PHASE 2 INITIAL BOREHOLE DRILLING AND TESTING, SOUTH BRUCE

WP01: Site Construction Report for SB_BH01

APM-REP-01332-0314 **September 2022**

Geofirma Engineering Ltd.

nwmo
NUCLEAR WASTE MANAGEMENT ORGANIZATION
SOCIÉTÉ DE GESTION DES DÉCHETS NUCLÉAIRES

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Phase 2 Initial Borehole Drilling and Testing, South Bruce

WP01: Site Construction Report for SB_BH01

NWMO Document ID: APM-REP-01332-0314

Revision: 0 (Final)

Prepared for:

Nuclear Waste Management Organization
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Project Number: 20-211-1
Document ID: SB_BH01_Site Construction Report_R0

September 23, 2022

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Prepared by:	Chris Morgan, Tim Galt	
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Revision Tracking Table

Revision	Revision Release Date	Description of Modifications/Edits
R0	23-Sep-22	Initial Release

TABLE OF CONTENTS

LIST OF FIGURES

APPENDICES

1 INTRODUCTION

The activities described in this report are one component of the geoscientific investigation that were completed by Geofirma as part of the NWMO Phase 2 Initial Borehole Drilling and Testing Program, in South Bruce, Ontario (Figure 1). Specifically, this report describes the activities undertaken to construct the access road and drill pad for SB_BH01. These activities were completed under the scope of work associated with Work Package 1 (WP01) (Site Construction and Infrastructure).

1.1 Background

The Initial Borehole Drilling and Testing project in South Bruce, Ontario is part of Phase 2 Geoscientific Preliminary Field Investigations of the NWMO's Adaptive Phased Management (APM) Site Selection Phase.

This project 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 2020a). A similar overall scope of work is planned for each of the two boreholes.

Borehole SB_BH01 is located 3.5 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_BH01. 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 first borehole location (SB_BH01) at 1021 Concession Road 8, Teeswater, Ontario. The drill pad for SB_BH01 is located approximately 240 meters south of Concession Road 8 and is behind several pre-existing structures at the site.

1.3.2 Care and Control of SB_BH01 Drill Site

The NWMO transferred care and control of the SB_BH01 site to Geofirma on September 29, 2020, for approximately four days so that pre-construction soil sampling could take place. The site was officially handed over to Geofirma on November 4, 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 March 31, 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_BH01 is provided below. Most construction activities, including stripping, grading, and compaction were completed in between November 4 and December 9, 2020. A detailed description of site construction activities is provided in the Section 2 of this this report.

- **June 03, 2020:** Site visit by NWMO and Geofirma at potential drill sites along Concession Rd 8
- **July 30, 2020:** Pre-construction site survey for use in preliminary site design and tendering
- **September 21, 2020:** Request for Quotation issued to local contractors
- **September 29, 2020:** Baseline soil sampling at SB_BH01, site visit for construction tender
- **October 05, 2020:** Request for Quotation closing date
- **November 02, 2020:** WP01 Test Plan: Site Infrastructure and Access Road Construction for SB_BH01 finalized
- **November 04, 2020:** Start of site construction at SB_BH01
- **December 09, 2020**: End of site construction at SB_BH01
- **April 14, 2021:** Installation of cellar at SB_BH01
- **April 23, 2021:** Site commissioning inspection completed for SB_BH01
- **August 09, 2021:** Clearing and seeding of swales and soil stockpiles at SB_BH01

MUNICIPALITY OF BROCKTON

Riversdale

Little Egypt

Greenock Swamp

F012077

Salem

Kinlough

T003553

Westford

BRUCE ROAD 4

TOWNSHIP OF HURON-KINLOSS

MUNICIPALITY OF SOUTH BRUCE

F012068

Holyrood

BRUCE ROAD 1

BRUCE ROAD 6

CONCESSION 8

SB_BH01

Culross

Kinloss Creek

Kinloss

Teeswater

F012062

Lower Langside

T004881

Dickies Creek Wetland Complex

Langside

Teeswater Wetland Complex

Anderson Creek Wetland Complex

LEGEND

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

INSET MAP

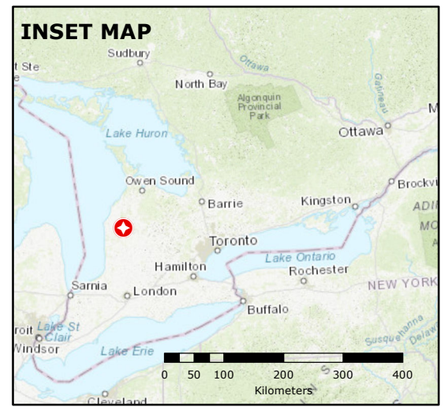


Figure 1
Location of SB_BH01 Drill Site

Scale 1:60,000

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

N

Projection: NAD 1983 UTM Zone 17N

Source: NWMO, Ontario GeoBase

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

PROJECT No. 20-211-1

NWMO South Bruce
Drilling and Testing

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

DATE: 2021-01-27

Geofirma Engineering Ltd

F:\Data\Project\Bruce\Maps\20-211-1_SouthBruce\20-211-1_Figure1_SB_BH01_TestPlans.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_BH01 (Geofirma, 2021a). 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

Geofirma completed a soil sampling program at the SB_BH01 site on September 29, 2020, to establish a record of soil quality for the shallow soil prior to construction and drilling activities. A total of 20 samples were collected, photographed, screened for contamination, and logged in the field. The 20 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_BH01 report that was prepared by Geofirma (Geofirma 2021b).

2.2 Pre-Construction Survey and Tender Preparation

GMBP completed a pre-construction topographic survey 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 R12 GPS, 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 B1).

With the data from the pre-construction topographic survey, Geofirma and GMBP prepared a tender package that was sent out to eight potential bidders for the site construction work on September 21,2020. One bid was received on October 5, 2020 to complete the work.

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_BH01. Geofirma and Cedarwell started site construction activities at SB_BH01 on November 4, 2021. Geofirma established a temporary site office trailer, 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 ramp near the entrance to the barn onsite was selected as the staging area for Cedarwell excavation equipment. All gasoline/diesel powered equipment was parked on the ramp when it was not in operation,

except for a small generator that was stored in a plastic spill containment berm near the Geofirma office trailer.

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.

2.5 Stripping of Topsoil

Cedarwell used a Caterpillar™ D8 dozer 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 a few 10s of centimeters to over a meter.

2.5.1 Storage of Topsoil

All topsoil was stored onsite and used to form two large stockpiles/berms along the northern and northeastern edges 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 length of the northeastern berm was reduced from the initial design due to limited volume of topsoil available to stockpile.

2.6 Import and Compaction of Granular Materials

The access road and 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 2911 tonnes of Granular A and 7103 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. 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 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 Appendix B.

2.6.1 Soil Quality Testing – Source Material

Four soil samples were collected on November 2, 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, Ontario 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 are provided in Appendix C and the Bureau Veritas Certificates of Analysis are provided in Appendix D.

2.7 Construction of Swales and Culverts

Cedarwell installed swales and culverts at the site to manage surface runoff from the drill pad and access road. Swales were constructed along the perimeter of the drill pad and along the eastern edge of the access road in accordance with design specs. Two straw bale flow checks were installed in the swales: one between two soil stockpiles along the north site of the drill pad and one near the southwest corner of the drill pad. A steel culvert was installed beneath the access road to allow water that accumulated in the eastern swale to drain to a lower-lying area west of the road. Installation of culverts and straw bale flow checks was completed in accordance with design specifications. Topsoil was reinstated across all disturbed areas with a minimum depth of 0.2m.

2.8 Installation of Drilling Cellar

A cellar was installed by Hays Electrical Contractor Ltd. on April 14, 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 Seeding of Stockpiles and Swales

Upon completion of access road and drill pad construction, the topsoil stockpiles and swales were cleared using walk-behind brush cutter. Once cleared, the stockpiles and swales were seeded by Cedarwell on August 9, 2021, using a Gator™ utility vehicle with a grass seeder.

2.10 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 on April 8, 2021. Five composite samples were submitted to Paracel Laboratories Ltd. (Paracel) for Petroleum Hydrocarbon (PHC) and Volatile Organic Compound (VOC) analysis. One sample (SS21-02) was collected from an area with visible hydrocarbon staining identified near a designated refueling area associated with WP01A activities. Sample SS21-02 was found to have F3 fraction concentrations (3310 ug/g) above applicable O. Reg 154/04 Table 2, Potable Groundwater Condition, Agricultural, Coarse Soils criteria of 300 ug/g. All other samples submitted for analysis met applicable O. Reg 154/04 Table 2 criteria. The impacted soil surrounding sample SS21-02 was subsequently remediated by Geofirma personnel using hand tools, and confirmatory composite sample SS21-2 was collected on April 14, 2021. Sample SS21-02 met applicable O. Reg 154/04 Table 2, Potable Groundwater Condition, Agricultural, Coarse Soils criteria, including for the F3 fraction. All impacted soils and absorbent pads were containerized and properly disposed of offsite.

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_BH01 (this report) started with preliminary site surveying on July 30, 2020 and pre-construction sampling on September 29, 2020. Access road and drill pad construction at SB_BH01 was completed between November 4 and December 9, 2020, 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_BH01. Geofirma and GM BluePlan staff completed oversite of all site design and construction activities, which included:

- A pre-construction topographic survey (GMBP) and soil testing (Geofirma).
- Site access and drill pad design and tendering.
- 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 two stockpile berms along the northern and northeastern edges of the drill pad.
- Import, grading, and compaction of granular materials to construct the access road and drill pad in accordance with design. Approximately 300-450 mm of granular B material was used as a base. Road and 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 were completed in accordance with design specifications.
- Installation of straw bale flow checks and a culvert to manage surface water run off from the drill pad and access road.
- Installation of a corrugated steel cellar for containment of blowout preventer equipment.
- Clearing weeds and seeding of topsoil stockpiles and swales along access road and drill pad.

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_BH01.

4 REFERENCES

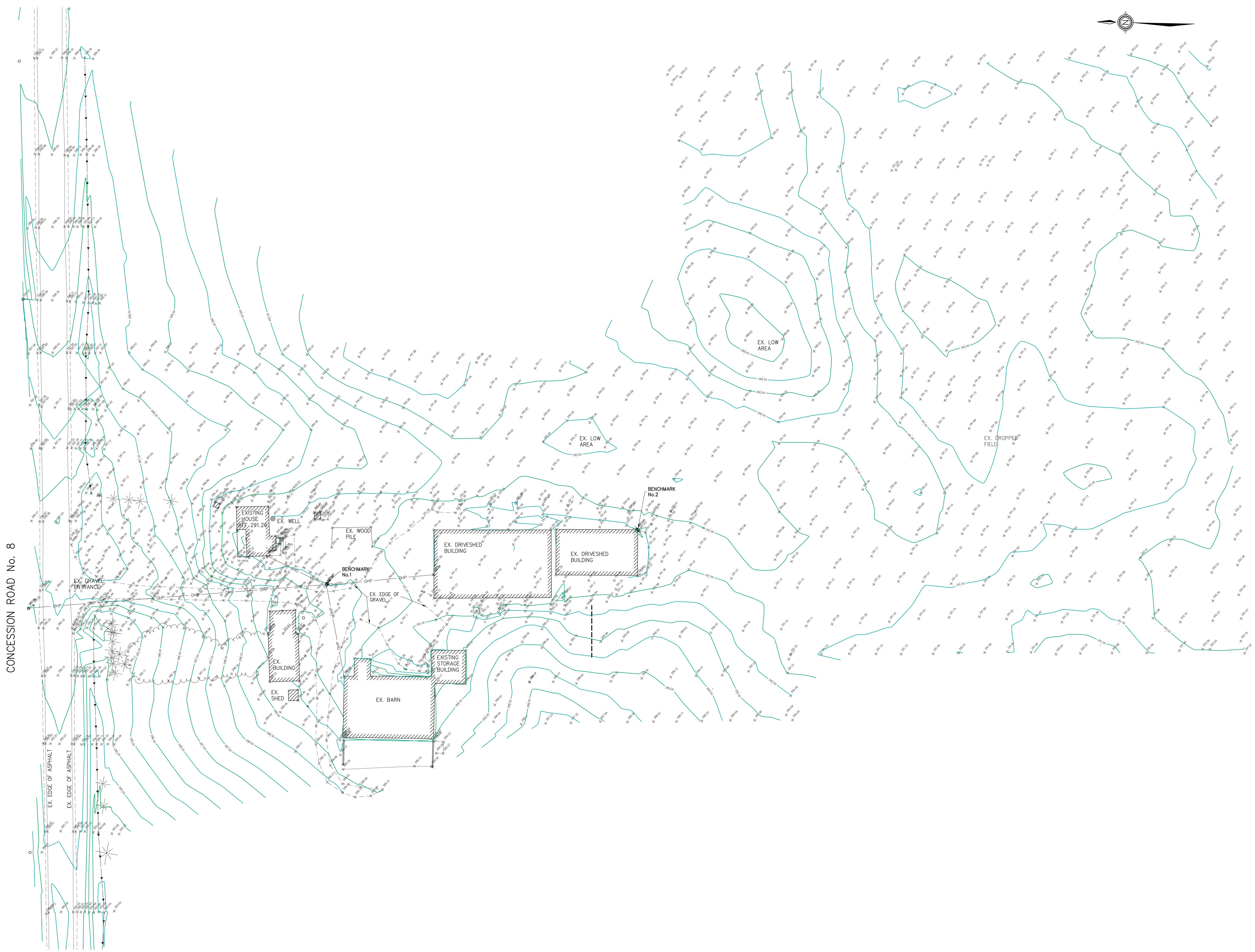
Geofirma Engineering Ltd., 2020a. Initial Borehole Characterization Plan for SB_BH01 – Phase 2 Initial Borehole Drilling and Testing, South Bruce. Revision 1, June 27.

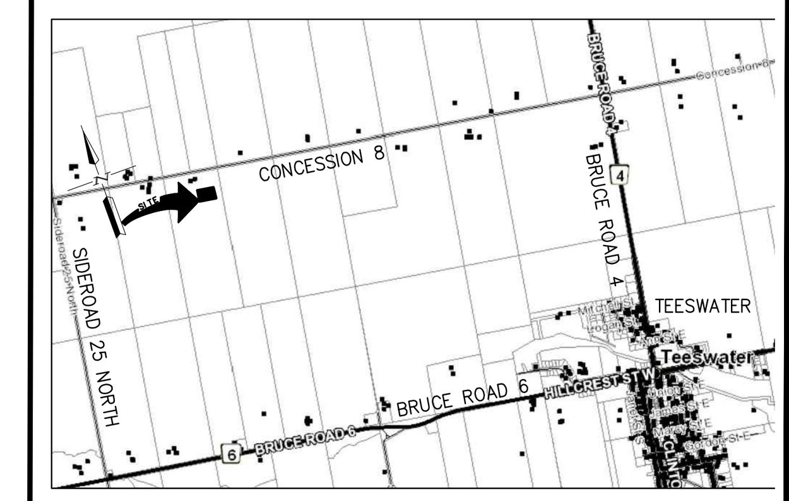
Geofirma Engineering Ltd., 2021a. WP01 Test Plan: Site Infrastructure and Access Road Construction for SB_BH01, Phase 2 Initial Borehole Drilling and Testing South Bruce. Revision 0. November 2.

Geofirma Engineering Ltd., 2021b. Baseline Soil Sampling at SB_BH01, NWMO Phase 2 Initial Borehole Drilling and Testing South Bruce. Memorandum Rev 0. February 17.

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, JULY 30, 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

#1 BENCHMARK ELEV. - 290.99m

TOP OF NAIL IN HYDRO POLE (AS SHOWN).
APPROXIMATELY 0.42m ABOVE FINISHED GRADE.

#2 BENCHMARK ELEV. - 292.39m

TOP OF NAIL IN SOUTHEAST CORNER OF SMALLER DRIVESHED BUILDING (AS SHOWN).
APPROXIMATELY 0.74m ABOVE FINISHED GRADE.

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
PROVINCE OF ONTARIO

NO.	DATE	REVISION DESCRIPTION	CH'KD
3	NOV 17 2020	ADJUSTMENTS FOR LOWERING SUBGRADE DUE TO EXISTING TOPSOIL CONDITIONS	I.E.E.
2	SEPT 21 2020	ISSUED FOR QUOTATION	I.E.E.
1	SEPT 09 2020	ISSUED FOR REVIEW	I.E.E.

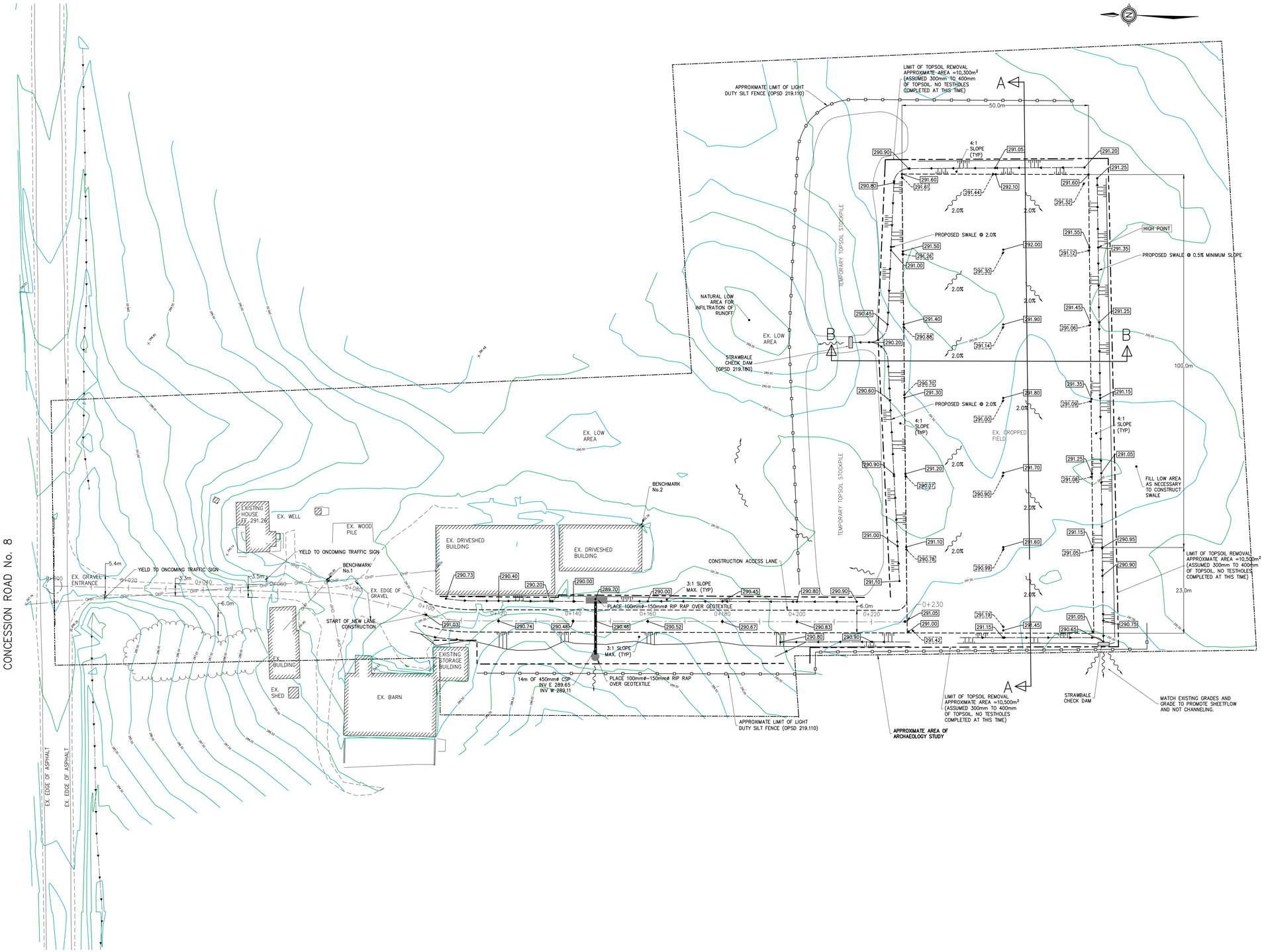
GM BluePlan ENGINEERING
GUELPH | OWEN SOUND | LISTOWEL | KITCHENER | LONDON | HAMILTON | GTA
1260 - 2ND AVENUE EAST, UNIT 1, OWEN SOUND, ON N4K 2J3
TEL. 519-376-1805 www.gmblueplan.ca

NWMO SB BH01

1021 CONCESSION 8 MUNICIPALITY OF SOUTH BRUCE

EXISTING CONDITIONS PLAN

DRAWN BY :	APPROVED BY :	PROJECT NO. :	DRAWING NO. :
R.J.W.	M.N.	216433	1of4
DESIGNED BY :	DATE :	SCALE :	
M.N.	AUG 10, 2020	1:500	



FILE:W:\Owen Sound\Owen Sound\216-2019\216433-1 NWMO DGR - East Site (BH-1) - Construction Support\Drawings\216433-1-CONSTRUCTION-NOV 16 2020.dwg | LAYOUT:SITE PLAN
LAST SAVED BY Heather | 11/17/2020 11:23:39 AM PLOTTED BY Heidi Walker - GM BluePlan | 11/17/2020 11:24:32 AM

MUNICIPALITY OF SOUTH BRUCE

KEY PLAN

NOT TO SCALE

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5. NO LEGAL PROPERTY BOUNDARY INFORMATION IS INCLUDED AS PART OF THIS PLAN. REFER TO LEGAL PLAN AS NECESSARY.
6. ALL STRIPPED AREAS NOT FINISHED WITH GRAVEL ARE TO BE FINISHED WITH 150mm TOPSOIL AND HYDROSEED.

LEGEND

- SURFACE DRAINAGE
- 275.90 — EXISTING CONDITIONS ELEVATION
- 290.00 — PROPOSED ELEVATION
- SWALE DRAINAGE
- 290.00 — EXISTING SUBGRADE ELEVATION AS OF NOV. 13, 2020

#1 BENCHMARK ELEV. - 290.99m

TOP OF NAIL IN HYDRO POLE (AS SHOWN). APPROXIMATELY 0.42m ABOVE FINISHED GRADE.

#2 BENCHMARK ELEV. - 292.39m

TOP OF NAIL IN SOUTHEAST CORNER OF SMALLER DRIVESHED BUILDING (AS SHOWN). APPROXIMATELY 0.74m ABOVE FINISHED GRADE.

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BluePlan ENGINEERING
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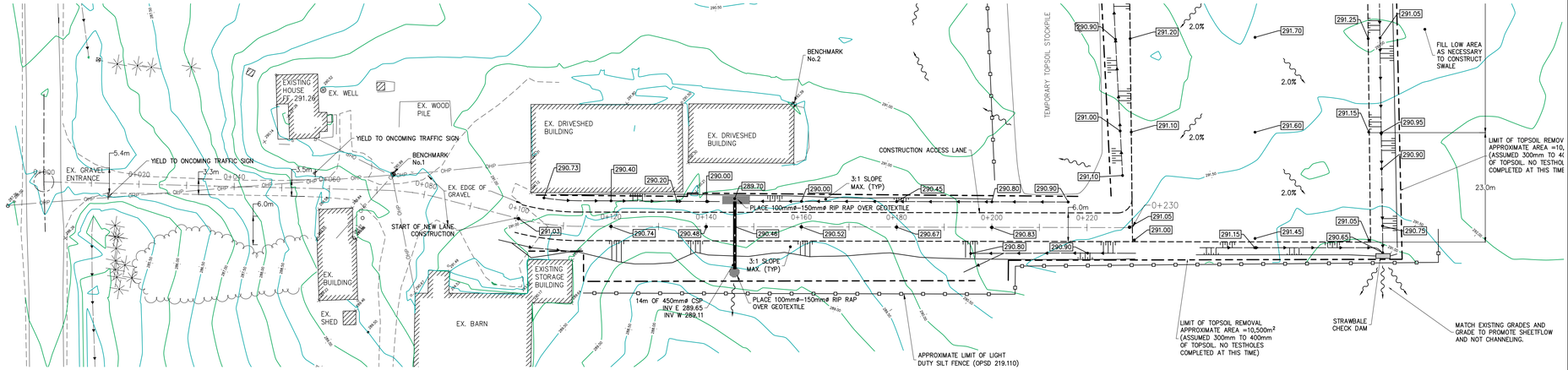
NWMO SB BH01

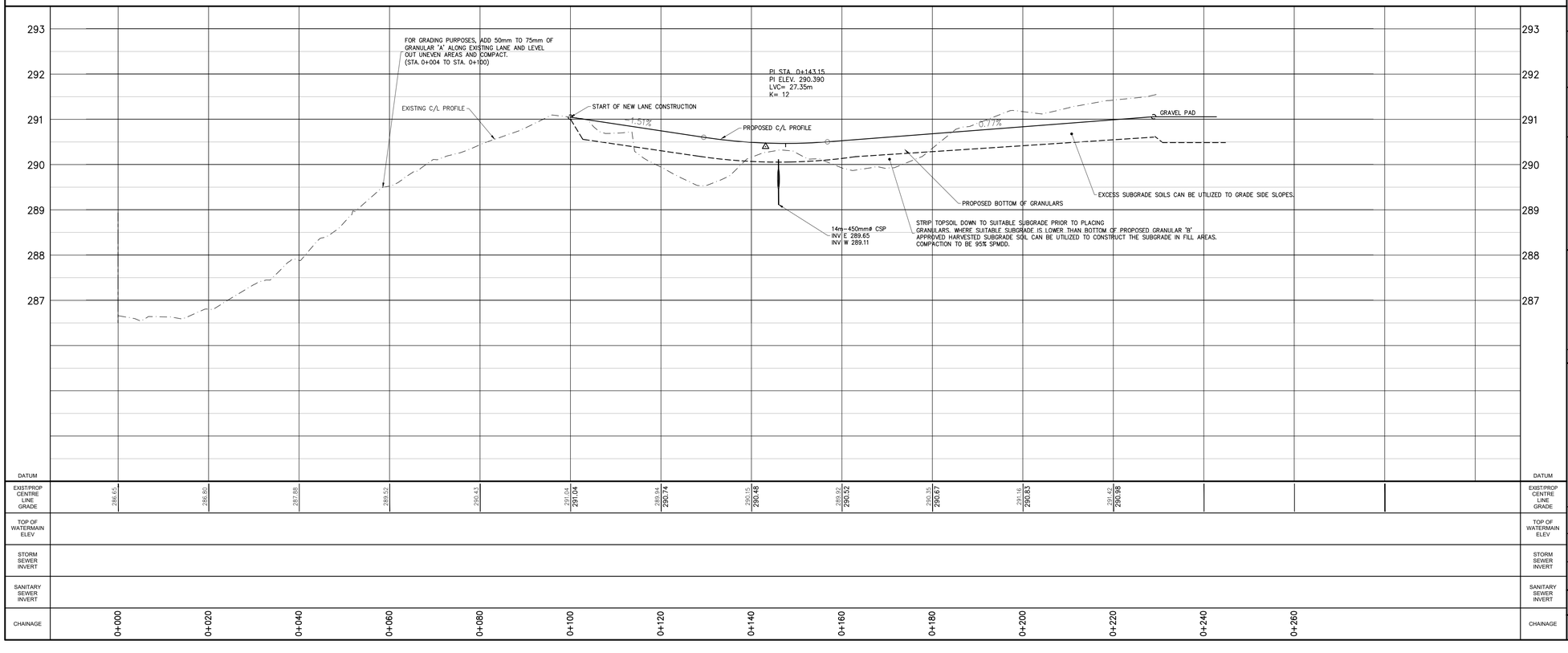
1021 CONCESSION 8
MUNICIPALITY OF SOUTH BRUCE

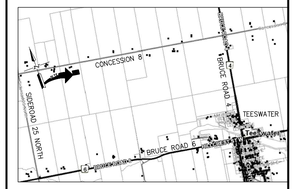
SITE PLAN-CONSTRUCTION

DRAWN BY :	APPROVED BY :	PROJECT NO. :	DRAWING NO. :
R.J.W.	M.N.	216433	2of4
DESIGNED BY :	DATE :	SCALE :	
M.N.	AUG 10, 2020	1:500	

CONCESSION ROAD No. 8







MUNICIPALITY OF SOUTH BRUCE

KEY PLAN

NOT TO SCALE

NOTES :

1. TOPOGRAPHIC SURVEY CONDUCTED BY GM BLUEPLAN ENGINEERING LIMITED, JULY 30, 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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5. NO LEGAL PROPERTY BOUNDARY INFORMATION IS INCLUDED AS PART OF THIS PLAN. REFER TO LEGAL PLAN AS NECESSARY.

LEGEND

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

#1 BENCHMARK ELEV. - 290.99m

TOP OF NAIL IN HYDRO POLE (AS SHOWN).
APPROXIMATELY 0.42m ABOVE FINISHED GRADE.

#2 BENCHMARK ELEV. - 292.39m

TOP OF NAIL IN SOUTHEAST CORNER OF SMALLER DRIVESHED BUILDING (AS SHOWN).
APPROXIMATELY 0.74m ABOVE FINISHED GRADE.

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LICENSED PROFESSIONAL ENGINEER
I. E. ERIKSEN
100128824
PROVINCE OF ONTARIO

NO.	DATE	REVISION DESCRIPTION	CHKD
3	NOV 17 2020	ADJUSTMENTS FOR LOWERING SUBGRADE DUE TO EXISTING TOPSOIL CONDITIONS	I.E.E.
2	SEPT 21 2020	ISSUED FOR QUOTATION	I.E.E.
1	SEPT 09 2020	ISSUED FOR REVIEW	I.E.E.

BluePlan ENGINEERING
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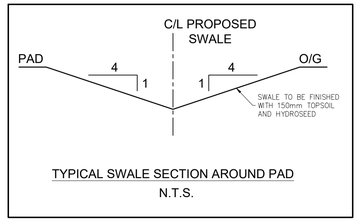
1021 CONCESSION 8
MUNICIPALITY OF SOUTH BRUCE

PLAN AND PROFILE
CONSTRUCTION ACCESS LANE

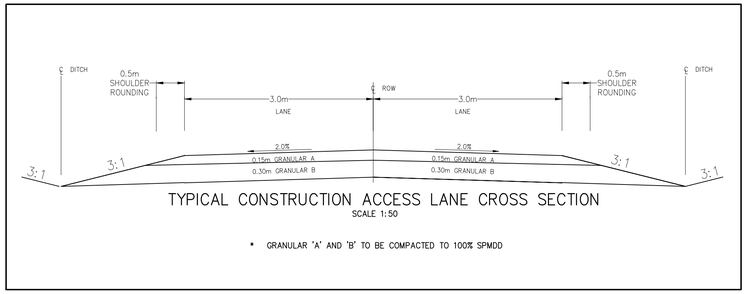
DRAWN BY :	APPROVED BY :	PROJECT NO. :	DRAWING NO. :
R.J.W.	M.N.	216433	3of4
DESIGNED BY :	DATE :	SCALE :	
M.N.	AUG 10, 2020	1:500	

FILE:W:\Owen Sound\Client Sound\216-2019\216433-1 NWMO DGR -East Site (BH-1) - Construction Support\Drawings\216433-1-CONSTRUCTION-NOV-16 2020.dwg LAYOUT PLAN AND PROFILE
LAST SAVED BY:Rwalker - 11/17/2020 11:23:33 AM PLOTTED BY:Rob Walker - GM BluePlan 11/17/2020 11:24:59 AM



TYPICAL SWALE SECTION AROUND PAD

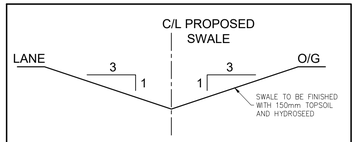
N.T.S.



TYPICAL CONSTRUCTION ACCESS LANE CROSS SECTION

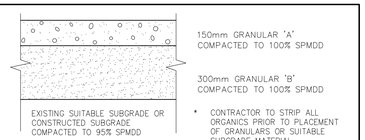
SCALE 1:50

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



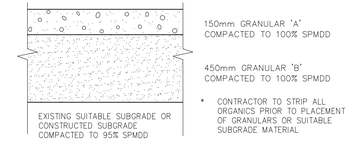
TYPICAL SWALE SECTION ALONG ACCESS LANE

N.T.S.



