PHASE 2 INITIAL BOREHOLE DRILLING AND TESTING AT IG_BH04/05/06 - IGNACE AREA

WP01 Site Demobilization Report – Site Infrastructure for IG_BH06

APM-REP-01332-0353 **October 2022**

Golder Associates Ltd.

nwmo
NUCLEAR WASTE MANAGEMENT ORGANIZATION
SOCIÉTÉ DE GESTION DES DÉCHETS NUCLÉAIRES

Nuclear Waste Management Organization
22 St. Clair Avenue East, 4th Floor
Toronto, Ontario
M4T 2S3
Canada

Tel: 416-934-9814
Web: www.nwmo.ca

REPORT

PHASE 2 INITIAL BOREHOLE DRILLING AND TESTING AT IG_BH04/05/06. IGNACE AREA

WP01 Site Demobilization Report - Site Infrastructure for IG_BH06

Submitted to:

Nuclear Waste Management Organization
4th Floor
22 St. Clair Avenue East
Toronto, Ontario
M4T 2S3

Submitted by:

Golder Associates Ltd.
6925 Century Avenue,
Suite #100,
Mississauga, Ontario,
L5N 7K2, Canada
+1 905 567 4444

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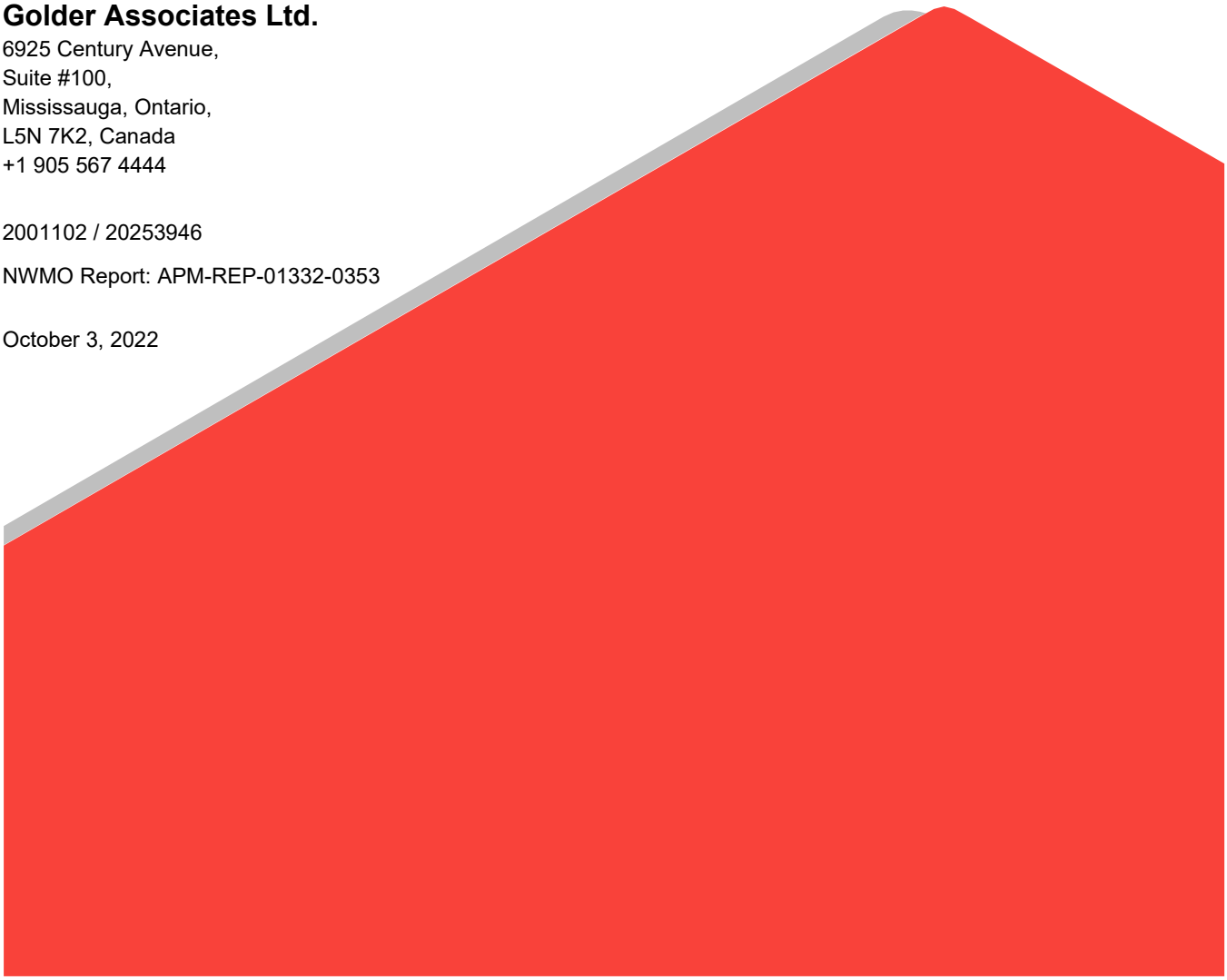
NWMO Report: APM-REP-01332-0353

October 3, 2022



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WP01 SITE DEMOBILIZATION REPORT
SITE INFRASTRUCTURE FOR IG_BH06

CLIENT INFORMATION

Project Name:	Phase 2 Initial Borehole Drilling and Testing, Ignace Area
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Client Contact:	Geoff Crann	Warwick Watt
Telephone	705-626-0569	437-972-3669
Email:	gcrann@nwmo.ca	wwatt@nwmo.ca

Issue/Revision Index

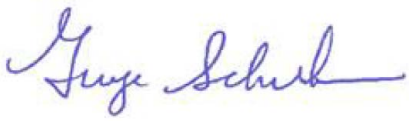
Issue Codes	Revision					Revision Details
	No.	By	Reviewed	Approved	Date	
RR	0	KRM	GWS	JLC	2022-03-21	Draft for review and comment
RR	1	KRM	GWS	JLC	2022-07-06	Updated with June 2022 activities
RI	2	KRM	GWS	JLC	2022-07-11	FINAL - Added Signatures - Addressed NWMO comment in section 4.2
RI	3	KRM	GWS	JLC	2022-09-12	Re-Issue - Updated reference to ground surface reference datum at IG_BH06
RI	4	KRM	GWS	JLC	2022-10-03	Revised based on NWMO Comments - Added Datum Correction Memo as Appendix C. Referenced Appendix C in Section 3.8

Issue Codes: RR = Released for Review and Comments, RI = Released for Information

SIGNATURES

Prepared by: 

Kyle Matter, MSc
WP01 Lead

Reviewed by: 

George Schneider, MSc, PGeo
Senior Technical Advisor - Principal

Approved by: 

Joe Carvalho, PhD, PEng
Senior Geotechnical Engineer - Principal

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1.0 INTRODUCTION

The Phase 2 Borehole Drilling and Testing at IG_BH04/05/06 project is part of the Phase 2 Geoscientific Preliminary Field Investigations of the Nuclear Waste Management Organization's (NWMO) Adaptive Phased Management Site Selection Phase.

This project involves testing of deep borehole IG_BH04 and the drilling and testing of deep boreholes IG_BH05 and IG_BH06 in the Ignace area within the identified Revell Potential Repository Area. The work comprises a total of 11 work packages and is being carried out by a team led by Golder Associates Ltd. (Golder) on behalf of the NWMO.

