Appendix F – Decommissioning Plan

City of Iqaluit

Iqaluit Solid Waste Management Plan
West 40 Landfill Decommissioning
Technical Memorandum

Prepared by:

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Project Number:

60196419

Date: January, 2014

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Revision Log

Revision #	Revised By	Date	Issue / Revision Description
1	Septa Rundra	June 27, 2011	DRAFT
2	Septa Rundra	July 15, 2011	DRAFT REV 2
3	Jim Clare	January 30, 2014	FINAL

AECOM Signatures

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PERMIT TO PRACTICE
AECOM CANADA LTD.
Signature
Date Jan 30, 2014
PERMIT NUMBER: P 639
NWT/NU Association of Professional Engineers and Geoscientists

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1. Introduction

1.1 Background

Exp. Services Inc. (exp) and AECOM were retained by City of Iqaluit (the City) to develop a Decommissioning Plan for the West 40 Landfill. This landfill is currently at capacity and the City is working towards developing a new solid waste management site. When the new solid waste management facility opens, the West 40 landfill will be decommissioned. This Decommissioning Plan is a requirement of the City's Water License.

1.2 Scope of Work

The following tasks were completed in order to assess the site:

- Confirmation between exp./AECOM and the City regarding project scope, budget, and schedule;
- Established formal lines of communication;
- Collected, requested, and assembled all necessary and available information from the City in order to conduct the site assessment;
- Reviewed existing information;
- Used existing topographical data to produce conceptual closure design; and
- Conducted a landfill site visit.

Utilizing this information, a decommissioning plan was developed to address the following components:

- Final reclamation plans providing final contours and evaluating airspace volume;
- Final contour plans will be developed to allow final grades of 5% where possible to minimize the amount of fill material required to establish final grades;
- Final capping material design, including the possibility of using biosolids from the sewage treatment plant and gravel if available;
- Drainage management;
- Description of final cover;
- Ground water monitoring;
- Erosion control;
- Post closure care;
- Re-vegetation;
- Operation and maintenance checklist for final cover system to protect and maintain survey bench marks; and,
- A cost estimate for this decommissioning plan and care responsibilities.

2. Site Description

2.1 Location

Iqaluit is a growing Baffin Island community and is the Capital of Nunavut. It is located at the south end of Baffin Island, on Frobisher Bay at 64^0 44' N latitude and 68^0 31' E longitude. Access is provided by commercial aircraft year round and sea-lift from the port of Montreal in the summer. Annual precipitation in the Iqaluit area is approximately 255 cm of snowfall and 19.2 cm of rainfall. Average annual temperatures range from a low in January of approximately -29.7°C to a high of approximately 11.4°C in July.

The landfill site is located in West 40 approximately 4 km from the City center. This site was built in 1995 and was intended as a temporary disposal site until funding for a permanent solution could be allocated.

2.2 Operational History

Existing solid waste management practices at the site consist of placement of wastes into working face, compacting the wastes and covering with granular fill and/or mulch from shredded waste. The site accepts Municipal Solid Waste (MSW) which is either collected through a municipal collection or dropped off by the public. Scrap metal, tires, white goods, wood, sewage sludge, hazardous waste and end of life vehicles are collected and stored in designated areas of the landfill.

The site is operated using area method without engineered liner and leachate collection systems.

2.3 Site Facilities

All solid waste management facilities associated with the landfill are located generally within the site. These facilities include:

- A site office and garage located near the entrance to the landfill site;
- MSW pile;
- Scrap metal areas;
- Tires collection area;
- Wood waste processing area;
- Hazardous waste depot;
- Sewage sludge area;
- Composting; and
- Surface water management (berms, on-site and off-site retention ponds).

The site facilities are presented in Figure 1.1, Appendix A.

2.3.1 Recycling Storage Facilities

The site includes storage areas for recycling of bulky materials including:

- Scrap metals;
- Car bodies;
- Appliances/refrigerators and freezers; and
- Scrap tires.

Public sorting of waste or scavenging is not permitted within the disposal area of the landfill.

2.3.2 Hazardous Waste Depot

The site includes storage areas for hazardous waste materials. These wastes include but are not limited to:

- Automobile batteries;
- Lead acid batteries;
- Paint; and
- Waste oils.

3. Engineering Review and Design Consideration

Based on the "Operation and Maintenance Manual, May 2005", it was estimated that the site would reach its design capacities in November 2001. However, the site expansion was implemented for continuing operation of this site. [1] The expansion was developed in order to optimize daily operations and efficiently use airspace, while complying with the management of the runoff in and around the site in order to keep clean surface water out of the site and manage runoff on-site.

