Public Works and Government Services Canada

PIN-B - Clifton Point PHC Contaminated Soil Remediation Plan

IEG CONSULTANTS LTD.

PR8A3.08

TABLE OF CONTENTS

PAGE

TABLE OF CONTENTS
(continued)

PAGE

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

1. INTRODUCTION

The following is a detailed Hydrocarbon Contaminated Soils Treatment Plan for the remediation of petroleum hydrocarbon (PHC) contaminated soil for Public Works and Government Services Canada (PWGSC) Project Number: R.015218.012, the Environmental Site Remediation Project at PIN-B Clifton Point, NU. This Treatment Plan was prepared based on the information provided in the tender documents issued for the site by PWGSC. The tender documents specify requirements for the entire scope of remediation work at the site, including but not limited to: debris removal; landfill excavation; landfill stabilization; PHC contaminated soil remediation; contaminated groundwater treatment; and, asbestos abatement. In accordance with Section 02 55 13 of the tender documents, this Treatment Plan was prepared to address the remediation of PHC contaminated soils only.

E. Grubens Transport (EGT) has been selected as the contractor to perform the scope of work specified in the tender documents. As subcontractors to EGT, IEG Consultants Ltd. (IEG) will provide a Soil Remediation Specialist to conduct the portion of work pertaining to the PHC contaminated soil remediation, as presented in this Treatment Plan. It is the understanding of IEG that all remediation activities at the PIN-B site must be approved by the appointed PWGSC Departmental Representative (DR). As indicated in the following sections, portions of the field activities will not proceed until specific approval has been granted by the DR.

2. BACKGROUND INFORMATION

2.1 Soil Remediation Criteria

Petroleum Hydrocarbon (PHC) soils at the PIN-B site are defined in Parts 1.2.4 – 1.2.8 of Section 02 55 13 of the site specifications (PWGSC, 2008). The specifications provide the following definitions:

Petroleum Hydrocarbons (PHC): Hydrocarbon products described by laboratory analyses as lubricating oil and grease, fuel oil, diesel and/or gasoline.

F1/F2 Hydrocarbon Contaminated Soil: Soil exceeding the concentration within hydrocarbon fractions F1, F2 and F3 as defined in the *INAC 2005 Abandoned Military Site Remediation Protocol for PHC in Soil.*

F3/F4 Hydrocarbon Contaminated Soil: Soil exceeding the concentration within hydrocarbon fractions F3 and F4 as defined in the *INAC 2005 Abandoned Military Site Remediation Protocol for PHC in Soil.*

Free Product: The presence of a layer of separated phase liquid petroleum hydrocarbon product.

Clean Soil: Soil that has been sampled, analyzed, and determined to have contaminant concentrations below those outlined in Parts 3.4.1.1 and 3.4.1.2 of Section 02 55 13 of the Issue for Tender (PWGSC, 2008). The concentrations that define treated (clean) soil are:

F1 – F2 Clean Soil Concentrations, Beach Area:
F1 Fraction - < 230 ppm
F2 Fraction - < 150 ppm

F1 – F3 Clean Soil Concentrations, Station Area:
F1 Fraction - < 130 ppm
F2 Fraction - < 450 ppm
F3 Fraction - < 400 ppm

2.2 Areas of Petroleum Hydrocarbon Contaminated (PHC) Contamination Requiring Treatment

The PIN-B site is divided into eight distinct areas:

- Areas 1 and 2: Beach Dump Area;
- Area 3: Beach South Dump Area;
- Area 4: Beach South Dump B Area;
- Area 5: Station Area West Dump Area;
- Area 6: Construction Camp Area;
- Area 7: Station Area; and,
- Area 8: Inuit Camp Area

Approximately 8,229 m^3 of PHC contaminated soil has been identified at the PIN-B site for onsite treatment. The contaminated soils are understood to be mineral soils (silt/sand/gravel). Table 1 lists the volume of PHC contaminated soil by Area.

Table 1: PHC Contaminated Soil Volumes by Area Identified for Onsite Treatment

Area Name	Total Volume of PHC Contaminated Soil (m^3)
Area 4 – Beach South Dump B Area	1,283
Area 7 – Station Area	6,946

PHC contaminated soil that requires treatment in Area 7 - Station Area is distributed across four sub-areas. Table 2 lists the volume of PHC contaminated soil by sub-area in the Station Area

Table 2: PHC Contaminated Soil Volumes by Sub-Area Identified for Onsite Treatment Within Area 7 – Station Area

Sub-Area Name	Total Volume of PHC Contaminated Soil (m^3)
SA – 4 - 5	1,255
SA – 4 – 12	2,359
SA – 4 – 13	225
SA – 4 - 14	3,107

2.2.1 Petroleum Hydrocarbon Contaminated Soils – Beach Area

The Beach South Dump B Area (referred to from here on as Beach Area), is adjacent to the Amundsen Gulf is the site of the former Beach POL (Petroleum-Oil-Lubricants) tanks. The area contains approximately 1,283 m^3 of PHC contaminated soils located in one plume.

Numerous boreholes were advanced throughout the Beach Area by AECOM during the environmental site assessment (ESA). Samples from two (2) boreholes exceeded remediation guidelines (F1>230 mg/kg, F2>150 mg/kg) while seven (7) boreholes surrounding the area were below the remediation guidelines (PWGSC, 2008).

2.2.2 Petroleum Hydrocarbon Contaminated Soils – Main Station Area

The Station Area is located inland of the Amundsen Gulf, at the topographic high of the site. The area contains approximately 6,946m^3 of PHC contaminated soil in four (4) separate locations. SA-4-5 is located adjacent to the garage. SA-4-12 is east and downgradient of the garage. SA-4-13 is east and downgradient of the Station Area POL tanks. SA-4-14 is located at the former Station Area POL tank farm.

2.3 PHC Remediation Objectives

2.3.1 Beach Area

Beach Area PHC Contaminated Soil remediation guidelines have been set as follows:

- Hydrocarbon Fraction - F1 (C_6-C_{10}) <230 mg/kg; and,
- Hydrocarbon Fraction - F2 (C_{10}-C_{16}) <150 mg/kg.

No remediation guidelines have been set for the onsite treatment of heavier F3 and F4 hydrocarbons at the Beach Area.

2.3.2 Station Area

Station Area PHC Contaminated Soil remediation guidelines have been set as follows:

- Hydrocarbon Fraction - F1 (C_6-C_{10}) <130 mg/kg;
- Hydrocarbon Fraction - F2 (C_{10}-C_{16}) <450 mg/kg; and,
- Hydrocarbon Fraction – F3 (C_{16}-C_{34}) <400 mg/kg.

No remediation guidelines have been set for the onsite treatment of F4 hydrocarbons at the Station Area.

3. REMEDIATION STRATEGY

3.1 Excavation Plan for PHC Soils

The estimated footprints for the soil excavations in each site Area are illustrated on the PWGSC-provided figures in Appendix I.

3.1.1 Pre-Excavation Activities

Before commencing the excavation work, inspections of all excavation and construction areas will be conducted by the Soil Remediation Specialist, the Site Supervisor and the DR. During these inspections, actual conditions and dimensions will be checked against the Treatment Plan to ensure proper execution of the work. Any conditions that vary from the Treatment Plan will be noted in writing by the DR before initiation of the excavation work.

The site surveyor will establish the excavation limits according to the specifications (PWGSC, 2008). Any surface debris present in the excavation area(s) will be removed and placed in a storage area approved by the DR. Snow, ice, and standing water will be removed from the excavation area prior to excavation. Snow and ice will be transported to a location down-gradient of the excavation area to prevent meltwater from entering the excavation area. Standing water will be removed to an area preapproved by the DR and the AHJ using a 2 inch gas-powered trash pump equipped with a suction hose.

3.1.2 Excavation Procedures

Excavation activities will be dependant on local site conditions, such as standing water and excess rain/snow and ice. Operations will be suspended during and after periods of excessive rain/snow to avoid excess site rutting and infilling of excavation areas. The excavation, treatment, stockpiling, and disposal of PHC contaminated soils will be

undertaken as outlined in this Treatment Plan and as approved by the DR. All excavation, transport and on-site storage of hazardous soils will be carried out in accordance with applicable Federal and Territorial Regulations. All wastes will be managed as per the Federal Transportation of Dangerous Goods Act and Regulations (TDGA) and the site specifications (PWGSC, 2008).

PHC contaminated soils will be excavated using an EX300 track-hoe (or similar) If buried debris is unearthed during excavation of PHC soils, the DR will be notified, and the excavation will continue as per the methods for buried debris excavations detailed in the specifications (PWGSC, 2008). Buried debris will be separated from the PHC contaminated soils. The DR will determine if the debris is to be disposed of in the onsite landfill or if is to be shipped off-site for final disposal. Soils will be treated as regular PHC contaminated soils following removal of buried debris.

When permafrost is encountered the DR will be notified immediately for the collection of excavation extent samples. It is anticipated that sampling will occur prior to the excavation filling with water. If this is not possible the excavation will be dewatered to allow sampling. The DR will also be notified when the horizontal excavation extents are met to allow for confirmatory sampling.

3.1.2.1 Excavation

Excavation and haul rates are estimated at 1,200 m^3 per day using one excavator and two to three dump and/or articulated trucks. At this rate, approximately 7 days will be required to remove and relocate all of the PHC contaminated soils requiring treatment. Site conditions and other onsite activities will dictate in what order the excavations proceed.