Work Package WP01 (WP01) addresses site establishment and site infrastructure activities for the drilling and testing of boreholes IG_BH04, IG_BH05, and IG_BH06. The overall program at IG_BH06 is described in the Borehole Characterization Plan for IG_BH06 (Golder 2021a).

The Ignace area is located a direct distance of approximately 21 km southeast of the Wabigoon Lake Ojibway Nation and a direct distance of 43 km northwest of the Town of Ignace. Access to the area is via Highway 17 and primary logging roads, as shown on Figure 1.

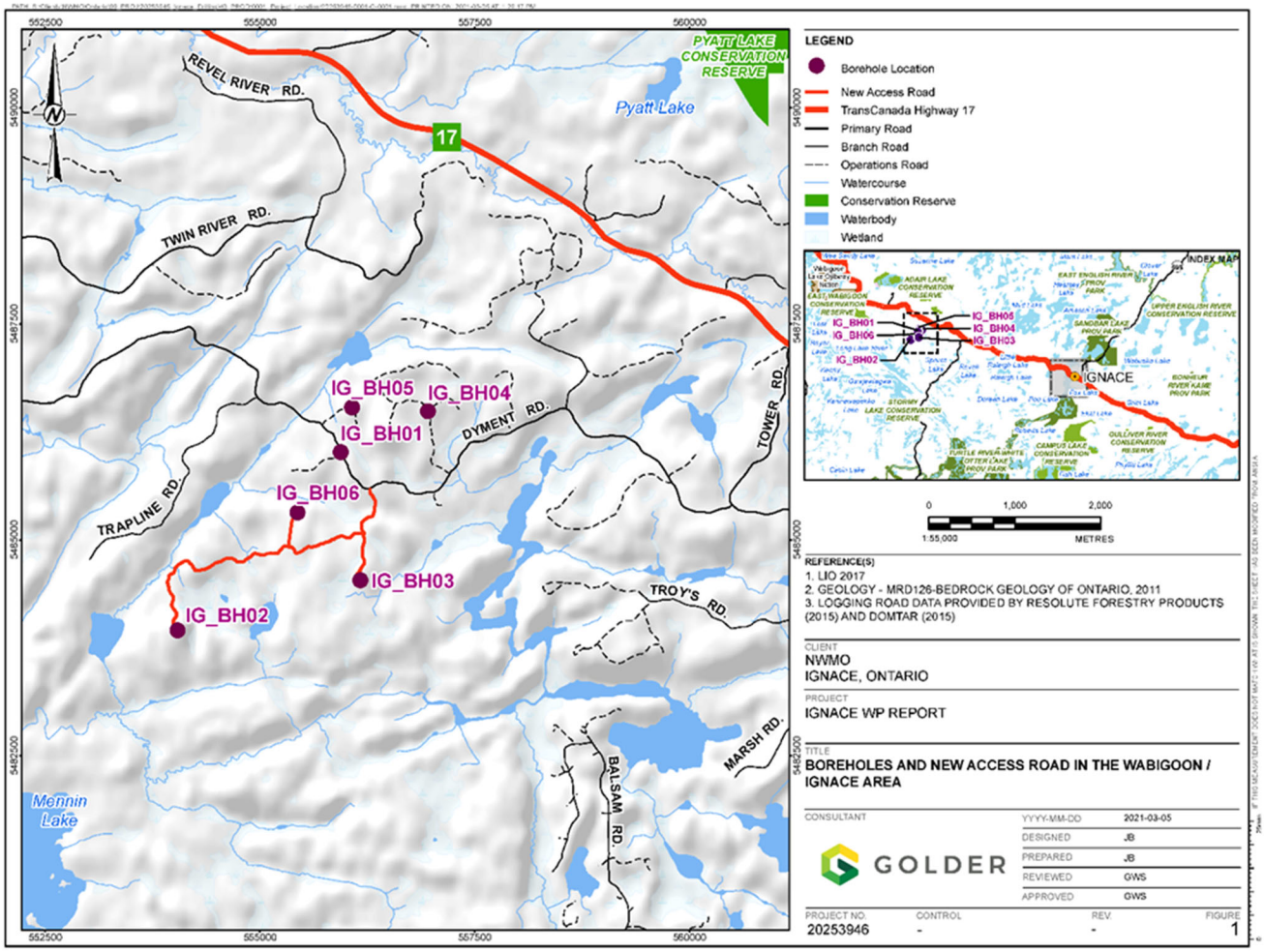


Figure 1: The Ignace Area - access roads and drill sites for IG_BH04, IG_BH05, and IG_BH06

2.0 OBJECTIVE

As stated in the WP01 Test Plan (Golder 2021b), a site decommissioning technical report is to be submitted for each of the drill sites to document the dismantling and demobilization of site infrastructure.

Section 9.5 of the WP01 Test Plan (Golder 2021b), states that the overall objectives of demobilization and decommissioning are as follows:

- To remove all equipment and infrastructure from the site upon completion of borehole drilling and testing in a timely manner;
- To ensure no refuse or waste is left behind either on the site or in the immediate surroundings;
- To remove any potentially impacted fill material from the site, such as petroleum hydrocarbons, drilling mud, or other substances;
- To leave the site in a physically and environmentally acceptable state; and,
- To perform the demobilization safely, and to document the manner in which demobilization was performed.

This report describes the site demobilization and decommissioning activities performed at borehole IG_BH06. An aerial photo of the IG_BH06 site while in operation during September 2021 is provided in Appendix A (Photo 1).

3.0 DEMOBILIZATION AND DECOMMISSIONING ACTIVITIES

The demobilization of site facilities from IG_BH06 was carried out by Obish Construction LP (Obish) and their subcontractors, and the demobilization of the drilling infrastructure was carried out by Rodren Drilling Ltd. (Rodren) all under the supervision of Golder.

The demobilization and decommissioning activities at IG_BH06 took place during the following periods and comprised the following general activities.

- October 2021 – A recycling bin was demobilized from IG_BH06.
- November 2021 – A diesel generator was demobilized from IG_BH06 and a replacement generator was transferred from IG_BH05.
- December 2021 – One Baker Tank was demobilized from site.
- February 2022 – The drilling rig and most of the drilling infrastructure was demobilized from IG_BH06; a cap was welded to the borehole casing; the electrical system decommissioning of the site was completed; and the site infrastructure demobilization was started.
- March 2022 – All remaining drilling and site infrastructure items were demobilized from IG_BH06. The IG_BH06 wellhead was surveyed, and a site demobilization inspection was completed by Golder along with a representative from the NWMO.
- June 2022 – The remaining underground electrical conduit was excavated from IG_BH06. The excavated areas were backfilled, and the site conditions were graded. Stained gravel, general debris, and the perimeter silt fence were collected and removed. Spray-paint marks indicating shot point locations along the

WP12 trails were cleaned. A final site decommissioning inspection was completed by Golder's site supervisor and an NWMO representative.

Further details of these activities are provided in the subsections below.

3.1 Drilling Equipment

Water Tanks

Drill water was stored in two 28,350 L Baker Tanks located on the north side of the site. The Baker tanks were dedicated to receiving fresh water sourced from the Township of Ignace municipal water supply, with the water later transferred to the fluorescein tank and mixed with fluorescein tracer as needed.

