Nuna Burnside Engineering and Environmental Ltd.
Building 764, Fred Coman Street, Iqaluit NU X0A 0H0
telephone (867) 975-2052 fax (867) 975-2053
15 Townline Orangeville ON L9W 3R4
telephone (519) 941-0342 fax (519) 941-8120
Email info@nunaburnside.com

NUNA BURNSIDE
An Aboriginal Company

March 2, 2009

Nunavut Water Board
P.O. Box 119
Gjoa Haven, Nunavut
XOE 1J0

Attention: **Ms. Phyllis Beaulieu**
Manager of Licensing

Re: **Hamlet of Rankin Inlet Water License NWB3RAN0207**
Renewal Application and Compliance Submissions
File No. N-O 14850

Dear Ms. Beaulieu,

Enclosed is an application submitted on behalf of the Hamlet of Rankin Inlet for a water license renewal for license NWB3RAN0207. The Hamlet is seeking a 5 year renewal/replacement of this license. This license includes solid waste disposal and landfarm activities for the Hamlet of Rankin Inlet. The requested license will be valid from issuance (2009) for 5 years until February 2014.

Water supply and sewage disposal for the Hamlet is operated by the Government of Nunavut, on behalf of the Hamlet, under a separate NWB license NWB3RAN0207.

Solid waste is collected by the Hamlet from each building, and is trucked to the Solid Waste Management Facility approximately 1 km from the community. The Facility consists of a landfill, a bulky metals area, and hazardous waste storage. The site is in the process of being closed. A new Solid Waste Disposal Facility has been constructed approximately 6 km from the community. It is to be commissioned in 2009 when the existing site closes.

The license application includes recommended conditions for monitoring and upgrades to the Solid Waste Management Facility.

Overall, the solid waste management and landfarm activities will not substantially impact the quality, quantity, or flow out rates of water through Inuit owned lands.

This submission includes:

- Application for a Nunavut Water Board License
- Executive Summary of License Application

- Water License Application – Supplementary Questionnaire for Municipalities
- Water License Application Supplementary Questionnaire for Landfarm Treatment Facility
- Application fee of $30.00 (c/o Receiver General for Canada).

In addition, this submission includes compliance items that are conditions of the license as follows:

- Water License Annual Report 2008, Rankin Inlet Water Use and Waste Disposal
- Solid Waste Management Facility, Operation and Maintenance (O&M) Plan, Hamlet of Rankin Inlet
- Environmental Emergency Contingency Plan, Hamlet of Rankin Inlet
- Environmental Monitoring Program and QA/QC Control Plan, Hamlet of Rankin Inlet.

If you have any questions or comments please contact the undersigned.

Yours truly,

Nuna Burnside Engineering and Environmental Ltd.

Jim Walls, P.Geol.

Enclosure

cc: Mr. Paul Waye, SAO, Hamlet of Whale Cove
Mr. Wayne Thistle, Community and Government Services, Government of Nunavut

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Effective June 16, 2006

P.O. Box 119
Gjoa Haven, NU XOB 1JO
Tel: (867) 360-6338
Fax: (867) 360-6369

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NUNAVUT IMALIRIYIN KATIMAYINGI
NUNAVUT WATER BOARD
OFFICE DES EAUX DU NUNAVUT

WATER LICENCE
APPLICATION FORM

Application for: (check one)

☐ **New** ☒ **Renewal** ☐ **Amendment** ☐ **Assignment** ☐ **Cancellation**

LICENCE NO:
(for NWB use only)

1. NAME AND MAILING ADDRESS OF APPLICANT/LICENSEE

The Hamlet of Rankin Inlet

Rankin Inlet, Nunavut
X0C 0G0

Phone: (867) 645-2895
Fax: (867) 645-2146
e-mail: _____

2. ADDRESS OF CORPORATE OFFICE IN CANADA (if applicable)

N/A

Phone: _____
Fax: _____
e-mail: _____

3. LOCATION OF UNDERTAKING (describe and attach a topographical map, indicating the main components of the Undertaking)

Latitude: (64°49' " N) Longitude: (92°05' " W)
NTS Map Sheet No. 55 K/16 Scale: 1:50,000

4. DESCRIPTION OF UNDERTAKING (attach plans and drawings)

see attached additional information.

5. TYPE OF PRIMARY UNDERTAKING (A supplementary questionnaire **must** be submitted with the application for undertakings listed in **"bold"**)

☐ **Industrial**
☐ **Mining and Milling**(includes exploration/drilling)
☒ **Municipal** (includes camps/lodges)
☐ Power
☐ Agricultural
☐ **Conservation**
☐ Recreational
☐ **Miscellaneous** (describe below):

See Schedule II of *Northwest Territories Waters Regulations* for Description of Undertakings

6. WATER USE

- ☐ To obtain water
- ☐ To cross a watercourse
- ☐ To modify the bed or bank of a watercourse
- ☐ Flood control
- ☐ To divert a watercourse
- ☐ To alter the flow of , or store, water
- ☐ Other (describe):

7. QUANTITY OF WATER INVOLVED (cubic metres per day including both quantity to be used and quality to be returned to source)

Water use
- ☐ $100m^3$/day or less
- ☐ Greater than $100m^3$/day; if greater, indicate quantities to be used for each purpose (camp, drilling, etc.)

Water returned to source

_____ m^3/day

8. WASTE (for each type of waste describe: composition, quantity (cubic metres per day), methods of treatment and disposal, etc.)

- ☐ Sewage
- ☒ Solid Waste
- ☒ Hazardous
- ☒ Bulky Items/Scrap Metal
- ☐ Waste oil
- ☐ Greywater
- ☒ Sludges
- ☐ Other describe):

9. OTHER PERSONS OR PROPERTIES AFFECTED BY THIS UNDERTAKING (give name, mailing address and location; attach if necessary)

Land Use Permit

DIAND	☒ Yes	☒ No	If no, date expected _____
Regional Inuit Association	☐ Yes	☒ No	If no, date expected _____
Commissioner	☐ Yes	☒ No	If no, date expected _____

10. PREDICTED ENVIRONMENTAL IMPACTS OF UNDERTAKING AND PROPOSED MITIGATION MEASURES (direct, indirect, cumulative impacts, etc.)

see attached additional information.

NIRB Screening ☐ Yes ☒ No If no, date expected
NIRB had not reviewed this project.

11. INUIT WATER RIGHTS

Will the project or activity substantially affect the quality, quantity, or flow of water flowing through Inuit Owned Lands and the rights of Inuit under Article 20 of the Nunavut Land Claims Agreement?
No

If yes, has the applicant entered into an agreement with the Designated Inuit organization to pay

compensation for any loss or damage that may be caused by the alteration. If no compensation agreement has been made, how will compensation be determined?

12. CONTRACTORS AND SUB-CONTRACTORS (name, address and functions)
None

13. STUDIES UNDERTAKEN TO DATE (list and attach copies of studies, reports, research, etc.)
see attached additional information.

14. THE FOLLOWING DOCUMENTS MUST BE INCLUDED WITH THE APPLICATION FOR THE REGULATORY PROCESS TO BEGIN

Supplementary Questionnaire (where applicable: see section 5) ☒ Yes ☐ No If no, date expected _____

Inuktitut and/or Inuinnaqtun/English Summary of Project ☒ Yes ☐ No If no, date expected _____

Application fee of $30.00 (Payee Receiver General for Canada) ☒ Yes ☐ No If no, date expected _____

Water Use fee of $30.00 (unless otherwise indicated in Section 9 of the *NWT Waters Regulations;* Payee Receiver General for Canada)

☐ Yes ☐ No If no, date expected _____

15. PROPOSED TIME SCHEDULE (unless otherwise indicated, the NWB will consider the application for a five (5) year term)

☐ one year or less (or) ☒ Multi Year

Start Date: 2009 Completion Date: 2014

Paul Waye	Senior Administrative Officer		
Name (Print)	**Title (Print)**	**Signature**	**Date**

For Nunavut Water Board office use only

APPLICATION FEE **Amount: $_____** **Pay ID No.: _____**

WATER USE DEPOSIT **Amount: $_____** **Pay ID No.: _____**

P.O. Box 119
Gjoa Haven, NT XOE 1JO
Tel: (867) 360-6338
Fax: (867) 360-6369
KATIMAYINGI

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NUNAVUT WATER BOARD
NUNAVUT IMALIRIYIN

Water Licence Application Supplementary Questionnaire for Municipalities

Hamlet of Rankin Inlet, Nunavut
Licence: NWB3RAN0207
December, 2008

I. GENERAL

1. Date: October 3, 2008

2. Applicant:_Hamlet of Rankin Inlet

3. Contacts:
   Name of Contact: Paul Wye
   Position: Senior Administrative Officer
   Telephone: (867) 645-2895
   Fax: (867) 645-2146

4. Community Status: __ Village __ Town __ City
   _x_ Hamlet __ Settlement Corporation

5. Indicate the status of the municipality's license on the date of the application.
   __ New Application
   _x_ Renewal - Water License # No. NWB3RAN0207

II. ATTACHMENTS

1. Attach current or up-to-date detailed map(s) showing the locations of the:

   a. raw water intake;
   b. water storage and treatment facilities;
   c. fuel and chemical storage;
   d. sewage treatment facilities (lagoon, honey bag pit, wetland);
   e. wastewater treatment area and discharge outlets;
   f. solid waste disposal areas and drainage patterns;
   g. hazardous waste disposal area;
   h. transportation access routes;
   i. existing water bodies/courses and any changes to these water bodies/courses that have or may occur as a result of water use or waste disposal facilities, locations of environmental monitoring sites. (Outline drainage basin);
   j. Traditional use areas outlined on site map and areas around the community used for recreation, camping, fishing, etc.
   k. abandoned and/or restored water treatment, sewage, and solid waste disposal facilities.

Are maps attached? _x Yes __ No

If no, please indicate when they will be available.

Indicate which organization has provided the various maps or diagrams.
Nuna Burnside Engineering and Environmental Ltd.

III. WATER SUPPLY

Water Source

1. Type of source: _x_ Lake __ River __Well __ Other _____

2. Name of water source and alternative, if any.

Nipissar Lake _____ _____
Primary Source Secondary Source

3. Usual break-up & freeze-up period: June _____ October _____
Break-up Freeze-up

Water Intake

1. Please provide short descriptions for the following:

   a. Freshwater intake facility
   b. Operating capacity of pumps used
   c. Intake screen size

The community continues to draw its water from the Lake Nipissar, located 2 km northwest of the Hamlet.

The Nipissar Lake pumphouse includes vertical turbine submersible pumps installed inside twin intake lines. Each of the 10 Hp pumps has a 1020 L/min. capacity. Only one pump operates at a time. Operation of the pump is controlled by the water level in the water storage tank adjacent to the Williamson Lake pumphouse. An air compressor aerates water around the intake to prevent taste and odour problems.

The water supply is operated by the Government of Nunavut under a separate Water License NWB3GRA0207.

Water Storage

1. Type of water storage facility. (check where applicable)

   ____ Reservoir/Pond x__ Storage tank ___ None _____ Other

   Description:

The storage tank was completed in 1993 and is used for fire or emergency storage. In case of an emergency lasting longer than two days water in Williamson Lake could be accessed by means of a portable pump, flexible hose, and ice auger.

Water Storage Tank Data	
Height	12.8 m
Diameter	18.3 m
Useable Storage	
2 hour fire demand	545,000 L
2 day emergency storage	2,030,000 L
Peak balance	473,000 L
Total	3,364,000 L

2. If "reservoir" checked:

Is the reservoir lined? ___ Yes ___ No

What type of liner? _____ When was it installed?_____

Water Treatment

1. Indicate the quality of the water.

Summer:	_x_ good	___ fair	___ poor
Fall:	_x__ good	____ fair	___ poor
Winter:	_x__ good	____ fair	___ poor
Spring:	_x__ good	____ fair	___ poor

2. Describe.

Water for the water storage tank and the distribution system is chlorinated by gas chlorinators, installed in 1996. A fluoridation system injects hydrofluosilicic acid directly into the water. In addition, compressed air is injected into the raw water at the Nipissar Lake intake

3. Type of water treatment.

___ Filtration and chlorination
_x__ Chlorination only
___ None
____ Other __Fluoridation_____
Description

Water Use And Distribution

1. Volume of water use:

Records from the operator of the Water Intake Pumphouse indicate that the average town use of water is approximately 2400 m^3/day. This is an annual consumption of 876,000 m^3/year.

General Condition of the water supply facilities

1. General condition of the:

a. Water supply facility
_x_ Satisfactory __ Unsatisfactory

If unsatisfactory, explain.

b. Storage facility

x__ Satisfactory __ Unsatisfactory

If unsatisfactory, explain.

c. Distribution system

_x_ Satisfactory __Unsatisfactory

If unsatisfactory, explain.

Modifications

1. Are there any changes *planned* for the water supply system?

_x__ No ___Yes

If yes, please attach a copy of the plan, or describe changes. Provide information on the implementation schedule.

2. Does the community believe changes are needed to the water supply, storage or treatment facilities? Describe.

No

Identification

Are there signs identifying drinking water sources presently used by the municipality?

_x_ Yes __ No

IV. SEWAGE DISPOSAL

1. What type(s) of sewage treatment does the community have?

___ Lagoon
_x_ Mechanical system
___ Wetland
___ Honey bag
___ Combination/Other: describe

The sewage treatment plant is operated by the Government of Nunavut under License NWB3GRA0207.

