down to the east of the drill pad. The soil stockpiles were graded and shaped to provide a barrier to shield Concession Road 8 and nearby dwellings from sound and noise emitted from the site during subsequent drilling and testing activities.

The topsoil storage pile north of the drill pad was subsequently reworked to provide space for construction of a residential house as requested by the NWMO. Reworked topsoil was moved downslope to the east and north.

2.6 Import and Compaction of Granular Materials

The previously constructed section of the access road was tested by GMBP to confirm whether the existing granular base was equivalent to the proposed 0.45 m thick Granular ‘B’ road base. The historical

granular material was determined to be more than 0.45 m thick and therefore acceptable to remain in place as the base material for the site access road.

The extension of the access road beyond the staging area and the drill pad were constructed with imported granular material (A & B) that was sourced from nearby pits and hauled to site in dump trucks. Sourcing and import of the granular material were coordinated by Cedarwell Excavation. In total, approximately 4155 tonnes of Granular A and 9538 tonnes of Granular B material was imported to the site. Grain size analysis and standard Proctor tests were completed on all imported granular materials. Test results are provided in Appendix B. Granular A and B material imported from the Hanover Pit met OPSS Gradation Requirements for Select Subgrade Materials, yet the Granular B material tested at the Bester Pit was marginally outside (8.4mm) the OPSS Granular B – Type I requirement of 8.0mm. The Granular B material from the Bester Pit was deemed to be acceptable for use on site as the deviation from the OPSS requirement was minor and its inclusion would not negatively impact the functionality or lifespan of the constructed pad. Granular A material from Bester Pit was found to meet OPS Gradation Requirements. The final construction drawings that show design specifications, including compaction and grading requirements are provided in Appendix A.

Cedarwell used dozers and graders to complete placement and grading of the granular material, with vibratory rollers and plate packers used for compaction. Approximately 300-450 mm of granular B material was imported and compacted on top of the subgrade material. After compaction of the granular B material, approximately 150 mm of granular A material was imported and compacted to form the surface of the access road and drill pad. All granular A and B material was compacted to 100% SPMDD.

GMBP staff completed topographic surveys, grain size analysis, and compaction tests throughout the construction process to ensure the work was completed in accordance with the design specifications. Results from onsite GMBP testing and equipment calibration certificates are provided in Appendices B.

2.6.1 Soil Quality Testing – Source Material

Four soil samples were collected on November 2, 2020, 2020 by GMBP personnel from the aggregate pits used to source granular material for construction. Two samples (SS-A and SS-B) were collected from the Bester Pit located at 549 Bruce Road 28, Mildmay, Ontario, while the other two samples (SS-1 and SS-2) were collected from the Cedarwell Pit located at 341416 Concession Rd 2 NDR, Hanover. The four soil samples were analyzed by Bureau Veritas Laboratories for an extensive suite of parameters including hydrocarbons, volatiles and semi-volatiles, metals, pH, conductivity, and sodium adsorption ratio (SAR). Soil quality results were compared to the O.Reg. 153/04 Table 1 Full Depth Background Site Condition Standards and Table 2 Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition.

Results show that all four soil samples had acceptable quality: No volatiles, semi-volatiles, or hydrocarbons were detected in any of the samples and all metal concentrations were well below the O.Reg. 153/04 Table 1 and 2 standards. Complete soil quality results and the laboratory certificate of analysis are provided in Appendix C and Appendix D of the SB_BH01 Site Construction Report (Geofirma 2022).

2.7 Construction of Swales and Culverts

Cedarwell installed swales at the site to manage surface runoff from the drill pad and access road. Swales were constructed along the eastern edge of the access road and western edge of the drill pad in accordance with design specifications. These swales were subsequently reworked by Cedarwell, and topsoil was applied as per NWMO direction. According to the design specifications, two steel culverts were to be installed along the access road to allow water accumulating in the western swale to drain to a lower-lying area east of the road. These culverts were not installed as per NWMO instruction. The culvert at the site entrance from Concession Road 8 was repaired and extended to widen the entrance for equipment access.

2.8 Installation of Drilling Cellar

A cellar was installed by Hays Electrical Contractor Ltd. on May 27, 2021. The purpose of the cellar was to provide adequate depth below ground surface to install blowout preventer equipment for drilling activities. A pit was excavated, and a 1.8 m diameter corrugated steel culvert was installed to approximately 2 m below ground surface to form the cellar. Backfilled granular material was compacted using plate compactors, with compaction testing completed by GMBP.

2.9 Environmental Monitoring and Remediation

All construction related machinery and vehicles were inspected for visible hydrocarbon leaks and other observable issues prior to being admitted on site. Small hydrocarbon sheens and drips were intermittently observed during construction activities, and generally traced to tri-axle tucks moving Granular A and Granular B materials. All hydrocarbon sheens and impacted soils were immediately remediated by Geofirma personnel using absorbent pads and hand tools.

As part of the Site Handover Agreement with the NWMO, Geofirma conducted surficial soil sampling along the access road and land adjacent to the drill pad on August 31, 2021. Six composite samples were submitted to Paracel Laboratories Ltd. (Paracel) for metals, Petroleum Hydrocarbon (PHC) and BTEX analysis. All samples met applicable O. Reg 153/04 Table 2, Potable Groundwater Condition, Agricultural, Coarse Soils criteria.

Complete soil quality results are provided in Appendix C and the Paracel Certificates of Analysis are provided in Appendix D.

3 SUMMARY

Geofirma was contracted by the Nuclear Waste Management Organization (NWMO) to complete site design, tender, and construction for two drill sites along Concession Road 8 near Teeswater, Ontario. Construction of SB_BH02 (this report) started with preliminary site surveying on October 16, 2020, and pre-construction sampling on November 17, 2020. Access road and drill pad construction at SB_BH02 was completed between December 7, 2020, and January 21, 2021, with Cedarwell Excavation Ltd. as Geofirma's primary construction subcontractor.

Site construction activities were completed in accordance with design specifications outlined in the site construction drawings (Appendix A) and the approved WP01 Test Plan for SB_BH02 (Geofirma 2020). Geofirma and GM BluePlan staff completed oversite of all site design and construction activities, which included:

- Pre-construction topographic survey (GMBP), test pit soil investigation (GMBP), and soil testing (Geofirma).
- Site access and drill pad design.
- Sampling and laboratory testing of proposed source materials for soil quality parameters. Results from soil quality testing were compared to O.Reg. 153/04 Table 1 and Table 2 Standards to confirm that the material was acceptable for use on the site.
- Establishment of temporary site infrastructure to support site construction activities.
- Installation of silt fencing around the work area prior to excavation activities.
- Stripping topsoil to suitable subgrade material. Stripped material was used to form a stockpile berm along the northern edge of the drill pad that wrapped around the eastern edge downslope of the drill pad.
- Import, grading, and compaction of granular materials to construct the access road and drill pad in accordance with the design. Approximately 300-450 mm of granular B material was used as a base. Access road and drill pad surfaces were completed with approximately 150 mm of granular A material.
- Construction of drainage swales.
- Grading confirmation, grain size analysis, and compaction testing by GM BluePlan staff throughout site construction. All grading and compaction was completed in accordance with design specifications.
- Installation of a corrugated steel cellar for containment of blowout preventer equipment.

The site construction activities described in this report provided a functional access road and drill pad that could be used for all subsequent drilling and testing activities at SB_BH02.

4 REFERENCES

Geofirma Engineering Ltd., 2020. WP01 Test Plan: Site Infrastructure and Access Road Construction for SB_BH02, Phase 2 Initial Borehole Drilling and Testing South Bruce. Revision 0. December 3.

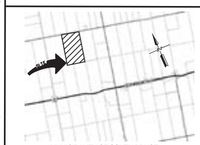
Geofirma Engineering Ltd., 2021a. Initial Borehole Characterization Plan for SB_BH02 – Phase 2 Initial Borehole Drilling and Testing, South Bruce. Revision 1, September 13.

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

Geofirma Engineering Ltd., 2022. WP01: Site Construction Report for SB_BH01, NWMO Phase 2 Initial Borehole Drilling and Testing South Bruce. DRAFT, Revision 0A. February 03.

Appendix A

Site Construction CAD Drawings



MUNICIPALITY OF SOUTH BRUCE
KEY PLAN
NOT TO SCALE

NOTES :

1. TOPOGRAPHIC SURVEY CONDUCTED BY GM BLUEPLAN ENGINEERING LIMITED, OCT 16, 2020 FOR GEOFIRMA.
2. ELEVATIONS AND DIMENSIONS IN METRIC.
3. THE TOPOGRAPHIC SURVEY INCLUDED SURFACE FEATURES AND STRUCTURES AS NOTED FOR INITIAL DESIGN ONLY. DESIGNER AND CONTRACTOR ARE RESPONSIBLE TO CONFIRM UNDERGROUND LOCATION, TYPE, SIZE OF UTILITIES AND BURIED STRUCTURES. ANY DATA WITH RESPECT TO LOCATES ON THIS PLAN ARE APPROXIMATE ONLY AND REQUIRE CONFIRMATION BY OTHERS.
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LEGEND

- SURFACE DRAINAGE
- × 215.90 EXISTING CONDITIONS ELEVATION
- SWALE DRAINAGE

#2 BENCHMARK ELEV. 293.75 m

TOP OF NAIL AND FLAG IN FENCE POST. WEST OF PROPOSED BOREHOLE LOCATION. (AS SHOWN)

#1 BENCHMARK ELEV. 292.84 m

TOP OF REBAR NORTH OF PROPOSED BOREHOLE LOCATION (STAKED WITH ORANGE FLAGGING) IN FIELD. (AS SHOWN)

THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND, WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED.

BEFORE STARTING WORK, THE CONTRACTOR SHALL INFORM HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES, AND SHALL ASSUME ALL LIABILITY FOR ANY DAMAGE TO THEM.

LICENSED PROFESSIONAL ENGINEER
I. E. ERIKSEN
100128824
Dec. 1/20
PROVINCE OF ONTARIO

NO.	DATE	REVISION DESCRIPTION	CH'KD
2	DEC 01 2020	ISSUED FOR QUOTATION	WED
1	NOV 30 2020	ISSUED FOR CLIENT REVIEW	WED

GM BluePlan ENGINEERING

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NWMO BH SITE No. 2

1257 CONCESSION 8

MUNICIPALITY OF SOUTH BRUCE

EXISTING CONDITIONS PLAN

DRAWN BY :	APPROVED BY :	PROJECT NO. :	DRAWING NO. :
R.J.W.	I.E.E.	216433-2	1 of 8
DESIGNED BY :	DATE :	SCALE :	
I.E.E.	OCTOBER 19, 2020	1:750	

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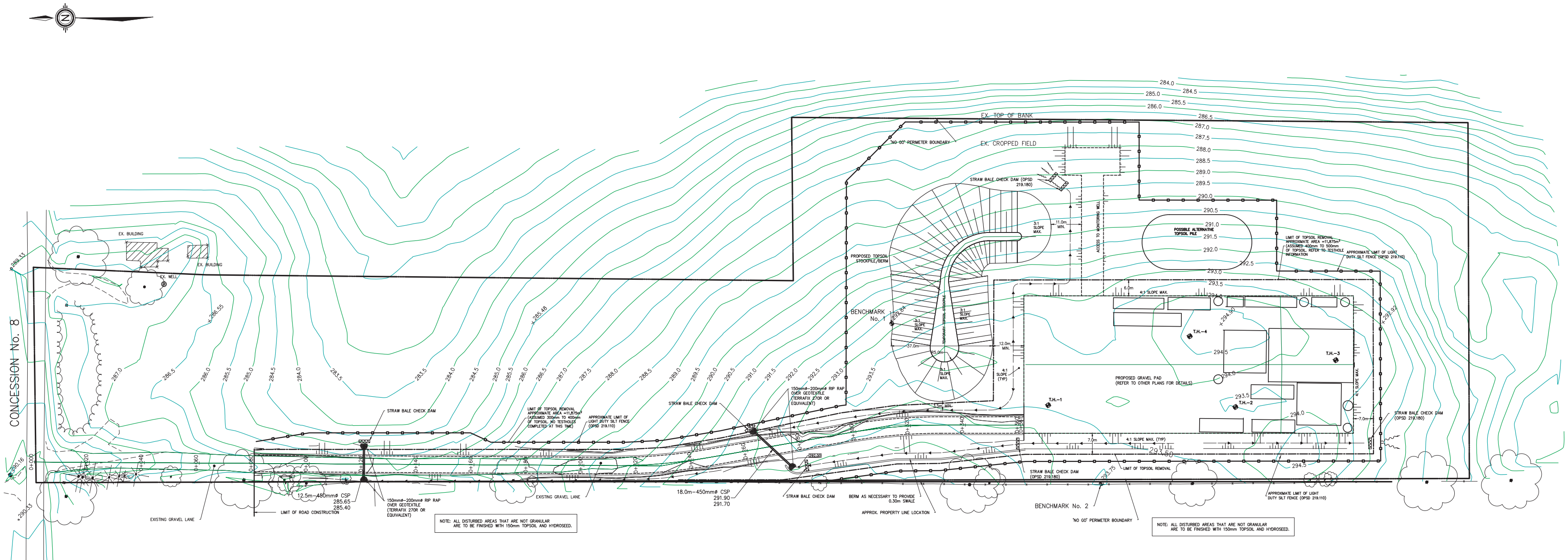

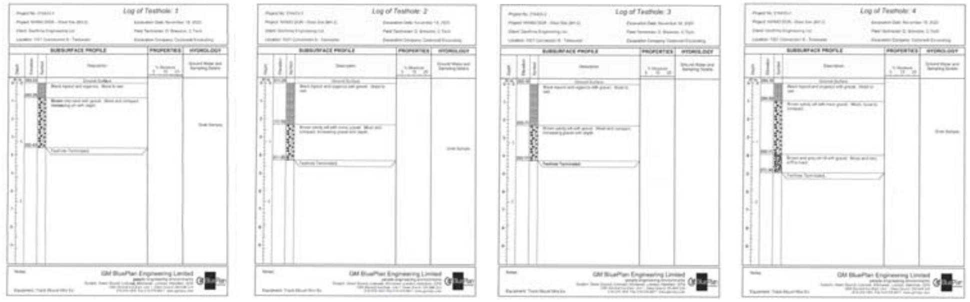

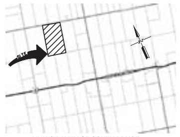

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LEGEND

Symbol	Description
	SURFACE DRAINAGE
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214.98	PROPOSED ELEVATION
	SWALE DRAINAGE
T.H.–1	TESTHOLE LOCATION AND NUMBER

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NWMO BH SITE No. 2

1257 CONCESSION 8

MUNICIPALITY OF SOUTH BRUCE

SITE PLAN

DRAWN BY :	APPROVED BY :	PROJECT NO. :	DRAWING NO. :
R.J.W.	I.E.E.	216433-2	2 of 8
DESIGNED BY :	DATE :	SCALE :	
I.E.E.	OCTOBER 19, 2020	1:750	

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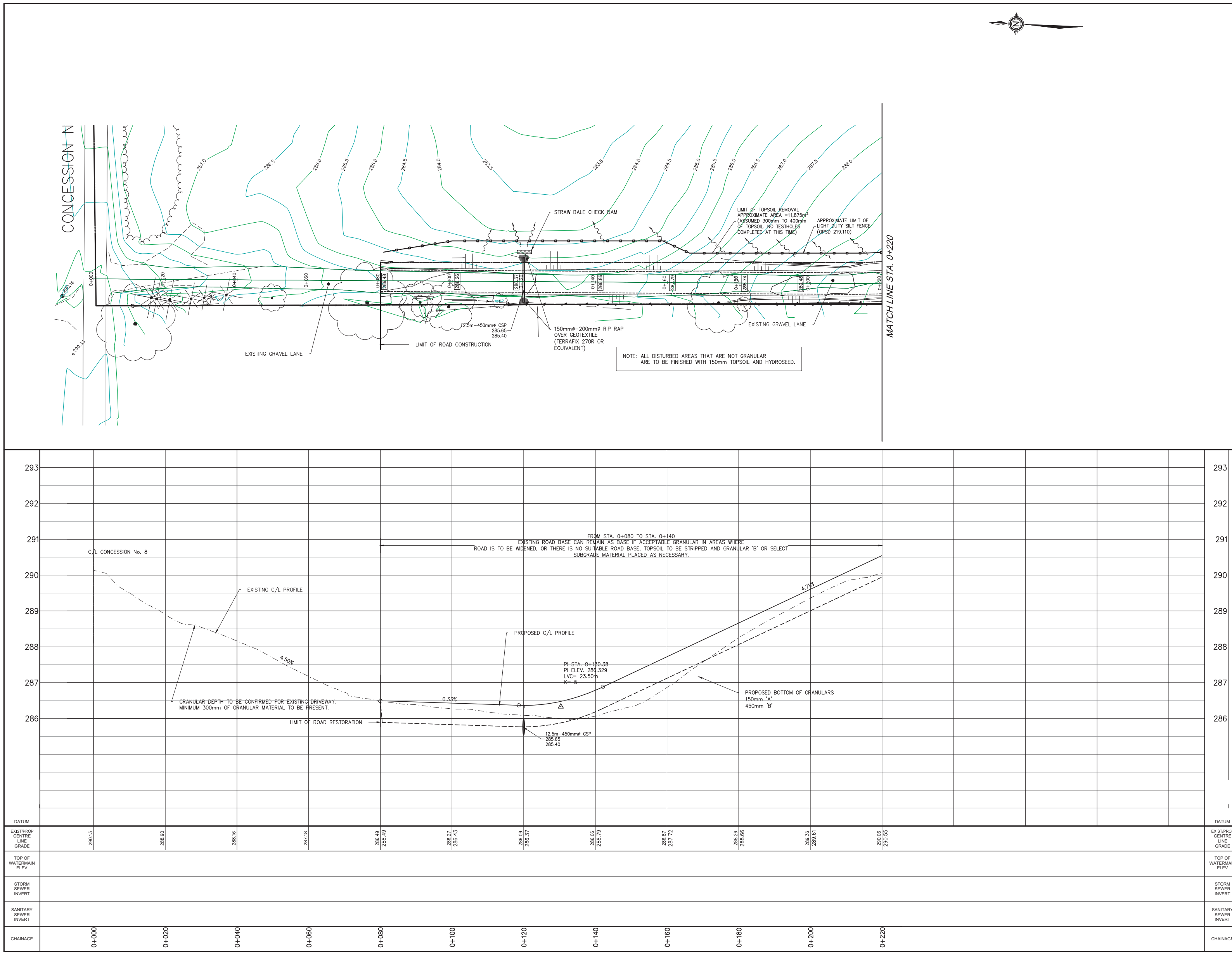

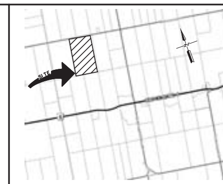

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LICENSED PROFESSIONAL ENGINEER I. E. ERIKSEN 100128824 Dec. 1/20 PROVINCE OF ONTARIO

NO.	DATE	REVISION DESCRIPTION	CH'KD
2	DEC 01 2020	ISSUED FOR QUOTATION	WED
1	NOV 30 2020	ISSUED FOR CLIENT REVIEW	WED

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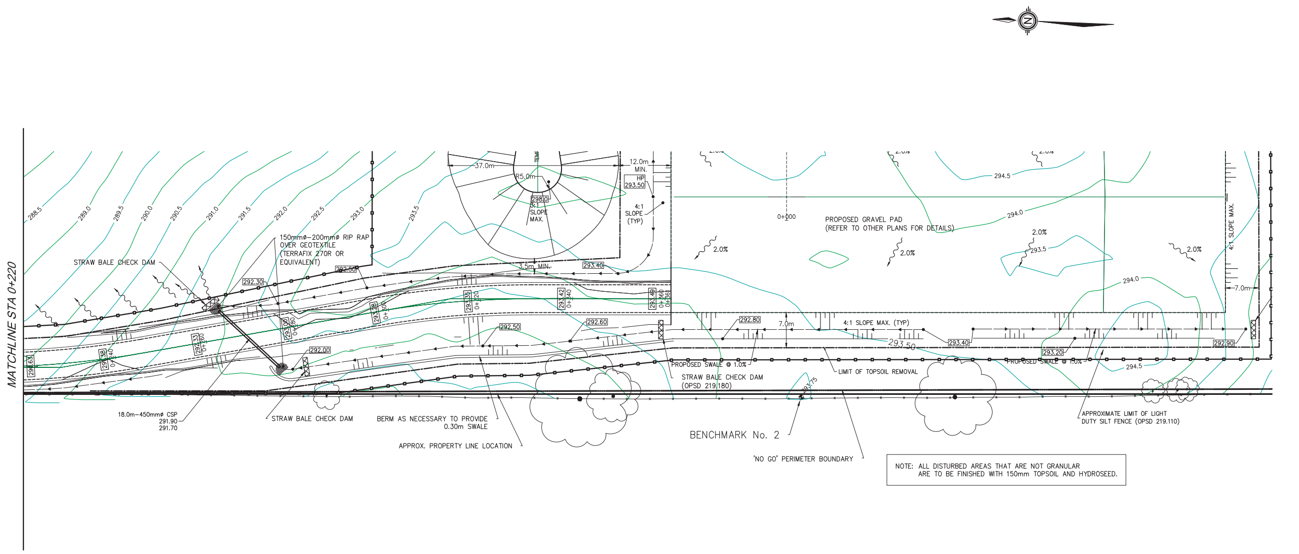
NWMO BH SITE No. 2

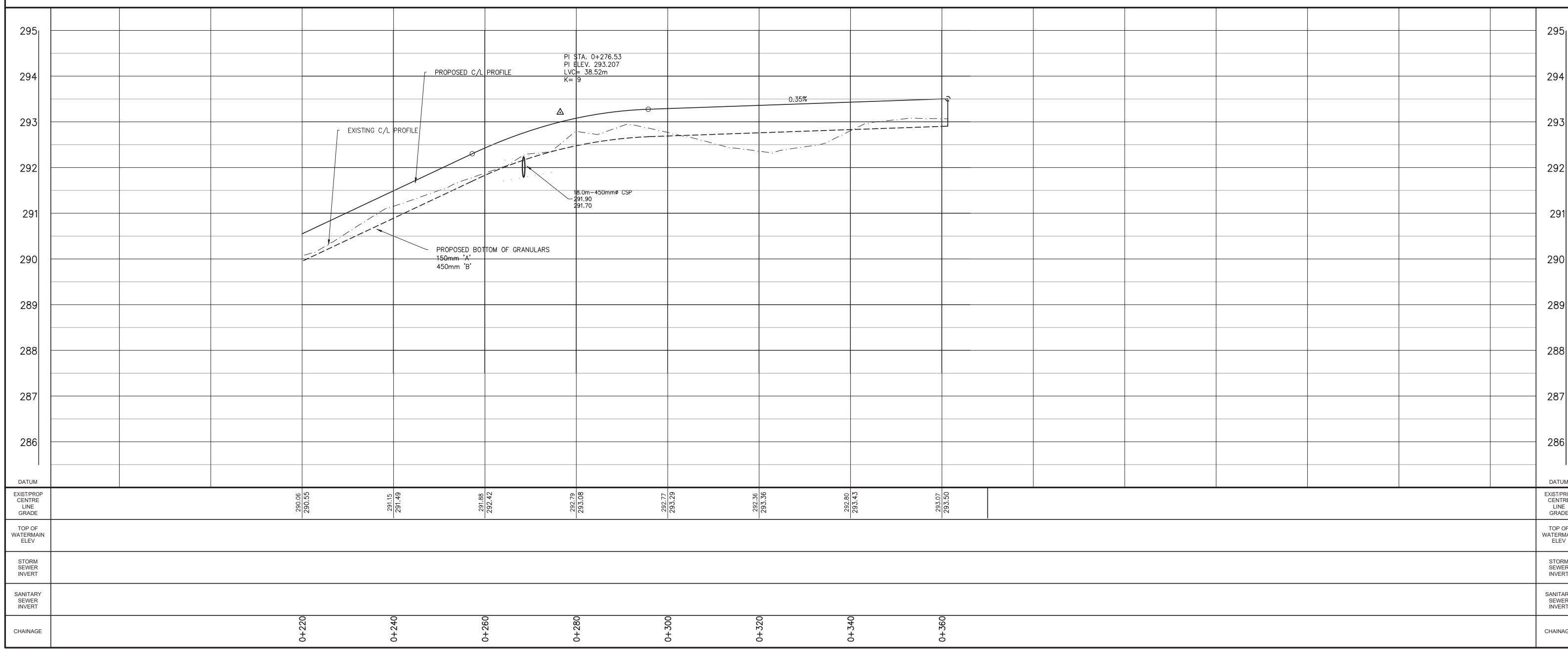
1257 CONCESSION 8

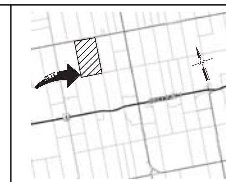
MUNICIPALITY OF SOUTH BRUCE

PLAN AND PROFILE
CONSTRUCTION ACCESS LANE

DRAWN BY :	APPROVED BY :	PROJECT NO. :	DRAWING NO. :
R.J.W.	M.N.	216433-2	3 of 8
DESIGNED BY :	DATE :	SCALE :	
M.N.	OCT 20, 2020	1:500	







NOTES :

1. TOPOGRAPHIC SURVEY CONDUCTED BY GM BLUEPLAN ENGINEERING LIMITED, OCT 16, 2020 FOR GEOFIRMA.
2. ELEVATIONS AND DIMENSIONS IN METRIC.
3. THE TOPOGRAPHIC SURVEY INCLUDED SURFACE FEATURES AND STRUCTURES AS NOTED FOR INITIAL DESIGN ONLY. DESIGNER AND CONTRACTOR ARE RESPONSIBLE TO CONFIRM UNDERGROUND LOCATION, TYPE, SIZE OF UTILITIES AND BURIED STRUCTURES. ANY DATA WITH RESPECT TO LOCATES ON THIS PLAN ARE APPROXIMATE ONLY AND REQUIRE CONFIRMATION BY OTHERS.
4. PDF PLAN IS FOR REFERENCE FOR THOSE WITHOUT CAD. FURTHER DETAILS ARE INCLUDED IN THE CAD FILE.
5. NO LEGAL PROPERTY BOUNDARY INFORMATION IS INCLUDED AS PART OF THIS PLAN. REFER TO LEGAL PLAN AS NECESSARY.

LEGEND

- SURFACE DRAINAGE
- 215.90 EXISTING CONDITIONS ELEVATION
- 214.98 PROPOSED ELEVATION
- SWALE DRAINAGE

#2 BENCHMARK ELEV. 293.75 m

TOP OF NAIL AND FLAG IN FENCE POST. WEST OF PROPOSED BOREHOLE LOCATION. (AS SHOWN)

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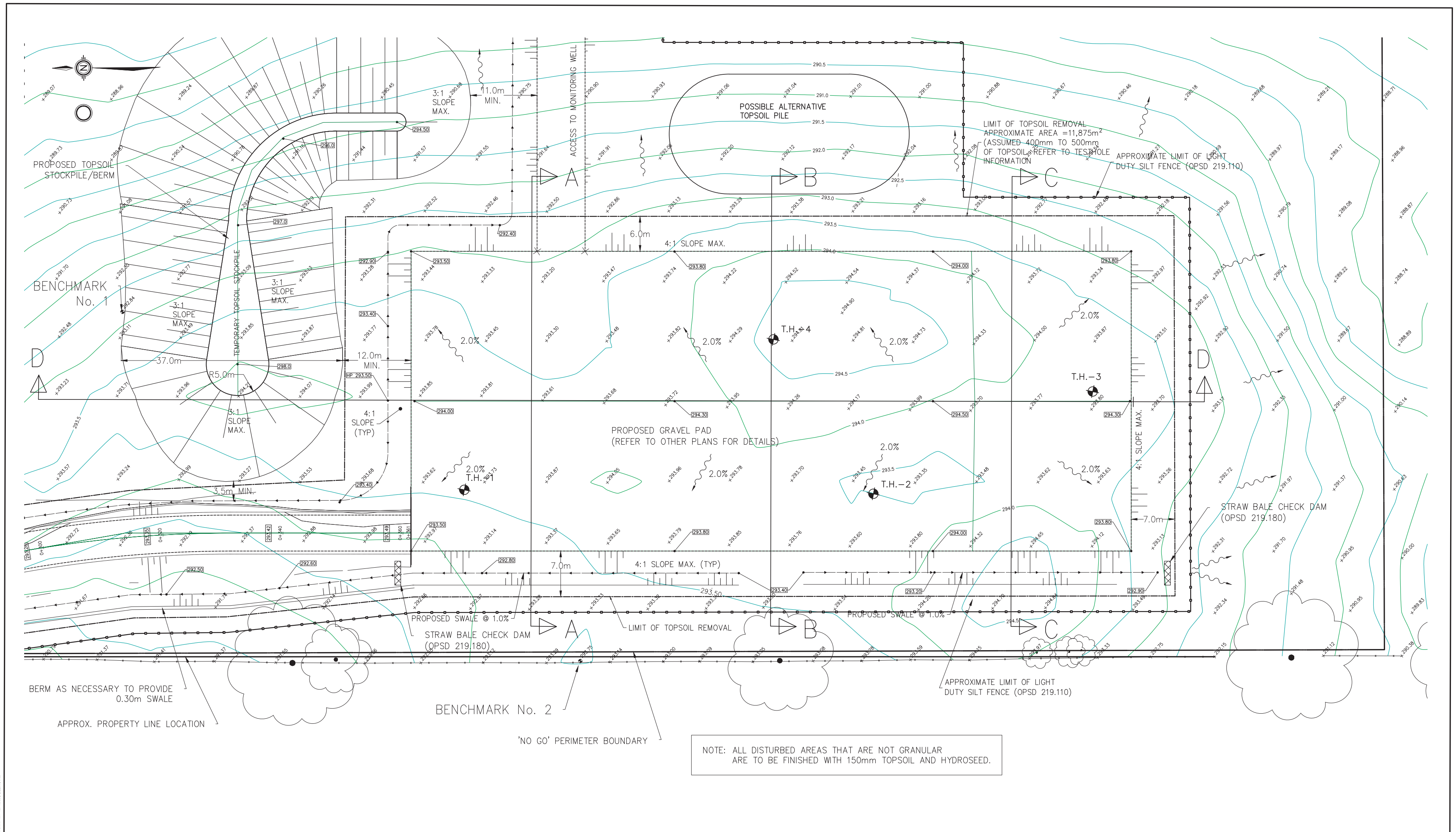
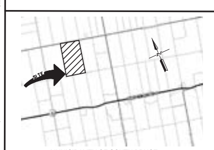


NOTE: ALL DISTURBED AREAS THAT ARE NOT GRANULAR ARE TO BE FINISHED WITH 150mm TOPSOIL AND HYDROSEED.



