Soil Management Plan
for
PROJECT
Heavy Water Management Building (HWMB)
D2O Storage Facility
Purchase Order No 00217807

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DOCUMENT NUMBER 48070014-SMP

Rev.#	Date	Prepared by:	Reviewed by:
1	25-Apr-2013	Roger Luck Engineering & Procurement Date 25 Apr 13	Magdi Chidiac Project Engineer Date 25 April 13
		Approved by:	
		for Bruce Smith Project Manager April 25, 2013	
		Acceptance by OPG	
		ROGER DALY (Name) — MNGR. CHEM & ENV (Title) — 26 APR 13 (Date)	

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REVISION LIST

REV #	DESCRIPTION OF CHANGE	REVISION PREPARED BY	AMENDMENT DATE
0	Original Issue	Roger Luck	3 Apr 2013
1	a. Revised Sec. 2.0 b. Revised Sec. 3.1 c. Revised Ref. 5.4 d. Appendix "B" final issue added e. Added Appendix "C"	Roger Luck	25 Apr 2013

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1.0 General

The scope of this plan is to provide a means for Black and McDonald to inform all interested parties of B&M's intended methods and means for handling the excavated soil for the new Heavy Water Management Building.

1.1 Purpose

The purpose/objective of the Soil Management Plan is to:

a. Ensure compliance with environmental legislation, regulations and conditions of approval.
b. Ensure proper records are maintained to meet regulatory environmental requirements.

1.2 Scope

The scope of this issue of the plan deals with the following excavated materials:

a. Daylighting using vacuum truck.(Top 3 metres)

This plan is a living document which will be revised to address the following additional excavated materials:

b. Caisson drilling
c. Bulk excavation
d. Miscellaneous soil excavation.

This plan is to be used in conjunction with 48070014-CEMP "Contractor Environmental Management Plan" (Ref 5.5)

2.0 Roles and Responsibilities:

a. Project Manager (PM) – responsible for the overall SMP, ensuring that it is prepared, approved and followed. (Bruce Smith 416-791-1898)
b. Work Coordinator (WC) – responsible for the implementation of the SMP on the project. (Kurt McDonald 416-677-7273)
c. Construction Superintendent (CS) – Responsible for all site construction activities. (Robert Nixon 289-685-0553)
d. All onsite personnel - All personnel are responsible for identifying and reporting any adverse conditions or issues that could affect soil management.

3.0 Daylighting

3.1 Daylighting

In order to confirm that there are no underground services that enter the footprint of the new HWMB building a vacuum truck will be used to daylight the first three (3) metres depth of the foot print. This will be done in a trench like fashion. B&M and field engineering shall verify that there are no services and if declared clear the trench will be back filled with lean concrete (0.7Mpa). This is to ensure that the area is stable and avoid cave-ins during the main excavation with excavators.

The daylighting will continue around the perimeter of the building foot print, when an underground service is encountered the area around the underground service will be further daylighted in order to allow a construction crew access to relocate the service. The area will be fenced off for safety.

B&M has contracted Kinectrics to sample the first 3 metre depth at 5 borehole locations. The test results have indicated that the top 3 metres of soil is below the allowable limit of tritium, confirmed with a report. Appendix "B" provides the conclusion of the report only. The full report (172 pages) is available upon request.(Ref 5.9)
Based on the results of the tests the daylighted material will be transported by truck to a temporary laydown area (C13 on the campus plan). The plan is to eventually send this material to a landfill site outside the PA.