The northeast boundary of the Beach Area excavation is adjacent to the visible high water mark of the Amundsen Gulf, according to Sheet C05 of the specifications (PWGSC, 2008). Excavation of PHC contaminated soils from this area will only proceed once silt fencing, or similar material, has been installed along the northeast portion of the excavation extents. In addition, the excavation will start at the furthest point away from the surface water and work towards it. Soil stability conditions will be monitored to reduce the potential for the excavation walls to collapse and allow surface water to enter the excavation.

Following excavation, the excavating equipment will be cleaned of soil and lumps prior to exiting the excavation area using track shovels, scrapers and brushes to decontaminate digging implements and tracks. Wherever possible, contaminated soil excavating will take place with the equipment placed on clean ground adjacent to the contaminated soils which minimizes the equipment contact with contaminated soils. Final equipment decontamination will utilize rags and heavy equipment cleaning solvent, or soapy water rinse if required. Any wash water and solvent will be collected in a metal tray and tested and handled as per the specifications (PWGSC, 2008). All applicable test results will be provided to the DR.

3.1.3 Excavation Confirmatory Samples

Confirmatory samples from the floor and sidewalls of the excavation sections will be collected, labelled, and logged onto a chain-of-custody form by the DR. The DR will relinquish the samples to IEG for packaging and transportation to the DR's analytical laboratory. IEG will prepare the samples for shipment in accordance with the sample handling procedures outlined in Section 5.

3.1.4 Backfilling

Each excavation section will remain open until the laboratory analytical results of the confirmatory samples determine that no additional excavation is necessary. Proper signage will be in place to prevent workers and equipment from accidentally entering the excavated area. Upon approval by the DR, the excavation section will be backfilled using locally sourced clean Type 3 granular material. The borrow location(s) will be discussed and agreed upon by EGT and the DR once on site.

An EX300 track-hoe and tandem dump trucks will remove soil from the borrow area and place the fill into the open excavations. Backfill deposited into the excavations will be spread and packed in 250 mm lifts as per the PWGSC (2008) specifications (31 22 15).

3.2 PHC Contaminated Soil Remediation

3.2.1 Construction of Treatment Cells

Two lined treatment cells will be constructed at the site, one at the Beach Area, and one at the Station Area. The Beach Area treatment cell will be constructed on a level area adjacent to the Beach POL access road towards the airstrip. The Station Area treatment cell will be constructed on Borrow Site 1B at the eastern extent of the Station Area. The final placement of each treatment cell will be determined in the field by the DR and Site Supervisor. Prior to construction of each treatment cell, the areas will be staked by the surveyor, graded to remove rocks, and levelled. The final grade of each area will be sloped a minimum of 2% towards one corner, to allow for the collection of rain water and/or seepage from the PHC soils. Any water which collects in the treatment cell will be sampled and analyzed prior to removal. Soil berms, approximately 1 meter high will be built around the perimeter of the treatment cell using Type 5 granular material. The source of the Type 5 material will be determined onsite by the EGT site supervisor and

the DR. An access road into the treatment cells will be constructed opposite the drainage corner.

Prior to the placement of the hydrocarbon resistant liner, soil samples will be collected and analyzed from the treatment cell area. Following the removal of the liner, additional soil samples will be collected and analyzed to ensure that the treatment cell did not contaminate the area with hydrocarbons.

Non-woven LP8 geotextile, manufactured by Layfield Geosynthetics & Industrial Fabrics Ltd, will be laid on the ground surface of the treatment area prior to the placement of the hydrocarbon resistant liner. The OR RPE 25 hydrocarbon resistant liner, manufactured by Layfield Geosynthetics & Industrial Fabrics Ltd, will be placed upon the geotextile. Both the geotextile and the liner will completely cover the treatment cell area and the soil berms. Specifications for both the geotextile and liner are provided in Appendix II. Sandbags will be placed around the perimeter of the liner. The liner will be covered with approximately 10 cm of compacted PHC contaminated soil material from which will act as a protective layer to prevent damage to the liner during treatment activities. The bedding material will be selected from the least contaminated area (e.g. near the extent of the excavation). The bedding material will be sampled following the successful treatment of the remaining PHC contaminated soils. If the bedding material requires treatment it will be carefully moved to one portion of the treatment cell and aerated.

Both treatment cells will be constructed to allow containment and treatment of the total volume of PHC contaminated soils from their respective areas. The liner for the Beach Area treatment cell will measure 24 m x 54 m, while the top of berm to top of berm treatment cell dimensions will measure 21 m x 51 m. Soil will be placed in the Beach Area treatment cell in one continuous windrow. The liner for the Station Area treatment cell will measure 40 x 120 m, while the top of berm to top of berm treatment cell

dimensions will measure 37 x 117 m. Soil will be placed in the Station Area treatment cell in two continuous windrows.

3.2.2 Alluing

PHC contaminated soils will be treated by aeration. Soils will be aerated using two track hoes equipped with Allu buckets (Figure 1).

Figure 1 Typical Allu bucket attached to an excavator

The track hoes will scoop up contaminated soil into the Allu buckets, which will process the soil through hydraulically operated rotating drums and screens to promote volatilization of adsorbed hydrocarbons and evaporation of moisture. The processed soil will then fall from the bucket, forming a continuous windrow (one Allu pass). The PHC contaminated soil will initially be loaded into one end of the treatment cell as a one continuous windrow (two windrows at the Station Area), leaving a section at the opposite end of the treatment cell vacant. Contaminated soil will be scooped from the loaded end of the treatment cell, processed by the allu buckets, and then deposited into the vacant section. Alluing will progress continuously from one end of the windrow to the other, resulting in the entire windrow shifting location and the vacant end of the treatment cell being reversed. At the Station Area treatment cell the track hoe will work in the area between the two windrows. Based on the Allu bucket specifications and the soil characteristics detailed in the specification (PWGSC, 2008) approximately 200 m^3 of soil

can be aerated per hour using two units. Based on these rates, it is anticipated that the entire volume of PHC contaminated soils can be aerated in 5 days. Based on treatment results from previous sites (e.g BAR-D) it is anticipated that 4 or more Allu passes will be required per treatment cell. Treatment time will be dependant on climatic conditions but it is anticipated that it will take four to six weeks to complete the PHC contaminated soils treatment and receive confirmatory samples from the analytical laboratory.

Alluing operations will be suspended during and after periods of rain/snow to optimize aeration and during periods of extreme wind to avoid dusting adjacent areas. The soil within the treatment cells will be covered with tarps to prevent wetting of the soil

3.2.3 Confirmatory Sampling of Treated Soil

Throughout soil treatment activities, the soil will be periodically field-screened with a photo-ionization detector (PID) (Figure 2) to determine the extent of treatment. A specification for the instrument is attached in Appendix II.

The PID will be field-calibrated as per the manufactures specifications, with calibration gas (usually isobutylene) of a known concentration (usually 100 ppm) on a daily basis. The results of instrument calibration events will be documented.

Figure 2 Example Photo-ionization Detector

To field-screen soil using a PID, soil samples will be placed in plastic zip-closure bags, filling the bags approximately 1/3 full. The bags will be provided by the analytical laboratory. Lumps of soil will be broken up to allow the volatilization of hydrocarbons into the headspace of the plastic bag and the PID probe will be inserted into the bag to measure the hydrocarbon concentration in the headspace.

Five-point composite samples, each representing 100 m^3 of treated soil, will be collected by IEG and will be field-screened with the PID following every Allu cycle. The results of the field-screening will be documented to establish concentration trends for evaluating the effectiveness of the Allu treatments. Once the field-screening indicates that hydrocarbon degradation is occurring, soil samples will be submitted for laboratory analysis to evaluate treatment progress and to correlate the field-screening readings to actual hydrocarbon concentrations.

Confirmatory treatment samples will be collected by the onsite Remediation Specialist after the field-screening indicates that the soil has been treated to below PWGSC (2008) specifications for each area. The confirmatory soil samples will be comprised of five-

point composite samples, each representing 100 m^3 of treated soil. Five discrete samples of similar volume will be collected using a clean hand-auger and will be combined together in a large plastic bag to create the composite sample. The composite sample will be packed into a laboratory-supplied clean soil sample jar to minimize void space, will be labelled with the sample name and collection time, and then logged onto a chain-of-custody form. The samples will be stored and prepared for shipping according to the sample handling protocol described in Section 5, and will be submitted to an accredited laboratory for analysis of F1 and F2 hydrocarbon fractions for Beach Area soils, and F1, F2 and F3, hydrocarbon fractions for Station Area hydrocarbons. Duplicate laboratory samples will be collected for a minimum of 20% of the confirmatory samples. Under direction of the DR, the duplicate samples will be similarly packaged and shipped to the DR's laboratory for analysis.

3.2.4 Treatment Cell Decommissioning

Once the laboratory analytical results have confirmed that the soil within the treatment cells have been remediated to the specifications (PWGSC, 2008) and the DR has issued approval, the treated soil will be removed from the treatment cell and placed at the approved disposal area and graded to the surrounding topography. Some of the remediated soil may be temporarily stockpiled on clean ground if the disposal area is unable to accept the soil at a given time.

The bedding material within each of the treatment cells will be sampled and analyzed to determine if further treatment is required. If the bedding material has PHC concentrations above those referenced in the specification (PWGSC, 2008) it will be treated using the Allu bucket, or if time does not permit, it will be placed in the Non-Hazardous Landfill at the approval of the DR. The hydrocarbon resistant liners and geotextile will be removed from the treatment cell and disposed of in the Non-Hazardous Landfill. Soil used to

construct treatment cell berms will be used as backfill material or will be placed in another area of the site, and the excavation and treatment cell areas will be re-graded to the natural topography at the direction of the DR. Confirmatory sampling of the soils underlying the cell area will be collected to confirm that the treatment area was not contaminated by the remediation activities. The track hoe and Allu bucket will receive final decontamination as detailed in Section 3.1.2.