***Lagoon** (if applicable)*

1. Has there been any operating problems with the lagoon?

___ Yes ___ No

If yes, describe

***Mechanical System** (if applicable)*

1. Describe (type, specifications, operation and maintenance program for the mechanical wastewater treatment system).

The plant consists of a rotating drum screen, which provides primary treatment and reduces BOD from an average influent level of approximately 230 to 280 mg/L to approximately 100 to 140 mg/L.

2. Are sludges produced? _x_ Yes __ No

If yes, describe how the sludges are disposed of:

The sludge is disposed of at the waste disposal site.

Wetland*(if applicable)*

1. Describe the Wetland wastewater treatment system.

Honey Bag Pit

1. Does the municipality use a honey bag pit?
___ Yes __x_ No
If yes, describe the location, drainage, and operation/maintenance of the site:

Commercial, Industrial and/or Hazardous Wastes

1. Are there any sources of commercial or industrial *liquid* waste being discharged or deposited to the wastewater treatment system that may affect the quality of the effluent or leachate produced? *(The municipality should be aware that any commercial or industrial discharge has to be approved by the municipality)*
___ Yes __x__No

If yes, indicate sources, types and quantities.

Sewage Discharge

1. Are fish, shell fish and other wildlife harvested in or near the discharge area ?
___ Yes _x__ No

If yes, indicate species harvested, and level of harvest.

General Condition of the sewage treatment facilities

1. General condition of the:

a. Sewage collection system
_x_ Satisfactory _ Unsatisfactory
If unsatisfactory, explain.

b. Discharge control system
_x_ Satisfactory __ Unsatisfactory
If unsatisfactory, explain.

c. Dams, diversion dykes, berms
__ Satisfactory __ Unsatisfactory
If unsatisfactory, explain.

Modifications

1. Are there any changes *planned* in the sewage treatment facilities?
   __ No x_ Yes
   If yes, please attach a copy of the plan, or describe changes. Provide information on the implementation schedule.

   See attached.

2. Does the municipality or residents believe changes are needed to the sewage treatment facilities? Describe.

   The Hamlet Council is concerned that raw sewage is discharged to the ocean and may be impacting marine life.

Abandonment and Restoration

1. List and describe abandoned or restored sewage treatment facilities.
   Refer to original attachment maps.

   None

Identification

Are there signs identifying past and present sewage disposal sites ?
_x_ Yes __ No

V. SOLID WASTE DISPOSAL

1. Briefly describe how solid wastes are collected and delivered to the disposal area.

   The Hamlet has two garbage trucks that work on a schedule and collect and bring the garbage to the waste disposal site.

2. Is the solid waste site fenced? _x_ Yes __ No

3. Is the fence adequate? __ Yes _x_ No

   If no, describe: Fence is starting to fall down.

Waste Reduction

1. Does the municipality burn garbage?
   x_Yes __No
   If yes, describe how and when this is done.

2. Has the municipality considered measures for waste reduction such as recycling or reuse?
   x Yes _x_ No

   If yes, describe

The Hamlet has initiated a bottle return system. They have also participated in a program with INAC Manitoba that included shipping out old cars for recycling. They shipped out approximately 60 cars in 2007.

Animal Carcasses Pit

1. Does the municipality have an area for the disposal of animal carcasses?

   __x Yes __ No

   If yes, describe the location, drainage and operation/maintenance of the site

   The burial pit is located at the back of the waste site. When an animal is disposed of it is buried immediately. A designated area at the new landfill has been identified.

Waste Oil Pit

1. Describe the waste oil storage area.

   Do not have an area for this. Almost all waste oil is used by a local contractor to burn in his waste oil furnace.

Bulky Scrap Metal Waste Disposal Area

1. Does the municipality have a scrap metal or bulky waste disposal area?

   _x_ Yes __ No

   If yes, briefly describe its location and operation plan.

   There is an area set aside for metal at the current (old) landfill, but no operation plan in place. A bulky waste disposal area has been identified at the new landfill. The operation and maintenance is described in the Solid Waste Management Facility Operation and Maintenance Plan (Nuna Burnside, 2008).

Commercial, Industrial and/or Hazardous Wastes Disposal Area

1. Are there any commercial or industrial waste being discharged or deposited in the solid waste disposal area? *(The municipality should be aware that any discharge of commercial or industrial waste has to be approved by the municipality)*

   ___ Yes _x_ No

   If yes, please indicate sources, types and quantity.

2. Will the municipality use a hazardous waste disposal area?

   _x__ Yes ___ No

   If yes, describe its:

   a. Location
      A hazardous waste disposal area has been identified at the new landfill.
   b. Structure
      The area will be a fenced in structure with a lined elevated area.
   c. Operation and maintenance (describe special handling/disposal methods for these wastes).

Batteries must be stored upright. Oils, lubricants and antifreeze may be bulked together in common drums, preferably remaining in their original packaging. Unknown substances should remain in their packages and placed into drums.

Hazardous wastes will be labeled and assigned for removal from the community to a licensed receiver in the south when the storage area nears capacity or when a cost effective volume to warrant shipping was accumulated.

General Condition of the Solid Waste Disposal Area

1. Comment on the general conditions of the:

a. Solid waste disposal area

__ Satisfactory __x Unsatisfactory

If unsatisfactory, explain.

The current (old) landfill has several problems with its operations and has not received adequate maintenance for several years. Some of the things contributing to the unsatisfactory condition of the landfill include lack of ground cover on garbage, no site supervisor to prevent people scavenging and opening bags, blowing of litter.

The new landfill has not been used yet.

Modifications

1. Are there any changes planned for the solid waste disposal area?

__ No _x_Yes

If yes, attach a copy of the plan, or describe changes. Provide information on the implementation schedule.

The waste facility reached its maximum capacity in 2002 and a new waste disposal site was planned in 2003. Construction of the new landfill was started in 2003 and completed in 2006. In 2007, the Hamlet decided to commission the new landfill and approved the environmental assessment of the current (old) landfill for its abandonment and restoration. The Hamlet retained Gartner Lee and Associates to complete the abandonment and restoration (A&R) plan for the old landfill.

2. Are changes needed to the solid waste disposal area? Describe.

Before commissioning of the new landfill, the following should be completed:

- Effective drainage of water surrounding the landfill should be designed and constructed.
- A hazardous waste storage area should be constructed.
- Top soil in the fill area should be removed and piled to be used as cover material

Abandonment and Restoration

1. List and describe abandoned or restored solid waste facilities.
Indicate their location on a map.

The Hamlet retained Gartner Lee and Associates to complete the abandonment and restoration (A&R) plan for the old landfill.

Identification

Are there signs identifying past and present solid waste disposal sites ?

__x Yes __ No

VI. INSPECTION AND MONITORING

1. When were municipal facilities inspected by:

_x_ Indian and Northern Affairs Inspector	Date: 2008/07/22
__ Municipal and Community Affairs	Date: _____
_x_ Other: Nuna Burnside	Date: 2008/09/08

2. Is there a system in place for reporting spills?

__x_ Yes ___ No

If yes, describe.

All spills are reported to the NT-NU 24-Hour Spill Report Line.

3. Is there a contingency plan for clean up of spills?

__x_ Yes ___ No

If yes, describe.

An Environmental Emergency Contingency Plan will be submitted to the board in October 2008.

4. Have any spills occurred in the past five years?

_x_ Yes ___ No

If yes, describe and show on a map the locations of the spills. What action has been taken to clean the affected areas?

Nipissar Lake Pumphouse Fuel Spill, June 30, 2008

On June 30, 2008, a fuel spill occurred at the Nipissar Lake Pumphouse in Rankin Inlet. Apparently youths attempting to climb on the roof of the pumphouse pulled down the fuel tank return line, and allowed the escape of a few hundreds litres of fuel oil into the sand and gravel surface next to the pumphouse. The fuel flowed overland away from the lake and seeped into the parking lot in front of the pumphouse. A small amount reached the shore of the lake. An NT-NU Spill Report was prepared by CGS staff and forwarded to the GN Spill Report Centre.

Emergency response consisted of:

- Strongly repairing the pipe attachment to the building to avoid a repeat event
- Use of a floater boom and absorbent mats in the lake
- Excavation of the impacted soil and containing the material in bags
- Excavation continued until all evidence of fuel oil was removed
- Monitoring wells were installed
- EBA Engineering Ltd. arranged the removal and disposal of the impacted soil at the Hamlet landfill
- EBA collected confirmatory samples.

Monitoring Program

1. Is water sampling and analysis done?

__x_ Yes ___No

If Yes, answer the questions a to e

a. Briefly describe how samples are taken and sent to the laboratory.

Samples are collected by an experienced technician. They are collected in appropriate bottles provided by an accredited laboratory. Samples are put into coolers with ice to keep at a temperature of 4°C and shipped to a laboratory within the required holding times.

b. Briefly describe any monitoring done for wastewater effluent and leachate.

Samples are collected at the wastewater discharge point identified in the licence as GRA-3. Samples are also collected from the leachate discharging out of the original landfill.

c. Who is responsible for water sampling?
Name: Manasie Oigonn
Position: Utilidor Systems Manager
Telephone #: (867) 645-8158
Fax #: (867) 645-8197

d. Recognized laboratory performing analysis of samples.

Name: Taiga Environmental Laboratory
Address:_4601-52 Avenue, Yellowknife, NWT
Telephone #: (867) 669-2788
Fax #: (867) 669-2718

e. Are any changes planned in the water quality monitoring program?
x Yes _ No
If yes, describe.

Water quality monitoring locations at the new landfill will be added to the program when the landfill is commissioned.

VII. PUBLIC CONCERNS

1. What concerns does the municipality or residents have regarding the municipal water supply or waste disposal facilities? List the concerns and describe what steps have been taken to address those concerns.

The community has several concerns about the current (old) waste disposal site.

It has been identified that the existing landfill does not meet current standards. These standards include Nav Canada's 3 km setback from an airstrip and the Department of Health's 450 m setback from residential dwellings. Scavenging and unauthorized fires in the solid waste disposal area is common because of the close proximity to the community. The site is also impeding the community's use and enjoyment of a prime costal recreational area.

The dump facility reached its maximum capacity in 2002 and a new garbage dump was planned in 2003. A study performed by Stanley and North Tech Consulting identified a suitable site for the landfill and construction of the new landfill was started in 2003 and completed in 2006.

In 2007, the Hamlet decided to commission the new landfill and approved the environmental assessment of the current landfill for its abandonment and restoration. The Hamlet retained Gartner Lee and Associates to complete the abandonment and restoration (A&R) plan for the old landfill.

VIII. PUBLIC HEALTH *(Help may be obtained from the Regional Environmental Health Officer if you have difficulty with this section.)*

The Kivalliq region does not currently have a Regional Environmental Health Officer; the Iqaluit Region Environmental Health Officer is filling in at this time.

1. Date: December 12, 2008

2. Municipality: Iqaluit

3. Contact: Wanda Joy
   Telephone #: 867-975-4817
   Fax # : 867-975-4833

4. Have there been any problems or health/environmental concerns with drinking water ?
   ___ Yes _x__No

   If yes, describe

5. Have there been any problems or health/environmental concerns with sewage disposal/treatment?
   ___ Yes _x_ No

   If yes, describe

6. Have there been any problems or health/environmental concerns with solid waste disposal?
   ___ Yes _x__ No

   If yes, describe

Monitoring Program

1. Does the Regional Health Board perform water quality sampling?
   ___No _x__If Yes, answer questions (a) to (e)

   a. Briefly describe the sampling methodology.

      DPW (Department of Public Works) takes the samples and the Health Board does the testing.

   b. Briefly describe any monitoring of wastewater effluent and leachate.

      Only drinking water is sampled for the Regional Health Board.

c. Who is responsible for sampling?

Name: Larry White
Position: Lab Assistant
Telephone #: (867) 645-8331

d. Recognized laboratory performing analysis of samples.

Name: Kivalliq Health Centre
Address: P.O. Box 008, Rankin Inlet, NU, X0C 0G0
Telephone #: (867) 645-8300

Fax # : (867) 645-8330

e. Are any changes planned in the water quality monitoring program?
__ Yes _x_No
If yes, describe.

IX. TECHNICAL INFORMATION *(Assistance may be obtained from the Regional Community Government (CG&T) office if you have difficult with this section).*

1. Date:

2. Municipality: Hamlet of Rankin Inlet

3. Contact: Wayne Thistle
(Community and Government Services, Government of Nunavut)

Telephone #: (867) 645-8178

Fax # : (867) 645-8196

4. Population (according to most recent census results): 2,358

5. Estimated growth rate over next 5 years: 1.4%

6. Has any baseline data collection and evaluation been undertaken with respect to the physical, biological, and chemical characteristics of the main water bodies in the area?
x_Yes ___No

If yes, provide a summary of program details or site title, authors, cities, and dates:

Prepared by	Title	Completion Date
• Stanley Associates Engineering Ltd.	Nipissar Lake Watershed Model	1996
• Nuna Burnside Engineering and Environmental Limited	A brief overview of local water bodies as part of Sewage Treatment Plan and NWB licence renewal submissions (Internal documents).	2008

If no, are such studies being planned?

___ No _x__Yes (If yes, when and by whom):

GN is proposing to contract an environmental risk assessment of sewage effluent discharge into Hudson Bay in 2009. RFP documents being prepared.