4.0 Laydown Area C13 (Future site of Rad Waste Processing Building) RWPB

The temporary laydown area inside the PA is identified as C13 on the campus plan. (Appendix "A")
The plan for this laydown area is to keep the excavated soils separately: that means no mixing at this time.
Daylighted material (top 3 metres)

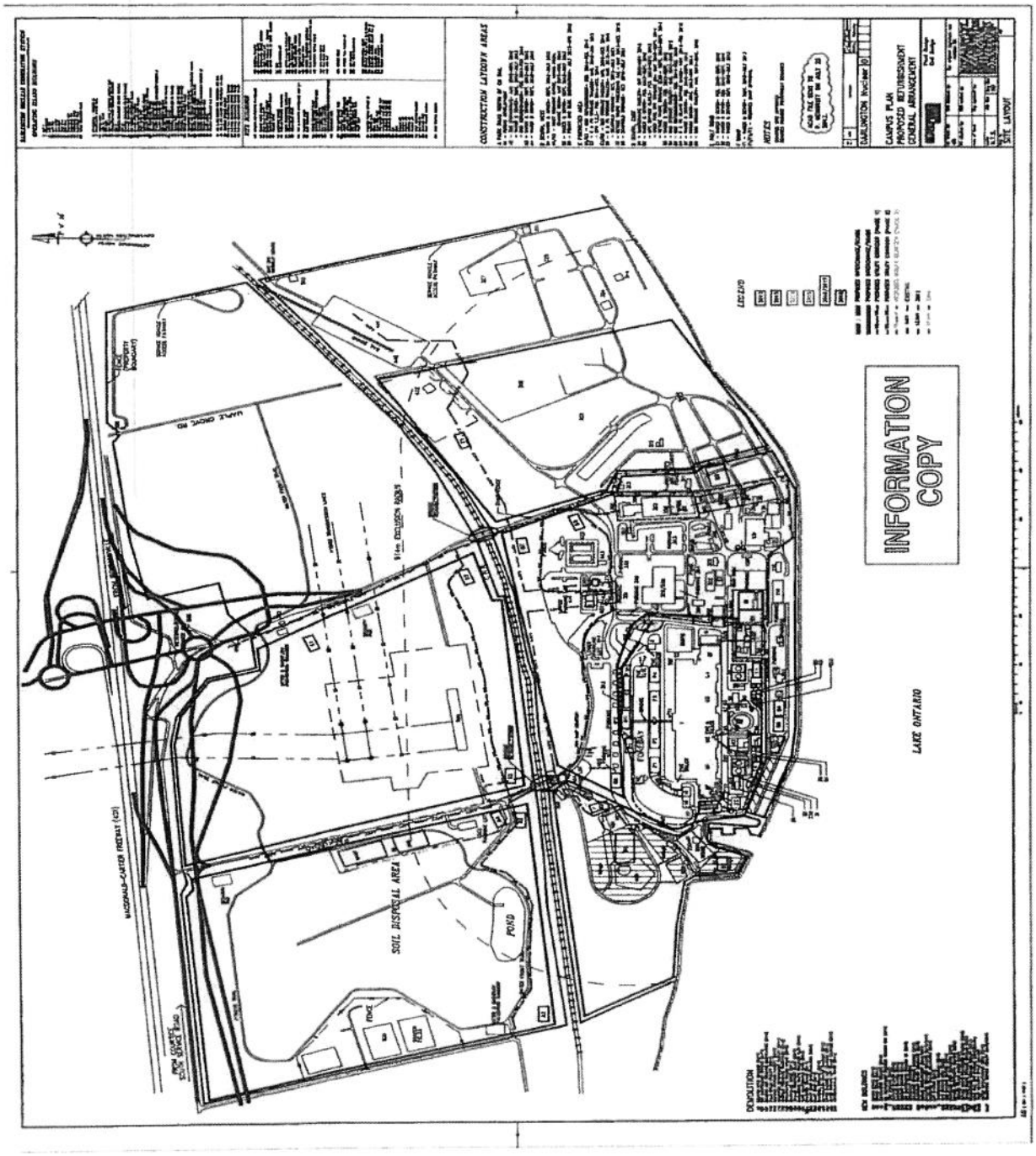
Area C13 which is approximately 80m x 80m will be divided into areas to keep soil from different areas without cross contamination. See appendix "B" for tritium limits.
To contain the daylighted material of approximately 200cuM. An area pad 30mx40m shall be constructed of asphalt on the surface with a 400mm high berm on 3 sides (Appendix "C"). The area needs to slope towards a sump so that any water would naturally drain to the sump.