4. MANAGEMENT, SAMPLING AND DISCHARGE OF GROUNDWATER

The management, sampling, and discharge of groundwater/melt-water is described in the EGT Dewatering Submittal. The excavations will be dewatered as per the details described in EGT Dewatering Submittal.

5. SAMPLE HANDLING PROTOCOL

Soil samples collected by IEG and/or the DR for laboratory analysis will be stored in a refrigerator or ice-chilled cooler for preservation purposes. To transport the samples for analytical testing, the sample bottles will be wrapped in bubble wrap and placed in an ice-chilled cooler. The relinquished chain-of-custody form will be sealed in a plastic zip-closure bag for protection against moisture and will be placed in the cooler along with the samples. The cooler will be sealed with evidence tape before being shipped to the laboratory to prevent and/or detect potential sample tampering.

6. DOCUMENTATION

All activities associated with the excavation, treatment, sampling, handling, and storage of PHC contaminated soils will be documented. Monthly reports will be submitted to the DR which will include: the volume of PHC contaminated soil excavated; the treatment schedule; the estimated percentage of hydrocarbon degradation; volume of treated soil;

summary of field tests; dates and volumes of amendments; climate data; and sea-can inventory (if applicable).

7. SCHEDULE

The PHC soil remediation program is anticipated to commence in late June 2010 and last approximately 12 weeks until mid September 2010.

8. EQUIPMENT

The following is a summary of the equipment necessary to complete the PHC soil remediation process.

- 2" Gas Powered Trash Pump and hose
  - Used to dewater excavations.
- 2 Track hoes
  - Used for excavating and Alluing mineral soil.
- 2 Allu Buckets
  - Used for the aeration of mineral soil.
- 2 HAZGARD® 250 Geomembrane liner
  - 24 m x 54 m (Beach Area)
  - 40 m x 120 m (Station Area)
- Tarps
- PID with calibration gas
- Refrigerator
- Hand Auger

- Ice chests (approximately 20) and packaging material
- Soil sample jars
- Digital cameras
- Nitrile gloves
- Sampling equipment decontamination supplies (phosphate-free detergent, scrub brush, buckets, methanol)
- Heavy equipment decontamination supplies (solvent, soap, scrappers, etc)

REFERENCES

Public Works and Government Services Canada (PWGSC). 2008. Tender Specification for Environmental Site Remediation PIN-B Clifton Point, Nunavut. Project Number: R.015218.012

APPENDIX I

Site Plans Provided in Tender Documents:
Site location Plan, C01
Overall Site Plan, C02
Area 4 – Beach South Dump B Area, C05
Area 7 – Station Area, C08

Sheet Size: B1 (1000mm x 707mm)

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Saved by: De Leon, Adrian

UMA FILE NO.: 2977-343-01-00-C-0001_RC.DWG

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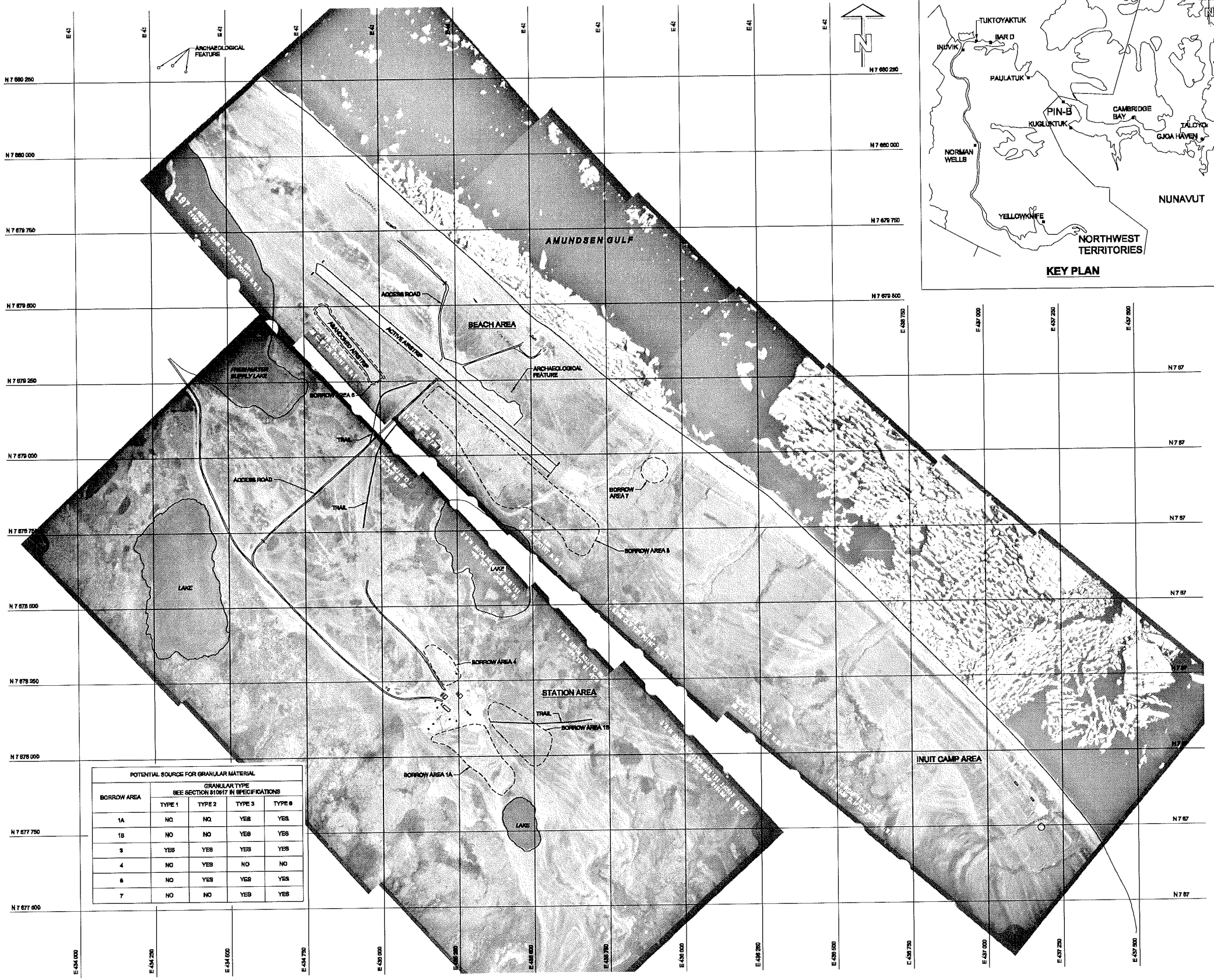

POTENTIAL SOURCE FOR GRANULAR MATERIAL				
BORROW AREA	GRANULAR TYPE SEE SECTION 815617 IN SPECIFICATIONS			
	TYPE 1	TYPE 2	TYPE 3	TYPE 6
1A	NO	NO	YES	YES
1B	NO	NO	YES	YES
3	YES	YES	YES	YES
4	NO	YES	NO	NO
6	NO	YES	YES	YES
7	NO	NO	YES	YES

KEY PLAN

Public Works and Government Services Canada / Travaux publics et Services gouvernementaux Canada

REAL PROPERTY SERVICES
Western Region

Client: Indian and Northern Affairs Canada / Affaires indiennes et du Nord Canada

Canada

NUNAVUT REGIONAL OFFICE
IQALUIT, NUNAVUT

PRELIMINARY
NOT FOR CONSTRUCTION

GENERAL NOTES:

1. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
2. ALL COORDINATES ARE REFERENCED TO NAD83(CSRS). ELEVATIONS ARE REFERENCED TO MEAN SEA LEVEL, RELATIVE TO GEOID MODEL CANADIAN HT2_0.

DO NOT SCALE THIS DOCUMENT. ALL MEASUREMENTS MUST BE OBTAINED FROM STATED DIMENSIONS OR COORDINATES.