CONSTRUCTED ACCESS LANE GRANULAR BASE DETAIL

N.T.S.



PAD - GRANULAR BASE DETAIL

N.T.S.

GENERAL NOTES

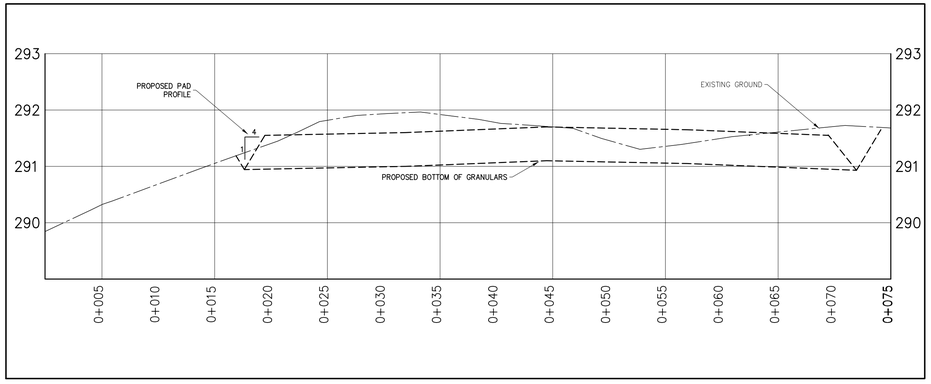
1. DRAWINGS ARE NOT TO BE SCALED.
2. ALL DIMENSIONS TO BE CHECKED AND VERIFIED ON THE SITE PRIOR TO ANY CONSTRUCTION. ANY DISCREPANCIES ARE TO BE REPORTED TO THE ENGINEER BEFORE PROCEEDING.
3. UNLESS OTHERWISE NOTED ON THE DRAWINGS THE STANDARD TOWN, AND OPSD DRAWINGS AND OPSS ARE TO CONSTITUTE PART 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 HE 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

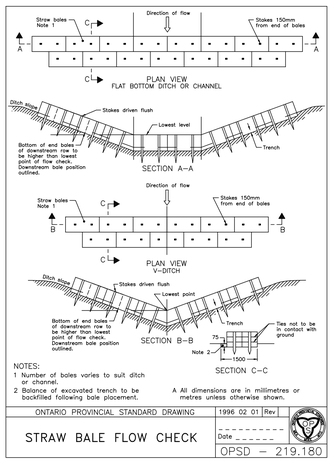
SEDIMENT AND EROSION CONTROL NOTES

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.
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.

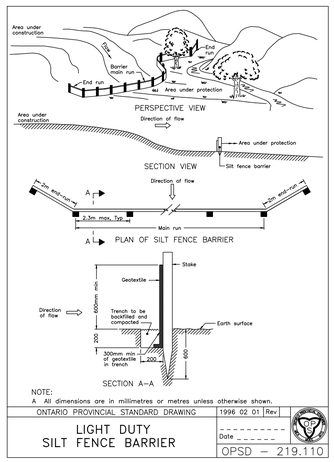


SECTION B-B

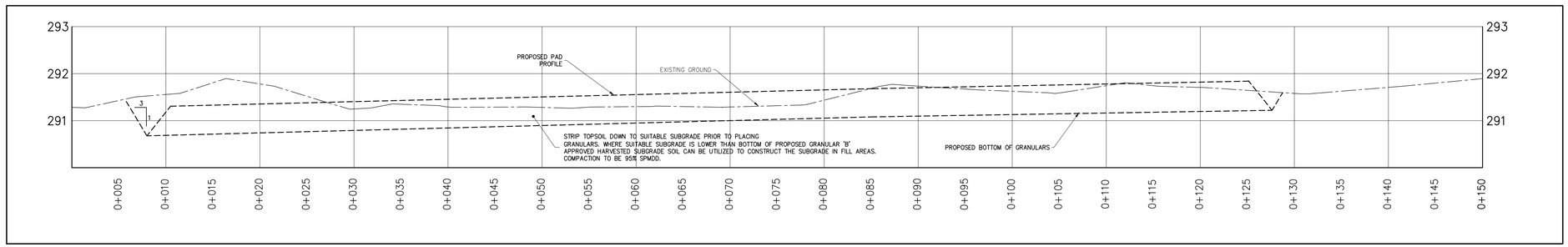
SCALE 1:250



ONTARIO PROVINCIAL STANDARD DRAWING	1996 02 01	Rev
STRAW BALE FLOW CHECK	Date	
	OPSD – 219.180	

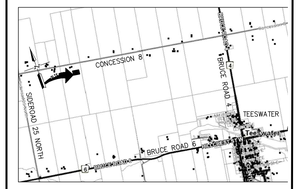


ONTARIO PROVINCIAL STANDARD DRAWING	1996 02 01	Rev
LIGHT DUTY SILT FENCE BARRIER	Date	
	OPSD – 219.110	



SECTION A-A

SCALE 1:250



MUNICIPALITY OF SOUTH BRUCE

KEY PLAN

NOT TO SCALE

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#1 BENCHMARK ELEV. - 290.99m

TOP OF NAIL IN HYDRO POLE (AS SHOWN).
APPROXIMATELY 0.42m ABOVE FINISHED GRADE.

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TOP OF NAIL IN SOUTHEAST CORNER OF SMALLER DRIVESHED BUILDING (AS SHOWN).
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I. E. ERIKSEN
100128824
PROVINCE OF ONTARIO

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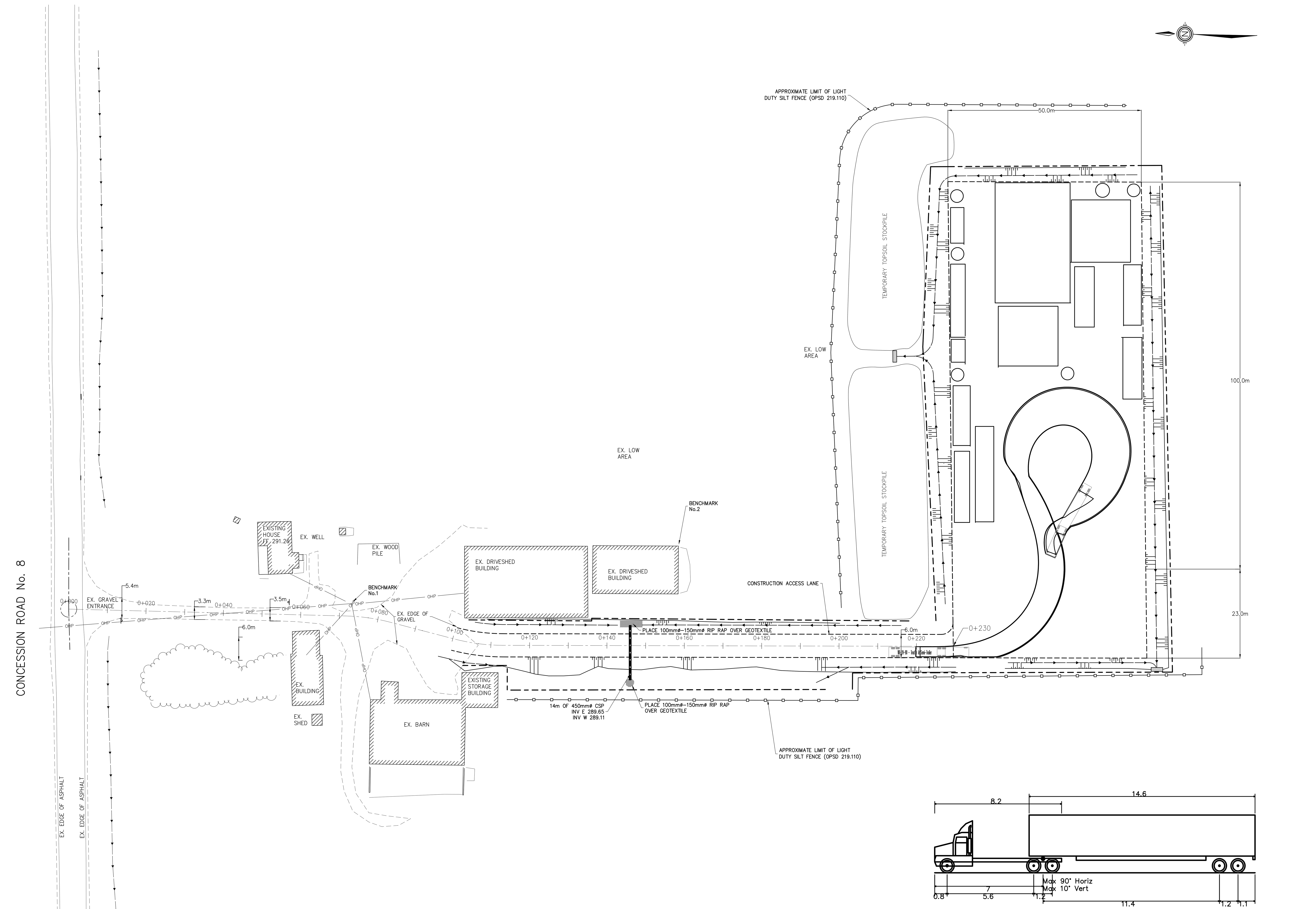
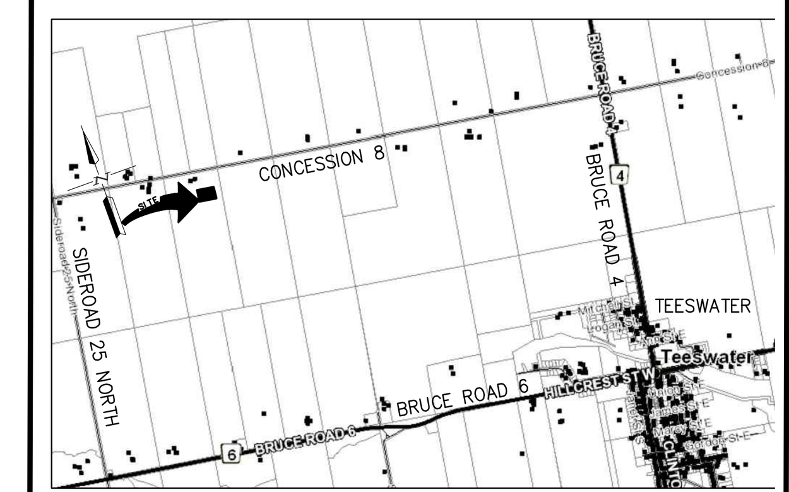
DETAILS AND NOTES

DRAWN BY :	APPROVED BY :	PROJECT NO. :	DRAWING NO. :
R.J.W.	M.N.	216433	4of4
DESIGNED BY :	DATE :	SCALE :	
M.N.	AUG 10, 2020	1:500	



WB-19-90 – Tractor & Semi-Trailer

Overall Length	20.700m
Overall Width	2.600m
Overall Body Height	3.730m
Min Body Ground Clearance	0.435m
Track Width	2.600m
Lock-to-lock time	4.00s
Curb to Curb Turning Radius	10.700m



MUNICIPALITY OF SOUTH BRUCE

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6. ALL STRIPPED AREAS NOT FINISHED WITH GRAVEL ARE TO BE FINISHED WITH 150mm TOPSOIL AND HYDROSEED.

LEGEND

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

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100128824
PROVINCE OF ONTARIO

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MUNICIPALITY OF SOUTH BRUCE

TRUCK TURNING

DRAWN BY :	APPROVED BY :	PROJECT NO. :	DRAWING NO. :
R.J.W.	M.N.	216433	5of5
DESIGNED BY :	DATE :	SCALE :	
M.N.	AUG 10, 2020	1:500	

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
EAST SITE - CONCESSION 8 TEESWATER, ON
GEOFIRMA ENGINEERING LTD.

File No. 216433

DATE OF SURVEY: July 30, 2020
TECHNICIAN: Luc Lapointe
WEATHER: Sunny, 25°C
REMARKS:

- CREW:
  - Party chief: Luc Lapointe
  - Assistant: Dana Liscio

- 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) (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 #1 Elevation 290.99 m: Top of Nail in Hydro Pole (As Shown on Site Plan)
  - Benchmark #2 Elevation 292.39 m: Top of Nail SW Corner of Ex. Building (As Shown on Site Plan)

GM BLUEPLAN ENGINEERING LIMITED
Per:
Luc Lapointe

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

File No. 216433-1

DATE OF REVIEW:	November 13, 2020
TECHNICIAN:	Derek Brewster, C.Tech
WEATHER:	+6°C, Mainly Sunny
REMARKS:	

As arranged with Geofirma Engineering Limited, the undersigned visited the above noted site to review the stripped subgrade prior to commencing the cut / fill activities to construct the subgrade to the proposed grades across the above noted site. The civil design drawings for the project were produced by GM BluePlan Engineering Limited (GMBP), - Revision No. 2 dated September 21, 2020.

Based on the civil design drawings, the road subgrade will be constructed to an approximate grade of 0.45 meters below the proposed finished grade, with the pad subgrade constructed to 0.60 meters below the proposed finished grade. The above referenced drawings identify small areas requiring the various fill placement, based on an interpreted thickness of surficial organics. It should be noted that no geotechnical investigation works were performed for this site development and no report was available prior to the site visit.

Upon arrival to the site, the surficial topsoil and organics were stripped and stockpiled along the northern limits of the pad. It was noted from the stripping works that a relatively thick layer (with isolated pockets) of organic and deleterious soils were encountered during the site stripping works. As a result, additional areas will require compacted fill to be installed to construct the subgrade to the proposed elevations. Nevertheless, it was noted that the subgrade across the pad site and access road had been suitably stripped to expose the underlain sand and gravel, which was compact to dense when probed using a steel rod. Based on the findings of the suitably stripped subgrade, the contractor can commence the re-grading of the site to the designed subgrade elevations.

It is understood that the native sand with gravel soils will be harvested and utilized as subgrade fill to complete the grading component of the subgrade works. The compaction of these harvested fill soils will be monitored by GMBP to confirm the target of 95% of the materials standard proctor maximum dry density (SPMDD) during the grading works. As discussed on-site, an acceptable installed lift thickness for each relevant engineered fill lift should not exceed 0.30 meters. Samples of the native sand and gravel were collected from the site to confirm the materials gradation and maximum dry density. The collected field compaction and lab data will be provided under a separate cover as it becomes available.

1260-2ND AVE. E., UNIT 1, OWEN SOUND ON N4K 2J3 P: 519-376-1805 F: 519-376-8977 WWW.GMBLUEPLAN.CA

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

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
Georfirma 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. 216433-1

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

File No. 216433-1

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. As noted in our Field Review No. 1, the civil design drawings for the site were produced by GM BluePlan Engineering Limited (GMBP) and are dated September 21, 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).

November 16, 2020 (+1°C, Fog with light rain)

The undersigned attended the site to review the construction limits and subgrade elevations with the contractor. In addition, compaction testing of the fill areas to the proposed subgrade elevation (using the native harvested granulars) was completed during the site visit. The field compaction data will be provided under a separate cover.

November 18, 2020 (-1°C, Overcast with light rain/snow mix)

The undersigned attended the site to finish the compaction testing of the fill areas required to construct the subgrade to the designed elevations. Compaction testing of these fill areas using the harvested granular fill was completed during the site visit. The field compaction data will be provided under a separate cover.

In addition, a survey of the constructed subgrade was completed to confirm the size, shape and elevation of the constructed subgrade to confirm general conformity to the design drawings. A “proof-roll” was also attempted to determine the constructed subgrade performance prior to the installation of the proposed imported Granular ‘B’ installation. However, due to the open graded surface of the native subgrade soil matrix, the tri-axle truck got stuck in various areas and the “proof-roll” was modified and completed using a 64” Ø ride-on steel drum roller. As a result, no excessive subgrade deflection or deformities were noted across the gravel pad area when loaded using the above noted ride-on roller. Therefore, the installation of the proposed imported granular ‘B’ could proceed.

November 20, 2020 (13°C, Overcast)

The undersigned attended the site to stake out the limits of the imported granular placement. Stakes were installed along the perimeter and at the proposed high points within the center of the proposed gravel pad. The access road has received on-going maintenance grading and additional granulars to provide stability during the hauling and construction activities. Any increase to the road elevation and increase in granular thickness to ensure performance will be addressed upon the final stages of the grading works if required.

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

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. 216433-1

FIELD REVIEW REPORT #3
NWMO – DGR
EAST SITE (BH-1) – CONCESSION 8, TEESWATER
GEOFIRMA ENGINEERING LIMITED

File No. 216433-1

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. As noted in our Field Review No. 1, the civil design drawings for the site were produced by GM BluePlan Engineering Limited (GMBP). Revision 3 was issued on November 17, 2020 to accommodate grade changes and is being referenced moving forward. 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).

November 24, 2020 (-2°C, Overcast)

The undersigned attended the site to review the contractor's progress and conduct compaction testing of the partially installed Granular 'B' subbase of the pad. It was noted that the access road and an area approximately 20m x 20m, located in the northwestern corner of the pad was installed using the Granular 'B' sourced from Bester Pit. However, it is understood that the stockpiled volume of Granular 'B' at the Bester Pit is nearing depletion. As a result, the contractor was required to change the pit source to Cedarwell's Hanover Pit to continue importing granular to the site. Samples of the imported Granular 'B' materials will be processed in the GMBP laboratory to ensure conformity to the OPSS grading requirements.

Compaction testing of the installed Granular 'B' on the northern half of the gravel pad was able to be completed during the site visit. The compaction test results of the tested areas indicate that the imported Granular 'B' fill was being compacted to suitable densities with moisture contents in an acceptable range. The field compaction data will be provided under a separate cover.

November 26, 2020 (-1°C, Overcast with light drizzle)

The undersigned attended the site to finish the compaction testing of the Granular 'B' subbase across the pad and also sample the Granular 'A' which is being sourced from Cedarwell's Hanover Pit. Compaction testing of the installed Granular 'B' on the southern half of the gravel pad was able to be completed during the site visit. The compaction test results of the tested areas indicate that the imported Granular 'B' fill was being compacted to suitable densities with moisture contents in an acceptable range. The field compaction data will be provided under a separate cover.

It was noted that the contractor had commenced the installation of the Granular 'A' along the access road and had begun the fine grading of the Granular 'A' along the northern portion of the pad.

1260-2ND AVE. E., UNIT 1, OWEN SOUND ON N4K 2J3 P: 519-376-1805 F: 519-376-8977 WWW.GMBLUEPLAN.CA

Additional site visits for materials testing and subsequent grading confirmation will be conducted as an on-going arrangement with this office.

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. 216433-1

FIELD REVIEW REPORT #4
NWMO – DGR
EAST SITE (BH-1) – CONCESSION 8, TEESWATER
GEOFIRMA ENGINEERING LIMITED

File No. 216433-1

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. As noted in our Field Review No. 3, the civil design drawings for the site were produced by GM BluePlan Engineering Limited (GMBP) and Revision 3 dated November 17, 2020 is being referenced moving forward. 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 1, 2020 (-1°C, Snow and Sleet)

The undersigned attended the site to confirm the grading of the site and complete the compaction testing of the installed Granular 'A' across the site. However, upon arrival no on-site representation or contractor was present. It was determined that no construction activities would be completed today and the undersigned departed from the site.

December 4, 2020 (+2°C, Overcast with light drizzle/fog)

The undersigned attended the site in attempts to confirm the grading of the constructed gravel pad and site drainage along with completing the compaction testing of the installed Granular 'A' across the pad. Upon arrival, it was evident that the grading beyond the gravel pad was not yet complete, however, the pad construction using Granular 'A' was generally finished. The contractor was capping the access road with the Granular 'A' and topsoil was being placed across the landscaped areas and ditches. A survey of the constructed gravel pad area was also completed to confirm the constructed elevations and limits were in general conformance to the design drawings.

Compaction testing of the installed Granular 'A' across the gravel pad was completed during the site visit. The compaction test results of the tested areas indicate that the imported Granular 'A' fill was being compacted to suitable densities with moisture contents in an acceptable range. The compaction data will be provided under a separate cover.

It is noted that a return visit to confirm the site grading will be required.

1260-2ND AVE. E., UNIT 1, OWEN SOUND ON N4K 2J3 P: 519-376-1805 F: 519-376-8977 WWW.GMBLUEPLAN.CA

Additional site visits for materials testing and subsequent grading confirmation will be conducted as an on-going arrangement with this office.

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 Enginering Limted: 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. 216433-1

FIELD REVIEW REPORT #5
NWMO – DGR
EAST SITE (BH-1) – CONCESSION 8, TEESWATER
GEOFIRMA ENGINEERING LIMITED

File No. 216433-1

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. As noted in our Field Review No. 3, the civil design drawings for the site were produced by GM BluePlan Engineering Limited (GMBP) and Revision 3 dated November 17, 2020 is being referenced moving forward. 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 9, 2020 (+2°C, Overcast with light drizzle/fog)

The undersigned attended the site to conduct confirm the grading of the site and complete the compaction testing of the installed Granular 'A' along the access laneway. A topographic survey to confirm the grading of the constructed gravel pad and site drainage was completed during today's works. Compaction testing of the installed Granular 'A' along the access road was completed during today's site visit. The compaction test results of the tested areas indicate that the imported Granular 'A' fill was compacted to suitable densities with moisture contents in an acceptable range. These collected field compaction data will be provided under a separate cover.

The survey information collected form today's grading confirmation will be processed and compared to the design with any deficiencies or discrepancies noted.

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. 216433-1

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:

- Compaction Test Results No. 1 to 7 – Subgrade Fill – November 16 & 18, 2020.
- Compaction Test Results No. 8 to 27 – Granular "B" for Pad – November 24 & 26, 2020.
- Compaction Test Results No. 28 to 42 – Granular "A" for Pad & Roadway – December 4 & 9, 2020.

Remarks:

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

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
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GMBP: Matt Nelson, P.Eng – matt.nelson@gmblueplan.ca
File No. 216433-1

FIELD COMPACTION TEST RESULTS

Project No.:	216433-1 **Project:** NWMO DGR - East Site (BH-1) - Construction Support	**Site Location:**	Teeswater, ON
Client:	Geofirma Engineering Ltd. 1 Raymond Street, Suite 200, Ottawa, ON K1R 1A2	**Contractor:** **Subcontractor:**	Cedarwell Excavating Ltd.
Area Tested:	Subgrade Fill	**Date:**	November 16, 2020

	Type Of Material Tested	Specified Compaction %	Max. Lab Density (tonnes/m^3)	☑ Standard Proctor ☐ Modified Proctor
1.	Native Sand and Gravel - Harvested from On-Site	98%	2.000 - 2.100 varies with stone content	
2.				
3.				
4.				
5.				

Test No.	Location of Test	Test Elev.	Material	Dry Density	% Moisture	% Compaction	Recommendations
1	See Attached Drawing	Subgrade	1	2.075	8.8	100.0	X
2	See Attached Drawing	Subgrade	1	2.063	7.9	100.0	X
3	See Attached Drawing	Subgrade	1	2.096	8.3	100.0	X
4	See Attached Drawing	Subgrade	1	2.106	8.9	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

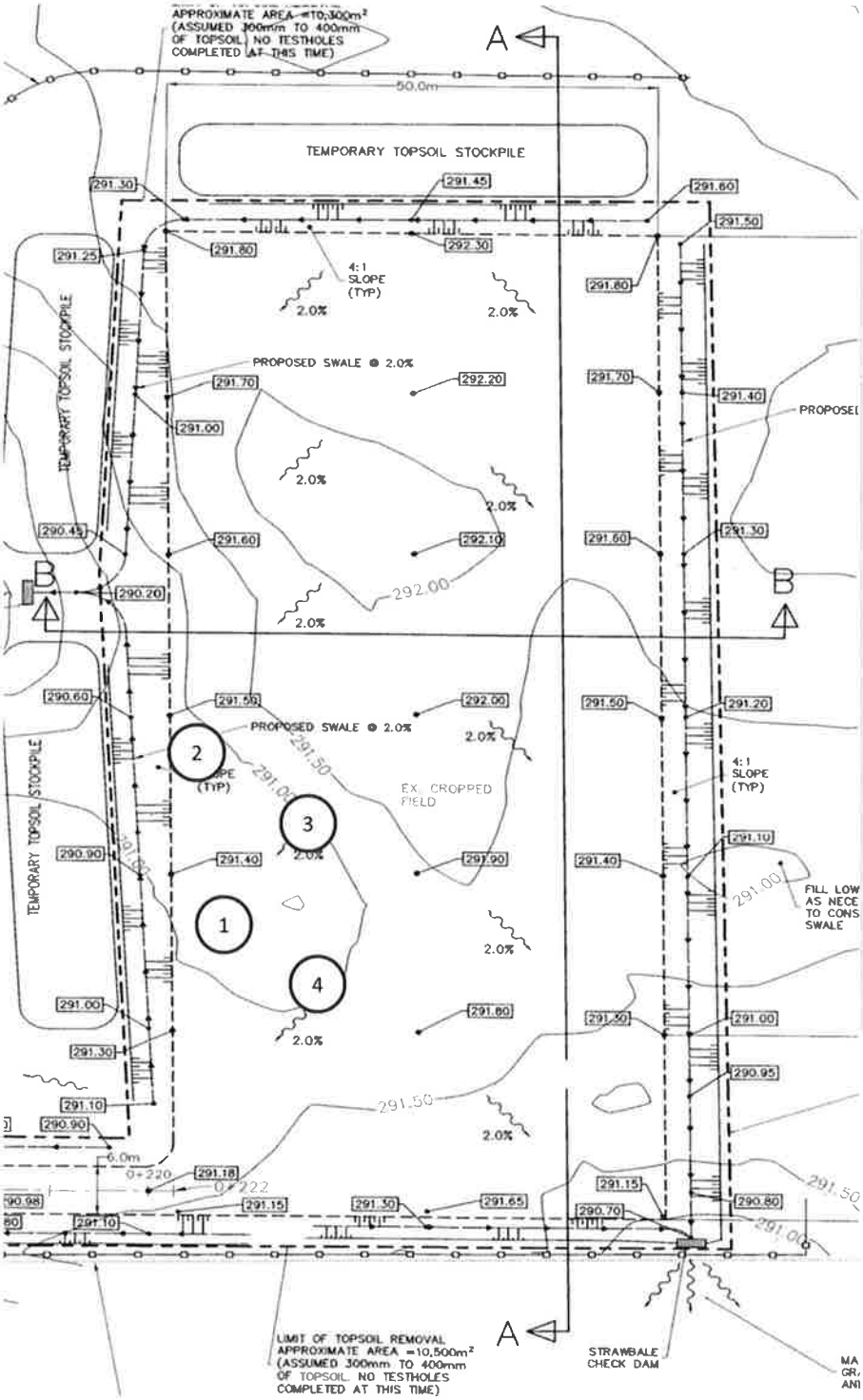
REMARKS: u/s footing = underside of footing

INSPECTOR: Derek Brewster

GM BluePlan Engineering Limited

NWMO DGR - East Site (BH-1) - Construction Support
Compaction Test Locations
November 16, 2020
GMBP File: 216433-1

N



FIELD COMPACTION TEST RESULTS

Project No.:	216433-1 **Project:** NWMO DGR - East Site (BH-1) - Construction Support	**Site Location:**	Teeswater, ON
Client:	Geofirma Engineering Ltd. 1 Raymond Street, Suite 200, Ottawa, ON K1R 1A2	**Contractor:** **Subcontractor:**	Cedarwell Excavating Ltd.
Area Tested:	Subgrade Fill	**Date:**	November 18, 2020

	Type Of Material Tested	Specified Compaction %	Max. Lab Density (tonnes/m^3)	☑ Standard Proctor ☐ Modified Proctor
1.	Native Sand and Gravel - Harvested from On-Site	98%	2.000 - 2.100 varies with stone content	
2.				
3.				
4.				
5.				

Test No.	Location of Test	Test Elev.	Material	Dry Density	% Moisture	% Compaction	Recommendations
5	See Attached Drawing	Subgrade	1	2.051	7.0	100.0	X
6	See Attached Drawing	Subgrade	1	2.060	6.9	100.0	X
7	See Attached Drawing	Subgrade	1	2.088	7.6	100.0	X

ABBREVIATIONS:

F.G. -Finish Grade
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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

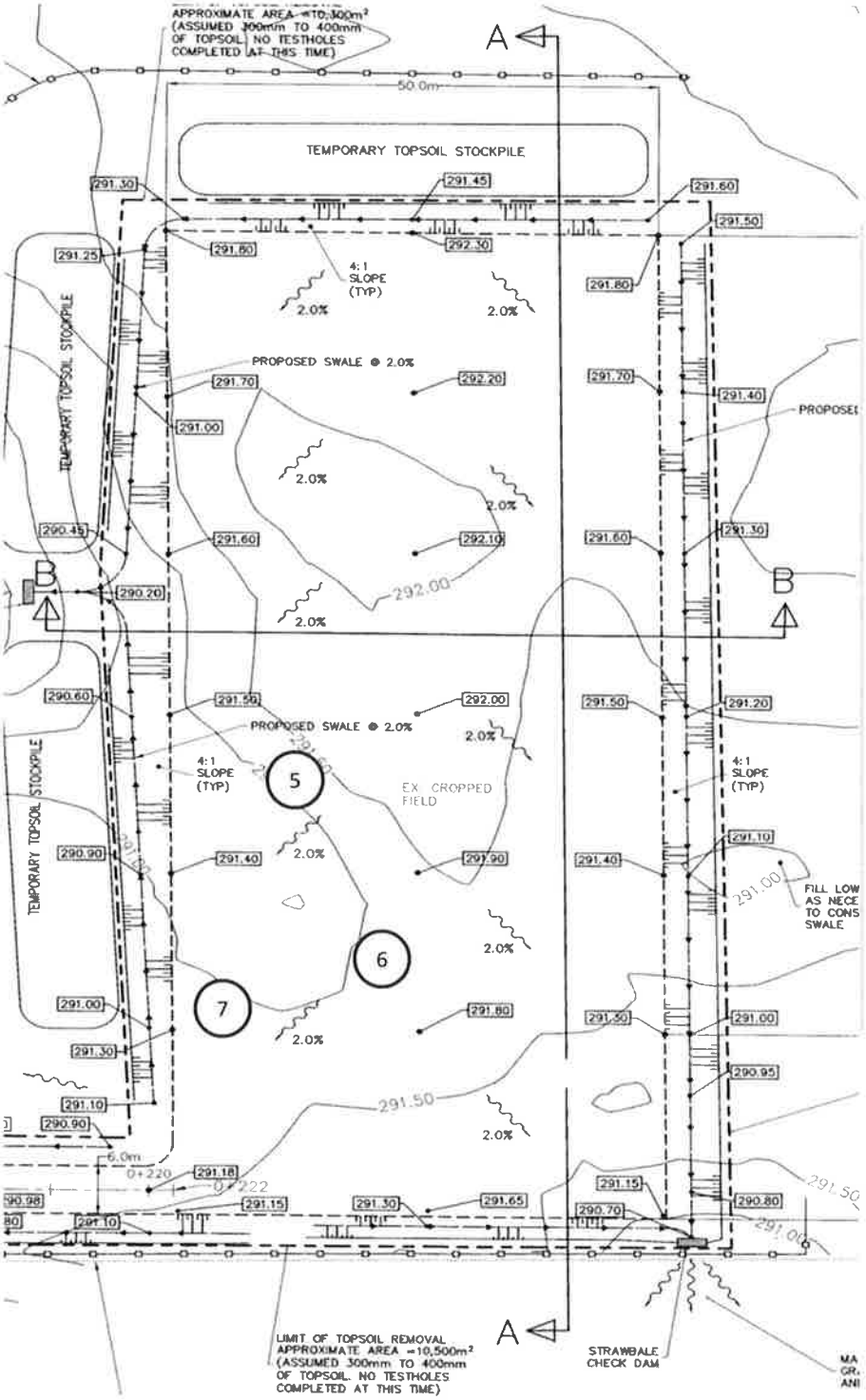
REMARKS: u/s footing = underside of footing

INSPECTOR: Derek Brewster

GM BluePlan Engineering Limited

NWMO DGR - East Site (BH-1) - Construction Support
Compaction Test Locations
November 18, 2020
GMBP File: 216433-1

N



FIELD COMPACTION TEST RESULTS

Project No.:	216433-1 **Project:** NWMO DGR - East Site (BH-1) - Construction Support	**Site Location:**	Teeswater, ON
Client:	Geofirma Engineering Ltd. 1 Raymond Street, Suite 200, Ottawa, ON K1R 1A2	**Contractor:** **Subcontractor:**	Cedarwell Excavating Ltd.
Area Tested:	Granular 'B'	**Date:**	November 24, 2020

	Type Of Material Tested	Specified Compaction %	Max. Lab Density (tonnes/m^3)	☑ Standard Proctor ☐ Modified Proctor
1.	Native Sand and Gravel - Harvested from On-Site	98%	2.000 - 2.100 varies with stone content	
2.	Imported Pit Run Sand and Gravel - Bester Pit/Hanover Pit, Granular 'B'	100%	2.200 est.	
3.				
4.				
5.				

