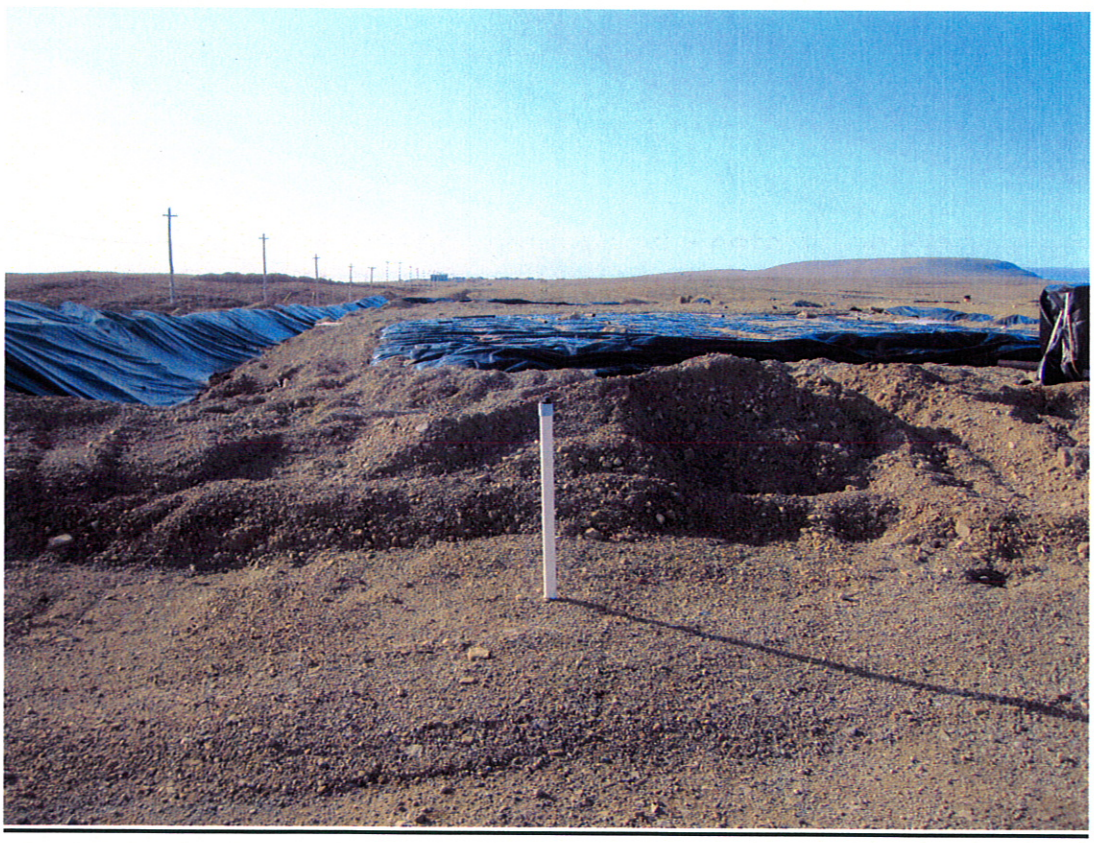
# Stand Alone Abandonment and Restoration Plan
# Resolute Bay Airport Land Farm, Nunavut

**Prepared by**
**Transport Canada**

**January 2012**



# Table of Contents

# 1.0 Scope of Work

Transport Canada is required to meet the required Petroleum Hydrocarbon (PHC) criteria under the Nunavut Environmental Guidelines (most current edition), CCME Petroleum Hydrocarbon Guidelines (most current edition) and the CCME Interim Canadian Environmental Quality Criteria for Contaminated Sites (most current edition) remediation criteria for coarse grain soil, industrial zoned sites. Once the Land Farm has been sampled and shows PHC levels are below the required criteria, the facility will be decommissioned and restored back to its original state.

The decommissioning will be done by removing the treated soil from the liner and removing the liner from the Land Farm. Using a gas Photo Ionization Detector (PID) or similar equipment to monitor hydrocarbon vapours, random samples of the material below the liner will be tested to ascertain if any contamination leached beneath the liner. In addition to the portable hydrocarbon vapour testing, 10 soil samples will be taken from under the liner area and sent to a certified laboratory for analysis of the same parameters as listed earlier. The liner itself will be taken to an approved landfill site for proper disposal. If contaminated soil is found below the Land Farm, this material will be removed and placed in an adjacent Land Farm TC is operating on site (please see attached drawing).

The treated soil will be used to backfill the Land Farm excavation and compacting, if necessary, to match the surrounding soil conditions. All monitoring wells will remain in place for future sampling until it is determined no contamination exists (approximately one year). Once this is completed the monitoring wells will be removed and sealed with bentonite using accepted standards under the Environmental Protection Agency (EPA).

Finally, once the Land Farm area has been replaced with the treated soil, the soil and berms shall be leveled and compacted to match the surrounding conditions, unless the Airport Manager wishes for a different land use for the area. The former Land Farm area will be re-seeded with vegetation that is natural and noninvasive to the area (to be determined). The estimated time frame to complete the restoration plan is 25 to 35 day.

Transport Canada constructed 2 Land Farms in 2001/02 to remediate soil from the decommissioned Fire Training Area (FTA). Approximately 5800$m^3$ of petroleum hydrocarbon contaminated soil was placed in the 2 Land Farms.

The Land Farms are located at the Resolute Bay Airport 74 degrees 44' 56.11"N 95 degrees 02' 03.71"W. The 2 Land Farms are approximately 70m X 40m and

80m X 30m. The construction of the Land Farms were initiated and completed in 2001/02.

The nearest building is the Airport Terminal Building (ATB) approximately 2.6 km to the south. The nearest water body is the Arctic Ocean located approximately 1.4 km east of the Land Farms. The topography of the site is generally flat and 171 feet above sea level. The area surrounding the airport (as indicated by the topographic map) has a gentle slope to the west toward the ocean. The map scale is 1:25,000. Please see Annex I for location/contour map.

The Land Farm is located in a developed area at the Resolute Bay airport. Therefore, it does not impact communities, traditional use areas (hunting and trapping camps), sensitive areas, parks, game preserves, resource harvesting areas, fish spawning areas, waterfowl habitat, animal migration routes, beaches, archaeological and historic sites, public or private water supplies.

## 2.0 Decommissioning

Upon closure of the facility the following tasks will be completed:

- Soil located in the facility will be tested to ensure the water license guideline criteria are met identified in Table No. 1 – Remediation Requirements in the license.
- Water will be tested in the sump to ensure it meets the remediation guidelines under the water license Section D Part 4.
- The soil will be removed from the facility and stockpiled adjacent to the liner
- The liner will be removed and sent to an approved disposal facility.
- The stockpiled soil will be used to fill in the excavation to match the surrounding topography.

## 3.0 Effective Period of Project/Schedule of Abandonment

The requested temporal scope of the project is 5 years, commencing in April 2012 and finishing in July 2016. The scope will allow for the continued operation of the existing facility, which has been in operation for 11 years. The estimated timeframe is dependant on many uncontrolled factors such as contamination levels, weather conditions and hiring contractors.

# 4.0 Project Description

The following terms of reference will be used to abandon and close the site once the contaminated soil has been remediated:

## 4.1 TITLE & PREFACE

Land Treatment Unit Decommissioning, Resolute Bay, Nunavut

Environmental Affairs, Programs, Transport Canada, Prairie and Northern Region, is requesting interested contractors to submit proposals for the supply of materials, equipment, and labour that are necessary to conduct the required 'Environmental Work' at the Resolute Bay Airport as described in the following request for proposal.

## 4.2 INTRODUCTION

Prior to July 1, 1995 Resolute Bay Airport was owned by the Government of Canada and operated by the Quebec Region of the Department of Transport. From July 1, 1995 until April 1, 1999 the airport was owned by the Government of Northwest Territories and operated by the Arctic Airports Division of the Department of Transportation. Since April 1, 1999 the airport has been owned by the Government of Nunavut and operated by the Nunavut Airports Division of the Nunavut Department of Community Government, Housing and Transportation.

As a condition of the Arctic A Airport transfer agreement (July 1995) between GNWT and Transport Canada, the environmental issues, which existed prior to the airport transfer, are to be remediated as well as any items identified by the GN within six years of the transfer date. Works identified under this document address some of the issues identified in the Transfer agreement as well as post transfer issues.