LEGEND:

- APPROXIMATE EXTENT OF BORROW AREA
- APPROXIMATE EXTENT OF SHORELINE
- ACCESS ROAD
- TRAIL
- CULVERT

UMA | AECOM

REVISIONS	DESCRIPTION	DATE
C	ISSUED FOR TENDER	08/25/14
B	ISSUED FOR 90% REVIEW	04/08/08
A	ISSUED FOR 90% REVIEW	08/01/20

A detail number / numéro du détail
B source drawing no. / no dessin no.
C detail on drawing no. / détail sur dessin no.

project title / titre du projet
PIN-B REMEDIATION PROJECT

drawing title / titre du dessin
SITE LOCATION PLAN

designed by / conçu par	T. ESHPETER
drawn by / dessiné par	A. DE LEON
approved by / approuvé par	C. CORRIGAN
PWGSC Project Manager / Administrateur de Projets TPSGC	M. BRINKMAN
scale / échelle	1:6000
project no. / projet no.	R.015218.012
date / date	SEPTEMBER, 2008
sheet / feuille	C01
of / de	12

R.015218.012 C01

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Saved by: De Leon, Adrian

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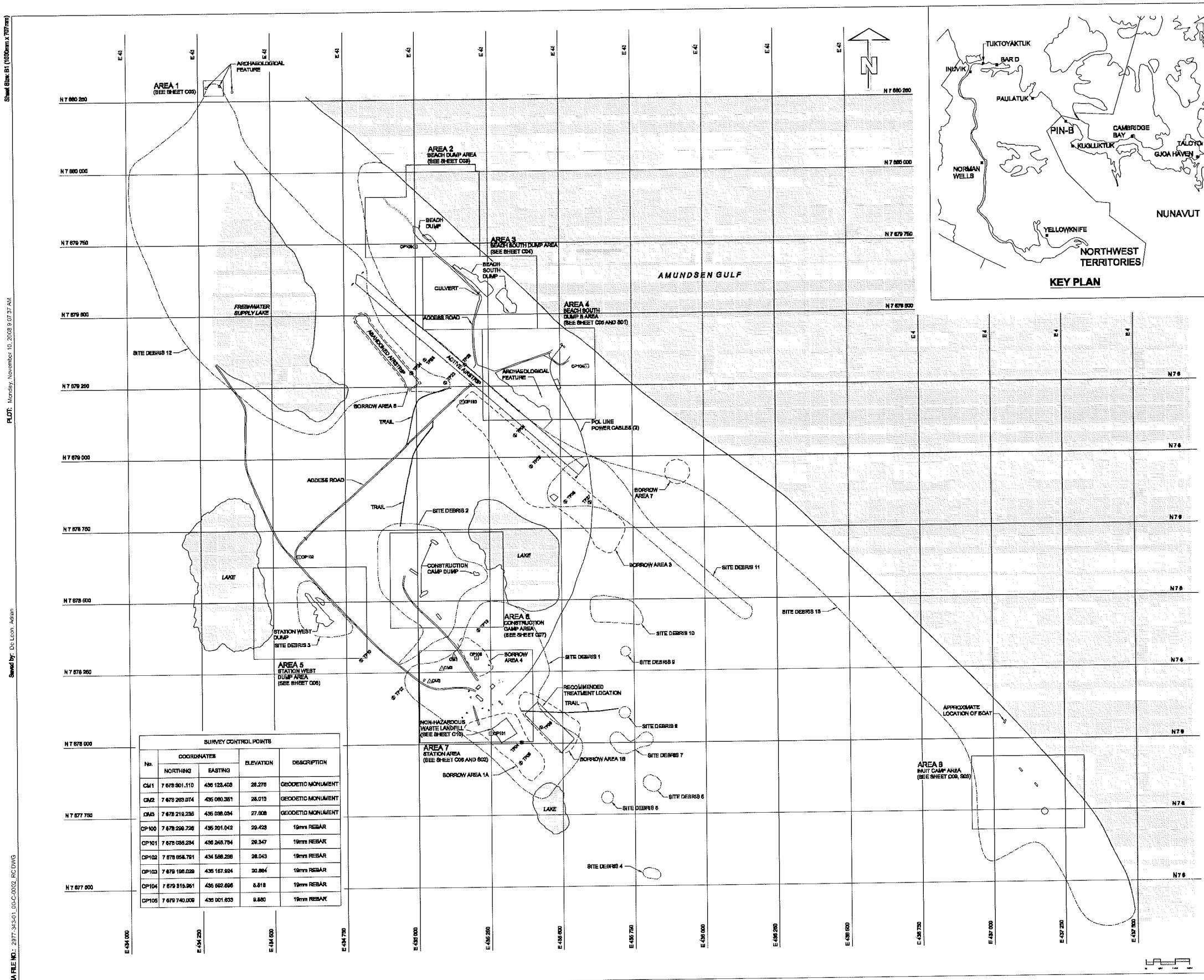

KEY PLAN

SURVEY CONTROL POINTS				
No.	COORDINATES NORTHING	COORDINATES EASTING	ELEVATION	DESCRIPTION
CM1	7 678 301.110	435 123.403	28.276	GEODETIC MONUMENT
CM2	7 678 263.074	435 080.351	28.013	GEODETIC MONUMENT
CM3	7 678 218.256	435 038.034	27.808	GEODETIC MONUMENT
CP100	7 678 299.728	435 201.042	29.428	19mm REBAR
CP101	7 678 035.234	435 245.784	29.347	19mm REBAR
CP102	7 678 858.791	434 568.286	28.043	19mm REBAR
CP103	7 679 195.029	435 157.924	30.894	19mm REBAR
CP104	7 679 315.961	435 602.696	5.818	19mm REBAR
CP105	7 679 740.009	435 001.633	9.880	19mm REBAR

Public Works and Government Services Canada / Travaux publics et Services gouvernementaux Canada

REAL PROPERTY SERVICES
Western Region

Client / Indian and Northern Affairs Canada / Affaires indiennes et du Nord Canada

Canada

NUNAVUT REGIONAL OFFICE
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PRELIMINARY
NOT FOR CONSTRUCTION

GENERAL NOTES:

1. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
2. ALL COORDINATES ARE REFERENCED TO NAD83(CSRS). ELEVATIONS ARE REFERENCED TO MEAN SEA LEVEL, RELATIVE TO GEOID MODEL CANADIAN HT2_0.
3. CULVERTS REMOVED AND CULVERT AREA GRADED TO DRAIN PRIOR TO PROJECT COMPLETION.
4. ARCHAEOLOGICAL FEATURES LOCATED AS PER THE ARCHAEOLOGICAL IMPACT ASSESSMENT.

DO NOT SCALE THIS DOCUMENT. ALL MEASUREMENTS MUST BE OBTAINED FROM STATED DIMENSIONS OR COORDINATES.

LEGEND:

- APPROXIMATE EXTENT OF BORROW AREA
- APPROXIMATE EXTENT OF SHORELINE
- ACCESS ROAD
- TRAIL
- EXTENT OF SITE DEBRIS AREAS
- CULVERT
- BODY OF WATER
- TP01 TESTPIT LOCATIONS
- CM1 SURVEY CONTROL MONUMENT
- CP100 SURVEY CONTROL POINTS

UMA | AECOM

REVISIONS	DESCRIPTION	DATE
C	ISSUED FOR TENDER	08/05/14
B	ISSUED FOR 90% REVIEW	08/05/30
A	ISSUED FOR 50% REVIEW	08/07/25

A detail number / number du detail
B source drawing no. / no de dessin no.
C detail on drawing no. / detail sur dessin no.

project title / titre du projet
PIN-B
REMEDIATION PROJECT

drawing title / titre du dessin
OVERALL SITE PLAN

designed by / conçu par	T. ESPETER
drawn by / dessiné par	A. DE LEON
approved by / approuvé par	C. CORRIGAN
PSGC Project Manager / Administrateur de Projets TPSGC	M. GERNARDIN
scale / échelle	1:5000
project no. / projet no.	R.015218.012
date	SEPTEMBER, 2008
sheet / feuille	C02
of / de	12

R.015218.012 - C02

FOR CONTINUATION - REFER TO DWG C04

WEST BEACH POL COORDINATE POINTS BURIED DEBRIS REGRADE		
NO.	COORDINATES NORTHING	EASTING
1-1	7 679 395.4	435 946.5
1-2	7 679 395.9	435 991.1
1-3	7 679 367.4	435 991.9
1-4	7 679 367.0	435 946.8

CONTAMINATED AREA BA-4-3		
NO.	COORDINATES NORTHING	EASTING
A-1	7 679 422.7	435 908.0
A-2	7 679 414.1	435 930.2
A-3	7 679 379.2	435 922.4
A-4	7 679 374.8	435 908.1
A-5	7 679 388.2	435 893.2
A-6	7 679 411.1	435 891.8

CONTAMINATED AREA BA-2-4		
NO.	COORDINATES NORTHING	EASTING
B-1	7 679 290.8	436 492.5
B-2	7 679 269.2	436 466.1
B-3	7 679 282.8	436 470.3
B-4	7 679 287.8	436 486.4

WEST BEACH POL BURIED DEBRIS

APPROXIMATE PERIMETER OF AREA TO BE REGRADED WITH 0.5m TYPE 2 GRANULAR F.L.L. SIDE SLOPES 5H:1V

BEACH POL TANK PAD

POL TANK FOUNDATIONS

BA-4-3 TREATMENT

VISIBLE HIGH WATER MARK

BEACH POL BLADDER PAD

AMUNDSEN GULF

ACCESS ROAD

ABOVE GROUND POL LINE POWER CABLES - 2

BA-2-4 OFF-SITE DISPOSAL

SURVEY CONTROL POINTS				
No.	COORDINATES NORTHING	EASTING	ELEVATION	DESCRIPTION
CP104	7 679 316.961	436 092.698	6.818	19mm REBAR

CONTAMINATED SOIL TO BE EXCAVATED							
AREA NAME	APPROX. AREA (m²)	ESTIMATED DEPTH OF CONTAMINATION (m)	ESTIMATED VOLUME OF EXCAVATION (m³)	CONTAINMENT CLASSIFICATION	COMMENTS	REFERENCE POINTS N	E
BA-4-3	972	1.2	1253	PHC F1/F2	TREATMENT	7 679 399	435 909
BA-2-4	156	0.5	78	TIER II	OFF-SITE DISPOSAL	7 679 293	436 481

BARREL STOCKPILE D

ARCHAEOLOGICAL FEATURE: SUSPECTED GRAVE SITE

GRAVEL PAD

ACTIVE AIRSTRIP

BORROW AREA 9

RUNWAY LIGHTS (TYP.)