On December 20, 2021, Atlas Dewatering removed one of the Baker Tanks from IG_BH06 after WP02 and WP05 activities were completed. On February 9, 2022, Atlas Dewatering removed the remaining Baker Tank after WP06 activities were completed (Appendix A, Photo 2).

Drilling Rig

A skid mounted Discovery Diamond Drill model EF-100 was transferred to IG_BH06 from IG_BH05 on August 14, 2021, and used for WP02, WP06, and WP09 activities at IG_BH06. All field activities requiring the EF-100 were completed on February 26, 2022.

The EF-100 was moved off the borehole on February 27, 2022 and was demobilized by Rodren from IG_BH06 on February 28, 2022 using a flat deck transport truck to Rodren's facility in Winnipeg, Manitoba.

Secondary Containment Disposal and Rig Matting

Beneath the workover rig was a secondary containment system with a central sump which captured any drill fluid spills that could potentially occur at the drill rig or within the drill fluid circulation system. Rig matting was placed over top of the containment system, to provide a level and solid foundation for the drill rig infrastructure.

The rig mats were removed from the drill pad on February 27, 2022 and stacked on-site in preparation for off-site demobilization. On February 28, 2022 the rig mats were loaded onto a transport truck and transported off-site to Rodren's facility in Winnipeg, Manitoba.

The secondary containment system was disassembled and placed into a waste bin on February 27, 2022 and disposed off-site by Obish's subcontractor, B&M Delivery, on February 28, 2022 (Appendix A, Photo 3).

Other Drilling Equipment and Support Infrastructure

Between February 26 to March 1, 2022, Rodren demobilized the following infrastructure from IG_BH06:

- February 26, 2022 - Rodren demobilized the centrifuge unit (AMC SRU), two rod sloops, two frost fighters, and two tanks used for wastewater and fluorescein using a flatbed truck. The load was transported off-site to Rodren's facility in Winnipeg, Manitoba.
- February 27, 2022 - Rodren demobilized the core extraction shack from site using a flatbed truck. The load was transported off-site to Rodren's facility in Winnipeg, Manitoba.
- February 28, 2022 - Rodren demobilized two frost fighters and all drilling supplies along with the rig mats, and the EF-100 drill rig off-site to Rodren's facility in Winnipeg, Manitoba.

- March 1, 2022 - Rodren demobilized the skid steer and dozer off-site to Rodren's facility in Winnipeg, Manitoba.

3.2 Security Fencing

Approximately 190 m (620 feet) of 2.5 m (8 feet) tall fencing, and 43.9 m (144 feet) of 2.9 m (9.5 feet) tall fencing was originally installed around the perimeter of the site in August 2021 to define the work area, provide security, and to discourage wildlife from entering the site. A lockable gate was installed on the south side of the site, to allow worker access to the site from the parking area.

In addition to the perimeter fencing, approximately 70 m (230 feet) of 1.8 m (6 feet) tall fencing was installed around the drill rig area to define an interior exclusion zone.

Obish took down all perimeter and interior fencing at IG_BH06 from February 28 to March 2, 2022 (Appendix A, Photo 4) and transported the 190 m (620 feet) of 2.5 m (8 feet) tall fencing to the NWMO's warehouse in Ignace on March 2, 2022. The remaining (rented) fencing was transported off-site by Obish to be returned to their supplier.

3.3 Site Communications

Cellular signals from the local mobile network were amplified for all site workers through two SureCall Fusion5X 2.0 Yagi/Panel Signal Boosters which were installed on two 15 m (50 feet) masts attached to Golder's office trailer and the Core Logging Seacan.

Internet service for the site was initially provided through the local cellular network with two Bell Canada ZTE MF288 Turbo Hub cellular internet receivers. On September 16, 2021, Golder installed Starlink satellite internet service to improve the internet service on site.

Emergency satellite communications were provided by a handheld Garmin In-Reach SE.

The two 15 m (50 feet) communication masts were removed from the Golder's office trailer and the Core Logging Seacan on February 28, 2022. All elements of the site communication systems were disconnected and packed for demobilization on February 28. (Appendix A, Photo 5).

On March 1, 2022 the Starlink satellite internet system was shipped to the Golder Mississauga office and all other site communication equipment was shipped to another Golder field project location.

3.4 Borehole Casing

A threaded HWT extension casing with a lockable lid was installed at IG_BH06 by a Rodren welder on February 28, 2022 (Appendix A, Photo 6).

On March 4, 2022 security fencing was installed by the NWMO around the borehole and the casing lid was secured with two locks supplied by the NWMO.

3.5 Site Trailers

3.5.1 Washroom Trailer

A heated and self-contained washroom trailer was placed on the south side of the site adjacent to the Rodren office trailer. The washroom trailer was divided into two units with separate entrances, each containing one toilet

and one sink. The self-contained washroom trailer was demobilized off-site from IG_BH06 by Obish subcontractor, Balla Bros, on February 28, 2022 (Appendix A, Photo 7).

3.5.2 Core Logging and Storage Seacans

Two 12 x 2.5 m (40 x 8 feet) modified shipping containers (seacans) were placed at the west side of site near the drill rig and functioned as a working space for all the work packages activities. One seacan was designated as the WP03 Core Logging Seacan and the other was designated as the WP02 Core Storage Seacan.

Two additional 6 x 2.5 m (20 x 8 feet) seacans were set up inside the interior drilling area fencing. One seacan was used for Rodren general storage and the other was used to house the wastewater and fluorescein tanks.

On March 1, 2022 the two 6 x 2.5 m (20 x 8 feet) storage seacans were demobilized from IG_BH06 by Secure Store (Appendix A, Photo 8).

On March 2, 2022 the two 12 x 2.5 m (40 x 8 feet) modified seacans were demobilized from IG_BH06 by Secure Store.

3.5.3 Office Trailers

A 12 x 3 m (40 x 10 feet) mobile office trailer was set up on the east side of the site and two 9.75 x 3 m (32 x 10 feet) mobile office trailers were set up on the southeast corner of the site. The office trailers functioned as field offices for Golder, the NWMO and the Wabigoon Lake Ojibway Nation (WLON), and Rodren, respectively.

All three site trailers were loaded onto trailers on March 1, 2022 (Appendix A, Photo 9) and moved to Tower Road. On March 3, 2022 the snow and ice were removed from the roofs of all three of the trailers and two of the site trailers were demobilized from IG_BH06 by Secure Store. The final site trailer was demobilized from IG_BH06 by Secure Store on March 7, 2022.

3.6 Power and Lighting

Fediuk Electric Inc. (Fediuk) from Dryden, Ontario was retained by Obish to disconnect and dismantle the power generation and distribution system at IG_BH06.

3.6.1 Power Distribution

Power from the main site generator was distributed to the site facilities via double jacketed electrical cables. The majority of the power lines were mounted to the site perimeter fence. In areas where the electrical lines passed through a trafficable area, they were buried underground inside ABS conduit.

On February 28, 2022 the site power system was decommissioned and all above ground infrastructure was removed by Fediuk.

On March 2, 2022 it was noted that the underground electrical conduit infrastructure was unable to be excavated and removed from site due to frozen ground conditions. The NWMO and Golder agreed that this task would be completed in Spring 2022 when the ground has thawed.

On June 27, 2022, the underground electrical conduit infrastructure including PVC piping, grounding wires, and grounding plates were excavated and removed by Obish from IG_BH06.