7. Have Elders been consulted in the collection of baseline data on main water bodies in the area?

__x_No __Yes

If yes, specify.

8. Have any baseline data collection and evaluation been undertaken with respect to the various biophysical components of the environment potentially affected by the project?

___No _x_Yes

If yes, provide details below.

Prepared by	Title	Completion Date
LGL Limited	Assessment of Potential Bird Hazards to Aircraft Safety Associated with the Proposed New Solid Waste Site – Rankin Inlet, Nunavut	September 2002

If no, are such studies being planned?

_x_ No __Yes.

If yes, specify:

Attachments

1. Attach detailed plan or drawing(s) of the present *solid waste disposal area.* Include the following information:

   a. details of pond size and elevation;
   b. details of all retaining structures (dimensions, materials of construction, etc.);
   c. details of the drainage basin, and existing and proposed drainage modifications;
   d. details of all decant, siphon mechanisms etc., including sewage treatment facilities;
   e. details regarding direction and path of wastewater flow from the area;
   f. distance from watercourses and fish bearing waters;
   g. location and construction of liners;
   h. leachate and groundwater collection systems; and
   i. control structures.

2. Attach detailed plan or drawing(s) of the present *sewage treatment system.* The drawing(s) should include the following:

a. details of all retaining structures (dimensions, materials of construction, etc.);
b. details of the drainage basin, and existing and proposed drainage modifications;
c. details regarding direction and path of wastewater flow from the area;
d. indications of the distance from watercourses and fish bearing waters;
e. all sources of seepage presently encountered near these areas, including volumes (m^3/day) and direct
f. The volume of seepage flow (m^3 / day); and
g. The direction of each flow.

3. Are drawings for the solid waste disposal area and sewage treatment system attached?
_x__ Yes ___No

If yes, who has provided them?
Nuna Burnside Engineering and Environmental Ltd.
Government of Nunavut

If no, indicate when they will be available?

Hydrology

1. Effects on surface water flow:
Are any stream channels altered? __ Yes _x_ No
Is the natural storage or water level of any lake or pond changed?__ Yes _x_ No
Are there changes in water flow downstream of the project?__ Yes _x_ No

Is a storage reservoir created in a natural channel? __ Yes _x_ No

If yes to any of the above, briefly describe the expected change in flow or storage:

2. Drainage Area:
What is the drainage area? __3.23__ km^2
What is the average elevation of the drainage basin? __50___metres
Is the drainage basin outlined on an attached map? _x__Yes ___No

Describe the drainage basin characteristics, (vegetation, general soil type, lakes, swamps and permafrost areas, etc.)

Surface materials consist mainly of exposed volcanic or sedimentary Precambrian rock and various types of re-worked ground moraine, notable marine terraces. The soil is a mixture of organic materials, gravel, sands and fines. Numerous eskers provide a good source of granular material. The shoreline is composed of recently deposited sands and silts. The Hamlet is within the continuous permafrost zone, with an estimated permafrost thickness of 300 m. The active layer of permafrost is very shallow, extending 0.3 m below the ground surface. Areas with developed soil layers support hardy grasses, while rock outcrops support lichens. Clusters of small willow bushes grow in well-sheltered areas.

3. Channel characteristics:
Is the course of any channel changed? ____ Yes _x__No

If yes, describe measures to maintain stream bed and bank stability.

4. Will the cross-section of any watercourse be changed? ___ Yes _x_ No
If yes, describe the change and its effect on the flow capacity of the channel.

Water Supply

1. What is the rate of withdrawal from the source? __2108_____ m^3/day.

2. Is water drawn from the source ___ intermittently __x_continuously

3. If it is drawn intermittently, during what month(s) is it drawn? _____

4. For what period is it drawn (days/weeks/months)? ____365 days_____

5. What is the rate of flow of source (if river) or size (if lake)?

Nipissar Lake covers an area of 1,090,565 m^2. With an estimated average depth of 4 metres the volume of the lake is estimated at 4,362,260 m^3. The lake's estimated annual recharge is 314,000 m^3 per year.

6. At the intended rate of water usage, describe the effects on the river or lake from which water will be drawn.

There have been no observed effects on the lake with the current rate of usage. It is recommended that a study be conducted to determine any effects on the lake due to the water taking. For the purpose of this application, there have been no observed effects.

Water Intake

1. Please provide short descriptions of the following:

   a. freshwater intake facility
   b. operating capacity of the pumps
   c. intake screen size

The community draws its water from the Lake Nipissar, located 2 km northwest of the Hamlet. The Nipissar Lake pumphouse contains vertical turbine submersible pumps installed inside twin intake lines. Each of the 10 Hp pumps has a 1020 L/min. capacity. Only one pump operates at a time. Operation of the pump is controlled by the water level in the water storage tank adjacent to the Williamson Lake pumphouse. An air compressor aerates water around the intake to prevent taste and odour problems.

Water Storage

1. Is a dam or dyke being used to store or alter the flow of water? ___Yes _x_No

2. What are the dimensions of the dam or dyke?
   Length:_____ Width: _____ Height:_____
   U/S slope: _____ D/S slope: _____

3. Does the proposed dam create a reservoir in a natural watercourse?
   ___ Yes _x__No
   If yes, what is the storage capacity and surface area of the reservoir?
   _____ m^3 _____ ha.

4. Will the dam or dyke affect fish migration or movement?
   ___ Yes __x_ No
   If yes, describe all measures for compensation of fish habitat lost due to the dam or dyke, and mitigation for fish migration or movement.

Water Treatment

1. Indicate the capacity of the treatment facility. _____1000_____ L/min

2. What is the capacity of the water storage facility__3,364_____ m^3

3. Describe the method of water treatment (i.e., backwash, flocculation, sedimentation, chemicals used), and provide the results of the most recent bacteriological and chemical analysis. Attach a diagram, if possible.

   Water for the water storage tank and the distribution system is chlorinated by new gas chlorinators, installed in 1996. A fluoridation system injects hydrofluosilicic acid directly into the water. In addition, compressed air is injected into the raw water at the Nipissar Lake intake

4. Are there any changes planned in the water treatment facilities?
   _x__ No ___Yes
   If yes, attach a copy of the plan or indicate changes and include an implementation schedule.

Sewage Disposal

1. Indicate the level of sewage treatment:
   ___ primary ___ secondary ___ tertiary
   Pre-treatment (if applicable): __x_ screening ___ maceration
   Lagoons (if applicable): ___ anaerobic ___ aerobic ___facultative

2. Indicate the capacity of the sewage treatment facility_____ m^3

3. Based on current population projections, the facility will meet the needs of the community until the year _____ .

4. Average depth of the wastewater lagoon ___n/a_____ m.

5. What is the design freeboard? ___n/a_____ m.

6. Indicate the retention time of the sewage while in the treatment facility__n/a_____ days.

7. Indicate the estimated rate of discharge of wastewater__65___L/sec.

8. Indicate the location of the discharge point__500 meters into Hudson Bay_____

9. Is the discharge: ___seasonal __x_continuous
If the discharge is seasonal, during what month(s) is it done? _____
What is the duration of the discharge (days/weeks/months) ? _____

10. Are there any changes planned in the sewage disposal facilities?
___ No ___Yes
If yes, attach a copy of the plan or indicate changes and include an implementation schedule.

Solid Waste Disposal

1. Indicate the capacity of the disposal area __352,700_____ m^3.

2. The *average* depth of the solid waste disposal site __3.3_____ m.

3. The current facility will meet community needs until the year _2009___.

4. Do any natural watercourse enter the solid waste disposal area? What methods are used to decrease the amount of runoff water entering these areas?

no

5. Indicate the volume of water that may enter these areas from any source(s) and attach all pertinent details of the diversions.

Source	Volume
none	

6. Please describe any diversions of watercourses:

none

7. Are there any changes planned in the solid waste disposal facilities?
___ No __x_Yes
If yes, attach a copy of the plan or indicate changes and include an implementation schedule.

The current landfill will be decommissioned and the use of the new landfill will begin pending approvals from agencies.

Other

1. Describe any additional details on the existing municipal facilities which should be considered by the Nunavut Water Board during it review.

Refer to other documents submitted with the application including:

- Environmental Emergency Contingency Plan, Hamlet of Rankin Inlet, Nuna Burnside Engineering and Environmental Ltd., December 2008
- Environmental Monitoring Program and Quality Assessment/Quality Control Plan, Hamlet of Rankin Inlet, Nuna Burnside Engineering and Environmental Ltd., December 2008
- Solid Waste Management Facility, Operations and Maintenance Plan, Hamlet of Rankin Inlet, Nuna Burnside Engineering and Environmental Ltd., December 2008
- Sewage Treatment Facility, Operations and Maintenance Plan, Hamlet of Rankin Inlet, Nuna Burnside Engineering and Environmental Ltd., December 2008
- Water Supply Facility, Operations and Maintenance Plan, Hamlet of Rankin Inlet, Nuna Burnside Engineering and Environmental Ltd., December 2008.

Hamlet of Rankin Inlet: Application to NWB for Water Licence
December 2008

EXECUTIVE SUMMARY

Enclosed is a water licence application for the Hamlet of Rankin Inlet, Nunavut. The Hamlet is seeking a five-year renewal of its current licence NWB3RAN0207. This application includes all solid waste disposal activities in the Hamlet of Rankin Inlet. Within the jurisdiction of the Hamlet is the current landfill, the new landfill and the landfarm.

Currently all solid waste is being disposed of at the original Rankin Inlet Landfill that is located 1 km southeast of the community. A new landfill has been constructed approximately 7 km from the community. When the new landfill is commissioned, the old landfill will be closed and all solid waste will be directed to the new landfill. An Abandonment and Restoration plan for the old landfill is in progress.

The landfarm in Rankin Inlet was constructed in 2005 and is located 5 km northwest of the Hamlet near the new landfill. The landfarm was constructed with a lined base and containment berm and covers an area of 2100 m^2. As a component of this application the Hamlet seeks to have the landfarm included in the licence.

The activities included in this licence application will not substantially affect the quality, quantity or flow of water through Inuit Owned Lands.

March 2, 2009

Nunavut Water Board
Gjoa Haven, Nunavut
X0E 1J0

Re: Water License Application Supplementary Questionnaire for Land Farm Treatment Facility, Hamlet of Rankin Inlet

I. General Information

1. Date of Application: December 20, 2008

2. Name and Mailing address of the applicant:

   Hamlet of Rankin Inlet,
   Rankin Inlet, Nunavut, X0C 0G0.

3. Contact information:

   Telephone: (867) 645-2895 Fax: (867) 645-2146

   Name(s) of Facility operator(s) and alternate management personnel:

   Project Manager: Manassie Oingonn, Government of Nunavut
   Phone: (867) 645-8159
   Fax: (867) 645-8196

   Number of years the applicant is requesting a license: 5 years

   Applying for amendment to existing Nunavut Water Board License NWB3RAN0207.

II. Technical Information Required to Process the Application

Site Assessment Considerations

1. Figure 3 illustrates the regional drainage features of the area. Also identified in Figure 3 are adjacent water bodies and traditional land use areas used for recreation.

   Figure 8 illustrates the soil landfarm active treatment locations, site drainage patterns, facility site access routes and surface and subsurface environmental monitoring sites.

3. The slope of the land underlying the Facility is to the east and is shown in Figure 8 of the attached application.

4. Hydrological/Climatic Assessment

   The Rankin Inlet area receives an average of 18.1 cm of rainfall and 107 cm of snowfall per annum. Mean annual precipitation totals 29.7 cm per annum. July mean high and low temperatures are 14.9°C and 5.9°C, respectively. January mean high and low temperatures are -28.3°C and -35.5°C, respectively. Winds are generally north-west, and average 23 km/h (Rankin Inlet Weather Station, Climate Normals 1991-2000, Environment Canada, 2008).

5. Soil Conditions

   Surface materials consist mainly of exposed volcanic or sedimentary Precambrian rock and various types of re-worked ground moraine, notable marine terraces. The soil is a mixture of organic materials, gravel, sands and fines. Numerous eskers provide a good source of granular material. The shoreline is composed of recently deposited sands and silts. Areas with developed soil layers support hardy grasses, while rock outcrops support lichens. Clusters of small willow bushes grow in well-sheltered areas.

   The Hamlet is within the continuous permafrost zone, with an estimated permafrost thickness of 300 m. The active layer of permafrost is very shallow, extending 0.3 m below the ground surface.

6. Municipal Zoning and Land Use Planning

   The land farm is located within the 450 metre setback zone for the new landfill site.

Soil Storage and Landfarm Treatment Design Considerations

1. The following was taken from plans for the facility created by Dillon Consultants in 2004. Actual as-built drawings were not available. Drawings are included in Appendix A.

a) retaining structures (dimensions, materials of construction, etc)	The slope of the berm is 2:1
b. Geo-synthetic liners (properties, installation details, etc)	10 Oz/yard non-woven geotextile, 30 Mil Artic Liner
c. Sumps, pumps, storage ponds/tanks and any other devices used to manage runoff and/or leachate	100 mm perforated pipe located in drainage sump

d. drainage modifications such as berms (natural or constructed) and diversion ditches	Granular berm surrounds facility
e. water quality and environmental monitoring stations and associated equipment	Water samples can be taken from sump pipe.

2. There are no barriers to prevent access to the site. The site is located 5 km outside of town so there is no need to prevent access to the site.