MUNICIPALITY OF SOUTH BRUCE
KEY PLAN
NOT TO SCALE

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LEGEND

Symbol	Description
~~>	SURFACE DRAINAGE
× 215.90	EXISTING CONDITIONS ELEVATION
214.98	PROPOSED ELEVATION
—▸—▸—	SWALE DRAINAGE
T.H.-1	TESTHOLE LOCATION AND NUMBER

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MUNICIPALITY OF SOUTH BRUCE

GRADING AND DRAINAGE PLAN

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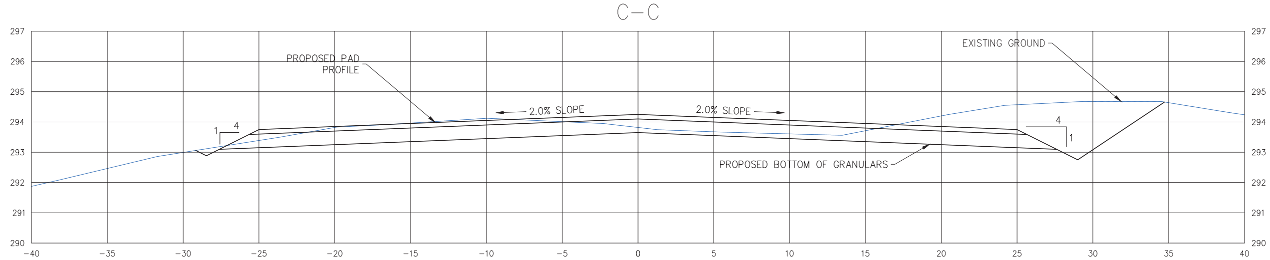
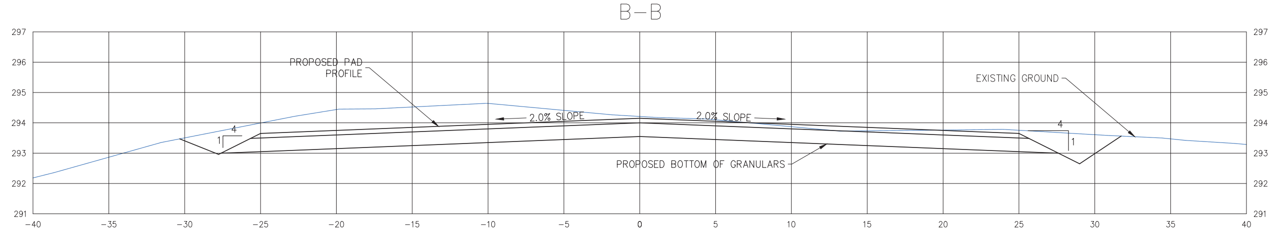
R.J.W.	I.E.E.	216433-2	5 of 8
DESIGNED BY :	DATE :	SCALE :	
I.E.E.	OCTOBER 19, 2020	1:300	

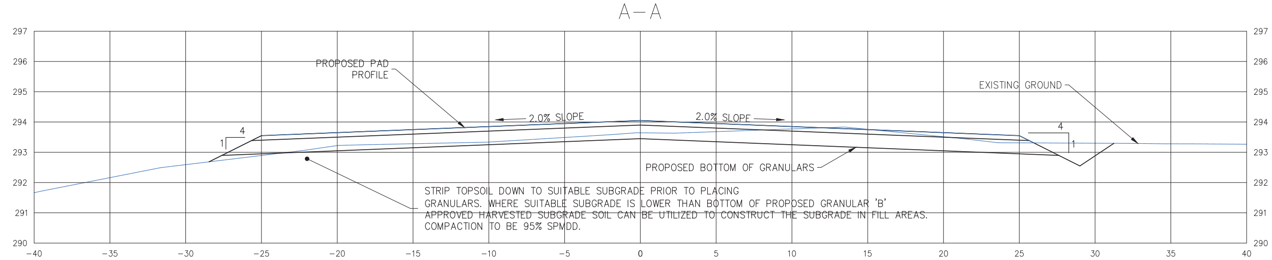
C–C



B–B

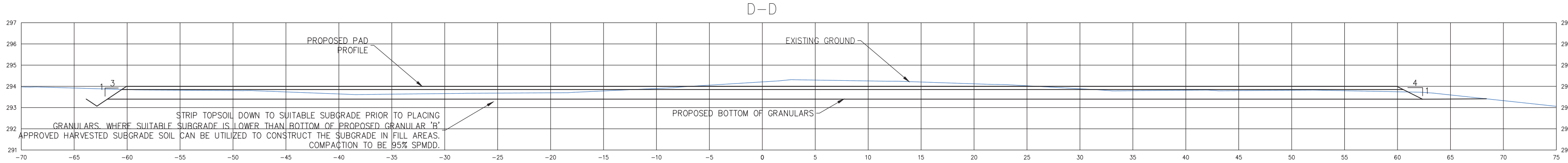


A–A

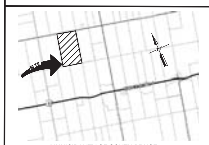


H 1:200
V 1:100

D–D



H 1:200
V 1:100



MUNICIPALITY OF SOUTH BRUCE
KEY PLAN
NOT TO SCALE

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SECTIONS

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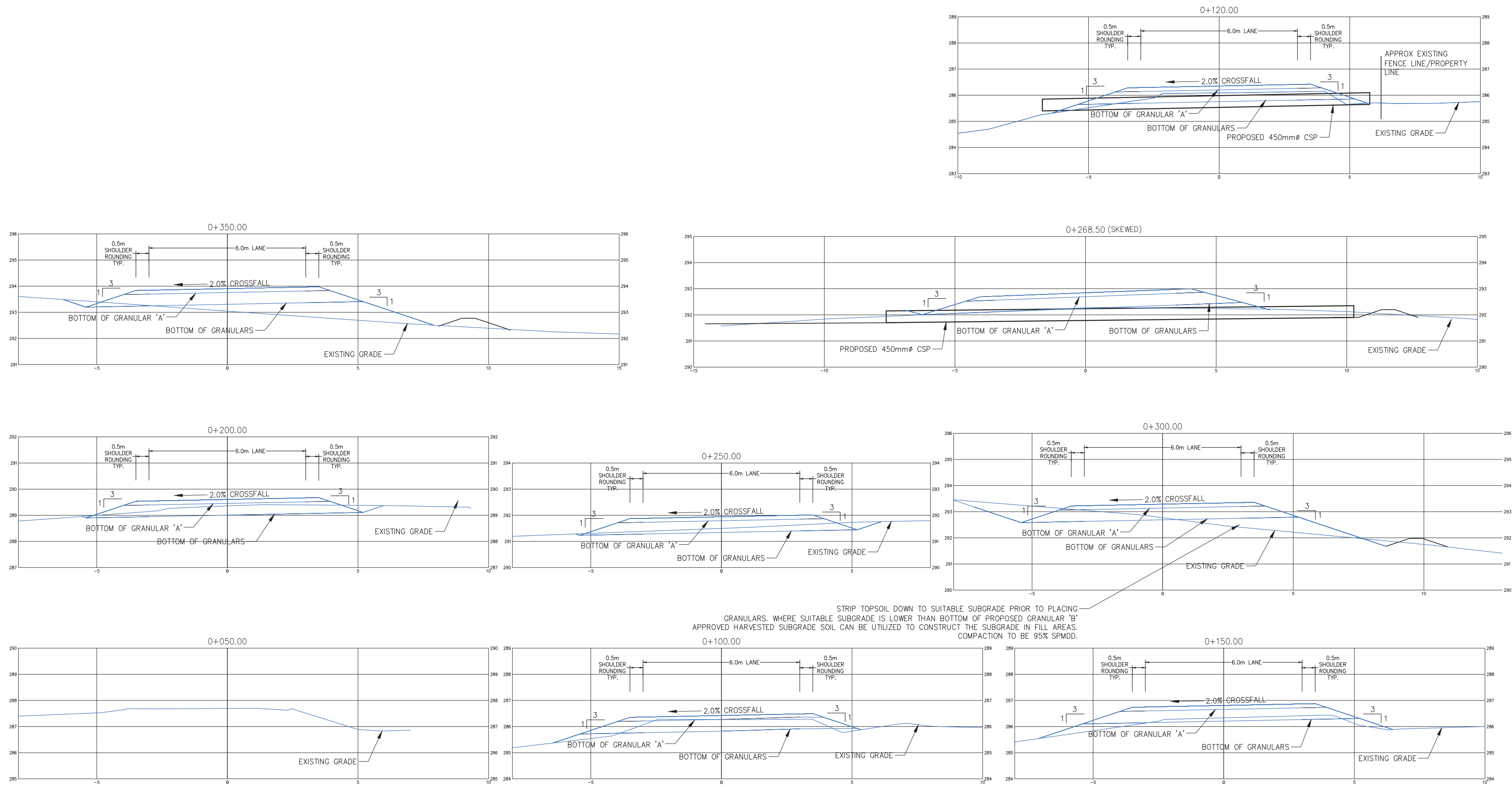

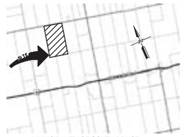

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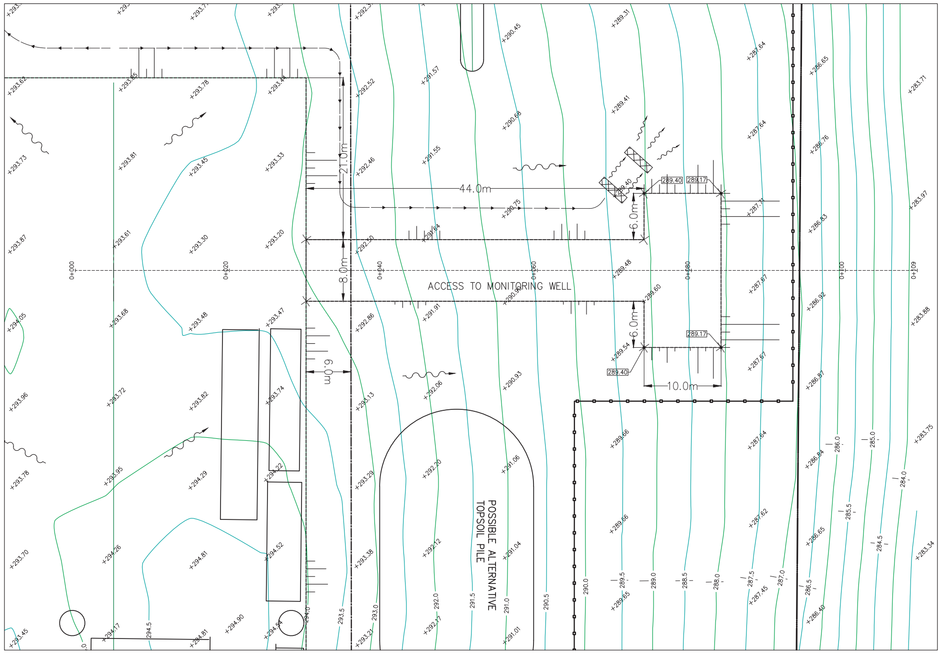
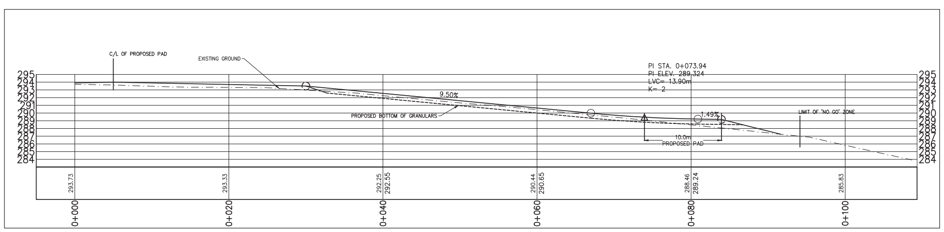
R.J.W.	I.E.E.	216433-2	7 of 8
DESIGNED BY :	DATE :	SCALE :	
I.E.E.	OCTOBER 19, 2020	1:75	



MINOR DRILL PAD ACCESS LANE PLAN
SCALE 1:300



MINOR DRILL PAD ACCESS LANE PROFILE
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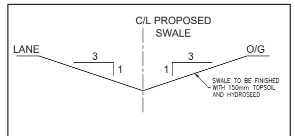

TYPICAL SWALE SECTION ALONG ACCESS LANE
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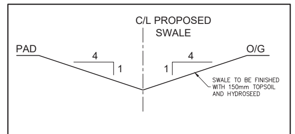

TYPICAL SWALE SECTION AROUND PAD
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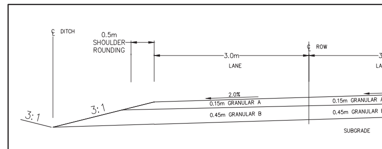
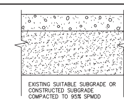
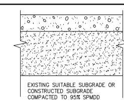


TYPICAL CONSTRUCTION ACCESS LANE CROSS SECTION
SCALE 1:50

* GRANULAR 'A' AND 'B' TO BE COMPACTED TO 100% SPMDD



CONSTRUCTED ACCESS LANE GRANULAR BASE DETAIL
N.T.S.



PAD - GRANULAR BASE DETAIL
N.T.S.

GENERAL NOTES

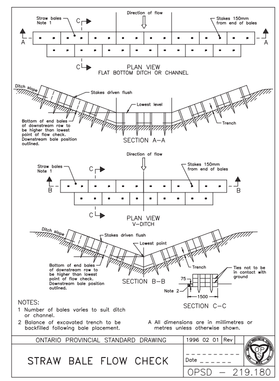
1. DRAWINGS ARE NOT TO BE SCALED.
2. ALL DIMENSIONS TO BE CHECKED AND VERIFIED ON THE SITE PRIOR TO ANY CONSTRUCTION. ANY DISCREPANCIES ARE TO BE REPORTED TO THE ENGINEER BEFORE PROCEEDING.
3. UNLESS OTHERWISE NOTED ON THE DRAWINGS THE STANDARD TOWN, AND OPSD DRAWINGS AND OPSS ARE TO CONSTITUTE PART OF THIS CONTRACT AND DRAWINGS.
4. EXISTING STRUCTURES ARE NOT TO BE DISTURBED, NOR ENCROACH ON ADJACENT PROPERTIES UNLESS SHOWN ON PLANS OR INSTRUCTED BY THE ENGINEER.
5. THE APPROVAL OF THIS PLAN DOES NOT EXEMPT THE OWNER'S CONTRACTOR FROM OBTAINING ANY NECESSARY PERMITS, INCLUDING BUT NOT LIMITED TO THE FOLLOWING, ROAD CUTS, SEWER PERMITS, RELOCATION OF SERVICES, ENCROACHMENT AGREEMENTS, APPROACH APPROVAL PERMITS, NEC DEVELOPMENT PERMITS ETC.
6. THIS PLAN IS TO BE READ IN CONJUNCTION WITH ANY OTHER PLANS OR DRAWINGS WHICH DEPICT WORKS THAT ARE PROPOSED FOR THIS SITE.
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL TRAFFIC CONTROL AND SAFETY MEASURES DURING THE CONSTRUCTION/RECONSTRUCTION PERIOD, INCLUDING THE SUPPLY, INSTALLATION AND REMOVAL OF ALL NECESSARY SIGNAGE, DELINEATORS, MARKERS, FENCING AND/OR BARRIERS.
8. THE CONTRACTOR SHALL ENDEAVOUR TO PREVENT MUD TRACKING ONTO EXISTING RIGHT-OF-WAYS AND SHALL PROVIDE FOR CLEANUP AT HIS OWN EXPENSE AS DIRECTED BY THE TOWN. THE CONTRACTOR SHALL ALSO BE RESPONSIBLE TO CONTROL DUST ON THE PROJECT AND SHALL PROVIDE CONTROLLING MEASURES AS DIRECTED BY THE TOWN.
9. THE CONTRACTOR IS RESPONSIBLE FOR LOCATING AND PROTECTING ALL EXISTING UTILITIES PRIOR TO AND DURING CONSTRUCTION. LOCATION OF EXISTING UTILITIES TO BE VERIFIED IN THE FIELD.
10. ALL CONSTRUCTION WORK IS TO BE CARRIED OUT IN ACCORDANCE WITH THE REQUIREMENTS OF THE OCCUPATIONAL HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS.
11. THE GENERAL CONTRACTOR IS RESPONSIBLE FOR CONTACTING GM BLUEPLAN ENGINEERING LIMITED FOR THE COMPLETION OF ALL REQUIRED SITE INSPECTIONS.

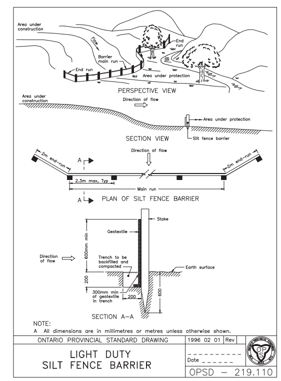
GRADING AND MATERIALS

1. CONTRACTOR TO RESTORE AREAS ON PUBLIC R.O.W. OR ADJACENT LANDS THAT HAVE BEEN DISTURBED DURING CONSTRUCTION TO PREVIOUS CONDITION OR BETTER.
2. ALL FILL WITHIN THE SITE TO BE COMPACTED TO A MIN. OF 98% STD PROCTOR DRY DENSITY. ALL FILL WITHIN THE SITE DRIVING AREA TO BE COMPACTED TO A MIN. OF 95% SPD. THE SUITABILITY OF ALL FILL MATERIALS ARE TO BE CONFIRMED BY A RECOGNIZED SOILS CONSULTANT TO THE DIRECTOR OF PUBLIC WORKS PRIOR TO INSTALLATION OF ANY ROAD BASE MATERIALS.
3. THE CONTRACTOR SHALL RECTIFY ALL DISTURBED AREAS TO ORIGINAL CONDITION OR BETTER AND TO THE SATISFACTION OF GM BLUEPLAN ENGINEERING LIMITED.
4. ALL COMPACTION TO BE VERIFIED BY A GEOTECHNICAL CONSULTANT.
5. SLOPES IN LANDSCAPE AREAS AND ON BERMS SHALL NOT EXCEED 3 HORIZONTAL TO 1 VERTICAL, UNLESS NOTED OTHERWISE

SEDIMENT AND EROSION CONTROL NOTES

1. SITE WORKS ARE TO BE STAGED IN SUCH A MANNER THAT EROSION WILL BE MINIMIZED AND THAT BARRIERS AND SEDIMENTATION FACILITIES WITHIN THE SITE ARE PROVIDED TO CONTROL ANY EROSION THAT DOES OCCUR.
2. SEDIMENT CONTROL MEASURES MUST BE ESTABLISHED TO COLLECT SURFACE DRAINAGE FROM ALL AREAS THAT WILL BE DISTURBED.
3. ALL SILT FENCING TO BE INSTALLED PRIOR TO THE COMMENCEMENT OF ANY GRADING EXCAVATION OR DEMOLITION.
4. CLEARING AND GRUBBING OF THE SITE SHOULD BE KEPT TO A MINIMUM AND VEGETATION REMOVED ONLY IN ADVANCE OF IMMEDIATE CONSTRUCTION.
5. STOCKPILES OF EARTH OR TOPSOIL ARE TO BE LOCATED AND PROTECTED TO MINIMIZE ENVIRONMENTAL INTERFERENCE. STOCKPILES SHOULD NOT BE LOCATED IMMEDIATELY ADJACENT TO DITCHES OR ROAD ALLOWANCES. EROSION CONTROL FENCING IS TO BE INSTALLED AROUND THE BASE OF ALL STOCKPILES.
6. EROSION PROTECTION TO BE PROVIDED AROUND ALL DITCHES, SWALES AND WATERCOURSES.
7. ADDITIONAL EROSION CONTROL MEASURES MAY BE REQUIRED AS SITE DEVELOPMENT PROGRESSES. THE CONTRACTOR IS TO PROVIDE ALL ADDITIONAL EROSION CONTROL STRUCTURES.
8. THE CONTRACTOR IS TO MONITOR EROSION CONTROL STRUCTURES TO ENSURE FENCING IS INSTALLED AND MAINTENANCE IS UNDERTAKEN.
9. EROSION CONTROL STRUCTURES ARE TO BE MONITORED REGULARLY AND ANY DAMAGE TO STRUCTURES REPAIRED IMMEDIATELY. SEDIMENTS ARE TO BE REMOVED WHEN ACCUMULATIONS REACH A MAXIMUM OF 50% OF THE FENCE. CLOGGED FILTER MATERIALS SUCH AS CRUSHED STONE, STRAW BALES OR FILTER CLOTH MUST BE REPLACED AS REQUIRED.
10. ALL EROSION CONTROL STRUCTURES ARE TO REMAIN IN PLACE UNTIL ALL DISTURBED GROUND SURFACES HAVE BEEN STABILIZED EITHER BY COMPACTION OR RESTORATION OF VEGETATIVE GROUND COVER.
11. THE CONTRACTOR IS RESPONSIBLE TO ENSURE THAT MUNICIPAL ROADWAYS ARE CLEANED OF ALL SEDIMENTS FROM VEHICULAR TRACKING ETC. TO AND FROM THE SITE AT THE END OF EACH WORK DAY.
12. ALL DISTURBED AREAS NOT INCLUDED IN CONSTRUCTION TO BE RE-TOPSOILED AND RE-SEEDED IMMEDIATELY AFTER COMPLETION OF AREA GRADING.





MUNICIPALITY OF SOUTH BRUCE
KEY PLAN
NOT TO SCALE

LEGEND

(symbol)	SURFACE DRAINAGE
x 215.90	EXISTING CONDITIONS ELEVATION
214.98	PROPOSED ELEVATION
(symbol)	SWALE DRAINAGE
T.H.-1	TESTHOLE LOCATION AND NUMBER

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MUNICIPALITY OF SOUTH BRUCE
DETAILS AND NOTES

DRAWN BY :	APPROVED BY :	PROJECT NO. :	DRAWING NO. :
R.J.W.	I.E.E.	216433-2	8 of 8
DESIGNED BY :	DATE :	SCALE :	
I.E.E.	OCTOBER 19, 2020	-	

Appendix B

GM BluePlan Reports

1. Survey Report (Pre-Construction)
2. Field Review Reports
3. Materials Testing Reports
4. Equipment Calibration Certificates

TOPOGRAPHICAL SURVEY REPORT
NWMO DGR – INVESTIGATION TECHNICAL SUPPORT
WEST SITE (BH02) - CONCESSION 8 TEESWATER, ON
GEOFIRMA ENGINEERING LTD.

File No. 216433

DATE OF SURVEY: Oct 16, 2020
TECHNICIAN: Luc Lapointe
WEATHER: Partly Cloudy, 15°C
REMARKS:

- CREW:
  - Party chief: Luc Lapointe

- INSTRUMENTS:
  - GPS: Trimble R10
  - Total Station: Trimble S3
    - Calibration Certificate Date: February 6, 2020
  - Data Collector: Trimble TSC3
- COORDINATE SYSTEM
  - Horizontal: NAD1983-CSRS V6 (Epoch 2010.0) (Zone 17N) (Acquired via CanNet VRS)
  - Vertical Datum: CGVD27:78 (Acquired via CanNet VRS & HT2.0 geoid model)
- COORDINATE SYSTEM VERIFICATION
  - Horizontal:
    - Monument #00820040101
      - ΔNorthing: 0.003 m
      - ΔEasting: 0.009 m
  - Vertical:
    - Monument #MTO 65-303
      - ΔElevation: 0.041 m
    - Monument #MTO 65-300
      - ΔElevation: 0.046 m
- SITE BENCHMARKS
  - Benchmark Elevation 293.75 m: Top of Nail in Fence Post West of Proposed Borehole Location (As Shown on Site Plan)
  - Benchmark Elevation 292.84 m: Top of Rebar North of Proposed Borehole Location (As Shown on Site Plan)
  - Benchmark Elevation 290.16 m: Top of Nail in Utility Pole north of Entrance (As Shown on Site Plan)

GM BLUEPLAN ENGINEERING LIMITED
Per:
Luc Lapointe

FIELD REVIEW REPORT #1
NWMO – DGR
WEST SITE (BH-2) – CONCESSION 8, TEESWATER
GEOFIRMA ENGINEERING LIMITED

File No. 216433-2

DATES OF REVIEW: See Below

TECHNICIAN: Derek Brewster, C.Tech

WEATHER: See Below

REMARKS:

As arranged with Geofirma Engineering Limited, the undersigned visited the above noted site on the dates outlined below to review construction activities and conduct materials testing and construction layout to support the civil design. It should be noted that the civil design drawings for the site were prepared by GM BluePlan Engineering Limited (GMBP) and are dated December 4, 2020. It is understood that Geofirma Engineering Ltd. staff are monitoring and documenting the day-to-day site-specific construction activities completed by the contractor (Cedarwell Excavating Limited).

December 11, 2020 (+6°C, Overcast and Warm)

The undersigned attended the site to provide construction layout for the access road review, the construction limits, and subgrade elevations with the contractor. In addition, two shallow testholes were excavated in the existing field access laneway to confirm organic soil removal, and to confirm that the existing granular base has an equivalency comparable to the proposed 0.45m thick Granular 'B' roadbase. The location of these two testholes were noted to be at approximate Station 0+120 and 0+200 referenced from the above noted plan. Based on the findings of these shallow testholes, there was minimal presence of historical organics and the thickness of historical granulars were found to be in excess of 0.45 meters.

Beyond approximate station 0+200, the contractor has cleared the surficial topsoil and organics from within the proposed roadway and stockpiled the organics east of the roadway (between Stataion 0+200 and 0+300). In addition, a larger area between Station 0+300 and 0+360 was stripped of organics east of the proposed roadway in order to generate harvestable inorganic fill soils. These harvested fill soils will be installed in compacted lifts along the roadway between approximate Stations 0+300 and 0+340 to construct the roadway to the designed subgrade elevations. In addition, additional fill soils are also required west of the roadway between approximate Stations 0+260 to 0+360 to construct the proposed ditching.

December 14, 2020 (-1°C, Overcast with light Rain/Snow mix)

The undersigned attended the site to witness the progress of the site development, which is mainly focused on the access road construction. The roadway subgrade construction was generally complete, and the stability of the recently installed harvested fill was assessed by "proof-rolling" the subgrade using a 64" Ø ride-on steel drum roller. No excessive subgrade deflection or deformations were noted across the recently constructed road subgrade when loaded using the above noted ride-on roller. Therefore, the installation of the proposed imported Granular 'B' could proceed between Stations 0+200 to 0+300. It should be noted that the construction of the existing granular access laneway was also witnessed to identify any performance related issues during the importation of the Granular 'B' using fully loaded tri-axle dump trucks. Based on the observations during the Granular 'B' importing activities, the existing granular access road was noted to perform with no excessive deflections or deformations noted.

In addition to the proposed access roadway works, the contractor has also elected to construct a small turn-around area near Station 0+200 (extending easterly). This area was also stripped of surficial organics and will also receive granular fill for stability of the turn-around area. This additional construction turnaround was determined by the contractor as an additional safety measure so the distance of reversing trucks could be reduced and staging of trucks are not backlogged onto Concession 8 due to the 300 meter long single width access laneway.

December 17, 2020 (-3°C, Overcast with trace Snow)

The undersigned attended the site to monitor progress of the Granular 'B' installation along the length of the proposed access roadway, ending at the granular drilling pads. As noted above, grade stakes were installed along the perimeter of the roadway at various stations between Station 0+200 and 0+300. At this point, (based on the existing access laneway's current performance) no additional Granular 'B' fill will be installed north of Station 0+200 as the historic granular fill is currently performing adequately. Granular 'A' will however be placed at a later date.

It is understood that the contractor (Cedarwell Excavating Ltd.) had equipment breakdown earlier today which will require the D8 bulldozer to be mobilized form the site. A Christmas shutdown was scheduled at the end of this week, however, this equipment breakdown advanced the schedule. Nevertheless, prior to the shutdown, the majority of the Granular 'B' access road had been constructed to grade and compacted, with approximately 200 tonnes of Granular 'B' remaining to be installed. In attempts to track the Granular 'B' quantities installed to construct the access road to date, truck tickets were requested from Cedarwell Excavating Ltd.

Additional site visits for materials testing and subsequent subgrade reviews will be conducted as an on-going arrangement with this office as construction works extend into the new year.

GM BLUEPLAN ENGINEERING LIMITED
Per:

Derek Brewster, C.Tech.
DB/mr

cc: Cedarwell Excavating Ltd.: Jayson Long, jlong@cedarwellexcavating.com
Geofirma Engineering Limited: Sean Sterling, ssterling@geofirma.com Glen Briscoe, gbriscoe@geofirma.com
Geofirma Engineering Limited: Tim Galt, tgalt@geofirma.com
Owner: via Geofirma Engineering Limited.
GMBP: Bill Dubeau, P.Eng. – bill.dubeau@gmblueplan.ca Ian Eriksen, P.Eng, - ian.eriksen@gmblueplan.ca
GMBP: Matt Nelson, P.Eng – matt.nelson@gmblueplan.ca
File No. 216433-2

FIELD REVIEW REPORT #2
NWMO – DGR
WEST SITE (BH-2) – CONCESSION 8, TEESWATER
GEOFIRMA ENGINEERING LIMITED

File No. 216433-2

DATES OF REVIEW: See Below

TECHNICIAN: Derek Brewster, C.Tech

WEATHER: See Below

REMARKS:

As arranged with Geofirma Engineering Limited, the undersigned visited the above noted site on the dates noted below to review construction activities and conduct materials testing and construction layout to support the civil design. It should be noted that the civil design drawings for the site were prepared by GM BluePlan Engineering Limited (GMBP) and are dated December 4, 2020. It is understood that Geofirma Engineering Ltd. staff are monitoring and documenting the day-to-day site-specific construction activities completed by the contractor (Cedarwell Excavating Limited).

January 6, 2021 (+2°C, Overcast)

The undersigned attended the site to review the site stripping and confirm the stability of the inorganic subgrade across the proposed gravel pad area. In addition, construction layout for the proposed gravel pad, along with the collection of topographic elevations across the subgrade were completed using a Trimble S3 Total Station. As noted in Field Review No. 1, the access laneway to the gravel pad was constructed in December 2020.

Upon arrival to the site, the contractor has cleared the surficial topsoil and organics across the entire proposed gravel pad (with the exception of the lower pad and associated laneway for the proposed monitoring well). The topsoil has been stockpiled along the northern limits of the gravel pad and the cut fill areas of the subgrade have been identified. It is understood that the contractor will attempt to utilize the “cut” areas consisting of the native sandy silt soils to harvest and place as fill to level the subgrade in the area of the gravel pad.

January 7, 2021 (-1°C, Clear)

The undersigned attended the site to witness the progress of the site development, which is mainly focused on finishing the topsoil removal and constructing the subgrade across the gravel pad area. The subgrade construction was being completed using harvested fill and compacted using a 64” Ø ride-on steel drum roller. It was noted that no excessive subgrade deflection or deformations occurred across in these fill areas when using the above noted ride-on roller. Subsequently, compaction testing was performed using an Instrotek 3500 Explorer moisture/density gauge. As a result, the installation of the proposed imported Granular ‘B’ could proceed across the pad area.

Additional site visits for materials testing, subsequent subgrade reviews, and surveying will be conducted as an on-going arrangement with this office as construction works continue.

GM BLUEPLAN ENGINEERING LIMITED
Per:

Derek Brewster, C.Tech.
DB/mr

cc: Cedarwell Excavating Ltd.: Jayson Long, jlong@cedarwellexcavating.com
Geofirma Engineering Limited: Sean Sterling, ssterling@geofirma.com Glen Briscoe, gbriscoe@geofirma.com
Geofirma Engineering Limited: Tim Galt, tgalt@geofirma.com
Owner: via Geofirma Engineering Limited.
GMBP: Bill Dubeau, P.Eng. – bill.dubeau@gmblueplan.ca Ian Eriksen, P.Eng, - ian.eriksen@gmblueplan.ca
GMBP: Matt Nelson, P.Eng – matt.nelson@gmblueplan.ca
File No. 216433-2

FIELD REVIEW REPORT #3
NWMO – DGR
WEST SITE (BH-2) – CONCESSION 8, TEESWATER
GEOFIRMA ENGINEERING LIMITED

File No. 216433-2

DATES OF REVIEW: See Below

TECHNICIAN: Derek Brewster, C.Tech

WEATHER: See Below

REMARKS:

As arranged with Geofirma Engineering Limited, the undersigned visited the above noted site on the dates noted below to review construction activities and conduct materials testing and construction layout to support the civil design. It should be noted that the civil design drawings for the site were prepared by GM BluePlan Engineering Limited (GMBP) and are dated December 4, 2020. It is understood that Geofirma Engineering Ltd. staff are monitoring and documenting the day-to-day site-specific construction activities completed by the contractor (Cedarwell Excavating Limited).

January 12, 2021 (-2°C, Freezing Rain)

The undersigned attended the site to confirm the completion of site stripping and witness the commencement of the importing of the Granular 'B' for the proposed gravel pad area. In addition, a subgrade survey was completed to confirm the elevations across the subgrade of the gravel pad. Compaction testing was also performed using an Instrotek 3500 Explorer moisture/density gauge on the subgrade fill areas in preparation to receive the imported Granular 'B'. It was noted that all of the inorganic soils have been utilized in the cut/fill to construct the subgrade. A relatively small balance of required subgrade fill remains along the southern pad boundary. Since there are no additional harvestable fill soils from the site, this balance of fill will consist of imported granular fill. It was noted that the importing of the Granular 'B' has started and is being installed at the end of the access road to the mid-point of the pad and extending in a southerly direction.

January 13, 2021 (+2°C, Fog)

The undersigned attended the site to conduct compaction testing on the recently installed imported Granular 'B'. These compaction testing results will follow under a separate cover. It was noted that due to the current volume of imported granular fill, the Bester Pit may not be able to keep up with the supply demand. Therefore, hauling from the Cedarwell Hanover Pit will likely result to supplement the required imported volumes of granular material.

January 15, 2021 (+2°C, Overcast with Fog)

The undersigned attended the site to conduct compaction testing on the recently installed imported Granular 'B', which is being installed in a progressive manner across the pad area. It is understood that the Hanover Pit will be utilized as today's pit source. These compaction testing results will follow under a separate cover.

FIELD REVIEW REPORT #4
NWMO – DGR
WEST SITE (BH-2) – CONCESSION 8, TEESWATER
GEOFIRMA ENGINEERING LIMITED

File No. 216433-2

DATES OF REVIEW: See Below

TECHNICIAN: Derek Brewster, C.Tech

WEATHER: See Below

REMARKS:

As arranged with Geofirma Engineering Limited, the undersigned visited the above noted site on the dates noted below to review construction activities and conduct materials testing and construction layout to support the civil design. It should be noted that the civil design drawings for the site were prepared by GM BluePlan Engineering Limited (GMBP) and are dated December 4, 2020. It is understood that Geofirma Engineering Ltd. staff are monitoring and documenting the day-to-day site-specific construction activities completed by the contractor (Cedarwell Excavating Limited).

January 18, 2021 (-2°C, Windy, Cool)

The undersigned attended the site to survey the constructed grade of the imported Granular 'B' along with continuing to complete compaction testing of the constructed gravel pad area. In addition, a subgrade survey was completed across the secondary drill pad area and the lane which accesses the secondary drill pad. Based on the slope of the encountered subgrade of the secondary drill pad, it was recommended to be regraded to a slightly lower elevation to reduce the amount of additional imported granular fill required to construct to the designed subgrade elevations. Lowering the subgrade will also reduce the adjacent slopes and limits of the grading required east of the secondary drill pad.

January 20, 2021 (-4°C, Overcast with periods of Snow)

The undersigned attended the site to witness the progress of importing granulars and constructing the granular pad. It is understood from discussions with Geofirma staff that the Granular 'B' importing was completed at the end of the day on January 18th and the importing of the Granular 'A' from the Bester Pit commenced January 19th. Nevertheless, a sample the Granular 'A' was obtained during today's site visit to confirm gradation and crushed particle conformance to the OPSS 1010 Granular 'A' Grading Specifications. Due to yesterday's snowfall and sub-zero temperatures, compaction testing of the Granular 'A' will be deferred until the spring, as it is expected that the granular pad will require final grading and final compaction.

January 22, 2021 (-10°C, Heavy Snow and Windy)

The undersigned attended the site to confirm the installation completion of the Granular 'A' down the length of the access road. At the time of the site visit, no contractor or supervisor personnel or were on site. However, the contractor's approach to "bulk" and rough grade the imported granular materials onto the site prior to "half-load" restrictions on the local roadways has generally been achieved.