3.6.2 Power Generation

Electrical Generator

From site set-up in August 2021, the site was powered by MQ WhisperWatt 70 diesel-electric generator, which supplied 56 kW (70 kVA) of 120 V single-phase output. It was used to power the site office trailers, core logging, and storage seacans, washroom trailer, and a portable power system on the drill pad.

On November 6, 2021 Fediuk was performing regular maintenance on the generator and noted that the coolant level was lower than expected and suspected there was a coolant leak. Golder's site supervisors were advised to monitor and top-up the coolant level until the generator was replaced or repaired.

On the morning of November 17, 2021, the Golder site supervisor arrived at site and noticed that the generator was not operating. The generator was diagnosed by Fediuk who identified that the alternator was faulty and that a replacement generator was required at IG_BH06. As field work at IG_BH05 was compete and site decommissioning activities were in progress, the Cummins mobile diesel generator (model C60D6R) was transferred from IG_BH05 to IG_BH06 and the MQ WhisperWatt generator was demobilized from site.

On March 1, 2022, the Cummins mobile diesel generator was demobilized from site and returned to United Rentals by Obish (Appendix A, Photo 10).

Fuel Tank & Secondary Containment

A 4,500 L double-walled fuel storage tank was located adjacent to the generator, so that refuelling of the generator could be performed directly from the fuel storage tank. The fuel tank and generator were placed inside a secondary containment berm with containment capacity of 5,460 L, sufficient to contain the maximum amount of fuel and oil in the system. The fuel tank was surrounded by concrete barricades to protect it from vehicular traffic and heavy machinery.

On March 1, 2022 Obish removed the concrete barricades and demobilized them from site.

On March 2, 2022 Mastrangelo Fuels (an Obish subcontractor) drained the remaining fuel from the fuel storage tank. The fuel storage tank was then loaded onto a Mastrangelo Fuels flatbed truck and demobilized from site.

On March 2, 2022 Obish disassembled the secondary containment berm and demobilized it from site.

3.6.3 Site Illumination

Three 4-kW Wacker Neuson Metrolite LTV4 diesel powered light towers with LED lights were installed at the site to provide outside illumination during work at night. Obish demobilized all three light towers from IG_BH06 on March 2, 2022.

3.7 Solid Waste

Solid waste was managed using one garbage bin and one recycling bin located near the front entrance to the site, for ease of access by the garbage and recycling truck. The bins were both located inside the fenced area and had lids which could be secured to prevent access by animals. The bins were supplied by Obish subcontractor, B&M Deliveries (B&M), who periodically transported waste material to the Town of Dryden Landfill Site for disposal.

Following a disagreement with B&M over the issue of wastewater being spilled by the subcontractor during recycling and garbage pick-ups, the recycling and garbage bins were both removed from IG_BH06 by B&M on October 23, 2021 and November 9, 2021 respectively. For the remainder of the time on site, Golder collected all

site waste and recycling on a regular basis and then transported and deposited the material in bins located in Ignace, as per arrangements made with the Township of Ignace.

For the purpose of demobilization, an empty roll-off garbage bin was delivered to IG_BH06 by B&M on February 14, 2022. The filled bin was removed and replaced with an empty bin by B&M on February 28, 2022. The second roll-off garbage bin was demobilized from IG_BH06 by B&M on March 3, 2022.

3.8 Borehole Survey

A final as-built survey of the borehole wellhead was performed by Rugged Geomatics Inc. (Rugged Geomatics) on March 2, 2022. Rugged Geomatics provided the results of this survey in a letter dated March 17, 2022 which is attached in Appendix B.

In August 2022, while preparing the IG_BH06 WP09 data report, Golder identified a discrepancy in the position of the **ground surface elevation reference datum** stated in the WP02 data report issued in June 2022 relative to the survey results provided by Rugged Geomatics (referenced above).

In an effort to resolve this discrepancy, Golder re-examined the correlation of the Rugged Geomatics survey data to the as-built wellhead at the time of the survey and reviewed the well head construction schematic from the WP02 data report for IG_BH06.

Based on the data review, Golder concluded that in the same manner to what happened at IG_BH05, the surveyed position of the HWT (PQ) surface casing at IG_BH06 reported in the letter from Rugged Geomatics was inadvertently mistaken to be the position of the HWT (PQ) surface casing as it was during drilling, testing and Westbay installation. However, prior to being surveyed by Rugged Geomatics in March 2022, this original casing at IG_BH06 was extended after the installation of the Westbay system in order to complete the well head with a monopod bracket and protective casing.

The original position of the HWT (PQ) surface casing prior to it being extended was also surveyed and was identified by Rugged Geomatics as survey point 506 “welded joint on pqt”.

Using that information, the correct ground surface elevation reference datum for IG_BH06 was calculated relative to the original position of the HWT (PQ) casing. Golder prepared a memo detailing the IG_BH06 datum correction which is provided in Appendix C.

The Universal Transverse Mercator (UTM) Zone 15 coordinates and geodetic elevations (CGVD2013 datum) survey results from the Rugged Geomatics as-built survey are provided in the table below, along with the corrected ground surface datum coordinates as calculated by Golder.

Table 1 - IG_BH06 Borehole Casing Elevations

Survey Point Description	Northing	Easting	Elevation (CGVD2013)
IG_BH06 – Top of Well Casing	5485327.78	555440.44	418.72
IG_BH06 – Top of Westbay Casing – White Top	5485327.79	555440.46	418.65
IG_BH06 – Top of Westbay Casing – Silver Cap	5485327.77	555440.44	418.60
IG_BH06 – Top of PQT	5485327.84	555440.44	418.55
IG_BH06 – Sump Box Weld	5485328.12	555440.47	417.87

Survey Point Description	Northing	Easting	Elevation (CGVD2013)
IG_BH06 – Welded Joint on PQT	5485327.95	555440.36	418.17
IG_BH06 – Ground surface (located approximately 2.5m from the borehole)	5485331.28	555440.75	417.72
IG_BH06 - Ground surface elevation reference datum	5485328.11	555440.35	417.74

4.0 SITE INSPECTIONS

4.1 Demobilization Inspection - March 2022

Following completion of all site demobilization and decommissioning activities, a site walkover inspection of IG_BH06 was performed on March 3, 2022 by Shady Hashem, Golder's site supervisor, and Matt Long, a site representative from the NWMO.

The objective of the inspection was to check for the presence of any litter which may still be present. A clean-up was completed, the entire site was inspected, and it was visually confirmed that there was no litter at the site. Due to the snow cover and frozen ground conditions, a final post-thaw inspection will be conducted in Spring 2022 to check for any remaining stained soil and litter.

4.2 Final Inspection - June 2022

Golder returned to IG_BH06 on June 27 to 29, 2022 to complete final site clean-up and decommissioning activities in post-thaw conditions. The NWMO's Geoff Crann met on-site with Warren Willis, Golder's site supervisor, and workers from Obish.

The following clean-up and decommissioning activities were completed prior to the final inspection at IG_BH06:

- One pallet of cement bags and two piles of salted sand were removed from site.
- Minor grading of the drill sump was completed.
- Spray-paint marks indicating shot point locations along the WP12 trails were cleaned.
- In addition, sandbags, general debris, gravel with minor staining, garbage, and the perimeter silt fence were collected and removed.