3. The facility is just south of a small pond of water. It is 2.5 km away from Hudson Bay.

4. The facility is located on fairly high ground. Any drainage waters will flow away from the site. The berm constructed around the soil pile raises the facility approximately 1 metre above grade on the lowest side. The risk of flooding is very low.

5. The soil will remain in the landfarm until CCME industrial levels are met and it can be used as cover for the landfill.

Operations and Maintenance Considerations

1. All soil to be deposited into the facility will be tested for baseline concentrations of the contaminant. The field engineer will determine a program that is representative of the total volume soil. The soil will also be tested for nutrients to determine if addition of nutrients would be beneficial for the remediation process. Before any soil is deposited in the facility a sampling program will be established by the engineer using the "QA/QC Plan and Monitoring Program for Rankin Inlet" (Nuna Burnside, 2008) for sampling protocols.

2.

a) Treatment cell development and material placement

The following outlines the soil treatment operations and methods to be used at the landfarm. It is assumed that conventional construction equipment will be used and experienced operators will be conducting the soil mixing and moving operation.

The facility will remain dormant over the winter periods until the ambient temperatures are favourable for treatment

Low ground-pressure equipment (i.e., Bobcat; back-hoe) should be used to move the soil while operating inside the landfarm. Equipment should not travel directly on the

liner until a minimum of 300 mm of impacted soil is placed. No sharp turning of equipment is allowed directly on the liner.

Objects that have the potential to puncture the underlying liner, such as metals, sharp rocks, and scrap wood should be removed from the impacted soil before it is transported to the landfarm for treatment

Liquid fertilizer should be sprayed over the impacted soil prior to soil turning and mixing. Site staff should determine the best type of fertilizer, the optimum concentration, and application quantity for the soil treatment. Spraying should not be conducted in windy conditions to prevent off site impacts

b) The impacted soil should be placed up to a maximum thickness of 0.6 m for treatment

c) The hydrocarbon impacted soil should be turned and mixed immediately after the fertilizer application. The soil is to be turned with an excavator to expose the soil from below. The mixing process should be conducted with care such that the underlying liner is not disturbed or damaged

d) N/A

e) The impacted surface water and leachate collected from the collection sump (down slope berm face) should be stored temporarily in a tank. The liquid can be mixed with the impacted soil for treatment, provided the soil requires additional liquid for treatment. Soil moisture should be monitored to optimise and monitor the treatment process

f) The excess leachate or surface water collected in the sump that will not be used in mixing with the soil can be stored in the Hazardous Waste Storage Area. The liquid level shall be monitored to avoid overflow. Any large accumulation of snow shall be removed as necessary, without removing any of the impacted soil, to prevent flooding or excessive soil moisture

g) The landfarm is 35 m x 60 m and the soil depth is currently 1.8 m. In the future soil will be filled to a maximum thickness of 0.6 m.

h) Dust Control: Mixing and turning of overly dry soil should be kept to a minimum to prevent dust generation

i) Staff training is an important aspect of operating a Landfarm Facility. Staff must be adequately trained to follow the O&M Plan (Nuna Burnside, 2008) and operate the facility. Site staff will have to undergo appropriate training and be provided with the appropriate personal protective equipment.

3. The Canadian Environmental Quality Guideline (CCME, 2007) will be used as comparative criteria to determine when land farmed soil can be removed from the landfarm and used as cover material at the landfill. The Industrial land use criteria as outlined in Chapter 7 for soil in the Canadian Environmental Quality Guidelines must be met in order for the soil to be placed in the landfill.

   The following guideline criteria are the most typical hydrocarbon fraction thresholds that must be achieved in order to use the soil in the landfill.

Clean-up Criteria for Contaminated Soil at Landfarm

	Criteria (mg/kg)
Petroleum Hydrocarbon Fraction-1 (F1)	310
Petroleum Hydrocarbon Fraction-2 (F2)	760
Petroleum Hydrocarbon Fraction-3 (F3)	1700
Petroleum Hydrocarbon Fraction-4 (F4)	3300

4.

a) Once the soil is remediated and tests show that soil meets desired levels then the soil will be used as cover material at the landfill.

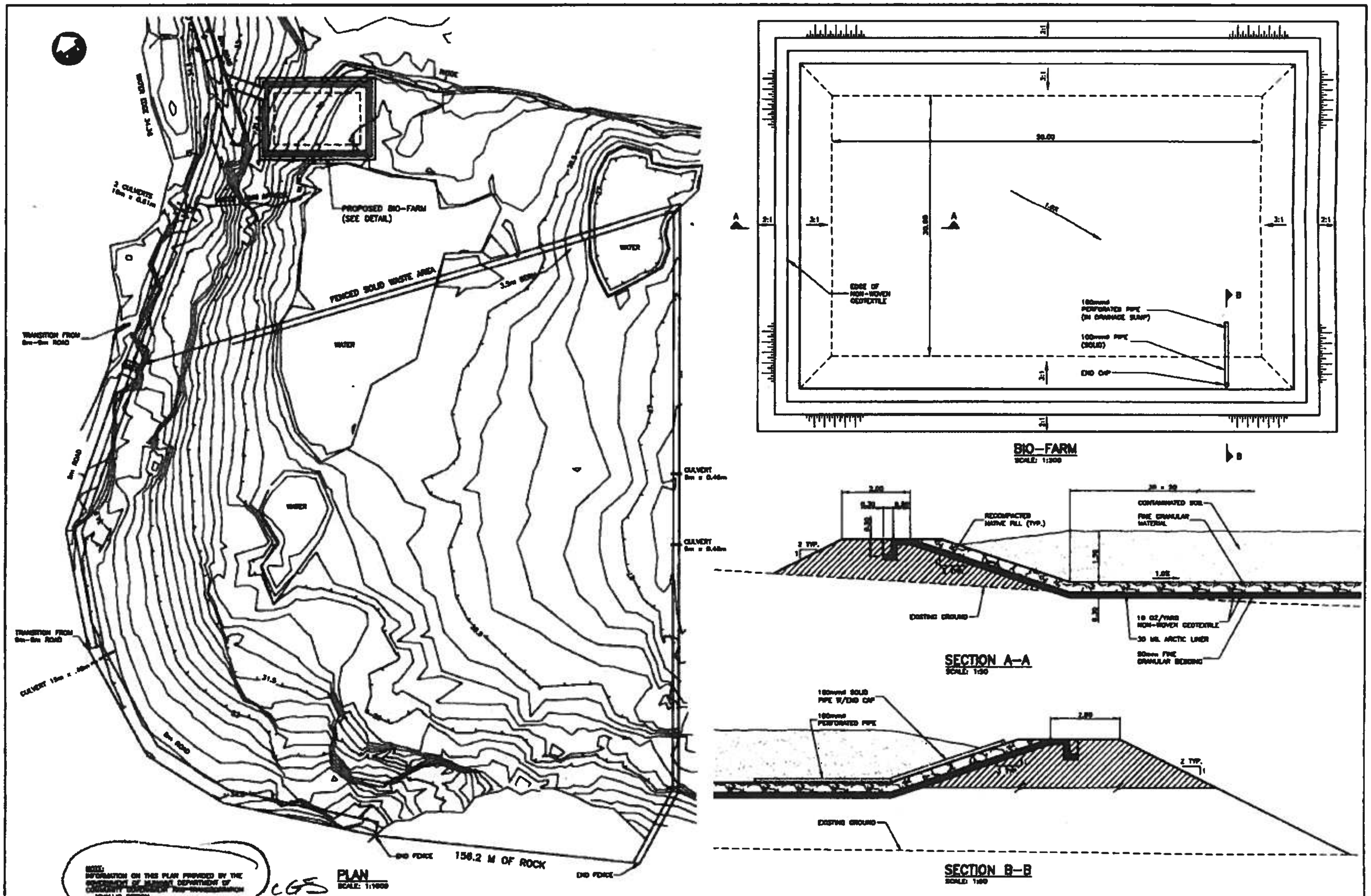
b) The soils will not contain bio-remediation-unsuitable compounds. Soils will remain in facility until they meet acceptable criteria.

Surface and Groundwater Monitoring Programs

A sampling program has been completed already for the soil currently in the landfarm. The most recent sampling was conducted by EBA Engineering Consultants Ltd. and is outlined in their report "Landfarm Assessment, Rankin Inlet, NU. September 2008". A plan indicating the sampling locations and the sampling results is attached in Appendix A. Any future sampling programs will be completed according to guidelines in the "Environmental Monitoring Program and QA/QC Plan, Hamlet of Rankin Inlet" Nuna Burnside, 2008.

BURNSIDE

Appendix A
Landfarm Drawings



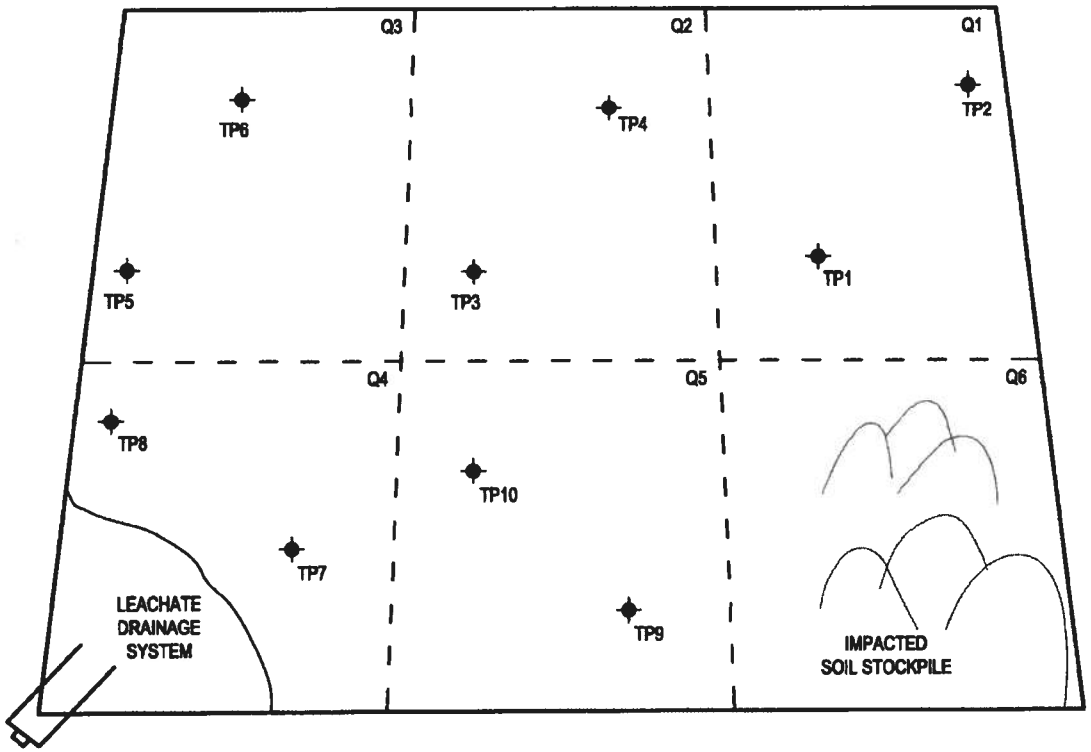
DILLON CONSULTING	1	ISSUED FOR REVIEW	04/06/3	P.M.K. / A.J.P. / J.B.E. / MAY 28 2004 / 1:1000

GOVERNMENT OF NUNAVUT
DECOMMISSION AIRPORT FUEL FACILITY

RANKIN INLET, NUNAVUT
BIOFARM SITE - PLAN AND SECTION

1

C:\Edmonton\Drafting\DIVISIONS2007\Other Offices\Y221\Y22101066001\acad\Y22101066001 Figure 1+2.dwg [FIGURE 2] September 08, 2008 - 4:38:15 pm (BY: RICHARD HEBERT)



LEGEND:

- TESTPIT AND SAMPLE LOCATION

0 20

Scale: 1: 400 (metres)

CLIENT

Government of Nunavut
Department of Community
and Government Services

Landfarm Assessment
Rankin Inlet, NU

Detailed Site Plan

EBA Engineering Consultants Ltd.

PROJECT NO.	DWN	CKD	REV
Y22101066.001	MM	KL	KL
OFFICE: EDM	DATE: August 2008		

Figure 2

TABLE 1: Soil Analytical Results - Landfarm Assessment

Location	Section 1			Section 2		Section 3		Section 4			Section 5		GNWT Environmental Guideline for Contaminated Site Remediation
Sample Identification	Q1(0.3m)	Dup 1	Q1(1.2m)	Q2(0.3m)	Q2(1.2m)	Q3(0.3m)	Q3(1.2m)	Q4(0.3m)	Q4(1.2m)	Dup 2	Q5(0.3m)	Q5(1.2m)	
Sample Type	Composite	Composite	Composite	Composite	Composite	Composite	Composite	Composite	Composite	Composite	Composite	Composite	
Sample Depth Below Grade (m)	0.3 m	0.3 m	1.2 m	0.3 m	1.2 m	0.3 m	1.2 m	0.3 m	1.2 m	1.2 m	0.3 m	1.2 m	Residential - Coarse Grained Surface Soil
Sample Date (M/D/Y)	7/31/2008	7/31/2008	7/31/2008	7/31/2008	7/31/2008	7/31/2008	7/31/2008	7/31/2008	7/31/2008	7/31/2008	7/31/2008	7/31/2008	-
Moisture (%)	9.1	11	8.1	8.7	12	8.4	13	9.6	11	11	7.3	8.6	-
Hydrocarbons													-
Benzene	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.5[b]
Toluene	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.8[b]
Ethylbenzene	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	1.2[b]
Xylenes	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	0.14	<0.040	<0.040	1[b]
F1-BTEX	<12	<12	<12	13	48	<12	37	<12	78	43	35	21	130[a]
F2 (C10-C16)	100	73	250	150	450	59	370	19	300	280	26	340	450[a]
F3 (C16-C34)	35	29	55	39	50	25	43	37	46	41	20	41	400[a]
F4 (C34-C50)	12	<10	18	13	14	10	12	11	15	11	<10	11	2800[a]

Notes:

Bold - indicates exceedance of adopted criteria

All units are in parts per million (ppm) unless otherwise specified

'-' indicates not analysed, no applicable standard, or not applicable

a - Eco -Soil Contact Standards, as published by GNWT "Guidelines for Contaminated Site Remediation" November (2003).

b - Residential/Parkland land use standards.