N 7 679 425 · N 7 679 400 · N 7 679 375 · N 7 679 350 · N 7 679 325 · N 7 679 300 · N 7 679 275 · N 7 679 250 · N 7 679 225 · N 7 679 200 · N 7 679 175 · N 7 679 150

E 435 250 · E 435 275 · E 435 300 · E 435 325 · E 435 350 · E 435 375 · E 435 400 · E 435 425 · E 435 450 · E 435 475 · E 435 500 · E 435 525 · E 435 550 · E 435 575 · E 435 600

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LEGEND:

- APPROXIMATE EXTENT OF BORROW AREA
- APPROXIMATE EXTENT OF SHORELINE
- ACCESS ROAD
- TIER II APPROXIMATE CONTAMINATED AREA
- P1/P2 APPROXIMATE CONTAMINATED AREA
- BODY OF WATER
- TESTPIT LOCATIONS
- CP SURVEY CONTROL POINTS
- SAMPLE LOCATIONS

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REVISIONS	DESCRIPTION	DATE
D	REVISED AREA AND TABLES	08/10/16
C	ISSUED FOR TENDER	08/09/19
B	ISSUED FOR 90% REVIEW	08/08/05
A	ISSUED FOR 60% REVIEW	08/07/25

A detail number / numéro du détail
B source drawing no. / ce dessin no.
C detail on drawing no. / détail sur dessin no.

project title / titre du projet
PIN-B REMEDIATION PROJECT

drawing title / titre du dessin
AREA 4
BEACH SOUTH DUMP B AREA

designed by / conçu par	T. ESPETER
drawn by / dessiné par	A. DE LEON
approved by / approuvé par	C. CORRIGAN
PWGSC Project Manager / Administrateur de Projets TPSGC	M. BERNARDIN
scale / échelle	1:500
project no. / projet no.	R.015218.012
date	OCTOBER 2008
sheet / feuille	C05
	OF 12

R.015218.012 - C05

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PLOT: Monday, November 10, 2008 @ 9:50 AM

Saved by: De Leon, Adrian

UMA FILE NO.: 2977-343-01_00-C-0008_R0.DWG

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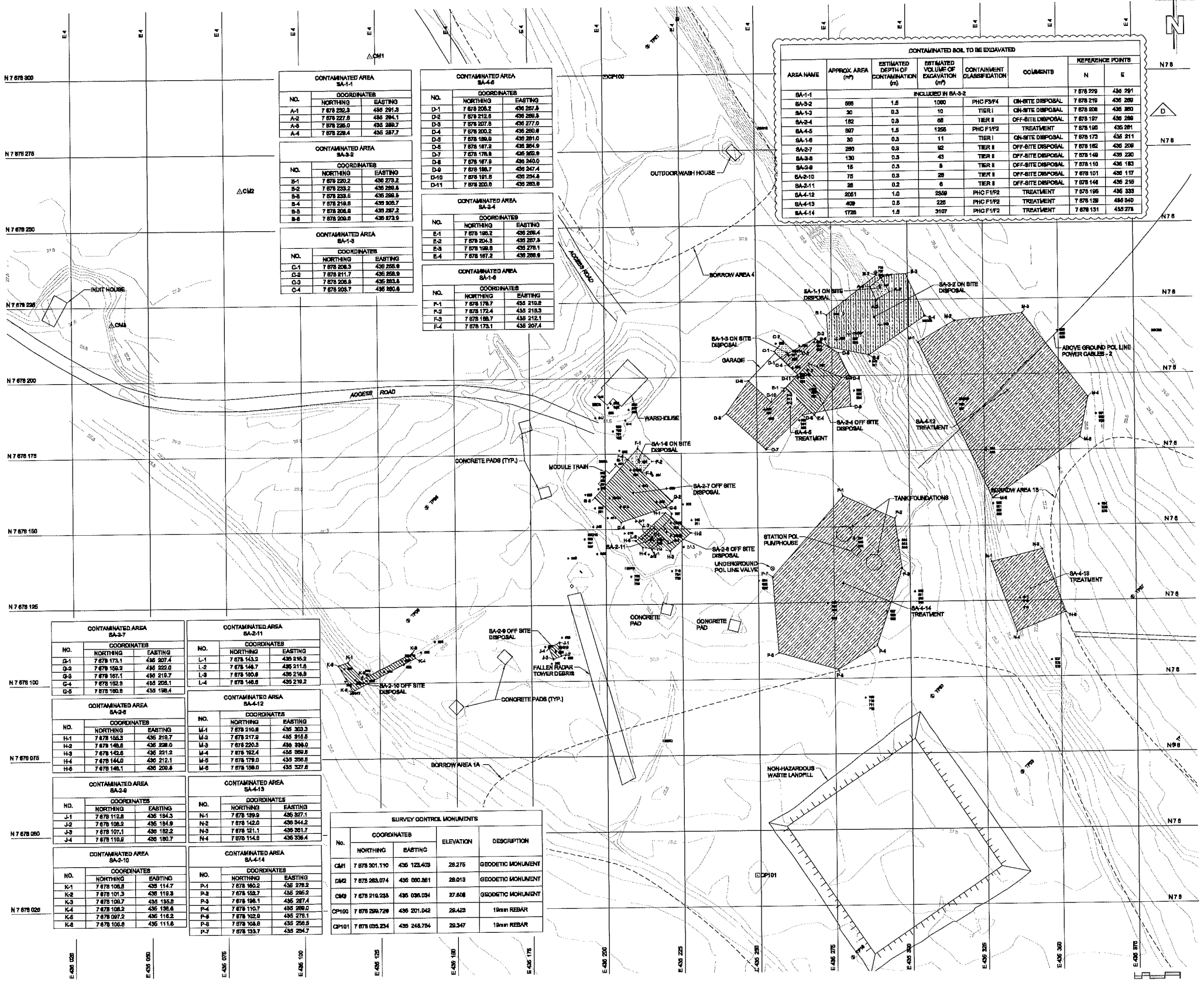

CONTAMINATED AREA SA-1-1

NO.	COORDINATES NORTHING	EASTING
A-1	7 678 232.3	436 291.3
A-2	7 678 227.8	436 284.1
A-3	7 678 226.0	436 289.7
A-4	7 678 229.4	436 297.7

CONTAMINATED AREA SA-3-2

NO.	COORDINATES NORTHING	EASTING
B-1	7 678 220.2	436 273.2
B-2	7 678 233.2	436 288.5
B-3	7 678 229.5	436 298.5
B-4	7 678 218.8	436 305.7
B-5	7 678 206.8	436 297.2
B-6	7 678 209.8	436 273.9

CONTAMINATED AREA SA-1-3

NO.	COORDINATES NORTHING	EASTING
C-1	7 678 208.3	436 265.9
C-2	7 678 211.7	436 268.9
C-3	7 678 208.9	436 283.5
C-4	7 678 203.7	436 280.6

CONTAMINATED AREA SA-4-6

NO.	COORDINATES NORTHING	EASTING
D-1	7 678 208.2	436 267.9
D-2	7 678 212.6	436 269.3
D-3	7 678 207.5	436 277.0
D-4	7 678 200.2	436 269.8
D-5	7 678 189.9	436 281.0
D-6	7 678 187.3	436 264.9
D-7	7 678 178.8	436 262.9
D-8	7 678 187.9	436 240.0
D-9	7 678 198.7	436 247.4
D-10	7 678 191.7	436 254.8
D-11	7 678 200.6	436 263.8

CONTAMINATED AREA SA-2-1

NO.	COORDINATES NORTHING	EASTING
E-1	7 678 185.2	436 269.4
E-2	7 678 204.3	436 287.3
E-3	7 678 198.8	436 278.1
E-4	7 678 187.2	436 268.9

CONTAMINATED AREA SA-1-6

NO.	COORDINATES NORTHING	EASTING
F-1	7 678 178.7	436 210.8
F-2	7 678 172.4	436 218.3
F-3	7 678 186.7	436 212.1
F-4	7 678 173.1	436 207.4

CONTAMINATED AREA SA-2-7

NO.	COORDINATES NORTHING	EASTING
G-1	7 678 173.1	436 307.4
G-2	7 678 159.2	436 322.6
G-3	7 678 167.1	436 319.7
G-4	7 678 152.8	436 306.1
G-5	7 678 160.8	436 189.4

CONTAMINATED AREA SA-2-11

NO.	COORDINATES NORTHING	EASTING
L-1	7 678 143.2	436 216.2
L-2	7 678 146.7	436 211.8
L-3	7 678 160.8	436 216.9
L-4	7 678 146.8	436 219.2

CONTAMINATED AREA SA-2-8

NO.	COORDINATES NORTHING	EASTING
H-1	7 678 155.3	436 218.7
H-2	7 678 146.6	436 228.0
H-3	7 678 143.6	436 221.2
H-4	7 678 144.0	436 212.1
H-5	7 678 146.1	436 209.8

CONTAMINATED AREA SA-4-12

NO.	COORDINATES NORTHING	EASTING
M-1	7 678 210.8	436 303.3
M-2	7 678 217.9	436 316.5
M-3	7 678 220.3	436 309.0
M-4	7 678 192.4	436 289.8
M-5	7 678 179.0	436 306.8
M-6	7 678 198.0	436 327.8

CONTAMINATED AREA SA-2-6

NO.	COORDINATES NORTHING	EASTING
J-1	7 678 112.8	436 194.3
J-2	7 678 108.9	436 184.9
J-3	7 678 107.1	436 182.2
J-4	7 678 110.9	436 180.7

CONTAMINATED AREA SA-4-13

NO.	COORDINATES NORTHING	EASTING
N-1	7 678 159.9	436 327.1
N-2	7 678 142.0	436 344.2
N-3	7 678 121.1	436 361.7
N-4	7 678 114.8	436 336.4