At the end of the day on June 28, 2022, a final walkover of the main site was completed by Geoff Crann and Warren Willis, and it was confirmed that the site conditions were acceptable.

Final completion of the WP12 trail clean-up work was completed on June 29, 2022 and the conditions were reviewed and accepted by the NWMO.

4.3 Site Decommissioning Checklist

The completion of demobilization and decommissioning activities was documented as they took place and the results recorded on a site decommissioning checklist. The checklist was signed off by Golder representatives upon completion of the winter demobilization activities and upon completion of the final post-thaw demobilization activities. The site decommissioning checklist is provided in Appendix D.

5.0 FINAL SITE CONDITIONS

An aerial photo of the IG_BH06 drill site was taken following completion of all site activities on June 28, 2022 by Geoff Crann of the NWMO (Appendix A, Photo 11).

6.0 REFERENCES

Golder (Golder Associates Ltd.), 2021a. Phase 2 Initial Borehole Drilling and Testing at IG_BH04/05/06, Ignace Area. Borehole Characterization Plan for IG_BH06 (NWMO Document: APM-PLAN-01332-0275), September 2021.

Golder, 2021b. WP01 Test Plan - Site Infrastructure for IG_BH04/05/06 (NWMO Document: APM-PLAN-01332-0373), March 2021.

APPENDIX A

IG_BH06 Site Demobilization Photos

Photo 1 - Drone photo of the commissioned IG_BH06 site, taken September 2021.

Photo 2 – Baker Tank demobilization, taken February 9, 2022

Photo 3 – IG_BH06 after removal of rig mats and secondary containment system, taken February 27, 2022

Photo 4 – Perimeter fence removal, taken February 28, 2022

Photo 5 – Communication system disconnect & removal, taken February 28, 2022

Photo 6 – IG_BH06 borehole welded cap, taken February 28, 2022.

Photo 7 – Removal of washroom trailer, taken February 28, 2022.

Photo 8 – Demobilization of storage seacan by Secure Store, taken March 1, 2022.

Photo 9 – Loading of office trailer by Secure Store, taken March 1, 2022.

Photo 10 – Demobilization of electrical generator by Obish, taken March 1, 2022.

Photo 11 – Aerial drone photo of IG_BH06 following post-thaw inspection, taken June 28, 2022

APPENDIX B

IG_BH06 As-Built Survey Letter

2022 03 17

Kyle Matter
Construction Project Manager
Golder Associates Ltd.
6925 Century Avenue
Suite 100
Mississauga, Ontario
L5N 7K2

Dear Mr. Matter;

RE: As-built Survey
Borehole IG_BH06
Nuclear Waste Management Organization
Dyment Site
Our File No. SK18128

Below please find the UTM Zone 15 Coordinates and geodetic elevations(CGVD**2013** Datum) for various components of the borehole. Golder's Shady Hashem, P. Eng. instructed us on site during the survey with respect to coding and identification of the points below.

Point	**Easting**	**Northing**	**Elevation**	**code**
504	555440.45	5485328.35	417.38	referencepoint beforebackfilling
505	555440.75	5485331.28	417.72	ground level
506	555440.36	5485327.95	418.17	welded joint on pqt
507	555440.47	5485328.12	417.87	sump box weld
508	555440.44	5485327.84	418.55	top of pqt
509	555440.44	5485327.77	418.65	topofwestbaycasingsilvercap
510	555440.46	5485327.79	418.60	topofwestbaycasingwhitetop
511	555440.44	5485327.78	418.72	top of well cap

Thanking you for the opportunity to be of service, I remain

Yours Very Truly,

Eric Rody, B.Sc., OLS, CLS

Unit 3, 619 Ninth Street North, Kenora, Ont. P9N 2S9
T: 1+807.464.3677

APPENDIX C

IG_BH06 Data Correction Memo

TECHNICAL MEMORANDUM

DATE September 27, 2022 **Project No.** 20253946

TO Warwick Watt
Nuclear Waste Management Organization

CC Andrew Verok, Matt Bowman, Kyle Matter, Jennifer Hlookoff, Natacha Lugo Bizarro

FROM George Schneider, Joe Carvalho, Natalie Solis **EMAIL george.schneider@wsp.com**

CORRECTION TO REFERENCE GROUND SURFACE ELEVATION DATUM – IG_BH06 – PHASE 2 INITIAL BOREHOLE DRILLING AND TESTING AT IG_BH04/05/06, IGNACE AREA

Mr. Watt

While the WP09 team was preparing the data report for IG_BH06, we came across a discrepancy in the position of the **ground surface elevation reference datum** stated in the WP02 data report issued in June 2022 relative to the survey results provided by Rugged Geomatics in their letter dated March 17, 2022.

In an effort to resolve this discrepancy, we re-examined our correlation of the Rugged Geomatics survey data to the as-built wellhead at the time of the survey, reviewed the well head construction schematic from the WP02 data report for IG_BH06, and prepared a as shown in the following attachments to this memorandum.

- Attachment 1 - Correlation of Wellhead Survey Data from Rugged Geomatics (letter dated March 17, 2022) to As-Built Wellhead at IG_BH06
- Attachment 2 - Original Casing Stickup and Ground Level Reference Point from WP02 Data Report for IG_BH06
- Attachment 3 - Schematic Showing IG_BH06 Well Head A – Initial Well Head during Drilling / Testing and B - Final Well Head with Locking Extension Added

Based on our review, we have concluded that in the same manner to what happened at IG_BH05, the surveyed position of the HWT (PQ) surface casing at IG_BH06 reported in the letter from Rugged Geomatics was inadvertently mistaken to be the position of the HWT (PQ) surface casing as it was during drilling, testing and Westbay installation. However, prior to being surveyed by Rugged Geomatics in March 2022, this original casing at IG_BH06 was extended after the installation of the Westbay system in order to complete the well head with a monopod bracket and protective casing.

The original position of the HWT (PQ) surface casing prior to it being extended was also surveyed, and was identified by Rugged Geomatics as survey point 506 “welded joint on pqt”.

Using that information, we have calculated the correct **ground surface elevation reference datum for IG_BH06** relative to the original position of the HWT (PQ) casing.

The calculation is presented in Table 1 (attached) and the corrected coordinates, along with the erroneous coordinates and the magnitude of the correction, are as follows.

Easting (m)	Northing (m)	Elevation (masl)	Note
555440.44	5485327.98	418.19	Erroneous Ground Surface Reference Datum
555440.35	5485328.11	417.74	Corrected Ground Surface Reference Datum
-0.09	0.13	-0.45	Magnitude of correction

CGVD 2013 datum

We will be correcting this datum in the IG_BH06 WP09 data deliverable (revision R2a) and will be re-issuing it to the NWMO, and we will be using the corrected datum in the draft IG_BH06 WP09 data report.

We will be informing our Work Package Leads of this correction to the datum, and ask them to identify which data packages and reports are affected and propose corrective actions. We will also be checking the ground surface reference elevation datum used at IG_BH04, and will report back immediately if a similar error occurred at this borehole.

This incident at IG_BH06 will be investigated as part of the existing non-conformance investigation we recently opened in our Quality Management System regarding Ground Surface Reference Datum discrepancy at IG_BH05, as both incidents appear to be the result of the same error.

If you have any questions, please contact the undersigned.