Nunavut Water Board
P.O. Box 119
Gjoa Haven, Nunavut
X0E 1J0

Re: Water License Application for Hamlet of Rankin Inlet

1. Name and Mailing Address of Applicant/Licensee

This application is being submitted on behalf of the Hamlet of Rankin Inlet, Rankin Inlet, Nunavut, X0C 0G0. Telephone: (867) 645-2895 Fax: (867) 645-2146

2. Address if Head Office in Canada if Incorporated

N/A

3. Location of Undertaking

The Hamlet of Rankin Inlet is located on Rankin Inlet, on the west coast of Hudson Bay (Figure 1). It is 96-air km southwest of Chesterfield Inlet and 1088 air km east of Yellowknife, at 62° 49'N latitude and 92° 05' W longitudes (Figure 1). Rankin Inlet is the regional centre for the Kivalliq Region of Nunavut. The hamlet has a land area of 20.24 km^2 and as of the 2006 census a population of 2,358.

Surface materials consist mainly of exposed volcanic or sedimentary Precambrian rock and various types of re-worked ground moraine, notable marine terraces. The soil is a mixture of organic materials, gravel, sands and fines. Numerous eskers provide a good source of granular material. The shoreline is composed of recently deposited sands and silts. The Hamlet is within the continuous permafrost zone, with an estimated permafrost thickness of 300 m. The active layer of permafrost is very shallow, extending 0.3 m below the ground surface. Areas with developed soil layers support hardy grasses, while rock outcrops support lichens. Clusters of small willow bushes grow in well-sheltered areas.

The Rankin Inlet area receives an average of 18.1 cm of rainfall and 107 cm of snowfall per annum. Mean annual precipitation totals 29.7 cm per annum. July mean high and low temperatures are 14.9°C and 5.9°C, respectively. January mean high and low temperatures are -28.3°C and -35.5°C, respectively. Winds are generally north-west, and average 23 km/h (Rankin Inlet Weather Station, Climate Normals 1971-2000, Environment Canada, 2008).

4. Description of Undertaking

This application includes all solid waste disposal activities in the Hamlet of Rankin Inlet. Within the jurisdiction of the Hamlet is the current (old) landfill, the new landfill, located 5 km outside of town and the landfarm. A regional map showing the locations of these facilities with respect to the Hamlet is shown in Figure 2. Figure 3 illustrates the regional surface water drainage patterns.

Current (Old) Landfill

Currently all waste is being disposed of at the original Rankin Inlet Landfill. The solid waste management site (55,000 m^2) is located 1 km southeast of the community on sloping land (Figure 4). The layout of the site is shown in Figure 5.

It has been identified that the existing landfill does not meet current standards. These standards include Nav Canada's 3 km setback from an airstrip and the Department of Health's 450 m setback from residential dwellings. Scavenging and unauthorized fires in the solid waste disposal area is common because of the close proximity to the community. The site is also impeding the community's use and enjoyment of a prime costal recreational area.

The waste facility reached its maximum capacity in 2002 and a new garbage dump was planned in 2003. A study performed by Stanley and North Tech Consulting identified a suitable site for the landfill and construction of the new landfill was started in 2003 and completed in 2006.

In 2007, the Hamlet decided to commission the new landfill and approved the environmental assessment of the current landfill for its abandonment and restoration. The Hamlet retained Gartner Lee and Associates to complete the abandonment and restoration (A&R) plan for the old landfill. Gartner Lee and Associates indicates the A&R plan will be completed by May 2009. Included in the A&R plan will be a monitoring program. Monitoring locations determined in the plan should be incorporated into this licence.

New Landfill

A new landfill has been constructed and is located 6.0 km from the community's centre. Drainage around the landfill site is shown in Figure 6 and an as-built drawing of the landfill is included in Figure 7. The constructed landfill is a total area of 85,000 m^2. A berm and road is constructed along the north and east edges of the site. A fence encloses the landfill along all edges except for 152 m of outcrop on the southwest side. The landfill has total waste area of 74,000 m^2 and a lay down area of 11,000 m^2.

The lay down area is split up in sections to deal with specific waste types that should be segregated from the general waste. These areas are identified by signs and include areas for animal carcasses, hazardous waste, metal bulky waste, non-metal bulky waste and sewage screenings.

An Operations and Maintenance Plan for the new landfill is to be completed when the site is commissioned. The Operations and Maintenance Plan will outline all operations on the site including staged filing of waste cells, locations of monitoring wells and surface sampling points, staged closure process as the site fills, household hazardous waste and storage of waste oil, bulky metals and materials segregation, recycling and reuse areas, general outline of Abandonment Restoration Plan and hazardous waste storage and disposal.

The new landfill is more than 3 km from the airstrip's centre. A bird hazard assessment for the landfill site was completed by LGL in 2002 to ensure that the landfill did not interfere with the flying of aircraft from the Rankin Inlet airport. In the report, the current site was determined to be the best option however mitigation measures were recommended due to its close proximity to the airport. These mitigation measures will be included in the Operation and Maintenance Plan for the facility.

Landfarm

The Rankin Inlet Landfarm was constructed by Dillon in 2005. The landfarm is located 5 km northwest of the Hamlet and is 2100 m^2 in area. The soil in the landfarm is approximately 1.8 m deep and is surrounded by a berm. A liner was installed at the base of the farm to prevent leachate from soil. After a year the permafrost rose into the soil and provided a base. A drawing of the landfarm is included in Figure 8.

The soil deposited in the landfarm originated from a fuel spill at the Airport Fuel Facility. There is no information on the original hydrocarbon concentrations of the soil. According to the Government of Nunavut, Community and Government Services, the soil was aerated and tilled once a year at the beginning of the summer. The soil has undergone treatment for 3 years.

The most recent sampling of the soil was taken on July 31, 2008 by FSC. The methodology of this sampling is outlined in the report "Landfarm Assessment, Rankin Inlet. September, 2008". The sampling indicated that samples taken from up to 1.2 metres in depth met all criteria from the GNWT Environmental Guideline for Contaminated Site Remediation. Sample results are included in the annual report for 2008.

Impacted soil from a recent fuel spill at the Nipissar Lake pumphouse in 2008 is stockpiled in the northeast corner of the site. A report titled "Nipissar Lake Fuel Spill Assessment and Remediation, Rankin Inlet NU, September 2008" includes soil sampling completed at the site of the spill.

5. Type of Undertaking

The undertakings included in this application are classified as "Municipal Undertakings".

6. Water Use

Water use in the Hamlet is not included in this application. A separate application for the Rankin Water Supply Intake has been submitted on behalf of the Government of Nunavut.

7. Quantity of Water Involved

As described above, this application does not include water intake or sewage disposal. They are the responsibility of the Government of Nunavut under a separate water license.

8. Waste

Solid Waste Collection and Disposal

Solid waste is collected once per week by a three-person crew using a 1995 15 m^3 garbage compacter truck. Prior to pickup, waste is placed in a 205 L drums in front of each home. During the last week of June the community participates in the annual spring clean up.

The current solid waste disposal site in the community is an open dump/landfill. The waste that is deposited is spread with a bulldozer weekly or more if required. Separation of the waste is not done except in the face of the fenced off area that receives solids from the wastewater treatment plant. The wastes are not compacted. Covering with granular materials occurs approximately once a year.

The study prepared for the Municipality of Rankin Inlet by Stanley Consulting Group and NorthTech Consulting (2001) details the types of solid wastes generated by the community as well as the composition, quantity, and current methods of treatment and

disposal. In addition, the study suggested options and recommendations for the new solid waste disposal site.

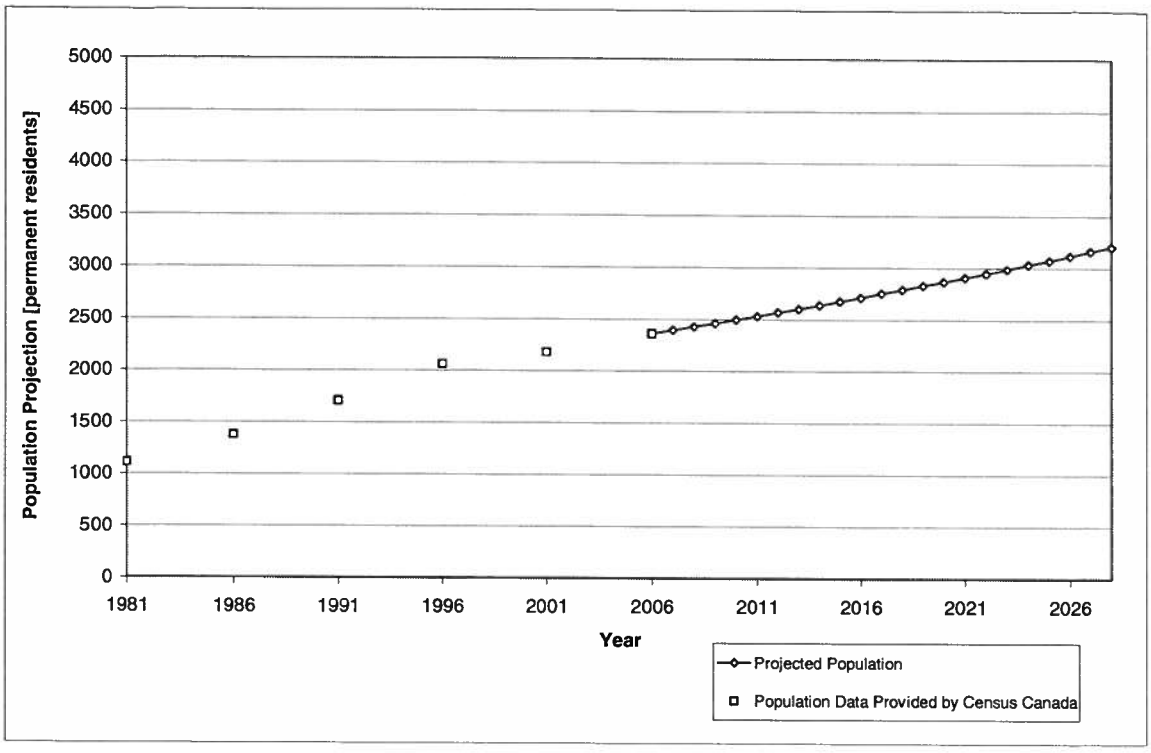
Population Estimates

Using population numbers from Census Reports between the years 1981 and 2006 and average provincial growth rate projections from Statistics Canada (Statistics Canada, 2000), a growth rate of 1.4% was determined. Table 1 shows the projected population of the Hamlet for the next 20 years.

Table 1: Projected Population Growth for Hamlet of Rankin Inlet

Year	Projected Population
2006	2358
2007	2392
2008	2426
2009	2460
2010	2495
2011	2530
2012	2566
2013	2602
2014	2639
2015	2676
2016	2714
2017	2752
2018	2791
2019	2831
2020	2871
2021	2912
2022	2953
2023	2995
2024	3037
2025	3080
2026	3124
2027	3168
2028	3213

Figure A: Population Projections Rankin Inlet, Nunavut



Solid waste projections for the Hamlet are provided in Table 3. The table is based on the population projections shown in Figure A. The annual volume of solid waste is the volume after burning and compaction. We assume that 20% of the waste is combustible and that the volume of garbage will decrease by 30% after compaction. Cover material will increase the volume of the waste by 20%. Projected solid waste generation calculations are outlined in a table in Appendix A.

The total fill area of the new landfill site excluding the lay down area is approximately 74,000 m^2. To enhance the life of the landfill, the waste will be deposited in two layers of 1.25 m. A second berm will need to be built when the first layer is completed. With an estimated average fill depth of 2.5 metres, the new landfill will have an estimated capacity of 185,000 m^3. If the landfill begins receiving waste in 2009, it should complete its first layer of waste in 8 years. The second layer of waste will be completed in approximately 16 years. The Hamlet will need to evaluate options for expansion of the landfill or a new site after this period.

Table 3: Solid Waste Projections for the Hamlet of Rankin Inlet

Year	Projected Population	Annual Volume of Solid Waste [m^3]	Cumulative Volume of Solid Waste and Cover Material [m^3]
2009	2,460	12,570.6	9,926
2010	2,495	12,749.5	19,993
2011	2,530	12,928.3	30,201
2012	2,566	13,112.3	40,554
2013	2,602	13,296.2	51,053
2014	2,639	13,485.3	61,701
2015	2,676	13,674.4	72,498
2016	2,714	13,868.5	83,449
2017	2,752	14,062.7	94,553
2018	2,791	14,262.0	105,814
2019	2,831	14,466.4	117,237

Sludges

Sludges are generated through the mechanical system of the Hamlet's sewage treatment plant. The sludges are taken to the landfill site for disposal. The Hamlet produces approximately 1 cubic metre of sludge a week[1]. Therefore, a total of 52 m^3 of sewage sludge is received by the landfill annually.