Transport Canada is obligated to remediate all hazardous substances that are the department's responsibility that do not comply with the applicable environmental laws.

Remediation of the former Fire Training Area (FTA) was initiated in July 2001. Two Land Farms with an oil resistant reinforced polyethylene liner was constructed on site to contain the contaminated soil. Monitoring wells were installed down gradient of the landfarm location to facilitate future monitoring of these sites. The site was backfilled with clean fill that was

excavated during landfarm construction. The landfarm requires a soil sampling program as well as decommissioning to complete the project

The following table provides some background information for the project.

| **Landfarm area** | |
|---|---|
| Liner - one piece OR-PRE (20 mil) | 80m X30m<br>70m X 40m |
| Approximate depth of material in landfarm | 1 m |

## 4.3 SCOPE OF WORK

The following details the methodology the contractor is to perform to complete each of the project tasks. The methodology may be adjusted through a change order authorized by TC if the changes result in a more practical and/or cost effective and/or timely approach.

- The first objective is to conduct a comprehensive soil sampling program for the Land Farm to ensure the soil meets the remediation criteria for closure of the landfarm.

The contractor will obtain eight (8) composite soil samples from each cell (16 soil samples total) and a water sample from each monitoring well (2) from for submission to a certified laboratory for analysis. The contractor will be responsible for designing the sampling and analysis program, which must be submitted to the Project Manager for approval. All sampling procedures must be in accordance with the standards contained in the CCME Guidance Manual on Sampling, Analysis and Data Management for Contaminated Sites Volume I &II. The contractor must provide details of the field and laboratory QA/QC program for review in the final report. As a minimum the QA/QC program must include:

- Use of trip, field and equipment blanks;
- Use of duplicate and spiked samples;
- Proper sample containment, preservation, handling and transportation; and
- Due regard for necessary health and safety precautions.

- All samples must be analyzed for the following parameters. Unit cost for each of the tests are to be provided in the bid.
  - BTEX;
  - Total Extractable Hydrocarbons (TEH); and
  - Canada Wide Standards for Petroleum Hydrocarbons in Soil for Fractions #1 to #4 for the Tier 1 criteria for Industrial Sites.

The results of the laboratory analysis are to be compared to the Environmental Protection Service, Department of Sustainable Development, Government of Nunavut Environmental Guideline for Site Remediation, CCME Canada-Wide Standards for Petroleum Hydrocarbons (PHC) in Soil (most current edition) and the CCME Interim Canadian Environmental Quality Criteria for Contaminated Sites (most current edition) remediation criteria for commercial/ industrial zoned sites. The results are to be presented in table form highlighting non-compliance with both federal and territorial regulations.

- The second objective of the project will be to decommission the Land Farm, if the soil tests indicate all of the soil has reached all of the mandatory limits of contamination. The decommissioning will be done by removing the soils from the liner and removing the liner from the Land Farm and backfilling the excavation with the treated soils and compacting, if necessary, to match the surrounding soil conditions. All monitoring wells will remain in place.

- Using a gas Photo Ionization Detector (PID) or similar equipment to monitor hydrocarbon vapours, the contractor must take random samples of the material below the liner to ascertain if any contamination leached beneath the liner. In addition to the portable hydrocarbon vapour testing, 8 soil samples will be taken from under the area (for each cell) and sent to a certified laboratory for analysis of the same parameters as listed in 3.2 on an expedited basis. **The liner itself will be taken to an approved landfill site for proper disposal (possibly sent outside of Nunavut to a southern location if required). The location of disposal will be determined by the contractor.**

The fourth objective is to landscape the excavated area once it has been replaced with the treated soil. The soil shall be levelled and compacted to match the surrounding conditions including smoothing out the berms to match the surrounding topography.

**If a project scope change is anticipated, the Contractor must notify the Project Manager in writing immediately. No additional or supplemental work shall be undertaken or in substitution of the work specified unless approved in writing by the Contracting Authority**.

Preparation of a report detailing works completed as a result of this scope of work.

## 4.4 PROJECT SCHEDULE AND INITIAL PROJECT MEETING

Ten (10) working days after the selected contractor has been notified of bid acceptance, the contractor is to submit to the Project Manager a detailed project schedule that will outline the time frames for each associated project work activity. After contract award an initial site start-up meeting will be organized by the Project Manager with the Resolute Bay Airport Manager and the contractor in order to review and finalize the contractor's project schedule, associated work activities and review airport safety and security requirements. This meeting may also be accomplished through a teleconference from the Project Manager's office to the Resolute Bay Airport Manager at the discretion of the Project Manager. All personnel, materials and equipment must be on site to facilitate a start date to be determined after contract award, as negotiated between contractor and Project Manager.

## 4.5 CONDITIONS FOR PROJECT WORK

**Mandatory Items To Be Submitted In the Proposal**

**With Their Proposal, Bidders <u>Must</u> Submit The Following:**

- A 'Work Plan' which includes the following:

  a. The Consultant must provide a qualified site superintendent, with a minimum of 10 years relevant practical experience, who will manage site contractual activities, the coordination of work, provide daily progress reports to the Project Manager and shall remain on the job site when the project is in progress.

  b. The name and credentials of the on-site supervisor. The site supervisor will not be replaced without prior **written** approval from Transport Canada.

  c. A detailed breakdown of the work to be completed by the Contractor under this contract.

  d. A detailed description of how each of the tasks will be carried out, ensuring compliance to all applicable legislation and regulations.

  e. A list of all consultant/contractor/subcontractor personnel that will be directly involved with the work under this contract, and their relation to the project.

- A project schedule; a detailed schedule is required 10 days after contract award. A proposed schedule for the completion of the work must be provided with your submittal. This schedule should identify

the timing of tasks associated with the various project tasks and activities, including required report submissions. The Contractor shall adhere to the detailed schedule established in their proposal.

- A site specific 'Health and Safety Plan' (HASP) which includes, as a minimum, a document complying with Nunavut WCB guidelines, outlining the following:

a. The major hazards that will be encountered on site.

b. The precautions that will be taken to minimize the hazards (Personal Protective Equipment, signage, barriers, etc.) All cost associated with monitoring and conflict control shall be born by the consultant/contractor.

c. Medical emergency procedures that will be followed by the consultant/contractor in case of accident or incident requiring medical attention, including a contact list of hospitals, fire department, etc.

d. A fire safety program that includes fire prevention, fire protection and fire reporting procedures and requirements. Details of the program must be included in the plan of operation that addresses safety and security at the site according to regulatory requirements.

e. A safe work procedure plan for active airports.

**Note:** a more detailed version of the HASP will be made available to the Project Manager for review prior to the start of work. Transport Canada wants to ensure the bidders are aware of the site-specific conditions and take the time to read and prepare a site-specific document, and not include a generic form or section.

During the onsite work phase of the project, the contractor must comply with the following:

- Changes to the personnel list will not be permitted once the contract has been awarded without consultation and written approval by the Project Manager; copies of their CV are required and will be reviewed prior to final acceptance.

- Do not disrupt airport business except as permitted by the Airport Manager;

- Provide barricades and lights where required;

- Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling and storage, and disposal of hazardous materials;

- Observe construction safety measures of the Nunavut Workers Compensation Board and municipal authority provided that in any case of conflict or discrepancy the more stringent shall apply;

- The Project Manager must be notified immediately by the contractor should there be problem areas encountered that are in addition to those covered by this Request for Proposal; and

- Personnel qualifications are to be provided as per Section 5.1(e) to demonstrate their capability to conduct the required field sampling of soil and water for formal laboratory analysis and compaction testing.

## 4.6 AIRSIDE SECURITY ACCESS REQUIREMENTS

The Land Farm is **NOT** located in a restricted area of the Resolute Bay Airport, however, authorization passes may be required from the Resolute Bay Airport Manager for contractor's personnel. As well, airside vehicle restrictions are also in place. The contractor will be responsible for obtaining and fulfilling the necessary Airport airside /access requirements from the Resolute Bay Airport Manager's office. If the Airport Manager decides that an escort is required, the contractor will be responsible for those costs.