Additional site visits in the spring to review the remainder of the site development works will be arranged in the spring of 2021.

GM BLUEPLAN ENGINEERING LIMITED
Per:

Derek Brewster, C.Tech.
DB/mr

cc: Cedarwell Excavating Ltd.: Jayson Long, jlong@cedarwellexcavating.com
Geofirma Engineering Limited: Sean Sterling, ssterling@geofirma.com Glen Briscoe, gbriscoe@geofirma.com
Geofirma Engineering Limited: Tim Galt, tgalt@geofirma.com
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GMBP: Bill Dubeau, P.Eng. – bill.dubeau@gmblueplan.ca Ian Eriksen, P.Eng, - ian.eriksen@gmblueplan.ca
GMBP: Matt Nelson, P.Eng – matt.nelson@gmblueplan.ca
File No. 216433-2

Additional site visits for materials testing, subsequent subgrade reviews, and surveying will be conducted as an on-going arrangement with this office as construction works continue.

GM BLUEPLAN ENGINEERING LIMITED
Per:

Derek Brewster, C.Tech.
DB/mr

cc: Cedarwell Excavating Ltd.: Jayson Long, jlong@cedarwellexcavating.com
Geofirma Engineering Limited: Sean Sterling, ssterling@geofirma.com Glen Briscoe, gbriscoe@geofirma.com
Geofirma Engineering Limited: Tim Galt, tgalt@geofirma.com
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GMBP: Matt Nelson, P.Eng – matt.nelson@gmblueplan.ca
File No. 216433-2

TRANSMITTAL

To: Geofirma Engineering Ltd.
1 Raymond Street
Suite 200
Ottawa, ON K1R 1A2

Attention: Sean Sterling

Date: July 20, 2021

Project No.: 216433-2

Project: NWMO DGR – West Site (BH-2)
Teeswater, ON

Delivery: Email: ssterling@geofirma.ca

ENCLOSED

- Compaction Test Results No. 35 to 44 – Granular "A" for Pad Area & Access Road – March 30, 2021.
- Compaction Test Results No. 45 to 50 – Cellar Backfill – May 28, 2021.

REMARKS

The compaction test results were satisfactory at the tested locations as noted.

ACTION REQUIRED

☒ Approved
☐ Approved as Noted
☐ Revised as Noted
☐ Not Approved
☐ For Your Approval
☐ For Your Information and Use

Yours truly,

GM BLUEPLAN ENGINEERING LIMITED
Per:

Derek Brewster, C.Tech.
DB/mr

cc: Cedarwell Excavating Ltd.: Jayson Long, jlong@cedarwellexcavating.com
Geofirma Engineering Limited: Glen Briscoe, gbriscoe@geofirma.com
Geofirma Engineering Limited: Tim Galt, tgalt@geofirma.com
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GMBP: Matt Nelson, P.Eng – matt.nelson@gmblueplan.ca
File No. 216433-2

FIELD COMPACTION TEST RESULTS

Project No.: 216433-2 **Project:** NWMO DGR - West Site (BH-1) - Construction Support
Client: Geofirma Engineering Ltd.
1 Raymond Street, Suite 200,
Ottawa, ON K1R 1A2
Area Tested: Granular 'A' - Pad Area

Site Location: Teeswater, ON
Contractor: Cedarwell Excavating Ltd.
Subcontractor:
Date: March 30, 2021

	Type Of Material Tested	Specified Compaction %	Max. Lab Density (tonnes/m^3)	☑ Standard Proctor ☐ Modified Proctor
1.	Native Sandy Silt with Gravel - Harvested from On-Site	98%	1.950 - 2.050 varies with stone content	
2.	Imported Pit Run Sand and Gravel - Bester Pit/Hanover Pit, Granular 'B'	100%	2.200 est.	
3.	Imported Crushed Sand and Gravel - Hanover Pit, Granular 'A'	100%	2.200 est.	
4.				
5.				

Test No.	Location of Test	Test Elev.	Material	Dry Density	% Moisture	% Compaction	Recommendations
35	See Attached Drawing	A-Grade	3	2.275	5.4	100.0	X
36	See Attached Drawing	A-Grade	3	2.211	5.2	100.0	X
37	See Attached Drawing	A-Grade	3	2.218	4.9	100.0	X
38	See Attached Drawing	A-Grade	3	2.244	4.9	100.0	X
39	See Attached Drawing	A-Grade	3	2.225	5.5	100.0	X
40	See Attached Drawing	A-Grade	3	2.213	4.3	100.0	X
41	See Attached Drawing	A-Grade	3	2.217	5.1	100.0	X
42	See Attached Drawing	A-Grade	3	2.234	5.2	100.0	X
43	See Attached Drawing	A-Grade	3	2.230	4.7	100.0	X
44	See Attached Drawing	A-Grade	3	2.207	4.8	100.0	X

ABBREVIATIONS:
F.G. -Finish Grade
B.F.G. -Below Finish Grade
S.G. -SubGrade
B.S.G. -Below Subgrade
B.F.F. -Below Finished Floor

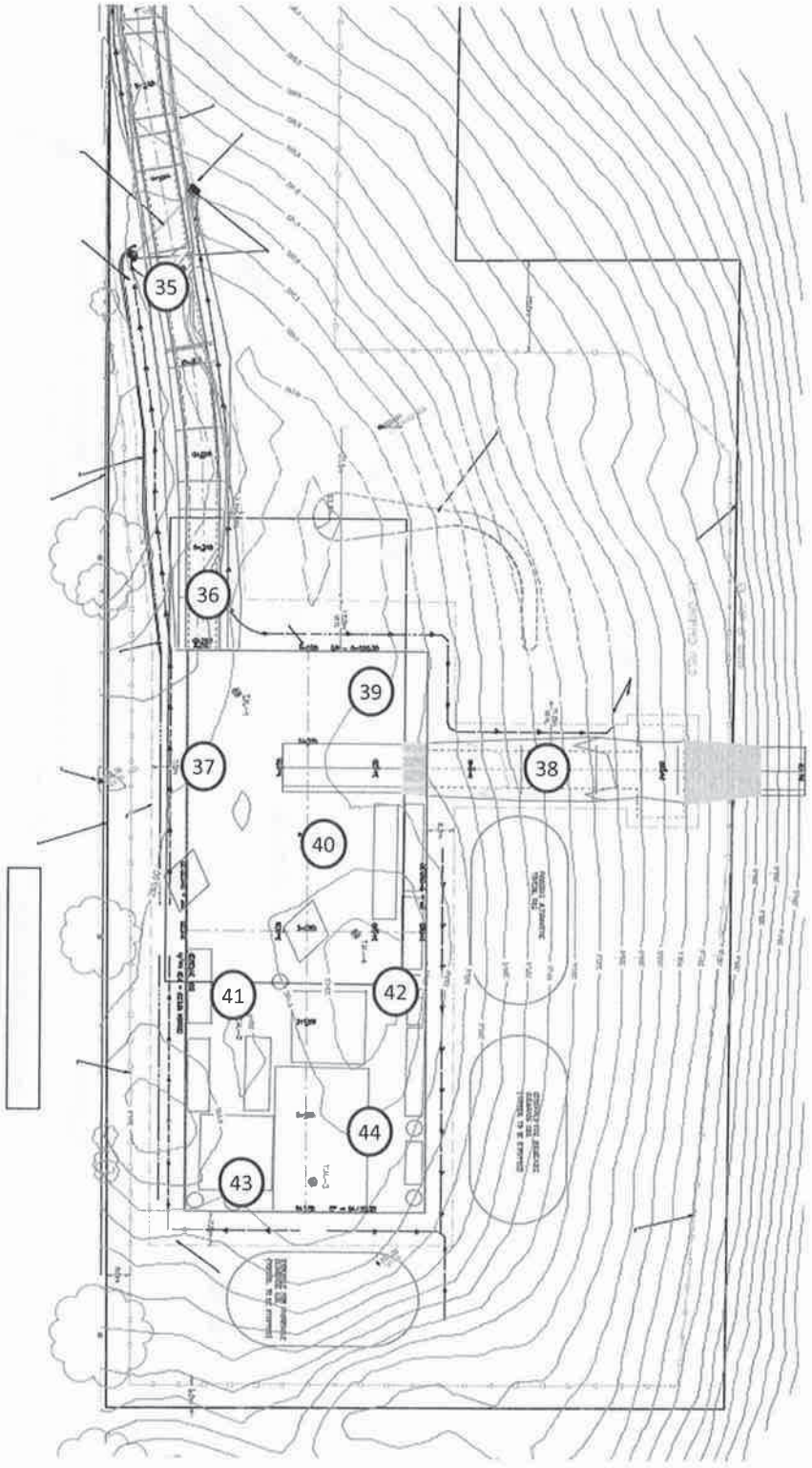
RECOMMENDATIONS
X - Satisfactory
Y - Re-Compact
Z - Re-Compact and Re-Test

RESULTS ARE:
☐ Preliminary
☑ Final

REMARKS:

INSPECTOR: Derek Brewster
GM BluePlan Engineering Limited

NWMO DGR - West Site (BH-2) - Construction Support
Compaction Test Locations
March 30, 2021
GMBP File: 216433-2



FIELD COMPACTION TEST RESULTS

Project No.: 216433-2 **Project:** NWMO DGR - West Site (BH-1) - Construction Support
Client: Geofirma Engineering Ltd.
1 Raymond Street, Suite 200,
Ottawa, ON K1R 1A2
Area Tested: Cellar Backfill

Site Location: Teeswater, ON
Contractor: Hayes Electrical
Subcontractor: Peter Inglis Construction
Date: May 28, 2021

	Type Of Material Tested	Specified Compaction %	Max. Lab Density (tonnes/m^3)	☑ Standard Proctor ☐ Modified Proctor
1.	Native Sandy Silt with Gravel - Harvested from On-Site	98%	1.950 - 2.050 varies with stone content	
2.	Imported Pit Run Sand and Gravel - Bester Pit/Hanover Pit, Granular 'B'	100%	2.200 est.	
3.	Imported Crushed Sand and Gravel - Hanover Pit, Granular 'A'	100%	2.200 est.	
4.				
5.				

Test No.	Location of Test	Test Elev.	Material	Dry Density	% Moisture	% Compaction	Recommendations
45	See Attached Drawing	0.6m BFG	3	2.241	5.9	100.0	X
46	See Attached Drawing	0.6m BFG	3	2.223	6.1	100.0	X
47	See Attached Drawing	A-Grade	3	2.218	6.0	100.0	X
48	See Attached Drawing	A-Grade	3	2.230	5.7	100.0	X
49	See Attached Drawing	A-Grade	3	2.209	5.5	100.0	X
50	See Attached Drawing	A-Grade	3	2.214	6.2	100.0	X

ABBREVIATIONS:
F.G. -Finish Grade
B.F.G. -Below Finish Grade
S.G. -SubGrade
B.S.G. -Below Subgrade
B.F.F. -Below Finished Floor

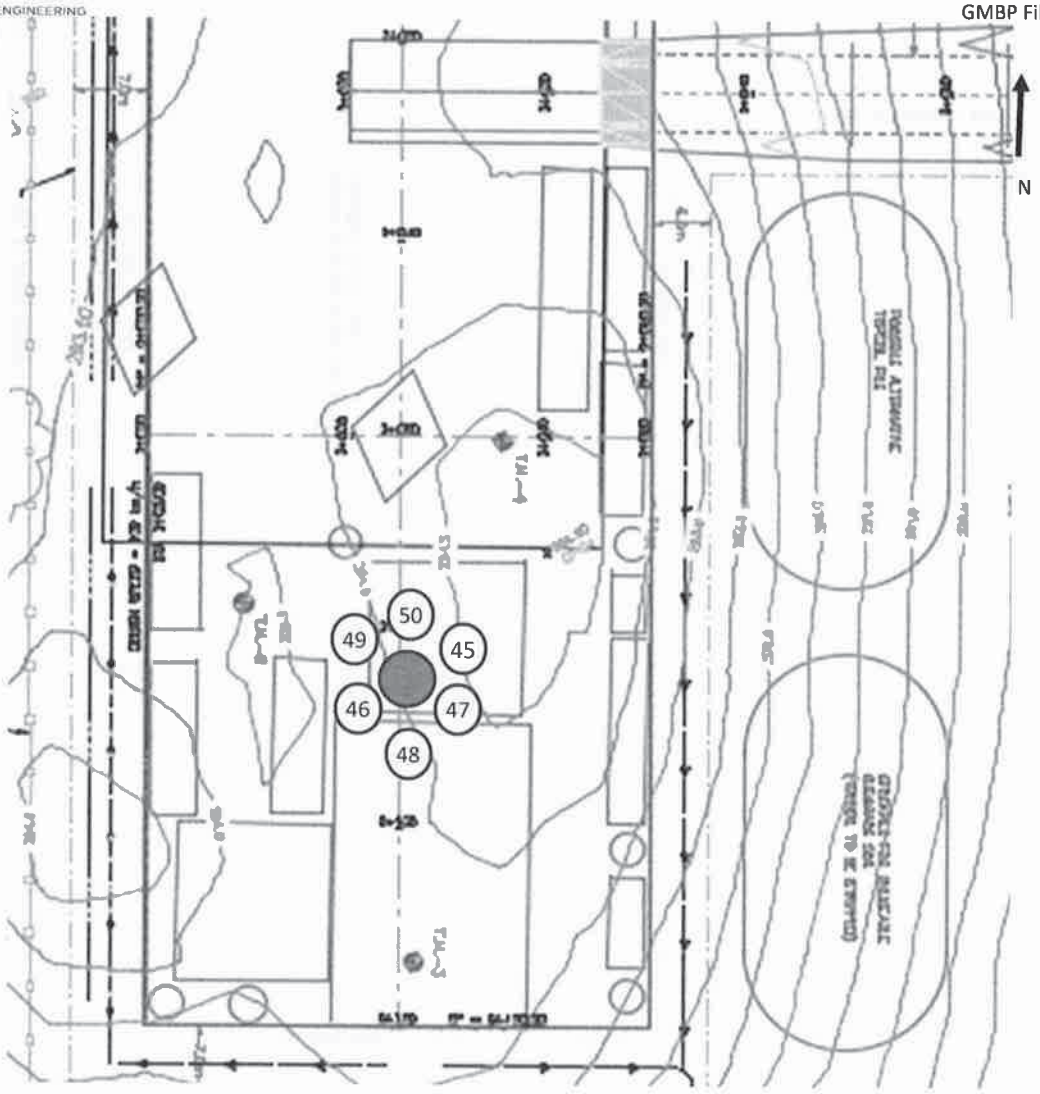
RECOMMENDATIONS
X - Satisfactory
Y - Re-Compact
Z - Re-Compact and Re-Test

RESULTS ARE:
☐ Preliminary
☑ Final

REMARKS:

INSPECTOR: Derek Brewster
GM BluePlan Engineering Limited

NWMO DGR - West Site (BH-2) - Construction Support
Compaction Test Locations
May 28, 2021
GMBP File: 216433-2



GM BluePlan ENGINEERING

PEOPLE | ENGINEERING | ENVIRONMENTS

TRANSMITTAL

To: Geofirma Engineering Ltd.
1 Raymond Street
Ottawa, ON K1R 1A2

Attention: Sean Sterling

Date: January 28, 2021

Project No.: 216433-2

Project: NWMO DGR – West Site (BH-2)
Concession 8 – Teeswater, ON

Delivery: Email: ssterling@geofirma.com

We Enclose:

- Grain-Size Analysis & Standard Proctor Test Results for Granular "A" (Bester Pit) – Sampled Jan. 18, 2020.

Remarks:

The Granular "A" sample from the Bester Pit was found to meet the OPSS Gradation Requirements for Granular "A". The crushed particle count was determined to be 71.9%. The standard proctor test result for the tested Granular "A" indicated a maximum dry density of 2.23 tonnes/m^3 with an optimum moisture content of 8.6%.

It is understood that the sampling completed from BH-1 Site (East Site) for the Granular 'B' (as per OPSS) will be applicable for this BH-2 Site (West Site), as the aggregate sources remain unchanged. As a result, the applicable reference densities (Proctor Values) of these imported materials will also be carried forward.

Type of Action:

☑ For Your Information and Use

GM BLUEPLAN ENGINEERING LIMITED
Per:

Derek Brewster, C.Tech.
DB/kd

cc: Geofirma Engineering Limited: Glen Briscoe, gbriscoe@geofirma.com; Tim Galt, tgalt@geofirma.com
Cedarwell Excavating: Jayson Long – jlong@cedarwellexcavating.com
Owner: via Geofirma Engineering Limited.
GMBP: Bill Dubeau, P.Eng. – bill.dubeau@gmblueplan.ca Ian Eriksen, P.Eng, - ian.eriksen@gmblueplan.ca
GMBP: Matt Nelson, P.Eng – matt.nelson@gmblueplan.ca
File No. 216433-1

GM BluePlan Engineering Limited
Guelph, Owen Sound, Listowel, Kitchener, London, Hamilton, GTA
1260 - 2nd Avenue E., Unit 1 Owen Sound, ON N4K 2J3
Phone 519-376-1805 Fax 519-376-8977 www.GMBluePlan.ca

GRAIN SIZE ANALYSIS

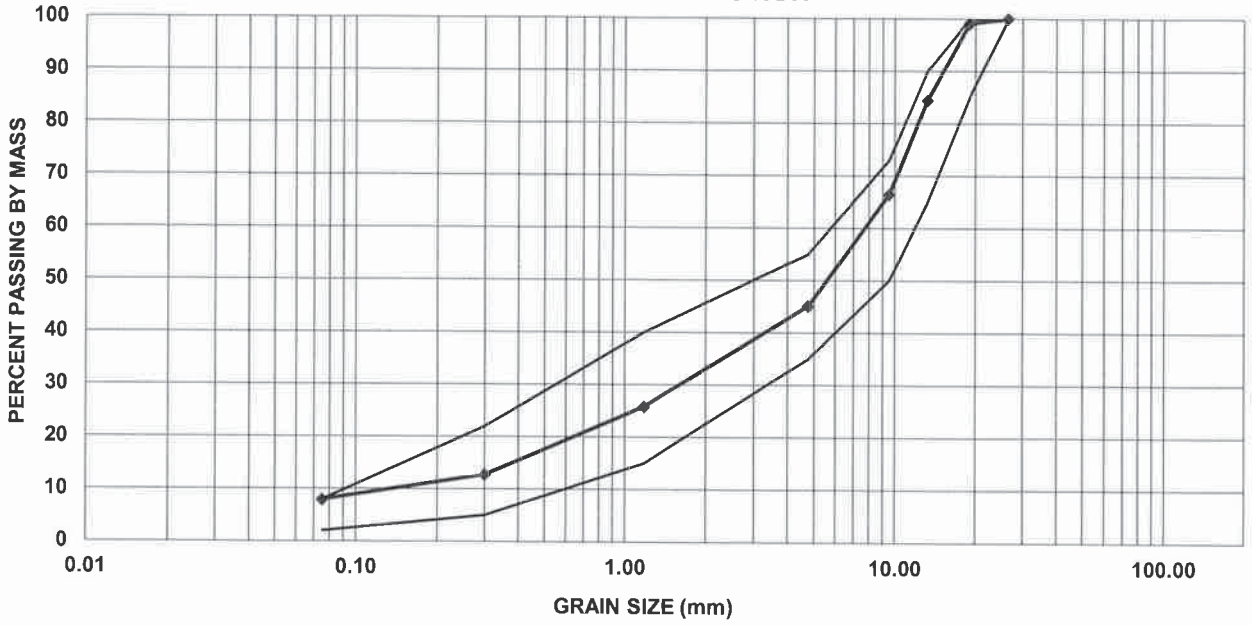
PROJECT: NWMO - DGR West Site
LOCATION: 1021 Conession 8 Tesswater,ON
CLIENT: Georirma Engineering Ltd

PROJECT NO: 216433-2
LAB NO: S-3973
RECEIVE: Jan-25,2021

SAMPLE MATERIAL: Crushed Sand & Gravel (Granular A)
SAMPLE SUPPLIER: Bester Pit
SAMPLE LOCATION: On-Site Stockpile

SAMPLE DATE: Jan 18, 2021
SAMPLED BY: D.B

GRAIN SIZE DISTRIBUTION



SIEVE SIZE mm	PERCENT PASSING SPECIFIED MIN.	PERCENT PASSING SPECIFIED MAX.	PERCENT PASSING SAMPLE	GRANULAR 'A' OPSS FORM 1010 TABLE 3
26.5	100	100	100.0	Remarks:
19.0	85	100	99.1	
13.2	65	90	84.5	
9.5	50	73	66.5	
4.75	35	55	45.1	
1.18	15	40	25.8	
0.300	5	22	12.8	
0.075	2	8	8.0	

Asphalt Coated Particles (%) N/A Crushed Particles (%) 71.9

NOTES: **Meets the OPSS Gradation Requirements of Granular A**

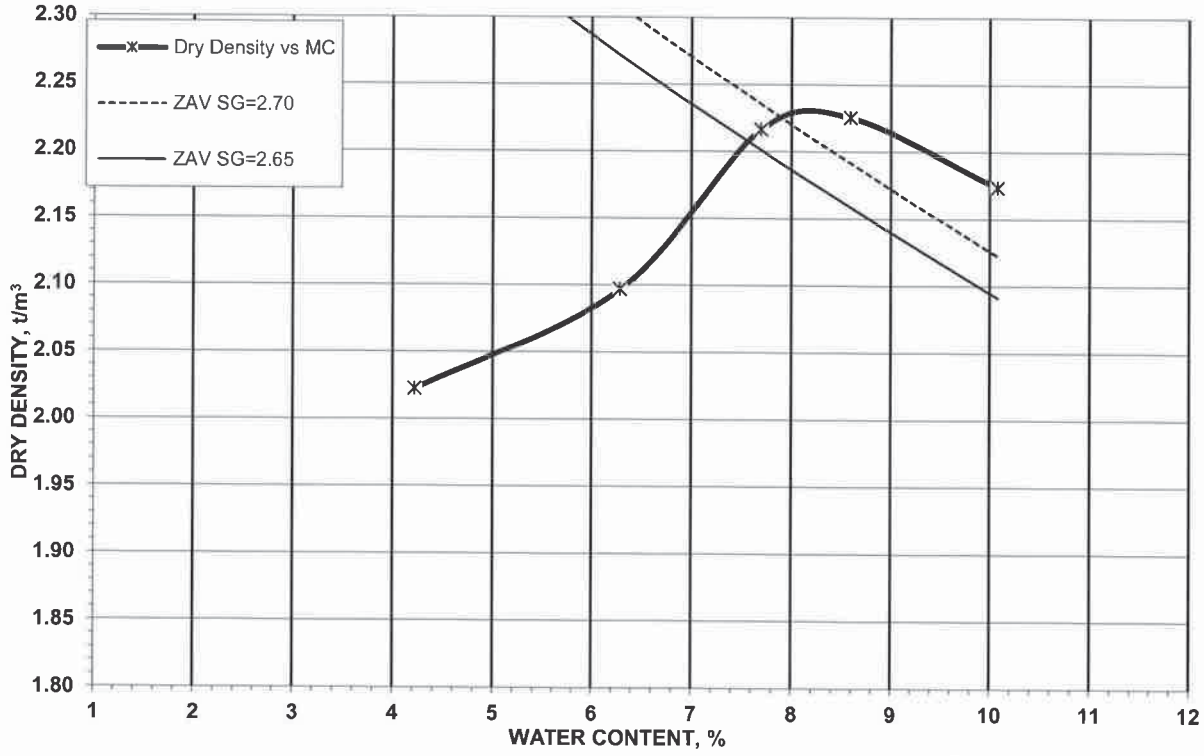
GM BluePlan Engineering Limited
Guelph, Owen Sound, Listowel, Kitchener, London, Hamilton, GTA
1260 - 2nd Avenue E., Unit 1 Owen Sound, ON N4K 2J3
Phone 519-376-1805 Fax 519-376-8977 www.GMBluePlan.ca

STANDARD PROCTOR TEST

PROJECT:	NWMO - DGR West Site	**PROJECT No.:**	216433-2
LOCATION:	1021 Conession 8 Tesswater,ON	**LAB No.:**	S-3973
CLIENT:	Georirma Engineering Ltd	**RECEIVE:**	Jan-25,2021
SAMPLE MATERIAL:	Crushed Sand & Gravel (Granular A)		
SAMPLE SUPPLIER:	Bester Pit	**SAMPLE DATE:**	Jan 18, 2021
SAMPLE LOCATION:	On-Site Stockpile	**SAMPLED BY:**	D.B

PROCTOR VALUES FROM GRAPHICAL PLOT		MTO 1 POINT CORRECTED VALUES	
MAXIMUM DRY DENSITY (t/m^3) :	2.23	MAX DRY DENSITY (t/m^3) :	N/A
OPTIMUM WATER CONTENT (%):	8.6	OPT. WATER CONTENT (%):	N/A

STANDARD PROCTOR DENSITY vs MOISTURE CONTENT



PEOPLE | ENGINEERING | ENVIRONMENTS

TRANSMITTAL

To: Geofirma Engineering Ltd.
1 Raymond Street
Ottawa, ON K1R 1A2

Attention: Sean Sterling

Date: December 18, 2020

Project No.: 216433-1

Project: NWMO DGR – East Site (BH-1)
Concession 8 – Teeswater, ON

Delivery: Email: ssterling@geofirma.com

We Enclose:

- Grain-Size Analysis & Standard Proctor Test Results for Native Material (Select Subgrade) from NW & SE Corners of Pad – Sampled Nov. 13, 2020.
- Grain-Size Analysis Results for Granular "B" – Type I (Bester Pit) – Sampled Nov. 18, 2020.
- Grain-Size Analysis Results for Granular "B" – Type I (Cedarwell Hanover Pit) – Sampled Dec. 4, 2020.
- Grain-Size Analysis Results for Granular "A" (Cedarwell Hanover Pit) – Sampled Nov. 26, 2020.

Remarks:

The native material sampled from the NW and SE areas of the pad were found to meet the OPSS Gradation Requirements for Select Subgrade Material.

The Granular "B" sample from the Bester Pit was just marginally outside OPSS Gradation Requirements for Granular "B" – Type I.

The Granular "B" sample from the Cedarwell Hanover Pit was found to meet the OPSS Gradation Requirments for Granular "B" – Type I.

The Granular "A" sample from the Cedarwell Hanover Pit was found to meet the OPSS Gradation Requirements for Granular "A". The crushed particle count was determined to be 81%.

Type of Action:

☑ For Your Information and Use

GM BLUEPLAN ENGINEERING LIMITED
Per:

Wm. E. Dubeau, P.Eng.
WED/mr

cc: Geofirma Engineering Limited: Glen Briscoe, gbriscoe@geofirma.com; Tim Galt, tgalt@geofirma.com
Cedarwell Excavating: Jayson Long – jlong@cedarwellexcavating.com
Owner: via Geofirma Engineering Limited.
GMBP: Bill Dubeau, P.Eng. – bill.dubeau@gmblueplan.ca Ian Eriksen, P.Eng, - ian.eriksen@gmblueplan.ca
GMBP: Matt Nelson, P.Eng – matt.nelson@gmblueplan.ca
File No. 216433-1

GM BluePlan Engineering Limited
Guelph, Owen Sound, Listowel, Kitchener, London, Hamilton, GTA
1260 - 2nd Avenue E., Unit 1 Owen Sound, ON N4K 2J3
Phone 519-376-1805 Fax 519-376-8977 www.GMBluePlan.ca

GRAIN SIZE ANALYSIS

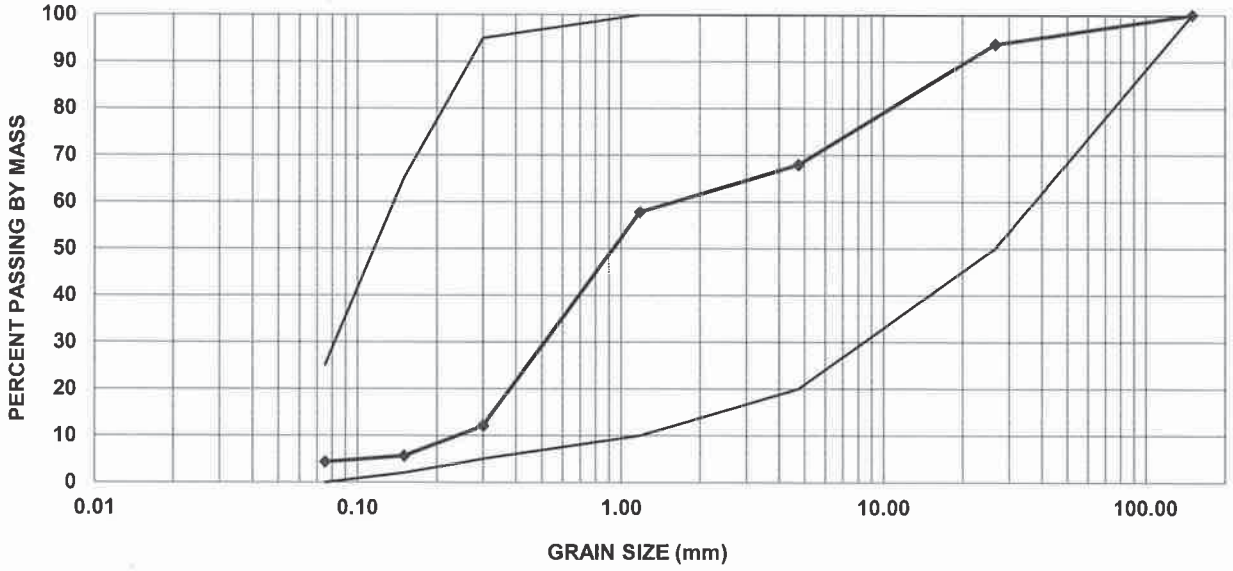
PROJECT: NWMO DGR
LOCATION: East Site (BH-1) 1021 Con,8 South Bruce
CLIENT: Geofirma Engineering Ltd

PROJECT NO: 216433-1
LAB NO: S-3908

SAMPLE MATERIAL: Native Material (Select Subgrade)
SAMPLE SUPPLIER: NW Corner of Pad
SAMPLE LOCATION: On-Site Stockpile

SAMPLE DATE: Nov 13, 2020
SAMPLED BY: D.B

GRAIN SIZE DISTRIBUTION



SIEVE SIZE mm	PERCENT PASSING SPECIFIED MIN.	PERCENT PASSING SPECIFIED MAX.	PERCENT PASSING SAMPLE	SELECT SUBGRADE MATERIAL OPSS FORM 1010 TABLE 3
150.0	100	100	100.0	Remarks:
26.5	50	100	93.7	
4.75	20	100	67.9	
1.18	10	100	57.8	
0.300	5	95	12.1	
0.150	2	65	5.6	
0.075	0	25	4.3	

NOTES: **Meets the OPSS Gradation requirements for Select Subgrade Material**

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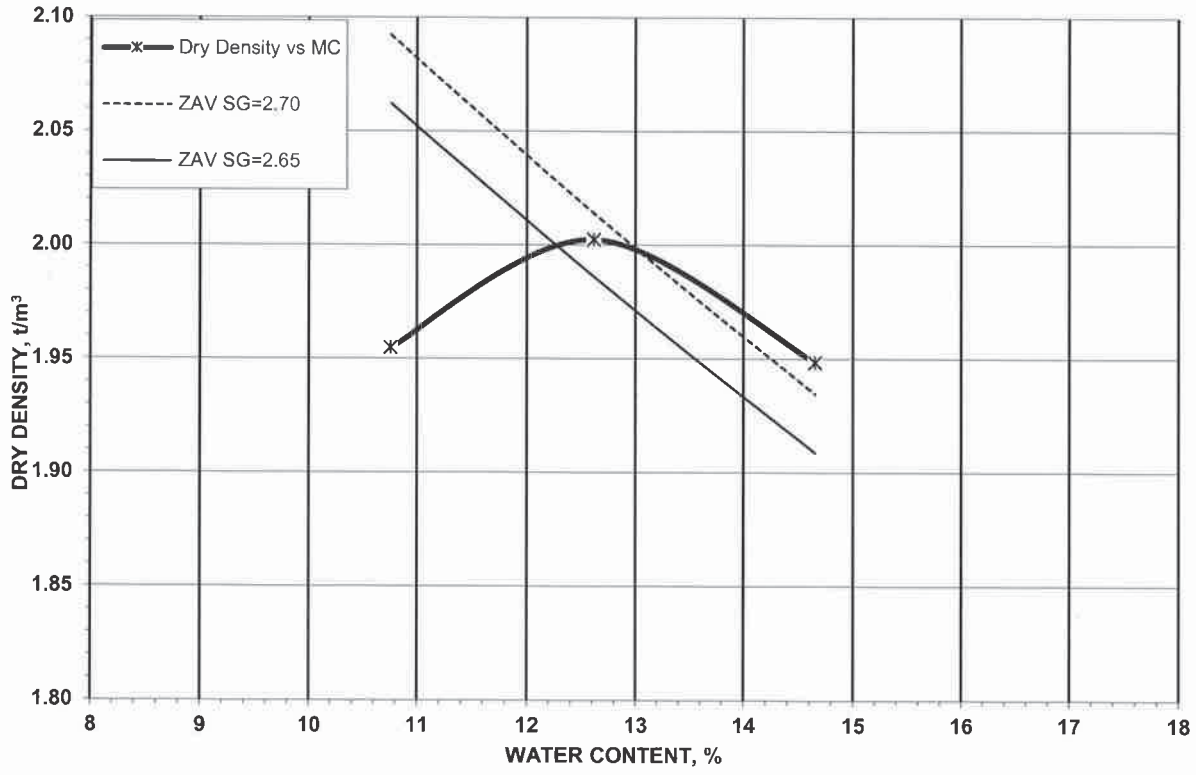
STANDARD PROCTOR TEST