CONTAMINATED AREA SA-2-10

NO.	COORDINATES NORTHING	EASTING
K-1	7 678 108.8	436 114.7
K-2	7 678 101.3	436 119.8
K-3	7 678 109.7	436 135.8
K-4	7 678 108.2	436 136.6
K-5	7 678 097.2	436 116.2
K-6	7 678 106.6	436 111.6

CONTAMINATED AREA SA-4-14

NO.	COORDINATES NORTHING	EASTING
P-1	7 678 160.2	436 278.2
P-2	7 678 152.7	436 286.2
P-3	7 678 156.1	436 287.4
P-4	7 678 110.7	436 269.0
P-5	7 678 102.9	436 278.1
P-6	7 678 108.8	436 286.5
P-7	7 678 133.7	436 294.7

SURVEY CONTROL MONUMENTS

No.	COORDINATES NORTHING	EASTING	ELEVATION	DESCRIPTION
CM1	7 678 301.110	436 123.409	28.275	GEODETIC MONUMENT
CM2	7 678 263.074	436 060.861	28.013	GEODETIC MONUMENT
CM3	7 678 219.235	436 036.034	27.808	GEODETIC MONUMENT
CP100	7 678 259.729	436 201.042	28.423	19mm REBAR
CP101	7 678 055.234	436 248.784	29.347	19mm REBAR

CONTAMINATED SOIL TO BE EXCAVATED

AREA NAME	APPROX. AREA (m²)	ESTIMATED DEPTH OF CONTAMINATION (m)	ESTIMATED VOLUME OF EXCAVATION (m³)	CONTAINMENT CLASSIFICATION	COMMENTS	REFERENCE POINTS N	E
SA-1-1	INCLUDED IN SA-3-2					7 678 229	436 291
SA-3-2	665	1.5	1000	PHC F3/F4	ON-SITE DISPOSAL	7 678 219	436 269
SA-1-3	30	0.3	10	TIER I	ON-SITE DISPOSAL	7 678 208	436 260
SA-2-4	182	0.3	55	TIER II	OFF-SITE DISPOSAL	7 678 197	436 286
SA-4-5	597	1.5	1255	PHC F1/F2	TREATMENT	7 678 190	436 291
SA-1-6	30	0.3	11	TIER I	ON-SITE DISPOSAL	7 678 173	436 211
SA-2-7	260	0.3	92	TIER II	OFF-SITE DISPOSAL	7 678 162	436 208
SA-3-8	130	0.3	43	TIER II	OFF-SITE DISPOSAL	7 678 149	436 220
SA-2-8	15	0.3	5	TIER II	OFF-SITE DISPOSAL	7 678 110	436 183
SA-2-10	75	0.3	28	TIER II	OFF-SITE DISPOSAL	7 678 101	436 117
SA-2-11	28	0.2	6	TIER II	OFF-SITE DISPOSAL	7 678 148	436 210
SA-4-12	2051	1.0	2559	PHC F1/F2	TREATMENT	7 678 195	436 333
SA-4-13	409	0.5	225	PHC F1/F2	TREATMENT	7 678 139	436 340
SA-4-14	1726	1.5	3107	PHC F1/F2	TREATMENT	7 678 151	430 279

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- APPROXIMATE EXTENT OF BORROW AREA
- ACCESS ROAD
- TIER I APPROXIMATE CONTAMINATED AREA
- TIER II APPROXIMATE CONTAMINATED AREA
- F3/F4 APPROXIMATE CONTAMINATED AREA
- F1/F2 APPROXIMATE CONTAMINATED AREA
- TESTPIT LOCATIONS
- SURVEY CONTROL MONUMENT
- SURVEY CONTROL POINTS
- SAMPLE LOCATIONS

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REVISIONS	DESCRIPTION	DATE
D	REVISED TMEC	08/10/14
C	ISSUED FOR TENDER	08/09/19
B	ISSUED FOR 90% REVIEW	08/08/05
A	ISSUED FOR 90% REVIEW	08/07/25

A detail number / numéro du détail
B source drawing no. / no. de dessin no.
C detail on drawing no. / détail sur dessin no.

project title / titre du projet
PIN-B
REMEDIATION PROJECT

drawing title / titre du dessin
AREA 7
STATION AREA

designed by / conçu par	T. ESHPETER
drawn by / dessiné par	A. DE LEON
approved by / approuvé par	C. CORRIGAN
PBSC Project Manager / Administrateur de Projet TPSGC	M. BERNARDIN
scale / échelle	1:500
project no. / projet no.	R.015218.012
date	OCTOBER, 2008
sheet / feuille	C08
of / de	12

R.015218.012 - C08

APPENDIX II

Photo-ionization Detector Specifications
LP8 Non-Woven Geotextile Specifications
OR RPE Geomembrane Specifications
Treatment Cell Plan

MiniRAE 2000

Portable Handheld VOC Monitor

The rugged MiniRAE 2000 is the smallest pumped handheld volatile organic compound (VOC) monitor on the market. Its Photoionization Detector's (PID) extended range of 0 to 10,000 ppm makes it an ideal instrument for applications from environmental site surveying to HazMat/ Homeland Security.

AutoRAE Compatible

Wireless

Key Features

- **Proven PID technology** The patented sensor provides a 3-second response up to 10,000 ppm and sets a new standard for resistance to moisture and dirt.
- **Wireless communication enabled and certified**
- **Self-cleaning lamp and sensor** The patented self-cleaning lamp and sensor minimize the need for maintenance and calibration.
- **The MiniRAE 2000 lamp and sensor can be taken apart in seconds for easy maintenance without tools!**
- **Measure more chemicals than with any other PID.** With over 100 Correction Factors built into the MiniRAE 2000 memory and the largest printed list of Correction Factors in the world (300+), RAE Systems offers the ability to accurately measure more ionizable chemicals than any other PID. When a gas is selected from the MiniRAE 2000's library, the alarm points are automatically loaded into the meter.
- **User friendly** screens make it easy to use for simple applications and flexible enough for sophisticated operations.
- **Drop-in battery** When work schedules require putting in more than the 10 hours supplied by the standard NiMH battery, the drop-in alkaline pack supplied with every MiniRAE 2000 lets you finish the job.
- **Rugged Rubber Boot** The standard rubber boot helps assure that the MiniRAE 2000 survives the bumps and knocks of tough field use.
- **Strong, built-in sample pump** draws up to 100 feet (30 m) horizontally or vertically.
- **Tough, flexible inlet probe**
- **Large keys** operable with 3 layers of gloves.
- **Easy-to-read display** with backlight.
- **Stores up to 267 hours of data** at one-minute intervals for downloading to PC.
- **3-year 10.6 eV lamp warranty**

Applications

HazMat/Homeland Security

- Initial PPE (personal protective equipment) assessment
- Leak detection
- Safety perimeter establishment and maintenance
- Spill delineation
- Decontamination
- Remediation

Industrial Hygiene/Safety

- Confined Space Entry (CSE)
- Indoor Air Quality (IAQ)
- Worker exposure studies

Environmental

- Soil and water headspace analysis
- Leaking underground storage tanks
- Perimeter fenceline monitoring
- Fugitive emissions (EPA Method 21)
- Vapor recovery breakthrough
- Landfill monitoring

ver12_04.07

Specifications*

Detector Specifications

Size	8.2" L x 3.0" W x 2.0" H (21.8 x 7.62 x 5.0 cm)
Weight	20 oz with battery pack (553 g) w/o rubber boot
Sensor	Photoionization sensor with standard 10.6 eV or optional 9.8 eV or 11.7 eV UV lamp
Battery	• Rechargeable, external, field-replaceable Nickel-Metal-Hydride (NiMH) battery pack • Alkaline battery holder (for 4 AA batteries)
Operating Period	10 hours continuous operation
Display	Large LCD, backlight activated manually, by alarms or by darkness
Keypad	1 operation and 2 programming keys
Direct Readout	• VOCs as ppm by volume • High and low values • STEL and TWA (in hygiene mode) • Battery and shut down voltage
Alarms	90 dB buzzer and flashing red LED to indicate exceeded preset limits: • High: 3 beeps and flashes per second • Low: 2 beeps and flashes per second • STEL and TWA: 1 beep and flash per second • Alarms automatic reset or latching with manual override • Optional plug-in pen size vibration alarm • User adjustable alarm limits
Calibration	Two-point field calibration of zero and standard reference gas. Calibration memory of 8 calibration gases, alarm limits, span values and calibration date
Datalogging	267 hours (at one-minute intervals) with date/time. Header information includes monitor serial number, user ID, site ID, date and time
Sampling Pump	• Internal, integrated flow rate of 400 cc/min • Sample from 100' (30 m) horizontally or vertically
Low Flow Alarm	Auto shut-off pump at low flow condition
Communication	Download data and upload instrument set-up from PC through RS-232 link to serial port. Wireless communication enabled and certified (requires RAELink2 and ProRAE Remote to use)
Temperature	14° F to 104° F (-10° C to 40° C)
Humidity	0% to 95% relative humidity (non-condensing)
EM/RFI	Highly resistant to EMI /RFI. Compliant with EMC Directive 89/336/EEC
IP-rating	IP-55: protected against dust, protected against low-pressure jets of water from all directions
Hazardous Area Approval	• **US and Canada:** UL and cUL, Classified for use in Class I, Division 1, Groups A, B, C and D hazardous locations • **Europe:** ATEX II IG EEx ia IIC T4
Attachment	Durable bright yellow rubber boot w/belt clip & wrist strap
Warranty	Lifetime on non-consumable components (per RAE Systems Standard Warranty), 3 years for 10.6.V PID lamp, 1 year for pump and battery