Test No.	Location of Test	Test Elev.	Material	Dry Density	% Moisture	% Compaction	Recommendations
8	See Attached Drawing	'B' Grade	2	2.209	5.0	100.0	X
9	See Attached Drawing	'B' Grade	2	2.265	5.9	100.0	X
10	See Attached Drawing	'B' Grade	2	2.239	5.6	100.0	X
11	See Attached Drawing	'B' Grade	2	2.225	6.2	100.0	X
12	See Attached Drawing	'B' Grade	2	2.241	7.9	100.0	X
13	See Attached Drawing	'B' Grade	2	2.213	6.8	100.0	X
14	See Attached Drawing	'B' Grade	2	2.220	6.2	100.0	X
15	See Attached Drawing	'B' Grade	2	2.217	6.5	100.0	X
16	See Attached Drawing	'B' Grade	2	2.246	6.9	100.0	X
17	See Attached Drawing	'B' Grade	2	2.228	6.3	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

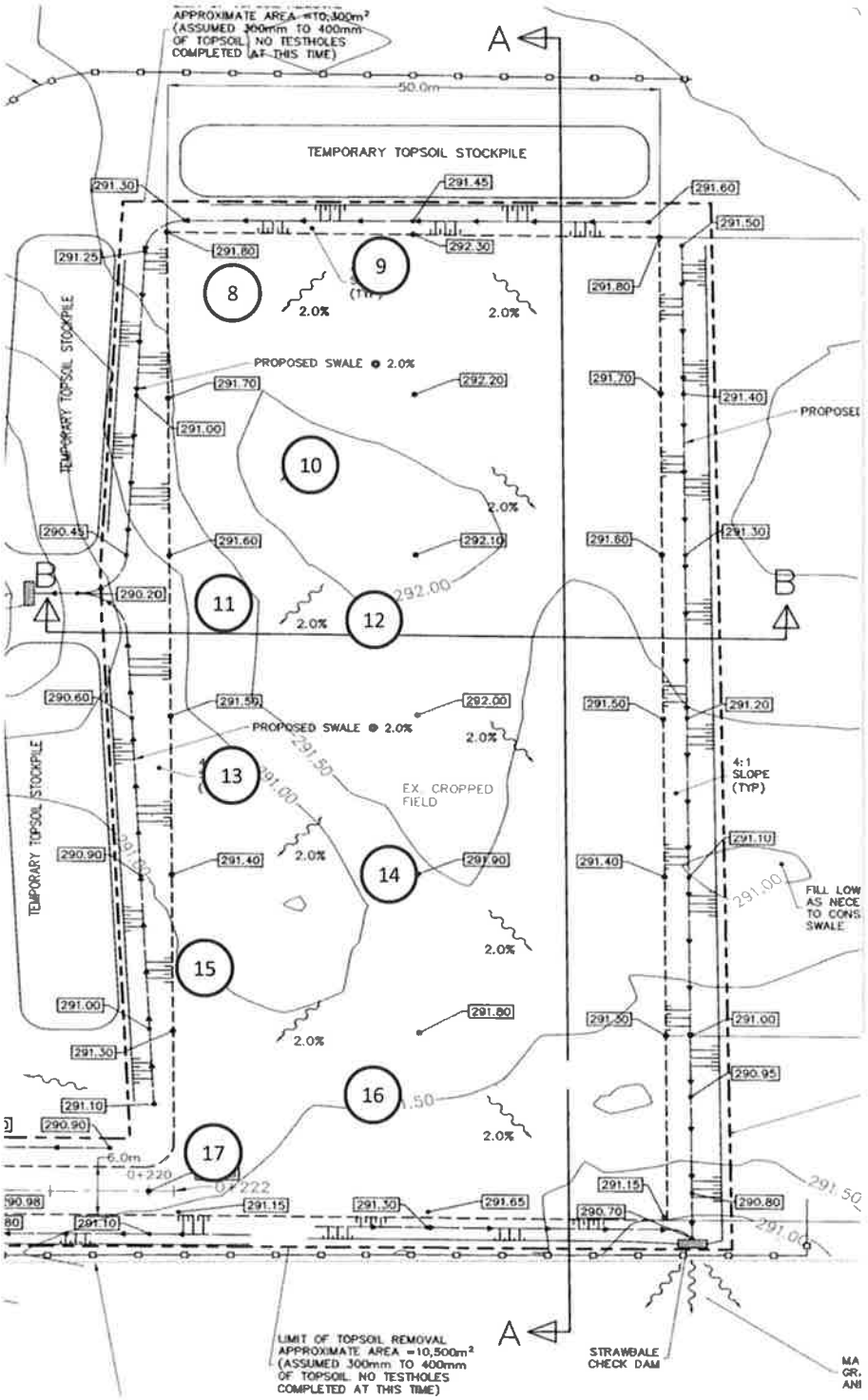
REMARKS: u/s footing = underside of footing

INSPECTOR: Derek Brewster

GM BluePlan Engineering Limited

NWMO DGR - East Site (BH-1) - Construction Support
Compaction Test Locations
November 24, 2020
GMBP File: 216433-1

N



FIELD COMPACTION TEST RESULTS

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

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

Area Tested: Granular 'B'
Date: November 26, 2020

	Type Of Material Tested	Specified Compaction %	Max. Lab Density (tonnes/m^3)	☑ Standard Proctor ☐ Modified Proctor
1.	Native Sand and Gravel - Harvested from On-Site	98%	2.000 - 2.100 varies with stone content	
2.	Imported Pit Run Sand and Gravel - Bester Pit/Hanover Pit, Granular 'B'	100%	2.200 est.	
3.				
4.				
5.				

Test No.	Location of Test	Test Elev.	Material	Dry Density	% Moisture	% Compaction	Recommendations
18	See Attached Drawing	'B' Grade	2	2.218	7.0	100.0	X
19	See Attached Drawing	'B' Grade	2	2.207	6.8	100.0	X
20	See Attached Drawing	'B' Grade	2	2.242	7.2	100.0	X
21	See Attached Drawing	'B' Grade	2	2.200	7.0	100.0	X
22	See Attached Drawing	'B' Grade	2	2.200	7.4	100.0	X
23	See Attached Drawing	'B' Grade	2	2.206	7.2	100.0	X
24	See Attached Drawing	'B' Grade	2	2.217	6.9	100.0	X
25	See Attached Drawing	'B' Grade	2	2.236	7.0	100.0	X
26	See Attached Drawing	'B' Grade	2	2.196	7.9	99.8	Y
27	See Attached Drawing	'B' Grade	2	2.257	7.7	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

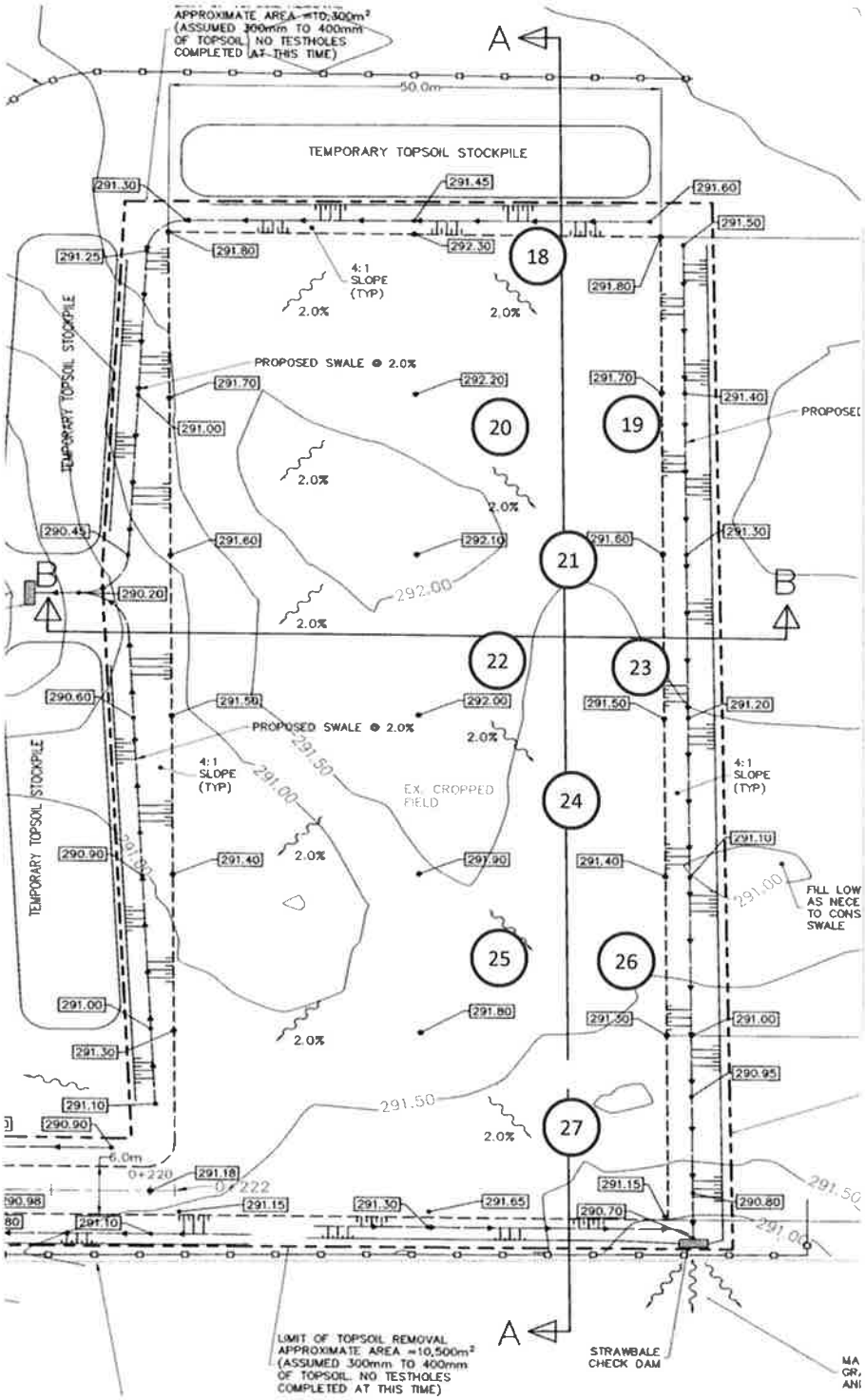
RESULTS ARE:
☐ Preliminary
☑ Final

REMARKS: u/s footing = underside of footing

INSPECTOR: Derek Brewster
GM BluePlan Engineering Limited

NWMO DGR - East Site (BH-1) - Construction Support
Compaction Test Locations
November 26, 2020
GMBP File: 216433-1

N



FIELD COMPACTION TEST RESULTS

Project No.:	216433-1 **Project:** NWMO DGR - East Site (BH-1) - Construction Support	**Site Location:**	Teeswater, ON
Client:	Geofirma Engineering Ltd. 1 Raymond Street, Suite 200, Ottawa, ON K1R 1A2	**Contractor:** **Subcontractor:**	Cedarwell Excavating Ltd.
Area Tested:	Granular 'A' - Pad	**Date:**	December 4, 2020

	Type Of Material Tested	Specified Compaction %	Max. Lab Density (tonnes/m^3)	☑ Standard Proctor ☐ Modified Proctor
1.	Native Sand and Gravel - Harvested from On-Site	98%	2.000 - 2.100 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
28	See Attached Drawing	'A' Grade	3	2.251	7.8	100.0	X
29	See Attached Drawing	'A' Grade	3	2.237	7.1	100.0	X
30	See Attached Drawing	'A' Grade	3	2.221	7.4	100.0	X
31	See Attached Drawing	'A' Grade	3	2.240	7.4	100.0	X
32	See Attached Drawing	'A' Grade	3	2.236	7.0	100.0	X
33	See Attached Drawing	'A' Grade	3	2.215	6.9	100.0	X
34	See Attached Drawing	'A' Grade	3	2.221	7.3	100.0	X
35	See Attached Drawing	'A' Grade	3	2.239	7.4	100.0	X
36	See Attached Drawing	'A' Grade	3	2.229	7.0	100.0	X
37	See Attached Drawing	'A' Grade	3	2.243	7.7	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:

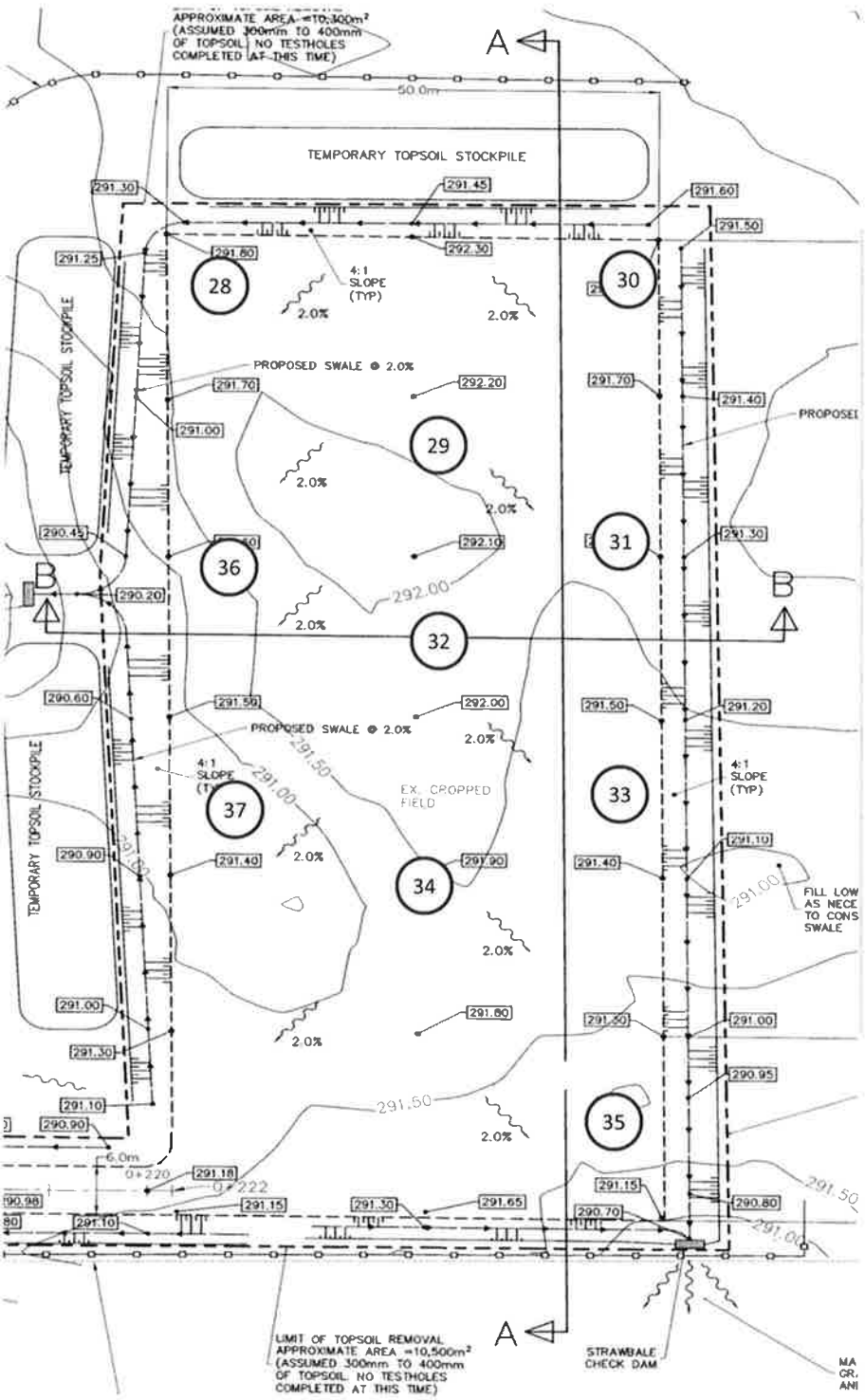
☐ Preliminary
☑ Final

REMARKS: u/s footing = underside of footing

INSPECTOR: Derek Brewster

GM BluePlan Engineering Limited

NWMO DGR - East Site (BH-1) - Construction Support
Compaction Test Locations
December 4, 2020
GMBP File: 216433-1



FIELD COMPACTION TEST RESULTS

Project No.:	216433-1 **Project:** NWMO DGR - East Site (BH-1) - Construction Support	**Site Location:**	Teeswater, ON
Client:	Geofirma Engineering Ltd. 1 Raymond Street, Suite 200, Ottawa, ON K1R 1A2	**Contractor:** **Subcontractor:**	Cedarwell Excavating Ltd.
Area Tested:	Granular 'A' - Roadway	**Date:**	December 9, 2020

	Type Of Material Tested	Specified Compaction %	Max. Lab Density (tonnes/m^3)	☑ Standard Proctor ☐ Modified Proctor
1.	Native Sand and Gravel - Harvested from On-Site	98%	2.000 - 2.100 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
38	See Attached Drawing	'A' Grade	3	2.207	8.2	100.0	X
39	See Attached Drawing	'A' Grade	3	2.218	8.3	100.0	X
40	See Attached Drawing	'A' Grade	3	2.216	8.9	100.0	X
41	See Attached Drawing	'A' Grade	3	2.204	8.2	100.0	X
42	See Attached Drawing	'A' Grade	3	2.229	8.0	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

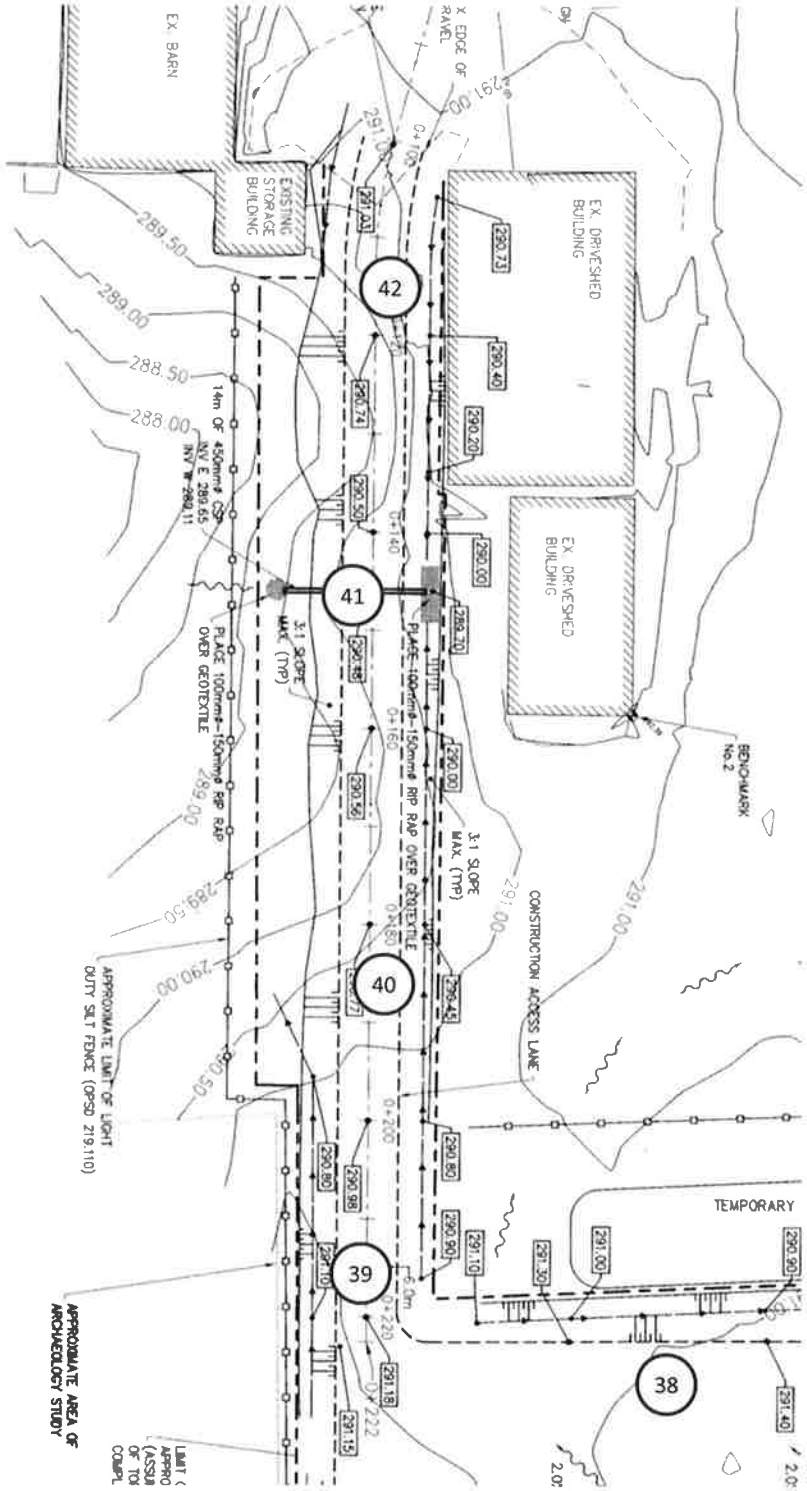
REMARKS: u/s footing = underside of footing

INSPECTOR: Derek Brewster

GM BluePlan Engineering Limited

BluePlan ENGINEERING

NWMO DGR - East Site (BH-1) - Construction Support
Compaction Test Locations
December 9, 2020
GMBP File: 216433-1



GM BluePlan ENGINEERING

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

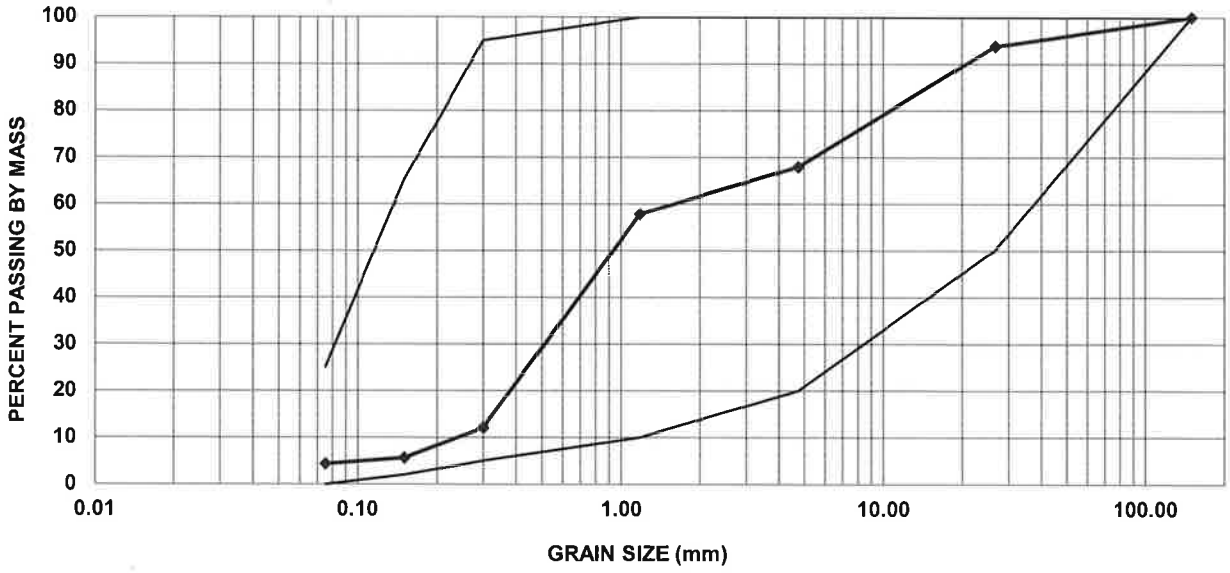
PROJECT: NWMO DGR
LOCATION: East Site (BH-1) 1021 Con,8 South Bruce
CLIENT: Geofirma Engineering Ltd

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.	SPECIFIED MAX.	SAMPLE
150.0	100	100	100.0
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

SELECT SUBGRADE MATERIAL
OPSS FORM 1010
TABLE 3

Remarks:

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

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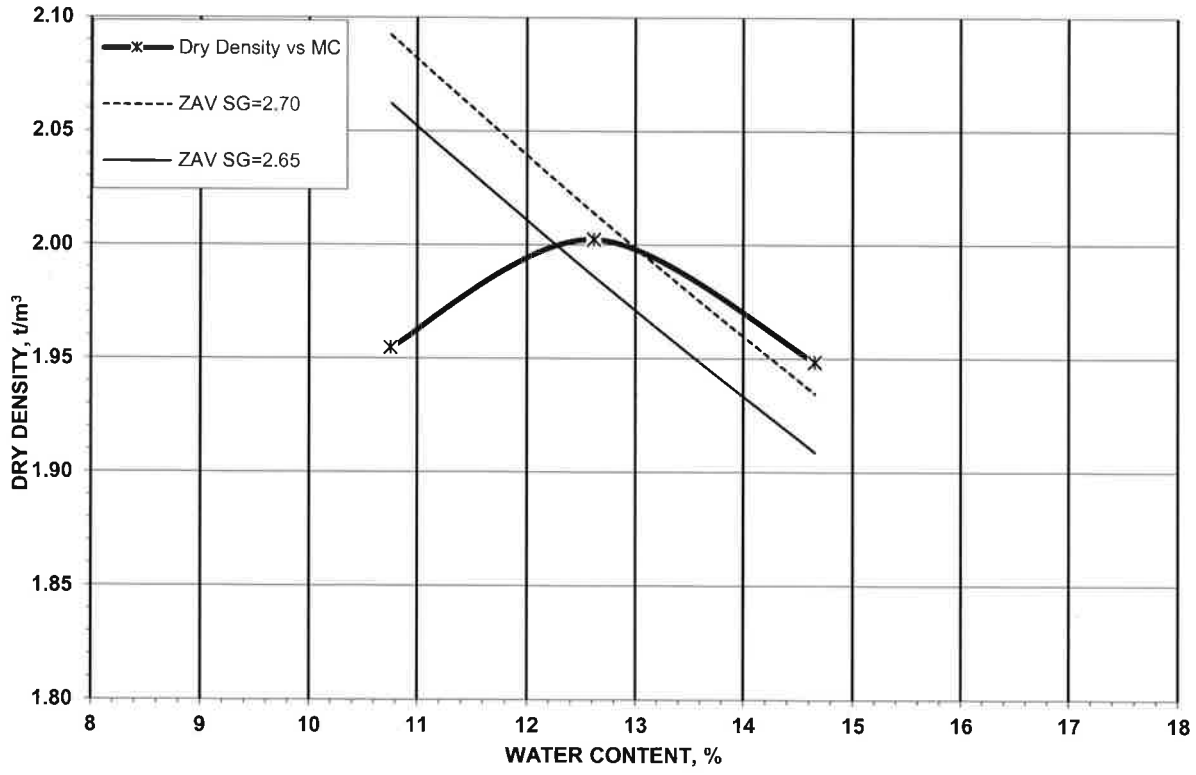
STANDARD PROCTOR TEST

PROJECT:	NWMO DGR	**PROJECT No.:**	216433-1
LOCATION:	East Site (BH-1) 1021 Con,8 South Bruce	**LAB No.:**	S-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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Phone 519-376-1805 Fax 519-376-8977 www.GMBluePlan.ca

GRAIN SIZE ANALYSIS

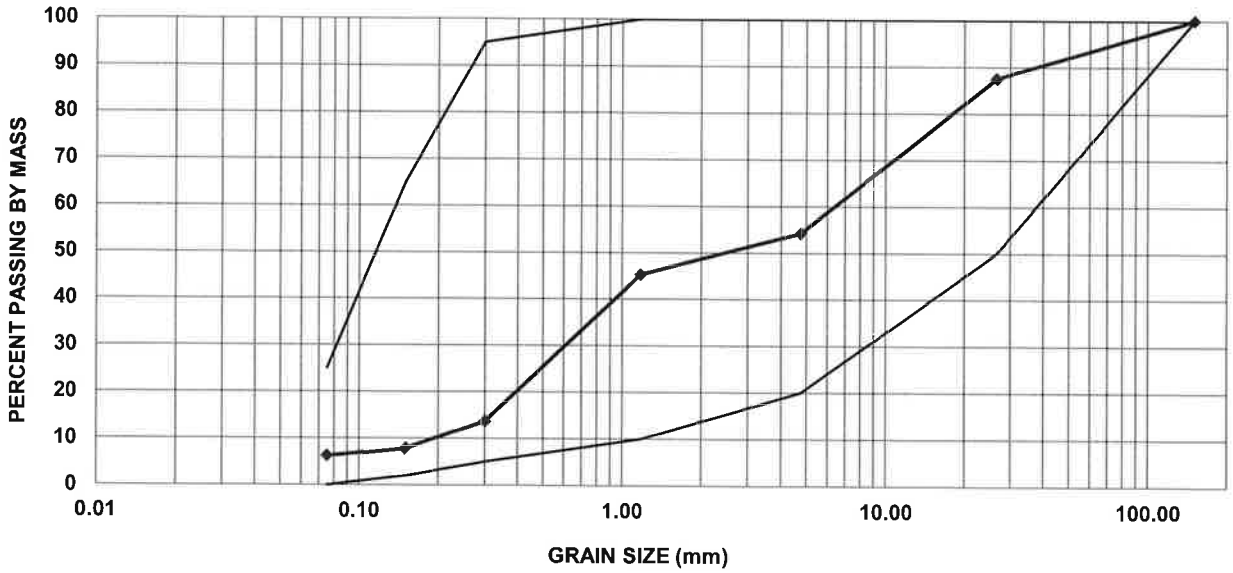
PROJECT: NWMO DGR
LOCATION: East Site (BH-1) 1021 Con,8 South Bruce
CLIENT: Geofirma Engineering Ltd

PROJECT NO: 216433-1
LAB NO: S-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.	PERCENT PASSING SPECIFIED MAX.	PERCENT PASSING 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**

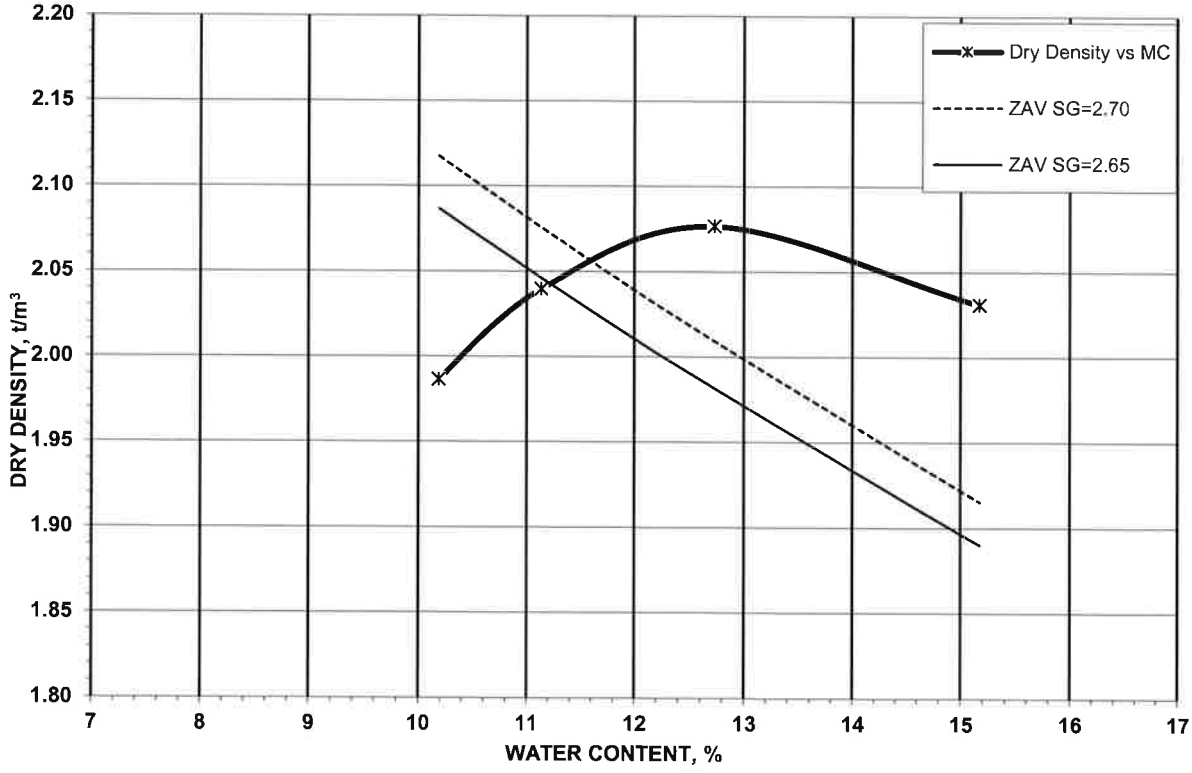
GM BluePlan Engineering Limited
Guelph, Owen Sound, Listowel, Kitchener, London, Hamilton, GTA
1260 - 2nd Avenue E., Unit 1 Owen Sound, ON N4K 2J3
Phone 519-376-1805 Fax 519-376-8977 www.GMBluePlan.ca