PROJECT:	NWMO DGR	**PROJECT No.:**	216433-1
LOCATION:	East Site (BH-1) 1021 Con,8 South Bruce	**LAB No.:**	S-3908
CLIENT:	Geofirma Engineering Ltd		
SAMPLE MATERIAL:	Native Material (Granular B Type 1)		
SAMPLE SUPPLIER:	NW Corner of Pad	**SAMPLE DATE:**	Nov 13, 2020
SAMPLE LOCATION:	On-Site Stockpile	**SAMPLED BY:**	D.B

PROCTOR VALUES FROM GRAPHICAL PLOT		MTO 1 POINT CORRECTED VALUES	
MAXIMUM DRY DENSITY (t/m^3) :	2.002	MAX DRY DENSITY (t/m^3) :	N/A
OPTIMUM WATER CONTENT (%):	12.6	OPT. WATER CONTENT (%):	N/A

STANDARD PROCTOR DENSITY vs MOISTURE CONTENT



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GRAIN SIZE ANALYSIS

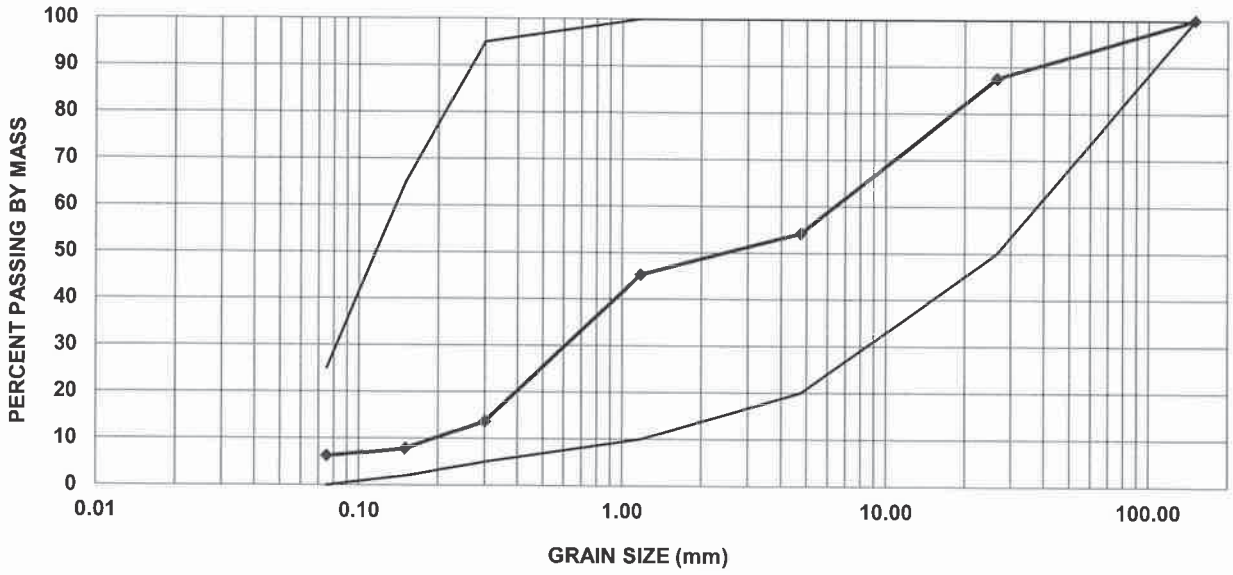
PROJECT: NWMO DGR
LOCATION: East Site (BH-1) 1021 Con,8 South Bruce
CLIENT: Geofirma Engineering Ltd

PROJECT NO: 216433-1
LAB NO: S-3907
RECEIVED: Nov-16,2020

SAMPLE MATERIAL: Native Material (Select Subgrade)
SAMPLE SUPPLIER: SE Area of Pad
SAMPLE LOCATION: On-Site Stockpile

SAMPLE DATE: Nov 13, 2020
SAMPLED BY: D.B

GRAIN SIZE DISTRIBUTION



SIEVE SIZE mm	PERCENT PASSING SPECIFIED MIN.	SPECIFIED MAX.	SAMPLE
150.0	100	100	100.0
26.5	50	100	87.5
4.75	20	100	54.2
1.18	10	100	45.3
0.300	5	95	13.7
0.150	2	65	7.9
0.075	0	25	6.2

SELECT SUBGRADE MATERIAL
OPSS FORM 1010
TABLE 3

Remarks:

NOTES: **Meets the OPSS Gradation requirements for Select Subgrade Material**

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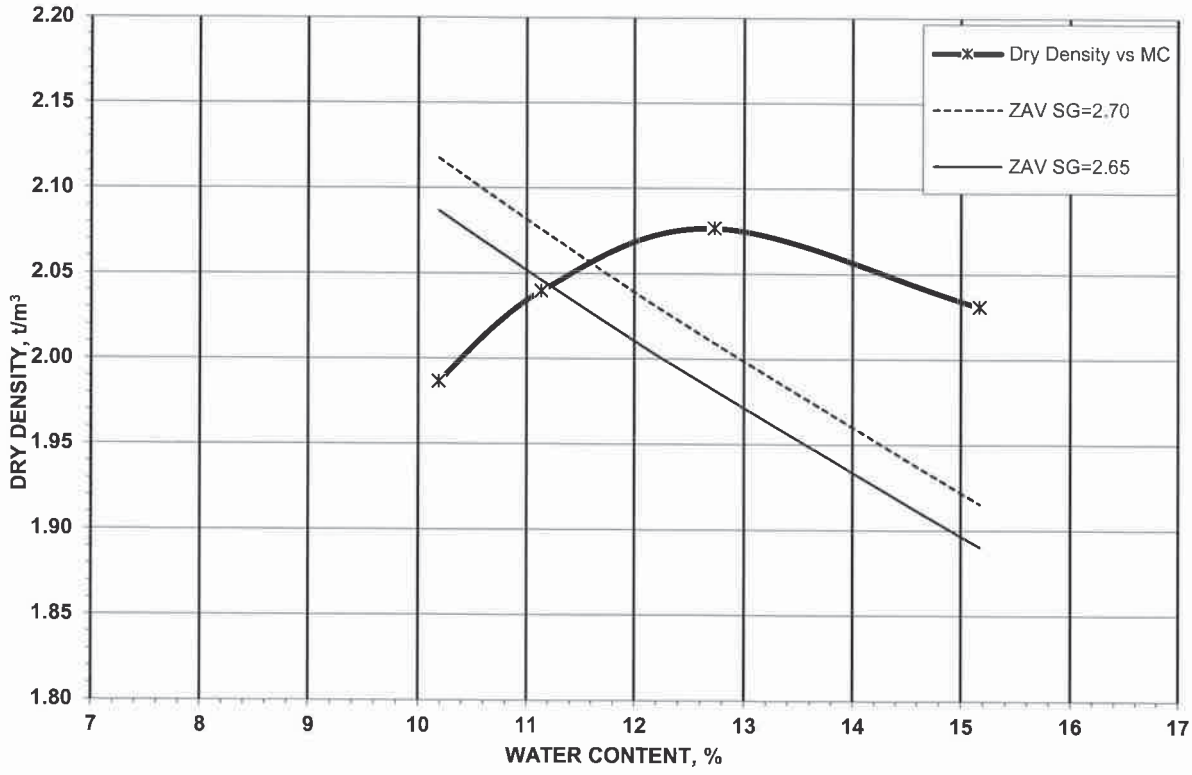
STANDARD PROCTOR TEST

PROJECT:	NWMO DGR	**PROJECT No.:**	216433-1
LOCATION:	East Site (BH-1) 1021 Con,8 South Bruce	**LAB No.:**	S-3907
CLIENT:	Geofirma Engineering Ltd		
SAMPLE MATERIAL:	Native Material (Select Subgrade)		
SAMPLE SUPPLIER:	SE Area of Pad	**SAMPLE DATE:**	Nov 13, 2020
SAMPLE LOCATION:	On-Site Stockpile	**SAMPLED BY:**	D.B

PROCTOR VALUES FROM GRAPHICAL PLOT		MTO 1 POINT CORRECTED VALUES	
MAXIMUM DRY DENSITY (t/m^3) :	2.077	MAX DRY DENSITY (t/m^3) :	N/A
OPTIMUM WATER CONTENT (%):	12.7	OPT. WATER CONTENT (%):	N/A

STANDARD PROCTOR DENSITY vs MOISTURE CONTENT



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Phone 519-376-1805 Fax 519-376-8977 www.GMBluePlan.ca

GRAIN SIZE ANALYSIS

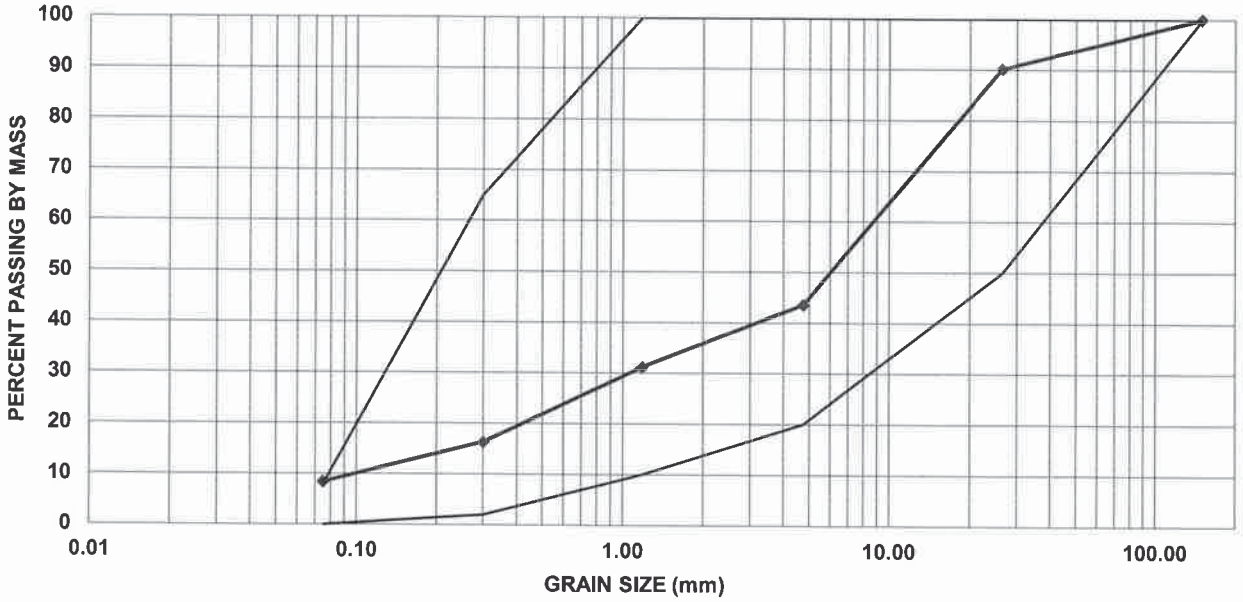
PROJECT: NWMO DGR
LOCATION: East Site (BH-1) 1021 Con,8 South Bruce
CLIENT: Geofirma Engineering

PROJECT NO: 216433-1
LAB NO: S-3912
RECEIVED: Nov-20,2020

SAMPLE MATERIAL: Sand & Gravel (Granular B Type 1)
SAMPLE SUPPLIER: Bester Pit
SAMPLE LOCATION: On-Site Stockpile

SAMPLE DATE: Nov 18, 2020
SAMPLED BY: D.B

GRAIN SIZE DISTRIBUTION



SIEVE SIZE mm	PERCENT PASSING SPECIFIED MIN.	SPECIFIED MAX.	SAMPLE		GRANULAR 'B' Type I OPSS FORM 1010 TABLE 3
150.0	100	100	100.0		Remarks:
26.5	50	100	90.2		
4.75	20	100	43.6		
1.18	10	100	31.1		
0.300	2	65	16.3		
0.075	0	8	8.4	#	

NOTES: **# Does not meet OPSS Gradation requirements for Granular B Type I**

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GRAIN SIZE ANALYSIS

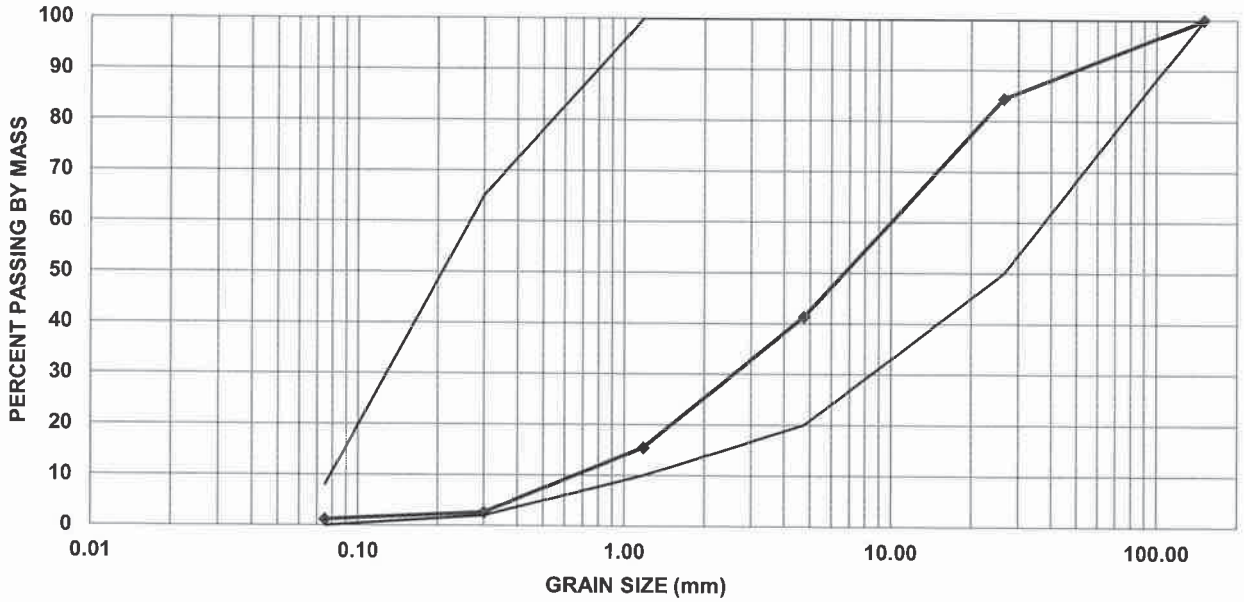
PROJECT: NWMO DGR
LOCATION: East Site (BH-1) 1021 Con,8 South Bruce
CLIENT: Geofirma Engineering

PROJECT NO: 216433-1
LAB NO: S-3929

SAMPLE MATERIAL: Sand & Gravel (Granular B Type 1)
SAMPLE SUPPLIER: Cedarwell Hanover pit
SAMPLE LOCATION: On-Site Stockpile

SAMPLE DATE: Dec 4, 2020
SAMPLED BY: D.B

GRAIN SIZE DISTRIBUTION



SIEVE SIZE mm	PERCENT PASSING			GRANULAR 'B' Type I OPSS FORM 1010 TABLE 3
	SPECIFIED MIN.	SPECIFIED MAX.	SAMPLE	
150.0	100	100	100.0	Remarks:
26.5	50	100	84.4	
4.75	20	100	41.4	
1.18	10	100	15.5	
0.300	2	65	2.7	
0.075	0	8	1.2	

NOTES: **Meets the OPSS Gradation requirements for Granular B Type I**

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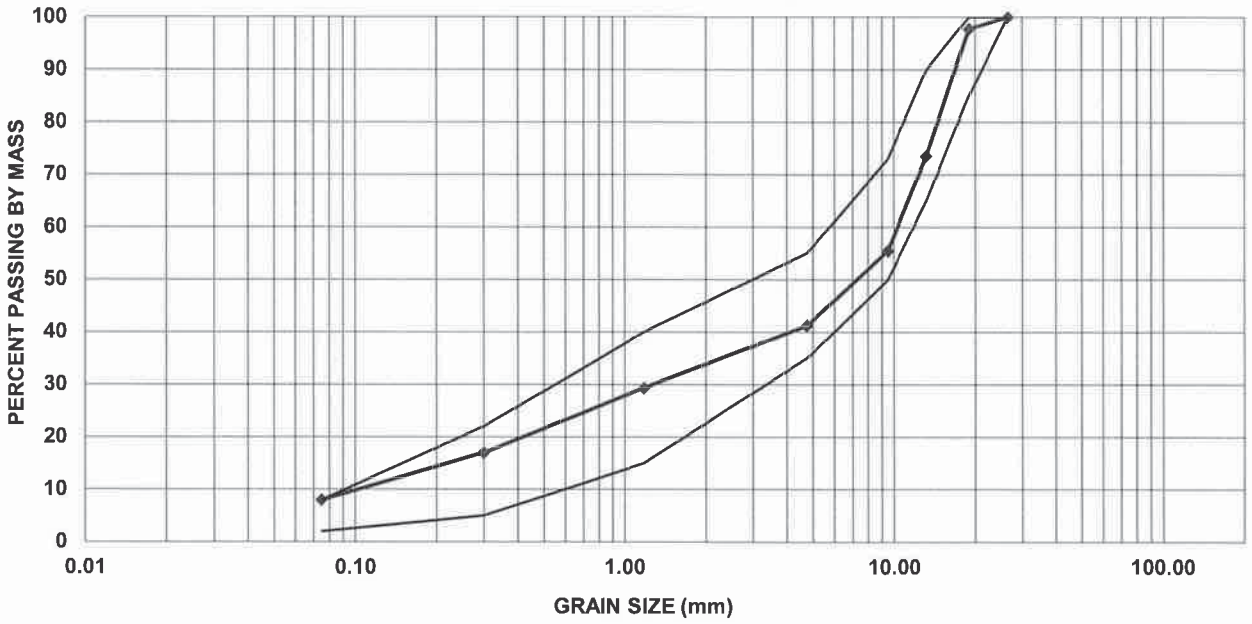
Phone 519-376-1805 Fax 519-376-8977 www.GMBluePlan.ca

GRAIN SIZE ANALYSIS

PROJECT:	NWMO - DGR Pad #1	**PROJECT NO:**	216433-1
LOCATION:	East Site (BH-1) 1021 Con,8 South Bruce	**LAB NO:**	S-3922
CLIENT:	Geofirma Engineering	**RECEIVED:**	Nov-26,2020
SAMPLE MATERIAL:	Crushed Sand & Gravel (Granular A)		
SAMPLE SUPPLIER:	Cedarwell Hanover Pit	**SAMPLE DATE:**	Nov 26, 2020
SAMPLE LOCATION:	On-Site Stockpile	**SAMPLED BY:**	D.B

GRAIN SIZE DISTRIBUTION



SIEVE SIZE mm	PERCENT PASSING SPECIFIED MIN.	PERCENT PASSING SPECIFIED MAX.	PERCENT PASSING SAMPLE	GRANULAR 'A' OPSS FORM 1010 TABLE 3
26.5	100	100	100.0	Remarks:
19.0	85	100	97.8	
13.2	65	90	73.5	
9.5	50	73	55.5	
4.75	35	55	41.2	
1.18	15	40	29.3	
0.300	5	22	17.0	
0.075	2	8	8.0	

Asphalt Coated Particles (%) N/A Crushed Particles (%) 81

NOTES: **Meets the OPSS Gradation Requirements of Granular A**

PEOPLE | ENGINEERING | ENVIRONMENTS

TRANSMITTAL

To: Geofirma Engineering Ltd.
1 Raymond Street
Suite 200
Ottawa, ON K1R 1A2

Attention: Sean Sterling

Date: January 18, 2021

Project No.: 216433-2

Project: NWMO DGR – West Site (BH-2)
Teeswater, ON

Delivery: Email: ssterling@geofirma.ca

ENCLOSED

- Compaction Test Results No. 1 to 4 – Access Road Subgrade – December 11, 2020.
- Compaction Test Results No. 5 to 10 – Access Road Roadbase – December 17, 2020.
- Compaction Test Results No. 11 to 29 – Subgrade & Granular "B" for Pad Area – January 7, 12, 13 & 15, 2021.

REMARKS

The compaction test results were satisfactory at the tested locations as noted.

ACTION REQUIRED

☒ Approved

☐ Approved as Noted

☐ Revised as Noted

☐ Not Approved

☐ For Your Approval

☐ For Your Information and Use

Yours truly,

GM BLUEPLAN ENGINEERING LIMITED
Per:

Wm. E. Dubeau, P.Eng.
WED/mr

cc: Cedarwell Excavating Ltd.: Jayson Long, jlong@cedarwellexcavating.com
Geofirma Engineering Limited: Glen Briscoe, gbriscoe@geofirma.com
Geofirma Engineering Limited: Tim Galt, tgalt@geofirma.com
Owner: via Geofirma Engineering Limited.
GMBP: Derek Brewster – derek.brewster@gmblueplan.ca Ian Eriksen, P.Eng, - ian.eriksen@gmblueplan.ca
GMBP: Matt Nelson, P.Eng – matt.nelson@gmblueplan.ca
File No. 216433-2

FIELD COMPACTION TEST RESULTS

Project No.: 216433-2 **Project:** NWMO DGR - West Site (BH-2)
Client: Geofirma Engineering Ltd.

Site Location: Teeswater, ON
Contractor: Cedarwell Excavating Ltd.
Subcontractor:

Area Tested: Access Road Subgrade

Date: December 11, 2020

	Type Of Material Tested	Specified Compaction %	Max. Lab Density (tonnes/m^3)	☑ Standard Proctor ☐ Modified Proctor
1.	Native Sandy Silt with Gravel - Harvested from On-Site	98%	1.950 - 2.050 varies with stone content	
2.	Imported Pit Run Sand and Gravel - Bester Pit/Hanover Pit, Granular 'B'	100%	2.200 est.	
3.	Imported Crushed Sand and Gravel - Hanover Pit, Granular 'A'	100%	2.200 est.	
4.				
5.				

Test No.	Location of Test	Test Elev.	Material	Dry Density	% Moisture	% Compaction	Recommendations
1	See Attached Drawing	Subgrade	1	1.942	8.0	99.6	X
2	See Attached Drawing	Subgrade	1	1.954	9.6	100.0	X
3	See Attached Drawing	Subgrade	1	1.929	9.2	98.9	X
4	See Attached Drawing	Subgrade	1	1.937	10.0	99.3	X

ABBREVIATIONS:
F.G. -Finish Grade
B.F.G. -Below Finish Grade
S.G. -SubGrade
B.S.G. -Below Subgrade
B.F.F. -Below Finished Floor

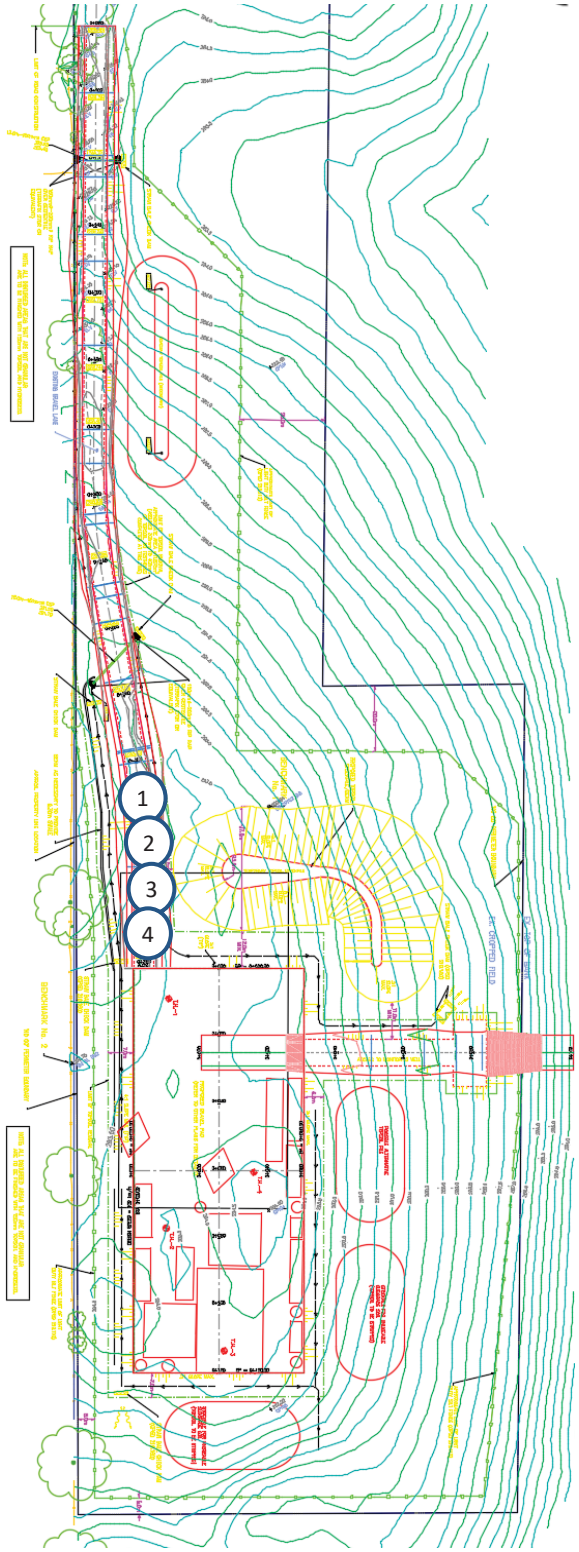
RECOMMENDATIONS
X - Satisfactory
Y - Re-Compact
Z - Re-Compact and Re-Test

RESULTS ARE:
☐ Preliminary
☑ Final

REMARKS:

INSPECTOR: Derek Brewster
GM BluePlan Engineering Limited

NWMO DGR - West Site (BH-2) - Construction Support
Compaction Test Locations
December 11, 2020
GMBP File: 216433-2



FIELD COMPACTION TEST RESULTS

Project No.: 216433-2 **Project:** NWMO DGR - West Site (BH-2)
Client: Geofirma Engineering Ltd.

Site Location: Teeswater, ON
Contractor: Cedarwell Excavating Ltd.
Subcontractor:

Area Tested: Access Road Granular 'B' Roadbase

Date: December 17, 2020

	Type Of Material Tested	Specified Compaction %	Max. Lab Density (tonnes/m^3)	☑ Standard Proctor ☐ Modified Proctor
1.	Native Sandy Silt with Gravel - Harvested from On-Site	98%	1.950 - 2.050 varies with stone content	
2.	Imported Pit Run Sand and Gravel - Bester Pit/Hanover Pit, Granular 'B'	100%	2.200 est.	
3.	Imported Crushed Sand and Gravel - Hanover Pit, Granular 'A'	100%	2.200 est.	
4.				
5.				

Test No.	Location of Test	Test Elev.	Material	Dry Density	% Moisture	% Compaction	Recommendations
5	See Attached Drawing	B-Grade	2	2.230	4.9	100.0	X
6	See Attached Drawing	B-Grade	2	2.216	4.6	100.0	X
7	See Attached Drawing	B-Grade	2	2.229	5.4	100.0	X
8	See Attached Drawing	B-Grade	2	2.211	5.5	100.0	X
9	See Attached Drawing	B-Grade	2	2.201	4.9	100.0	X
10	See Attached Drawing	B-Grade	2	2.223	5.0	100.0	X

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RECOMMENDATIONS
X - Satisfactory
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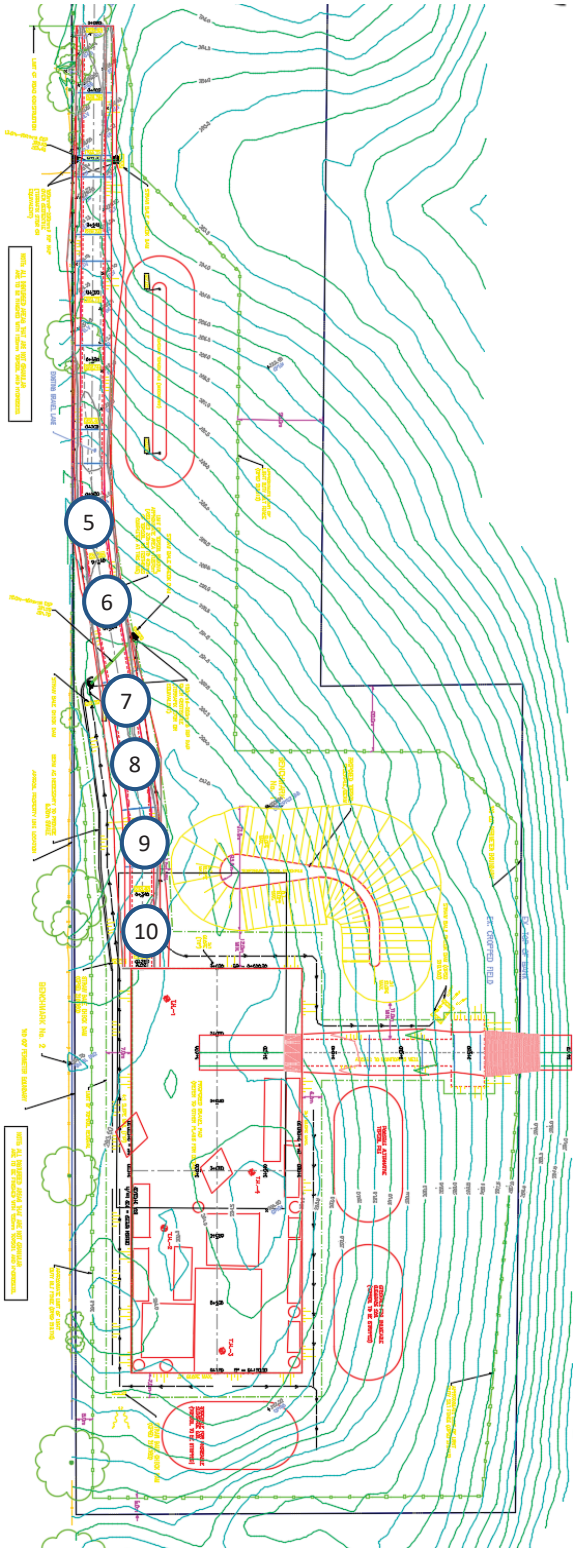
Z - Re-Compact and Re-Test

RESULTS ARE:
☐ Preliminary
☑ Final

REMARKS:

INSPECTOR: Derek Brewster
GM BluePlan Engineering Limited

NWMO DGR - West Site (BH-2) - Construction Support
Compaction Test Locations
December 17, 2020
GMBP File: 216433-2



FIELD COMPACTION TEST RESULTS

Project No.: 216433-2 **Project:** NWMO DGR - West Site (BH-2)
Client: Geofirma Engineering Ltd.

Site Location: Teeswater, ON
Contractor: Cedarwell Excavating Ltd.
Subcontractor:

Area Tested: Subgrade - Pad Area

Date: January 7, 2021

	Type Of Material Tested	Specified Compaction %	Max. Lab Density (tonnes/m^3)	☑ Standard Proctor ☐ Modified Proctor
1.	Native Sandy Silt with Gravel - Harvested from On-Site	98%	1.950 - 2.050 varies with stone content	
2.	Imported Pit Run Sand and Gravel - Bester Pit/Hanover Pit, Granular 'B'	100%	2.200 est.	
3.	Imported Crushed Sand and Gravel - Hanover Pit, Granular 'A'	100%	2.200 est.	
4.				
5.				

Test No.	Location of Test	Test Elev.	Material	Dry Density	% Moisture	% Compaction	Recommendations
11	See Attached Drawing	Subgrade	1	1.991	7.3	100.0	X
12	See Attached Drawing	Subgrade	1	1.982	6.9	100.0	X
13	See Attached Drawing	Subgrade	1	1.959	7.1	100.0	X

ABBREVIATIONS:
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RECOMMENDATIONS
X - Satisfactory
Y - Re-Compact
Z - Re-Compact and Re-Test

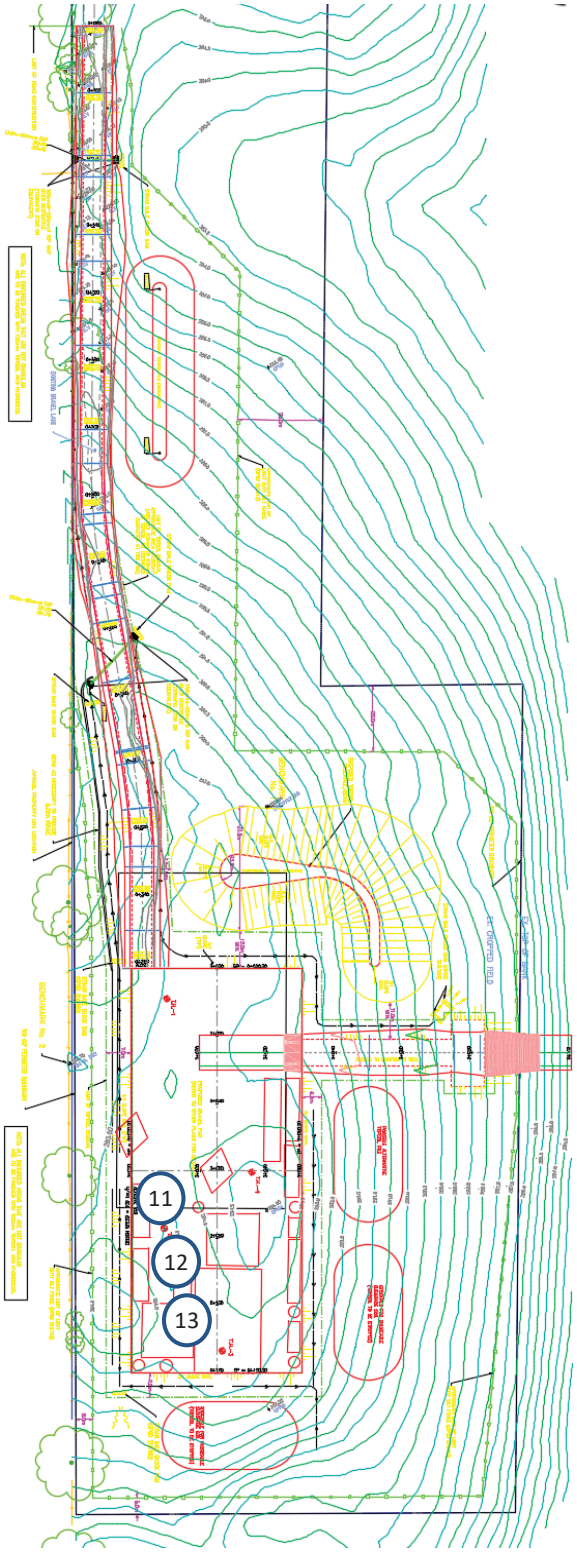
RESULTS ARE:
☐ Preliminary
☑ Final

REMARKS:

INSPECTOR: Derek Brewster
GM BluePlan Engineering Limited

NWMO DGR - West Site (BH-2) - Construction Support
Compaction Test Locations
January 7, 2021
GMBP File: 216433-2

N



FIELD COMPACTION TEST RESULTS

Project No.: 216433-2 **Project:** NWMO DGR - West Site (BH-2)
Client: Geofirma Engineering Ltd.