## 4.7 PROTECTION OF BURIED INFRASTRUCTURE

While the work is in progress the Consultant will protect all utility lines and buried services, water, sewer, gas, electric, telephone and other utilities and structures encountered. If any utilities are damaged, the Consultant will restore them to original or better condition unless directed otherwise. If any previously unknown underground services are discovered during this project, report the find to the TC Project Manager and discuss with them on how to proceed.

## 4.8 POST CONSTRUCTION ACTIVITIES

Upon completion of the project works, the Consultant's site superintendent will notify the TC Project Manager to arrange for a contractual final acceptance to be conducted by Transport Canada.

A TC departmental representative will inspect all work. Work not done to the satisfaction of the departmental representative will be redone to the same and the Consultant will incur the cost.

Failure to carry out work to the satisfaction of the departmental representative may result in the termination of the contract and full payment of the contract may be suspended.

## 4.9 REPORTING

The Contractor will provide reports, and associated documentation including all annexes, tables and photographs as per deliverable format outlined below.

The Contractor will be responsible for the cost of processing the project reports using the Contractor's own or contracted typing/word processing facilities.

The Contractor will be responsible for all proof-reading. CADD Standards will be provided to the Contractor. The CADD drawing format required for drawings is the AutoCAD native format with the DWG file extension, preferably Release 2007 or higher. All drawings are to be produced in the metric system of measurement.

The Contractor shall maintain contact with the Project Manager throughout the contract including the report writing phases. Draft and Final reports shall be submitted to the Project Managers. Submissions include two (2) hard copies & one (1) electronic copy (Adobe Acrobat pdf) of the Draft Reports, and two (2) hard copies & one electronic copy on CD in pdf format of the Final Reports. All report figures and final site survey are to be in AutoCAD format.

The Contractor will provide Draft Documents for review by the Project Manager within four (4) weeks of completion of fieldwork to provide Transport Canada ample time to comment on the contents of the document. Project Manager will provide comments within two (2) weeks of submission. If required, the Consultant will provide written response to Project Managers comments for each review.

The final report is required two (2) weeks after receipt of comments.

Final copies are to be submitted to:

Manager, Environmental Affairs, Programs
Transport Canada
Prairie and Northern Region
1100-9700 Jasper Avenue
Edmonton, Alberta T5J 4E6

The report will include as a minimum:

- A Table of Contents
- An executive summary;
- A description of the scope of work;

- Description of field methods, construction activities, and disposal methods;
- Drawings indicating the location of site characteristics and infrastructure;
- Photos of the Land Farm prior to, during and after completion of the work;
- Drawings and photos of the locations where samples are collected;
- Conclusions based on the field and laboratory results; and
- Appendices containing, analytical methods, lab analysis and certificates.
- Reports will be in Ariel 12 font, on 8 ½ by 11 paper, single spaced, double sided; drawings can be on larger paper.

## 4.10 CONTRACT WORK SCHEDULE

The following scheduled milestones must be met in order to coincide with site operations:

- Proposal Due Date
- Submission of Contractor complete and detailed Site Specific Health & Safety Plan – 2 weeks prior to field work
- Field work to be completed by
- Completion of Draft Report
- Completion of Final Report - 2 weeks after receipt of client comments

## 4.11 REGULATORY FRAMEWORK

The contractor must observe the most recent published/current edition of applicable Federal, Provincial and Municipal legislation, regulations, guidelines and codes of practice (including all amendments), including but not limited to the following:

- Federal Guidelines for Land Farming Petroleum Hydrocarbon Contaminated Soils remediation criteria for commercial/ industrial zoned sites;
- Current Occupational Health and Safety Regulations;
- Canadian Environmental Protection Act;
- Transport of Dangerous Goods Act;
- National Fire Code, plus amendments;
- National Building Code (with all current amendments);
- CCME Guidance Manual on Sampling, Analysis and Data Management for Contaminated Sites;
- Work Site Hazardous Material Information System Regulation (WHMIS);
- CCME Interim Canadian Environmental Quality Criteria for Contaminated Sites (most current edition);
- CCME Environmental Quality Guidelines (most current edition);
- Canada Wide Standards for Petroleum Hydrocarbons in Soil (with amendments); and
- The regulations and standards of any other local governing agencies.

In case of conflict or discrepancy, the more stringent requirement shall apply. The contractor must meet or exceed requirements of contract documents, specified standards; codes and referenced documents. The contractor must ensure that all on site personnel are familiar with the mitigative measures included in the contractor Health and Safety Plan should a spill on site occur.

**No on-site work will be undertaken prior to receipt of written approval of the Occupational Health and Safety Plan from the Project Manager.**

The Consultant will be responsible for and must implement and maintain the plan of operation, which addresses safety and security at the site according to the direction received from the Airport Manager as part of his Aerodrome Operations Certificate.

The Consultant must observe and enforce the following safety measures, including but not limited to:

- Canada Labour Code,
- National Fire Code of Canada,
- Worker's Compensation Board,
- All applicable Health and Safety regulations, and Provincial and Municipal authority, provided that is any case of conflict or discrepancy the more stringent requirements shall apply.
- Workplace Hazardous Materials Information system (WHMIS) regarding use, handling, storage and disposal of hazardous materials; and regarding labelling and provision of material safety sheets acceptable to Labour Canada and Health and Welfare Canada.
- Deliver copies of WHMIS data sheets to Project Manager on delivery of applicable materials.

## 4.12 IMPOSED CONSTRAINTS

### Conflict of Interest

The contractor, the team or team member carrying out this contract is expected to identify any conflict of interest, declare them early in the performance of the work and act in accordance with the instructions provided by TC to resolve them.

### Standards of Conduct and Confidentiality of information

The successful contractor agrees to hold as confidential and shall not disclose to any person or firm any information gathered through assignment (s) or the

knowledge of pending assignments. The only exception is if and only if that disclosure of such confidential information is necessary for the performance of the duties of the contractor, as agreed by the Department.

All information data, material, etc. gathered as part of this project shall be treated as confidential, the property of Transport Canada and shall only be discussed with the Project Manager and Transport Canada personnel unless otherwise directed and authorized.

**Language of work**

The language of work will be English.

**Location of Work**

The work as described in this Terms of Reference will be performed at the Resolute Bay Airport, Resolute Bay, Nunavut.

**Appropriate Law**

This contract awarded shall be governed by and construed in accordance with the laws in force in the Territory of Nunavut, Canada.

**Travel**

The contractor and/or their personnel will be required to travel to Resolute Bay, Nunavut.
Travel arrangements will be the contractors responsibility and travel costs will be reimbursed in accordance with the terms and conditions described in Appendix "H".

## 4.13 CONTRACTOR'S USE OF SITE

The contractor must comply with the following:

- Do not unreasonably encumber the site with materials or equipment.
- Move stored products or equipment, which interfere with operations of the airport.
- Obtain and pay for use of any additional storage or work areas if required by the Airport Manager.