STANDARD PROCTOR TEST

PROJECT:	NWMO DGR	**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



GM BluePlan Engineering Limited
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Phone 519-376-1805 Fax 519-376-8977 www.GMBluePlan.ca

GRAIN SIZE ANALYSIS

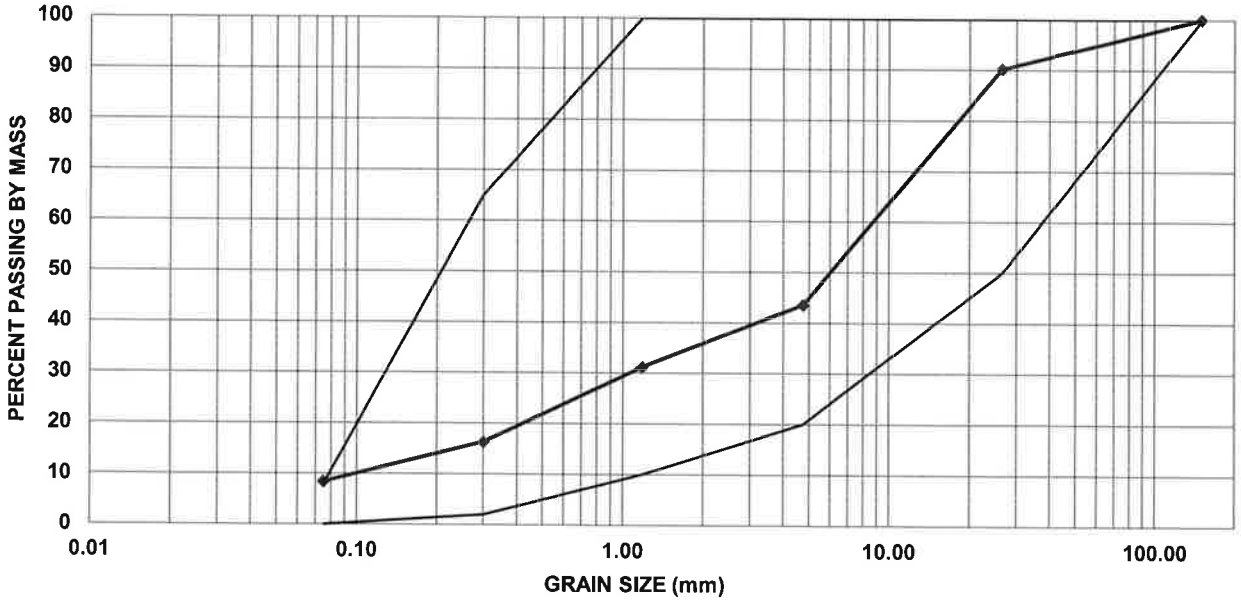
PROJECT: NWMO DGR
LOCATION: East Site (BH-1) 1021 Con,8 South Bruce
CLIENT: Geofirma Engineering

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**

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

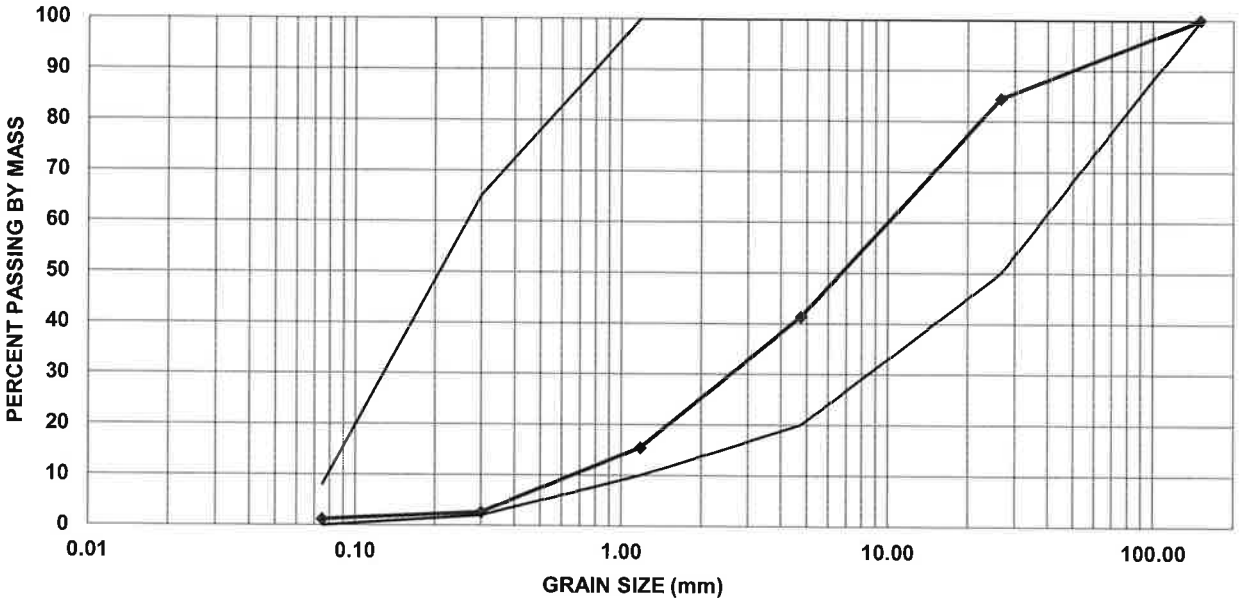
PROJECT: NWMO DGR
LOCATION: East Site (BH-1) 1021 Con,8 South Bruce
CLIENT: Geofirma Engineering

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 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	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	

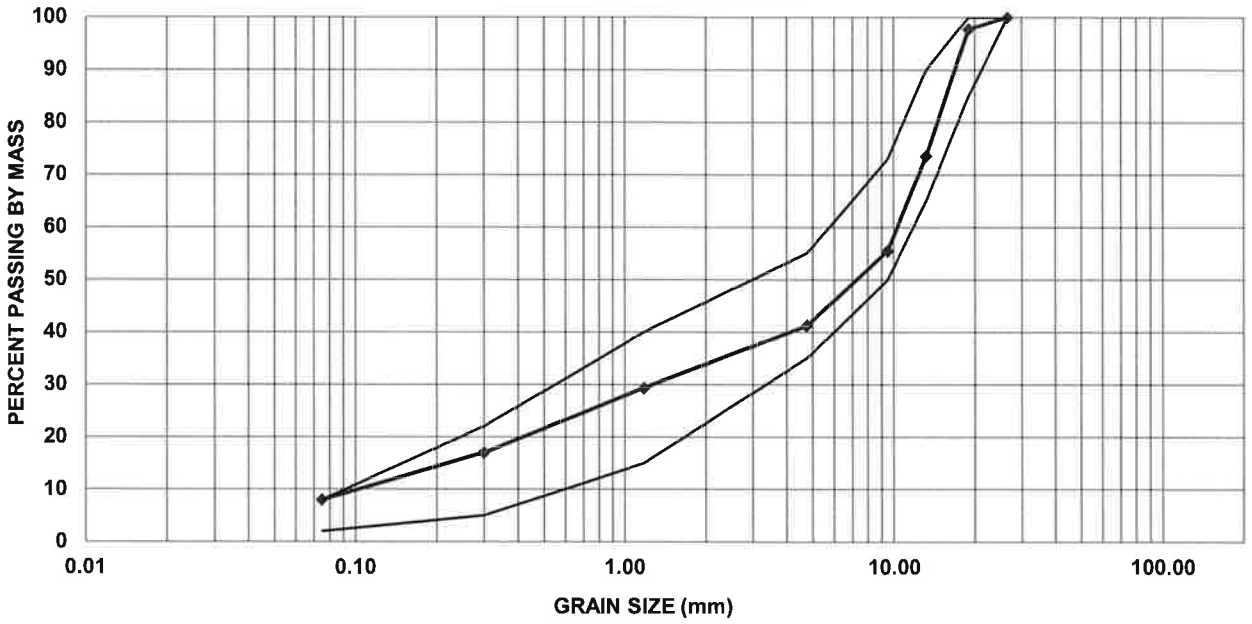
NOTES: **Meets the OPSS Gradation requirements for Granular B Type I**

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 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**

TRANSMITTAL

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

Attention: Sean Sterling

Date: July 20, 2021

Project No.: 216433-1

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

Delivery: Email: ssterling@geofirma.ca

ENCLOSED

- Compaction Test Results No. 43 to 48 – Cellar Backfill – April 14, 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
Owner: via Geofirma Engineering Limited.
GMBP: Bill Dubeau – 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

FIELD COMPACTION TEST RESULTS

Project No.: 216433-1 **Project:** NWMO DGR - East 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: April 14, 2021

	Type Of Material Tested	Specified Compaction %	Max. Lab Density (tonnes/m^3)	☑ Standard Proctor ☐ Modified Proctor
1.	Native Sand and Gravel - Harvested from On-Site	98%	2.000 - 2.100 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
43	See Attached Drawing	1.0m BFG	3	2.213	6.0	100.0	X
44	See Attached Drawing	1.0m BFG	3	2.228	5.2	100.0	X
45	See Attached Drawing	0.5m BFG	3	2.235	6.4	100.0	X
46	See Attached Drawing	0.5m BFG	3	2.201	6.1	100.0	X
47	See Attached Drawing	FG	3	2.211	5.8	100.0	X
48	See Attached Drawing	FG	3	2.230	5.5	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

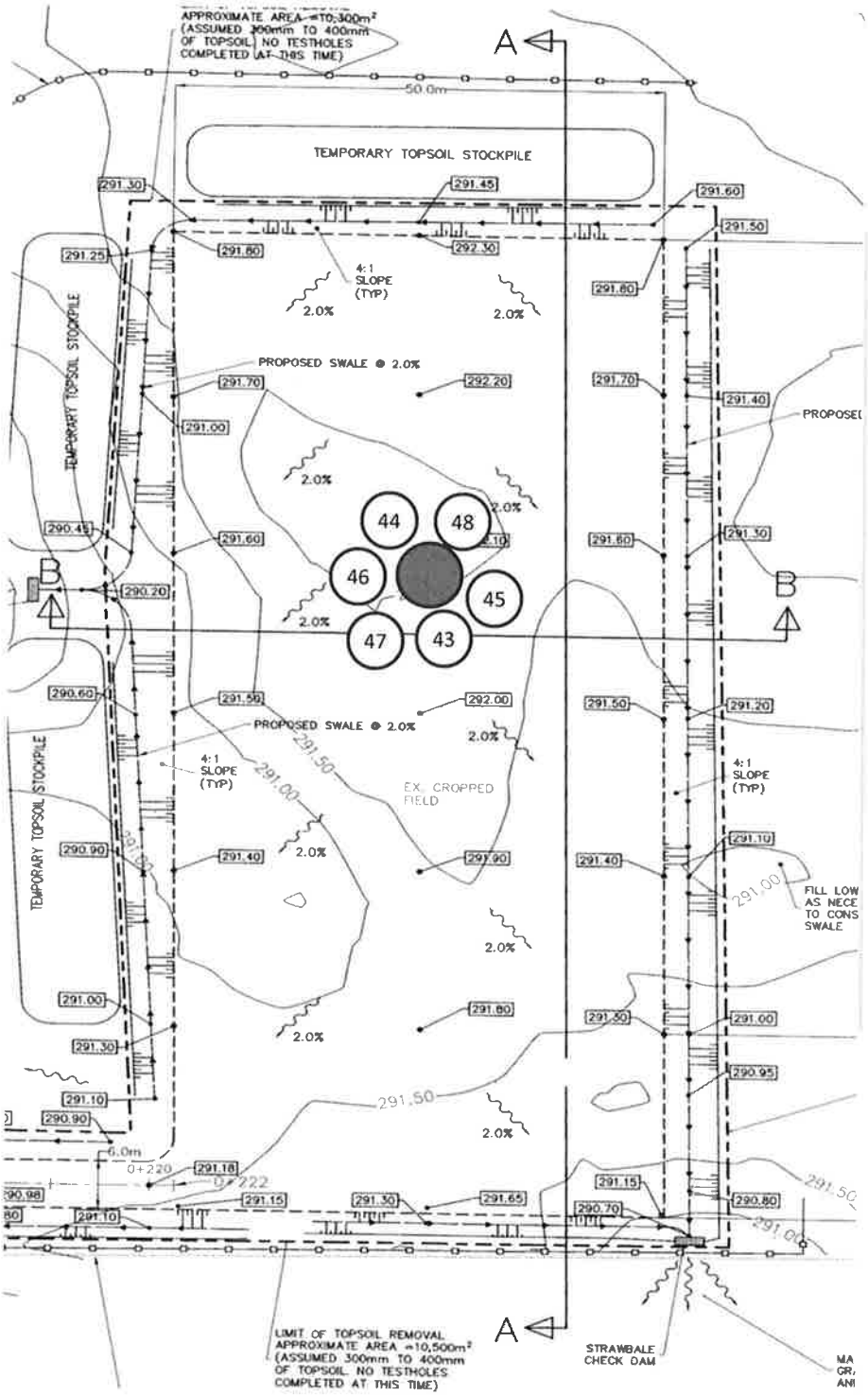
RECOMMENDATIONS
X - Satisfactory
Y - Re-Compact
Z - Re-Compact and Re-Test

RESULTS ARE:
☐ Preliminary
☑ Final

REMARKS: u/s footing = underside of footing

INSPECTOR: Derek Brewster
GM BluePlan Engineering Limited

NWMO DGR - East Site (BH-1) - Construction Support
Compaction Test Locations
April 14, 2021
GMBP File: 216433-1



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:

Cansel
Improving field to finish productivity

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

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.

1260-2ND AVE. E., UNIT 1, OWEN SOUND ON N4K 2J3 P: 519-376-1805 F: 519-376-8977 WWW.GMBLUEPLAN.CA

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, 3411B	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.

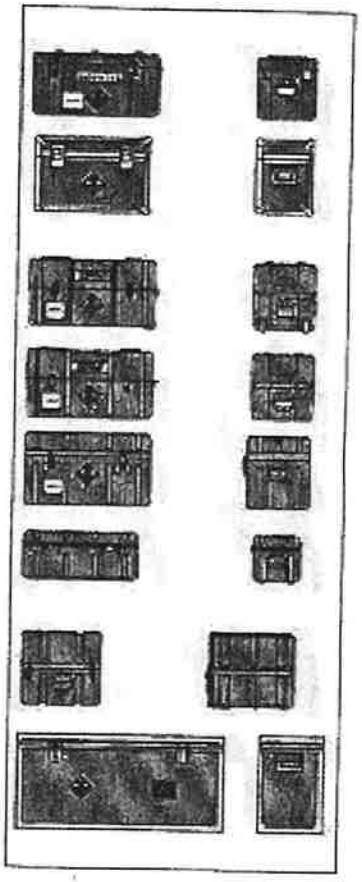
Sean Reilly
Radiation Safety Officer

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 1005043	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	ONE Container, Dimentions 76 x 40 x 42 cm	^{137}CS	370 MBq (10 mCi)	II - Yellow	0.4
Class 7	42 Kg	^{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.

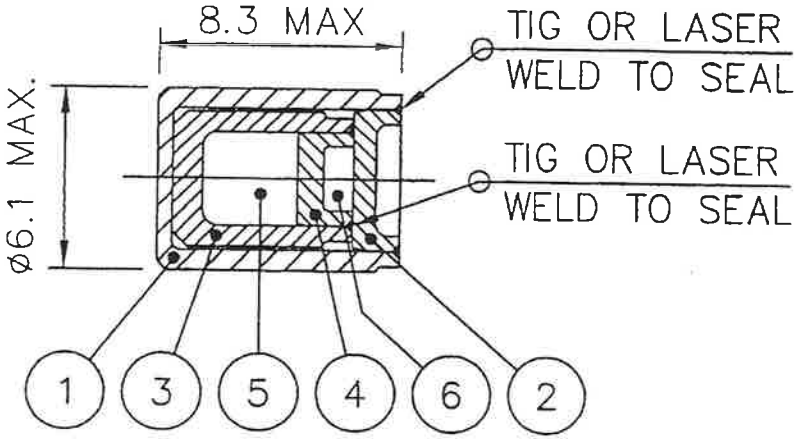
This certificate is issued in accordance with paragraph(s) 804 of the IAEA Regulations and Section 173.476 of Title 49 of the Code of Federal Regulations, in response to the October 6, 2017 petition by QSA Global, Inc., Burlington, MA, and in consideration of other information on file in this Office.

Certified By:

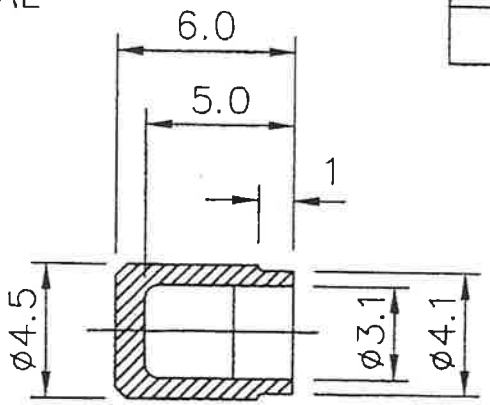
William Schoonover
Associate Administrator for Hazardous Materials Safety

November 03, 2017
(DATE)

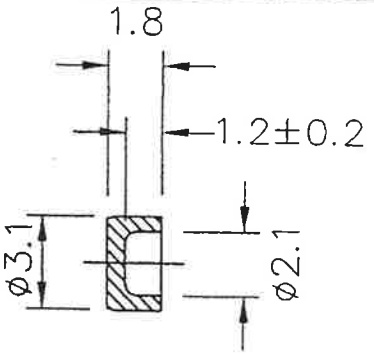
Revision 5 - Issued to extend the expiration date.



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



ITEM 3



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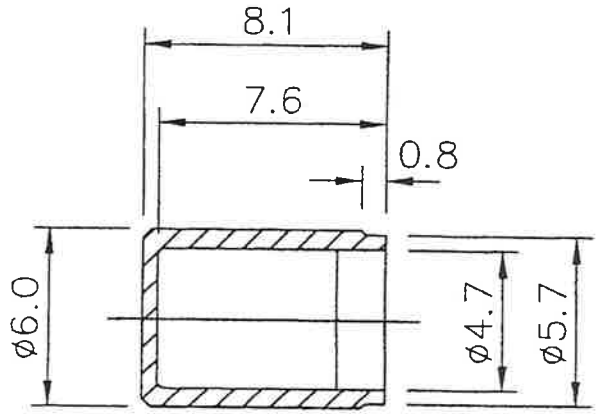
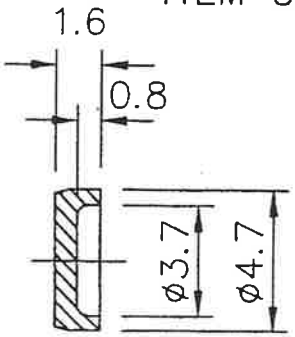


ITEM 1



ITEM 2

APPROVALS	
R. Wynn	10-03
	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.

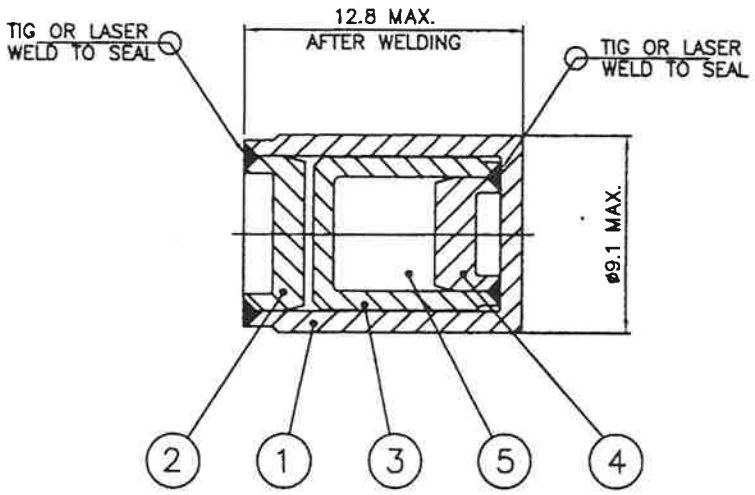
Certified By:

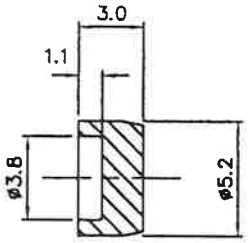
William Schoonover
Associate Administrator for Hazardous Materials Safety

August 29, 2017
(DATE)

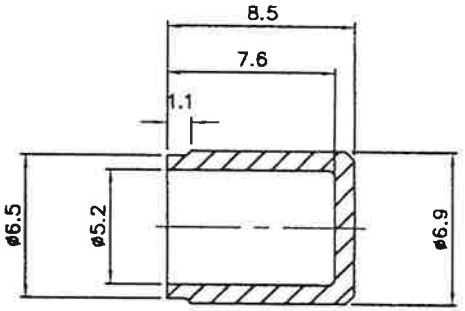
Revision 4 - Issued to extend the expiration date

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

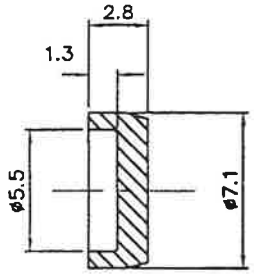




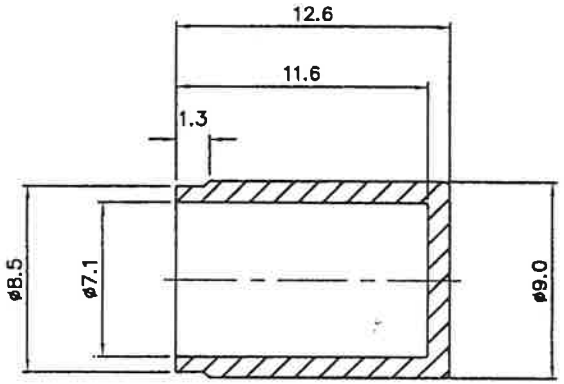
ITEM 4



ITEM 3



ITEM 2



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	ONE Container, Dimentions 76 x 40 x 42 cm	^{137}CS	370 MBq (10 mCi)	II - Yellow	0.4
Class 7	42 Kg	^{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.

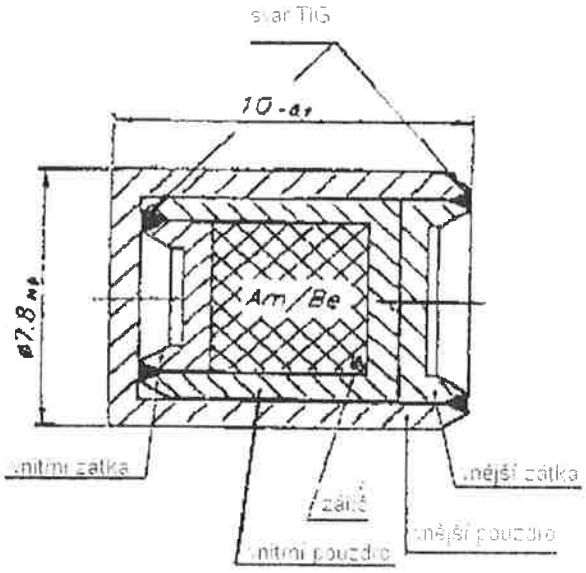
Eckert & Ziegler Cesio s. r. o., Radiová 1, 102 27 Prague 10, is the manufacturer of this SFRM.

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

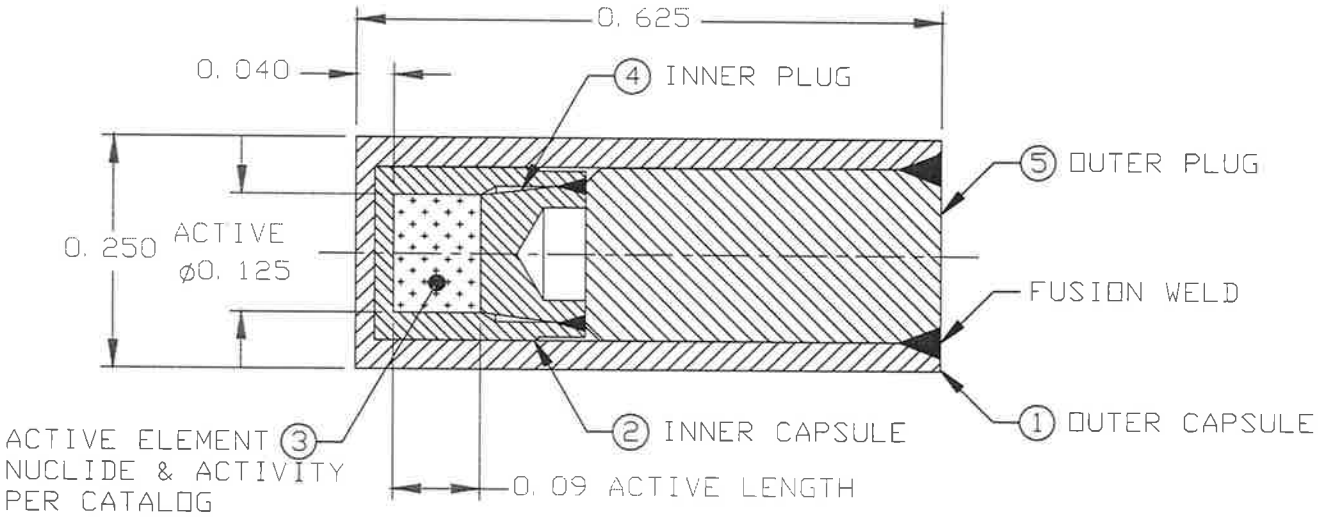
This certificate is issued in accordance with paragraph(s) 804 of the IAEA Regulations and Section 173.476 of Title 49 of the Code of Federal Regulations, in response to the June 25, 2019 petition by Eckert & Ziegler Isotope Products, Valencia, CA, and in consideration of other information on file in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

Certified By:

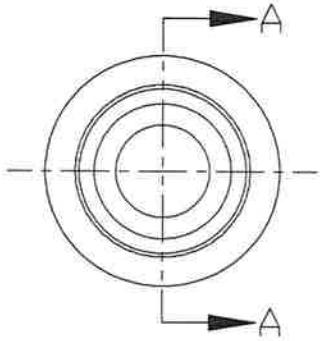
William Schoonover
Associate Administrator for Hazardous
Materials Safety

July 03, 2019
(DATE)

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



SECTION A–A



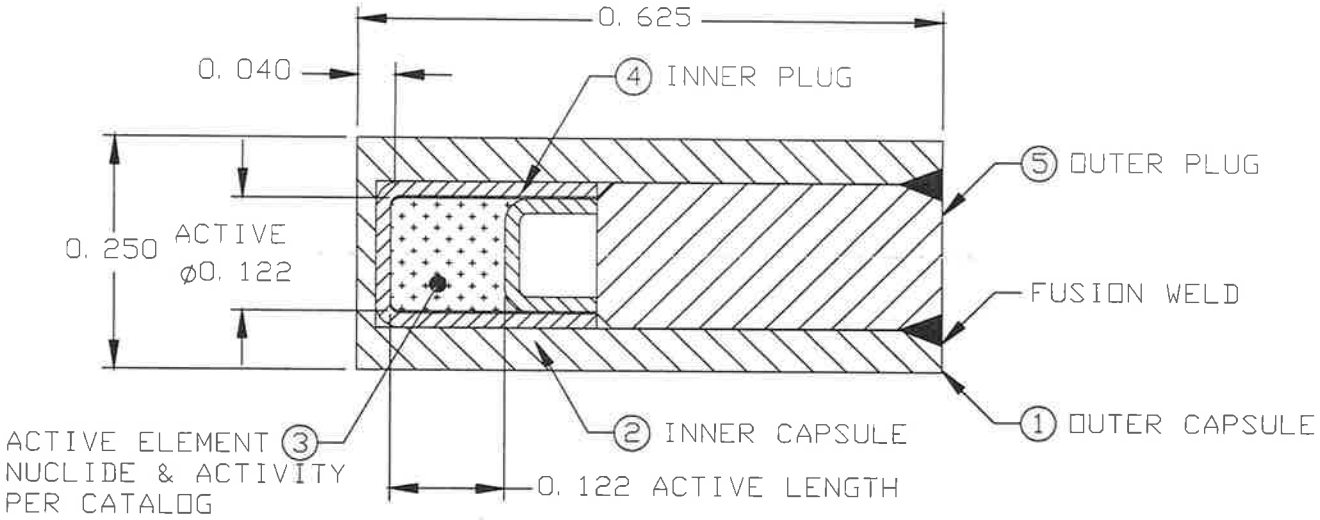
3. IDENTIFY PART NUMBER
2. ALL CAPSULES AND PLUGS ARE MADE FROM 304 OR 304L STAINLESS STEEL AND THE ACTIVE ELEMENT IS CERAMIC
1. ASSEMBLE COMPLETE PER ENGINEERING DRAWING AND FUSION WELD AS REQUIRED

NOTES: UNLESS OTHERWISE SPECIFIED

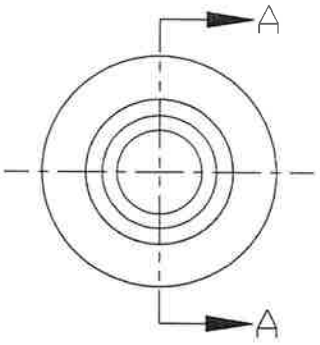
SECTION A–A

P/N A3000 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	DRAWING TITLE MODEL 225 POINT SOURCE	
		SCALE NONE	SERIES TITLE INDUSTRIAL SOURCES, HIGH INTENSITY GAMMA AND NEUTRON	
		SIZE A	CAGE CODE 32993 | REVISION L | DRAWING NUMBER 3000	SHEET 3 OF 10