Site Location: Teeswater, ON
Contractor: Cedarwell Excavating Ltd.
Subcontractor:

Area Tested: Granular 'B' - Pad Area

Date: January 12, 2021

	Type Of Material Tested	Specified Compaction %	Max. Lab Density (tonnes/m^3)	☑ Standard Proctor ☐ Modified Proctor
1.	Native Sandy Silt with Gravel - Harvested from On-Site	98%	1.950 - 2.050 varies with stone content	
2.	Imported Pit Run Sand and Gravel - Bester Pit/Hanover Pit, Granular 'B'	100%	2.200 est.	
3.	Imported Crushed Sand and Gravel - Hanover Pit, Granular 'A'	100%	2.200 est.	
4.				
5.				

Test No.	Location of Test	Test Elev.	Material	Dry Density	% Moisture	% Compaction	Recommendations
14	See Attached Drawing	B-Grade	2	2.216	7.3	100.0	X
15	See Attached Drawing	B-Grade	2	2.205	6.5	100.0	X
16	See Attached Drawing	B-Grade	2	2.211	6.9	100.0	X

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Z - Re-Compact and Re-Test

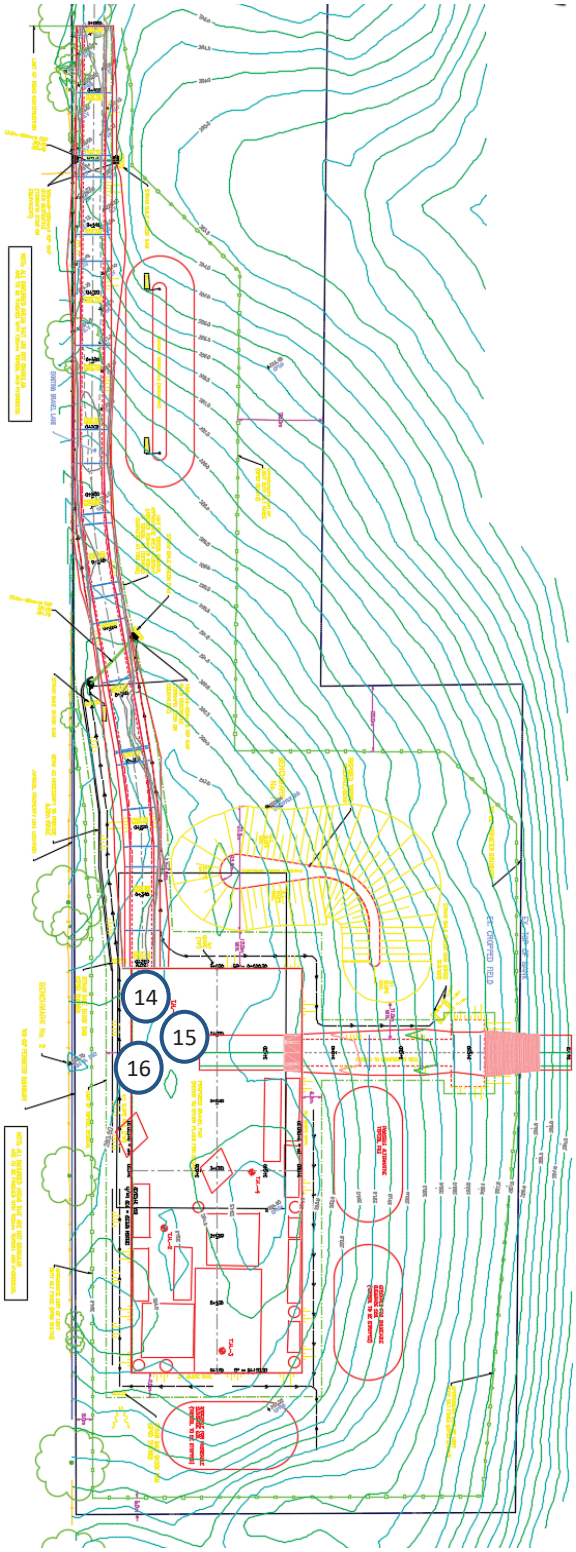
RESULTS ARE:
☐ Preliminary
☑ Final

REMARKS:

INSPECTOR: Derek Brewster
GM BluePlan Engineering Limited

NWMO DGR - West Site (BH-2) - Construction Support
Compaction Test Locations
January 12, 2021
GMBP File: 216433-2

N



FIELD COMPACTION TEST RESULTS

Project No.: 216433-2 **Project:** NWMO DGR - West Site (BH-1) - Construction Support
Client: Geofirma Engineering Ltd.
Site Location: Teeswater, ON
Contractor: Cedarwell Excavating Ltd.
Subcontractor:
Area Tested: Granular 'B' - Pad Area
Date: January 13, 2021

	Type Of Material Tested	Specified Compaction %	Max. Lab Density (tonnes/m^3)	☑ Standard Proctor ☐ Modified Proctor
1.	Native Sandy Silt with Gravel - Harvested from On-Site	98%	1.950 - 2.050 varies with stone content	
2.	Imported Pit Run Sand and Gravel - Bester Pit/Hanover Pit, Granular 'B'	100%	2.200 est.	
3.	Imported Crushed Sand and Gravel - Hanover Pit, Granular 'A'	100%	2.200 est.	
4.				
5.				

Test No.	Location of Test	Test Elev.	Material	Dry Density	% Moisture	% Compaction	Recommendations
17	See Attached Drawing	B-Grade	2	2.275	4.7	100.0	X
18	See Attached Drawing	B-Grade	2	2.219	6.7	100.0	X
19	See Attached Drawing	B-Grade	2	2.222	6.4	100.0	X
20	See Attached Drawing	B-Grade	2	2.233	5.5	100.0	X
21	See Attached Drawing	B-Grade	2	2.231	4.4	100.0	X

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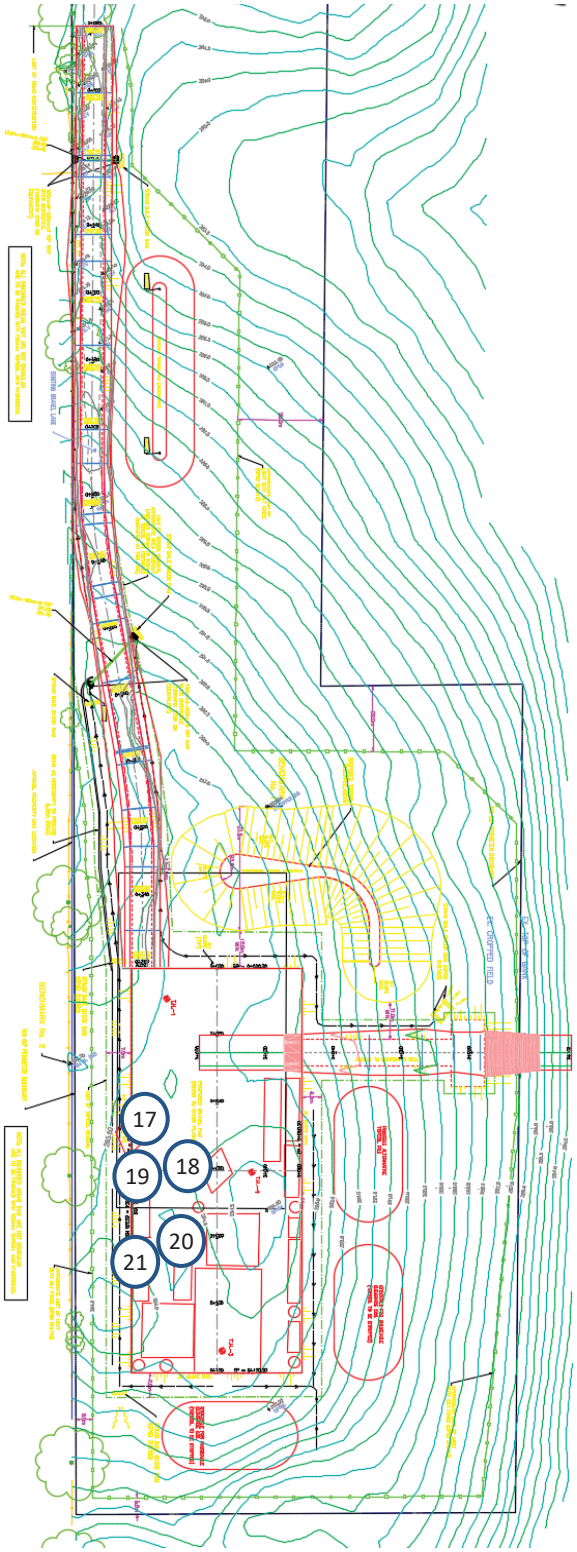
RESULTS ARE:
☐ Preliminary
☑ Final

REMARKS:

INSPECTOR: Derek Brewster
GM BluePlan Engineering Limited

NWMO DGR - West Site (BH-2) - Construction Support
Compaction Test Locations
January 13, 2021
GMBP File: 216433-2

N



FIELD COMPACTION TEST RESULTS

Project No.: 216433-2 **Project:** NWMO DGR - West Site (BH-1) - Construction Support
Client: Geofirma Engineering Ltd.
1 Raymond Street, Suite 200,
Ottawa, ON K1R 1A2
Area Tested: Granular 'B' - Pad Area

Site Location: Teeswater, ON
Contractor: Cedarwell Excavating Ltd.
Subcontractor:
Date: January 15, 2021

	Type Of Material Tested	Specified Compaction %	Max. Lab Density (tonnes/m^3)	☑ Standard Proctor ☐ Modified Proctor
1.	Native Sandy Silt with Gravel - Harvested from On-Site	98%	1.950 - 2.050 varies with stone content	
2.	Imported Pit Run Sand and Gravel - Bester Pit/Hanover Pit, Granular 'B'	100%	2.200 est.	
3.	Imported Crushed Sand and Gravel - Hanover Pit, Granular 'A'	100%	2.200 est.	
4.				
5.				

Test No.	Location of Test	Test Elev.	Material	Dry Density	% Moisture	% Compaction	Recommendations
22	See Attached Drawing	B-Grade	2	2.235	5.8	100.0	X
23	See Attached Drawing	B-Grade	2	2.231	4.4	100.0	X
24	See Attached Drawing	B-Grade	2	2.241	5.6	100.0	X
25	See Attached Drawing	B-Grade	2	2.227	5.1	100.0	X
26	See Attached Drawing	B-Grade	2	2.219	5.8	100.0	X
27	See Attached Drawing	B-Grade	2	2.207	4.9	100.0	X
28	See Attached Drawing	B-Grade	2	2.219	5.1	100.0	X
29	See Attached Drawing	B-Grade	2	2.233	5.2	100.0	X

ABBREVIATIONS:
F.G. -Finish Grade
B.F.G. -Below Finish Grade
S.G. -SubGrade
B.S.G. -Below Subgrade
B.F.F. -Below Finished Floor

RECOMMENDATIONS
X - Satisfactory
Y - Re-Compact
Z - Re-Compact and Re-Test

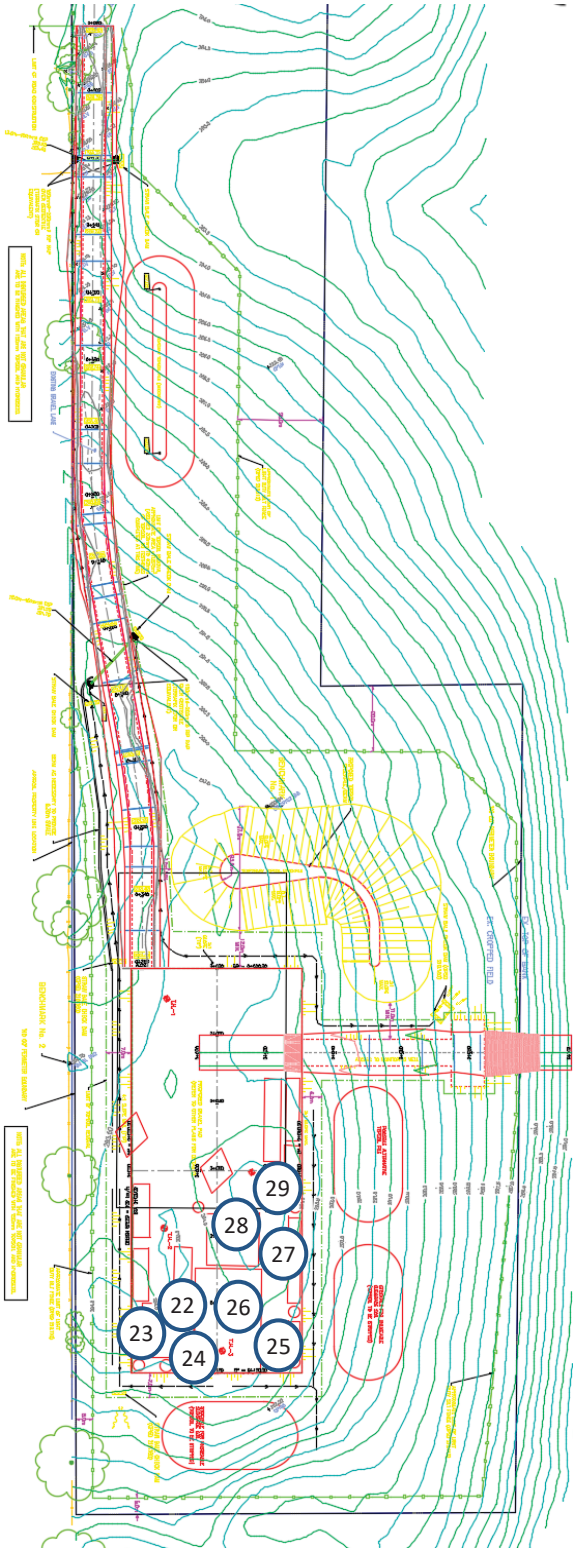
RESULTS ARE:
☐ Preliminary
☑ Final

REMARKS:

INSPECTOR: Derek Brewster
GM BluePlan Engineering Limited

NWMO DGR - West Site (BH-2) - Construction Support
Compaction Test Locations
January 15, 2021
GMBP File: 216433-2

N



TRANSMITTAL

To: Geofirma Engineering Ltd.
1 Raymond Street
Suite 200
Ottawa, ON K1R 1A2

Attention: Sean Sterling

Date: January 27, 2021

Project No.: 216433-2

Project: NWMO DGR – West Site (BH-2)
Teeswater, ON

Delivery: Email: ssterling@geofirma.ca

ENCLOSED

- Compaction Test Results No. 30 to 34 – Granular "B" for Pad Area – January 18, 2021.
- Field Review Report #4 – January 18, 20 & 22, 2021.

REMARKS

The compaction test results were satisfactory at the tested locations as noted.

ACTION REQUIRED

☒ Approved
☐ Approved as Noted
☐ Revised as Noted
☐ Not Approved
☐ For Your Approval
☐ For Your Information and Use

Yours truly,

GM BLUEPLAN ENGINEERING LIMITED
Per:

Wm. E. Dubeau, P.Eng.
WED/mr

cc: Cedarwell Excavating Ltd.: Jayson Long, jlong@cedarwellexcavating.com
Geofirma Engineering Limited: Glen Briscoe, gbriscoe@geofirma.com
Geofirma Engineering Limited: Tim Galt, tgalt@geofirma.com
Owner: via Geofirma Engineering Limited.
GMBP: Derek Brewster – derek.brewster@gmblueplan.ca Ian Eriksen, P.Eng, - ian.eriksen@gmblueplan.ca
GMBP: Matt Nelson, P.Eng – matt.nelson@gmblueplan.ca
File No. 216433-2

FIELD COMPACTION TEST RESULTS

Project No.: 216433-2 **Project:** NWMO DGR - West Site (BH-1) - Construction Support
Client: Geofirma Engineering Ltd.
1 Raymond Street, Suite 200,
Ottawa, ON K1R 1A2
Area Tested: Granular 'B' - Pad Area

Site Location: Teeswater, ON
Contractor: Cedarwell Excavating Ltd.
Subcontractor:
Date: January 18, 2021

	Type Of Material Tested	Specified Compaction %	Max. Lab Density (tonnes/m^3)	☑ Standard Proctor ☐ Modified Proctor
1.	Native Sandy Silt with Gravel - Harvested from On-Site	98%	1.950 - 2.050 varies with stone content	
2.	Imported Pit Run Sand and Gravel - Bester Pit/Hanover Pit, Granular 'B'	100%	2.200 est.	
3.	Imported Crushed Sand and Gravel - Hanover Pit, Granular 'A'	100%	2.200 est.	
4.				
5.				

Test No.	Location of Test	Test Elev.	Material	Dry Density	% Moisture	% Compaction	Recommendations
30	See Attached Drawing	B-Grade	2	2.197	5.5	99.9	Y
31	See Attached Drawing	B-Grade	2	2.237	5.6	100.0	X
32	See Attached Drawing	B-Grade	2	2.194	5.5	99.7	Y
33	See Attached Drawing	B-Grade	2	2.218	5.7	100.0	X
34	See Attached Drawing	B-Grade	2	2.206	5.3	100.0	X

ABBREVIATIONS:
F.G. -Finish Grade
B.F.G. -Below Finish Grade
S.G. -SubGrade
B.S.G. -Below Subgrade
B.F.F. -Below Finished Floor

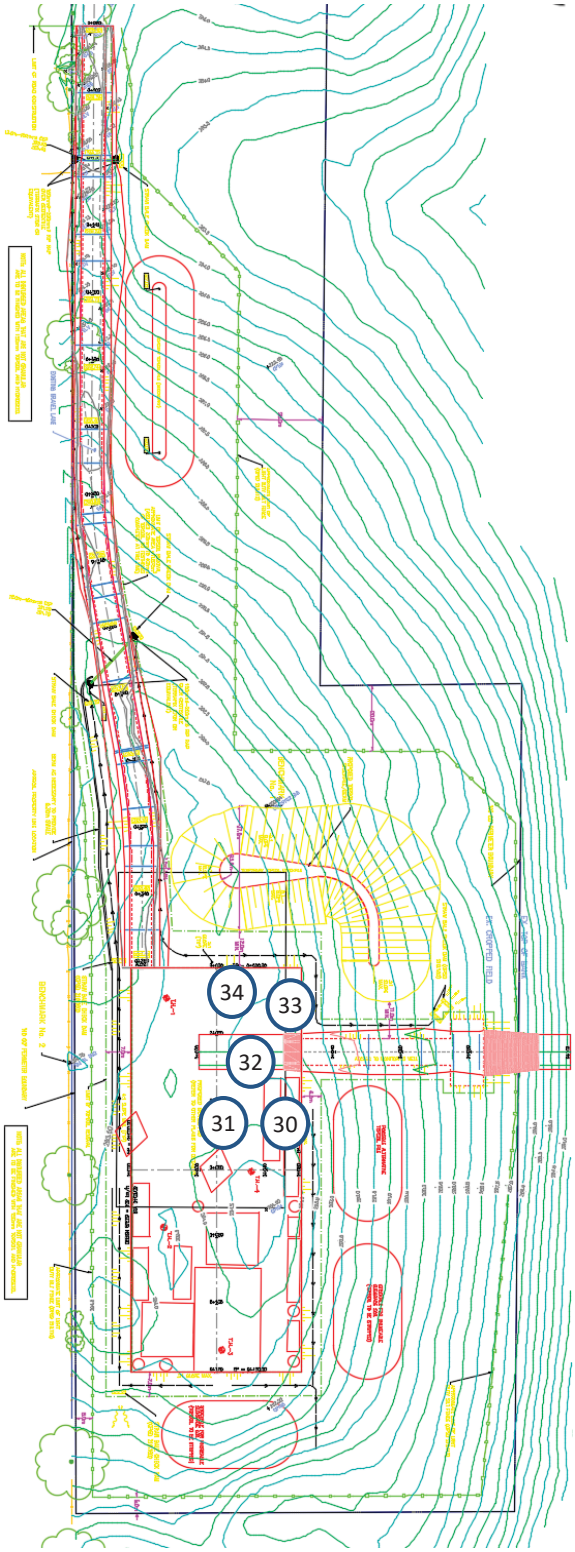
RECOMMENDATIONS
X - Satisfactory
Y - Re-Compact
Z - Re-Compact and Re-Test

RESULTS ARE:
☐ Preliminary
☑ Final

REMARKS:

INSPECTOR: Derek Brewster
GM BluePlan Engineering Limited

NWMO DGR - West Site (BH-2) - Construction Support
Compaction Test Locations
January 18, 2021
GMBP File: 216433-2



Certificate of Calibration

Cansel certifies that **Trimble S7 3" DR Plus** *with serial number* **37411538** *complies with the following specifications:*

ANGLE MEASUREMENT

Accuracy (standard deviation based on DIN 18723): VA = 3", HA = 3"

Automatic Level Compensator

Dual-axis with a working range of: +/- 5.4'

DISTANCE MEASUREMENT

Prism mode

Accuracy (RMSE): 2mm + 2ppm

DR mode

Accuracy (RMSE): 2mm + 2ppm

Full specifications of this instrument are available in the Datasheet, it could be downloaded from www.trimble.com

This instrument has been calibrated and tested to comply with original manufacturers specifications stated on this certificate. Baseline tests and angular measurements have been conducted over established baselines verified by Trimble S8 gold unit s/n: 99310413. This gold unit is calibrated annually on established & calibrated baselines at Trimble, Dayton, OH. EDM baselines at Trimble, Dayton, OH, have been calibrated with special Trimble instruments that are calibrated at the Physikalisch-Technische Bundesanstalt (PTB) in Braunschweig, Germany. The PTB meets the requirements for calibration and testing laboratories as defined in the EN ISO/IEC 17025.

Certified by:

Technician: Andy Semple
Calibration Date: 2020-07-16
Next Calibration Due: 2021-07-16

Cansel
Improving field to finish productivity

Trimble
Authorized Dealer

Electronic Survey Equipment
NWMO – WP01
GMBP File No. 216433-1
November 3, 2020

Equipment	Serial #	Calibration	Remarks
Trimble R12 GPS	6023F00803	Site Specific	GPS is calibrated on each new site at onset of project.
Trimble R10 GPS	5313432411	Site Specific	GPS is calibrated on each new site at onsite of project.
Trible S7 Robotic Total Station	37411538	July-20	See attached Calibration Certificate.

NWMO – DGR
EAST SITE (BH-1) – CONCESSION 8, TEESWATER
GEOFIRMA ENGINEERING LIMITED
NUCLEAR GAUGE INFORMATION PACKAGE
ON-SITE COMPACTION TESTING

GMBP File No. 216433-1

- Nuclear Substances and Radiation Devices Licence No. 15245-1-25.0
- Class 7 Special Forms Declaration and Type A Package Requirements
- Dangerous Good Shipping Document for Site Work (Gauges assembled prior to 2008)
- Special Form Certificate USA/0627/5-96 Rev. 4
- Construction Detail of X2084 Capsule Assembly
- Special Form Certificate USA/0634/5-96 Rev. 5
- Construction Detail of X8 Capsule Assembly
- Dangerous Good Shipping Document for Site Work (Gauges assembled after 2008)
- Special Form Certificate IAEA (SFC) No. CZ/1009/S-96 (Dated 10/10/2013)
- Special Form Certificate USA/0356/S-96 Rev. 14
- Construction Details of : A3000 & A3000-1 Capsule Assembly
  A3015 & A3015-1 Capsule Assembly
  A3023 Capsule Assembly
  A3024-1/A3024-3 Capsule Assembly
  A3024-2/A3024-4 Capsule Assembly
- Leak Test Certificates Leak Test Certificates
- Photos of Nuclear Gauge and Case
- Personnel Certificates of Training
- Safe Gauge Usage and Emergency Procedures with Contact Information

I) LICENCE NUMBER: 15245-1-25.0

II) LICENSEE

Pursuant to section 24 of the Nuclear Safety and Control Act, this licence is issued to:

GM Blueplan Engineering Limited
650 Woodlawn Road West
Block C, Unit 2
Guelph, ON
N1K 1B8
Canada

Corporate No.: 1907211 (Ontario)

III) LICENCE PERIOD

This licence is valid from: March 1, 2020 to February 28, 2025 unless otherwise suspended, amended, revoked or replaced.

IV) LICENSED ACTIVITIES

This licence authorizes the licensee to:

(a) possess, transfer, use and store the prescribed equipment listed in the Appendix: Nuclear Substances and Radiation Devices of this licence.

(b) conduct licensed activities in the location(s) specified in the Appendix: Locations of Licensed Activities of this licence.

This licence is issued for: portable gauges (811).

V) CONDITIONS

The contents of the appendices attached to this licence form part of the licence.

1. Location Notification
   The licensee shall, for any site where licensed activities are to be conducted for more than 90 consecutive days, notify the Commission in writing of the site within 7 days of starting to conduct the activities at the site. The licensee shall notify the Commission in writing within 7 days of the discontinuance of licensed activities at any site. The continuity of consecutive days is not broken during off site use or off site temporary storage. (2300-2)

2. Records Requirements - Portable Devices
   The licensee shall ensure that a copy of the prescribed records and operating procedures specific to the site where licensed activities are conducted for more than 90 consecutive days is maintained at that site. The continuity of consecutive days is not broken during off site use or off site temporary storage. (2350-4)

3. Maintenance Limitations
This licence authorizes the cleaning and lubrication of the radiation devices listed in this licence, in accordance with the manufacturer's operating manual.
(2093-0)

4. Storage
The licensee shall:
(a) ensure that when in storage radioactive nuclear substances or radiation devices are accessible only to persons authorized by the licensee;
(b) ensure that the dose rate at any occupied location outside the storage area, room or enclosure resulting from the substances or devices in storage does not exceed 2.5 microSv/h; and
(c) have measures in place to ensure that the dose limits in the Radiation Protection Regulations are not exceeded as a result of the substances or devices in storage.
(2575-2)

5. Annual Compliance Report
The licensee shall, by December 31 of each year, submit to the Commission a written annual compliance report in the form specified at www.nuclearsafety.gc.ca/acr.
(2912-3)

6. Operation Limitations
Subject to any other condition of this licence and unless otherwise permitted by the prior written approval of the Commission or a person authorized by the Commission, the licensee shall carry out the licensed activities in accordance with the documents or parts thereof referred to in the Appendix: Licence Document(s).
(2917-7)

7. Inaccuracies Notification
The licensee shall report to the Commission or a person authorized by the Commission, as soon as is practicable, the discovery of any inaccuracy or incompleteness in the documents referred to in the Appendix: Licence Document(s).
(2920-6)

8. Survey Meter Requirements - Portable Gauge
The licensee shall, within two hours, make available a radiation survey meter at any site where a radiation device is used as authorized by this licence.
(2922-2)

9. Financial Guarantee
The licensee shall maintain, at all times, a financial guarantee in respect of the activities authorized by this licence of a value set by the Commission and in a form acceptable to the Commission.
(2020-2)

10. Sealed Source Security Requirements
The licensee shall meet the security measures for sealed sources as set out in Regulatory Document REGDOC-2.12.3, Security of Nuclear Substances: Sealed Sources, as amended from time to time. The sealed source categories are specified in REGDOC-2.12.3.
(2490-3)

Designated Officer pursuant to paragraph 37(2)(c) of the Nuclear Safety and Control Act

Appendix: Nuclear Substances and Radiation Devices

GM Blueplan Engineering Limited

Radiation Devices

Equipment Make and Model	Sealed Source Assembly	Nuclear Substance	Maximum Quantity per Radiation Device
CPN International, An InstroTek Company MC1 DR, MC1 DRP, MC3, MC1 Elite, MC3 Elite	n/a	Cesium 137	370 MBq
	n/a	Americium 241/ Beryllium	1850 MBq
InstroTek 3500 Xplorer and 3500 Xplorer2	n/a	Cesium 137	370 MBq
	n/a	Americium 241/ Beryllium	1.48 GBq
Troxler 3430, 3440, 3401, 3401B, 3411, 11B	n/a	Americium 241/ Beryllium	1628 MBq
	n/a	Cesium 137	326 MBq

end of appendix

Appendix: Location(s) of Licensed Activities

GM Blueplan Engineering Limited

Throughout Canada

end of appendix

Appendix: Licence Document(s)

LICENCE DOCUMENTS

[A1] Radiation Protection Program for Portable Nuclear Density/Moisture Gauges, February 2020. CNSC Document Number 6119663

end of appendix

SPECIAL FORM

49CFR 173.476 **Approval of special form radioactive materials.**

(a) Each offeror of special form Class 7 (radioactive) materials must maintain on file for at least one year after the latest shipment, and provide to the Associate Administrator on request, a complete safety analysis, including documentation of any tests, demonstrating that the special form material meets the requirements of Paragraph 173.469. An IAEA Certificate of Competent Authority issued for the special form material may be used to satisfy this requirement.

49CFR173.469 **Tests for special form radioactive materials**

(1) Impact Test	Free fall of capsule from a height of 9 meters onto a granite block of smooth surface. No shattering or breaking observed.
(2)Percussion Test	Capsule placed on a ¼" sheet of lead on concrete. Steel rod 25 mm in diameter by 330 mm long was dropped from a height of one meter. No shattering or breaking observed.
(3) Bending Test	Not applicable due to small length.
(4) Heat Test	Capsule heated in air to a temperature of not less than 800°C (1472°F) and held at that termperature for a period of 10 minutes, then allowed to air cool. Discoloration, but no melting or dispersement observed.

Leakage test performed after each test. No activity in excess of .005 microcuries (185 Bq) observed.

The radioactive material encapsulated in CPN International, Inc. stainless steel sealed source capsule, identified as model number **CPN-131**, has been tested for and is in compliance with the requirements for special radioactive material. IAEA Certificates of Competent Authority have been issued as follows:

CPN GAUGES	ACTIVITY & NUCLIDE	IAEA (SFC) NO.	**New IAEA (SFC) NO.
MC-1/DR, MC-2, MC-3, 501/DR, MC-4C, MC-S-24	10 mCi Cs-137 and 50 mCi Am-241/Be	USA/0634/S and USA/0627/S	USA/0356/S and CZ/1009/S
503/DR, MCM/2	50 mCi Am-241/Be	USA/0627/S	CZ/1009/S
AC-2R	100 mCi Am-241/Be	USA/0627/S	CZ/1009/S

****Any gauge manufactured after March 31, 2008 (S/N's M_80308995" or higher) require new SFC No.**

CPN, DIV. OF INSTROTEK
1057 PORT CHICAGO HWY., STE 100
CONCORD, CA 94520 U.S.A.
PHONE: 925-363-9770
FAX: 925-363-9385
www.instrotek.com

Sean Reilly
Radiation Safety Officer
Signed: April 1, 2008

CPN

Advanced Instrumentation for Testing

AN INSTROTEK® COMPANY

April 1, 2008

To Whom It May Concern:

Effective March 31, 2008 any new gauges manufactured by CPN International, Inc. will contain sources from a new supplier. Therefore, the special form certificates (SFC) listed on the Dangerous Goods (DG) Declarations will change. The new special form certificate numbers are:

CPN Gauges	Activity/ Nuclide	IAEA (SFC) NO.
MC-1DRP, MC-3, 501DR, MC-S-24	50 mCi Am-241/Be and 10 mCi Cs-137	CZ/1009/S-96 USA/0356/S
503DR, MCM-2	50 mCi Am-241/Be	CZ/1009/S-96
AC-2R	100 mCi Am-241/Be	CZ/1009/S-96

Please be sure to prepare your DG Declarations accordingly. Make sure to use the above mentioned new special form certificate numbers for any gauges manufactured after March 31, 2008. Gauges with serial numbers of "**M_80308995**" or higher will use the new special form certificates.

See attached copies of the special form certificates.

For all gauges manufactured before March 2008, you use Special Form Certificate Numbers USA/0627/S and USA/0634/S.