Golder Associates Ltd.

George Schneider, M.Sc., P.Geo.
Senior Geoscientist - Principal

Joe Carvalho, Ph.D., P.Eng.
Mining & Rock Engineering - Principal

Natalie Solis, P.Eng.
Project Manager

GWS/JLC/NAS

Distribution: WSP Golder, Westbay Instruments, NWMO

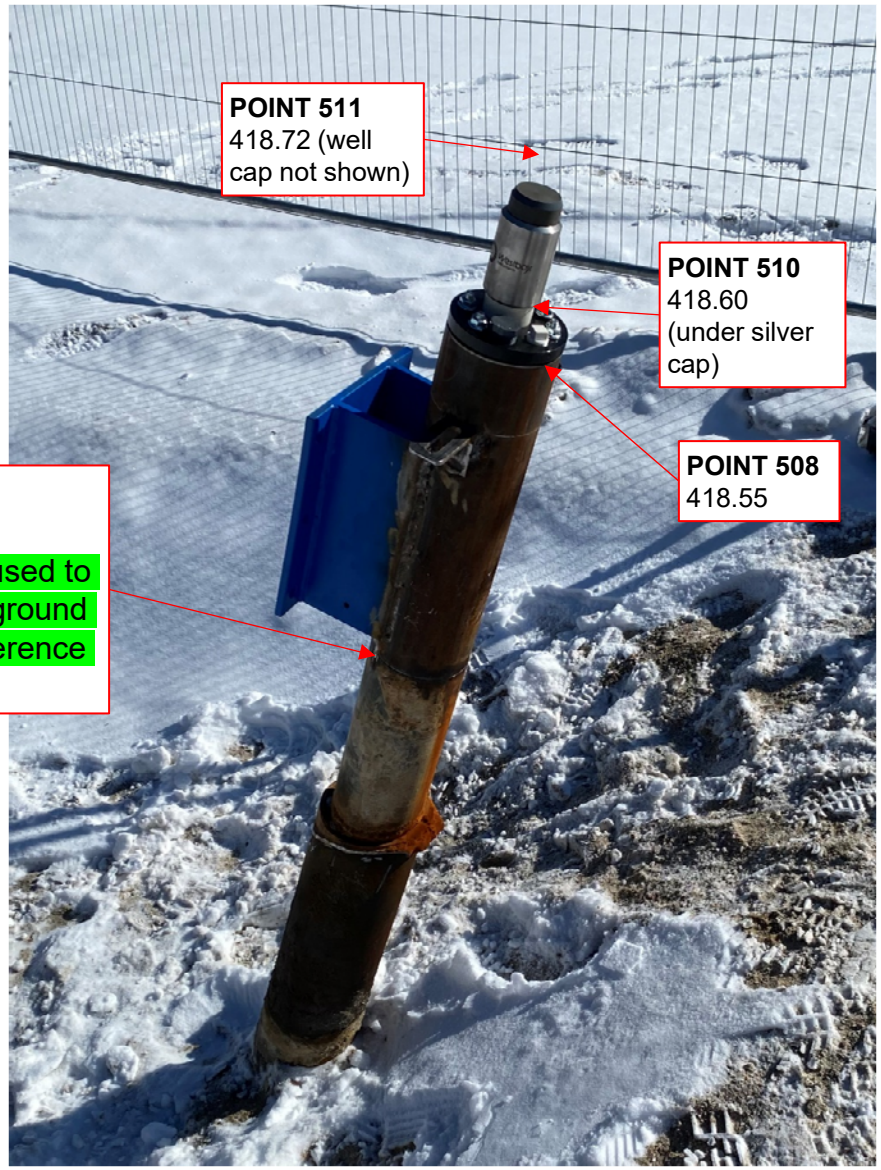
Attachments: Table 1 – Calculation of Original Ground Surface Reference Datum Position from Rugged Geomatics Survey Data IG_BH06

Attachments 1 to 3

https://golderassociates.sharepoint.com/sites/142487/project files/5 qaqc/07 qaqc ncrs/10 ncr gnd surface reference datum/bh06 gen memo/20253946 ig_bh06 elev ref datum correction 27sep2022 r2a.docx

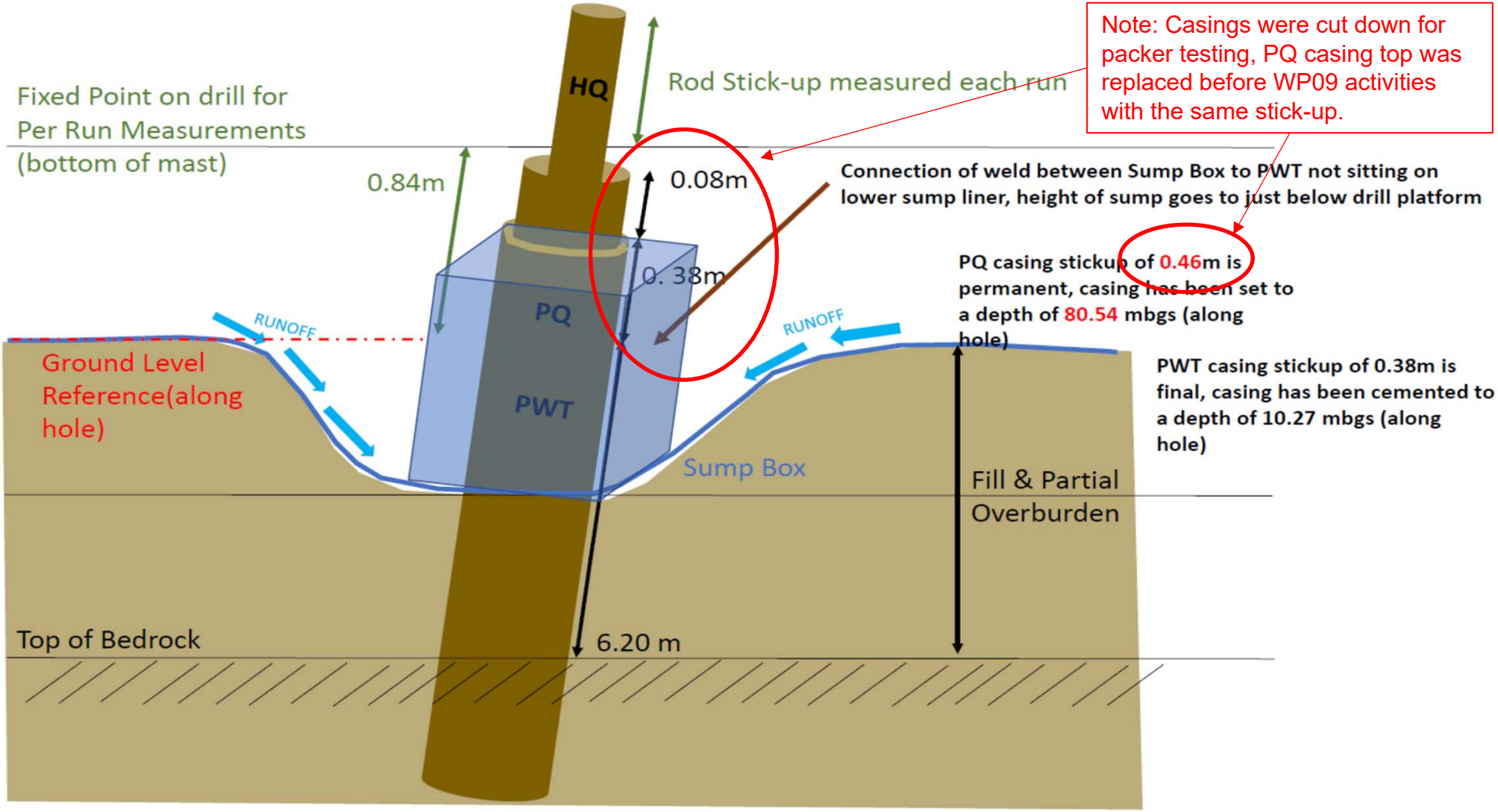
Attachment 1 - Correlation of Wellhead Survey Data from Rugged Geomatics (letter dated March 17, 2022) to As-Built Wellhead at IG_BH06