3.1 Solid Waste Generation

The landfill currently utilizes all of the available area designated for disposal and it has exceeded its capacity. However, there is an undisturbed area adjacent to the disposal footprint that can be used to dispose of waste until a new landfill is constructed. The remaining site life of undisturbed ground in years must be determined in order to plan for the final closure and post-closure management and costs.

To estimate the waste that will be generated over the lifetime of the site operation, the population data from City of Iqaluit General Plan[2] was used as a base for the projection. An average increase of 2.87% growth per year was applied to represent projected population and waste generation increases. A waste generation rate of 0.03 m^3/capita/day and a waste density of 100 kg/m^3 were used to estimate the volume of waste generation. Projected data describing the wastes generation is presented in Table 3.1.

Table 3.1 - Projected Waste Generation

Year	Accumulated Waste Generated (m^3)	Accumulated Waste Generated (tonnes)	Note
2011	83,412	8,314	
2012	169,218	16,922	
2013	257,486	25,749	
2014	348,288	34,829	
2015	441,713	44,171	New Solid Waste Site Scheduled to be Opened (Iqaluit Solid Waste Management Plan 2014) West 40 site closes and decommissioning begins.
2016	96,107		
2017	194,972		
2018	296,674		

3.2 Site Life

In order to establish the capacity requirements of the design, the expected future waste generation was calculated in order to predict the length of time the cell can viably service the site operations. Using the data provided in Table 3.1 the site life will be calculated.

The remaining capacity at year end is calculated by subtracting the waste accumulated for that year from the previous year's remaining site capacity. It is estimated that horizontal expansion to the north and south of existing waste, where the wood wastes and metals are placed, will accommodate waste disposal until approximately 2015-2016 (see Drawing 00-C-1003, Appendix B).

[1] Darcy Reist and Ken Johnson (2006). *Journal of the Northern Territories Water & Waste Association, pp. 10 – 13.*
[2] City of Iqaluit General Plan By Law 703, October 2010.

The site life of the landfill is calculated using the following assumptions:

- Development based on existing conditions of the site topography and area fill of the proposed disposal area;
- Calculation of disposal airspace based on the final elevation of the disposal area which is still to be determined; and
- Compacted waste density of 700 kg/m^3.

It is estimated that the new solid waste facility will be opened in 2015 and that the decommissioning of the West 40 Landfill will begin in 2015.

If the City needs to extend the lifespan of the West 40 landfill there are variations of options that can be developed. These options include:

- Increase compaction of the wastes:
  - It is estimated that current waste density at the site is approximately 400 kg/m^3 based on Operation and Maintenance Manual 2005 revision 2. The current compaction can be increased to 700 kg/m^3 by using new equipment and/or drive the compactor over the thin layer of the waste several times (more than 6 times over the waste). Table B.3 in Appendix B shows that increasing the waste density to 700 kg/m^3 could almost double the remaining airspace capacity.

- Remove metal waste (tires as well) and fill the area:
  - The Government of Nunavut has funded a scrap metal removal program in Iqaluit which has successfully removed significant amounts of metal from various waste management sites around Iqaluit. Although this program no longer has funding, the City may be able be able initiate a new project with a similar objective and possibly expand the objective to include landfilled tires.

- Relocate office and garage and fill the area:
  - The office and garage area would be useable fill areas for the landfill operation but would require relocation. The buildings could be relocated to the north using the entrance to the biosolids management area. This relocation would require a significant reorganization to the entire waste management site including consideration of using the community composting area as part of the City's waste management operations.

- Fill the area further north into areas currently used for electronics, woodwaste and biosolids:
  - The landfill area may potentially expand further north than is currently delineated in the decommissioning plan. This area is significantly smaller than the current operating area because of the encroaching bedrock outcrops on either side. This expansion would require a significant reorganization to the entire waste management site including consideration of using the community composting area as part of the City's waste management operations.
  - Lateral expansion of the waste fill area may be developed by using undisturbed areas of the site or by re-purposing the existing wood waste area as indicated in Drawings 00-C-1001 to 00-C-1003, Appendix A.

- Bring in incineration unit for temporary operation:
  - The application of a portable incineration unit could provide the City with significant waste reduction opportunity if required. This would be the most expensive option for increasing the operating window of the West 40 landfill site.

4. Closure Plan

4.1 General

Closure activities should be considered as part of the landfill operations and routine working practices. As the waste disposal face is filled above ground to the proposed final elevations, the perimeter slopes and surfaces are reclaimed. In this way the landfill is closed and reclaimed progressively throughout the active landfill life.

For scheduled fill development and in preparation of final landfill closure, the site should be supervised when open. Equipment will be used to reshape and compact the waste on a regular basis. In this manner, most grading and reshaping of the landfill required prior to installing the final cap may be completed by judicious placement of incoming waste over the site life, therefore, minimizing re-contouring following closure.