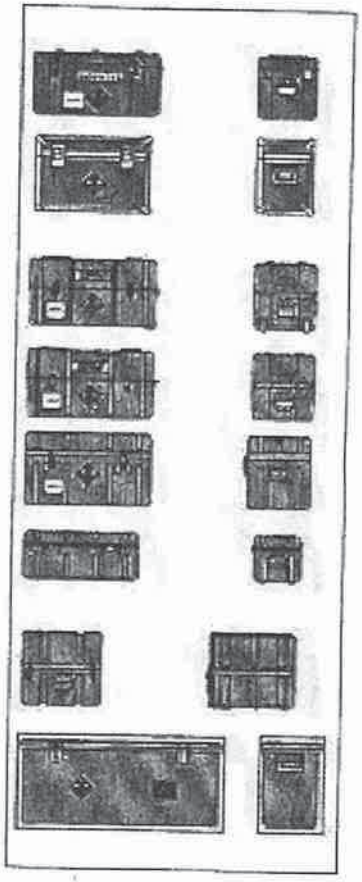
Sean Reilly
Radiation Safety Officer

CPN International, Division • 4057 Port Chicago Hwy., Ste. 100 • Concord, CA 94520 • tel: 925.363.9770 fax: 925.363.9385

CPN
AN INSTROTEK® COMPANY

INSTROTEK, INC
5052 Commercial Cir.
Concord, CA 94520
(925)363-9770
www.InstroTek.com

	Type A Testing					Case Specifications				
	Water Spray Test	Free Drop Test	Stacking Test	Penetration Test	Vibration Test	Loaded Wt Lbs (kg)	Width in (cm)	Depth in (cm)	Height in (cm)	Construction
Xplorer 3500 PN 1035043	Pass	Pass	Pass	Pass	Pass	85 (39)	27 (69)	14 (36)	18 (46)	Dual Wall Rotational Molded Polyethylene
Xplorer 3500 PN 1500027	Pass	Pass	Pass	Pass	Pass	95 (44)	27 (69)	14 (36)	18 (46)	Fiberglass Coated Plywood with Aluminum Frame
MC Series PN C-704467	Pass	Pass	Pass	Pass	Pass	80 (36)	27 (69)	15 (38)	17 (43)	Dual Wall Rotational Molded Polyethylene
MC Series PN C-705805	Pass	Pass	Pass	Pass	Pass	85 (39)	30 (76)	15 (38)	17 (43)	Dual Wall Rotational Molded Polyethylene
MC Series PN C-704432 501 Depthprobe PN C-501515	Pass Pass	Pass Pass	Pass Pass	Pass Pass	Pass Pass	90 (41)	30 (76)	15 (38)	17 (43)	Vacuum Thermo Formed Polyethylene with Aluminum Frame
503 Hydroprobe PN C-700094 MCM2 Hydrotector PN C-401465	Pass Pass	Pass Pass	Pass Pass	Pass Pass	Pass Pass	35 (16)	27 (69)	12 (30)	11 (28)	Vacuum Thermo Formed Polyethylene with Aluminum Frame
AC2 & AC2R PN C-100388	Pass	Pass	Pass	Pass	Pass	65 (29)	20 (51)	20 (51)	18 (46)	Vacuum Thermo Formed Polyethylene with Aluminum Frame
MCS-24 Stratagauge PN C-400754	Pass	Pass	Pass	Pass	Pass	200 (91)	50 (127)	16 (41)	28 (71)	Fiberglass Coated Plywood with Aluminum Frame



49 CFR 173.415 AUTHORIZED TYPE A PACKAGES

(a)Each offeror of a Specification 7A package must maintain on file for at least one year after the latest shipment, and shall provide DOT on request, complete documentation of tests and an engineering evaluation or comparative data showing that the construction methods, packaging design, and materials of construction comply with the specification.

Engineering Evaluation
The packaging referenced above meets or exceeds the requirements of 49CFR 173.415

Sean Reilly
Radiation Safety Officer
October 20, 2012

DANGEROUS GOODS SHIPPING DOCUMENT

Consignor Business Name & Address:	**Consignee Business Name & Address:**
GM BluePlan Engineering Limited 1260 - 2nd Avenue East, Unit 1. Owen Sound, On N4K 2J3 (519) 376-1805	GM BluePlan Engineering Limited 1260 - 2nd Avenue East, Unit 1. Owen Sound, On N4K 2J3 (519) 376-1805
CNSC-Licence No. 15245-1-25.0	**CNSC-Licence No. 15245-1-25.0**
24-Hour Emergency Contact Numbers: Derek Brewster (519) 372-5432 (Cellular) Ethan Webb (519) 372-6542 (Cellular) Bill Dubeau (519) 372-4821 (Cellular)	**Location of Dangerous Goods in Vehicle:** Rear of Vehicle
Additional Handling Information/Special Instructions: Electronic Measuring Device - Fragile	**Special Form Certificate Numbers:** USA/0634/S-96, Rev. 5 USA/0627/S-96, Rev. 4 *(Gauge Assay Date prior to 2008)*

UN#, Shipping Name, Class.	No. of Packages	Radio-nuclide	Isotope Max. Activity	Category	T.I.
UN 3332 RADIOACTIVE MATERIAL, TYPE A PACKAGE SPECIAL FORM Class 7	ONE Container, Dimentions 76 x 40 x 42 cm 42 Kg	^{137}CS	370 MBq (10 mCi)	II - Yellow	0.4
		^{241}Am/Be	1850 MBq (50 mCi)		

Consignor's Declaration:

I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked and labelled, and are in all respects in the proper condition for transport by ground according to the applicable International and National Government Regulations.

Printed Name: Derek Brewster, RSO	**Date Prepared:** February 10, 2020

East Building, PHH-23
1200 New Jersey Ave, SE
Washington, D.C. 20590

U.S. Department of Transportation

Pipeline and Hazardous Materials Safety Administration

IAEA CERTIFICATE OF COMPETENT AUTHORITY SPECIAL FORM RADIOACTIVE MATERIALS

CERTIFICATE USA/0634/S-96, REVISION 5

This certifies that the source described has been demonstrated to meet the regulatory requirements for special form radioactive material as prescribed in the regulations of the International Atomic Energy Agency[1] and the United States of America[2] for the transport of radioactive material.

1. Source Identification - QSA Global, Inc. Model X.8 (Manufactured on or after September 23, 1981).

2. Source Description - Cylindrical double encapsulation made of stainless steel and tungsten inert gas or laser seal welded. Approximate exterior dimensions are 6.1 mm (0.24 in.) in diameter and 8.3 mm (0.33 in.) in length. Minimum wall thickness of the outer encapsulation is 0.4 mm (0.02 in.). Construction shall be in accordance with attached AEA Technology QSA, Inc. Drawing No. RBA62011, Rev. C.

3. Radioactive Contents - No more than either 37.0 GBq (1.0 Ci) of Cesium-137, or 740.0 MBq (20.0 mCi) of Radium-226, or 740.0 MBq (20.0 mCi) of Barium-133. The Cs-137 is in the form of a cesium silicate in a glass matrix or a sulfate as ceramic ion exchange pellets. The Ra-226 is in the form of a low solubility radium sulfate powder. The Ba-133 is in the form of barium silicate as a glass bead or a ceramic pellet.

---

[1] "Regulations for the Safe Transport of Radioactive Material, 2012 Edition, No. SSR-6" published by the International Atomic Energy Agency (IAEA), Vienna, Austria.

[2] Title 49, Code of Federal Regulations, Parts 100-199, United States of America.

CERTIFICATE USA/0634/S-96, REVISION 5

4. Management System Activities - Records of Management System activities required by Paragraph 306 of the IAEA regulations shall be maintained and made available to the authorized officials for at least three years after the last shipment authorized by this certificate. Consignors in the United States exporting shipments under this certificate shall satisfy the requirements of Subpart H of 10 CFR 71.

5. Expiration Date - This certificate expires on October 31, 2022. Previous editions which have not reached their expiration date may continue to be used.

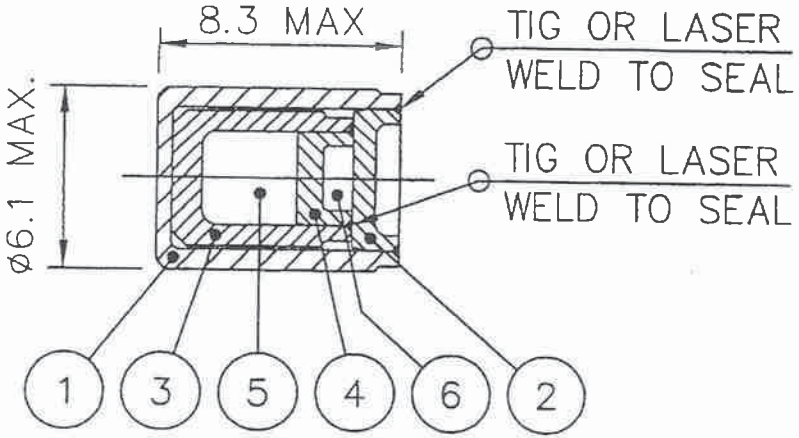
This certificate is issued in accordance with paragraph(s) 804 of the IAEA Regulations and Section 173.476 of Title 49 of the Code of Federal Regulations, in response to the October 6, 2017 petition by QSA Global, Inc., Burlington, MA, and in consideration of other information on file in this Office.

Certified By:

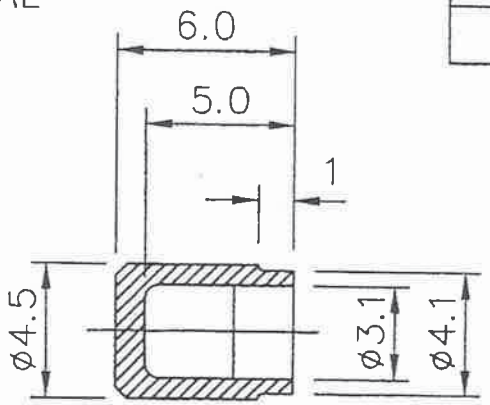
William Schoonover
Associate Administrator for Hazardous Materials Safety

November 03, 2017
(DATE)

Revision 5 - Issued to extend the expiration date.



ITEM No.	DESCRIPTION		QTY.
1	SHEATH BODY	STAIN.STL.	1
2	SHEATH LID	STAIN.STL.	1
3	CELL BODY	STAIN.STL.	1
4	CELL LID	STAIN.STL.	1
5	ACTIVE MATERIAL AND CERAMIC FIBER PACKING MATERIAL		AR
6	CERAMIC FIBER PACKING MATERIAL (OPTIONAL)		AR



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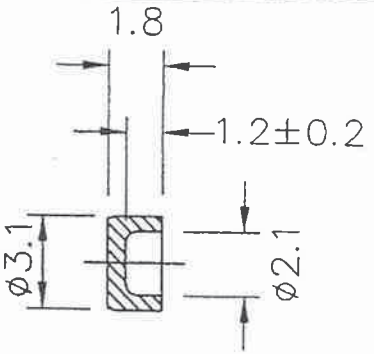
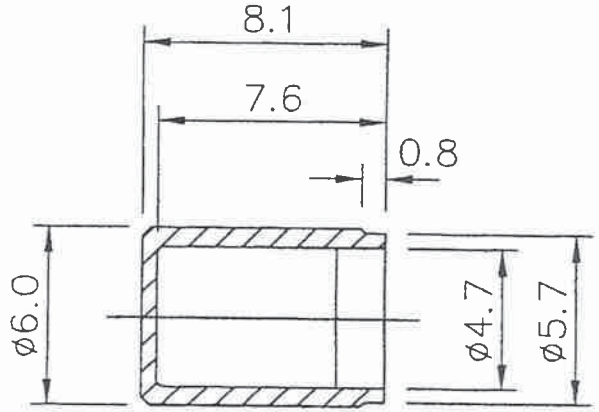
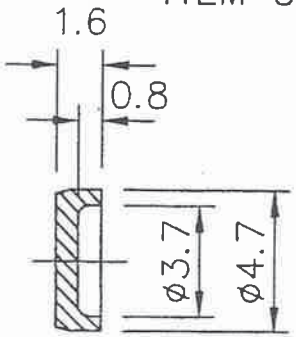


ITEM 4



ITEM 1



ITEM 2

APPROVALS	
R. Wynn	10-03
[signature]	10-03

AEATECHNOLOGY
Q5A
40 NORTH AVE, BURLINGTON, MA 01803

DESCRIPTIVE DRAWING

DIMENSIONS IN MILLIMETERES
UNLESS OTHERWISE STATED TOLERANCES:
X ±0.5
X.X ±0.1
X.XX ±0.05
ANGULAR ±5°
INTERNAL N7
EXTERNAL N6

TITLE X8 CAPSULE ASSY

SIZE	DWG. NO.	REV
A	RBA62011	C
	SCALE: NONE	SHEET 1 OF 1

ERF #	679

U.S. Department of
Transportation

**Pipeline and
Hazardous Materials
Safety Administration**

East Building, PHH-23
1200 New Jersey Ave, SE
Washington, D.C. 20590

CERTIFICATE NUMBER: USA/0634/S-96

ORIGINAL REGISTRANT(S):

QSA Global, Inc.
30 North Avenue
Burlington, MA, 01803
USA

Schlumberger
300 Schlumberger Drive
MD-121
Sugar Land, TX, 77478
USA

Troxler Electronic Laboratories
P.O. Box 12057
3008 Cornwallis Road
Research Triangle Park, NC, 27709
USA

East Building, PHH-23
1200 New Jersey Ave, SE
Washington, D.C. 20590

U.S. Department of Transportation

Pipeline and Hazardous Materials Safety Administration

IAEA CERTIFICATE OF COMPETENT AUTHORITY SPECIAL FORM RADIOACTIVE MATERIALS

CERTIFICATE USA/0627/S-96, REVISION 4

This certifies that the source described has been demonstrated to meet the regulatory requirements for special form radioactive material as prescribed in the regulations of the International Atomic Energy Agency[1] and the United States of America[2] for the transport of radioactive material.

1. Source Identification - QSA Global, Inc. Model No. X.2084 (Manufactured on or after July 28, 1983).

2. Source Description - Cylindrical double encapsulation made of stainless steel and tungsten inert gas or laser seal welded. Approximate outer dimensions are 9.1 mm (0.36 in.) in diameter and 12.8 mm (0.5 in.) in length. Minimum wall thickness of the sheath body is 0.95 mm (0.04 in.) and of the cell body is 0.85 mm (0.03 in.). Construction shall be in accordance with attached AEA Technology QSA, Inc. Drawing No. RBA61685, Rev. A.

3. Radioactive Contents - No more than 5.55 GBq (0.15 Ci) of Americium-241. The Am-241 is in solid oxide form and mixed with beryllium.

4. Management System Activities - Records of Management System activities required by Paragraph 306 of the IAEA regulations shall be maintained and made available to the authorized officials for at least three years after the last shipment authorized by this certificate. Consignors in the United States exporting shipments under this certificate shall satisfy the requirements of Subpart H of 10 CFR 71.

5. Expiration Date - This certificate expires on August 30, 2022. Previous editions which have not reached their expiration date may continue to be used.

---

[1] "Regulations for the Safe Transport of Radioactive Material, 2012 Edition, No. SSR-6" published by the International Atomic Energy Agency (IAEA), Vienna, Austria.

[2] Title 49, Code of Federal Regulations, Parts 100-199, United States of America.

CERTIFICATE USA/0627/S-96, REVISION 4

This certificate is issued in accordance with paragraph(s) 804 of the IAEA Regulations and Section 173.476 of Title 49 of the Code of Federal Regulations, in response to the August 14, 2017 petition by QSA Global, Inc., Burlington, MA, and in consideration of other information on file in this Office.

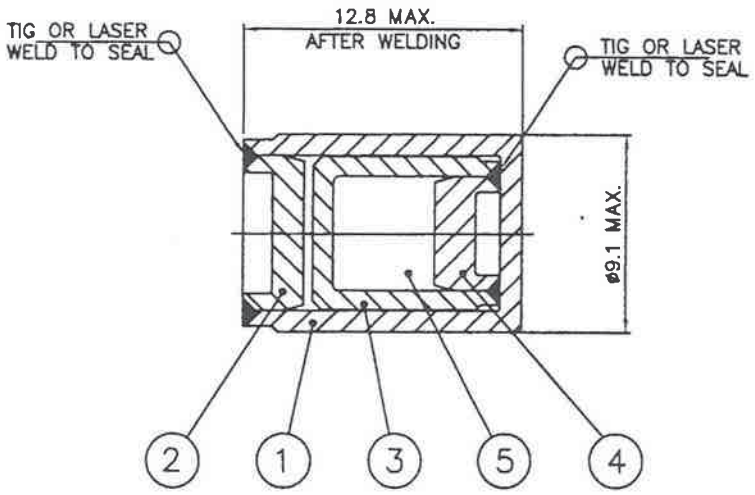
Certified By:

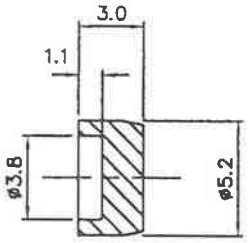
William Schoonover
Associate Administrator for Hazardous Materials Safety

August 29, 2017
(DATE)

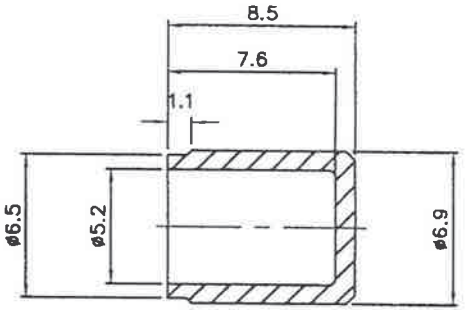
Revision 4 - Issued to extend the expiration date

ITEM No.	DESCRIPTION		QTY.
1	SHEATH BODY	STAIN.STL.	1
2	SHEATH LID	STAIN.STL.	1
3	CELL BODY	STAIN.STL.	1
4	CELL LID	STAIN.STL.	1
5	ACTIVE MATERIAL		AR

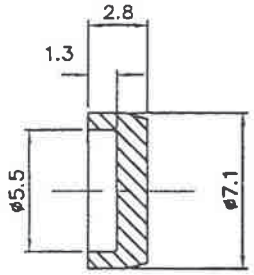




ITEM 4



ITEM 3



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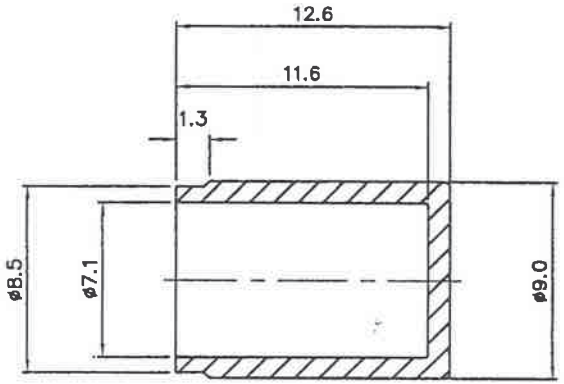


ITEM 1

APPROVALS	
	03MAR03
	3 Mar 03

AEA TECHNOLOGY QSA
40 NORTH AVE, BURLINGTON, MA 01803

DESCRIPTIVE DRAWING

DIMENSIONS IN MILLIMETERES
UNLESS OTHERWISE STATED TOLERANCES:
X ±0.5
X.X ±0.1
X.XX ±0.05
ANGULAR ±5°
INTERNAL N7
EXTERNAL N6

TITLE: X2084 CAPSULE ASSEMBLY

ERF #	475

SIZE	DWG. NO.	REV
A	RBA61685	A
	SCALE: NONE — SHEET 1 OF 1	

U.S. Department of
Transportation

**Pipeline and
Hazardous Materials
Safety Administration**

East Building, PHH-23
1200 New Jersey Ave, SE
Washington, D.C. 20590

CERTIFICATE NUMBER: USA/0627/S-96

ORIGINAL REGISTRANT(S):

QSA Global, Inc.
30 North Avenue
Burlington, MA, 01803
USA

Troxler Electronic Laboratories
P.O. Box 12057
3008 Cornwallis Road
Research Triangle Park, NC, 27709
USA

U.S. Geologic Survey
Department of the Interior
P.O. Box 25046 (MS-974)
Denver, CO, 80225-0046
USA

DANGEROUS GOODS SHIPPING DOCUMENT

Consignor Business Name & Address:	**Consignee Business Name & Address:**
GM BluePlan Engineering Limited 1260 - 2nd Avenue East, Unit 1. Owen Sound, On N4K 2J3 (519) 376-1805	GM BluePlan Engineering Limited 1260 - 2nd Avenue East, Unit 1. Owen Sound, On N4K 2J3 (519) 376-1805
CNSC-Licence No. 15245-1-25.0	**CNSC-Licence No. 15245-1-25.0**
24-Hour Emergency Contact Numbers: Derek Brewster (519) 372-5432 (Cellular) Ethan Webb (519) 372-6542 (Cellular) Bill Dubeau (519) 372-4821 (Cellular)	**Location of Dangerous Goods in Vehicle:** Rear of Vehicle
	Special Form Certificate Numbers: IAEA (SFC) No. CZ/1009/S-96 (Dated 10/10/2013) USA/0356/S-96, Rev. 14 *(Gauge Assay Date after 2008)*
Additional Handling Information/Special Instructions: Electronic Measuring Device - Fragile	

UN#, Shipping Name, Class.	No. of Packages	Radio-nuclide	Isotope Max. Activity	Category	T.I.
UN 3332 RADIOACTIVE MATERIAL, TYPE A PACKAGE SPECIAL FORM Class 7	ONE Container, Dimentions 76 x 40 x 42 cm 42 Kg	^{137}CS	370 MBq (10 mCi)	II - Yellow	0.4
		$^{241}Am/Be$	1850 MBq (50 mCi)		

Consignor's Declaration:

I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked and labelled, and are in all respects in the proper condition for transport by ground according to the applicable International and National Government Regulations.

Printed Name: Derek Brewster, RSO	**Date Prepared:** February 10, 2020

STATE OFFICE FOR NUCLEAR SAFETY

State Office for Nuclear Safety
Senovážné nám. 9, 110 00 Prague 1
Nuclear Safety Section

In Prague, on 10 October 2013
Ref. no.: SÚJB/ONRV/21067/2013
File no.: SÚJB/POD/19221/2013/2
RAW and Spent Fuel Management Division

DECISION

The State Office for Nuclear Safety (SONS) as the competent administrative body pursuant to Section 3 (2) (e) of Act no. 18/1997 Sb., On Peaceful Utilisation of Nuclear Energy and Ionising Radiation (the Atomic Act) and on Amendments and Additions to Some Acts, as later amended, has decided as follows in the administrative proceedings initiated pursuant to Section 44 (1) of Act no. 500/2004 Sb., Rules of Administrative Procedure (hereinafter referred-to as "RAP"), on 2 September 2013 on the basis of an application filed by a participant in proceedings as defined in Section 27 (1) (a) RAP – Eckert & Ziegler Cesio s.r.o., Identification Number 45274584, Registration Number 108600 (hereinafter referred-to as "Participant in Proceedings"), of 28 August 2013 under file no. 20/EZC/13 in the matter of repeated issuance of the decision on type approval of a special form radioactive material:

SONS, pursuant to Section 67 (1) RAP and Section 23 (2) of Act no. 18/1997 Sb., as later amended,

a p p r o v e s

Construction type **Am1.N02** special form radioactive material (hereinafter referred-to as "SFRM"), this SFRM, manufactured in conformity with the documentation assessed, being assigned the identification designation

CZ/1009/S – 96

and, for the purposes of international identification, this Am1.N02 SFRM type approval decision being assigned the code designation

CZ/1009/S – 96 (Rev. 2).

The special form radioactive material under the identification designation CZ/1009/S – 96 complies with the requirements of Act no. 18/1997 Sb., as amended, as well as the relevant implementing regulations, the recommendation of the International Atomic Energy Agency (IAEA) titled "Regulations for the Safe Transport of Radioactive Material, 2009 Edition Safety Requirements Series No. TS-R-1." and the requirements of the international transportation regulations that refer to the cited IAEA's rules.

Description of the Special Form Radioactive Material

Am1.N02 special form radioactive material is a cylinder 10 mm long and the diameter of 7.8 mm. It consists of an outer capsule of stainless-steel closed with a plug of the same material welded on by welding in the protective atmosphere, an inner capsule with a plug, both of stainless steel, too, welded on using the TIG method as well, and a radionuclide emitter inside the inner capsule. A distance piece fixes the inner capsule so that the radionuclide emitter is in close contact with the outlet hole of the outer capsule, 0.2 mm thick.

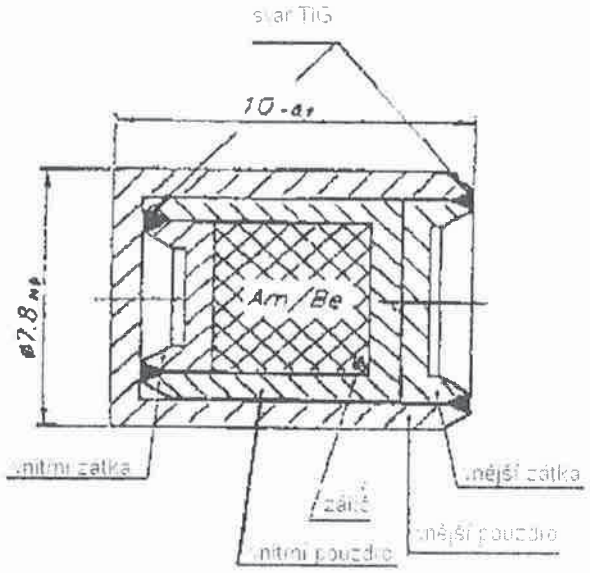
Eckert & Ziegler Cesio s. r. o., Radiová 1, 102 27 Prague 10, is the manufacturer of this SFRM.

Parameters of the Special Form Radioactive Material (SFRM)

SRFM	Outer diameter [mm]	Height [mm]	Thickness of the hole [mm]	Maximum activity [GBq]	ISO Classification
Am1.N02	**7.8**	**10**	**0.2**	**7.4**	**C 66545**

Picture of the Special Form Radioactive Material

The picture of the Am1.N02 SFRM corresponds to the technical drawing "Am – Be NEUTRON SOURCE Am1.N02, 1. 207.02.02 – 00:00 (4), BEBIG Isotopentechnik und Umweltdiagnostik GmbH, of 2 May/28 July 1995".



svar TIG = TIG weld, vnitřní zátka = inner plug, vnitřní pouzdro = inner capsule, zářič = emitter, vnější pouzdro = outer capsule, vnější zátka = outer plug

Conditions for Use of the Special Form Radioactive Material:

Type-approved SFRM Am1.N02 under identification designation CZ/1009/S - 96 may be used only subject to the compliance with the following conditions:

1. Permitted Radioactive Content

The Am1.N02 special form radioactive material under identification designation CZ/1009/S – 96 may only contain a radionuclide emitter consisting of a mixture of natural beryllium powder and a ^{241}Am radionuclide bound in the form of americium oxide, with the maximum activity of 7.4 GBq.

2. Handling, Maintenance and Inspections

Handling, maintenance and operating inspections – reviews of the Am1.N02 SFRM must be performed in compliance with the requirements given in the valid version of "Instructions for Safe Handling of Ionizing Radiation Sources (ZIZ), QM-RP-006, Eckert & Ziegler Cesio s.r.o."

Reviews of the Am1.N02 SFRM, operating stability test and long-term stability test performed in accordance with the above document under ISO 9978 "Radiation Protection – Sealed Radioactive Sources –Leakage Test Methods 1992" must be documented by an official record and archived throughout the life of the SFRM.

3. Quality Assurance

The Am1.N02 special form radioactive material under identification designation CZ/1009/S – 96 and with the given serial number must be manufactured in accordance with the technical drawing "Am – Be NEUTRON SOURCE Am1.N02, 1. 207.02.02 – 00:00 (4), BEBIG Isotopentechnik und Umweltdiagnostik GmbH, of 2 May/28 July 1995", in accordance with the approved procedures and with the document titled "Quality Assurance Programme (to meet the requirements of ISO 9001, ISO13485 and Decree no. 132/2008 Sb.), Q940-001", in the valid version.

The manufacturer must document the conformity of the Am1.N02 special form radioactive material, under identification designation CZ/1009/S – 96 and with the given serial number, with the approved type by a written Declaration of Conformity pursuant to Section § 6 (2) (e) of Decree no. 317/2002 Sb., On type approval of packaging for shipment, storage and disposal of nuclear materials and radioactive substances, on type approval of ionizing radiation sources, and on shipment of nuclear materials and specified radioactive substances (on type approval and shipment).

The Am1.N02 special form radioactive material under identification designation CZ/1009/S – 96 and with the given serial number may be put into circulation only if its conformity with the approved type was proved by the special form radioactive material acceptance test according to the valid version of the document "Closed Radionuclide Emitter (URZ) Conformity Verification, Methodology, QM – T – 541 Eckert & Ziegler Cesio s. r. o."

4. Labelling

The Am1.N02 special form radioactive material under identification designation CZ/1009/S – 96 must be labelled with the serial number and the identification designation CZ/1009/S – 96 in a clear, legible and durable manner. In case it is not technically practicable to place the identification designation onto the capsule of the special form radioactive material, it can be replaced by the type approval decision.

5. Reporting of Accidents

If any defect or accident accompanied with damage to the Am1.N02 special form radioactive material under identification designation CZ/1009/S – 96 occurs in handling it, the SFRM

must be temporarily put out of operation without unnecessary delay, in compliance with all requirements of radiation safety.

The SFRM may be put into operation only after an inspection and/or repair. At the same time, a record of the incident must be elaborated and sent by the Approval Holder pursuant to Section 9 (1) (i) of Act no. 18/1997 Sb., Atomic Act, as amended, to the State Office for Nuclear Safety within 14 days after the occurrence of the incident.

6. Validity of the Decision

a) The Decision of Type Approval of Am1.N02 SFRM does not replace other permissions of the State Office for Nuclear Safety issued pursuant to Section 9 (1) of Act no. 18/1997 Sb., as amended, and/or permissions/licenses for activities issued by other central state administration bodies pursuant to special regulations.

b) Decision ref. no. 19481/2008 of 5 September 2008 is hereby invalidated and replaced at the same time.

The validity of this Decision expires on 30 November 2023.

Justification:

The Decision is issued on the ground of the application from the Eckert & Ziegler Cesio s.r.o. Company, ref. no. 20/EZC/13 of 28 August 2013, after having assessed the documentation presented, which was submitted to the State Office for Nuclear Safety pursuant to the provision of Section 23 of Act no. 18/1997 Sb., as amended.

The Applicant submitted this application for repeated issuance of the decision on type approval of Am1.N02 SFRM for reasons of the forthcoming expiry of the above-mentioned SONS's decision ref. no. 19481/2008, of 5 September 2008, as of 31 December 2013.

The Participant in Proceedings submitted valid documentation in compliance with Sections 3 and 4 of Decree no. 317/2002 Sb., On type approval and shipment, as amended, during previous administrative procedures, the last one of which was concluded by the issuance of the Decision of the State Office for Nuclear Safety on Am1.N02 SFRM type approval, ref. no. 19481/2008 of 5 September 2008.

The Application was also supported by the following documents, in compliance with the above-cited provisions of legal regulations:

- Authenticated copy of the entry in the Register of Companies regarding the Eckert & Ziegler Cesio s. r. o. Company of 25 March 2013;
- Affirmation pursuant to Section 13 (8) of Act no. 18/1997 Sb., Atomic Act, as amended, of Eckert & Ziegler Cesio s. r. o. of 31 May 2013;
- Requirements of an application for type approval of a special form radioactive material within the meaning of Decree no. 317/2002 Sb., Eckert & Ziegler Cesio s. r. o., of 28 August 2013;
- Annex C to ref. no. 20/EZC/13, Construction types of special form radioactive materials (SFRM), Eckert & Ziegler Cesio s. r. o., of 28 August 2013;
- Copy of the document titled "Instructions for Safe Handling of Ionizing Radiation Sources (ZIZ)", QM-RP-006, Eckert & Ziegler Cesio s. r. o., copy no. 2, version no. 3, of 18 May 2011;

- Copy of the front page of the Quality Assurance Programme (to meet the requirements of ISO 9001, ISO13485 and Decree no. 132/2008 Sb.) Q940-001, Eckert & Ziegler Cesio s. r. o., version 3 of 8 April 2010, approved by SONS's Decision ref. no. SÚJB/OZ/9373/2010 of 14 April 2010;
- Digital form of the "Quality Manual" document, QM-Q-000 Eckert & Ziegler Cesio s. r. o.;
- Digital form of the "Closed Radionuclide Emitter (URZ) Conformity Verification, Methodology" document, QM – T – 541 Eckert & Ziegler Cesio s. r. o., version 1, of 27 October 1998;
- Sample of a Closed Emitter Certification, Eckert & Ziegler Cesio s. r. o., of 22 May 2013;
- Copy of the ISO 9001:2008 Quality Certificate, Certificate no. 12 100 12817 TMS, TÜV SÜD Management Service GmbH, of 30 July 2012.

SONS states that the assessed documentation complies with the relevant provisions of Act no. 18/1997 Sb., as amended, and the relevant provisions of Decree no. 317/2002 Sb., as amended, and that's why the suitability of Am1.N02 SFRM for its use in accordance with Condition 1 and subject to the other conditions hereof is proved.

The administrative fee within the meaning of Act no. 634/2004 Sb., On Administrative Fees, in the amount of CZK 1,000.- was paid in accordance with Item no. 107 (2b) of the Annex to the Act.

For reasons above, SONS decided as stated in the Statement.

Advice:

Remonstrance against this Decision can be lodged to SONS's Chairperson through SONS/SÚJB, Nuclear Safety Section, Senovážné náměstí 9, 110 00 Prague 1, within 15 days after the service hereof.