Bulky Waste

The Hamlet has an area set aside for bulky scrap metal near the landfill. However, there is no operation plan in place to deal with this type of waste. Currently the new landfill has an area designated for bulky waste (metal and non-metal) within the lay down area. This area however may not be enough for all of the bulky waste produced by the community. Procedures for ensuring that the lay down area does not get full from the waste will need to be established. This will be included in the new landfill's O&M Plan.

Animal Carcasses

At the current landfill there is an animal carcass pit located towards the back of the fill area. When an animal is disposed of it is covered with dirt. The new landfill will have a designated area for animal carcasses. The carcasses will be covered with dirt and periodically added to the fill area.

---

[1] According to Hamlet of Rankin Inlet Public Works staff member, Sept 2008

Hazardous Waste

All hazardous waste will be separated from the other waste. Currently at the old landfill, hazardous waste is separated from the waste and stored just outside of the landfill in barrels. An area at the new landfill has been designated for hazardous waste however this area does not have any added protection to the environment such as a liner or containment berm. It is recommended that a constructed hazardous waste area be constructed outside of the landfill area with spill containment structures to protect the environment.

9. Persons or Properties Affected by this Undertaking

There are no persons or properties affected by this undertaking. A land use permit was completed by the DIAND on 2000/07/27.

10. Predicted Environmental Impacts of Undertaking and Proposed Mitigation

The disposal of solid waste may have local site effects due to the clearing of vegetation, and contamination at the site. In addition, there may be some contamination of groundwater and surface water. Proper grading of the landfill will be completed to reduce the amount of water flowing into the landfill and to keep contaminated water from flowing out.

Procedures such as segregation of wastes, promotion of recycling or salvaging will be used to minimize the volume of disposed solid waste. Fencing has been installed at the new landfill to limit the spread of debris by wind and will be used to reduce litter.

11. Inuit Water Rights

Studies to date indicate that these projects will not substantially affect the quality, quantity, or flow of water flowing through the Inuit Owned Lands and the rights of Inuit under Article 20 of the Nunavut Land Claims Agreement.

12. Contractors and Sub-Contractors

None

13. Studies Undertaken to Date

- Environmental Emergency Contingency Plan, Hamlet of Rankin Inlet, by Nuna Burnside, December 2008
- Environmental Monitoring Program and Quality Assurance / Quality Control Plan, Hamlet of Rankin Inlet, by Nuna Burnside, December 2008
- Water Supply Facility, Operations and Maintenance Plan, Hamlet of Rankin Inlet, by Nuna Burnside, December 2008
- Sewage Treatment Facility, Operations and Maintenance Plan, Hamlet of Rankin Inlet, by Nuna Burnside, December 2008
- NWB Annual Report, 2008, Rankin Inlet Water Use and Waste Disposal by Nuna Burnside, December 2008.

14. Attachments

The following are attached with this document.

- Figures 1 to 8
- Appendix A: Waste Quantity Calculations
- Water Licence Application Supplementary Questionnaire for Municipalities
- Water Licence Application Supplementary Questionnaire for Landfarm Treatment Facilities
- English and Inuktitut Summary of Project.

15. Proposed Time Schedule

We propose that the licence be a 5 year license starting immediately upon approval.

16. References

Department of Municipal and Community Affairs (MACA), Government of Northwest Territories, October 1996. *Guidelines for the Preparation of an Operation and Maintenance Manual for Sewage and Solid Waste Disposal Facilities in the Northwest Territories.* Queen's Printer: Yellowknife, Northwest Territories.

EBA Engineering Consulting Ltd., *Landfarm Assessment, Rankin Inlet*, for the Government of Nunavut, 2008.

EBA Engineering Consulting Ltd., *Nipissar Lake Fuel Spill, Assessment and Remediation, Rankin Inlet*, for the Government of Nunavut, 2008.

Environment Canada, 2008. *Canadian Climate Normals 1971-2000, Rankin Inlet A Weather Station*, Environment Canada. <http://climate.weatheroffice.ec.gc.ca/climate_normals/results_e.html?StnID=1721&autofwd=1>. Accessed Nov 10, 2008.

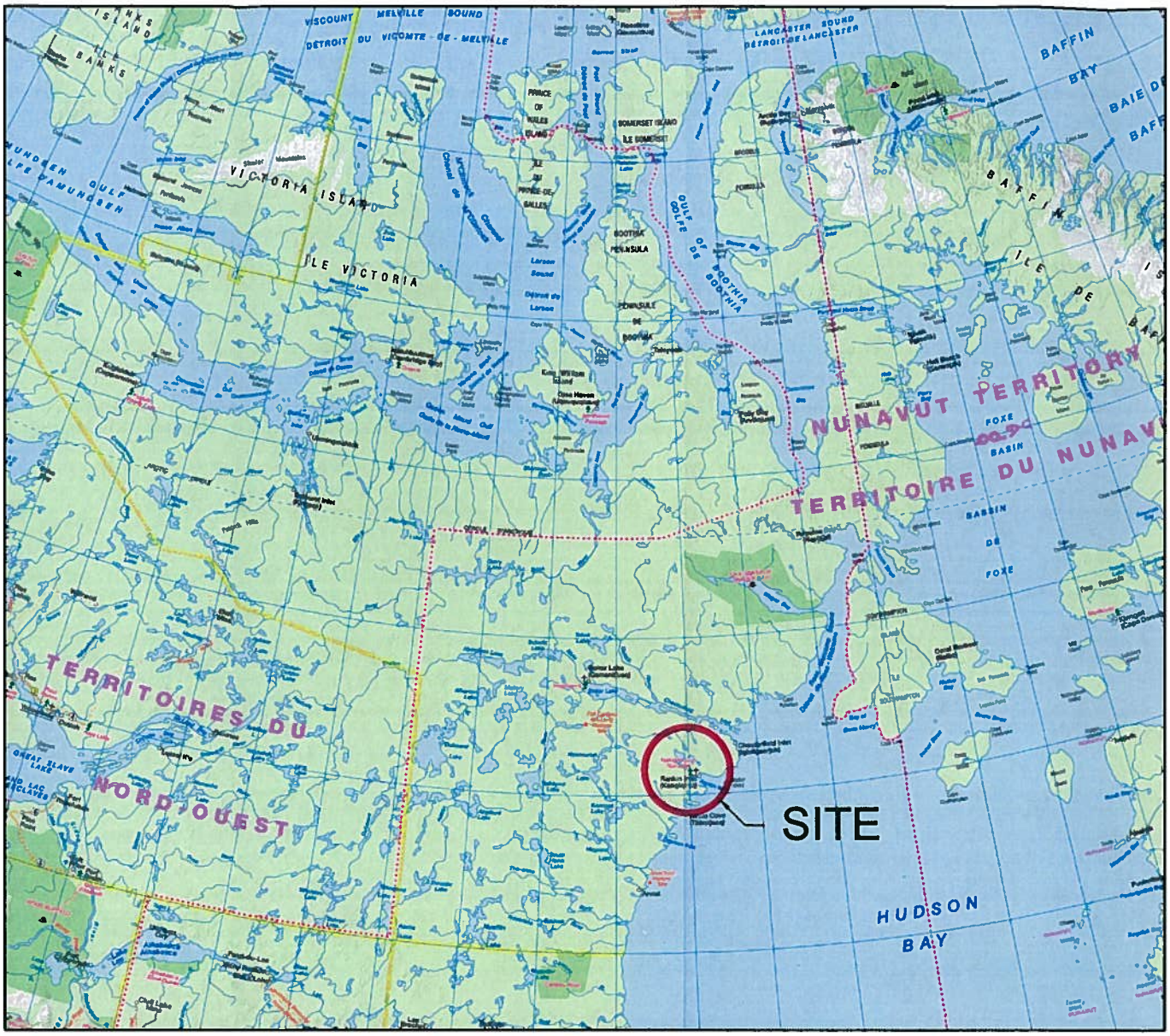
LGL Limited, *Assessment of Potential Bird Hazards to Aircraft Safety Associated with the Proposed New Solid Waste Site – Rankin Inlet, Nunavut*, September 2002.

Stanley Consulting Group and North Tech Consulting Nunavut Ltd., *Rankin Inlet Solid Waste Study*, for the Municipality of Rankin Inlet, 2001.

Statistics Canada, 2000. *Population Projections for Canada, Provinces and Territories 2000 – 2026.* Statistics Canada, 2000.

Hamlet of Ranking Inlet, Rankin Inlet Community Plan, 2008.

Figures



Map Reference:
Map Art Publishing

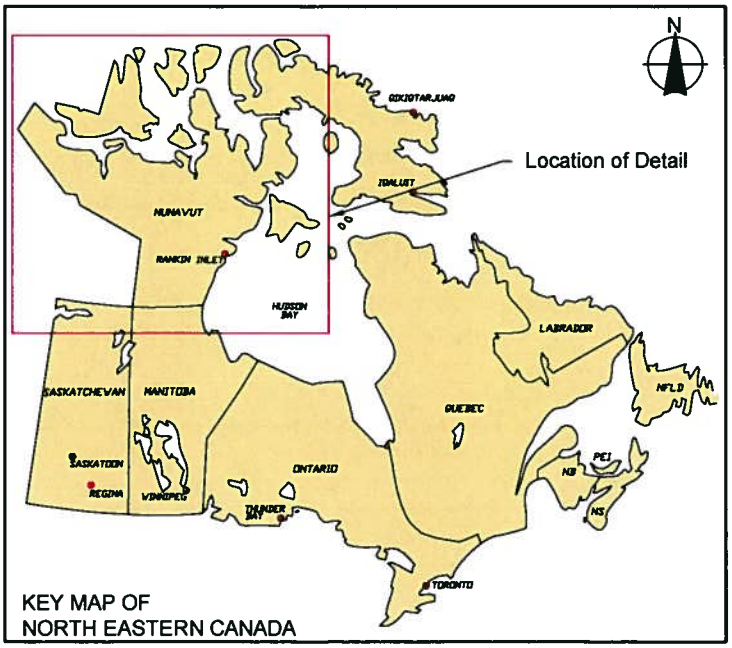


FIGURE 1 - SITE LOCATION MAP

HAMLET OF RANKIN INLET

HAMLET OF RANKIN INLET, NUNAVUT

WATER LICENCE SUBMISSION

December 2008
Project Number: N-O14850

Prepared by: C. Sheppard

Verified by: J. Walls

Nunn BURNSIDE

N-O14850 WATER LICENCE SUB-HAMLET SL.dwg

Plot Time: Mar 05, 2009-10:44am

FIGURE 2

HAMLET OF RANKIN INLET
HAMLET OF RANKIN INLET, NUNAVUT
WATER LICENCE SUBMISSION

COMMUNITY PLAN

Satellite Image Source:
Background 2006 satellite image covering the immediate community area obtained from MDA Geospatial Services.
Background colour satellite image covering the area beyond the immediate community obtained from the Google Earth Pro website.

N

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Kilometres

1:30,000
August 2008
Project Number: N-O14850

Projection: UTM Zone 15
Datum: NAD83

Prepared by: C. Sheppard
Verified by: J. Walls

NUNA BURNSIDE

N-O14850 WATER LICENCE SUB-HAMLET CP.dwg

Plot Time: Mar 05, 2009 - 10:49am

FIGURE 3

HAMLET OF RANKIN INLET
HAMLET OF RANKIN INLET, NUNAVUT
WATER LICENCE SUBMISSION

DRAINAGE AREAS

LEGEND

100m — 25m INTERVAL CONTOUR LINES (m amsl) (Obtained from National Topographic Digital Database)

INTERPRETED SURFACE WATER DRAINAGE DIVIDE

INTERPRETED SURFACE WATER FLOW DIRECTION

Satellite Image Source:
Background 2006 satellite image covering the immediate community area obtained from MDA Geospatial Services.
Background colour satellite image covering the area beyond the immediate community obtained from the Google Earth Pro website.