SECTION A–A



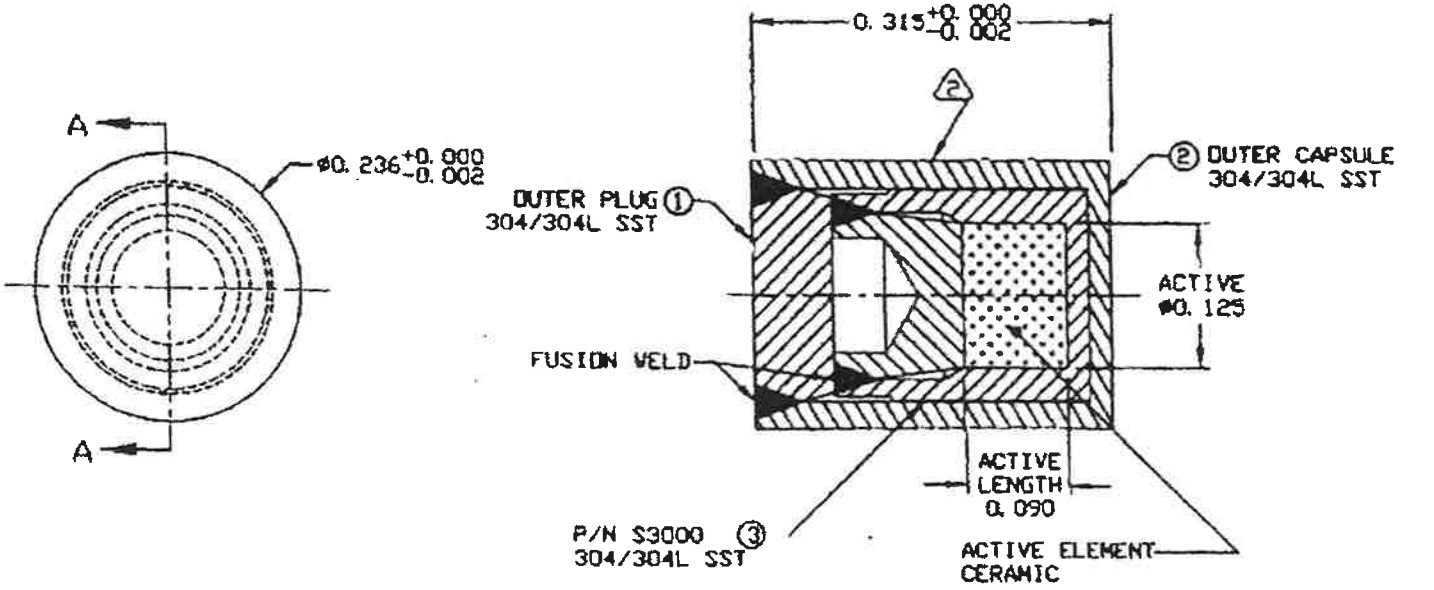
3. IDENTIFY PART NUMBER
2. ALL CAPSULES AND PLUGS ARE MADE FROM 304 OR 304L STAINLESS STEEL AND THE ACTIVE ELEMENT IS CERAMIC
1. ASSEMBLE COMPLETE PER ENGINEERING DRAWING AND FUSION WELD AS REQUIRED

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	DRAWING TITLE MODEL 225 POINT SOURCE		
		SCALE NONE	SERIES TITLE INDUSTRIAL SOURCES, HIGH INTENSITY GAMMA AND NEUTRON		
		SIZE A	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

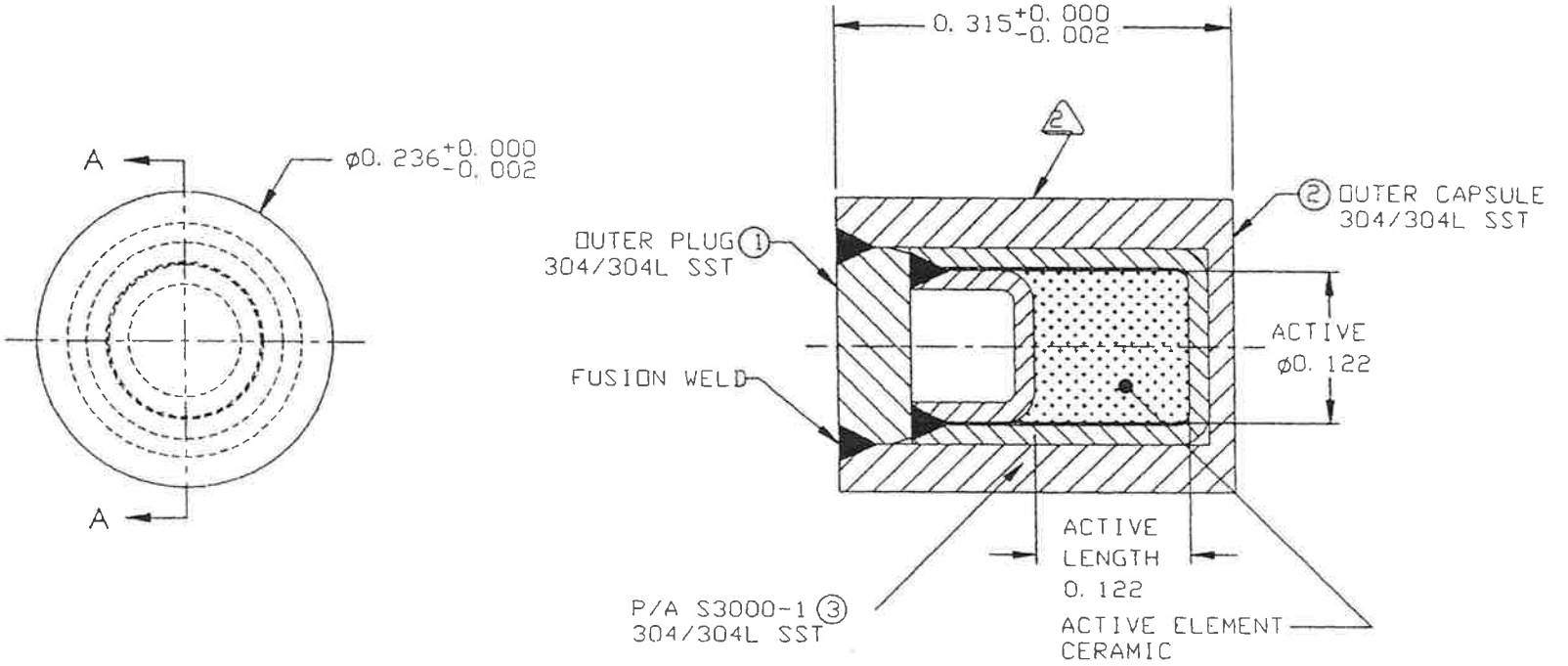
P/N A3015 ASSEMBLY

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

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
FRACTION ±1/64 | DECIMAL X ±.1, XX .01, XXX .002 | ANGLE ±.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

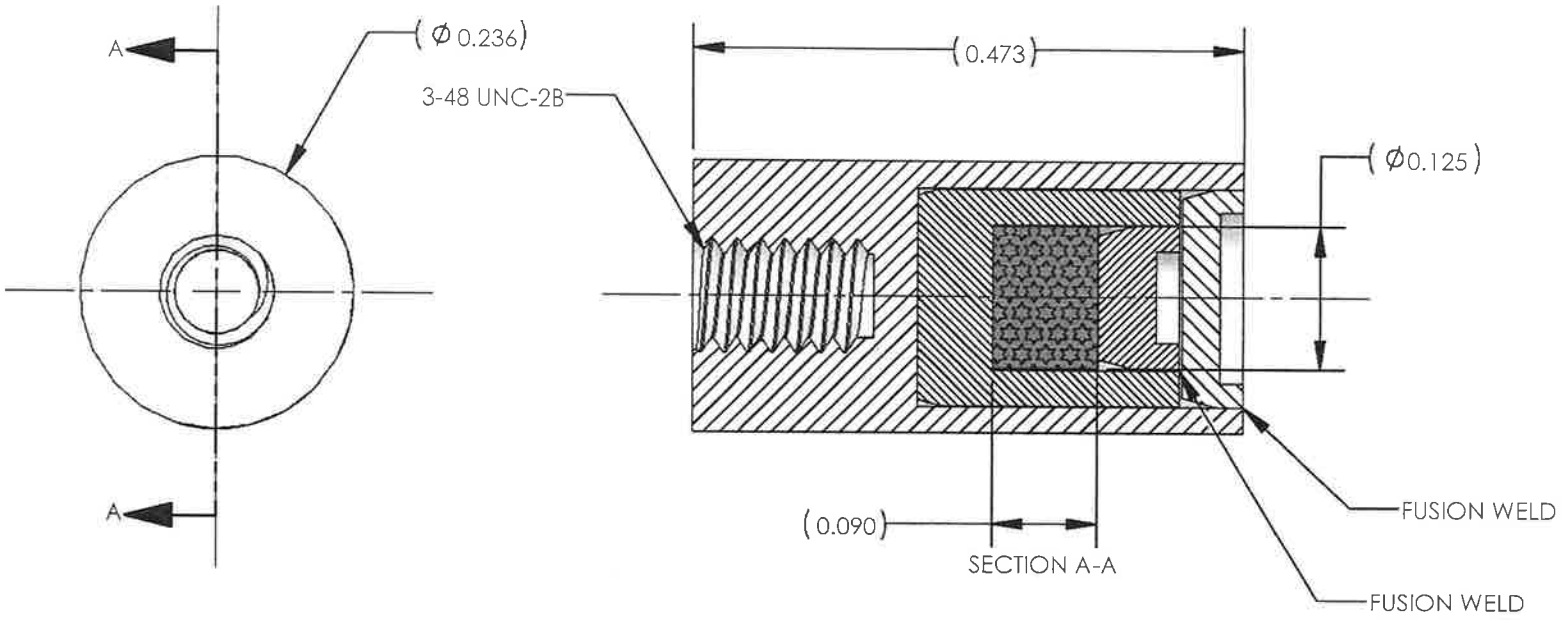
(2) ENGRAVE CHARACTERS 0.060 HIGH x 0.003 DEEP MAXIMUM AS SHOWN:
IPL NUCLIDE ACTIVITY SERIAL NUMBER

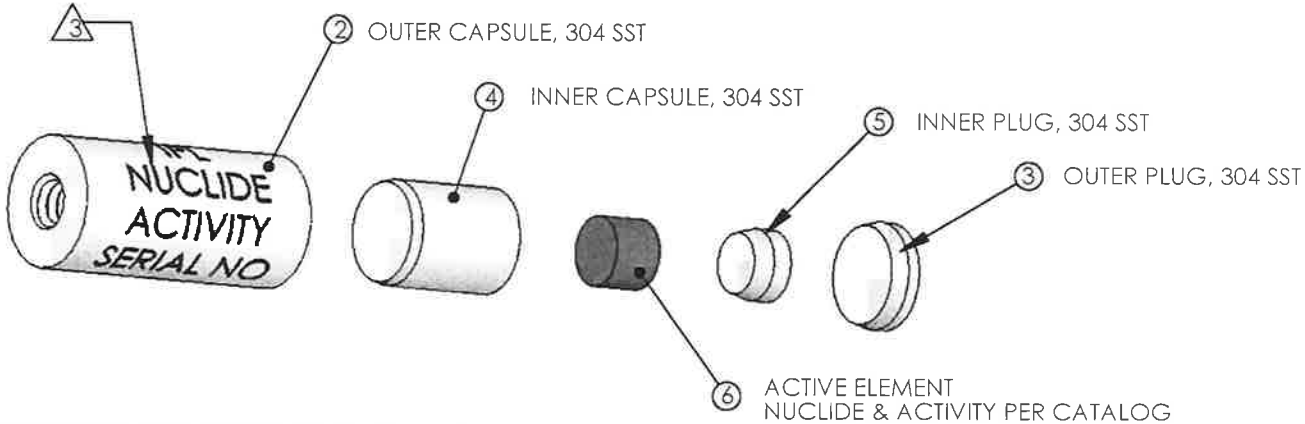
1. ASSEMBLE COMPLETE PER ENGINEERING DRAWING AND PER PROCEDURE

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

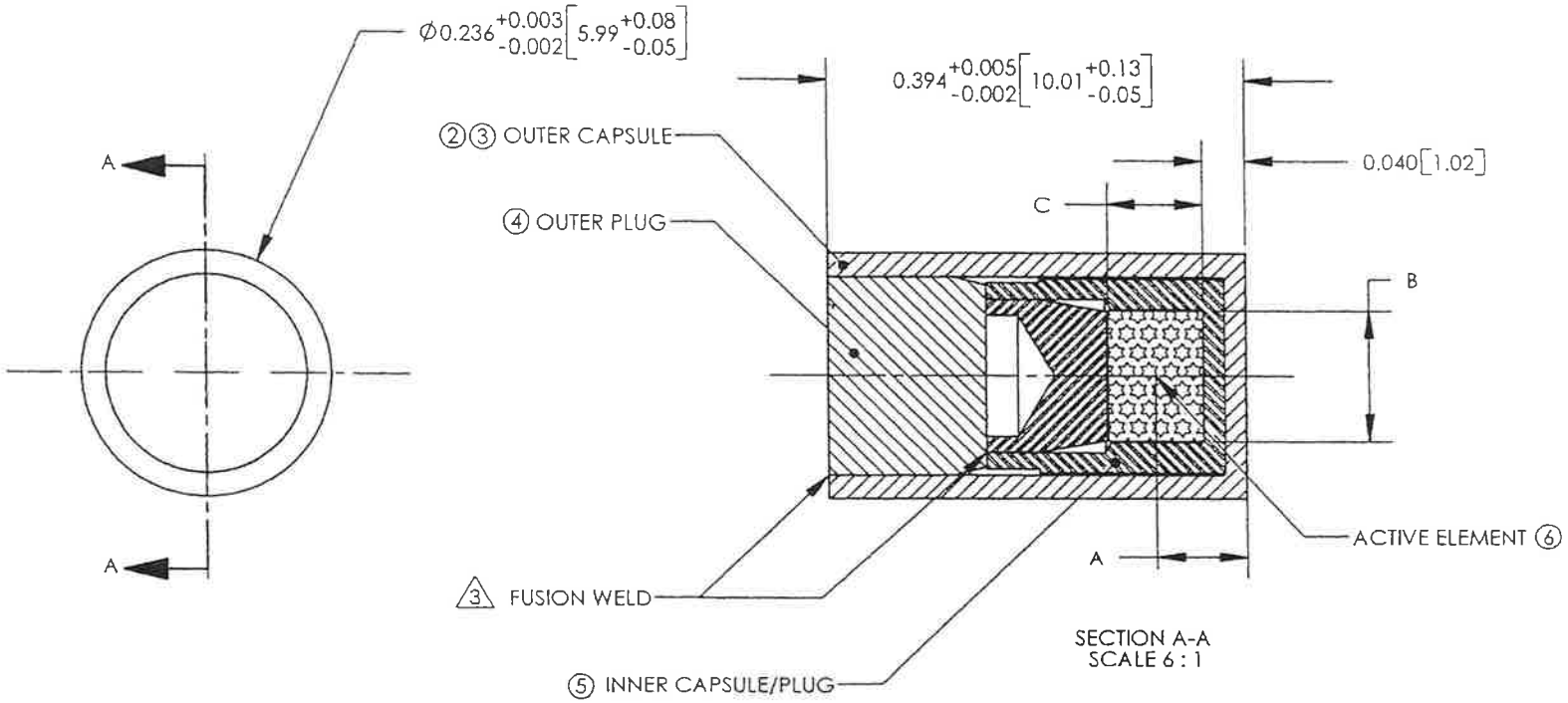
P/N A3023 GAMMA METRICS ASSEMBLY

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

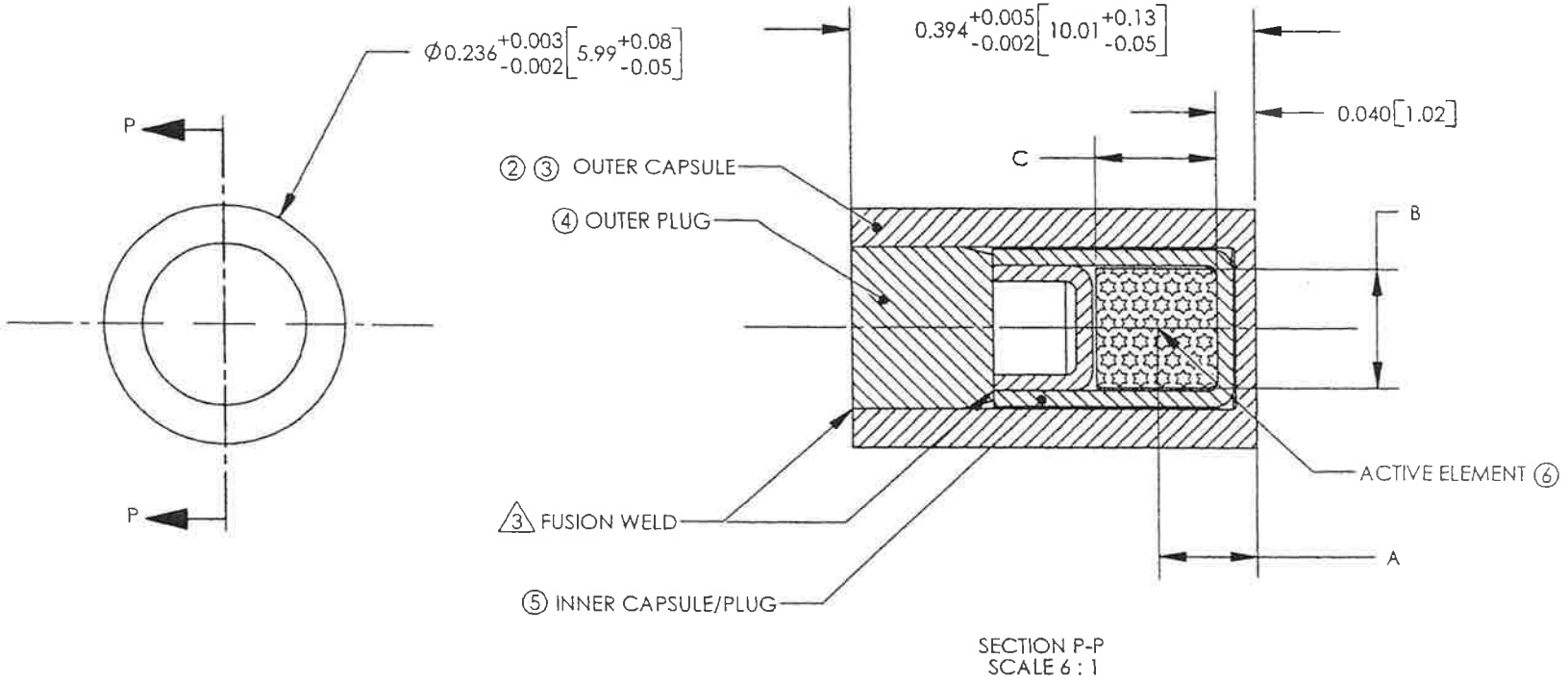
DRAWN	ME/CHECKER	ENGINEER
RLT	LF	RMD

TITLE: HEG SOURCE, 1cm LENGTH

SERIES TITLE: INDUSTRIAL SOURCES, HIGH INTENSITY GAMMA AND NEUTRON

SCALE	SIZE	CAGE CODE	DRAWING NO.	REV	SHEET
NONE	A	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 RLT
ME/CHECKER LF
ENGINEER RMD

TITLE: HEG SOURCE, 1cm LENGTH

SERIES TITLE: INDUSTRIAL SOURCES, HIGH INTENSITY GAMMA AND NEUTRON

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.


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

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

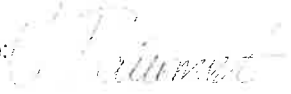
Kit #	Device SN	Source SN	Radioisotope	Gross CPM	Bq Value	Action Required
229052	10117	10117	Am-241/Be	27.1	< 0.2	None Required
		C-10117	Cs-137	33.5	< 1.0	None Required
229053	10348	10348	Am-241/Be	34.7	< 0.2	None Required
		C-10348	Cs-137	36.5	< 1.0	None Required
229054	MD10406117	06117	Am-241/Be	29.7	< 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. Source Material
2. Surficial Soil Sampling

Appendix C - Soil Quality Results - Source Material

Parameter	Units	MDL	Regulation		Sample			
					SS-A	SS-B	SS-1	SS-2
					OBH473	OBH474	OBH451	OBH452
Sample Date (m/d/y)			Reg 153/04 (2011)-Table 1 Agricultural	Reg 153/04 (2011)-Table 2 Agricultural	2-Nov-20	2-Nov-20	2-Nov-20	2-Nov-20
General Inorganics								
SAR	N/A	0.01	1	5	0.31	0.33	0.34	0.32
Conductivity	mS/cm	0.002	0.47 mS/cm	0.7 mS/cm	0.11	0.099	0.098	0.093
pH	pH Units	0.05			8.33	8.19	8.31	8.21
Metals								
Boron, available	ug/g dry	0.05	--	1.5 ug/g dry	0.069	<0.05	<0.05	<0.05
Antimony	ug/g dry	0.2	1 ug/g dry	7.5 ug/g dry	<0.2	<0.2	<0.2	<0.2
Arsenic	ug/g dry	1	11 ug/g dry	11 ug/g dry	2.5	3.4	1.7	2
Barium	ug/g dry	0.5	210 ug/g dry	390 ug/g dry	21	28	9.2	9.1
Beryllium	ug/g dry	0.2	2.5 ug/g dry	4 ug/g dry	0.2	0.31	<0.2	<0.2
Boron	ug/g dry	5	36 ug/g dry	120 ug/g dry	11	12	5.1	5.5
Cadmium	ug/g dry	0.1	1 ug/g dry	1 ug/g dry	<0.10	<0.10	<0.1	<0.1
Chromium	ug/g dry	1	67 ug/g dry	160 ug/g dry	8.8	13	5.8	5.8
Cobalt	ug/g dry	0.1	19 ug/g dry	22 ug/g dry	3.9	6.2	2.4	2.6
Copper	ug/g dry	0.5	62 ug/g dry	140 ug/g dry	9.4	19	8.4	7.6
Lead	ug/g dry	1	45 ug/g dry	45 ug/g dry	5.4	6.8	3	2.9
Mercury	ug/g dry	0.05	0.16 ug/g dry	0.25 ug/g dry	<0.05	<0.05	<0.05	<0.05
Molybdenum	ug/g dry	0.5	2 ug/g dry	6.9 ug/g dry	0.57	<0.50	<0.5	<0.5
Nickel	ug/g dry	0.5	37 ug/g dry	130 ug/g dry	9	16	5.3	4.9
Selenium	ug/g dry	0.5	1.2 ug/g dry	2.4 ug/g dry	<0.5	<0.5	<0.5	<0.5
Silver	ug/g dry	0.2	0.5 ug/g dry	25 ug/g dry	<0.2	<0.2	<0.2	<0.2
Thallium	ug/g dry	0.05	1 ug/g dry	1 ug/g dry	0.12	0.17	0.054	0.053
Uranium	ug/g dry	0.05	1.9 ug/g dry	23 ug/g dry	0.76	0.62	0.3	0.31
Vanadium	ug/g dry	5	86 ug/g dry	86 ug/g dry	12	18	9.5	10
Zinc	ug/g dry	5	290 ug/g dry	340 ug/g dry	19	34	12	12
Volatiles								
Acetone	ug/g dry	0.5	0.5 ug/g dry	28 ug/g dry	<0.5	<0.5	<0.5	<0.5
Benzene	ug/g dry	0.02	0.02 ug/g dry	0.17 ug/g dry	<0.02	<0.02	<0.02	<0.02
Bromodichloromethane	ug/g dry	0.05	0.05 ug/g dry	1.9 ug/g dry	<0.05	<0.05	<0.05	<0.05
Bromoform	ug/g dry	0.05	0.05 ug/g dry	0.26 ug/g dry	<0.05	<0.05	<0.05	<0.05
Bromomethane	ug/g dry	0.05	0.05 ug/g dry	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Carbon Tetrachloride	ug/g dry	0.05	0.05 ug/g dry	0.12 ug/g dry	<0.05	<0.05	<0.05	<0.05
Chlorobenzene	ug/g dry	0.05	0.05 ug/g dry	2.7 ug/g dry	<0.05	<0.05	<0.05	<0.05
Chloroform	ug/g dry	0.05	0.05 ug/g dry	0.18 ug/g dry	<0.05	<0.05	<0.05	<0.05
Dibromochloromethane	ug/g dry	0.05	0.05 ug/g dry	2.9 ug/g dry	<0.05	<0.05	<0.05	<0.05
Dichlorodifluoromethane	ug/g dry	0.05	0.05 ug/g dry	25 ug/g dry	<0.05	<0.05	<0.05	<0.05
1,2-Dichlorobenzene	ug/g dry	0.05	0.05 ug/g dry	1.7 ug/g dry	<0.05	<0.05	<0.05	<0.05
1,3-Dichlorobenzene	ug/g dry	0.05	0.05 ug/g dry	6 ug/g dry	<0.05	<0.05	<0.05	<0.05
1,4-Dichlorobenzene	ug/g dry	0.05	0.05 ug/g dry	0.097 ug/g dry	<0.05	<0.05	<0.05	<0.05
1,1-Dichloroethane	ug/g dry	0.05	0.05 ug/g dry	0.6 ug/g dry	<0.05	<0.05	<0.05	<0.05
1,2-Dichloroethane	ug/g dry	0.05	0.05 ug/g dry	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
1,1-Dichloroethylene	ug/g dry	0.05	0.05 ug/g dry	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
cis-1,2-Dichloroethylene	ug/g dry	0.05	0.05 ug/g dry	2.5 ug/g dry	<0.05	<0.05	<0.05	<0.05
trans-1,2-Dichloroethylene	ug/g dry	0.05	0.05 ug/g dry	0.75 ug/g dry	<0.05	<0.05	<0.05	<0.05
1,2-Dichloropropane	ug/g dry	0.05	0.05 ug/g dry	0.085 ug/g dry	<0.05	<0.05	<0.05	<0.05
cis-1,3-Dichloropropylene	ug/g dry	0.03	--	--	<0.03	<0.03	<0.03	<0.03
trans-1,3-Dichloropropylene	ug/g dry	0.04	--	--	<0.04	<0.04	<0.04	<0.04
1,3-Dichloropropene, total	ug/g dry	0.058	0.05 ug/g dry	0.081 ug/g dry	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	ug/g dry	0.02	0.05 ug/g dry	1.6 ug/g dry	<0.02	<0.02	<0.02	<0.02
Ethylene dibromide (dibromoethane, 1,2-)	ug/g dry	0.05	0.05 ug/g dry	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Hexane	ug/g dry	0.05	0.05 ug/g dry	34 ug/g dry	<0.05	<0.05	<0.05	<0.05
Methyl Ethyl Ketone (2-Butanone)	ug/g dry	0.5	0.5 ug/g dry	44 ug/g dry	<0.5	<0.5	<0.5	<0.5
Methyl Isobutyl Ketone	ug/g dry	0.5	0.5 ug/g dry	4.3 ug/g dry	<0.5	<0.5	<0.5	<0.5
Methyl tert-butyl ether	ug/g dry	0.05	0.05 ug/g dry	1.4 ug/g dry	<0.05	<0.05	<0.05	<0.05
Methylene Chloride	ug/g dry	0.05	0.05 ug/g dry	0.96 ug/g dry	<0.05	<0.05	<0.05	<0.05
Styrene	ug/g dry	0.05	0.05 ug/g dry	2.2 ug/g dry	<0.05	<0.05	<0.05	<0.05
1,1,1,2-Tetrachloroethane	ug/g dry	0.05	0.05 ug/g dry	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
1,1,2,2-Tetrachloroethane	ug/g dry	0.05	0.05 ug/g dry	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Tetrachloroethylene	ug/g dry	0.05	0.05 ug/g dry	2.3 ug/g dry	<0.05	<0.05	<0.05	<0.05
Toluene	ug/g dry	0.02	0.2 ug/g dry	6 ug/g dry	<0.02	<0.02	<0.02	<0.02
1,1,1-Trichloroethane	ug/g dry	0.05	0.05 ug/g dry	3.4 ug/g dry	<0.05	<0.05	<0.05	<0.05
1,1,2-Trichloroethane	ug/g dry	0.05	0.05 ug/g dry	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Trichloroethylene	ug/g dry	0.05	0.05 ug/g dry	0.52 ug/g dry	<0.05	<0.05	<0.05	<0.05
Trichlorofluoromethane	ug/g dry	0.05	0.05 ug/g dry	5.8 ug/g dry	<0.05	<0.05	<0.05	<0.05
Vinyl Chloride	ug/g dry	0.02	0.02 ug/g dry	0.022 ug/g dry	<0.02	<0.02	<0.02	<0.02
m/p-Xylene	ug/g dry	0.02	--	--	<0.02	<0.02	<0.02	<0.02
o-Xylene	ug/g dry	0.02	--	--	<0.02	<0.02	<0.02	<0.02
Xylenes, total	ug/g dry	0.02	0.05 ug/g dry	25 ug/g dry	<0.02	<0.02	<0.02	<0.02
Hydrocarbons								
F1 PHCs (C6-C10)	ug/g dry	10	17 ug/g dry	65 ug/g dry	<10	<10	<10	<10
F2 PHCs (C10-C16)	ug/g dry	10	10 ug/g dry	150 ug/g dry	<10	<10	<10	<10
F3 PHCs (C16-C34)	ug/g dry	10	240 ug/g dry	1300 ug/g dry	<10	<10	<10	<10
F4 PHCs (C34-C50)	ug/g dry	50	120 ug/g dry	5600 ug/g dry	<50	<50	<50	<50
Semi-Volatiles								
Acenaphthene	ug/g dry	0.005	0.05 ug/g dry	29 ug/g dry	--	--	<0.005	<0.005
Acenaphthylene	ug/g dry	0.005	0.093 ug/g dry	0.17 ug/g dry	--	--	<0.005	<0.005
Anthracene	ug/g dry	0.005	0.05 ug/g dry	0.74 ug/g dry	--	--	<0.005	<0.005
Benzo[a]anthracene	ug/g dry	0.005	0.095 ug/g dry	0.63 ug/g dry	--	--	<0.005	<0.005
Benzo[a]pyrene	ug/g dry	0.005	0.05 ug/g dry	0.078 ug/g dry	--	--	<0.005	<0.005
Benzo[b]fluoranthene	ug/g dry	0.005	0.3 ug/g dry	0.78 ug/g dry	--	--	<0.005	<0.005
Benzo[g,h,i]perylene	ug/g dry	0.005	0.2 ug/g dry	7.8 ug/g dry	--	--	<0.005	<0.005
Benzo[k]fluoranthene	ug/g dry	0.005	0.05 ug/g dry	0.78 ug/g dry	--	--	<0.005	<0.005
Chrysene	ug/g dry	0.005	0.18 ug/g dry	7.8 ug/g dry	--	--	<0.005	<0.005
Dibenzo[a,h]anthracene	ug/g dry	0.005	0.1 ug/g dry	0.1 ug/g dry	--	--	<0.005	<0.005
Fluoranthene	ug/g dry	0.005	0.24 ug/g dry	0.69 ug/g dry	--	--	<0.005	<0.005
Fluorene	ug/g dry	0.005	0.05 ug/g dry	69 ug/g dry	--	--	<0.005	<0.005
Indeno[1,2,3-cd]pyrene	ug/g dry	0.005	0.11 ug/g dry	0.48 ug/g dry	--	--	<0.005	<0.005
1-Methylnaphthalene	ug/g dry	0.005	0.05 ug/g dry	3.4 ug/g dry	--	--	<0.005	<0.005
2-Methylnaphthalene	ug/g dry	0.005	0.05 ug/g dry	3.4 ug/g dry	--	--	<0.005	<0.005
Methylnaphthalene (1&2)	ug/g dry	0.05	0.05 ug/g dry	3.4 ug/g dry	--	--	<0.0071	<0.0071
Naphthalene	ug/g dry	0.005	0.05 ug/g dry	0.75 ug/g dry	--	--	<0.005	<0.005
Phenanthrene	ug/g dry	0.005	0.19 ug/g dry	7.8 ug/g dry	--	--	<0.005	<0.005
Pyrene	ug/g dry	0.005	0.19 ug/g dry	78 ug/g dry	--	--	<0.005	<0.005

Notes:

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

Appendix C - Surficial Soil Quality Results - SB BH01 Access Road

Parameter	Units	MDL		Sample					
				SS21-01	SS21-02	SS21-2 Follow-Up	SS21-03	SS21-04	SS21-05
Sample Date (m/d/y)			Reg 153/04 (2011)- Table 2 Agricultural, coarse	8-Apr-21	8-Apr-21	14-Apr-21	8-Apr-21	8-Apr-21	8-Apr-21
Metals									
Antimony	ug/g dry	1	7.5 ug/g dry	--	--	--	--	--	--
Arsenic	ug/g dry	1	11 ug/g dry	--	--	--	--	--	--
Barium	ug/g dry	1	390 ug/g dry	--	--	--	--	--	--
Beryllium	ug/g dry	0.5	4 ug/g dry	--	--	--	--	--	--
Boron	ug/g dry	5	120 ug/g dry	--	--	--	--	--	--
Cadmium	ug/g dry	0.5	1 ug/g dry	--	--	--	--	--	--
Chromium	ug/g dry	5	160 ug/g dry	--	--	--	--	--	--
Cobalt	ug/g dry	1	22 ug/g dry	--	--	--	--	--	--
Copper	ug/g dry	5	140 ug/g dry	--	--	--	--	--	--
Lead	ug/g dry	1	45 ug/g dry	--	--	--	--	--	--
Molybdenum	ug/g dry	1	6.9 ug/g dry	--	--	--	--	--	--
Nickel	ug/g dry	5	100 ug/g dry	--	--	--	--	--	--
Selenium	ug/g dry	1	2.4 ug/g dry	--	--	--	--	--	--
Silver	ug/g dry	0.3	20 ug/g dry	--	--	--	--	--	--
Thallium	ug/g dry	1	1 ug/g dry	--	--	--	--	--	--
Uranium	ug/g dry	1	23 ug/g dry	--	--	--	--	--	--
Vanadium	ug/g dry	10	86 ug/g dry	--	--	--	--	--	--
Zinc	ug/g dry	20	340 ug/g dry	--	--	--	--	--	--
Volatiles									
Acetone	ug/g dry	0.5	16 ug/g dry	<0.50	<0.50	--	<0.50	<0.50	<0.50
Benzene	ug/g dry	0.02	0.21 ug/g dry	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Bromodichloromethane	ug/g dry	0.05	1.5 ug/g dry	<0.05	<0.05	--	<0.05	<0.05	<0.05
Bromoform	ug/g dry	0.05	0.27 ug/g dry	<0.05	<0.05	--	<0.05	<0.05	<0.05
Bromomethane	ug/g dry	0.05	0.05 ug/g dry	<0.05	<0.05	--	<0.05	<0.05	<0.05
Carbon Tetrachloride	ug/g dry	0.05	0.05 ug/g dry	<0.05	<0.05	--	<0.05	<0.05	<0.05
Chlorobenzene	ug/g dry	0.05	2.4 ug/g dry	<0.05	<0.05	--	<0.05	<0.05	<0.05
Chloroform	ug/g dry	0.05	0.05 ug/g dry	<0.05	<0.05	--	<0.05	<0.05	<0.05
Dibromochloromethane	ug/g dry	0.05	2.3 ug/g dry	<0.05	<0.05	--	<0.05	<0.05	<0.05
Dichlorodifluoromethane	ug/g dry	0.05	16 ug/g dry	<0.05	<0.05	--	<0.05	<0.05	<0.05
1,2-Dichlorobenzene	ug/g dry	0.05	1.2 ug/g dry	<0.05	<0.05	--	<0.05	<0.05	<0.05
1,3-Dichlorobenzene	ug/g dry	0.05	4.8 ug/g dry	<0.05	<0.05	--	<0.05	<0.05	<0.05
1,4-Dichlorobenzene	ug/g dry	0.05	0.083 ug/g dry	<0.05	<0.05	--	<0.05	<0.05	<0.05
1,1-Dichloroethane	ug/g dry	0.05	0.47 ug/g dry	<0.05	<0.05	--	<0.05	<0.05	<0.05
1,2-Dichloroethane	ug/g dry	0.05	0.05 ug/g dry	<0.05	<0.05	--	<0.05	<0.05	<0.05
1,1-Dichloroethylene	ug/g dry	0.05	0.05 ug/g dry	<0.05	<0.05	--	<0.05	<0.05	<0.05
cis-1,2-Dichloroethylene	ug/g dry	0.05	1.9 ug/g dry	<0.05	<0.05	--	<0.05	<0.05	<0.05
trans-1,2-Dichloroethylene	ug/g dry	0.05	0.084 ug/g dry	<0.05	<0.05	--	<0.05	<0.05	<0.05
1,2-Dichloropropane	ug/g dry	0.05	0.05 ug/g dry	<0.05	<0.05	--	<0.05	<0.05	<0.05
cis-1,3-Dichloropropylene	ug/g dry	0.05	NV	<0.05	<0.05	--	<0.05	<0.05	<0.05
trans-1,3-Dichloropropylene	ug/g dry	0.05	NV	<0.05	<0.05	--	<0.05	<0.05	<0.05
1,3-Dichloropropene, total	ug/g dry	0.05	0.05 ug/g dry	<0.05	<0.05	--	<0.05	<0.05	<0.05
Ethylbenzene	ug/g dry	0.05	1.1 ug/g dry	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Ethylene dibromide (dibromoethane, 1,2-)	ug/g dry	0.05	0.05 ug/g dry	<0.05	<0.05	--	<0.05	<0.05	<0.05
Hexane	ug/g dry	0.05	2.8 ug/g dry	<0.05	<0.05	--	<0.05	<0.05	<0.05
Methyl Ethyl Ketone (2-Butanone)	ug/g dry	0.5	16 ug/g dry	<0.50	<0.50	--	<0.50	<0.50	<0.50
Methyl Isobutyl Ketone	ug/g dry	0.5	1.7 ug/g dry	<0.50	<0.50	--	<0.50	<0.50	<0.50
Methyl tert-butyl ether	ug/g dry	0.05	0.75 ug/g dry	<0.05	<0.05	--	<0.05	<0.05	<0.05
Methylene Chloride	ug/g dry	0.05	0.1 ug/g dry	<0.05	<0.05	--	<0.05	<0.05	<0.05
Styrene	ug/g dry	0.05	0.7 ug/g dry	<0.05	<0.05	--	<0.05	<0.05	<0.05
1,1,1,2-Tetrachloroethane	ug/g dry	0.05	0.058 ug/g dry	<0.05	<0.05	--	<0.05	<0.05	<0.05
1,1,2,2-Tetrachloroethane	ug/g dry	0.05	0.05 ug/g dry	<0.05	<0.05	--	<0.05	<0.05	<0.05
Tetrachloroethylene	ug/g dry	0.05	0.28 ug/g dry	<0.05	<0.05	--	<0.05	<0.05	<0.05
Toluene	ug/g dry	0.05	2.3 ug/g dry	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
1,1,1-Trichloroethane	ug/g dry	0.05	0.38 ug/g dry	<0.05	<0.05	--	<0.05	<0.05	<0.05
1,1,2-Trichloroethane	ug/g dry	0.05	0.05 ug/g dry	<0.05	<0.05	--	<0.05	<0.05	<0.05
Trichloroethylene	ug/g dry	0.05	0.061 ug/g dry	<0.05	<0.05	--	<0.05	<0.05	<0.05
Trichlorofluoromethane	ug/g dry	0.05	4 ug/g dry	<0.05	<0.05	--	<0.05	<0.05	<0.05
Vinyl Chloride	ug/g dry	0.02	0.02 ug/g dry	<0.02	<0.02	--	<0.02	<0.02	<0.02
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	7	<4
F3 PHCs (C16-C34)	ug/g dry	8	300 ug/g dry	34	**3310**	223	53	52	15
F4 PHCs (C34-C50)	ug/g dry	6	2800 ug/g dry	19	1580	126	73	26	8

Notes:

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

Appendix D

Certificates of Analysis

1. Bureau Veritas
2. Paracel Laboratories

Your Project #: 216433-1
Site Location: 341416 CON.RD.2, HANOVER, ON
Your C.O.C. #: N/A

Attention: Reporting Contacts

GM BluePlan Engineering Limited
1260 - 2nd Ave E
Unit 1
Owen Sound, ON
CANADA N4K 2J3

Report Date: 2020/11/10
Report #: R6406022
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C0T1006
Received: 2020/11/03, 09:22

Sample Matrix: Soil
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Methylnaphthalene Sum	2	N/A	2020/11/06	CAM SOP-00301	EPA 8270D m
Hot Water Extractable Boron	2	2020/11/06	2020/11/06	CAM SOP-00408	R153 Ana. Prot. 2011
1,3-Dichloropropene Sum	2	N/A	2020/11/05		EPA 8260C m
Free (WAD) Cyanide	2	2020/11/04	2020/11/05	CAM SOP-00457	OMOE E3015 m
Conductivity	2	2020/11/06	2020/11/06	CAM SOP-00414	OMOE E3530 v1 m
Hexavalent Chromium in Soil by IC (1)	2	2020/11/05	2020/11/06	CAM SOP-00436	EPA 3060/7199 m
Petroleum Hydrocarbons F2-F4 in Soil (2)	2	2020/11/05	2020/11/05	CAM SOP-00316	CCME CWS m
Strong Acid Leachable Metals by ICPMS	2	2020/11/05	2020/11/05	CAM SOP-00447	EPA 6020B m
Moisture	2	N/A	2020/11/04	CAM SOP-00445	Carter 2nd ed 51.2 m
PAH Compounds in Soil by GC/MS (SIM)	2	2020/11/05	2020/11/06	CAM SOP-00318	EPA 8270D m
pH CaCl2 EXTRACT	2	2020/11/06	2020/11/06	CAM SOP-00413	EPA 9045 D m
Sodium Adsorption Ratio (SAR)	2	N/A	2020/11/09	CAM SOP-00102	EPA 6010C
Volatile Organic Compounds and F1 PHCs	2	N/A	2020/11/05	CAM SOP-00230	EPA 8260C m

Remarks:

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

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

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

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.

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

Your Project #: 216433-1
Site Location: 341416 CON.RD.2, HANOVER, ON
Your C.O.C. #: N/A

Attention: Reporting Contacts

GM BluePlan Engineering Limited
1260 - 2nd Ave E
Unit 1
Owen Sound, ON
CANADA N4K 2J3

Report Date: 2020/11/10
Report #: R6406022
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C0T1006
Received: 2020/11/03, 09:22

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

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

(1) Soils are reported on a dry weight basis unless otherwise specified.

(2) All CCME PHC results met required criteria unless otherwise stated in the report. The CWS PHC methods employed by Bureau Veritas Laboratories conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following "Alberta Environment's Interpretation of the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil Validation of Performance-Based Alternative Methods September 2003". Documentation is available upon request. Modifications from Reference Method for the Canada-wide Standard for Petroleum Hydrocarbons in Soil-Tier 1 Method: F2/F3/F4 data reported using validated cold solvent extraction instead of Soxhlet extraction.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Ashton Gibson, Project Manager
Email: Ashton.Gibson@bvlabs.com
Phone# (905)817-5765

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This report has been generated and distributed using a secure automated process.
BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

BV Labs Job #: C0T1006
Report Date: 2020/11/10

GM BluePlan Engineering Limited
Client Project #: 216433-1
Site Location: 341416 CON.RD.2, HANOVER, ON
Sampler Initials: AE

O.REG 153 METALS & INORGANICS PKG (SOIL)

BV Labs ID		OBH451	OBH452		
Sampling Date		2020/11/02	2020/11/02		
COC Number		N/A	N/A		
	UNITS	SS-1	SS-2	RDL	QC Batch
Calculated Parameters					
Sodium Adsorption Ratio	N/A	0.34 (1)	0.32 (1)		7035876
Inorganics					
Conductivity	mS/cm	0.098	0.093	0.002	7042009
Available (CaCl2) pH	pH	8.31	8.21		7042087
WAD Cyanide (Free)	ug/g	<0.01	<0.01	0.01	7038918
Chromium (VI)	ug/g	<0.18	<0.18	0.18	7039380
Metals					
Hot Water Ext. Boron (B)	ug/g	<0.050	<0.050	0.050	7041995
Acid Extractable Antimony (Sb)	ug/g	<0.20	<0.20	0.20	7040099
Acid Extractable Arsenic (As)	ug/g	1.7	2.0	1.0	7040099
Acid Extractable Barium (Ba)	ug/g	9.2	9.1	0.50	7040099
Acid Extractable Beryllium (Be)	ug/g	<0.20	<0.20	0.20	7040099
Acid Extractable Boron (B)	ug/g	5.1	5.5	5.0	7040099
Acid Extractable Cadmium (Cd)	ug/g	<0.10	<0.10	0.10	7040099
Acid Extractable Chromium (Cr)	ug/g	5.8	5.8	1.0	7040099
Acid Extractable Cobalt (Co)	ug/g	2.4	2.6	0.10	7040099
Acid Extractable Copper (Cu)	ug/g	8.4	7.6	0.50	7040099
Acid Extractable Lead (Pb)	ug/g	3.0	2.9	1.0	7040099
Acid Extractable Molybdenum (Mo)	ug/g	<0.50	<0.50	0.50	7040099
Acid Extractable Nickel (Ni)	ug/g	5.3	4.9	0.50	7040099
Acid Extractable Selenium (Se)	ug/g	<0.50	<0.50	0.50	7040099
Acid Extractable Silver (Ag)	ug/g	<0.20	<0.20	0.20	7040099
Acid Extractable Thallium (Tl)	ug/g	0.054	0.053	0.050	7040099
Acid Extractable Uranium (U)	ug/g	0.30	0.31	0.050	7040099
Acid Extractable Vanadium (V)	ug/g	9.5	10	5.0	7040099
Acid Extractable Zinc (Zn)	ug/g	12	12	5.0	7040099
Acid Extractable Mercury (Hg)	ug/g	<0.050	<0.050	0.050	7040099

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) Sodium was not detected. To report SAR the sodium detection limit was used in the calculation. This value represents a maximum ratio.

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O.REG 153 PAHS (SOIL)

BV Labs ID		OBH451	OBH452		
Sampling Date		2020/11/02	2020/11/02		
COC Number		N/A	N/A		
	UNITS	SS-1	SS-2	RDL	QC Batch
Calculated Parameters					
Methylnaphthalene, 2-(1-)	ug/g	<0.0071	<0.0071	0.0071	7035936
Polyaromatic Hydrocarbons					
Acenaphthene	ug/g	<0.0050	<0.0050	0.0050	7039618
Acenaphthylene	ug/g	<0.0050	<0.0050	0.0050	7039618
Anthracene	ug/g	<0.0050	<0.0050	0.0050	7039618
Benzo(a)anthracene	ug/g	<0.0050	<0.0050	0.0050	7039618
Benzo(a)pyrene	ug/g	<0.0050	<0.0050	0.0050	7039618
Benzo(b/j)fluoranthene	ug/g	<0.0050	<0.0050	0.0050	7039618
Benzo(g,h,i)perylene	ug/g	<0.0050	<0.0050	0.0050	7039618
Benzo(k)fluoranthene	ug/g	<0.0050	<0.0050	0.0050	7039618
Chrysene	ug/g	<0.0050	<0.0050	0.0050	7039618
Dibenzo(a,h)anthracene	ug/g	<0.0050	<0.0050	0.0050	7039618
Fluoranthene	ug/g	<0.0050	<0.0050	0.0050	7039618
Fluorene	ug/g	<0.0050	<0.0050	0.0050	7039618
Indeno(1,2,3-cd)pyrene	ug/g	<0.0050	<0.0050	0.0050	7039618
1-Methylnaphthalene	ug/g	<0.0050	<0.0050	0.0050	7039618
2-Methylnaphthalene	ug/g	<0.0050	<0.0050	0.0050	7039618
Naphthalene	ug/g	<0.0050	<0.0050	0.0050	7039618
Phenanthrene	ug/g	<0.0050	<0.0050	0.0050	7039618
Pyrene	ug/g	<0.0050	<0.0050	0.0050	7039618
Surrogate Recovery (%)					
D10-Anthracene	%	102	101		7039618
D14-Terphenyl (FS)	%	87	86		7039618
D8-Acenaphthylene	%	87	88		7039618

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

O.REG 153 VOCS BY HS & F1-F4 (SOIL)

BV Labs ID		OBH451	OBH452		
Sampling Date		2020/11/02	2020/11/02		
COC Number		N/A	N/A		
	UNITS	SS-1	SS-2	RDL	QC Batch
Inorganics					
Moisture	%	5.8	8.1	1.0	7037711
Calculated Parameters					
1,3-Dichloropropene (cis+trans)	ug/g	<0.050	<0.050	0.050	7036367
Volatile Organics					
Acetone (2-Propanone)	ug/g	<0.50	<0.50	0.50	7037996
Benzene	ug/g	<0.020	<0.020	0.020	7037996
Bromodichloromethane	ug/g	<0.050	<0.050	0.050	7037996
Bromoform	ug/g	<0.050	<0.050	0.050	7037996
Bromomethane	ug/g	<0.050	<0.050	0.050	7037996
Carbon Tetrachloride	ug/g	<0.050	<0.050	0.050	7037996
Chlorobenzene	ug/g	<0.050	<0.050	0.050	7037996
Chloroform	ug/g	<0.050	<0.050	0.050	7037996
Dibromochloromethane	ug/g	<0.050	<0.050	0.050	7037996
1,2-Dichlorobenzene	ug/g	<0.050	<0.050	0.050	7037996
1,3-Dichlorobenzene	ug/g	<0.050	<0.050	0.050	7037996
1,4-Dichlorobenzene	ug/g	<0.050	<0.050	0.050	7037996
Dichlorodifluoromethane (FREON 12)	ug/g	<0.050	<0.050	0.050	7037996
1,1-Dichloroethane	ug/g	<0.050	<0.050	0.050	7037996
1,2-Dichloroethane	ug/g	<0.050	<0.050	0.050	7037996
1,1-Dichloroethylene	ug/g	<0.050	<0.050	0.050	7037996
cis-1,2-Dichloroethylene	ug/g	<0.050	<0.050	0.050	7037996
trans-1,2-Dichloroethylene	ug/g	<0.050	<0.050	0.050	7037996
1,2-Dichloropropane	ug/g	<0.050	<0.050	0.050	7037996
cis-1,3-Dichloropropene	ug/g	<0.030	<0.030	0.030	7037996
trans-1,3-Dichloropropene	ug/g	<0.040	<0.040	0.040	7037996
Ethylbenzene	ug/g	<0.020	<0.020	0.020	7037996
Ethylene Dibromide	ug/g	<0.050	<0.050	0.050	7037996
Hexane	ug/g	<0.050	<0.050	0.050	7037996
Methylene Chloride(Dichloromethane)	ug/g	<0.050	<0.050	0.050	7037996
Methyl Ethyl Ketone (2-Butanone)	ug/g	<0.50	<0.50	0.50	7037996
Methyl Isobutyl Ketone	ug/g	<0.50	<0.50	0.50	7037996
Methyl t-butyl ether (MTBE)	ug/g	<0.050	<0.050	0.050	7037996
Styrene	ug/g	<0.050	<0.050	0.050	7037996
1,1,1,2-Tetrachloroethane	ug/g	<0.050	<0.050	0.050	7037996

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

O.REG 153 VOCS BY HS & F1-F4 (SOIL)

BV Labs ID		OBH451	OBH452		
Sampling Date		2020/11/02	2020/11/02		
COC Number		N/A	N/A		
	UNITS	SS-1	SS-2	RDL	QC Batch
1,1,2,2-Tetrachloroethane	ug/g	<0.050	<0.050	0.050	7037996
Tetrachloroethylene	ug/g	<0.050	<0.050	0.050	7037996
Toluene	ug/g	<0.020	<0.020	0.020	7037996
1,1,1-Trichloroethane	ug/g	<0.050	<0.050	0.050	7037996
1,1,2-Trichloroethane	ug/g	<0.050	<0.050	0.050	7037996
Trichloroethylene	ug/g	<0.050	<0.050	0.050	7037996
Trichlorofluoromethane (FREON 11)	ug/g	<0.050	<0.050	0.050	7037996
Vinyl Chloride	ug/g	<0.020	<0.020	0.020	7037996
p+m-Xylene	ug/g	<0.020	<0.020	0.020	7037996
o-Xylene	ug/g	<0.020	<0.020	0.020	7037996
Total Xylenes	ug/g	<0.020	<0.020	0.020	7037996
F1 (C6-C10)	ug/g	<10	<10	10	7037996
F1 (C6-C10) - BTEX	ug/g	<10	<10	10	7037996
F2-F4 Hydrocarbons					
F2 (C10-C16 Hydrocarbons)	ug/g	<10	<10	10	7039614
F3 (C16-C34 Hydrocarbons)	ug/g	<50	<50	50	7039614
F4 (C34-C50 Hydrocarbons)	ug/g	<50	<50	50	7039614
Reached Baseline at C50	ug/g	Yes	Yes		7039614
Surrogate Recovery (%)					
o-Terphenyl	%	89	90		7039614
4-Bromofluorobenzene	%	92	93		7037996
D10-o-Xylene	%	93	95		7037996
D4-1,2-Dichloroethane	%	98	102		7037996
D8-Toluene	%	102	103		7037996

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

BV Labs Job #: C0T1006
Report Date: 2020/11/10

GM BluePlan Engineering Limited
Client Project #: 216433-1
Site Location: 341416 CON.RD.2, HANOVER, ON
Sampler Initials: AE

TEST SUMMARY

BV Labs ID: OBH451
Sample ID: SS-1
Matrix: Soil

Collected: 2020/11/02
Shipped:
Received: 2020/11/03

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	7035936	N/A	2020/11/06	Automated Statchk
Hot Water Extractable Boron	ICP	7041995	2020/11/06	2020/11/06	Jolly John
1,3-Dichloropropene Sum	CALC	7036367	N/A	2020/11/05	Automated Statchk
Free (WAD) Cyanide	TECH	7038918	2020/11/04	2020/11/05	Gnana Thomas
Conductivity	AT	7042009	2020/11/06	2020/11/06	Neil Dassanayake
Hexavalent Chromium in Soil by IC	IC/SPEC	7039380	2020/11/05	2020/11/06	Violeta Porcila
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	7039614	2020/11/05	2020/11/05	Anna Stuglik Rolland
Strong Acid Leachable Metals by ICPMS	ICP/MS	7040099	2020/11/05	2020/11/05	Azita Fazaeli
Moisture	BAL	7037711	N/A	2020/11/04	Gurpreet Kaur (ONT)
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	7039618	2020/11/05	2020/11/06	Mitesh Raj
pH CaCl2 EXTRACT	AT	7042087	2020/11/06	2020/11/06	Surinder Rai
Sodium Adsorption Ratio (SAR)	CALC/MET	7035876	N/A	2020/11/09	Automated Statchk
Volatile Organic Compounds and F1 PHCs	GC/MSFD	7037996	N/A	2020/11/05	Denis Reid

BV Labs ID: OBH452
Sample ID: SS-2
Matrix: Soil

Collected: 2020/11/02
Shipped:
Received: 2020/11/03

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	7035936	N/A	2020/11/06	Automated Statchk
Hot Water Extractable Boron	ICP	7041995	2020/11/06	2020/11/06	Jolly John
1,3-Dichloropropene Sum	CALC	7036367	N/A	2020/11/05	Automated Statchk
Free (WAD) Cyanide	TECH	7038918	2020/11/04	2020/11/05	Gnana Thomas
Conductivity	AT	7042009	2020/11/06	2020/11/06	Neil Dassanayake
Hexavalent Chromium in Soil by IC	IC/SPEC	7039380	2020/11/05	2020/11/06	Violeta Porcila
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	7039614	2020/11/05	2020/11/05	Anna Stuglik Rolland
Strong Acid Leachable Metals by ICPMS	ICP/MS	7040099	2020/11/05	2020/11/05	Azita Fazaeli
Moisture	BAL	7037711	N/A	2020/11/04	Gurpreet Kaur (ONT)
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	7039618	2020/11/05	2020/11/06	Mitesh Raj
pH CaCl2 EXTRACT	AT	7042087	2020/11/06	2020/11/06	Surinder Rai
Sodium Adsorption Ratio (SAR)	CALC/MET	7035876	N/A	2020/11/09	Automated Statchk
Volatile Organic Compounds and F1 PHCs	GC/MSFD	7037996	N/A	2020/11/05	Denis Reid

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

GENERAL COMMENTS

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
7037996	4-Bromofluorobenzene	2020/11/04	95	60 - 140	95	60 - 140	93	%		
7037996	D10-o-Xylene	2020/11/04	97	60 - 130	101	60 - 130	94	%		
7037996	D4-1,2-Dichloroethane	2020/11/04	97	60 - 140	97	60 - 140	95	%		
7037996	D8-Toluene	2020/11/04	108	60 - 140	105	60 - 140	102	%		
7039614	o-Terphenyl	2020/11/05	88	60 - 130	91	60 - 130	94	%		
7039618	D10-Anthracene	2020/11/05	99	50 - 130	101	50 - 130	104	%		
7039618	D14-Terphenyl (FS)	2020/11/05	91	50 - 130	91	50 - 130	90	%		
7039618	D8-Acenaphthylene	2020/11/05	89	50 - 130	90	50 - 130	90	%		
7037711	Moisture	2020/11/04							4.1	20
7037996	1,1,1,2-Tetrachloroethane	2020/11/05	116	60 - 140	114	60 - 130	<0.050	ug/g	NC	50
7037996	1,1,1-Trichloroethane	2020/11/05	93	60 - 140	92	60 - 130	<0.050	ug/g	NC	50
7037996	1,1,2,2-Tetrachloroethane	2020/11/05	102	60 - 140	103	60 - 130	<0.050	ug/g	NC	50
7037996	1,1,2-Trichloroethane	2020/11/05	103	60 - 140	100	60 - 130	<0.050	ug/g	NC	50
7037996	1,1-Dichloroethane	2020/11/05	93	60 - 140	93	60 - 130	<0.050	ug/g	NC	50
7037996	1,1-Dichloroethylene	2020/11/05	96	60 - 140	96	60 - 130	<0.050	ug/g	NC	50
7037996	1,2-Dichlorobenzene	2020/11/05	98	60 - 140	95	60 - 130	<0.050	ug/g	NC	50
7037996	1,2-Dichloroethane	2020/11/05	85	60 - 140	85	60 - 130	<0.050	ug/g	NC	50
7037996	1,2-Dichloropropane	2020/11/05	97	60 - 140	96	60 - 130	<0.050	ug/g	NC	50
7037996	1,3-Dichlorobenzene	2020/11/05	94	60 - 140	91	60 - 130	<0.050	ug/g	NC	50
7037996	1,4-Dichlorobenzene	2020/11/05	115	60 - 140	112	60 - 130	<0.050	ug/g	NC	50
7037996	Acetone (2-Propanone)	2020/11/05	96	60 - 140	117	60 - 140	<0.50	ug/g	NC	50
7037996	Benzene	2020/11/05	89	60 - 140	88	60 - 130	<0.020	ug/g	NC	50
7037996	Bromodichloromethane	2020/11/05	102	60 - 140	101	60 - 130	<0.050	ug/g	NC	50
7037996	Bromoform	2020/11/05	126	60 - 140	126	60 - 130	<0.050	ug/g	NC	50
7037996	Bromomethane	2020/11/05	97	60 - 140	97	60 - 140	<0.050	ug/g	NC	50
7037996	Carbon Tetrachloride	2020/11/05	101	60 - 140	100	60 - 130	<0.050	ug/g	NC	50
7037996	Chlorobenzene	2020/11/05	96	60 - 140	94	60 - 130	<0.050	ug/g	NC	50
7037996	Chloroform	2020/11/05	92	60 - 140	91	60 - 130	<0.050	ug/g	NC	50
7037996	cis-1,2-Dichloroethylene	2020/11/05	95	60 - 140	95	60 - 130	<0.050	ug/g	NC	50
7037996	cis-1,3-Dichloropropene	2020/11/05	91	60 - 140	90	60 - 130	<0.030	ug/g	NC	50
7037996	Dibromochloromethane	2020/11/05	117	60 - 140	115	60 - 130	<0.050	ug/g	NC	50

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
7037996	Dichlorodifluoromethane (FREON 12)	2020/11/05	79	60 - 140	78	60 - 140	<0.050	ug/g	NC	50
7037996	Ethylbenzene	2020/11/05	93	60 - 140	91	60 - 130	<0.020	ug/g	NC	50
7037996	Ethylene Dibromide	2020/11/05	97	60 - 140	95	60 - 130	<0.050	ug/g	NC	50
7037996	F1 (C6-C10) - BTEX	2020/11/05					<10	ug/g	NC	30
7037996	F1 (C6-C10)	2020/11/05	96	60 - 140	95	80 - 120	<10	ug/g	NC	30
7037996	Hexane	2020/11/05	96	60 - 140	96	60 - 130	<0.050	ug/g	NC	50
7037996	Methyl Ethyl Ketone (2-Butanone)	2020/11/05	99	60 - 140	114	60 - 140	<0.50	ug/g	NC	50
7037996	Methyl Isobutyl Ketone	2020/11/05	92	60 - 140	97	60 - 130	<0.50	ug/g	NC	50
7037996	Methyl t-butyl ether (MTBE)	2020/11/05	87	60 - 140	88	60 - 130	<0.050	ug/g	NC	50
7037996	Methylene Chloride(Dichloromethane)	2020/11/05	100	60 - 140	100	60 - 130	<0.050	ug/g	NC	50
7037996	o-Xylene	2020/11/05	91	60 - 140	89	60 - 130	<0.020	ug/g	NC	50
7037996	p+m-Xylene	2020/11/05	93	60 - 140	91	60 - 130	<0.020	ug/g	NC	50
7037996	Styrene	2020/11/05	100	60 - 140	97	60 - 130	<0.050	ug/g	NC	50
7037996	Tetrachloroethylene	2020/11/05	87	60 - 140	86	60 - 130	<0.050	ug/g	NC	50
7037996	Toluene	2020/11/05	92	60 - 140	89	60 - 130	<0.020	ug/g	NC	50
7037996	Total Xylenes	2020/11/05					<0.020	ug/g	NC	50
7037996	trans-1,2-Dichloroethylene	2020/11/05	91	60 - 140	92	60 - 130	<0.050	ug/g	NC	50
7037996	trans-1,3-Dichloropropene	2020/11/05	102	60 - 140	99	60 - 130	<0.040	ug/g	NC	50
7037996	Trichloroethylene	2020/11/05	91	60 - 140	91	60 - 130	<0.050	ug/g	NC	50
7037996	Trichlorofluoromethane (FREON 11)	2020/11/05	95	60 - 140	95	60 - 130	<0.050	ug/g	NC	50
7037996	Vinyl Chloride	2020/11/05	100	60 - 140	98	60 - 130	<0.020	ug/g	NC	50
7038918	WAD Cyanide (Free)	2020/11/05	97	75 - 125	91	80 - 120	<0.01	ug/g	NC	35
7039380	Chromium (VI)	2020/11/06	46 (1)	70 - 130	90	80 - 120	<0.18	ug/g	NC	35
7039614	F2 (C10-C16 Hydrocarbons)	2020/11/05	NC	50 - 130	94	80 - 120	<10	ug/g	11	30
7039614	F3 (C16-C34 Hydrocarbons)	2020/11/05	NC	50 - 130	102	80 - 120	<50	ug/g	8.2	30
7039614	F4 (C34-C50 Hydrocarbons)	2020/11/05	100	50 - 130	102	80 - 120	<50	ug/g	NC	30
7039618	1-Methylnaphthalene	2020/11/05	105	50 - 130	112	50 - 130	<0.0050	ug/g	NC	40
7039618	2-Methylnaphthalene	2020/11/05	99	50 - 130	108	50 - 130	<0.0050	ug/g	NC	40
7039618	Acenaphthene	2020/11/05	108	50 - 130	111	50 - 130	<0.0050	ug/g	NC	40
7039618	Acenaphthylene	2020/11/05	102	50 - 130	104	50 - 130	<0.0050	ug/g	NC	40
7039618	Anthracene	2020/11/05	114	50 - 130	114	50 - 130	<0.0050	ug/g	NC	40