Imprint of the official seal

RNDr. Peter Lietava
Head of the RAW and Spent Fuel Management Division

Distribution List:

Applicant

Eckert & Ziegler Cesio s. r. o.
Radiová 1
102 27 Prague 10

File

East Building, PHH-23
1200 New Jersey Ave, SE
Washington, D.C. 20590

U.S. Department of Transportation

Pipeline and Hazardous Materials Safety Administration

IAEA CERTIFICATE OF COMPETENT AUTHORITY SPECIAL FORM RADIOACTIVE MATERIALS

CERTIFICATE USA/0356/S-96, REVISION 14

This certifies that the sources described have been demonstrated to meet the regulatory requirements for special form radioactive material as prescribed in the regulations of the International Atomic Energy Agency[1] and the United States of America[2] for the transport of radioactive material.

1. Source Identification - Eckert & Ziegler Isotope Products Model HEG-XXX Series (A3000, A3000-1, A3015, A3015-1, A3023, A3024-1, A3024-2, A3024-3, and A3024-4), where XXX represents the radionuclide mass number.

2. Source Description - Cylindrical double encapsulations made of Type 304 or 304L stainless steel and fusion welded. Approximate external dimensions are 6.4 mm (0.25 in.) in diameter and 15.9 mm (0.625 in.) in length (Models A3000 and A3000-1); 6.0 mm (0.236 in.) in diameter and 8.0 mm (0.315 in.) in length (Models A3015 and A3015-1); 6.0 mm (0.236 in.) in diameter and 12.0 mm (0.473 in.) in length with one end having an internal 3-48 thread (Model A3023); and 6.0 mm (0.236 in.) in diameter and 10.0 mm (0.394 in.) in length (Models A3024-1, A3024-2, A3024-3, and A3024-4). Construction shall be in accordance with attached Isotope Products Laboratories Drawing Nos. 3000 (Sheet 3 or 4 of 10), 3015 (Sheet 3 or 4 of 8), 3023 (Sheet 3 of 7), or 3024 (Sheet 4 or 5 of 8).

---

[1] "Regulations for the Safe Transport of Radioactive Material, 2012 Edition, No. SSR-6" published by the International Atomic Energy Agency (IAEA), Vienna, Austria.

[2] Title 49, Code of Federal Regulations, Parts 100-199, United States of America.

3. Radioactive Contents - The sources described by this certificate are authorized to contain any one of the following radionuclides in the chemical form identified and limited to the activity shown.

Radionuclide	Form	Activity GBq (Ci)
Na-22	NaCl in gold or ceramic	3.7 (0.10)
Co-57	$CoCl_2$ or CoO in ceramic or Co metal plated on Ni foil	11.1 (0.30)
Co-58	$CoCl_2$ or CoO in ceramic	11.1 (0.30)
Co-60	$CoCl_2$ or CoO in ceramic or 1 mm x 1mm Ni clad Co	22.2 (0.60)
Ge-68	GeO_2 in silver	1.9 (0.05)
Ba-133	$BaSO_4$ in ceramic	3.7 (0.10)
Cs-137	CsCl in gold or Cs in ceramic	22.2 (0.60)
Eu-152	Oxide in gold or ceramic	0.74 (0.020)
Ra-226	$RaSO_4$ in gold or ceramic	1.9 (0.05)
Cf-252	Oxide in metal or ceramic	0.037 (0.001)
Actinides*	Oxides in gold or ceramic	1.9 (0.05)

*(Isotopes of Ac, Th, Pa, Np, U, Pu, Am, and Cm only)

4. Management System Activities - Records of Management System activities required by Paragraph 306 of the IAEA regulations shall be maintained and made available to the authorized officials for at least three years after the last shipment authorized by this certificate. Consignors in the United States exporting shipments under this certificate shall satisfy the requirements of Subpart H of 10 CFR 71.

5. Expiration Date - This certificate expires on June 30, 2024. Previous editions which have not reached their expiration date may continue to be used.

CERTIFICATE USA/0356/S-96, REVISION 14

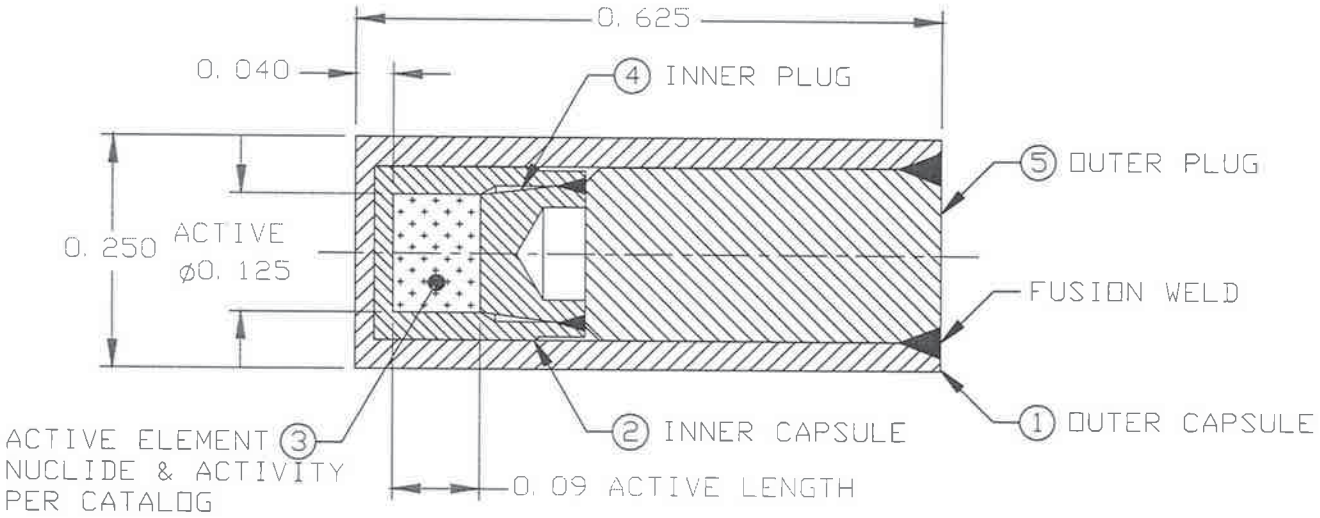
This certificate is issued in accordance with paragraph(s) 804 of the IAEA Regulations and Section 173.476 of Title 49 of the Code of Federal Regulations, in response to the June 25, 2019 petition by Eckert & Ziegler Isotope Products, Valencia, CA, and in consideration of other information on file in this Office.

Certified By:

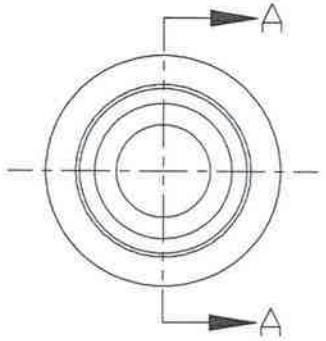
William Schoonover
Associate Administrator for Hazardous Materials Safety

July 03, 2019
(DATE)

Revision 14 - Issued to extend the expiration date and update Drawing No. 3000.



SECTION A–A



SECTION A–A

3. IDENTIFY PART NUMBER
2. ALL CAPSULES AND PLUGS ARE MADE FROM 304 OR 304L STAINLESS STEEL AND THE ACTIVE ELEMENT IS CERAMIC
1. ASSEMBLE COMPLETE PER ENGINEERING DRAWING AND FUSION WELD AS REQUIRED

NOTES: UNLESS OTHERWISE SPECIFIED

P/N A3000 ASSEMBLY, MODEL 225 POINT SOURCE

Eckert & Ziegler

Isotope Products

Valencia, California 91355

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES

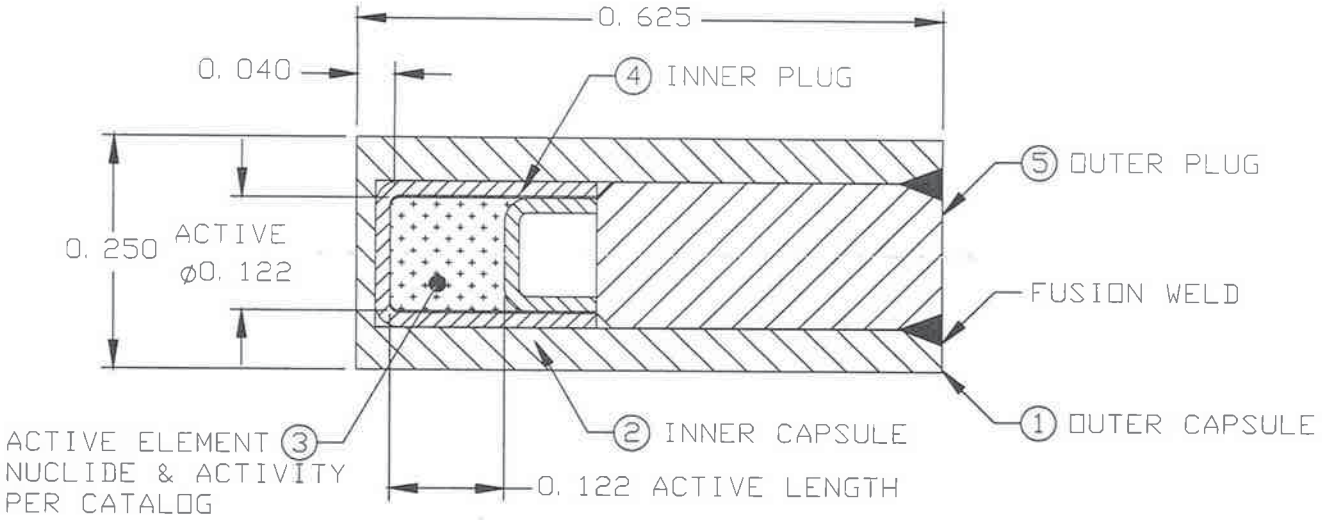
TOLERANCES ON

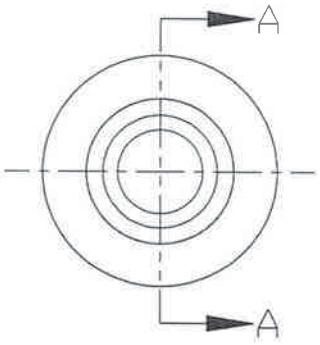
FRACTION	DECIMAL X	DECIMAL XX	DECIMAL XXX	ANGLE
±1/64	±. 1	. 01	. 002	± 5°

THIRD ANGLE PROJECTION

DESIGN	DRAWING TITLE
EZ/DI	MODEL 225 POINT SOURCE
SCALE: NONE	SERIES TITLE: INDUSTRIAL SOURCES, HIGH INTENSITY GAMMA AND NEUTRON

SIZE	CAGE CODE	REVISION	DRAWING NUMBER	SHEET
A	32993	L	3000	3 OF 10





SECTION A–A

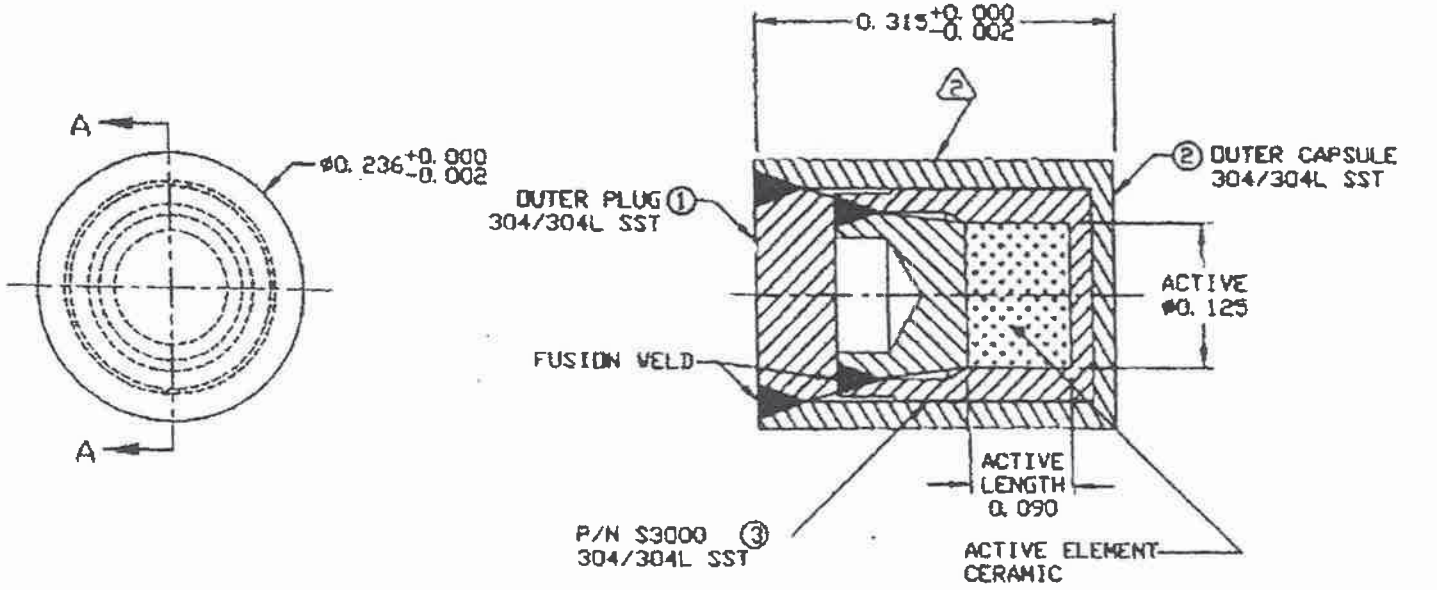
3. IDENTIFY PART NUMBER
2. ALL CAPSULES AND PLUGS ARE MADE FROM 304 OR 304L STAINLESS STEEL AND THE ACTIVE ELEMENT IS CERAMIC
1. ASSEMBLE COMPLETE PER ENGINEERING DRAWING AND FUSION WELD AS REQUIRED

NOTES: UNLESS OTHERWISE SPECIFIED

SECTION A–A

P/N A3000-1 ASSEMBLY, MODEL 225 POINT SOURCE

Eckert & Ziegler Isotope Products Valencia, California 91355	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTION ±1/64 | DECIMAL X ±.1 | XX .01 | XXX .002 | ANGLE ±.5° THIRD ANGLE PROJECTION	DESIGN EZ/DI SCALE NONE SIZE A	DRAWING TITLE MODEL 225 POINT SOURCE SERIES TITLE INDUSTRIAL SOURCES, HIGH INTENSITY GAMMA AND NEUTRON		
			CAGE CODE 32993	REVISION L	DRAWING NUMBER 3000 / SHEET 4 OF 10



SECTION A-A

3. IDENTIFY PART NUMBER

2 ENGRAVE CHARACTERS 0.060 HIGH x 0.003 DEEP MAXIMUM AS SHOWN:
IPL NUCLIDE ACTIVITY SERIAL NUMBER

1. ASSEMBLE COMPLETE PER ENGINEERING DRAWING AND PER PROCEDURE

NOTES: UNLESS OTHERWISE SPECIFIED

P/N A3015 ASSEMBLY

Isotope Products Laboratories
An Eckert & Ziegler Company
VALENCIA, CALIFORNIA 91355

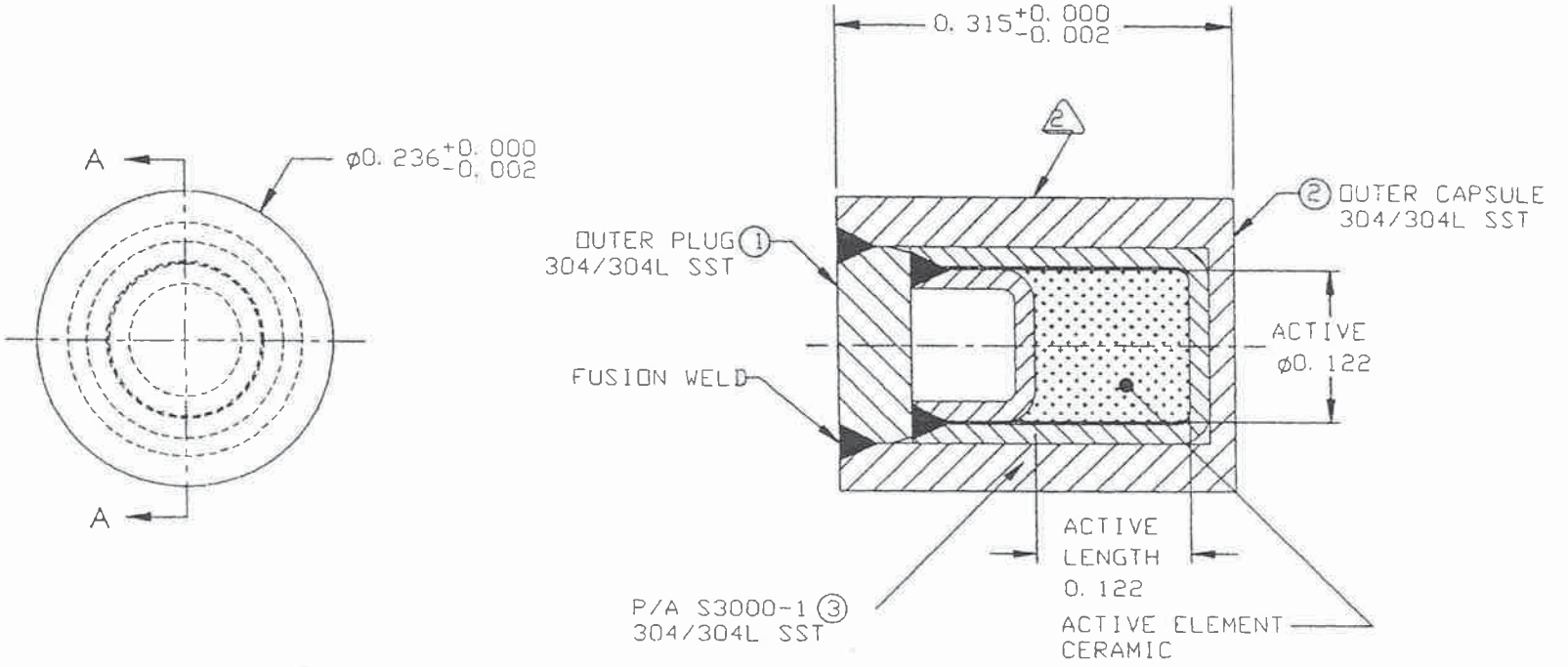
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES

TOLERANCES ON FRACTION	DECIMAL X	DECIMAL XX	DECIMAL XXX	ANGLE
±1/64	±.1	.01	.002	±.5°

THIRD ANGLE PROJECTION

DESIGN	DRAWING TITLE
EZ/DI	SPECIAL 225 CAPSULE, GAMMA POINT SOURCE
SCALE: NONE	SERIES TITLE: INDUSTRIAL SOURCES, HIGH INTENSITY GAMMA AND NEUTRON

SIZE	CAGE CODE	REVISION	DRAWING NUMBER	SHEET
A	32993	G	3015	3 OF 8



3. IDENTIFY PART NUMBER

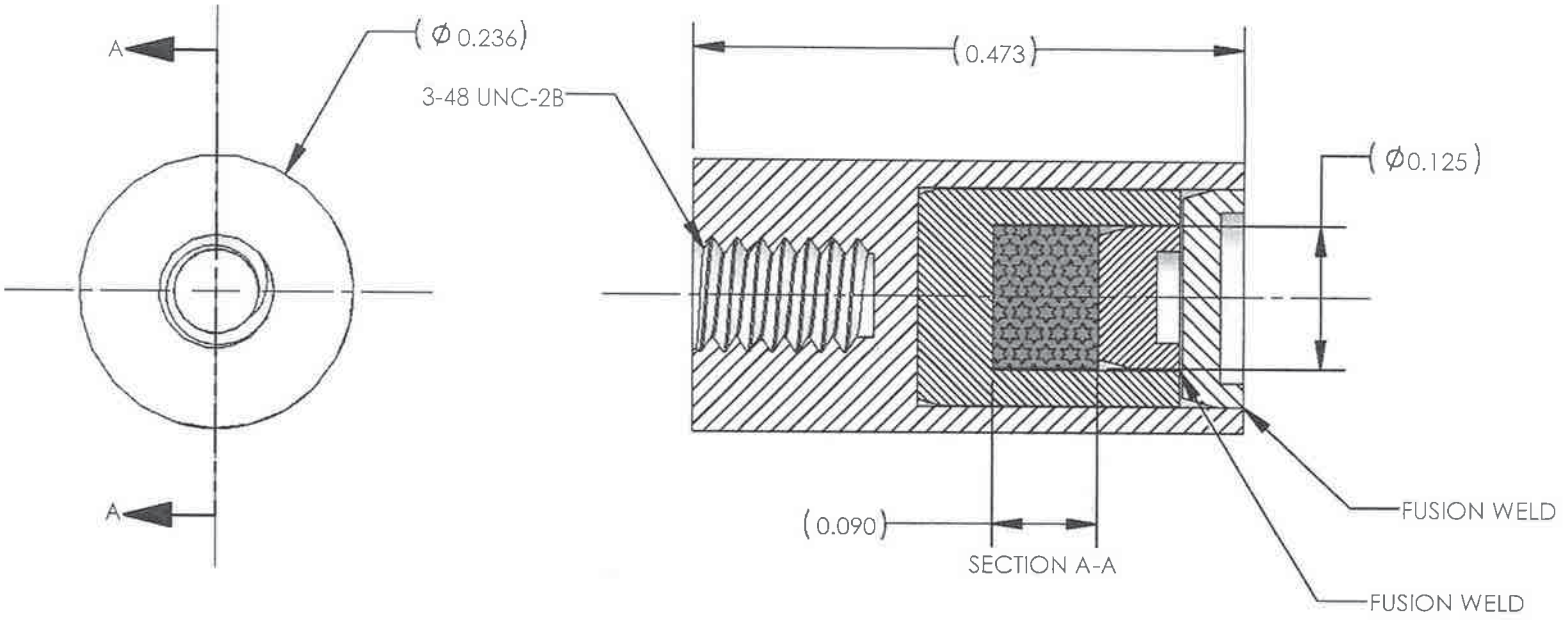
(2) ENGRAVE CHARACTERS 0.060 HIGH x 0.003 DEEP MAXIMUM AS SHOWN:
IPL NUCLIDE ACTIVITY SERIAL NUMBER

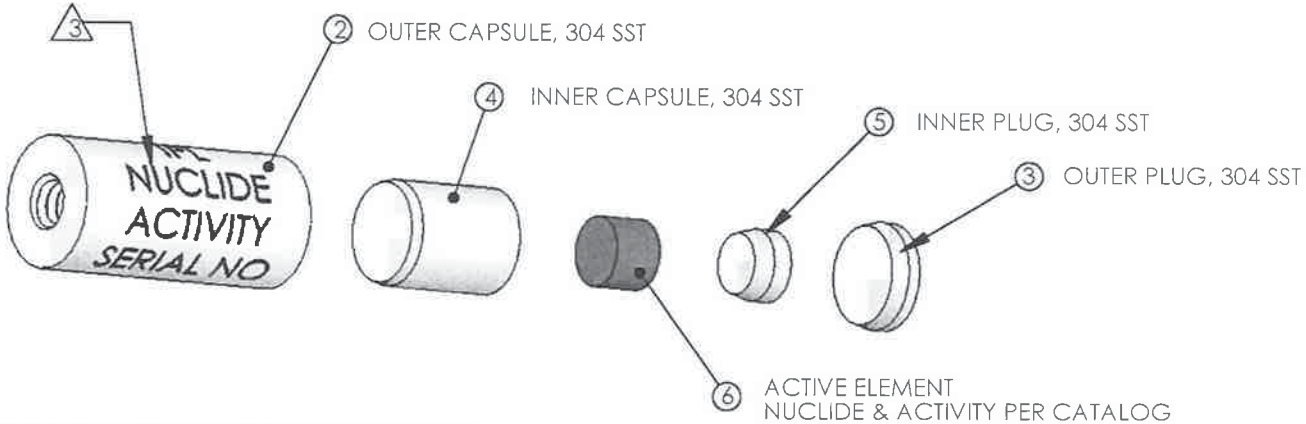
1. ASSEMBLE COMPLETE PER ENGINEERING DRAWING AND PER PROCEDURE

NOTES: UNLESS OTHERWISE SPECIFIED

A3015-1 ASSEMBLY

Isotope Products Laboratories An Eckert & Ziegler Company VALENCIA, CALIFORNIA 91355	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTION ±1/64 | DECIMAL X ± .1, XX ± .01, XXX ± .002 | ANGLE ± .5° THIRD ANGLE PROJECTION	DESIGN EZ/DI	DRAWING TITLE SPECIAL 225 CAPSULE, GAMMA POINT SOURCE	
		SCALE NONE	SERIES TITLE INDUSTRIAL SOURCES, HIGH INTENSITY GAMMA AND NEUTRON	
		SIZE A	CAGE CODE 32993 | REVISION G | DRAWING NUMBER 3015	SHEET 4 OF 8





3 ENGRAVE CHARACTERS 0.060 HIGH X 0.003 DEEP MAX AS SHOWN (BLACK FILL) IPL, NUCLIDE, ACTIVITY, SERIAL NO.
2. PACKAGE AND IDENTIFY PART NUMBER THEREON
1. ASSEMBLE PER ENGINEERING DRAWING
NOTES: UNLESS OTHERWISE SPECIFIED

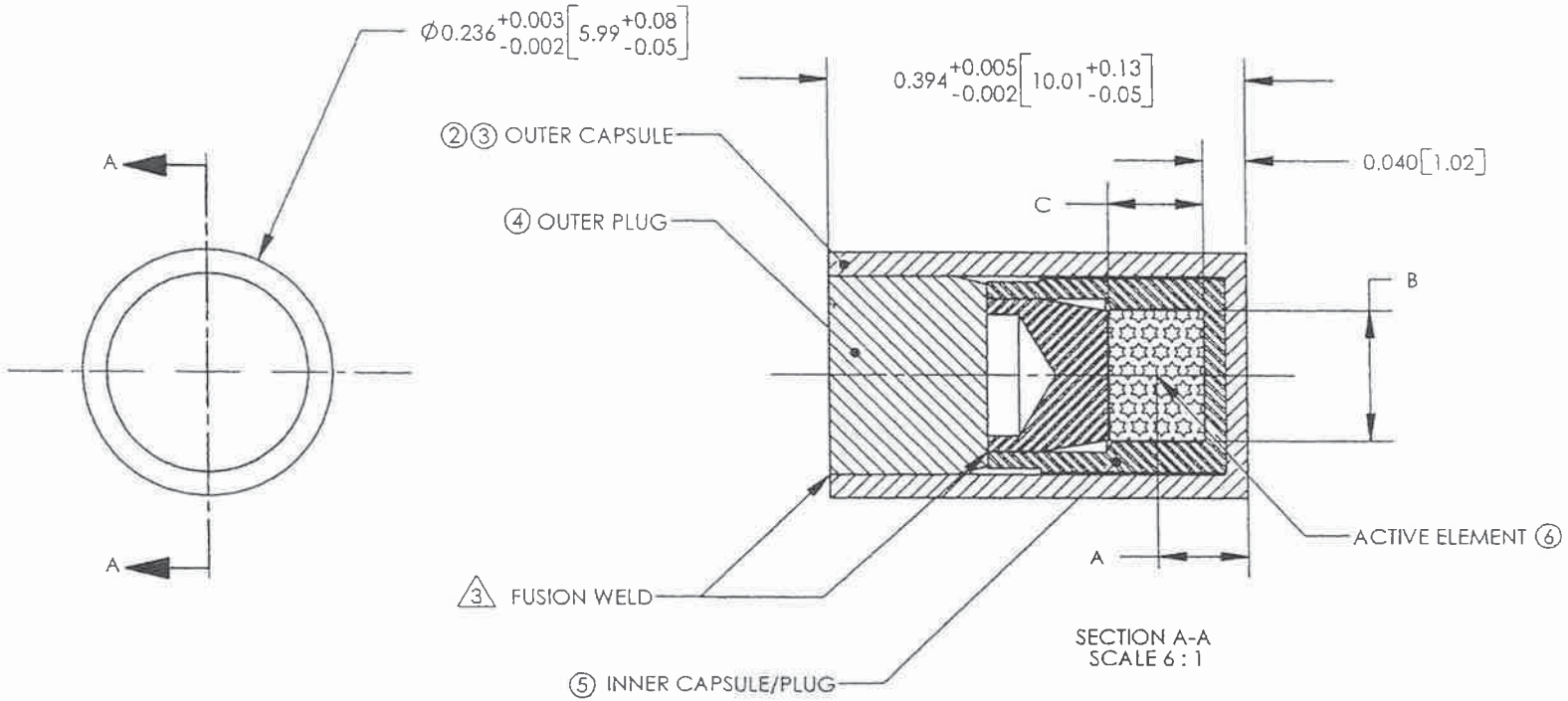
P/N A3023 GAMMA METRICS ASSEMBLY

Eckert & Ziegler
Isotope Products

VALENCIA, CALIFORNIA 91355

CAGE CODE 32993	DRAWING SIZE LETTER	DRAWN JMD/RLT	TITLE GAMMA METRICS
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCH SIZES. METRIC UNITS [mm] ARE IN MILLIMETERS.		ME/CHECKER SC	SERIES TITLE HIGH INTENSITY GAMMA AND NEUTRON SOURCES
TOLERANCES (UNLESS OTHERWISE SPECIFIED) X.XXX ± .002 INCH ANGULAR TOLERANCE OF 0°±30' X.XX ± .005 INCH FRACTIONAL DIMENSIONS ± 1/32" X.X ± .03 INCH REFERENCE DIMENSIONS () N/A X. ± .1 INCH SURFACE ROUGHNESS µINCH MAX		ENGINEER EZ	
		SCALE 6:1	DRAWING NO. 3023 / REV B / SHEET 3 OF 7

	A3024-1	A3024-3
A(CENTER OF ACTIVITY)	0.085[2.16]	0.085[2.16]
B(ACTIVE DIAMETER)	0.125[3.18]	0.125[3.18]
C(ACTIVE LENGTH)	0.090[2.29]	0.090[2.29]
ENGRAVING	STANDARD	CUSTOMER SPECIFIC



3 FUSION WELD AS REQUIRED 0.015 MINIMUM WELD DEPTH
2. PACKAGE AND IDENTIFY PART NUMBER THEREON
1. ASSEMBLE PER ENGINEERING DRAWING.
NOTES: UNLESS OTHERWISE SPECIFIED

A3024-1/ A3024-3 ASSEMBLY

Eckert & Ziegler
Isotope Products
VALENCIA, CALIFORNIA 91355

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCH-SIZES, METRIC UNITS [mm] ARE IN MILLIMETERS.

TOLERANCES (UNLESS OTHERWISE SPECIFIED)

X.XXX	± .002	INCH	ANGULAR TOLERANCE OF 0°±30'
X.XX	± .005	INCH	FRACTIONAL DIMENSIONS ± 1/32"
X.X	± .03	INCH	REFERENCE DIMENSIONS () N/A
X.	± .1	INCH	SURFACE ROUGHNESS µINCH MAX

ALL DIMENSIONS ARE FINISHED DIMENSIONS

THIRD ANGLE PROJECTION

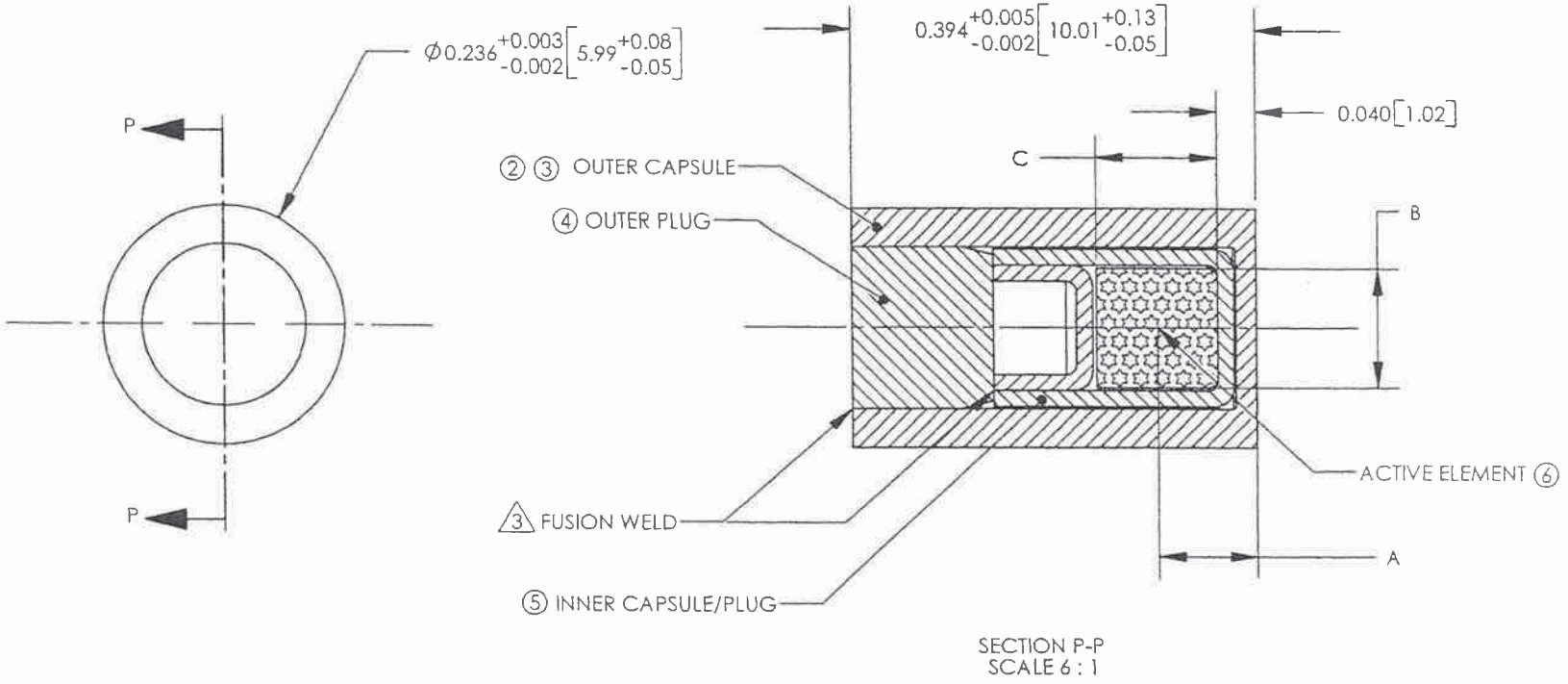
DRAWN	RLT
ME/CHECKER	LF
ENGINEER	RMD
SCALE	NONE
SIZE	A

TITLE: HEG SOURCE, 1cm LENGTH

SERIES TITLE: INDUSTRIAL SOURCES, HIGH INTENSITY GAMMA AND NEUTRON

CAGE CODE	DRAWING NO.	REV	SHEET
32993	3024	F	4 OF 8

	A3024-2	A3024-4
A(CENTER OF ACTIVITY)	0.099[2.51]	0.099[2.51]
B(ACTIVE DIAMETER)	0.118[3.00]	0.118[3.00]
C(ACTIVE LENGTH)	0.118[3.00]	0.118[3.00]
ENGRAVING	STANDARD	CUSTOMER SPECIFIC



SECTION P-P
SCALE 6 : 1

3. FUSION WELD AS REQUIRED 0.015 MINIMUM WELD DEPTH
2. PACKAGE AND IDENTIFY PART NUMBER THEREON
1. ASSEMBLE PER ENGINEERING DRAWING.
NOTES: UNLESS OTHERWISE SPECIFIED

A3024-2/A3024-4 ASSEMBLY

Eckert & Ziegler
Isotope Products
VALENCIA, CALIFORNIA 91355

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCH-SIZES. METRIC UNITS [mm] ARE IN MILLIMETERS.