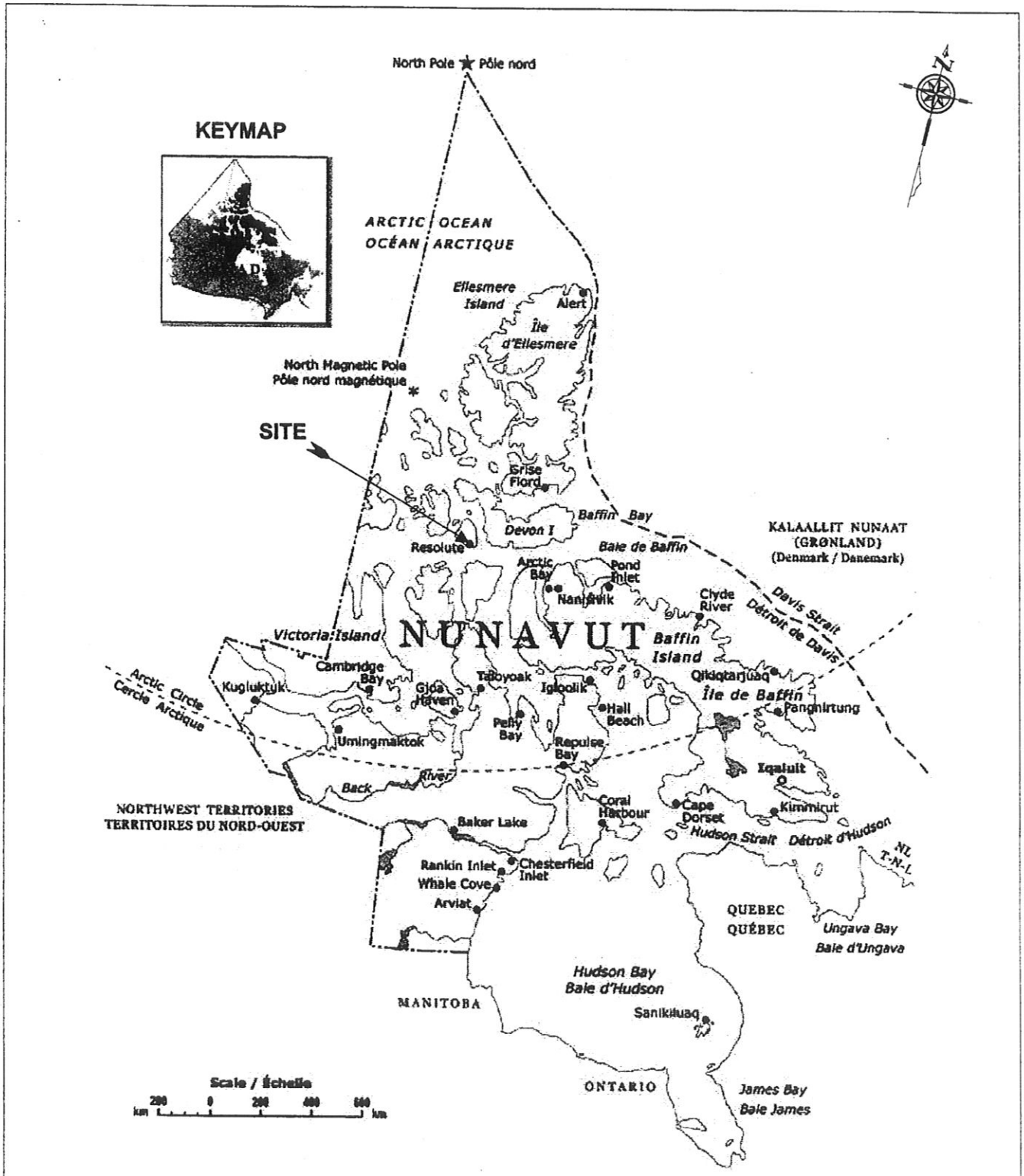
## PERSONNEL PROTECTION

The contractor must comply with the following:

- Personnel entering the area must be equipped with steel-toed work boots, hard hats, hearing protection, and safety glasses as required by the Occupational Health and Safety Act.
- Workers must be equipped with appropriate personal protective gear. Should contamination be encountered and exposure to hazardous materials be encountered the worker must use or wear such gear as appropriate and necessary.
- Excavation team may be required to wear respirators as directed by Transport Canada if vapour levels exceed regulations for exposure limits. Ensure that all contractor personnel are instructed for the proper use and maintenance of respirators. All personnel must be fit-tested as well.
- If in a high traffic area, high visibility vests must be worn.
- Use barricades and warning signs where necessary.
- Avoid skin contact and inhalation of hydrocarbon products.
- Promptly wash hydrocarbon contaminated soaked cloths and avoid using soaked leather goods. Properly dispose of any soaked rags.
- Keep work areas clean and well ventilated.
- Shore and brace excavated slopes and banks according to applicable regulations.
- Clean up spills promptly.
- Precautions must be taken to eliminate all potential sources of ignition from the area (i.e. smoking materials and non explosion-proof electrical and internal combustion equipment).
- Cover or wet down dry materials and waste to prevent blowing dust and debris. Control dust on all temporary roads.
- Fires and burning of waste or materials are not permitted on-site.
- Prevent accumulation of vapours at ground level.
- Report fires immediately by fastest means as possible; report all fire incidents to Contractor's site supervisor, Airport Authorities and local fire facilities.
- Maintain fire extinguishers in sufficient quantity to protect, in an emergency, work in progress and personnel on site.
- Smoking is not permitted on work site.

# Appendix I

**Location Map Resolute Bay Airport Land Farm**
**Contour Site Map**
**Engineer Drawings of Land Farm Facility**

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| DRAWN BY: | SCALE: | DATE: | FILE No. | FIGURE No. |
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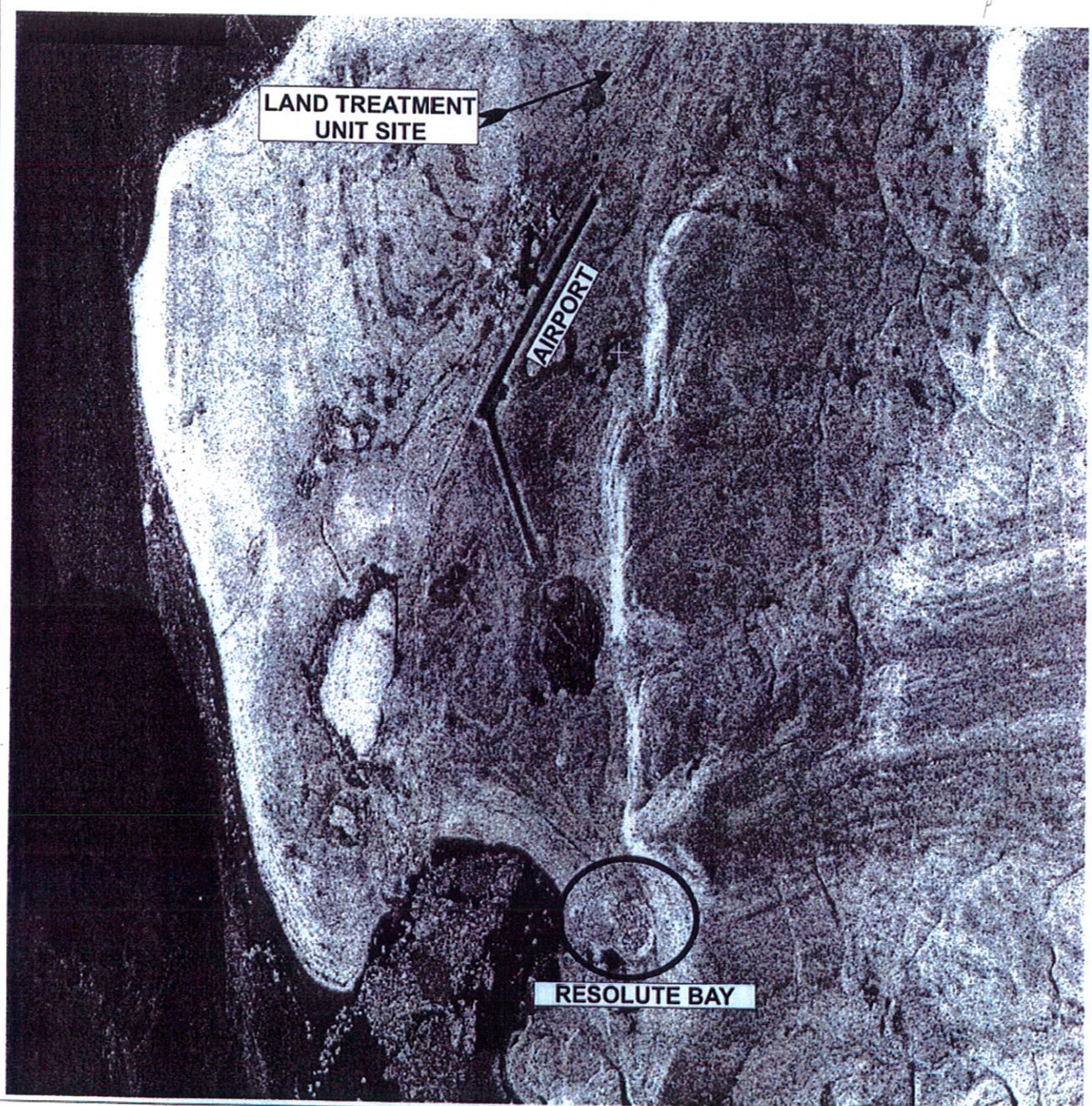