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
7039618	Benzo(a)anthracene	2020/11/05	115	50 - 130	111	50 - 130	<0.0050	ug/g	NC	40
7039618	Benzo(a)pyrene	2020/11/05	103	50 - 130	102	50 - 130	<0.0050	ug/g	NC	40
7039618	Benzo(b/j)fluoranthene	2020/11/05	108	50 - 130	110	50 - 130	<0.0050	ug/g	NC	40
7039618	Benzo(g,h,i)perylene	2020/11/05	127	50 - 130	127	50 - 130	<0.0050	ug/g	NC	40
7039618	Benzo(k)fluoranthene	2020/11/05	117	50 - 130	119	50 - 130	<0.0050	ug/g	NC	40
7039618	Chrysene	2020/11/05	119	50 - 130	121	50 - 130	<0.0050	ug/g	NC	40
7039618	Dibenzo(a,h)anthracene	2020/11/05	127	50 - 130	121	50 - 130	<0.0050	ug/g	NC	40
7039618	Fluoranthene	2020/11/05	115	50 - 130	114	50 - 130	<0.0050	ug/g	NC	40
7039618	Fluorene	2020/11/05	108	50 - 130	110	50 - 130	<0.0050	ug/g	NC	40
7039618	Indeno(1,2,3-cd)pyrene	2020/11/05	125	50 - 130	123	50 - 130	<0.0050	ug/g	NC	40
7039618	Naphthalene	2020/11/05	79	50 - 130	96	50 - 130	<0.0050	ug/g	NC	40
7039618	Phenanthrene	2020/11/05	117	50 - 130	119	50 - 130	<0.0050	ug/g	NC	40
7039618	Pyrene	2020/11/05	114	50 - 130	112	50 - 130	<0.0050	ug/g	NC	40
7040099	Acid Extractable Antimony (Sb)	2020/11/05	84	75 - 125	102	80 - 120	<0.20	ug/g	NC	30
7040099	Acid Extractable Arsenic (As)	2020/11/05	103	75 - 125	103	80 - 120	<1.0	ug/g	14	30
7040099	Acid Extractable Barium (Ba)	2020/11/05	NC	75 - 125	100	80 - 120	<0.50	ug/g	7.6	30
7040099	Acid Extractable Beryllium (Be)	2020/11/05	107	75 - 125	101	80 - 120	<0.20	ug/g	5.8	30
7040099	Acid Extractable Boron (B)	2020/11/05	97	75 - 125	95	80 - 120	<5.0	ug/g	12	30
7040099	Acid Extractable Cadmium (Cd)	2020/11/05	104	75 - 125	100	80 - 120	<0.10	ug/g	9.5	30
7040099	Acid Extractable Chromium (Cr)	2020/11/05	NC	75 - 125	101	80 - 120	<1.0	ug/g	5.0	30
7040099	Acid Extractable Cobalt (Co)	2020/11/05	98	75 - 125	102	80 - 120	<0.10	ug/g	6.4	30
7040099	Acid Extractable Copper (Cu)	2020/11/05	NC	75 - 125	101	80 - 120	<0.50	ug/g	4.5	30
7040099	Acid Extractable Lead (Pb)	2020/11/05	98	75 - 125	100	80 - 120	<1.0	ug/g	4.8	30
7040099	Acid Extractable Mercury (Hg)	2020/11/05	87	75 - 125	87	80 - 120	<0.050	ug/g	NC	30
7040099	Acid Extractable Molybdenum (Mo)	2020/11/05	104	75 - 125	102	80 - 120	<0.50	ug/g	1.7	30
7040099	Acid Extractable Nickel (Ni)	2020/11/05	NC	75 - 125	102	80 - 120	<0.50	ug/g	8.9	30
7040099	Acid Extractable Selenium (Se)	2020/11/05	108	75 - 125	103	80 - 120	<0.50	ug/g	NC	30
7040099	Acid Extractable Silver (Ag)	2020/11/05	103	75 - 125	100	80 - 120	<0.20	ug/g	NC	30
7040099	Acid Extractable Thallium (Tl)	2020/11/05	100	75 - 125	99	80 - 120	<0.050	ug/g	1.2	30
7040099	Acid Extractable Uranium (U)	2020/11/05	102	75 - 125	100	80 - 120	<0.050	ug/g	0.90	30
7040099	Acid Extractable Vanadium (V)	2020/11/05	NC	75 - 125	102	80 - 120	<5.0	ug/g	3.2	30

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
7040099	Acid Extractable Zinc (Zn)	2020/11/05	NC	75 - 125	106	80 - 120	<5.0	ug/g	3.9	30
7041995	Hot Water Ext. Boron (B)	2020/11/06	106	75 - 125	95	75 - 125	<0.050	ug/g	0.73	40
7042009	Conductivity	2020/11/06			102	90 - 110	<0.002	mS/cm	1.6	10
7042087	Available (CaCl2) pH	2020/11/06			100	97 - 103			0.85	N/A

N/A = Not Applicable

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

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

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

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

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

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

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

(1) The matrix spike recovery was below the lower control limit. This may be due in part to the reducing environment of the sample. The sample was reanalyzed with the same results

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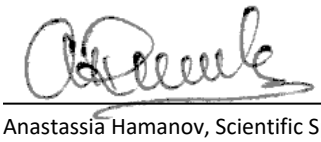
BV Labs Job #: C0T1006
Report Date: 2020/11/10

GM BluePlan Engineering Limited
Client Project #: 216433-1
Site Location: 341416 CON.RD.2, HANOVER, ON
Sampler Initials: AE

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Anastassia Hamanov, Scientific Specialist

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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BUREAU VERITAS

6740 Campobello Road, Mississauga, Ontario L5N 2L8
Phone: 905-817-5700 Fax: 905-817-5779 Toll Free: 800-563-6266
CAM FCD-01191/6

CHAIN OF CUSTODY RECORD

Page 1 of 1

Invoice Information
Company Name: GM Blue Plan
Contact Name: Amanda Eriksen
Address: 1260 2nd Ave E, Owen Sound
Phone: 519 376 1805 Fax:
Email: amanda.eriksen@gmblueplan.ca

Report Information (if differs from invoice)
Company Name:
Contact Name:
Address:
Phone: Fax:
Email:

Project Information (where applicable)
Quotation #:
P.O. #/ AFE#:
Project #: 216433-1
Site Location: 341416 Con. Rd. 2
Site #:
Site Location Province: Hanover, ON
Sampled By: AE

Turnaround Time (TAT) Required
[X] Regular TAT (5-7 days) Most analyses
PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Rush TAT (Surcharges will be applied)
[ ] 1 Day [ ] 2 Days [ ] 3-4 Days
Date Required:
Rush Confirmation #:

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

Regulation 153
[ ] Table 1 [ ] Res/Park [ ] Med/ Fine
[ ] Table 2 [ ] Ind/Comm [ ] Coarse
[ ] Table 3 [ ] Agri/ Other
[ ] Table ____
FOR RSC (PLEASE CIRCLE) Y / (N)

Other Regulations
[ ] CCME [ ] Sanitary Sewer Bylaw
[ ] MISA [ ] Storm Sewer Bylaw
[ ] PWQO Region
[ ] Other (Specify)
[ ] REG 558 (MIN. 3 DAY TAT REQUIRED)
[ ] REG 406 Table

Include Criteria on Certificate of Analysis: Y / (N)

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

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED (CIRCLE) Metals / Hg / CrVI	BTEX/ PHC F1	PHCs F2 - F4	VOCs	REG 153 METALS & INORGANICS	REG 153 ICPMS METALS	REG 153 METALS (Hg, Cr VI, ICPMS Metals, HWS - B)	PAHs	HOLD- DO NOT ANALYZE
1	SS - 1	2020/11/02		Soil	6		X	X	X	X		X	X	
2	SS - 2	"		"	6		X	X	X	X		X	X	
3														
4														
5														
6														
7														
8														
9														
10														

03-Nov-20 09:22
Ashton Gibson
C0T1006
ZPK ENV-1170

LABORATORY USE ONLY

CUSTODY SEAL Y / (N) Present	Intact	COOLER TEMPERATURES
		8.9

COOLING MEDIA PRESENT: (Y) / N

COMMENTS: metals by ICP/MS including B (HWE) and inorganics please (pH, Con, SAR)

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)
Amanda Eriksen	2020/11/02		Purolator		
			Ashton Gibson	2020/11/03	09:22

BV JOB #

Your Project #: 216433-1
Site Location: 549 BRUCE RD.28, MILDMAY, ON
Your C.O.C. #: n/a

Attention: Reporting Contacts

GM BluePlan Engineering Limited
1260 - 2nd Ave E
Unit 1
Owen Sound, ON
CANADA N4K 2J3

Report Date: 2020/11/09
Report #: R6404311
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C0T1016
Received: 2020/11/03, 09:22

Sample Matrix: Soil
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Hot Water Extractable Boron	2	2020/11/05	2020/11/06	CAM SOP-00408	R153 Ana. Prot. 2011
1,3-Dichloropropene Sum	2	N/A	2020/11/06		EPA 8260C m
Free (WAD) Cyanide	2	2020/11/05	2020/11/06	CAM SOP-00457	OMOE E3015 m
Conductivity	2	2020/11/06	2020/11/06	CAM SOP-00414	OMOE E3530 v1 m
Hexavalent Chromium in Soil by IC (1)	2	2020/11/04	2020/11/06	CAM SOP-00436	EPA 3060/7199 m
Petroleum Hydrocarbons F2-F4 in Soil (2)	2	2020/11/05	2020/11/05	CAM SOP-00316	CCME CWS m
Strong Acid Leachable Metals by ICPMS	1	2020/11/05	2020/11/05	CAM SOP-00447	EPA 6020B m
Strong Acid Leachable Metals by ICPMS	1	2020/11/05	2020/11/06	CAM SOP-00447	EPA 6020B m
Moisture	2	N/A	2020/11/04	CAM SOP-00445	Carter 2nd ed 51.2 m
pH CaCl2 EXTRACT	2	2020/11/06	2020/11/06	CAM SOP-00413	EPA 9045 D m
Sodium Adsorption Ratio (SAR)	2	N/A	2020/11/09	CAM SOP-00102	EPA 6010C
Volatile Organic Compounds and F1 PHCs	2	N/A	2020/11/05	CAM SOP-00230	EPA 8260C m

Remarks:

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

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

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

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.

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Your Project #: 216433-1
Site Location: 549 BRUCE RD.28, MILDMAY, ON
Your C.O.C. #: n/a

Attention: Reporting Contacts

GM BluePlan Engineering Limited
1260 - 2nd Ave E
Unit 1
Owen Sound, ON
CANADA N4K 2J3

Report Date: 2020/11/09
Report #: R6404311
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C0T1016

Received: 2020/11/03, 09:22

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

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

(1) Soils are reported on a dry weight basis unless otherwise specified.

(2) All CCME PHC results met required criteria unless otherwise stated in the report. The CWS PHC methods employed by Bureau Veritas Laboratories conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following "Alberta Environment's Interpretation of the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil Validation of Performance-Based Alternative Methods September 2003". Documentation is available upon request. Modifications from Reference Method for the Canada-wide Standard for Petroleum Hydrocarbons in Soil-Tier 1 Method: F2/F3/F4 data reported using validated cold solvent extraction instead of Soxhlet extraction.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Ashton Gibson, Project Manager
Email: Ashton.Gibson@bvlabs.com
Phone# (905)817-5765

==========

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BV Labs Job #: C0T1016
Report Date: 2020/11/09

GM BluePlan Engineering Limited
Client Project #: 216433-1
Site Location: 549 BRUCE RD.28, MILDMAY, ON
Sampler Initials: AE

O.REG 153 METALS & INORGANICS PKG (SOIL)

BV Labs ID		OBH473	OBH474		
Sampling Date		2020/11/02	2020/11/02		
COC Number		n/a	n/a		
	UNITS	SS-A	SS-B	RDL	QC Batch
Calculated Parameters					
Sodium Adsorption Ratio	N/A	0.31 (1)	0.33 (1)		7035876
Inorganics					
Conductivity	mS/cm	0.11	0.099	0.002	7042009
Available (CaCl2) pH	pH	8.33	8.19		7042109
WAD Cyanide (Free)	ug/g	<0.01	<0.01	0.01	7039962
Chromium (VI)	ug/g	<0.18	<0.18	0.18	7038772
Metals					
Hot Water Ext. Boron (B)	ug/g	0.069	<0.050	0.050	7040057
Acid Extractable Antimony (Sb)	ug/g	<0.20	<0.20	0.20	7040099
Acid Extractable Arsenic (As)	ug/g	2.5	3.4	1.0	7040099
Acid Extractable Barium (Ba)	ug/g	21	28	0.50	7040099
Acid Extractable Beryllium (Be)	ug/g	0.20	0.31	0.20	7040099
Acid Extractable Boron (B)	ug/g	11	12	5.0	7040099
Acid Extractable Cadmium (Cd)	ug/g	<0.10	<0.10	0.10	7040099
Acid Extractable Chromium (Cr)	ug/g	8.8	13	1.0	7040099
Acid Extractable Cobalt (Co)	ug/g	3.9	6.2	0.10	7040099
Acid Extractable Copper (Cu)	ug/g	9.4	18	0.50	7040099
Acid Extractable Lead (Pb)	ug/g	5.4	6.8	1.0	7040099
Acid Extractable Molybdenum (Mo)	ug/g	0.57	<0.50	0.50	7040099
Acid Extractable Nickel (Ni)	ug/g	9.0	16	0.50	7040099
Acid Extractable Selenium (Se)	ug/g	<0.50	<0.50	0.50	7040099
Acid Extractable Silver (Ag)	ug/g	<0.20	<0.20	0.20	7040099
Acid Extractable Thallium (Tl)	ug/g	0.12	0.17	0.050	7040099
Acid Extractable Uranium (U)	ug/g	0.76	0.62	0.050	7040099
Acid Extractable Vanadium (V)	ug/g	12	18	5.0	7040099
Acid Extractable Zinc (Zn)	ug/g	19	34	5.0	7040099
Acid Extractable Mercury (Hg)	ug/g	<0.050	<0.050	0.050	7040099

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) Sodium was not detected. To report SAR the sodium detection limit was used in the calculation. This value represents a maximum ratio.

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GM BluePlan Engineering Limited
Client Project #: 216433-1
Site Location: 549 BRUCE RD.28, MILDMAY, ON
Sampler Initials: AE

O.REG 153 VOCS BY HS & F1-F4 (SOIL)

BV Labs ID		OBH473	OBH474		
Sampling Date		2020/11/02	2020/11/02		
COC Number		n/a	n/a		
	UNITS	SS-A	SS-B	RDL	QC Batch
Inorganics					
Moisture	%	5.3	6.3	1.0	7037794
Calculated Parameters					
1,3-Dichloropropene (cis+trans)	ug/g	<0.050	<0.050	0.050	7036367
Volatile Organics					
Acetone (2-Propanone)	ug/g	<0.50	<0.50	0.50	7039621
Benzene	ug/g	<0.020	<0.020	0.020	7039621
Bromodichloromethane	ug/g	<0.050	<0.050	0.050	7039621
Bromoform	ug/g	<0.050	<0.050	0.050	7039621
Bromomethane	ug/g	<0.050	<0.050	0.050	7039621
Carbon Tetrachloride	ug/g	<0.050	<0.050	0.050	7039621
Chlorobenzene	ug/g	<0.050	<0.050	0.050	7039621
Chloroform	ug/g	<0.050	<0.050	0.050	7039621
Dibromochloromethane	ug/g	<0.050	<0.050	0.050	7039621
1,2-Dichlorobenzene	ug/g	<0.050	<0.050	0.050	7039621
1,3-Dichlorobenzene	ug/g	<0.050	<0.050	0.050	7039621
1,4-Dichlorobenzene	ug/g	<0.050	<0.050	0.050	7039621
Dichlorodifluoromethane (FREON 12)	ug/g	<0.050	<0.050	0.050	7039621
1,1-Dichloroethane	ug/g	<0.050	<0.050	0.050	7039621
1,2-Dichloroethane	ug/g	<0.050	<0.050	0.050	7039621
1,1-Dichloroethylene	ug/g	<0.050	<0.050	0.050	7039621
cis-1,2-Dichloroethylene	ug/g	<0.050	<0.050	0.050	7039621
trans-1,2-Dichloroethylene	ug/g	<0.050	<0.050	0.050	7039621
1,2-Dichloropropane	ug/g	<0.050	<0.050	0.050	7039621
cis-1,3-Dichloropropene	ug/g	<0.030	<0.030	0.030	7039621
trans-1,3-Dichloropropene	ug/g	<0.040	<0.040	0.040	7039621
Ethylbenzene	ug/g	<0.020	<0.020	0.020	7039621
Ethylene Dibromide	ug/g	<0.050	<0.050	0.050	7039621
Hexane	ug/g	<0.050	<0.050	0.050	7039621
Methylene Chloride(Dichloromethane)	ug/g	<0.050	<0.050	0.050	7039621
Methyl Ethyl Ketone (2-Butanone)	ug/g	<0.50	<0.50	0.50	7039621
Methyl Isobutyl Ketone	ug/g	<0.50	<0.50	0.50	7039621
Methyl t-butyl ether (MTBE)	ug/g	<0.050	<0.050	0.050	7039621
Styrene	ug/g	<0.050	<0.050	0.050	7039621
1,1,1,2-Tetrachloroethane	ug/g	<0.050	<0.050	0.050	7039621

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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GM BluePlan Engineering Limited
Client Project #: 216433-1
Site Location: 549 BRUCE RD.28, MILDMAY, ON
Sampler Initials: AE

O.REG 153 VOCS BY HS & F1-F4 (SOIL)

BV Labs ID		OBH473	OBH474		
Sampling Date		2020/11/02	2020/11/02		
COC Number		n/a	n/a		
	UNITS	SS-A	SS-B	RDL	QC Batch
1,1,2,2-Tetrachloroethane	ug/g	<0.050	<0.050	0.050	7039621
Tetrachloroethylene	ug/g	<0.050	<0.050	0.050	7039621
Toluene	ug/g	<0.020	<0.020	0.020	7039621
1,1,1-Trichloroethane	ug/g	<0.050	<0.050	0.050	7039621
1,1,2-Trichloroethane	ug/g	<0.050	<0.050	0.050	7039621
Trichloroethylene	ug/g	<0.050	<0.050	0.050	7039621
Trichlorofluoromethane (FREON 11)	ug/g	<0.050	<0.050	0.050	7039621
Vinyl Chloride	ug/g	<0.020	<0.020	0.020	7039621
p+m-Xylene	ug/g	<0.020	<0.020	0.020	7039621
o-Xylene	ug/g	<0.020	<0.020	0.020	7039621
Total Xylenes	ug/g	<0.020	<0.020	0.020	7039621
F1 (C6-C10)	ug/g	<10	<10	10	7039621
F1 (C6-C10) - BTEX	ug/g	<10	<10	10	7039621
F2-F4 Hydrocarbons					
F2 (C10-C16 Hydrocarbons)	ug/g	<10	<10	10	7039614
F3 (C16-C34 Hydrocarbons)	ug/g	<50	<50	50	7039614
F4 (C34-C50 Hydrocarbons)	ug/g	<50	<50	50	7039614
Reached Baseline at C50	ug/g	Yes	Yes		7039614
Surrogate Recovery (%)					
o-Terphenyl	%	94	94		7039614
4-Bromofluorobenzene	%	95	95		7039621
D10-o-Xylene	%	102	97		7039621
D4-1,2-Dichloroethane	%	96	95		7039621
D8-Toluene	%	100	99		7039621

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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BV Labs Job #: C0T1016
Report Date: 2020/11/09

GM BluePlan Engineering Limited
Client Project #: 216433-1
Site Location: 549 BRUCE RD.28, MILDMAY, ON
Sampler Initials: AE

TEST SUMMARY

BV Labs ID: OBH473
Sample ID: SS-A
Matrix: Soil

Collected: 2020/11/02
Shipped:
Received: 2020/11/03

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	7040057	2020/11/05	2020/11/06	Suban Kanapathippllai
1,3-Dichloropropene Sum	CALC	7036367	N/A	2020/11/06	Automated Statchk
Free (WAD) Cyanide	TECH	7039962	2020/11/05	2020/11/06	Gnana Thomas
Conductivity	AT	7042009	2020/11/06	2020/11/06	Neil Dassanayake
Hexavalent Chromium in Soil by IC	IC/SPEC	7038772	2020/11/04	2020/11/06	Violeta Porcila
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	7039614	2020/11/05	2020/11/05	Anna Stuglik Rolland
Strong Acid Leachable Metals by ICPMS	ICP/MS	7040099	2020/11/05	2020/11/06	Azita Fazaeli
Moisture	BAL	7037794	N/A	2020/11/04	Gurpreet Kaur (ONT)
pH CaCl2 EXTRACT	AT	7042109	2020/11/06	2020/11/06	Neil Dassanayake
Sodium Adsorption Ratio (SAR)	CALC/MET	7035876	N/A	2020/11/09	Automated Statchk
Volatile Organic Compounds and F1 PHCs	GC/MSFD	7039621	N/A	2020/11/05	Yang (Philip) Yu

BV Labs ID: OBH474
Sample ID: SS-B
Matrix: Soil

Collected: 2020/11/02
Shipped:
Received: 2020/11/03

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	7040057	2020/11/05	2020/11/06	Suban Kanapathippllai
1,3-Dichloropropene Sum	CALC	7036367	N/A	2020/11/06	Automated Statchk
Free (WAD) Cyanide	TECH	7039962	2020/11/05	2020/11/06	Gnana Thomas
Conductivity	AT	7042009	2020/11/06	2020/11/06	Neil Dassanayake
Hexavalent Chromium in Soil by IC	IC/SPEC	7038772	2020/11/04	2020/11/06	Violeta Porcila
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	7039614	2020/11/05	2020/11/05	Anna Stuglik Rolland
Strong Acid Leachable Metals by ICPMS	ICP/MS	7040099	2020/11/05	2020/11/05	Azita Fazaeli
Moisture	BAL	7037794	N/A	2020/11/04	Gurpreet Kaur (ONT)
pH CaCl2 EXTRACT	AT	7042109	2020/11/06	2020/11/06	Neil Dassanayake
Sodium Adsorption Ratio (SAR)	CALC/MET	7035876	N/A	2020/11/09	Automated Statchk
Volatile Organic Compounds and F1 PHCs	GC/MSFD	7039621	N/A	2020/11/05	Yang (Philip) Yu

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BV Labs Job #: C0T1016
Report Date: 2020/11/09

GM BluePlan Engineering Limited
Client Project #: 216433-1
Site Location: 549 BRUCE RD.28, MILDMAY, ON
Sampler Initials: AE

GENERAL COMMENTS

Results relate only to the items tested.

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BV Labs Job #: C0T1016
Report Date: 2020/11/09

QUALITY ASSURANCE REPORT

GM BluePlan Engineering Limited
Client Project #: 216433-1
Site Location: 549 BRUCE RD.28, MILDMAY, ON
Sampler Initials: AE

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
7039614	o-Terphenyl	2020/11/05	88	60 - 130	91	60 - 130	94	%		
7039621	4-Bromofluorobenzene	2020/11/05	101	60 - 140	102	60 - 140	95	%		
7039621	D10-o-Xylene	2020/11/05	107	60 - 130	99	60 - 130	96	%		
7039621	D4-1,2-Dichloroethane	2020/11/05	95	60 - 140	100	60 - 140	98	%		
7039621	D8-Toluene	2020/11/05	105	60 - 140	102	60 - 140	100	%		
7037794	Moisture	2020/11/04							6.4	20
7038772	Chromium (VI)	2020/11/06	24 (1)	70 - 130	92	80 - 120	<0.18	ug/g	NC	35
7039614	F2 (C10-C16 Hydrocarbons)	2020/11/05	NC	50 - 130	94	80 - 120	<10	ug/g	11	30
7039614	F3 (C16-C34 Hydrocarbons)	2020/11/05	NC	50 - 130	102	80 - 120	<50	ug/g	8.2	30
7039614	F4 (C34-C50 Hydrocarbons)	2020/11/05	100	50 - 130	102	80 - 120	<50	ug/g	NC	30
7039621	1,1,1,2-Tetrachloroethane	2020/11/05	99	60 - 140	106	60 - 130	<0.050	ug/g	NC	50
7039621	1,1,1-Trichloroethane	2020/11/05	102	60 - 140	102	60 - 130	<0.050	ug/g	NC	50
7039621	1,1,2,2-Tetrachloroethane	2020/11/05	90	60 - 140	107	60 - 130	<0.050	ug/g	NC	50
7039621	1,1,2-Trichloroethane	2020/11/05	101	60 - 140	111	60 - 130	<0.050	ug/g	NC	50
7039621	1,1-Dichloroethane	2020/11/05	95	60 - 140	98	60 - 130	<0.050	ug/g	NC	50
7039621	1,1-Dichloroethylene	2020/11/05	101	60 - 140	98	60 - 130	<0.050	ug/g	NC	50
7039621	1,2-Dichlorobenzene	2020/11/05	98	60 - 140	105	60 - 130	<0.050	ug/g	NC	50
7039621	1,2-Dichloroethane	2020/11/05	91	60 - 140	101	60 - 130	<0.050	ug/g	NC	50
7039621	1,2-Dichloropropane	2020/11/05	97	60 - 140	104	60 - 130	<0.050	ug/g	NC	50
7039621	1,3-Dichlorobenzene	2020/11/05	104	60 - 140	106	60 - 130	<0.050	ug/g	NC	50
7039621	1,4-Dichlorobenzene	2020/11/05	125	60 - 140	128	60 - 130	<0.050	ug/g	NC	50
7039621	Acetone (2-Propanone)	2020/11/05	107	60 - 140	120	60 - 140	<0.50	ug/g	NC	50
7039621	Benzene	2020/11/05	93	60 - 140	95	60 - 130	<0.020	ug/g	NC	50
7039621	Bromodichloromethane	2020/11/05	98	60 - 140	106	60 - 130	<0.050	ug/g	NC	50
7039621	Bromoform	2020/11/05	92	60 - 140	109	60 - 130	<0.050	ug/g	NC	50
7039621	Bromomethane	2020/11/05	100	60 - 140	98	60 - 140	<0.050	ug/g	NC	50
7039621	Carbon Tetrachloride	2020/11/05	102	60 - 140	101	60 - 130	<0.050	ug/g	NC	50
7039621	Chlorobenzene	2020/11/05	99	60 - 140	103	60 - 130	<0.050	ug/g	NC	50
7039621	Chloroform	2020/11/05	98	60 - 140	102	60 - 130	<0.050	ug/g	NC	50
7039621	cis-1,2-Dichloroethylene	2020/11/05	100	60 - 140	104	60 - 130	<0.050	ug/g	NC	50
7039621	cis-1,3-Dichloropropene	2020/11/05	98	60 - 140	102	60 - 130	<0.030	ug/g	NC	50

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
7039621	Dibromochloromethane	2020/11/05	94	60 - 140	105	60 - 130	<0.050	ug/g	NC	50
7039621	Dichlorodifluoromethane (FREON 12)	2020/11/05	91	60 - 140	89	60 - 140	<0.050	ug/g	NC	50
7039621	Ethylbenzene	2020/11/05	100	60 - 140	99	60 - 130	<0.020	ug/g	NC	50
7039621	Ethylene Dibromide	2020/11/05	92	60 - 140	105	60 - 130	<0.050	ug/g	NC	50
7039621	F1 (C6-C10) - BTEX	2020/11/05					<10	ug/g	NC	30
7039621	F1 (C6-C10)	2020/11/05	105	60 - 140	97	80 - 120	<10	ug/g	NC	30
7039621	Hexane	2020/11/05	105	60 - 140	99	60 - 130	<0.050	ug/g	NC	50
7039621	Methyl Ethyl Ketone (2-Butanone)	2020/11/05	93	60 - 140	111	60 - 140	<0.50	ug/g	NC	50
7039621	Methyl Isobutyl Ketone	2020/11/05	104	60 - 140	130 (2)	60 - 130	<0.50	ug/g	NC	50
7039621	Methyl t-butyl ether (MTBE)	2020/11/05	91	60 - 140	100	60 - 130	<0.050	ug/g	NC	50
7039621	Methylene Chloride(Dichloromethane)	2020/11/05	102	60 - 140	108	60 - 130	<0.050	ug/g	NC	50
7039621	o-Xylene	2020/11/05	96	60 - 140	98	60 - 130	<0.020	ug/g	NC	50
7039621	p+m-Xylene	2020/11/05	103	60 - 140	103	60 - 130	<0.020	ug/g	NC	50
7039621	Styrene	2020/11/05	109	60 - 140	114	60 - 130	<0.050	ug/g	NC	50
7039621	Tetrachloroethylene	2020/11/05	97	60 - 140	94	60 - 130	<0.050	ug/g	NC	50
7039621	Toluene	2020/11/05	98	60 - 140	98	60 - 130	<0.020	ug/g	NC	50
7039621	Total Xylenes	2020/11/05					<0.020	ug/g	NC	50
7039621	trans-1,2-Dichloroethylene	2020/11/05	100	60 - 140	99	60 - 130	<0.050	ug/g	NC	50
7039621	trans-1,3-Dichloropropene	2020/11/05	106	60 - 140	106	60 - 130	<0.040	ug/g	NC	50
7039621	Trichloroethylene	2020/11/05	105	60 - 140	106	60 - 130	<0.050	ug/g	NC	50
7039621	Trichlorofluoromethane (FREON 11)	2020/11/05	105	60 - 140	102	60 - 130	<0.050	ug/g	NC	50
7039621	Vinyl Chloride	2020/11/05	101	60 - 140	98	60 - 130	<0.020	ug/g	NC	50
7039962	WAD Cyanide (Free)	2020/11/06	97	75 - 125	96	80 - 120	<0.01	ug/g	NC	35
7040057	Hot Water Ext. Boron (B)	2020/11/06	105	75 - 125	104	75 - 125	<0.050	ug/g	1.2	40
7040099	Acid Extractable Antimony (Sb)	2020/11/05	84	75 - 125	102	80 - 120	<0.20	ug/g	NC	30
7040099	Acid Extractable Arsenic (As)	2020/11/05	103	75 - 125	103	80 - 120	<1.0	ug/g	14	30
7040099	Acid Extractable Barium (Ba)	2020/11/05	NC	75 - 125	100	80 - 120	<0.50	ug/g	7.6	30
7040099	Acid Extractable Beryllium (Be)	2020/11/05	107	75 - 125	101	80 - 120	<0.20	ug/g	5.8	30
7040099	Acid Extractable Boron (B)	2020/11/05	97	75 - 125	95	80 - 120	<5.0	ug/g	12	30
7040099	Acid Extractable Cadmium (Cd)	2020/11/05	104	75 - 125	100	80 - 120	<0.10	ug/g	9.5	30
7040099	Acid Extractable Chromium (Cr)	2020/11/05	NC	75 - 125	101	80 - 120	<1.0	ug/g	5.0	30

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
7040099	Acid Extractable Cobalt (Co)	2020/11/05	98	75 - 125	102	80 - 120	<0.10	ug/g	6.4	30
7040099	Acid Extractable Copper (Cu)	2020/11/05	NC	75 - 125	101	80 - 120	<0.50	ug/g	4.5	30
7040099	Acid Extractable Lead (Pb)	2020/11/05	98	75 - 125	100	80 - 120	<1.0	ug/g	4.8	30
7040099	Acid Extractable Mercury (Hg)	2020/11/05	87	75 - 125	87	80 - 120	<0.050	ug/g	NC	30
7040099	Acid Extractable Molybdenum (Mo)	2020/11/05	104	75 - 125	102	80 - 120	<0.50	ug/g	1.7	30
7040099	Acid Extractable Nickel (Ni)	2020/11/05	NC	75 - 125	102	80 - 120	<0.50	ug/g	8.9	30
7040099	Acid Extractable Selenium (Se)	2020/11/05	108	75 - 125	103	80 - 120	<0.50	ug/g	NC	30
7040099	Acid Extractable Silver (Ag)	2020/11/05	103	75 - 125	100	80 - 120	<0.20	ug/g	NC	30
7040099	Acid Extractable Thallium (Tl)	2020/11/05	100	75 - 125	99	80 - 120	<0.050	ug/g	1.2	30
7040099	Acid Extractable Uranium (U)	2020/11/05	102	75 - 125	100	80 - 120	<0.050	ug/g	0.90	30
7040099	Acid Extractable Vanadium (V)	2020/11/05	NC	75 - 125	102	80 - 120	<5.0	ug/g	3.2	30
7040099	Acid Extractable Zinc (Zn)	2020/11/05	NC	75 - 125	106	80 - 120	<5.0	ug/g	3.9	30
7042009	Conductivity	2020/11/06			102	90 - 110	<0.002	mS/cm	1.6	10
7042109	Available (CaCl2) pH	2020/11/06			100	97 - 103			0.0013	N/A

N/A = Not Applicable

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

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

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

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

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

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

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

(1) The matrix spike recovery was below the lower control limit. This may be due in part to the reducing environment of the sample. The sample was reanalyzed with the same results

(2) The recovery was above the upper control limit. This may represent a high bias in some results for this specific analyte. For results that were not detected (ND), this potential bias has no impact.