TOLERANCES (UNLESS OTHERWISE SPECIFIED)
X.XXX ± .002 INCH ANGULAR TOLERANCE OF 0°±30'
X.XX ± .005 INCH FRACTIONAL DIMENSIONS ± 1/32"
X.X ± .03 INCH REFERENCE DIMENSIONS () N/A
X. ± .1 INCH SURFACE ROUGHNESS µINCH MAX
ALL DIMENSIONS ARE FINISHED DIMENSIONS

THIRD ANGLE PROJECTION

DRAWN	TITLE
RLT	HEG SOURCE, 1cm LENGTH
ME/CHECKER: LF	SERIES TITLE: INDUSTRIAL SOURCES, HIGH INTENSITY GAMMA AND NEUTRON
ENGINEER: RMD	

SCALE	SIZE	CAGE CODE	DRAWING NO.	REV	SHEET
NONE	A	32993	3024	F	5 OF 8

East Building, PHH-23
1200 New Jersey Ave, SE
Washington, D.C. 20590

U.S. Department of
Transportation

**Pipeline and
Hazardous Materials
Safety Administration**

CERTIFICATE NUMBER: USA/0356/S-96

ORIGINAL REGISTRANT(S):

Eckert & Ziegler Isotope Products
24937 Avenue Tibbitts
Valencia, CA, 91355
USA

J.L. Shepherd & Associates
1010 Arroyo Ave.
San Fernando, CA, 91340-1822
USA

Halliburton
3000 North Sam Houston Parkway, East
Houston, TX, 77032
USA

Stuart Hunt & Associates Ltd
5949 Ambler Drive
Mississauga, Ontario, L4W 2K2
Canada

Tru-Tec Services, Inc.
11005 West Fairmont Parkway
La Porte, TX, 77571
USA

Troxler Electronic Laboratories
P.O. Box 12057
3008 Cornwallis Road
Research Triangle Park, NC, 27709
USA

U.S. Geologic Survey
Idaho Water Science Center, U.S. Geological Survey
Department of Interior
1955 N Fremont MS 4131
Idaho Falls, ID, 83415

USA


DANGER
RADIOACTIVE II
0.4
7
11/25/2009

CPN

MC-1DR-P Portaprobe
09/16/2010

Stuart Hunt & Associates Ltd.

SEALED RADIOACTIVE SOURCE LEAK TEST MEASUREMENT CERTIFICATE

Company Name: GM Blueplan Engineering Limited
Address: 1260 - 2nd Avenue East, Unit 1
Owen Sound, ON
N4K 2J3

CNSC License No: 15245-1-25.0
Certificate ID: 79-58150
Measurement Date: July 30, 2020

MEASUREMENT SYSTEM INFORMATION

Measurement Method: Gamma Counting – Wizard²

Equipment Calibration Date: July 30, 2020

Verification Date: April 6, 2020

MEASUREMENT DATA

Radioisotope	Counting Efficiency	Background (CPM)	MDA (Bq)	Limit (Bq)
Am-241/Be	89.1%	28.4	0.2	200
Cs-137	20.8%	35.0	1.0	200

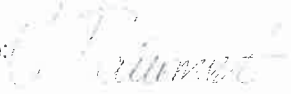
Kit #	Device SN	Source SN	Radioisotope	Gross CPM	Bq Value	Action Required
229052	10117	10117	Am-241/Be	27.1	< 0.2	None Required
		C-10117	Cs-137	33.5	< 1.0	None Required
229053	10348	10348	Am-241/Be	34.7	< 0.2	None Required
		C-10348	Cs-137	36.5	< 1.0	None Required
229054	MD10406117	06117	Am-241/Be	29.7	< 0.2	None Required
		C-06117	Cs-137	34.4	< 1.0	None Required
229051	3840	K494/19	Am-241/Be	30.8	< 0.2	None Required
		BG836	Cs-137	29.5	< 1.0	None Required

* MDA is defined as the smallest amount of activity that can be quantified for comparison with regulatory limits and is considered significant at the 95% confidence level.

CONCLUSIONS/ACTION REQUIRED

No evidence of removable radioactive contamination in excess of 200 becquerels is present.

Name: Chantel Paiement

Signature: 

15803 – 145 Avenue N.W. · Edmonton, Alberta, Canada · T6V 0H8 · ph: 800·661·4591 · fax: 905·602·0774
5949 Ambler Drive · Mississauga, Ontario, Canada · L4W 2K2 · ph: 800· 664·4591 · fax: 905·602·0774
WWW.STUARTHUNT.COM

InstroTek, Inc. Nuclear Gauge Certificate

Model:	Serial Number:	Ship Date:
3500 Xplorer 2	*4092*	*7/29/2020*

Transfer From:

InstroTek, Inc.
1 Triangle Dr, BOX 13944
Research Triangle Park, NC 27709
USA
919-875-8371
License No.: *092-1073-1*
Exp. Date: *12/31/2022*

Transfer To:

STUART HUNT & ASSOCIATES, LTD.
5949 AMBLER DRIVE
MISSISSAUGA ON L4W 2K2
CANADA
905-602-8871
License No.: *09787-1-10.10*
Exp. Date: *10/31/2020*

Sealed Source Information

Activity/Radioactive Material	Gamma Source Cs-137 / 10 mCi +/-10% (370 MBq)	Neutron Source Am241:Be / 40 mCi +/-10% (1.48Gbq)
Source Model Number	*HEG-137*	*AM1.N02*
Special Form Certificate	*USA/0356/S-96*	*CZ/1009/S-96*
ANSI Specification	*C66535*	*C66545*
Date of Leak Test	*7/29/2020*	*7/29/2020*
Source Code	*HEG-0085*	*PHI-0161*
Source Serial Number	*BG1093*	*K251/20*
Source Measure Date	*6/15/2020*	*5/19/2020*

Leak Test

The above referenced leak test revealed the removable activity to be less than 0.005 microcurie.

Special Form Certificates

Radioactive materials used in this gauge have been certified as "Special Form" by a recognized "Competent Authority"

Proper Shipping Name

UN 3332, RQ, Radioactive Material, Special Form, US DOT 7A Type "A" Package, Radioactive Yellow II

Stuart Hunt & Associates Ltd

ONLINE TRAINING CENTRE

ONLINE TRAINING

CERTIFICATE OF COMPLETION

Derek Brewster

HAS SUCCESSFULLY COMPLETED

Radiation Safety & TDG - Portable Gauge Users

On 30 MAY 2019 via the AVANTI E-training System

Expires on: 30 MAY 2022

Marks: 100%
Minimum Required: 100%

Student E-mail: derek.brewster@gmblueplan.ca

Avanti e-training system

Stuart Hunt & Associates Ltd

ONLINE TRAINING CENTRE

ONLINE TRAINING

CERTIFICATE OF COMPLETION

Scott Garland

HAS SUCCESSFULLY COMPLETED

Radiation Safety & TDG - Portable Gauge Users

On 22 DECEMBER 2019 via the AVANTI E-training System

Expires on: 22 DECEMBER 2022

Mark: 100%
Minimum Required: 100%

Student E-mail: scott.garland@gmblueplan.ca

Avanti e-training system

Stuart Hunt & Associates Ltd

ONLINE TRAINING CENTRE

ONLINE TRAINING

CERTIFICATE OF COMPLETION

Ethan Webb

HAS SUCCESSFULLY COMPLETED

Radiation Safety & TDG - Portable Gauge Users

On 17 APRIL 2020 via the AVANTI E-training System

Expires on: 17 APRIL 2023

Mark: 100%
Minimum Required: 100%

Student E-mail: ethan.webb@gmblueplan.ca

Avanti e-training system

Stuart Hunt & Associates Ltd

ONLINE TRAINING CENTRE

ONLINE TRAINING

CERTIFICATE OF COMPLETION

Brodie Donnelly

HAS SUCCESSFULLY COMPLETED

Radiation Safety & TDG - Portable Gauge Users

On 10 AUGUST 2020 via the AVANTI E-training System

Expires on: 10 AUGUST 2023

Mark: 100%
Minimum Required: 100%

Student E-mail: brodie.donnelly@gmblueplan.ca

Avanti

Emergency Procedures for Damaged Portable Gauges

- Quickly assess the severity of the damage, keeping as far as possible from the gauge.
- Establish a control zone having a radius of 2m from the device.
- If possible, retract the source rod into the protective casing of the instrument.
- If the source has been possibly dislodged, or exposed, secure entry to the control zone and advise the site supervisor.
- Have someone contact the office in Owen Sound immediately (519) 376-1805 or the emergency contacts identified in the list below.
- If someone from this office is unable to provide instruction, call our supplier Hoskin Scientific Limited at (905) 333-5510 for additional information.
- If the source is dislodged and visible, it may be possible to collect it with a long handled shovel and place in transportation container for temporary containment.
- Obtain information to permit shipping in Type "A" container back to licence site.
- Arrange inspection of site with radiation survey meter. If site is not clean, proceed with further evaluation and any necessary clean-up.
- Keep records of activities.
- Notify the Canadian Nuclear Safety Commission (613) 995-0479 immediately of the incident followed up with a written report within 21 days of the incident including the root cause of the event as well as the measures implemented to prevent a reoccurrence (as per the NSRD Regulation 38).

EMERGENCY CONTACTS

GM BluePlan Engineering LIMITED
1260 – 2nd Avenue East, Unit 1, ON N4K 2J3
Emergency Contacts:

1.	Derek Brewster	-	Cell: (519) 372-5432
2.	Ethan Webb	-	Cell: (519) 372-6542
3.	Bill Dubeau	-	Cell: (519) 372-4821
4.	Scott Garland	-	Cell: (519) 372-5380

In the event of Fire:

1. Call the Fire Department and/or 911.
2. Take action appropriate with a fire to protect personnel.
3. Notify the RSO.
4. Stand by to advise the firefighters as to the nature, location and potential hazards of the radioactive materials. Supply them with information consisting of the facility layout and if available, a data sheet of the radioactive equipment.

Melting points

Stainless steel	= 1500°C	Aluminium	= 540°C
Carbide	= 1090°C	Lead	= 327°C

Loss or Theft of a Nuclear Substance

This policy outlines the procedural steps to take when our in-house traceability steps (outlined on page #3) of a density gauge reveals a gauge appears to be unaccounted for:

1. Immediately determine if any qualified staff/operator may actually have the density gauge.
2. Attempt to determine if the gauge has been simply misplaced in the office or vehicle, or if the gauge has been sent for repairs.
3. Notify RSO(s).
4. Review documentation and determine the last documented/known location of the density gauge while under the supervision of a qualified staff/operator.
5. If applicable, contact client or contractor where gauge was last located to confirm that the gauge was not taken or moved unintentionally.
6. Upon confirmation that the gauge has been lost or stolen, call local police (911) to report the incident/occurrence.
7. Notify the Canadian Nuclear Safety Commission (CNSC) (613) 995-0479 of the incident/occurrence.
8. Review current policies and procedures to investigate if the event/occurrence could have been avoided.
9. Follow up with the CNSC with a written report (within 21 days of the occurrence) outlining the root cause of the event as well as measures implemented to prevent a reoccurrence.
10. Implement revised policies and procedures as per the CNSC response to the provided report.

Note: The emergency contact information (identified below) is located on the door of the locked storage room, the Type 'A' package, along with the gauge itself. If the density gauge is found unattended or in the possession of an unauthorized person, this contact information is available with the gauge.

In case of an emergency involving the Nuclear Densometer Please Contact:

GM BluePlan Engineering Limited
1260-2nd Avenue East, Unit 1
Owen Sound, ON N4K 2J3
Tel: 519-376-1805

EMERGENCY CONTACTS:

1. Derek Brewster.....Cell: (519) 372-5432
2. Ethan Webb.....Cell: (519) 372-6542
3. Bill Dubeau.....Cell: (519) 372-4821
4. Scott Garland .....Cell: (519) 372-5380

Appendix C

Soil Quality Results

1. Surficial Soil Sampling

Appendix C - Analytical Soil Results

Parameter	Units	MDL		Sample					
				SB-BH02-SS21-01 2136445-01	SB-BH02-SS21-02 2136445-02	SB-BH02-SS21-03 2136445-03	SB-BH02-SS21-04 2136445-04	SB-BH02-SS21-05 2136445-05	SB-BH02-SS21-06 2136445-06
Sample Date (m/d/y)			**Reg 153/04 (2011)-Table 2 Agricultural**	**08/31/2021 03:00 PM**	**08/31/2021 03:45 PM**	**08/31/2021 04:00 PM**	**08/31/2021 04:30 PM**	**08/31/2021 05:00 PM**	**08/31/2021 03:45 PM**
Metals									
Antimony	ug/g dry	1.0	7.5 ug/g dry	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Arsenic	ug/g dry	1.0	11 ug/g dry	2.9	2.2	2.7	3.3	2.5	2.6
Barium	ug/g dry	1.0	390 ug/g dry	23.4	13.9	20	42.3	28.4	13.6
Beryllium	ug/g dry	0.5	4 ug/g dry	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Boron, available	ug/g dry	0.5	1.5 ug/g dry	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Boron	ug/g dry	5.0	120 ug/g dry	10.9	6.8	10.5	5.3	<5	6.6
Cadmium	ug/g dry	0.5	1 ug/g dry	<0.5	<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	<0.2
Chromium	ug/g dry	5.0	160 ug/g dry	11.5	8.4	9.2	14.5	10.5	7.4
Cobalt	ug/g dry	1.0	22 ug/g dry	3.4	2.5	3.2	4.3	3.1	2.7
Copper	ug/g dry	5.0	140 ug/g dry	13.2	9.2	12.2	7.6	6.8	8.3
Lead	ug/g dry	1.0	45 ug/g dry	11.8	5.9	6.1	8.2	6.2	6.6
Mercury	ug/g dry	0.1	0.25 ug/g dry	<0.1	<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	<1.0
Nickel	ug/g dry	5.0	100 ug/g dry	9.2	5.6	8.2	9.5	6.9	5.8
Selenium	ug/g dry	1.0	2.4 ug/g dry	<1.0	<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	<0.3	<0.3	<0.3
Thallium	ug/g dry	1.0	1 ug/g dry	<1.0	<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	<1.0
Vanadium	ug/g dry	10.0	86 ug/g dry	14.7	10.7	12.9	21.7	15.8	10.9
Zinc	ug/g dry	20.0	340 ug/g dry	25.9	<20	<20	30	22.1	<20
Volatiles									
Benzene	ug/g dry	0.02	0.21 ug/g dry	<0.02	<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	<0.05
Toluene	ug/g dry	0.05	2.3 ug/g dry	<0.05	0.06	0.34	<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	<0.05
o-Xylene	ug/g dry	0.05	NV	<0.05	<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	<0.05
Hydrocarbons									
F1 PHCs (C6-C10)	ug/g dry	7	55 ug/g dry	<7	<7	<7	<7	<7	<7
F2 PHCs (C10-C16)	ug/g dry	4	98 ug/g dry	<4	<4	<4	<4	<4	<4
F3 PHCs (C16-C34)	ug/g dry	8	300 ug/g dry	69	<8	<8	<8	<8	<8
F4 PHCs (C34-C50)	ug/g dry	6	2800 ug/g dry	94	<6	<6	<6	<6	<6

Notes:

1. Larger bold font and highlight indicates parameter concentration exceeds applicable criteria.
2. NV = No Value
3. -- = Parameter not analysed

Prepared by: ADG
Reviewed by: TKG
Date: 27-Oct-22
20-211_WP01_BH02SiteConstruction_AppendixC_SoilQuality

GEOFIRMA ENGINEERING

Appendix D

Certificates of Analysis

1. Paracel Laboratories

PARACEL LABORATORIES LTD.
TRUSTED. RESPONSIVE. RELIABLE.

300 - 2319 St. Laurent Blvd
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: Tim Galt

Client PO:
Project: 20-211-1
Custody: 58886

Report Date: 8-Sep-2021
Order Date: 2-Sep-2021

Order #: 2136445

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

Paracel ID	Client ID
2136445-01	SB-BH02-SS21-01
2136445-02	SB-BH02-SS21-02
2136445-03	SB-BH02-SS21-03
2136445-04	SB-BH02-SS21-04
2136445-05	SB-BH02-SS21-05
2136445-06	SB-BH02-SS21-06

Approved By:

Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Report Date: 08-Sep-2021

Client: Geofirma Engineering Ltd.

Order Date: 2-Sep-2021

Client PO:

Project Description: 20-211-1

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Boron, available	MOE (HWE), EPA 200.7 - ICP-OES	3-Sep-21	3-Sep-21
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	3-Sep-21	3-Sep-21
Chromium, hexavalent - soil	MOE E3056 - Extraction, colourimetric	2-Sep-21	8-Sep-21
Mercury by CVAA	EPA 7471B - CVAA, digestion	7-Sep-21	8-Sep-21
PHC F1	CWS Tier 1 - P&T GC-FID	3-Sep-21	3-Sep-21
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	2-Sep-21	3-Sep-21
REG 153: Metals by ICP/MS, soil	EPA 6020 - Digestion - ICP-MS	3-Sep-21	3-Sep-21
Solids, %	Gravimetric, calculation	2-Sep-21	3-Sep-21

Certificate of Analysis

Client: **Geofirma Engineering Ltd.**

Client PO:

Report Date: 08-Sep-2021

Order Date: 2-Sep-2021

Project Description: 20-211-1

	Client ID:	SB-BH02-SS21-01	SB-BH02-SS21-02	SB-BH02-SS21-03	SB-BH02-SS21-04
	Sample Date:	31-Aug-21 15:00	31-Aug-21 15:45	31-Aug-21 16:00	31-Aug-21 16:30
	Sample ID:	2136445-01	2136445-02	2136445-03	2136445-04
	MDL/Units	Soil	Soil	Soil	Soil
Physical Characteristics					
% Solids	0.1 % by Wt.	96.8	98.3	98.6	90.6
Metals					
Antimony	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Arsenic	1.0 ug/g dry	2.9	2.2	2.7	3.3
Barium	1.0 ug/g dry	23.4	13.9	20.0	42.3
Beryllium	0.5 ug/g dry	<0.5	<0.5	<0.5	<0.5
Boron	5.0 ug/g dry	10.9	6.8	10.5	5.3
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	11.5	8.4	9.2	14.5
Chromium (VI)	0.2 ug/g dry	<0.2	<0.2	<0.2	<0.2
Cobalt	1.0 ug/g dry	3.4	2.5	3.2	4.3
Copper	5.0 ug/g dry	13.2	9.2	12.2	7.6
Lead	1.0 ug/g dry	11.8	5.9	6.1	8.2
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	9.2	5.6	8.2	9.5
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	14.7	10.7	12.9	21.7
Zinc	20.0 ug/g dry	25.9	<20.0	<20.0	30.0
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	0.06	0.34	<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	68.4%	89.8%	93.2%	69.8%
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	69	<8	<8	<8

Certificate of Analysis

Client: Geofirma Engineering Ltd.

Client PO:

Report Date: 08-Sep-2021

Order Date: 2-Sep-2021

Project Description: 20-211-1

	Client ID:	SB-BH02-SS21-01	SB-BH02-SS21-02	SB-BH02-SS21-03	SB-BH02-SS21-04
	Sample Date:	31-Aug-21 15:00	31-Aug-21 15:45	31-Aug-21 16:00	31-Aug-21 16:30
	Sample ID:	2136445-01	2136445-02	2136445-03	2136445-04
	MDL/Units	Soil	Soil	Soil	Soil
F4 PHCs (C34-C50)	6 ug/g dry	94	<6	<6	<6

Certificate of Analysis

Client: **Geofirma Engineering Ltd.**

Client PO:

Report Date: 08-Sep-2021

Order Date: 2-Sep-2021

Project Description: 20-211-1

	Client ID:	SB-BH02-SS21-05	SB-BH02-SS21-06	-	-
	Sample Date:	31-Aug-21 17:00	31-Aug-21 15:45	-	-
	Sample ID:	2136445-05	2136445-06	-	-
	MDL/Units	Soil	Soil	-	-
Physical Characteristics					
% Solids	0.1 % by Wt.	94.5	98.4	-	-
Metals					
Antimony	1.0 ug/g dry	<1.0	<1.0	-	-
Arsenic	1.0 ug/g dry	2.5	2.6	-	-
Barium	1.0 ug/g dry	28.4	13.6	-	-
Beryllium	0.5 ug/g dry	<0.5	<0.5	-	-
Boron	5.0 ug/g dry	<5.0	6.6	-	-
Boron, available	0.5 ug/g dry	<0.5	<0.5	-	-
Cadmium	0.5 ug/g dry	<0.5	<0.5	-	-
Chromium	5.0 ug/g dry	10.5	7.4	-	-
Chromium (VI)	0.2 ug/g dry	<0.2	<0.2	-	-
Cobalt	1.0 ug/g dry	3.1	2.7	-	-
Copper	5.0 ug/g dry	6.8	8.3	-	-
Lead	1.0 ug/g dry	6.2	6.6	-	-
Mercury	0.1 ug/g dry	<0.1	<0.1	-	-
Molybdenum	1.0 ug/g dry	<1.0	<1.0	-	-
Nickel	5.0 ug/g dry	6.9	5.8	-	-
Selenium	1.0 ug/g dry	<1.0	<1.0	-	-
Silver	0.3 ug/g dry	<0.3	<0.3	-	-
Thallium	1.0 ug/g dry	<1.0	<1.0	-	-
Uranium	1.0 ug/g dry	<1.0	<1.0	-	-
Vanadium	10.0 ug/g dry	15.8	10.9	-	-
Zinc	20.0 ug/g dry	22.1	<20.0	-	-
Volatiles					
Benzene	0.02 ug/g dry	<0.02	<0.02	-	-
Ethylbenzene	0.05 ug/g dry	<0.05	<0.05	-	-
Toluene	0.05 ug/g dry	<0.05	<0.05	-	-
m,p-Xylenes	0.05 ug/g dry	<0.05	<0.05	-	-
o-Xylene	0.05 ug/g dry	<0.05	<0.05	-	-
Xylenes, total	0.05 ug/g dry	<0.05	<0.05	-	-
Toluene-d8	Surrogate	73.9%	70.1%	-	-
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	<7	<7	-	-
F2 PHCs (C10-C16)	4 ug/g dry	<4	<4	-	-
F3 PHCs (C16-C34)	8 ug/g dry	<8	<8	-	-

Certificate of Analysis

Client: **Geofirma Engineering Ltd.**

Client PO:

Report Date: 08-Sep-2021

Order Date: 2-Sep-2021

Project Description: 20-211-1

	Client ID:	SB-BH02-SS21-05	SB-BH02-SS21-06	-	-
	Sample Date:	31-Aug-21 17:00	31-Aug-21 15:45	-	-
	Sample ID:	2136445-05	2136445-06	-	-
	MDL/Units	Soil	Soil	-	-
F4 PHCs (C34-C50)	6 ug/g dry	<6	<6	-	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
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	*3.25*		*ug/g*		*101*	*50-140*			

Certificate of Analysis

Report Date: 08-Sep-2021

Client: Geofirma Engineering Ltd.

Order Date: 2-Sep-2021

Client PO:

Project Description: 20-211-1

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g dry	ND			NC	40	
F2 PHCs (C10-C16)	ND	4	ug/g dry	ND			NC	30	
F3 PHCs (C16-C34)	38	8	ug/g dry	69			57.9	30	QR-04
F4 PHCs (C34-C50)	49	6	ug/g dry	94			62.5	30	QR-04
Metals									
Antimony	ND	1.0	ug/g dry	ND			NC	30	
Arsenic	3.1	1.0	ug/g dry	3.3			5.4	30	
Barium	67.2	1.0	ug/g dry	64.0			4.8	30	
Beryllium	0.6	0.5	ug/g dry	ND			NC	30	
Boron, available	ND	0.5	ug/g dry	ND			NC	35	
Boron	7.9	5.0	ug/g dry	7.2			9.0	30	
Cadmium	ND	0.5	ug/g dry	ND			NC	30	
Chromium (VI)	ND	0.2	ug/g dry	ND			NC	35	
Chromium	16.8	5.0	ug/g dry	16.5			1.8	30	
Cobalt	4.9	1.0	ug/g dry	4.6			6.5	30	
Copper	17.6	5.0	ug/g dry	16.9			4.2	30	
Lead	12.3	1.0	ug/g dry	11.8			4.8	30	
Mercury	ND	0.1	ug/g dry	ND			NC	30	
Molybdenum	ND	1.0	ug/g dry	ND			NC	30	
Nickel	10.4	5.0	ug/g dry	10.1			3.1	30	
Selenium	ND	1.0	ug/g dry	ND			NC	30	
Silver	ND	0.3	ug/g dry	ND			NC	30	
Thallium	ND	1.0	ug/g dry	ND			NC	30	
Uranium	ND	1.0	ug/g dry	ND			NC	30	
Vanadium	22.8	10.0	ug/g dry	22.0			3.6	30	
Zinc	62.6	20.0	ug/g dry	59.3			5.4	30	
Physical Characteristics									
% Solids	91.9	0.1	% by Wt.	91.8			0.1	25	
Volatiles									
Benzene	ND	0.02	ug/g dry	ND			NC	50	
Ethylbenzene	ND	0.05	ug/g dry	ND			NC	50	
Toluene	ND	0.05	ug/g dry	ND			NC	50	
m,p-Xylenes	ND	0.05	ug/g dry	ND			NC	50	
o-Xylene	ND	0.05	ug/g dry	ND			NC	50	
Surrogate: Toluene-d8	*2.30*		*ug/g dry*		*69.5*	*50-140*			

Certificate of Analysis

Report Date: 08-Sep-2021

Client: Geofirma Engineering Ltd.

Order Date: 2-Sep-2021

Client PO:

Project Description: 20-211-1

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	228	7	ug/g	ND	114	80-120			
F2 PHCs (C10-C16)	87	4	ug/g	ND	106	60-140			
F3 PHCs (C16-C34)	357	8	ug/g	69	142	60-140			QM-06
F4 PHCs (C34-C50)	212	6	ug/g	94	91.9	60-140			
Metals									
Antimony	49.0	1.0	ug/g	ND	97.7	70-130			
Arsenic	52.9	1.0	ug/g	1.3	103	70-130			
Barium	75.0	1.0	ug/g	25.6	98.8	70-130			
Beryllium	49.9	0.5	ug/g	ND	99.3	70-130			
Boron, available	4.24	0.5	ug/g	ND	84.7	70-122			
Boron	48.0	5.0	ug/g	ND	90.3	70-130			
Cadmium	47.0	0.5	ug/g	ND	93.8	70-130			
Chromium (VI)	0.1	0.2	ug/g	ND	71.5	70-130			
Chromium	58.9	5.0	ug/g	6.6	105	70-130			
Cobalt	53.3	1.0	ug/g	1.9	103	70-130			
Copper	56.1	5.0	ug/g	6.8	98.7	70-130			
Lead	51.5	1.0	ug/g	4.7	93.6	70-130			
Mercury	1.63	0.1	ug/g	ND	109	70-130			
Molybdenum	50.6	1.0	ug/g	ND	101	70-130			
Nickel	53.5	5.0	ug/g	ND	98.9	70-130			
Selenium	48.3	1.0	ug/g	ND	96.5	70-130			
Silver	45.9	0.3	ug/g	ND	91.8	70-130			
Thallium	48.0	1.0	ug/g	ND	95.9	70-130			
Uranium	49.4	1.0	ug/g	ND	98.5	70-130			
Vanadium	61.8	10.0	ug/g	ND	106	70-130			
Zinc	71.0	20.0	ug/g	23.7	94.5	70-130			
Volatiles									
Benzene	4.86	0.02	ug/g	ND	121	60-130			
Ethylbenzene	3.32	0.05	ug/g	ND	83.0	60-130			
Toluene	3.96	0.05	ug/g	ND	98.9	60-130			
m,p-Xylenes	7.53	0.05	ug/g	ND	94.1	60-130			
o-Xylene	3.80	0.05	ug/g	ND	95.1	60-130			
Surrogate: Toluene-d8	*2.12*		*ug/g*		*66.3*	*50-140*			

Qualifier Notes:

Login Qualifiers :

Samples received submerged in water, possibly melted ice. This condition can compromise sample integrity.

Applies to samples: SB-BH02-SS21-01, SB-BH02-SS21-02, SB-BH02-SS21-03, SB-BH02-SS21-04, SB-BH02-SS21-05, SB-BH02-SS21-06

QC Qualifiers :

QM-06 : Due to noted non-homogeneity of the QC sample matrix, the spike recoveries were out side the accepted range. Batch data accepted based on other QC.

QR-04 : Duplicate results exceeds RPD limits due to non-homogeneous matrix.

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 criteria.
- When reported, data for F4G has been processed using a silica gel cleanup.

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Chain Of Custody
(Lab Use Only)
№ 58886

Client Name: Geofirma Engineering Ltd.	Project Ref: 20-211-1	Page 1 of 1
Contact Name: Tim Galt, Amy Cartier	Quote #: WP01B/A	Turnaround Time
Address: 1 Raymond Street, Suite 200 Ottawa ON K1R 1A2	PO #:	☐ 1 day ☐ 3 day
	E-mail: tgalt@geofirma.com acartier@geofirma.com	☐ 2 day ☒ Regular
Telephone: 613-232-2525		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	PHCs	BTEX
1	SB-BH02-SS21-01	S	-	2	31-Aug-21	15:00	X	X	X
2	SB-BH02-SS21-02	S	-	2	31-Aug-21	15:45	X	X	X
3	SB-BH02-SS21-03	S	-	2	31-Aug-21	16:00	X	X	X
4	SB-BH02-SS21-04	S	-	2	31-Aug-21	16:30	X	X	X
5	SB-BH02-SS21-05	S	-	2	31-Aug-21	17:00	X	X	X
6	SB-BH02-SS21-06	S	-	2	31-Aug-21	15:45	X	X	X
7									
8									
9									
10									

Comments: Temp: 4°C

Method of Delivery: Purolator

Relinquished By (Sign): Amy Cartier	Received By Driver/Depot:	Received at Lab: Sureepan Rahmani	Verified By:
Relinquished By (Print): Amy Cartier	Date/Time:	Date/Time: Sep 02, 2021 08.50	Date/Time: Sept 2 2021 11:20
Date/Time: 01 Sep 2021	Temperature: °C	Temperature: 2.3 °C	pH Verified: ☐ By:

NUCLEAR WASTE MANAGEMENT ORGANIZATION | SOCIÉTÉ DE GESTION DES DÉCHETS NUCLÉAIRES

NWMO-FORM-AD-0004 R001

Document Transmittal for Records
QA/Classified

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Originator retains copy until acknowledgement received.
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To **NWMO Records** Date: October 25, 2023

Submitted By: Geoff Crann

SECTION A: COMPLETE FOR EACH DOCUMENT OR COLLECTION OF DOCUMENTS

The following documents are being transmitted for the following purpose:

☐	Approval	☐	Revise, Issue and File	☐	As requested
☐	Acceptance	☒	QA Record	☐	File

File Information :

Property #	APM	Retention: P	CSI:01332	Doc.Type/Subtype: REP
Area:		Aboriginal: No	Community:	

List of attached QA documents :

Doc. Number	No. of Pages (QA only)	Rev	Title	Security Classification
APM-REP-01332-0315	22	000	Phase 2 Initial Borehole Drilling and Testing, South Bruce. WP01B: Site Commissioning Report for SB_BH01	Confidential
APM-REP-01332-0327	129	000	Phase 2 Initial Borehole Drilling and Testing, South Bruce. WP01: Site Construction Report for SB_BH02	Confidential

Section B: QA ACKNOWLEDGEMENT

Receipt Acknowledgement to be returned to the NWMO submitter within 15 working days of receipt of records into secure storage. NWMO Submitter to contact Records Clerk if acknowledgement not received within 15 days.

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