ENG-TECH CONSULTING LIMITED

CLIENT: TRANSPORT CANADA

| DRAWN BY: | SCALE: | DATE: | FILE No. | FIGURE No. |
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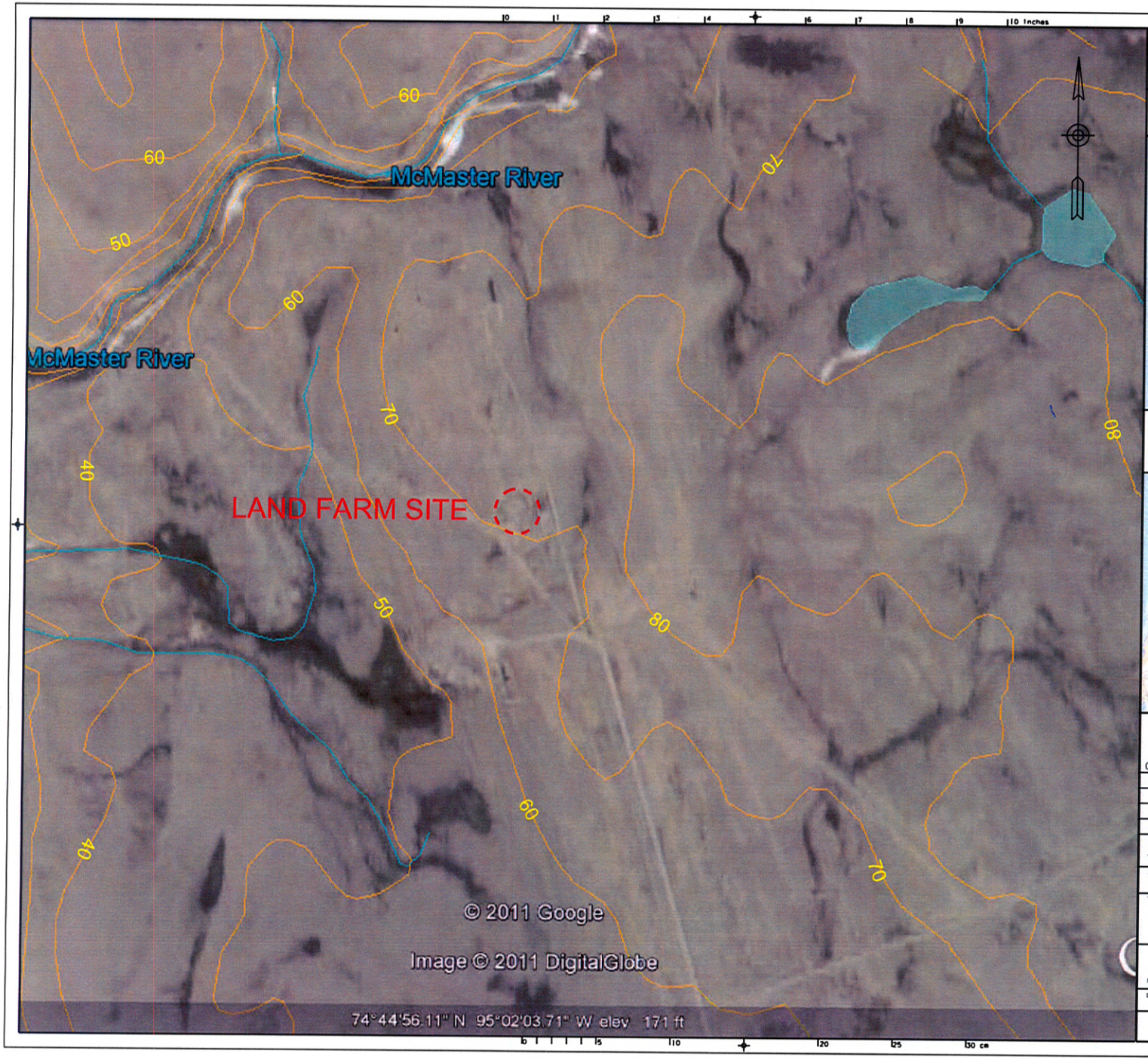
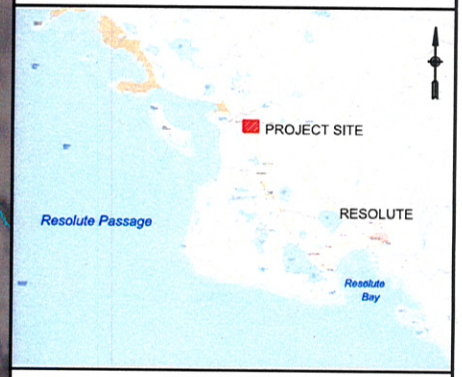
LTU SITE LOCATION
RESOLUTE BAY FTA
REMEDIAL WORK
RESOLUTE BAY, NUNAVUT

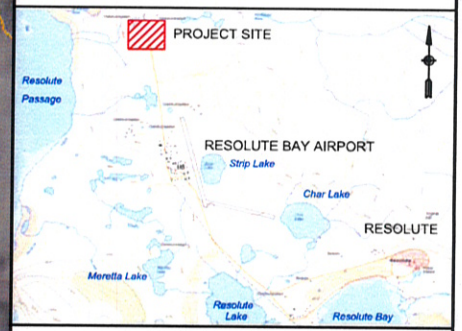



Transport Canada / Transports Canada
Programs Group / Groupe des programmes
Canada

PROFESSIONAL & TECHNICAL SERVICES
Prairie and Northern Region




KEY MAP (Not To Scale)
NTDB 1:50,000 Map Sheet 58F11, 58F12, 58F14, 58F15




SITE LOCATION (Not To Scale)
Project Site Geographic Location: 74 44' 33.22" N 95 0' 12.27" W
NTDB 1:50,000 Map Sheet 58F11, 58F12