4.2 Final Grading Plan

The proposed final grades of the landfill maintain a minimum slope of 3% across the top of the waste fill area to allow surface water drainage off of the site. The design is based on the following:

- Steeper slopes (to meet 5% grade) at this site would require a significant amount of earthwork to construct, as well as a large quantity of soil fill which there is not available on-site;
- Settlement is expected to be a significant issue due to assumed high waste thickness with low compaction; and
- Cover maintenance is included as part of post-closure care.

4.3 Final Cover Design

The final cover design provides a protective “cap” over the waste fill area. The objectives of the final cover design are to:

- Provide a barrier layer over the waste to minimize infiltration of precipitation into the landfill to minimize leachate generation;
- Create and maintain positive drainage of precipitation off of the landfill and minimize erosion; and
- Provide a layer of soil/gravel on which to establish an acceptable level of vegetative cover.

For the purpose of landfill closure, the entire disposal area will require capping. If the undisturbed ground identified throughout the site (under roads, areas not surveyed, etc) is not filled prior to re-grading, it will be included within the cover design in order to ensure proper drainage off of the cap. Otherwise, areas left uncapped within the final covered footprint may collect surface water and compromise the final cover system.

The final contours of the landfill should promote drainage away from the site to discourage infiltration and leachate production while also preventing erosion. To suit these criteria, a 3H:1V slope is proposed for the side slopes with a 3% grade upwards to the crown of the landfill, directing drainage to the northeast and southwest.

The construction of final cover, or “cap”, includes placement of “topsoil” and “subsoil” and needs to be constructed to satisfy the future management and integrity of the waste fill area. For “topsoil”, the City may use fine granular and/or sewage sludge or composted material and for “subsoil” the City may use granular fill and/or gravel from quarry area. While the topsoil layer should be constructed as soon as possible, it is not necessary to place it immediately after the subsoil layer has been constructed. The purpose of the “cap” is to prevent erosion of the landfill and maintain the integrity of the site.

Generally accepted best practices have been employed for the decommissioning requirements, and the following final cover design is recommended:

- "Topsoil" of fine granular or compost material of 200 mm over subsoil;
- "Subsoil" of 350 mm over barrier layer;
- Barrier layer that is constructed by compacting soils or gravel to a thickness of not less than 600 mm measured perpendicular to the compacted waste surface.
- Contoured such that no water pools on the disposal area; and
- Final cover material graded to achieve a minimum slope of 3% and not to exceed 30%.

A combined estimate of 16,146 m^3 of in place material for the barrier, subsoil and topsoil layer will required to cover the landfill site.

Alternative final cover systems, such as gravel, biosolids, and compost or high density polyethylene (HDPE) may be used due to unavailability of soils in the area. However, HDPE is likely too expensive to be used as cover. If biosolids are used for the purpose of topsoil it is anticipated that the City will require approximately 3 m^3 per day of biosolids or compost or a combination of biosolids and compost to be collected and stored for the period of 2014 to 2015 in order to provide the required amount of topsoil. However, if fine granular is substituted or combined with the material then less biosolids and/or compost will be required.

4.4 Drainage Restoration

The site was developed with surface water management infrastructure. The existing drainage systems include off-site and on-site surface water diversion ditches, on-site drainage pond and off-site retention pond. This drainage system can be seen in Figure 1.1, Appendix A.

Runoff and run-on surface water would be re-directed away from the cap via drainage ditching around the waste disposal area. The runoff drainage ditching will drain in a northern direction, and be further directed towards the off-site retention pond. Run-off collected in the retention pond will be tested and if found to be within acceptable parameters, can be discharged directly to the environment. If the water does not meet acceptable criteria it will be treated as required.

To maintain the integrity of the cover system, the entire fill area will be incorporated into a single cover design which will direct water toward the outer edges and off of the surface, allowing no accumulation on the surface. This translates into incorporating some undisturbed ground area into the footprint of the cover design in order to create smooth contours.

4.5 Re-vegetation

Following the completion of grading operations and the placement of final cover materials, vegetation of the surface will be required in order to prevent erosion of materials and also to integrate the area with the surrounding landscape. Vegetation of the cap should include native tundra species to ensure uptake and longevity of the plants.

A seed mix approved by the City will be selected, comprised of native species and low maintenance grasses to better acclimatize the vegetation to the natural environment and reduce the need for replacement over time.

4.6 Subsidence Remediation

The final cover design objectives include creating and maintaining positive drainage across the fill area. Areas where waste has subsided will be re-graded as part of the final cover installation.