N

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Kilometres

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August 2008
Project Number: N-O14850

Projection: UTM Zone 15
Datum: NAD83

Prepared by: C. Sheppard

Verified by: J. Walls

NUNA BURNSIDE

N-O14850 WATER LICENCE SUB-HAMLET DA.dwg

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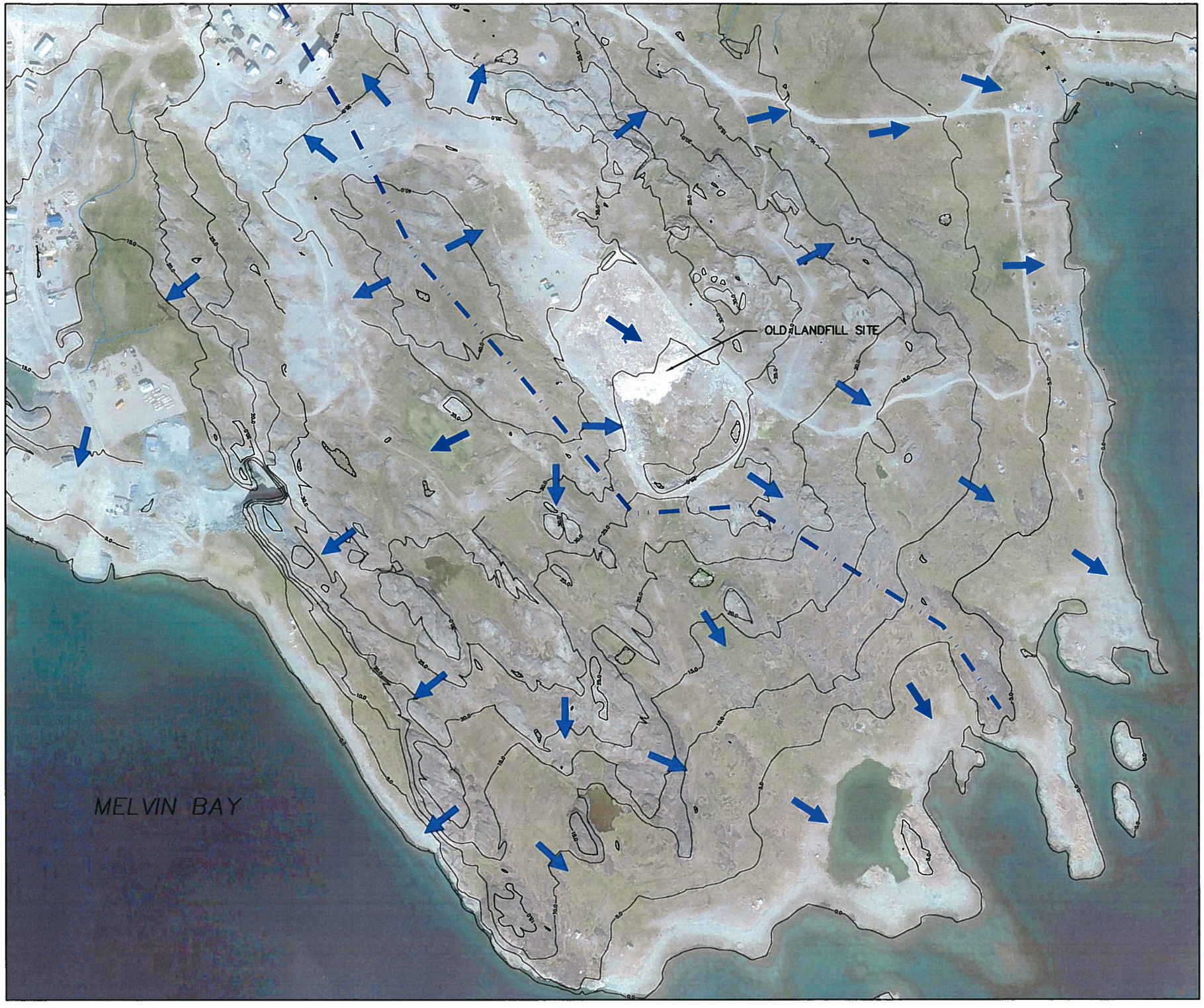

FIGURE 4

HAMLET OF RANKIN INLET
HAMLET OF RANKIN INLET, NUNAVUT
WATER LICENCE SUBMISSION

OLD LANDFILL DRAINAGE

LEGEND

20m — 5m INTERVAL CONTOUR LINES (m amsl) (Obtained from the Hamlet of Rankin Inlet Town Plan, Government of Nunavut)

INTERPRETED SURFACE WATER DRAINAGE DIVIDE

INTERPRETED SURFACE WATER FLOW DIRECTION

Satellite Image Source:
Background 2006 satellite image covering the immediate community area obtained from MDA Geospatial Services.
Background colour satellite image covering the area beyond the immediate community obtained from the Google Earth Pro website.

N

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Metres

1:5,000
August 2008
Project Number: N-O14850

Projection: UTM Zone 15
Datum: NAD83

Prepared by: C. Sheppard

Verified by: J. Walls

NUNA BURNSIDE

N-O14850 WATER LICENCE SUB-HAMLET OLFD.dwg

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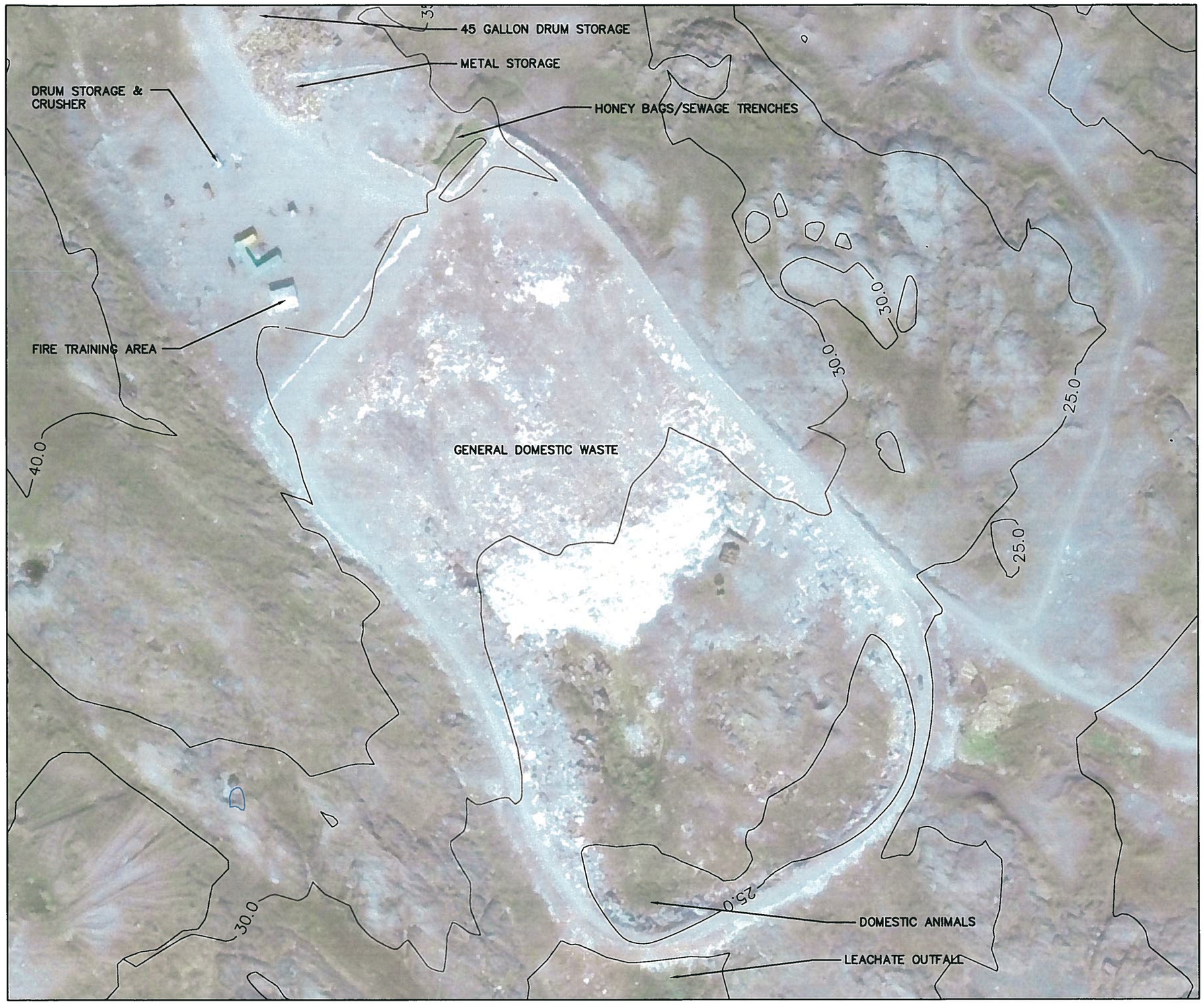

FIGURE 5

HAMLET OF RANKIN INLET
HAMLET OF RANKIN INLET, NUNAVUT
WATER LICENCE SUBMISSION

OLD LANDFILL SITE

LEGEND

20m — 5m INTERVAL CONTOUR LINES (m amsl) (Obtained from National Topographic Digital Database)

Satellite Image Source:
Background 2006 satellite image obtained from MDA Geospatial Services.

N

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Metres

1:1,500
August 2008
Project Number: N-O14850

Projection: UTM Zone 15
Datum: NAD83

Prepared by: C. Sheppard

Verified by: J. Walls

BURNSIDE

N-O14850 WATER LICENCE SUB-HAMLET OLF.dwg

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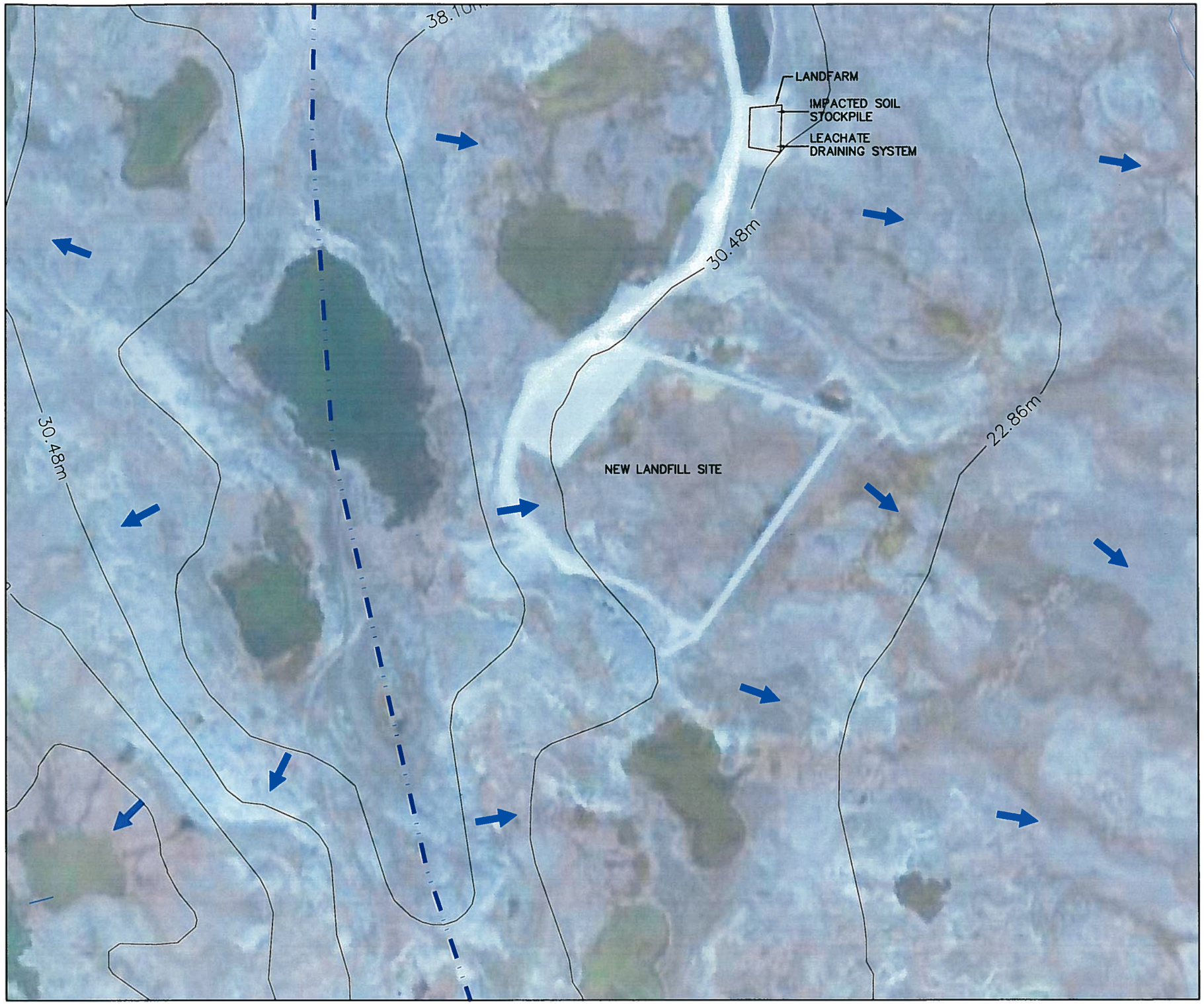

FIGURE 6

HAMLET OF RANKIN INLET

HAMLET OF RANKIN INLET, NUNAVUT

WATER LICENCE SUBMISSION

NEW LANDFILL DRAINAGE

LEGEND

100m — 25m INTERVAL CONTOUR LINES (m amsl) (Obtained from National Topographic Digital Database)

INTERPRETED SURFACE WATER DRAINAGE DIVIDE

INTERPRETED SURFACE WATER FLOW DIRECTION

Satellite Image Source:
Background colour satellite image obtained from the Google Earth Pro website.