Contour Interval: 10 m

| Date | Revision | By |
|---|---|---|
| | | |

Scale 1: 10,000 — 0 100 200 300 400 m

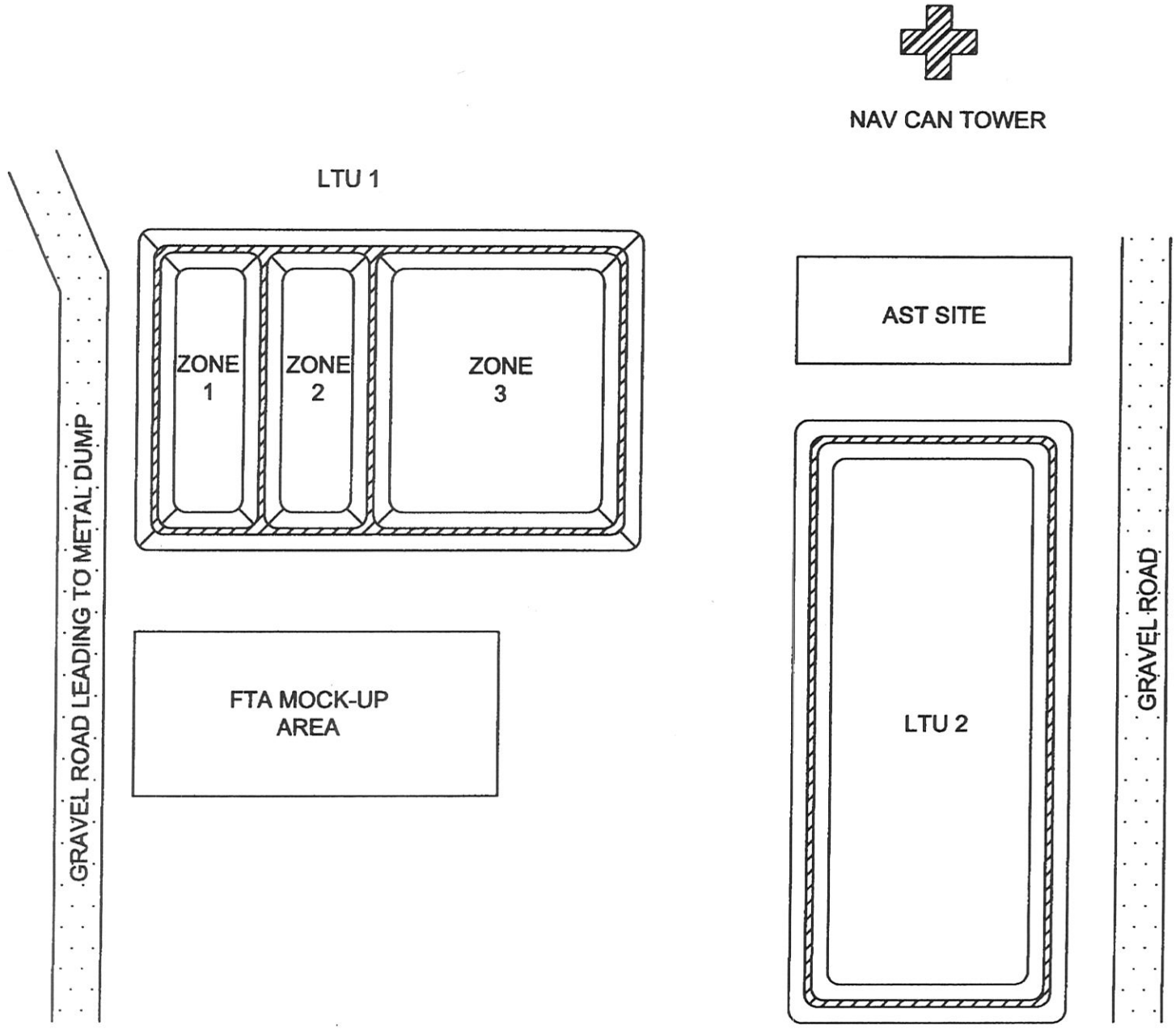
Site: RESOLUTE BAY AIRPORT, NU

Title: LAND FARM SITE
SITE PLAN

Date March 23, 2011

OFFICE OF REGIONAL MANAGER,
PROFESSIONAL AND TECHNICAL SERVICES

| Drawn By | Checked By | Project No. | Sheet |
|---|---|---|---|
| L.C. | | | 1 of 1 |




| No. | DD / MM / YYYY | DESCRIPTION | BY |
|---|---|---|---|
| | | | |

ENG-TECH Consulting Limited
#6 - 854 Marion Street
Winnipeg, MB R2J 0K4
Phone: (204) 233-1894
Fax: (204) 235-1579

ENG. STAMP:

APEGM
Certificate of Authorization
ENG-TECH Consulting Limited
No. 2475 Expiry: April 30, 2006

CLIENT:
TRANSPORT CANADA

PROJECT:
RESOLUTE BAY FTA
REMEDIAL WORK
RESOLUTE BAY, NUNAVUT

DWG DESCRIPTION:
LTU LOCATIONS

SCALE:
NTS

| DRAWN BY: | DATE: |
|---|---|
| KWJ | FEBRUARY 2004 |

| FILE No.: | CLIENT DWG/FIG. No.: |
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| 02-117-06 | |

| ENG-TECH DWG/FIG. No.: | REV.: |
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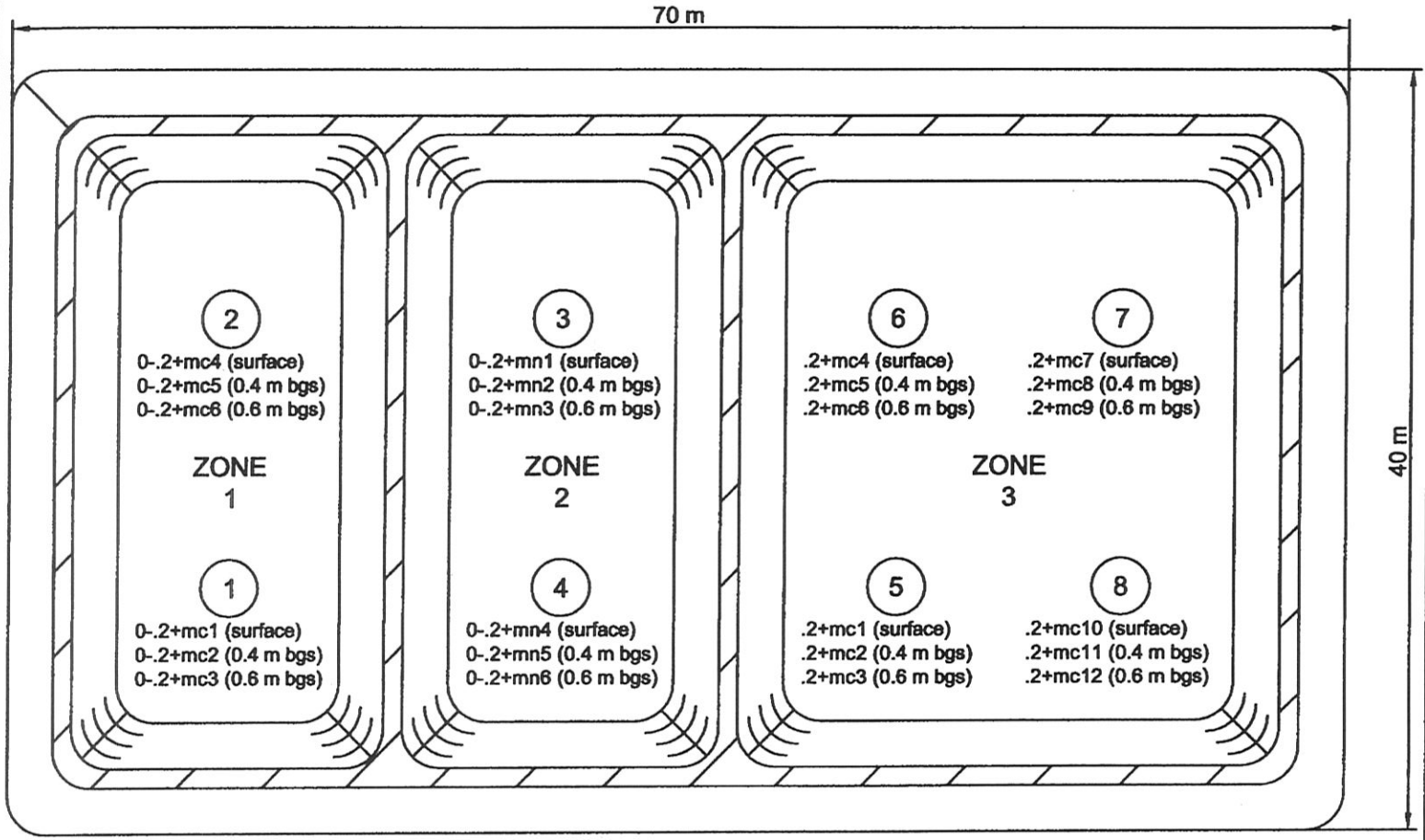


**NOTES:**

(1) Sample Location

bgs = Below ground surface

0-.2+mc1 (surface) = Sample identification (depth of sample)

| No. | DD / MM / YYYY | DESCRIPTION | BY |
|---|---|---|---|
| | | | |

ENG-TECH Consulting Limited
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APEGM
Certificate of Authorization
ENG-TECH Consulting Limited
No. 3475 Expiry: April 30, 2006