This is a temporary storage location and once the daylighting is complete and material dried, this material will be transported by truck to a clean landfill site. Based on Kinectrics report this material has been deemed "clean" as outlined in Kinectrics Report. (Ref 5.9)
A 20,000 litre storage tank (3wx6Lx2h) has to be in place so that the water collected in the sump can be pumped to the storage tank for sampling to determine its quality for disposal options. The tank should have an internal weir so the fines may settle out. Tank and sump should be checked regularly.

5.0 References

5.1) N-GUID-09701-10013	Environmental Requirements Guideline
5.2) D-INS-79000-10002	Waste Disposal Guidelines for Solid Waste and Recycling at Darlington
5.3) D-INS-07290-10000	Darlington Spill Prevention and Contingency Plan
5.4) B&M 48070038-Sketch 001	Soil Laydown Pad (C13) (Appendix "C)
5.5) B&M 48070014-CEMP	Contractor Environmental Management Plan
5.6) B&M 48070014-SPCP	Spill Prevention and Contingency Plan
5.7) B&M 48070014-GDP	Groundwater and Dewatering Plan
5.8) B&M 48070014-WMP	Waste Management Plan
5.9) Kinectrics K-415072-003 -TM-0001-R00	Shallow Soil Sampling (Appendix "B")

APPENDIX "A"


CONSTRUCTION LAYDOWN AREAS
NOTES
CAMPUS PLAN
PROPOSED REDEVELOPMENT
CONCEPTUAL ARRANGEMENT
SITE LAYOUT
DARLINGTON
LAKE ONTARIO
SITE DISPOSAL AREA
POND
INFORMATION COPY

APPENDIX "B"

Heavy Water Storage Building Project: Shallow Soil Sampling during Daylighting Activities – Preliminary Results Ontario Power Generation - Darlington Nuclear (OPG-DN)

Kinectrics Report: K-415072-003-TM-0001-R00
April 24, 2013

Kinectrics Inc
Analytical and Waste Services

Kinectrics Inc., 800 Kipling Avenue, Unit 2
Toronto, Ontario, Canada M8Z 5G5

Heavy Water Storage Building Project: Shallow Soil Sampling during Daylighting Activities – Preliminary Results
Ontario Power Generation - Darlington Nuclear (OPG-DN)

Kinectrics Report:

K-415072-003-TM-0001-R00
April 24, 2013

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Dated: April 24, 2013

DISCLAIMER

This report was prepared for Black and McDonald under the Kinectrics Inc ISO 9001 Quality Program Registered with QMI. Kinectrics Inc. takes reasonable steps to ensure that all work performed shall meet the industry standards, and that all reports shall be reasonably free of errors, inaccuracies or omissions. This report was prepared in accordance with Purchase Order Number 48005121OSR002.

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REVISIONS

Revision Number	Date	Comments	Approved
DRAFT	March 28, 2013	DRAFT RELEASE	OH
R00	April 24, 2013	FINAL RELEASE	OH

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Memo

PGL File #: 3821-01.02

DATE: April 23, 2013

TO: Ruth Burany, Kinectrics Inc.

FROM: Salima Jaffer, PGL
John DeWilde, PGL

Re: Heavy Water Storage Building Project:
Shallow Soil Sampling during Daylighting Activites
Ontario Power Generation – Darlington Nuclear (OPG-DN)

Pottinger Gaherty Environmental Consultants Ltd. (PGL) has conducted shallow-soil sampling during daylighting activities to provide disposal options as a part of the Heavy Water Storage Building (HWSB) construction project at OPG DN. A summary of our work, results and conclusions is provided herein.

Background

A historic spill in December 2009 from Injection Water Storage Tanks (IWST) occurred in the area of the proposed HWSB excavation. The IWST water was primarily demineralized water containing 44,807,000Bq/L of tritium and 58.8mg/kg of hydrazine.