***** Specifications are subject to change

****** Performance based on isobutylene calibration

Default Sensor Settings**

Gas Monitor (ppm)	Range (ppm)	Resolution Time (T90)	Response
VOCs	0 to 99.9 ppm	0.1 ppm	< 3 sec
	100 to 10,000 ppm	1 ppm	< 3 sec

MiniRAE 2000 and Accessories

Monitor only includes:

- RAE Systems UV lamp: 10.6 eV, 9.8 eV or 11.7 eV as specified
- ProRAE Suite software package for Windows® 98, NT, 2000 and XP
- Computer interface cable
- 5-inch Flex-I-Probe
- External filter
- Rubber boot with belt clip
- Alkaline battery adapter
- Tool kit
- Lamp cleaning kit
- Nickel-Metal-Hydride (NiMH) battery
- 120/230 V AC/DC wall adapter (if specified)
- Operation and maintenance manual

Monitor with accessories kit adds:

- Hard transport case with pre-cut foam padding
- 5 porous metal filters and O-rings
- Organic vapor zeroing adapter
- Gas outlet port and tubing

Optional calibration kit adds:

- 10 ppm isobutylene calibration gas, 34L
- Calibration regulator and flow controller

Optional Guaranteed Cost of Ownership Program:

- 4-year repair and replacement guarantee
- Annual maintenance service

DISTRIBUTED BY:

ver12_04.07

RAE Systems Inc.
3775 North First Street
San Jose, CA 95134 USA
raesales@raesystems.com

USA/Canada 1-877-723-2878
Europe/Russia +45 8652 5155
Middle East/Australia 971 50 429 1385
China 8610 58858788
Asia +852 2669 0828

www.raesystems.com

LAYFIELD

Product Data Sheet

Geotextiles - Nonwoven

Non-woven needle-punched geotextiles offer excellent water flow properties for drainage and other applications.

Material Properties - US Values

19 Nov 2007	Non-Woven Needle-Punched Geotextiles - US Values									
	ASTM	LP3.5	LP4	LP4.5	LP6	LP7	LP8	LP10	LP12	LP16
Grab Tensile (lbs)	D4632	90	100	120	160	180	205	250	300	380
Elongation (%)	D4632	50	50	50	50	50	50	50	50	50
Tear (lbs)	D4533	40	50	50	65	75	85	100	115	145
Puncture (lbs)	D4833	60	65	70	90	105	130	160	180	240
AOS (sieve)	D4751	50	70	70	70	70	80	100	100	100
Permittivity (sec-1)	D4491	2.2	2.0	1.8	1.6	1.5	1.4	1.2	1.0	0.7
Water Flow (gpm/ft_2)	D4491	150	140	120	110	100	90	80	75	50
Weight[1] (oz/yd_2) Nominal	D5261	3.5	4.0	4.5	6.0	7.0	8.0	10.0	12.0	16.0
Thickness[1] (mil) Nominal	D5199	40	45	50	70	85	85	100	110	165
UV (500 hrs)	D4355	70%	70%	70%	70%	70%	70%	70%	70%	70%
Roll Size (ft)		15 x 360	15 x 360	15 x 360	15 x 300[2]	15 x 300[2]	15 x 300[2]	15 x 300	15 x 300	15 x 150
Roll Weight[1] (lbs)		160	172	190	202	220	250	308	400	250

Note[1]: Typical values. All other values are minimum average roll values (MARV).
Note[2]: LP6, LP7, and LP8 may be 15 x 360 ft depending on inventory

Material Properties - Metric Values

19 Nov 2007	Non-Woven Needle-Punched Geotextiles - Metric Values									
	ASTM	LP3.5	LP4	LP4.5	LP6	LP7	LP8	LP10	LP12	LP16
Grab Tensile (N)	D4632	401	445	533	711	800	911	1,110	1,330	1,690
Elongation (%)	D4632	50	50	50	50	50	50	50	50	50
Tear (N)	D4533	178	222	222	289	333	378	444	511	644
Puncture (N)	D4833	267	289	311	400	467	578	711	800	1,070
AOS (microns)	D4751	300	212	212	212	212	180	150	150	150
Permittivity (sec-1)	D4491	2.2	2.0	1.8	1.6	1.5	1.4	1.2	1.0	0.7
Water Flow (l/min/m_2)	D4491	6,095	5,689	4,885	4,480	4,074	3,657	3,251	3,055	2,035
Weight[1](g/m_2) Typical	D5261	119	136	153	203	237	271	339	407	542
Thickness[1] (mm) Nominal	D5199	1.0	1.1	1.3	1.7	2.1	2.1	2.9	3.0	4.1
UV (500 hrs)	D4355	70%	70%	70%	70%	70%	70%	70%	70%	70%

Roll Size (m)		4.57 x 110	4.57 x 110	4.57 x 110	4.57 x 91.4[2]	4.57 x 91.4[2]	4.57 x 91.4[2]	4.57 x 91.4	4.57 x 91.4	4.57 x 45.7
Roll Weight[1](kg)		73	78	86	92	99	113	140	181	112

Please Note

If you have any further questions please call your Layfield representative. Layfield product information is provided free of charge for your consideration. The comments offered are for discussion purposes only. While this information is based on Layfield's experience, this information may not be relied upon for any specific application as the nature of applications and site conditions are beyond Layfield's control. It is the user's responsibility to statisfy themselves as to the suitability of this information and to determine the suitability of this information for their specific application. Layfield shall not be liable for any loss or damages whatsoever that may occur from the use of this information. No warranty against patent infringement is offered or implied.

LAYFIELD

Layfield Group
Web » **www.layfieldgroup.com**
E-mail » **corporate@layfieldgroup.com**
Phone (United States) » **1-800-796-6868**
Phone (Canada) » **1-800-840-2884**

San Diego | Seattle | Vancouver | Edmonton | Calgary | Toronto

Geomembrane - RPE

RPE®'s are economical lining materials for seepage control, soil remediation, and interim landfill cap applications.

Reinforced Polyethylene (RPE®) has been used as an economical geomembrane material by Layfield for over 25 years.

Common uses of RPE®'s are canal liners, drilling sump liners, soil remediation liners, tailings dam liners, and interim landfill caps. RPE®'s have UV resistance for short term exposed use, are flexible in extremely low temperatures, and have very good chemical resistance.

RPE®'s are most commonly used for seepage control in non-hazardous applications. In canal liners and water reservoirs a backfilled RPE® liner provides permanent seepage control. In a carefully prepared site on sandy soils RPE® can provide geomembrane level containment, however placement and backfilling of the material needs to be done carefully.

26 Jan 2006	RPE® Typical Material Properties			
Style	**ASTM**	**RPE® 15**	**RPE® 25**	**OR RPE® 25**
Thickness (Nominal)		12 mil 0.30 mm	20 mil 0.51 mm	24 mil 0.60 mm
Coating Thickness (Nominal)		1.75 mil 0.044 mm	2.5 mil 0.063 mm	2.5 mil 0.063 mm
Tensile Strength MD	D5034	210 lbs 933 N	340 lbs 1,510 N	360 lbs 1,600 N
Tensile Strength CD	D5034	180 lbs 801 N	340 lbs 1,510 N	360 lbs 1,600 N
Elongation	D751	15%	15%	15%
Tear Strength MD	D2261 Tongue Tear	70 lbs 311 N	125 lbs 560 N	90 lbs 400 N
Tear Strength CD	D2261 Tongue Tear	70 lbs 311 N	125 lbs 560 N	90 lbs 400 N
Low Temperature Bend	D2136	-67°F -55°C	-67°F -55°C	-67°F -55°C
Burst Strength	D3786	370 psi 2553 kPa	551 psi 3800 kPa	609 psi 4200 kPa
UV Resistance (Strength Retained)	G53-84 2000 Hours	>80%[1]	>80%[1]	>80%[1]
Note[1]: UV results are for black product only. Colors other than black may have a lower U.V. resistance.				

Layfield Geosynthetics and Industrial Fabrics Ltd.
www.geomembranes.com
service@geomembranes.com

Geosynthetics, North America
Toll Free: 800-840-2884
Tel: 780-453-6731
Fax: 780-455-5218

Geosynthetics, US West Coast
Toll Free: 800-796-6868
Tel: 425-254-1075
Fax: 425-254-1575

15 Dec 2006	RPE® Minimum Shop Seam Strengths			
Style	**ASTM**	**RPE® 15**	**RPE® 25**	**OR RPE® 25**
Heat bonded Seam Strength	D6392 25.4 mm (1") Strip[2]	90 ppi 15.8 N/mm	120 ppi 21 N/mm	120 ppi 21.0 N/mm
Heat Bonded Peel Adhesion Strength	D6392 25.4 mm (1") Strip[2]	FTB AD-DEL	FTB AD-DEL	FTB AD-DEL
Note [2]: Layfield uses a 25.4 mm (1 in.) strip tensile test in it's QC testing due to the nature of the test equipment available.				