CLIENT: TRANSPORT CANADA

PROJECT:
RESOLUTE BAY FTA
REMEDIAL WORK
RESOLUTE BAY, NUNAVUT

DWG DESCRIPTION:
LTU 1 SAMPLING LOCATIONS

SCALE: NTS

| DRAWN BY: | DATE: |
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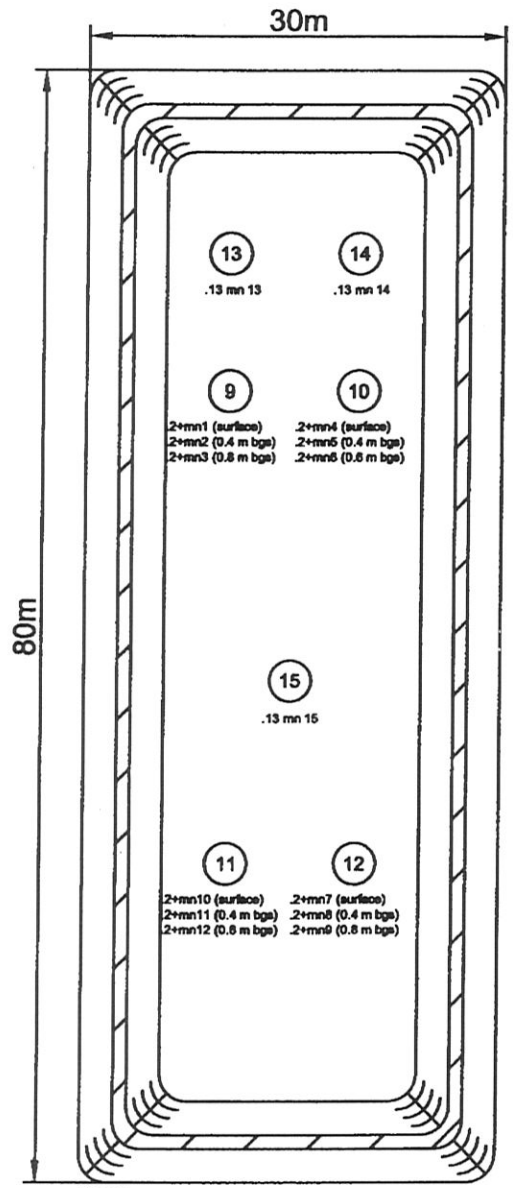
| ENG-TECH DWG/FIG. No.: 4 | REV.: 1 |




**NOTES:**

(11) Sample Location

bgs = Below ground surface

0-.2+mc1 (surface) = Sample identification (depth of sample)


| No. | DD / MM / YYYY | DESCRIPTION | BY |
|---|---|---|---|
| | | | |

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ENG. STAMP:

APEGM
Certificate of Authorization
ENG-TECH Consulting Limited
No. 3475 Expiry: April 30, 2006

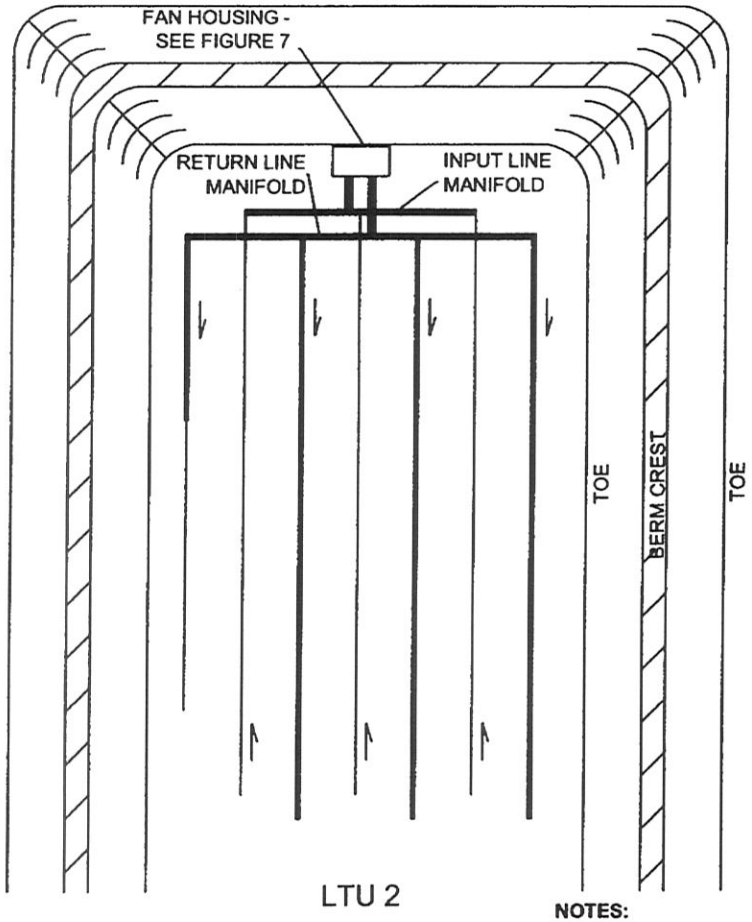
CLIENT:
TRANSPORT CANADA

PROJECT:
RESOLUTE BAY FTA
REMEDIAL WORK
RESOLUTE BAY, NUNAVUT

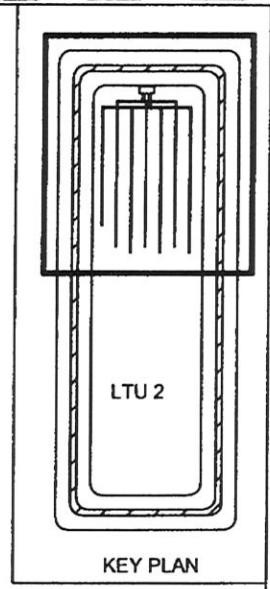
DWG DESCRIPTION:
LTU 2 SAMPLING LOCATIONS

SCALE:
NTS

| DRAWN BY: | DATE: |
|---|---|
| KWJ | FEBRUARY 2004 |
| FILE No.: | CLIENT DWG/FIG. No.: |
| 02-117-06 | |
| ENG-TECH DWG/FIG. No.: | REV.: |
| 5 | 1 |




LTU 2




KEY PLAN

**NOTES:**

RETURN LINES (4):

USED 150 mm (6 in.) DIAMETER PIPE WITH SAW CUTS. ( ▌ )
ALL RETURN LINES WERE 24.4 m (80 ft.) LONG, EXCEPT FOR THE MOST WESTERN LINE WAS 19.8 m (65 ft.) LONG; AND THE SOUTHERN 12.2 m (40 ft.) WAS 75 mm (3 in. PIPE) IN DIAMETER.

INPUT LINES (3):

USED 75 mm (3 in.) DIAMETER PIPE WITH MANUFACTURE CUTS. ( | )
ALL INPUT LINES WERE 24.4 m (80 ft.) LONG.

ALL PIPE, EXCEPT MANIFOLDS, WERE INSTALLED 0.4 m BELOW GRADE.
MOST WESTERN PIPE WAS LOCATED 1.5 m (5 ft.) INSIDE TOE OF BERM.
ALL PIPES WERE SPACED AT 2.4 m (8 ft.) APART.
USED SOLID 200 mm (8 in.) DIAMETER PVC WITH TEES FOR INPUT/RETURN LINE MANIFOLD CONNECTIONS.
USED 300 mm (12 in.) DIAMETER CLOTH FLEXIBLE MEMBRANES FOR FAN HOUSING MANIFOLDS


| No. | DD / MM / YYYY | DESCRIPTION | BY |
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ENG. STAMP:

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ENG-TECH Consulting Limited
No. 2475 Expiry: April 30, 2006