Twenty-nine boreholes and 28 wells have been installed since, in the area to investigate impacts from the spill event. The investigation identified tritium impacts to both soil and groundwater in the area of the HWSB and beyond. The investigation also identified petroleum hydrocarbons (PHC) and limited volatile organic compounds (VOC) impacts. The soil and groundwater quality were evaluated against Ontario Regulation 153/04 Table 3 industrial/commercial/community standards for coarse-textured soil in a non-potable groundwater condition.

PGL was contracted to evaluate the asphalt, soil, bedrock and groundwater as part of the excavation and disposal work required for the construction project. Our sampling program for these materials was outlined in our *Sampling and Analysis Plan (SAP), Heavy Water Storage Building, Ontario Power Generation, Darlington Nuclear Generating Station, Bowmanville ON*, dated January 23, 2013 previously submitted under separate cover.

Sampling Rationale

PGL recommended completing an *in situ* sampling and scan survey to collect data that will allow for offsite disposal of soils. It is intended that after the collection of this data, soils can be cleared directly for disposal onsite or offsite either under a Conditional Transfer Permit (CTP) or Unconditional Transfer Permit (UTP).

As identified in our Sampling and Analysis Plan, five boreholes in the area of the proposed building footprint were to be completed to augment existing soil and groundwater data collected this past year (2012) at the Site. The first 3m (10') of each borehole location was daylighted using a vacuum truck operated by Badger Daylighting Inc. This preliminary technical memo details the results of the sampling during daylighting activities. The rest of the soil and bedrock sampling associated with drilling activities will be reported under separate cover.

To assess disposal options, PGL compared the conventional analysis data with the Ministry of Environment's (MOE) standards found in *Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act*, April 15, 2011. We compared data to both Table 1 Full Depth Background Site Condition Standards and Table 3 Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition. For Table 3 we used coarse-grained soil standards for an industrial/commercial/community use.

Work Program: Shallow Soil Sampling

As a part of this work, PGL conducted the following tasks:

- Prepared a Sampling and Analysis Plan as required by Ontario Regulation 153/04;
- Prepared both a health and safety plan and Job Safety Analysis form;
- Attended a Project Readiness meeting February 15, 2013;
- Collected shallow-soil samples during daylighting work at the five proposed borehole locations (BH281 to BH285)
- Sampled soil at 0.5m intervals using a hand auger;
- Logged and screened samples using a Model 3 Ludlum Analog Ratemeter with Model 44-9 pancake detector and screened for organic vapours with the use of an RKI Eagle 2 equipped with both photoionization device sensor and LEL/PPM catalytic sensor;
- Collected soil samples in laboratory supplies bottles, labelled the bottles and kept samples refrigerated or on ice until submission to the laboratory;
- Submitted soil samples based on elevated Ludlum Ratemeter results, elevated photoionization device results and to provide vertical coverage, to be representative for the full length of the borehole at each location;
- Collected composite soil samples and submitted them to OPG chem lab for tritium and gross gamma screening. These results were provided to OPG Health Physics to assess the type of release permit for the samples prior to shipment to Kinectrics Inc. (Kinectrics) for analysis;
- Submitted six samples for radiological parameters and conventional parameters and two samples for TCLP analyses; and
- Evaluated the data and prepared this memo.

Findings

This technical memo presents the available results of the shallow soil sampling conducted. The results are included in Table 1 to 4 and laboratory certificates are attached.

The gross gamma and tritium results from the OPG chem lab for the composite soil samples required for shipping are presented in Table A below. PGL obtained confirmation from OPG on March 25, 2013 that composite soil samples for pre-laboratory shipment was not required if Kinectrics was performing gamma scans and tritium analysis of samples (see included correspondence). A standing conditional transfer permit (SCTP 29) was provided for use for the rest of the project work. The conditions of SCTP apply to soil only and no OPG Chem lab analysis of soil samples is required.