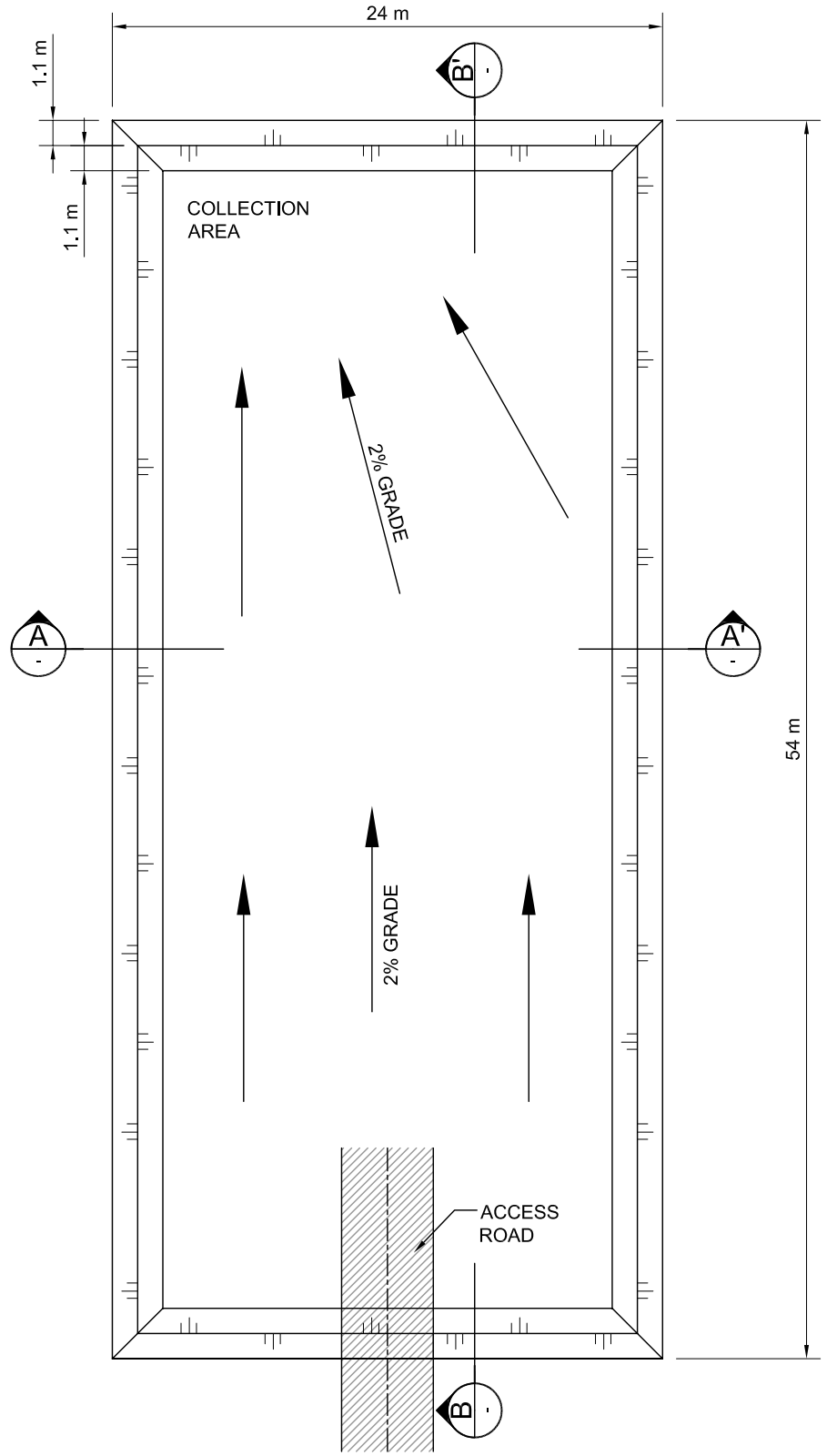
Each and every RPE® liner produced by Layfield is a custom sized panel. These liner panels are sized to your job requirements to the closest multiple of our roll stock widths.

RPE® FABRICATION SIZES		
Material Style	**3000 lb Panel size 1400 kg**	**4000 lb Panel size 1800 kg**
RPE® 15	76,900 ft^2 7,200 m^2	102,500 ft^2 9,600 m^2
RPE® 25	49,000 ft^2 4,600 m^2	65,500 ft^2 6,100 m^2
OR RPE® 25	47,600 ft^2 4,500 m^2	63,500 ft^2 5,900 m^2

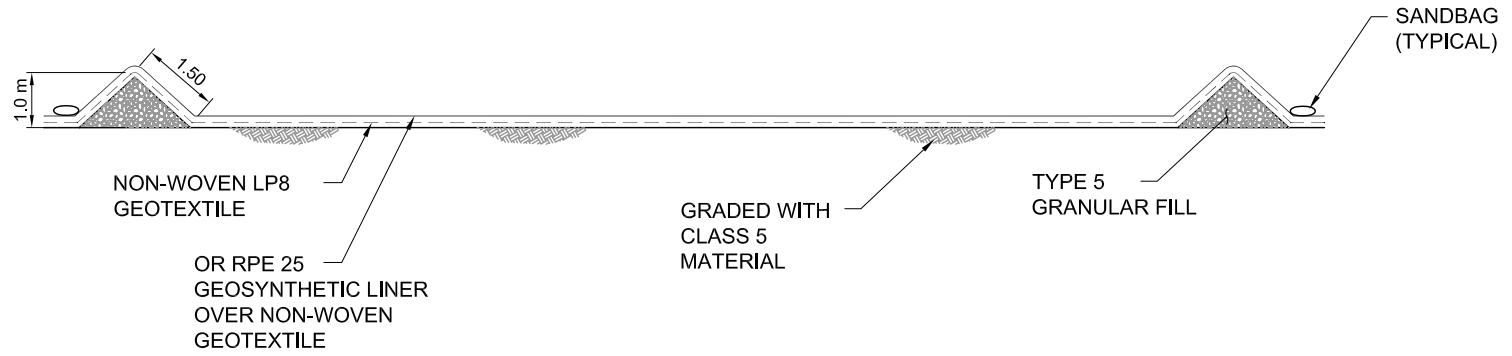
There are no theoretical limits to the size of liner panel we can fabricate, however there are some practical handling weights. Panel weight is important because of the limits of handling equipment available in the field. If a forklift or other piece of equipment is available for placement and deployment then a panel of up to 1800 kg (4000 lbs) could be used. If only "hand power" is available then a panel weight of 1400 kg (3000 lbs) should not be exceeded. Under certain circumstances larger panels could be provided. Please contact your Layfield representative for further details.

Layfield utilizes hot air fusion welding for all RPE® fabrication. This welding technique provides a fully fused, water-tight weld. Panels are accordion folded in one direction and then rolled in the other direction. Unfolding instructions and panel size are marked on the individual lining panel. Each panel is wrapped in an opaque, weather resistant, covering suitable for shipment and storage at site.

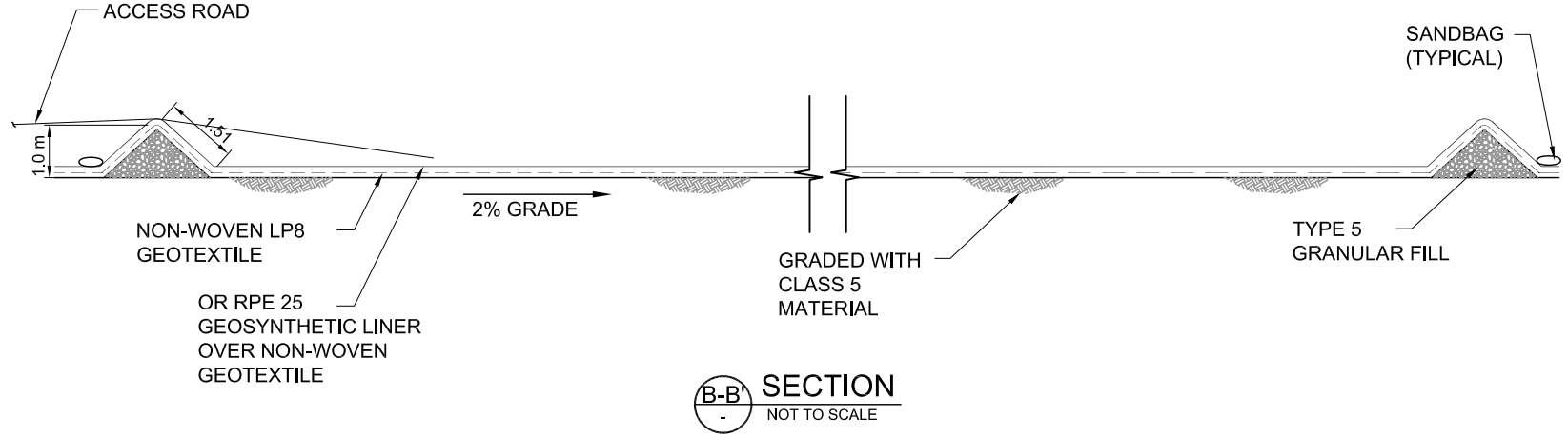
Layfield maintains large inventories of RPE® materials throughout the construction season. Most RPE® panels can be fabricated and delivered in a matter of days, and larger projects can be supplied very quickly. Please contact your Layfield representative for further delivery information.



TREATMENT CELL PLAN VIEW
NOT TO SCALE



A-A' SECTION
NOT TO SCALE



B-B' SECTION
NOT TO SCALE

TO BE READ WITH IEG REPORT DATED MAY 2009

NOT FOR CONSTRUCTION

CLIENT: E. GRUBEN'S TRANSPORT

IEG CONSULTANTS LTD.

PROJECT: PIN-B CLIFTON POINT, NUNAVUT

TITLE: SOIL TREATMENT CELL

PROJECT No.: PR8A3.08

FIG. No.: FIGURE 1

A04002A01.FIG-1.dwg

KCC-F-B-M

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