CLIENT:
TRANSPORT CANADA

PROJECT:
RESOLUTE BAY FTA
REMEDIAL WORK
RESOLUTE BAY, NUNAVUT

DWG DESCRIPTION:
LAYOUT PLAN OF GROUND HEATING SYSTEM

SCALE: NTS

DRAWN BY: KWJ

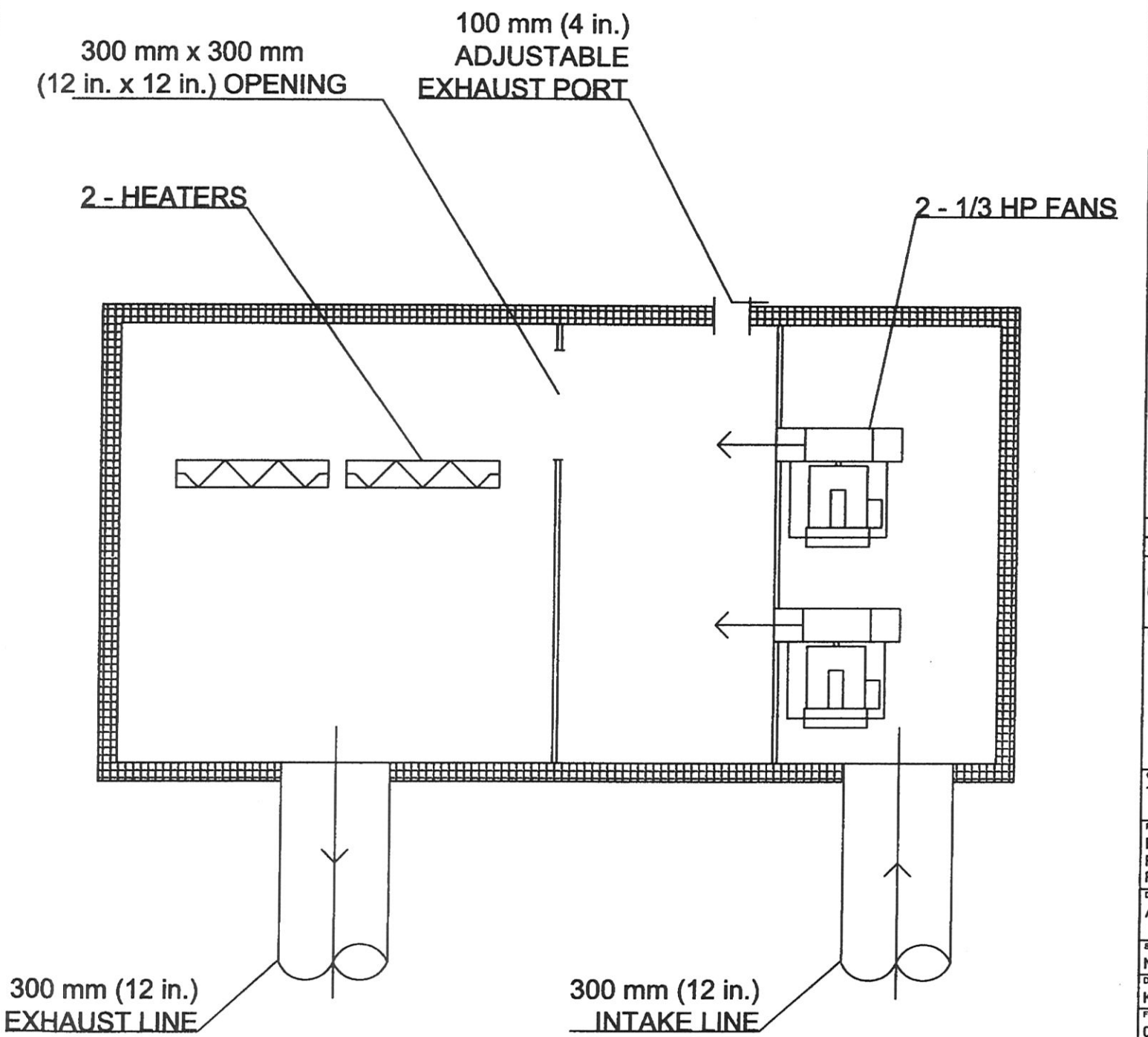
DATE: FEBRUARY 2004

FILE No.: 02-117-06

CLIENT DWG/FIG. No.:

ENG-TECH DWG/FIG. No.: 6

REV.: 1





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CLIENT:
TRANSPORT CANADA

PROJECT:
RESOLUTE BAY FTA
REMEDIAL WORK
RESOLUTE BAY, NUNAVUT

DWG DESCRIPTION:
AIR EXCHANGE HOUSING

SCALE:
NTS

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| FILE No.: | CLIENT DWG/FIG. No.: |
| 02-117-06 | |

| ENG-TECH DWG/FIG. No.: | REV.: |
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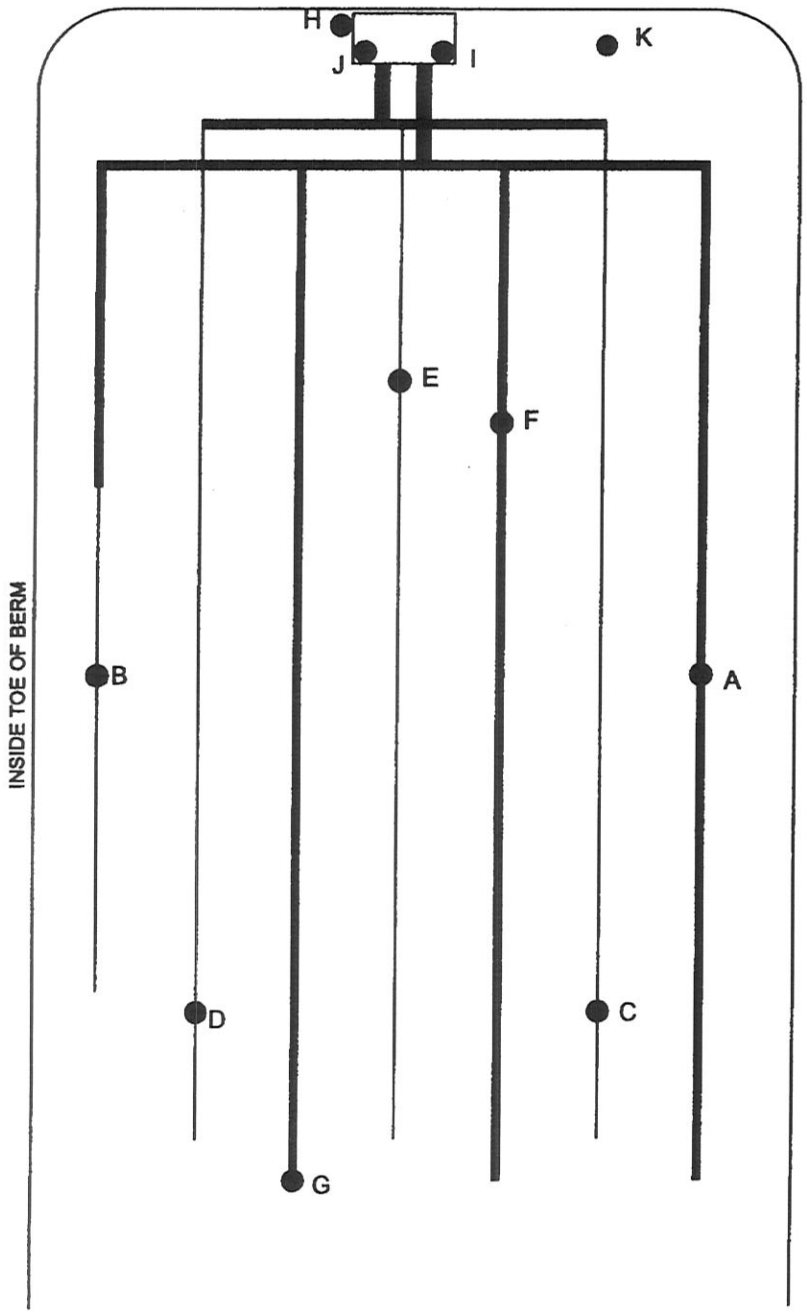
| 7 | 1 |




**▮ 150 mm (6 in.) DIAMETER PIPE WITH SAW CUTS**

**I 75 mm (3 in.) DIAMETER PIPE WITH MANUFACTURE CUTS**

**● THERMOCOUPLE LEGEND**

ID - Depth (wire coding)

A - 0.0 m below grade (1 thin black strip)
0.4 m below grade (2 thin black strips)

B - 0.0 m below grade (3 thin black strips)
0.4 m below grade (4 thin black strips)

C - 0.4 m below grade (1 thick grey strip)

D - 0.0 m below grade (1 thick grey strip, 1 thin black strip)
0.4 m below grade (1 thick grey strip, 2 thin black strips)

E - 0.0 m below grade (1 thick grey strip, 3 thin black strips)
0.4 m below grade (1 thick grey strip, 4 thin black strips)

F - 0.4 m below grade (2 thick grey strips)

G - 0.4 m below grade (2 thick grey strips, 1 thin black)

H - Ambient Air Temperature (2 thick grey strips, 2 thin black)

I - Intake Chamber (2 thick grey strips, 3 thin black strips)

J - Exhaust Chamber (2 thick grey strips, 4 thin black)

K - 0.0 m below grade (3 thick grey strips)
0.4 m below grade (3 thick grey strips, 1 thin black strip)

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No. 2475 Expiry: April 30, 2006

CLIENT: TRANSPORT CANADA

PROJECT: THERMOCOUPLE LOCATIONS

DWG DESCRIPTION: AIR EXCHANGE HOUSING

SCALE: NTS

DRAWN BY: KWJ

DATE: FEBRUARY 2004

FILE No.: 02-117-06

CLIENT DWG/FIG. No.:

ENG-TECH DWG/FIG. No.: 8

REV.: 1