Table A: Gross Gamma and Tritium Composite Soil Results

OPG Chem Sample ID	Sample Date	Gross Gamma (µCi/L)	Tritium (µCi/kg)	S. Taras Review/Response
2013-02-G766	Feb 20, 2013	0.00428	0.144	H3 > UTP limit CTP required
2013-02-H111	Feb 21, 2013	0.0051	1.97	Activity and H3 > MDL CTP required
2013-02-H493	Feb 22, 2013	0.00474	<0.003	activity > MDL CTP required
2013-02-H494	Feb 22, 2013	0.00283	<0.003	activity > MDL CTP required
2013-02-I427	Feb 25, 2013	0.00533	0.365	Review not required

Radiological Parameter Results

Most of the radionuclide results were less than the laboratory detection limits with the exception of Potassium-40 (K-40), Thorium-series (Th-series), uranium-series (U-series), and tritium (H3). Tritium results in the shallow soil samples ranged from 18.2 to 291Bq/kg. All tritium results were less than 0.02µCi/kg (740 Bq/kg). Refer to Table 1.

PGL also compared the tritium data collected with that obtained in previous investigations. All tritium results from CH2M Hill's investigations of the top 3m of soil from the area are also below 0.02uCi/kg.

The tritium results from the OPG Chem Lab (Table A) vary from the data provided by Kinectrics. PGL understands, based on a conversation with Chris Wood (OPG), that this is typical and that the Kinectrics data is considered to supersede the OPG Chem Lab data.

Conventional Parameter Results

BTEX and PHC F1-F4 Results

All the sample results were below the laboratory method detection limits for the samples submitted.

Refer to Table 2.

VOC Results

All the sample results were below the laboratory method detection limits for the samples submitted.

Refer to Table 3.

Metals Results

All the sample results were below MOE Table 1 and 3 standards except for one sample. Sample BH285-2 from 0.8m to 1m below ground surface (bgs) exceeded the MOE Table 1 standard for electrical conductivity. Electrical conductivity is a measure of soil salinity and excess salts have an adverse affect on plants. This standard is intended to be protective of agricultural habitat which is not the case here. PGL would argue that since only one in

six samples exceeded electrical conductivity that this is not considered an issue for soil disposal. PGL does not believe that this result will affect offsite soil disposal options as landfills do not request this analysis for soil disposal. Refer to Table 4.

Results for sodium absorption ratio are outstanding and will be provided as a part of the investigation report when data is available.

Hydrazine was not detected in soil with the exception of a field blank. This result was only slightly over the detection limit and is likely an instrument issue.

TCLP

The Ontario Regulation 347/588 leachate extraction data is attached. The soil was evaluated against Schedule 4 and is not leachate toxic. These soils are classified as non-hazardous and maybe disposed of at an MOE approved landfill.

QA/QC

For ease of use, a detailed discussion on quality assurance and quality control is not included in this technical memo. Instead it will be included in the larger investigation report for the full borehole drilling program. In general however, the data meets quality assurance/quality objectives and is suitable for use in assessing disposal options.

Recommendation

PGL recommends that this memo and results be submitted to OPG Health Physics to assess the type of release permit for the material.