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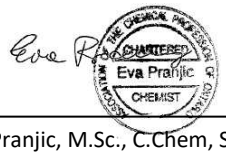
BV Labs Job #: C0T1016
Report Date: 2020/11/09

GM BluePlan Engineering Limited
Client Project #: 216433-1
Site Location: 549 BRUCE RD.28, MILDMAY, ON
Sampler Initials: AE

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Ewa Pranjic, M.Sc., C.Chem, Scientific Specialist

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports.
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CAM FCD-01191/6

CHAIN OF CUSTODY RECORD

Page 1 of 1

Invoice Information	Report Information (if differs from invoice)	Project Information (where applicable)	Turnaround Time (TAT) Required
Company Name: Grn Blue Plan	Company Name:	Quotation #:	☒ Regular TAT (5-7 days) Most analyses
Contact Name: Amanda Erikson	Contact Name:	P.O. #/ AFE#:	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 1260 2nd Ave E Owen Sound	Address:	Project #: 2164433-1	Rush TAT (Surcharges will be applied) ☐ 1 Day ☐ 2 Days ☐ 3-4 Days
Phone: 519 376-1805 Fax:	Phone: Fax:	Site Location: 549 Bruce Rd 28	
Email: amanda.erikson@greenblueplan.ca	Email:	Site #:	Date Required:
		Site Location Province: Midway, ON	Rush Confirmation #:
		Sampled By: AE	

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

Regulation 153: ☐ Table 1 ☐ Table 2 ☐ Table 3 ☐ Table ____ ☐ Res/Park ☐ Ind/Comm ☐ Agri/ Other ☐ Med/ Fine ☐ Coarse
FOR RSC (PLEASE CIRCLE) Y / N

Other Regulations: ☐ CCME ☐ MISA ☐ PWQO ☐ Other (Specify) ☐ REG 558 (MIN. 3 DAY TAT REQUIRED) ☐ REG 406 Table ____ ☐ Sanitary Sewer Bylaw ☐ Storm Sewer Bylaw Region ____

Include Criteria on Certificate of Analysis: Y / N

LABORATORY USE ONLY: CUSTODY SEAL Y / N (Present / Intact) — COOLER TEMPERATURES: 8.9.9

COOLING MEDIA PRESENT: Y / N

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

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED (CIRCLE) Metals / Hg / CrVI	BTEX/ PHC F1	PHCs F2 - F4	VOCs	REG 153 METALS & INORGANICS	REG 153 ICPMS METALS	REG 153 METALS (Hg, Cr VI, ICPMS Metals, HWS - B)	HOLD- DO NOT ANALYZE	COMMENTS
1	SS-A	2020/11/02		Soil	6		X	X	X	X		X		metals by ICP/MS
2	SS-B	11		11	6		X	X	X	X		X		including B(HWE)
3														and inorganics
4														(pH, Cn, SAR)
5														please
6														
7														
8														
9														
10														

03-Nov-20 09:22
Ashton Gibson
C0T1016
ZPK ENV-1170

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	BV JOB #
Amanda Erikson	2020/11/02		Purolator			
			[illegible]	2020/11/03	09:22	

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Certificate of Analysis

Geofirma Engineering Ltd.

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

Client PO:
Project: 20-211
Custody: 129513

Report Date: 15-Apr-2021
Order Date: 12-Apr-2021

Order #: 2116057

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

Paracel ID	Client ID
2116057-01	SS21-01
2116057-02	SS21-02
2116057-03	SS21-03
2116057-04	SS21-04
2116057-05	SS21-05

Approved By: Mark Foto

Mark Foto, M.Sc.
Lab Supervisor

Certificate of Analysis

Client: Geofirma Engineering Ltd.

Client PO:

Report Date: 15-Apr-2021

Order Date: 12-Apr-2021

Project Description: 20-211

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
PHC F1	CWS Tier 1 - P&T GC-FID	13-Apr-21	13-Apr-21
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	12-Apr-21	13-Apr-21
REG 153: VOCs by P&T GC/MS	EPA 8260 - P&T GC-MS	13-Apr-21	13-Apr-21
Solids, %	Gravimetric, calculation	12-Apr-21	12-Apr-21

Certificate of Analysis

Report Date: 15-Apr-2021

Client: Geofirma Engineering Ltd.

Order Date: 12-Apr-2021

Client PO:

Project Description: 20-211

	Client ID:	SS21-01	SS21-02	SS21-03	SS21-04
	Sample Date:	08-Apr-21 12:30	08-Apr-21 13:45	08-Apr-21 14:00	08-Apr-21 14:25
	Sample ID:	2116057-01	2116057-02	2116057-03	2116057-04
	MDL/Units	Soil	Soil	Soil	Soil
Physical Characteristics					
% Solids	0.1 % by Wt.	90.1	92.6	89.3	95.3
Volatiles					
Acetone	0.50 ug/g dry	<0.50	<0.50	<0.50	<0.50
Benzene	0.02 ug/g dry	<0.02	<0.02	<0.02	<0.02
Bromodichloromethane	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Bromoform	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Bromomethane	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Carbon Tetrachloride	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Chlorobenzene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Chloroform	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Dibromochloromethane	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Dichlorodifluoromethane	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
1,2-Dichlorobenzene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
1,3-Dichlorobenzene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
1,4-Dichlorobenzene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
1,1-Dichloroethane	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
1,2-Dichloroethane	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
1,1-Dichloroethylene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
cis-1,2-Dichloroethylene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
trans-1,2-Dichloroethylene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
1,2-Dichloropropane	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
cis-1,3-Dichloropropylene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
trans-1,3-Dichloropropylene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
1,3-Dichloropropene, total	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Ethylene dibromide (dibromoethane, 1,2-)	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Hexane	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Methyl Ethyl Ketone (2-Butanone)	0.50 ug/g dry	<0.50	<0.50	<0.50	<0.50
Methyl Isobutyl Ketone	0.50 ug/g dry	<0.50	<0.50	<0.50	<0.50
Methyl tert-butyl ether	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Methylene Chloride	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Styrene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
1,1,1,2-Tetrachloroethane	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
1,1,2,2-Tetrachloroethane	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Tetrachloroethylene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05

Certificate of Analysis

Client: Geofirma Engineering Ltd.

Client PO:

Report Date: 15-Apr-2021

Order Date: 12-Apr-2021

Project Description: 20-211

	Client ID:	SS21-01	SS21-02	SS21-03	SS21-04
	Sample Date:	08-Apr-21 12:30	08-Apr-21 13:45	08-Apr-21 14:00	08-Apr-21 14:25
	Sample ID:	2116057-01	2116057-02	2116057-03	2116057-04
	MDL/Units	Soil	Soil	Soil	Soil
Toluene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
1,1,1-Trichloroethane	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
1,1,2-Trichloroethane	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Trichloroethylene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Trichlorofluoromethane	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Vinyl chloride	0.02 ug/g dry	<0.02	<0.02	<0.02	<0.02
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
4-Bromofluorobenzene	Surrogate	125%	133%	134%	133%
Dibromofluoromethane	Surrogate	97.1%	97.4%	98.4%	98.3%
Toluene-d8	Surrogate	126%	127%	128%	127%
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	<7	<7	<7	<7
F2 PHCs (C10-C16)	4 ug/g dry	<4	<4	<4	7
F3 PHCs (C16-C34)	8 ug/g dry	34	3310	53	52
F4 PHCs (C34-C50)	6 ug/g dry	19	1580	73	26

Certificate of Analysis

Client: Geofirma Engineering Ltd.

Client PO:

Report Date: 15-Apr-2021

Order Date: 12-Apr-2021

Project Description: 20-211

	Client ID:	SS21-05	-	-	-
	Sample Date:	08-Apr-21 15:10	-	-	-
	Sample ID:	2116057-05	-	-	-
	MDL/Units	Soil	-	-	-
Physical Characteristics					
% Solids	0.1 % by Wt.	95.0	-	-	-
Volatiles					
Acetone	0.50 ug/g dry	<0.50	-	-	-
Benzene	0.02 ug/g dry	<0.02	-	-	-
Bromodichloromethane	0.05 ug/g dry	<0.05	-	-	-
Bromoform	0.05 ug/g dry	<0.05	-	-	-
Bromomethane	0.05 ug/g dry	<0.05	-	-	-
Carbon Tetrachloride	0.05 ug/g dry	<0.05	-	-	-
Chlorobenzene	0.05 ug/g dry	<0.05	-	-	-
Chloroform	0.05 ug/g dry	<0.05	-	-	-
Dibromochloromethane	0.05 ug/g dry	<0.05	-	-	-
Dichlorodifluoromethane	0.05 ug/g dry	<0.05	-	-	-
1,2-Dichlorobenzene	0.05 ug/g dry	<0.05	-	-	-
1,3-Dichlorobenzene	0.05 ug/g dry	<0.05	-	-	-
1,4-Dichlorobenzene	0.05 ug/g dry	<0.05	-	-	-
1,1-Dichloroethane	0.05 ug/g dry	<0.05	-	-	-
1,2-Dichloroethane	0.05 ug/g dry	<0.05	-	-	-
1,1-Dichloroethylene	0.05 ug/g dry	<0.05	-	-	-
cis-1,2-Dichloroethylene	0.05 ug/g dry	<0.05	-	-	-
trans-1,2-Dichloroethylene	0.05 ug/g dry	<0.05	-	-	-
1,2-Dichloropropane	0.05 ug/g dry	<0.05	-	-	-
cis-1,3-Dichloropropylene	0.05 ug/g dry	<0.05	-	-	-
trans-1,3-Dichloropropylene	0.05 ug/g dry	<0.05	-	-	-
1,3-Dichloropropene, total	0.05 ug/g dry	<0.05	-	-	-
Ethylbenzene	0.05 ug/g dry	<0.05	-	-	-
Ethylene dibromide (dibromoethane, 1	0.05 ug/g dry	<0.05	-	-	-
Hexane	0.05 ug/g dry	<0.05	-	-	-
Methyl Ethyl Ketone (2-Butanone)	0.50 ug/g dry	<0.50	-	-	-
Methyl Isobutyl Ketone	0.50 ug/g dry	<0.50	-	-	-
Methyl tert-butyl ether	0.05 ug/g dry	<0.05	-	-	-
Methylene Chloride	0.05 ug/g dry	<0.05	-	-	-
Styrene	0.05 ug/g dry	<0.05	-	-	-
1,1,1,2-Tetrachloroethane	0.05 ug/g dry	<0.05	-	-	-
1,1,2,2-Tetrachloroethane	0.05 ug/g dry	<0.05	-	-	-

Certificate of Analysis

Client: **Geofirma Engineering Ltd.**

Client PO:

Report Date: 15-Apr-2021

Order Date: 12-Apr-2021

Project Description: 20-211

	Client ID:	SS21-05	-	-	-
	Sample Date:	08-Apr-21 15:10	-	-	-
	Sample ID:	2116057-05	-	-	-
	MDL/Units	Soil	-	-	-
Tetrachloroethylene	0.05 ug/g dry	<0.05	-	-	-
Toluene	0.05 ug/g dry	<0.05	-	-	-
1,1,1-Trichloroethane	0.05 ug/g dry	<0.05	-	-	-
1,1,2-Trichloroethane	0.05 ug/g dry	<0.05	-	-	-
Trichloroethylene	0.05 ug/g dry	<0.05	-	-	-
Trichlorofluoromethane	0.05 ug/g dry	<0.05	-	-	-
Vinyl chloride	0.02 ug/g dry	<0.02	-	-	-
m,p-Xylenes	0.05 ug/g dry	<0.05	-	-	-
o-Xylene	0.05 ug/g dry	<0.05	-	-	-
Xylenes, total	0.05 ug/g dry	<0.05	-	-	-
4-Bromofluorobenzene	Surrogate	134%	-	-	-
Dibromofluoromethane	Surrogate	97.5%	-	-	-
Toluene-d8	Surrogate	127%	-	-	-
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	<7	-	-	-
F2 PHCs (C10-C16)	4 ug/g dry	<4	-	-	-
F3 PHCs (C16-C34)	8 ug/g dry	15	-	-	-
F4 PHCs (C34-C50)	6 ug/g dry	8	-	-	-

Certificate of Analysis

Report Date: 15-Apr-2021

Client: Geofirma Engineering Ltd.

Order Date: 12-Apr-2021

Client PO:

Project Description: 20-211

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						
Volatiles									
Acetone	ND	0.50	ug/g						
Benzene	ND	0.02	ug/g						
Bromodichloromethane	ND	0.05	ug/g						
Bromoform	ND	0.05	ug/g						
Bromomethane	ND	0.05	ug/g						
Carbon Tetrachloride	ND	0.05	ug/g						
Chlorobenzene	ND	0.05	ug/g						
Chloroform	ND	0.05	ug/g						
Dibromochloromethane	ND	0.05	ug/g						
Dichlorodifluoromethane	ND	0.05	ug/g						
1,2-Dichlorobenzene	ND	0.05	ug/g						
1,3-Dichlorobenzene	ND	0.05	ug/g						
1,4-Dichlorobenzene	ND	0.05	ug/g						
1,1-Dichloroethane	ND	0.05	ug/g						
1,2-Dichloroethane	ND	0.05	ug/g						
1,1-Dichloroethylene	ND	0.05	ug/g						
cis-1,2-Dichloroethylene	ND	0.05	ug/g						
trans-1,2-Dichloroethylene	ND	0.05	ug/g						
1,2-Dichloropropane	ND	0.05	ug/g						
cis-1,3-Dichloropropylene	ND	0.05	ug/g						
trans-1,3-Dichloropropylene	ND	0.05	ug/g						
1,3-Dichloropropene, total	ND	0.05	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Ethylene dibromide (dibromoethane, 1,2	ND	0.05	ug/g						
Hexane	ND	0.05	ug/g						
Methyl Ethyl Ketone (2-Butanone)	ND	0.50	ug/g						
Methyl Isobutyl Ketone	ND	0.50	ug/g						
Methyl tert-butyl ether	ND	0.05	ug/g						
Methylene Chloride	ND	0.05	ug/g						
Styrene	ND	0.05	ug/g						
1,1,1,2-Tetrachloroethane	ND	0.05	ug/g						
1,1,2,2-Tetrachloroethane	ND	0.05	ug/g						
Tetrachloroethylene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
1,1,1-Trichloroethane	ND	0.05	ug/g						
1,1,2-Trichloroethane	ND	0.05	ug/g						
Trichloroethylene	ND	0.05	ug/g						
Trichlorofluoromethane	ND	0.05	ug/g						
Vinyl chloride	ND	0.02	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: 4-Bromofluorobenzene	*8.99*		*ug/g*		*112*	*50-140*			
Surrogate: Dibromofluoromethane	*7.75*		*ug/g*		*96.8*	*50-140*			
Surrogate: Toluene-d8	*10.4*		*ug/g*		*130*	*50-140*			

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)	26	8	ug/g dry	34			26.1	30	
F4 PHCs (C34-C50)	16	6	ug/g dry	19			15.6	30	
Physical Characteristics									
% Solids	60.6	0.1	% by Wt.	66.5			9.4	25	
Volatiles									
Acetone	ND	0.50	ug/g dry	ND			NC	50	
Benzene	ND	0.02	ug/g dry	ND			NC	50	
Bromodichloromethane	ND	0.05	ug/g dry	ND			NC	50	
Bromoform	ND	0.05	ug/g dry	ND			NC	50	
Bromomethane	ND	0.05	ug/g dry	ND			NC	50	
Carbon Tetrachloride	ND	0.05	ug/g dry	ND			NC	50	
Chlorobenzene	ND	0.05	ug/g dry	ND			NC	50	
Chloroform	ND	0.05	ug/g dry	ND			NC	50	
Dibromochloromethane	ND	0.05	ug/g dry	ND			NC	50	
Dichlorodifluoromethane	ND	0.05	ug/g dry	ND			NC	50	
1,2-Dichlorobenzene	ND	0.05	ug/g dry	ND			NC	50	
1,3-Dichlorobenzene	ND	0.05	ug/g dry	ND			NC	50	
1,4-Dichlorobenzene	ND	0.05	ug/g dry	ND			NC	50	
1,1-Dichloroethane	ND	0.05	ug/g dry	ND			NC	50	
1,2-Dichloroethane	ND	0.05	ug/g dry	ND			NC	50	
1,1-Dichloroethylene	ND	0.05	ug/g dry	ND			NC	50	
cis-1,2-Dichloroethylene	ND	0.05	ug/g dry	ND			NC	50	
trans-1,2-Dichloroethylene	ND	0.05	ug/g dry	ND			NC	50	
1,2-Dichloropropane	ND	0.05	ug/g dry	ND			NC	50	
cis-1,3-Dichloropropylene	ND	0.05	ug/g dry	ND			NC	50	
trans-1,3-Dichloropropylene	ND	0.05	ug/g dry	ND			NC	50	
Ethylbenzene	ND	0.05	ug/g dry	ND			NC	50	
Ethylene dibromide (dibromoethane, 1,2	ND	0.05	ug/g dry	ND			NC	50	
Hexane	ND	0.05	ug/g dry	ND			NC	50	
Methyl Ethyl Ketone (2-Butanone)	ND	0.50	ug/g dry	ND			NC	50	
Methyl Isobutyl Ketone	ND	0.50	ug/g dry	ND			NC	50	
Methyl tert-butyl ether	ND	0.05	ug/g dry	ND			NC	50	
Methylene Chloride	ND	0.05	ug/g dry	ND			NC	50	
Styrene	ND	0.05	ug/g dry	ND			NC	50	
1,1,1,2-Tetrachloroethane	ND	0.05	ug/g dry	ND			NC	50	
1,1,2,2-Tetrachloroethane	ND	0.05	ug/g dry	ND			NC	50	
Tetrachloroethylene	ND	0.05	ug/g dry	ND			NC	50	
Toluene	ND	0.05	ug/g dry	ND			NC	50	
1,1,1-Trichloroethane	ND	0.05	ug/g dry	ND			NC	50	
1,1,2-Trichloroethane	ND	0.05	ug/g dry	ND			NC	50	
Trichloroethylene	ND	0.05	ug/g dry	ND			NC	50	
Trichlorofluoromethane	ND	0.05	ug/g dry	ND			NC	50	
Vinyl chloride	ND	0.02	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: 4-Bromofluorobenzene	*12.2*		*ug/g dry*		*137*	*50-140*			
Surrogate: Dibromofluoromethane	*8.74*		*ug/g dry*		*98.3*	*50-140*			
Surrogate: Toluene-d8	*11.3*		*ug/g dry*		*128*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	160	7	ug/g	ND	80.0	80-120			
F2 PHCs (C10-C16)	82	4	ug/g	ND	92.1	60-140			
F3 PHCs (C16-C34)	280	8	ug/g	34	113	60-140			
F4 PHCs (C34-C50)	180	6	ug/g	19	117	60-140			
Volatiles									
Acetone	6.34	0.50	ug/g	ND	63.4	50-140			
Benzene	3.03	0.02	ug/g	ND	75.7	60-130			
Bromodichloromethane	2.82	0.05	ug/g	ND	70.5	60-130			
Bromoform	2.73	0.05	ug/g	ND	68.1	60-130			
Bromomethane	4.87	0.05	ug/g	ND	122	50-140			
Carbon Tetrachloride	3.01	0.05	ug/g	ND	75.3	60-130			
Chlorobenzene	3.38	0.05	ug/g	ND	84.4	60-130			
Chloroform	2.97	0.05	ug/g	ND	74.2	60-130			
Dibromochloromethane	3.11	0.05	ug/g	ND	77.7	60-130			
Dichlorodifluoromethane	3.59	0.05	ug/g	ND	89.7	50-140			
1,2-Dichlorobenzene	2.84	0.05	ug/g	ND	70.9	60-130			
1,3-Dichlorobenzene	3.33	0.05	ug/g	ND	83.2	60-130			
1,4-Dichlorobenzene	3.31	0.05	ug/g	ND	82.9	60-130			
1,1-Dichloroethane	3.19	0.05	ug/g	ND	79.8	60-130			
1,2-Dichloroethane	3.01	0.05	ug/g	ND	75.4	60-130			
1,1-Dichloroethylene	2.95	0.05	ug/g	ND	73.8	60-130			
cis-1,2-Dichloroethylene	2.95	0.05	ug/g	ND	73.7	60-130			
trans-1,2-Dichloroethylene	3.08	0.05	ug/g	ND	77.1	60-130			
1,2-Dichloropropane	2.99	0.05	ug/g	ND	74.8	60-130			
cis-1,3-Dichloropropylene	2.68	0.05	ug/g	ND	66.9	60-130			
trans-1,3-Dichloropropylene	2.52	0.05	ug/g	ND	62.9	60-130			
Ethylbenzene	3.55	0.05	ug/g	ND	88.8	60-130			
Ethylene dibromide (dibromoethane, 1,2-	2.80	0.05	ug/g	ND	70.0	60-130			
Hexane	3.52	0.05	ug/g	ND	87.9	60-130			
Methyl Ethyl Ketone (2-Butanone)	11.3	0.50	ug/g	ND	113	50-140			
Methyl tert-butyl ether	6.58	0.05	ug/g	ND	65.8	50-140			
Methylene Chloride	2.90	0.05	ug/g	ND	72.5	60-130			
Styrene	3.23	0.05	ug/g	ND	80.9	60-130			
1,1,1,2-Tetrachloroethane	3.58	0.05	ug/g	ND	89.5	60-130			
1,1,2,2-Tetrachloroethane	2.54	0.05	ug/g	ND	63.4	60-130			
Tetrachloroethylene	3.51	0.05	ug/g	ND	87.7	60-130			
Toluene	3.78	0.05	ug/g	ND	94.4	60-130			
1,1,1-Trichloroethane	2.85	0.05	ug/g	ND	71.4	60-130			
1,1,2-Trichloroethane	2.45	0.05	ug/g	ND	61.2	60-130			
Trichloroethylene	3.02	0.05	ug/g	ND	75.5	60-130			
Trichlorofluoromethane	3.06	0.05	ug/g	ND	76.4	50-140			
Vinyl chloride	3.88	0.02	ug/g	ND	97.1	50-140			
m,p-Xylenes	7.04	0.05	ug/g	ND	88.0	60-130			
o-Xylene	3.48	0.05	ug/g	ND	87.1	60-130			
Surrogate: 4-Bromofluorobenzene	*9.67*		*ug/g*		*121*	*50-140*			
Surrogate: Dibromofluoromethane	*7.59*		*ug/g*		*94.9*	*50-140*			
Surrogate: Toluene-d8	*9.23*		*ug/g*		*115*	*50-140*			

Qualifier Notes:

None

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.

PARAC
LABORATORIE

Paracel ID: 2116057

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Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2116057	№ 129513

Client Name: GeoFirma	Project Ref: 20-211	Page 1 of 1
Contact Name: Tim Galt	Quote #:	Turnaround Time
Address: 1 Raymond St, Suite 200 Ottawa, ON K1R 1A2	PO #:	☐ 1 day ☐ 3 day
	E-mail: tgalt@geofirma.com	☐ 2 day ☒ Regular
Telephone:		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	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)	
1	SS21-01	S		2	8-Apr-21	12:30	X	X						✓
2	SS21-02	S		2	8-Apr-21	13:45	X	X						✓
3	SS21-03	S		2	8-Apr-21	14:00	X	X						✓
4	SS21-04	S		2	8-Apr-21	14:25	X	X						✓
5	SS21-05	S		2	8-Apr-21	15:10	X	X						✓
6														
7														
8														
9														
10														

Comments:

Method of Delivery: Drop Box

Relinquished By (Sign):	Received By Driver/Depot:	Received at Lab:	Verified By:
Relinquished By (Print): Tim Galt	Date/Time:	Date/Time: Apr 12 2021 12:05	Date/Time: Apr 12 2021
Date/Time: 12-APR-21 / 12:03	Temperature: °C	Temperature: 7.1 °C	pH Verified: ☐ By: NA

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Certificate of Analysis

Geofirma Engineering Ltd.

1 Raymond St.,Suite 200
Ottawa, ON K1R 1A2
Attn: Chris Morgan

Client PO: 20211
Project: 20-211
Custody:

Report Date: 29-Apr-2021
Order Date: 26-Apr-2021

Order #: 2118046

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

Paracel ID	Client ID
2118046-01	SS21-1
2118046-02	SS21-2

Approved By:

Mark Foto, M.Sc.
Lab Supervisor

Certificate of Analysis

Client: Geofirma Engineering Ltd.

Client PO: 20211

Report Date: 29-Apr-2021

Order Date: 26-Apr-2021

Project Description: 20-211

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	27-Apr-21	28-Apr-21
PHC F1	CWS Tier 1 - P&T GC-FID	27-Apr-21	28-Apr-21
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	24-Apr-21	27-Apr-21
REG 153: Metals by ICP/MS, soil	EPA 6020 - Digestion - ICP-MS	28-Apr-21	28-Apr-21
Solids, %	Gravimetric, calculation	28-Apr-21	28-Apr-21

Certificate of Analysis

Client: Geofirma Engineering Ltd.

Client PO: 20211

Report Date: 29-Apr-2021

Order Date: 26-Apr-2021

Project Description: 20-211

	Client ID:	SS21-1	SS21-2	-	-
	Sample Date:	14-Apr-21 08:45	22-Apr-21 14:45	-	-
	Sample ID:	2118046-01	2118046-02	-	-
	MDL/Units	Soil	Soil	-	-
Physical Characteristics					
% Solids	0.1 % by Wt.	94.0	88.9	-	-
Metals					
Antimony	1.0 ug/g dry	<1.0	-	-	-
Arsenic	1.0 ug/g dry	1.7	-	-	-
Barium	1.0 ug/g dry	9.4	-	-	-
Beryllium	0.5 ug/g dry	<0.5	-	-	-
Boron	5.0 ug/g dry	7.4	-	-	-
Cadmium	0.5 ug/g dry	<0.5	-	-	-
Chromium	5.0 ug/g dry	7.1	-	-	-
Cobalt	1.0 ug/g dry	1.8	-	-	-
Copper	5.0 ug/g dry	<5.0	-	-	-
Lead	1.0 ug/g dry	1.9	-	-	-
Molybdenum	1.0 ug/g dry	<1.0	-	-	-
Nickel	5.0 ug/g dry	<5.0	-	-	-
Selenium	1.0 ug/g dry	<1.0	-	-	-
Silver	0.3 ug/g dry	<0.3	-	-	-
Thallium	1.0 ug/g dry	<1.0	-	-	-
Uranium	1.0 ug/g dry	<1.0	-	-	-
Vanadium	10.0 ug/g dry	10.9	-	-	-
Zinc	20.0 ug/g dry	<20.0	-	-	-
Volatiles					
Benzene	0.02 ug/g dry	-	<0.02	-	-
Ethylbenzene	0.05 ug/g dry	-	<0.05	-	-
Toluene	0.05 ug/g dry	-	<0.05	-	-
m,p-Xylenes	0.05 ug/g dry	-	<0.05	-	-
o-Xylene	0.05 ug/g dry	-	<0.05	-	-
Xylenes, total	0.05 ug/g dry	-	<0.05	-	-
Toluene-d8	Surrogate	-	117%	-	-
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	-	<7	-	-
F2 PHCs (C10-C16)	4 ug/g dry	-	<4	-	-
F3 PHCs (C16-C34)	8 ug/g dry	-	223	-	-
F4 PHCs (C34-C50)	6 ug/g dry	-	126	-	-

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	ND	5.0	ug/g						
Cadmium	ND	0.5	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						
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	*9.45*		*ug/g*		*118*	*50-140*			

Certificate of Analysis

Client: Geofirma Engineering Ltd.

Client PO: 20211

Report Date: 29-Apr-2021

Order Date: 26-Apr-2021

Project Description: 20-211

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	5			NC	30	
F3 PHCs (C16-C34)	17	8	ug/g dry	28			NC	30	
F4 PHCs (C34-C50)	18	6	ug/g dry	23			24.4	30	
Metals									
Antimony	1.4	1.0	ug/g dry	ND			NC	30	
Arsenic	4.7	1.0	ug/g dry	4.5			5.3	30	
Barium	10.2	1.0	ug/g dry	10.4			1.8	30	
Beryllium	ND	0.5	ug/g dry	ND			NC	30	
Boron	ND	5.0	ug/g dry	ND			NC	30	
Cadmium	ND	0.5	ug/g dry	ND			NC	30	
Chromium	7.4	5.0	ug/g dry	7.4			0.5	30	
Cobalt	3.3	1.0	ug/g dry	3.2			5.0	30	
Copper	9.4	5.0	ug/g dry	9.5			1.6	30	
Lead	4.8	1.0	ug/g dry	4.2			13.4	30	
Molybdenum	2.1	1.0	ug/g dry	1.5			NC	30	
Nickel	9.5	5.0	ug/g dry	9.2			3.0	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	16.0	10.0	ug/g dry	17.6			9.4	30	
Zinc	44.7	20.0	ug/g dry	37.9			16.5	30	
Physical Characteristics									
% Solids	96.5	0.1	% by Wt.	96.0			0.5	25	
Volatiles									
Benzene	0.032	0.02	ug/g dry	0.033			1.5	50	
Ethylbenzene	ND	0.05	ug/g dry	ND			NC	50	
Toluene	ND	0.05	ug/g dry	ND			NC	50	
m,p-Xylenes	0.130	0.05	ug/g dry	0.165			23.5	50	
o-Xylene	ND	0.05	ug/g dry	ND			NC	50	
Surrogate: Toluene-d8	*9.72*		*ug/g dry*		*116*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	195	7	ug/g	ND	97.6	80-120			
F2 PHCs (C10-C16)	89	4	ug/g	5	100	60-140			
F3 PHCs (C16-C34)	251	8	ug/g	28	109	60-140			
F4 PHCs (C34-C50)	170	6	ug/g	23	112	60-140			
Metals									
Antimony	46.4	1.0	ug/g	ND	92.6	70-130			
Arsenic	50.3	1.0	ug/g	1.8	97.1	70-130			
Barium	52.4	1.0	ug/g	4.2	96.5	70-130			
Beryllium	47.8	0.5	ug/g	ND	95.5	70-130			
Boron	46.3	5.0	ug/g	ND	89.3	70-130			
Cadmium	46.5	0.5	ug/g	ND	92.8	70-130			
Chromium	52.1	5.0	ug/g	ND	98.3	70-130			
Cobalt	49.9	1.0	ug/g	1.3	97.2	70-130			
Copper	50.4	5.0	ug/g	ND	93.3	70-130			
Lead	46.8	1.0	ug/g	1.7	90.2	70-130			
Molybdenum	48.3	1.0	ug/g	ND	95.5	70-130			
Nickel	50.7	5.0	ug/g	ND	94.0	70-130			
Selenium	45.7	1.0	ug/g	ND	91.2	70-130			
Silver	36.0	0.3	ug/g	ND	72.0	70-130			
Thallium	46.4	1.0	ug/g	ND	92.7	70-130			
Uranium	50.1	1.0	ug/g	ND	99.6	70-130			
Vanadium	55.9	10.0	ug/g	ND	97.7	70-130			
Zinc	61.9	20.0	ug/g	ND	93.4	70-130			
Volatiles									
Benzene	4.71	0.02	ug/g	ND	118	60-130			
Ethylbenzene	4.40	0.05	ug/g	ND	110	60-130			
Toluene	4.85	0.05	ug/g	ND	121	60-130			
m,p-Xylenes	9.37	0.05	ug/g	ND	117	60-130			
o-Xylene	4.42	0.05	ug/g	ND	110	60-130			
Surrogate: Toluene-d8	*8.12*		*ug/g*		*102*	*50-140*			

Qualifier Notes:

QC Qualifiers :

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.

PARAC LABORATORIES

Paracel ID: 2118046

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Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2118046	

Client Name: Geofirma Engineering	Project Ref: 20-211	Page __ of __
Contact Name: Chris Morgan	Quote #: Standing offer	Turnaround Time
Address: 1 Raymond St. Ottawa, ON	PO #: 20211	☐ 1 day ☐ 3 day
Telephone: 613-402-1701	E-mail: cmorgan@geofirma.com	☐ 2 day ☒ Regular
		Date Required:

☒ REG 153/04 ☐ REG 406/19

☒ Table 1 ☐ Res/Park ☐ Med/Fine
☐ Table 2 ☐ Ind/Comm ☐ Coarse
☐ Table 3 ☐ Agri/Other
☐ Table
For RSC: ☐ Yes ☐ No

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

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

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)					
1	SS21-1	S		1	14-Apr-21	08:45				X								
2	SS21-2	S		2	22-Apr-21	14:00	X											
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		

Comments:

Method of Delivery: Drop Box

Relinquished By (Sign): Chris Morgan	Received By Driver/Depot:	Received at Lab:	Verified By:
Relinquished By (Print):	Date/Time:	Date/Time: Apr 26 2021 1046	Date/Time: Apr 26 2021 1103
Date/Time: 26-Apr-21 10:30	Temperature: °C	Temperature: 3.2	pH Verified: ☐ By: NT