Point	Easting	Northing	Elevation	code
504	555440.45	5485328.35	417.38	referencepoint beforebackfilling
505	555440.75	5485331.28	417.72	ground level
506	555440.36	5485327.95	418.17	welded joint on pqt
507	555440.47	5485328.12	417.87	sump box weld
508	555440.44	5485327.84	418.55	top of pqt
509	555440.44	5485327.77	418.65	topofwestbaycasingsilvercap
510	555440.46	5485327.79	418.60	topofwestbaycasingwhitetop
511	555440.44	5485327.78	418.72	top of well cap

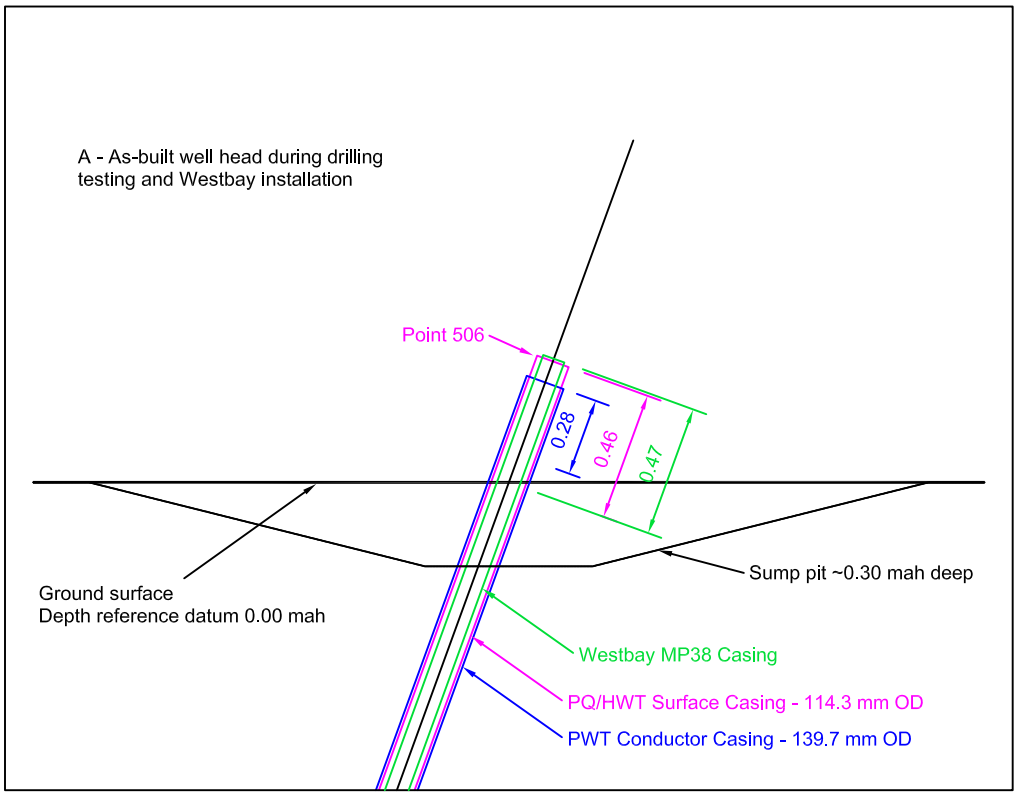


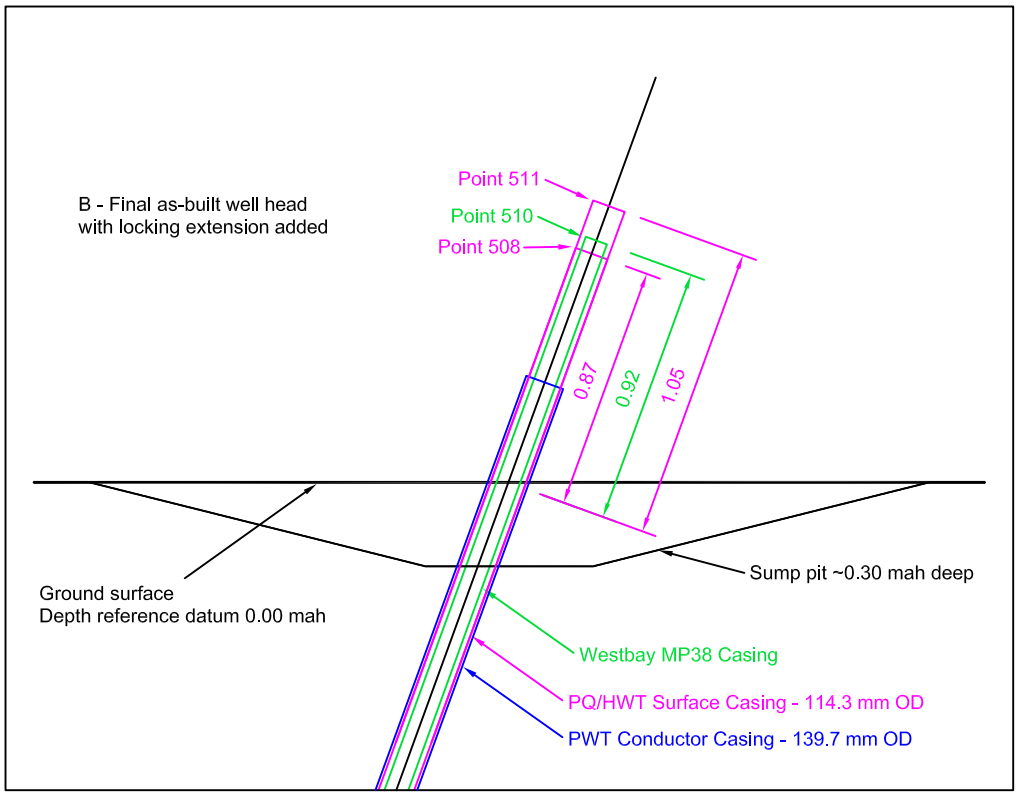
Ground Level Reference Elevation
= Top of PQ – 0.46 mah
(0.43 m vertical @ BH angle of 69.22 deg)
= welded joint on pqt (from survey) – 0.43 m
= 418.17 m – 0.43 m
= 417.74 m

Attachment 2 – Original Casing Stickup and Ground Level Reference Point from WP02 Data Report for IG_BH06



Attachment 3 - Schematic Showing IG_BH06 Well Head
A - Initial Well Head during Drilling / Testing and B - Final Well Head with Locking Extension Added