Standard Limitations

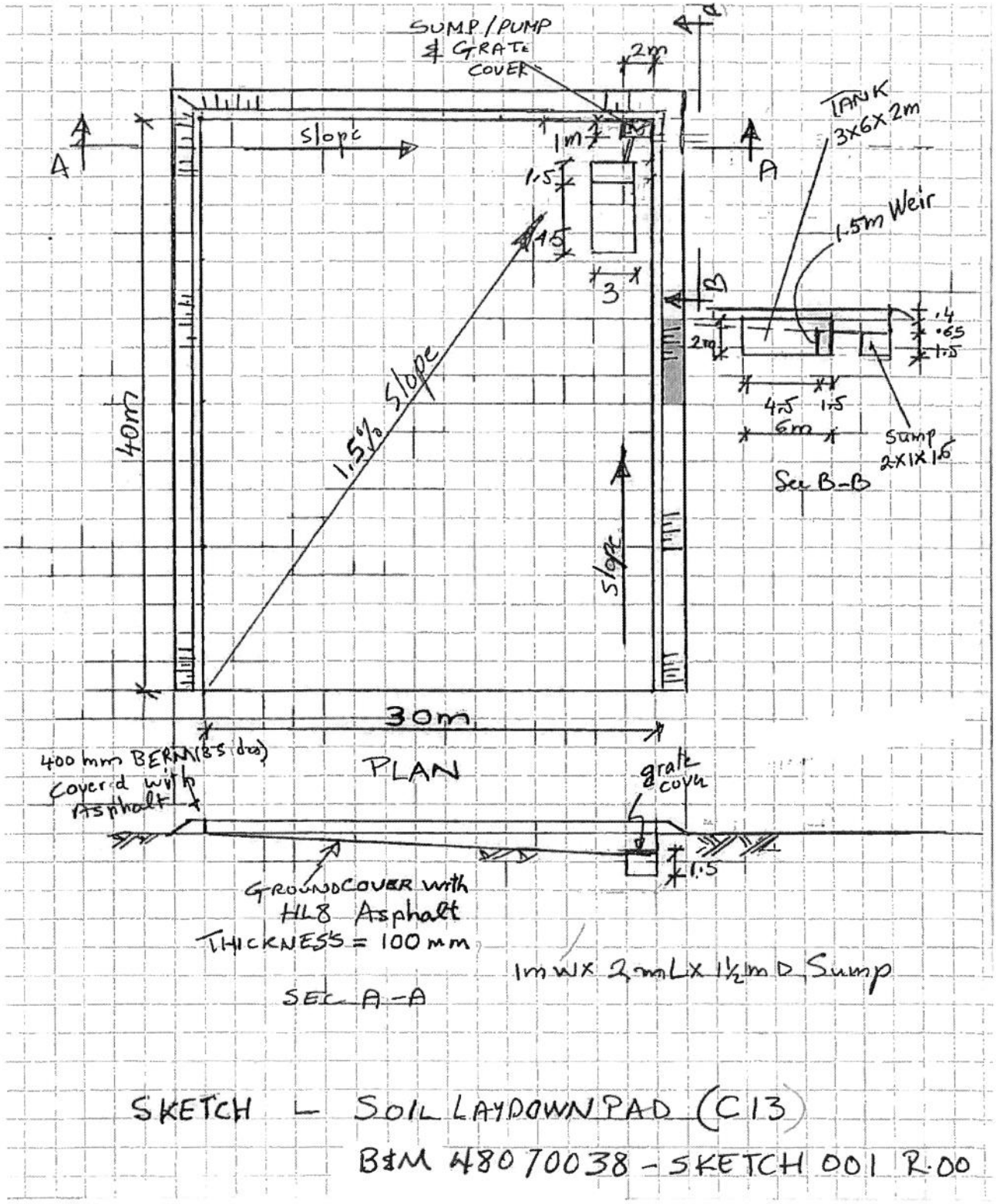
PGL prepared this memo for our client and its agents exclusively. PGL accepts no responsibility for any damages that may be suffered by third parties as a result of decisions or actions based on this report. The memo's purpose is to transmit and interpret monitoring data and so will need to be used in conjunction with previous reports by PGL or others. As is true for all environmental investigations, potential remains for the presence of unknown, unidentified, or unforeseen surface or subsurface contamination. More or different investigation may be required if other risks are identified. The data presented in this report is valid for the date of sampling, but site conditions may change with time.

The findings and conclusions are Site-specific and were developed in a manner consistent with that level of care and skill normally exercised by environmental professionals currently practicing under similar conditions in the area. Changing assessment techniques, regulations, and site conditions means that environmental investigations and their conclusions can quickly become dated, so this memo is for use now. The memo should not be used after that without PGL review/approval.

The project has been conducted according to our instructions and work program. Additional conditions and limitations on our liability are set forth in our work program/contract. No warranty, express or implied, is made.

Attachments: Correspondence
Tables
Soil Lab Results
TCLP Lab Results

APPENDIX "C"



SKETCH – SOIL LAYDOWN PAD (C13)

B&M 48070038 - SKETCH 001 R.00