N

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Metres

1:5,000
August 2008
Project Number: N-O14850

Projection: UTM Zone 15
Datum: NAD83

Prepared by: C. Sheppard

Verified by: J. Walls

BURNSIDE

N-O14850 WATER LICENCE SUB-HAMLET NLFD.dwg

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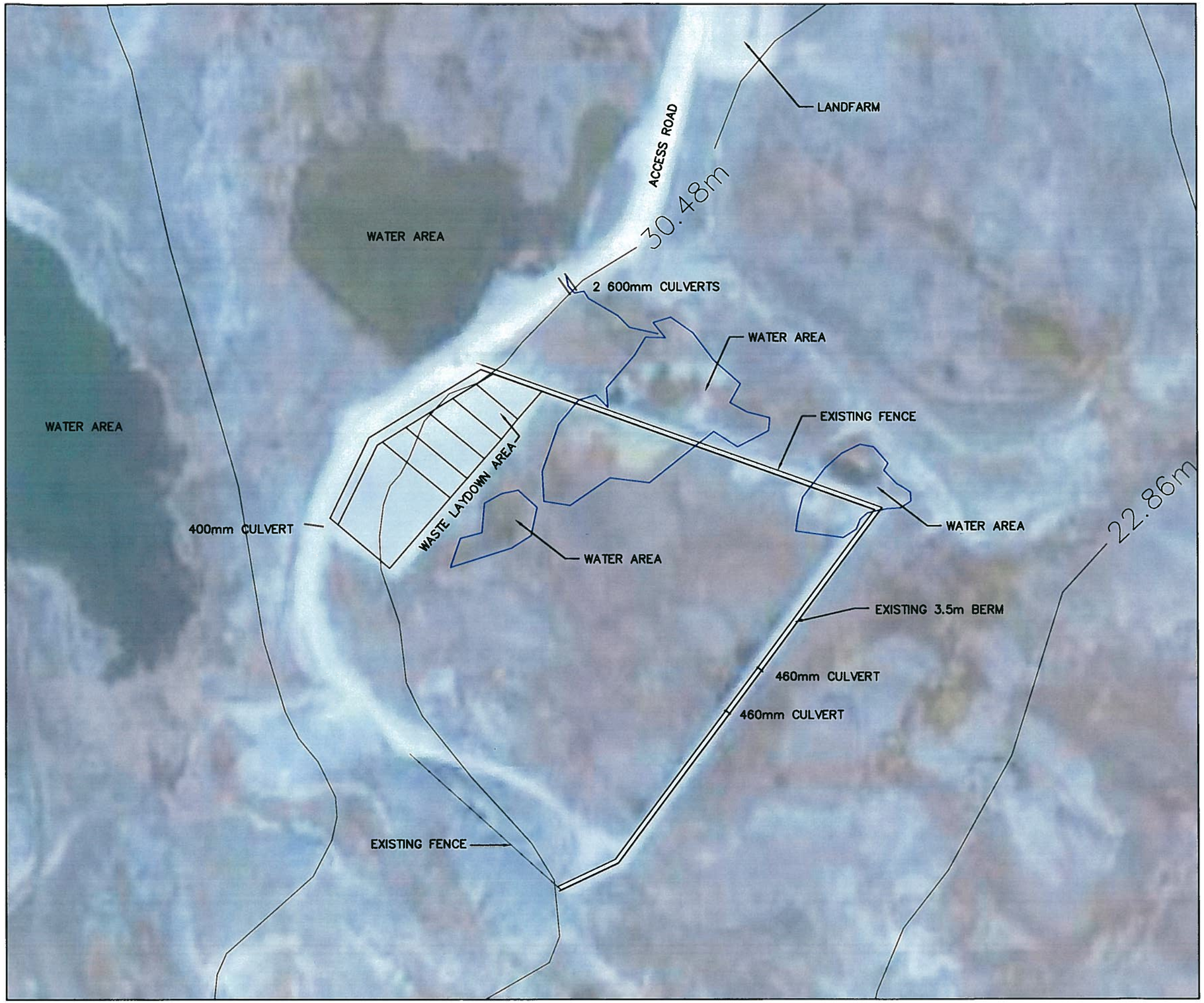

FIGURE 7

HAMLET OF RANKIN INLET
HAMLET OF RANKIN INLET, NUNAVUT
WATER LICENCE SUBMISSION

NEW LANDFILL SITE

LEGEND

—— 100m —— 25m INTERVAL CONTOUR LINES (m amsl) (Obtained from National Topographic Digital Database)

Data Source:
Background colour satellite image obtained from the Google Earth Pro website.

Landfill plan obtained from the Government of Nunavut, Department of Community Government and Transportation - Kivalliq Region.

N

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Metres

1:3,000
August 2008
Project Number: N-O14850

Projection: UTM Zone 15
Datum: NAD83

Prepared by: C. Sheppard

Verified by: J. Walls

NUNA BURNSIDE

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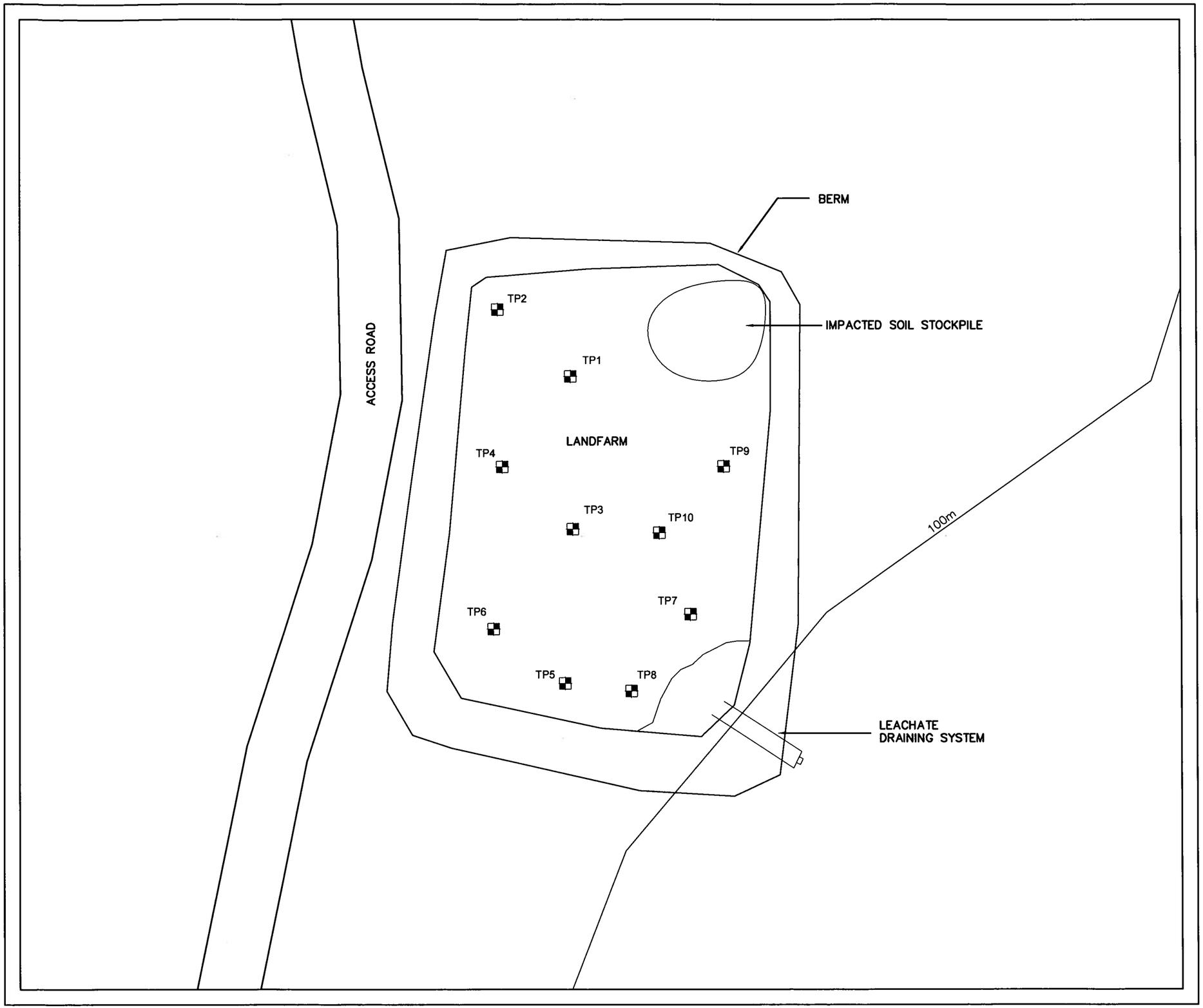

FIGURE 8

HAMLET OF RANKIN INLET

HAMLET OF RANKIN INLET, NUNAVUT

WATER LICENCE SUBMISSION

LANDFARM

LEGEND

TP1 — TEST PIT LOCATION
By EBA Engineers, August 2008

Site Plan Source:
Site data obtained from the EBA Engineering & Consulting Ltd., Landfarm Assessment, Rankin Inlet, 2008

N

0 5 10 15 20 25 30 35 40

Metres

1:500
September 2008
Project Number: N-O14850

Projection: UTM Zone 15
Datum: NAD83

Prepared by: C. Sheppard

Verified by: J. Walls

BURNSIDE

N-O14850 WATER LICENCE SUB-HAMLET LFARM.dwg

Plot Time: Mar 05, 2009 - 11:16am

BURNSIDE

Appendix A
Waste Quantity Calculations

Waste Quantity Calculations - Rankin Inlet, Nunavut

Waste Generation Rates Table
Key Assumptions

Starting Year: 2006 | Starting Population: 2358 | Population Growth Rate: 1.4%

% of waste that is combustible	20%	% of combustible waste remaining after burning	30%	% Decrease in volume of waster after compaction	30%	Cover Material Required per volume of garbage.	20%

Planning Year	Calendar Year	Projected Population [people]	Annual Volume of Solid Waste [m^3]	Cumulative Volume of Solid Waste [m^3]	Annual Volume of Combustible Solid Waste [m^3]	Annual Volume of Combustible Solid Waste After Burning [m^3]	Annual Volume of Uncombustible Solid Waste [m^3]	Total Annual Volume of Uncombustible and Combusted (Burned) Solid Waste [m^3]	Annual Volume of Compacted Waste [m^3]	Annual Volume of Cover Material [m^3]	Total Annual Volume of Compacted Waste and Cover Material [m^3]	Cumulative Landfill Volume [m3]
	2006	2358	12049.4	12049.4	2409.9	1686.9	9639.5	11326.4	7928.5	1585.7	9514.2	
	2007	2392	12223.1	24272.5	2444.6	1711.2	9778.5	11489.7	8042.8	1608.6	9651.4	
	2008	2426	12396.9	36669.4	2479.4	1735.6	9917.5	11653.0	8157.1	1631.4	9788.6	
0	2009	2460	12570.6	49240.0	2514.1	1759.9	10056.5	11816.4	8271.5	1654.3	9926	9,926
	2010	2495	12749.5	61989.4	2549.9	1784.9	10199.6	11984.5	8389.1	1677.8	10067	19,993
	2011	2530	12928.3	74917.7	2585.7	1810.0	10342.6	12152.6	8506.8	1701.4	10208	30,201
	2012	2566	13112.3	88030.0	2622.5	1835.7	10489.8	12325.5	8627.9	1725.6	10353	40,554
	2013	2602	13296.2	101326.2	2659.2	1861.5	10637.0	12498.4	8748.9	1749.8	10499	51,053
5	2014	2639	13485.3	114811.5	2697.1	1887.9	10788.2	12676.2	8873.3	1774.7	10648	61,701
	2015	2676	13674.4	128485.8	2734.9	1914.4	10939.5	12853.9	8997.7	1799.5	10797	72,498
	2016	2714	13868.5	142354.4	2773.7	1941.6	11094.8	13036.4	9125.5	1825.1	10951	83,449
	2017	2752	14062.7	156417.1	2812.5	1968.8	11250.2	13219.0	9253.3	1850.7	11104	94,553
	2018	2791	14262.0	170679.1	2852.4	1996.7	11409.6	13406.3	9384.4	1876.9	11261	105,814
10	2019	2831	14466.4	185145.5	2893.3	2025.3	11573.1	13598.4	9518.9	1903.8	11423	117,237
	2020	2871	14670.8	199816.3	2934.2	2053.9	11736.6	13790.6	9653.4	1930.7	11584.1	128,821
	2021	2912	14880.3	214696.7	2976.1	2083.2	11904.3	13987.5	9791.3	1958.3	11749.5	140,570
	2022	2953	15089.8	229786.5	3018.0	2112.6	12071.9	14184.4	9929.1	1985.8	11914.9	152,485
	2023	2995	15304.5	245090.9	3060.9	2142.6	12243.6	14386.2	10070.3	2014.1	12084.4	164,570
15	2024	3037	15519.1	260610.0	3103.8	2172.7	12415.3	14587.9	10211.5	2042.3	12253.9	176,824
Landfill Capacity Filled												
	2025	3080	15738.8	276348.8	3147.8	2203.4	12591.0	14794.5	10356.1	2071.2	12427.4	189,251
	2026	3124	15963.6	292312.4	3192.7	2234.9	12770.9	15005.8	10504.1	2100.8	12604.9	201,856
	2027	3168	16188.5	308500.9	3237.7	2266.4	12950.8	15217.2	10652.0	2130.4	12782.4	214,638
	2028	3213	16418.4	324919.4	3283.7	2298.6	13134.7	15433.3	10803.3	2160.7	12964.0	227,602
20	2029	3258	16648.4	341567.7	3329.7	2330.8	13318.7	15649.5	10954.6	2190.9	13145.6	240,748

Landfill Capacity

Large waste area excluding laydown area	74000 m2
Avg depth of first layer of waste	1.25 m
Avg depth of second layer of waste	1.25 m
Total Depth of Waste	2.5 m
Volume of Landfill Area	185,000 m^3