APPENDIX D

IG_BH06 Site Decommissioning Checklist

Drill Site Decommissioning Checklist – IG_BH06

BOREHOLE: IG_BH06

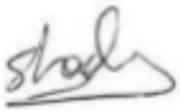
Item No.	Item	General Requirements	Date Completed	Checked by	Approved by	Comments
1.0	**SITE PREPARATION**					
1.1	Drill pad	Drill pad cleaned of debris and adequately graded.	June 28, 2022	WW	KRM	Feb 27 – Drill mats were stacked & liner removed Feb 28 – Drill pad graded with Rodren dozer Feb 28 – Drill mats removed from site March 3 – Walkover with NWMO confirmed site is clear of debris June 27/28 2022 – Drill pad graded, remaining debris removed from site. -Final walkover with the NWMO's Geoff Crann. All areas of concern were addressed.
1.3	General site levelling	General site cleaned of debris and adequately graded.	June 28, 2022	WW	KRM	March 3 – Walkover with NWMO confirmed site is clear of debris June 27/28 2022 – Drill pad graded. - Final walkover with the NWMO's Geoff Crann. All areas of concern were addressed.
1.4	General Site Condition	Site is free of oil sheens and staining.	June 28, 2022	WW	KRM	June 2022 - Final walkover with the NWMO's Geoff Crann. All areas of concern were addressed.
2.0	**FENCING**					
2.1	Silt fencing	Silt fencing remains in place.	March 3, 2022	SH	KM	Silt fence is NWMO responsibility
2.2	Snow fencing	Snow fencing remains in place.	N/A	N/A	N/A	A No snow fencing at site

Item No.	Item	General Requirements	Date Completed	Checked by	Approved by	Comments
2.3	Modulok security fencing	Security fencing dismantled and removed from site.	March 2, 2022	SH	KM	Feb 28 – Disassembly started March 2 – Disassembly completed; fence demobbed
3.0	**OFFICE TRAILERS**					
3.1	Trailer 1 (Golder)	Trailer removed from site.	March 7, 2022	SH	KM	March 1 – trailer moved to Tower Road March 7 - trailer was removed from site
3.2	Trailer 2 (NWMO)	Trailer removed from site.	March 3, 2022	SH	KM	March 1 – trailer moved to Tower Road March 3 - trailer was removed from site
3.3	Trailer 3 (Rodren)	Trailer removed from site.	March 3, 2022	SH	KM	March 1 – trailer moved to Tower Road March 3 - trailer was removed from site
4.0	**CORE LOGGING AND STORAGE**					
4.1	Core Logging Shipping Container	Core Logging Shipping Container removed from site.	March 2, 2022	SH	KM	
4.2	Core Logging Table	Core logging table put away for storage.	Nov 7, 2021	SH	KM	
4.3	Camera Racking	Camera tracking put away for storage.	Nov 7, 2021	SH	KM	
4.4	Core Storage Shipping container	Core storage shipping container removed from site.	March 2, 2022	SH	KM	
4.5	Commercial Refrigerator	Refrigerators removed from site.	March 1, 2022	SH	KM	
5.0	**COMMUNICATIONS**					
5.1	Satellite phone	Satellite phone removed from site.	Feb 28, 2022	SH	KM	Feb 28 - Garmin in Reach device was packed March 1 - Delivered to Golder Mississauga
5.2	Cellular internet	Cellular Internet Wi-Fi network removed from site.	Feb 28, 2022	SH	KM	Feb 28 – Internet disconnect & packed up March 1 - Delivered to Golder Mississauga
6.0	**GENERATOR**					
6.1	Generator	Generator removed from site.	March 1, 2022	SH	KM	

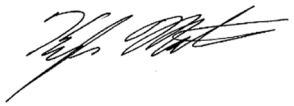
Item No.	Item	General Requirements	Date Completed	Checked by	Approved by	Comments
6.2	Secondary containment	Secondary spill containment removed from site.	March 2, 2022	SH	KM	
6.3	Power distribution	Power distribution cables and panels removed from site.	Feb 28, 2022	SH	KM	Feb 28 – Electrical Decommissioning March 2 – Decision to delay underground electrical conduit & grounding plates removal due to frozen ground. June 27, 2022 – Conduit removed
			June 27, 2022	WW		
7.0	**LIGHT TOWERS**					
7.1	Light Tower	All light towers removed from site.	March 2, 2022	SH	KM	
7.2	Secondary containment	All secondary spill containments for light towers removed from site.	March 2, 2022	SH	KM	
8.0	**FUEL STORAGE**					
8.1	Fuel tank	Fuel Tank removed from site.	March 2, 2022	SH	KM	Final drainage completed March 2, 2022
8.2	Secondary containment	Secondary spill containment removed from site.	March 2, 2022	SH	KM	
8.3	Protective barricade	Protective barricades removed from site.	March 2, 2022	SH	KM	All concrete jersey barriers removed from site
9.0	**SANITARY FACILITIES**					
9.1	Washroom	Washroom removed from site.	Feb 28, 2022	SH	KM	
9.2	Water tank	Water tank removed from site.	N/A	N/A	N/A	No septic tank, washroom is 1 unit
9.3	Septic tank	Septic tank removed from site.	N/A	N/A	N/A	No septic tank, washroom is 1 unit

Item No.	Item	General Requirements	Date Completed	Checked by	Approved by	Comments
9.3	Temporary Washroom Facilities	Temporary washroom facilities removed from site.	March 2, 2022	SH	KM	Feb 21 – Delivered to site Feb 25 – Demobilized from site
10.0	**GARBAGE BINS**					
10.1	Garbage Bin	Garbage bin removed from site.	Nov 9, 2021 March 3, 2022	SH	KM	Nov 9 – B&M garbage bin removed from site Feb 14 – Roll-off bin delivered to site Feb 28 – Bin #1 removed, Bin #2 delivered March 3 – Roll-off bin #2 removed from site
10.2	Recycling Bin	Recycle bin removed from site.	Oct 23, 2021	SH	KM	Oct 23 – B&M recycle bin removed from site
11.0	**WELL HEAD**					
11.1	Well Head Survey	Well head casing reference and Westbay casing is surveyed to benchmark.	March 2, 2022	SH	KM	Survey completed by Rugged Geomatics
11.2	Well Head Security	Well head protective casing is installed, painted for visibility, and locked for security.	March 4, 2022	SH	KM	March 4 – Casing installed; locks installed Painting is the responsibility of the NWMO.
12.0	**OTHER**					
12.1	Site Condition	Final inspection for garbage and debris (snow covered)	March 4, 2022	SH	KM	Final inspection completed by Shady
12.2	Post-Thaw Site Condition	Post-thaw inspection for garbage and debris.	June 28, 2022	WW	KRM	June 28 – Final walkover with the NWMO's Geoff Crann. All areas of concern were addressed.

Checklist Approval – Post-Winter Demobilization

Checked by:  2022-03-07

Shady Hashem, WP01 Site Supervisor Date

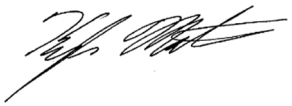
Approved by:  2022-03-07

Kyle Matter, WP01 Lead Date

Final Checklist Approval – Post-Thaw Activities Completed

Checked by:  2022-07-04

Warren Willis, WP01 Site Supervisor Date

Approved by:  2022-07-04

Kyle Matter, WP01 Lead Date

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