Due to the high elevation of the landfill cell and low compaction, it is expected that future subsidence will occur. Inspection of the final cover for signs of subsidence, erosion or other damage will be performed annually by landfill operators. Should these inspections detect subsidence that interferes with the intended drainage of the site, maintenance will be performed to restore positive drainage while maintaining the final cover design over the site.

5. Post-Closure Plan

5.1 Overview

Best practise standards for decommissioned landfills suggest that, a post-closure plan should operate for a period no less than 25 years. Typically, the post-closure care period should continue until the following circumstances occur:

- Leachate quality performance standards are met at the points of compliance; and/or
- The leachate constituents are lower than the groundwater performance standard criteria concentrations.

During the post-closure care period, the City is responsible to complete the following activities:

- Protecting and maintaining the integrity of the final cover system;
- Providing repairs to the final cover system as necessary to correct settlement, subsidence, erosion, leachate break-out; and
- Monitoring surface water quality and taking corrective action where necessary.

During the post-closure care period the landfill operator should inspect the final cover system at least once per year, and complete an annual report that includes a record of:

- Annual surface water monitoring;
- Maintenance and repairs completed; and
- Any remedial or corrective action taken.

5.2 Post-Closure Care Activities

Post-closure care activities include the following:

- Final Cover Maintenance:
  - Monitoring final cover integrity
  - Prevention of erosion of cover soils
  - Maintenance of vegetation
  - Filling of low areas resulting from settlement or subsidence of the landfill
- Surface Water Monitoring:
  - Annual surface water monitoring
- Monitoring Records:
  - The post-closure care plan includes a program for maintaining records of surface water monitoring, site inspections, maintenance and repairs, and remedial actions.

Table 5.1 below summarizes the post-closure care activities and potential issues and solutions.

Table 5.1 - Post-Closure Activities and Potential Issues and Solutions

Item	Activities	Possible Issues	Response Actions
Final Cover Maintenance	• Monitoring final cover integrity (min 1 time per year) • Maintenance of vegetation (seed, cut, fertilize) as required	• Erosion of final cover • Ponding of water after precipitation in settlement areas	• Replace top and subsoil, vegetate, and apply erosion control product such as mulch and/or erosion matting • Fill settled areas with topsoil, grade to drain. and vegetate
Surface Water Monitoring	• Conduct water sampling program as required by the City's Water License.	• Exceed regulatory requirements	Follow groundwater monitoring plan response which may include: • Resample and confirm • Increase monitoring frequency • Expand monitoring program • Identify potential risks/risk analysis • Investigate possible causes and mitigate
Leachate Management	• Monitor waste fill area for seeps or stains	• Surface springs of leachate	• Prevent drainage to surface water ditches • Investigate cause and design and implement appropriate remediation measures • Fill and grade settlement areas • Maintain final cover vegetation where possible • Increase frequency of site inspections until resolved

For purposes of closure, it is assumed that the entire cleared area will require capping.

6. Implementation Schedule and Cost Estimate

6.1 Closure Schedule

The closure schedule is contingent on the timing for the development of the City's new waste management facility and the waste filling option(s) selected by the City. The closure of the landfill may be initiated as early as 2015, but is subject to confirmation by additional surveying of the area.

Following closure, the landfill must be covered and seeded (it will take a couple of years to become vegetated) within the subsequent summer period. Upon completion of the closure, post-closure care will commence directly following and a closure report will be submitted to the Nunavut Water Board and Nunavut Department of Environment as required.

6.2 Post-Closure Schedule

Post-Closure monitoring will be required for a minimum of 25 years and shall include annual, surface water monitoring and management, and inspections of the final cover. Environmental remediation or cover repair activities shall be scheduled as necessary following detection of groundwater impacts or damage to the landfill cap.

6.3 Closure Cost Estimates

Closure costs for the landfill consist of the capital costs required to grade the existing site to meet minimum slope guidelines and construct the necessary final cap, installation of monitoring wells and re-vegetation. The total cost to carry out the closure plan is approximately $894,000, in 2011 dollars excluding GST.

A representation of the cost structure has been included within Table B.5, Appendix B. The cover material cost is based on a unit cost per square metre. It has been assumed that a 600 mm barrier layer, 350 mm of "substrate", and 200 mm of "topsoil" will be used to cap the existing landfill, based on standard best practice.

6.4 Post-Closure Cost Estimates

It is estimated that annual cost of the post-closure is approximately $65,000 (in 2011) and total post-closure cost for 25 years is approximately $2,820,466 (with 3% annual inflation).

A representation of the cost structure (annual and total costs) has been included within Table B.6, Appendix B.

Appendix A

Figure and Drawings

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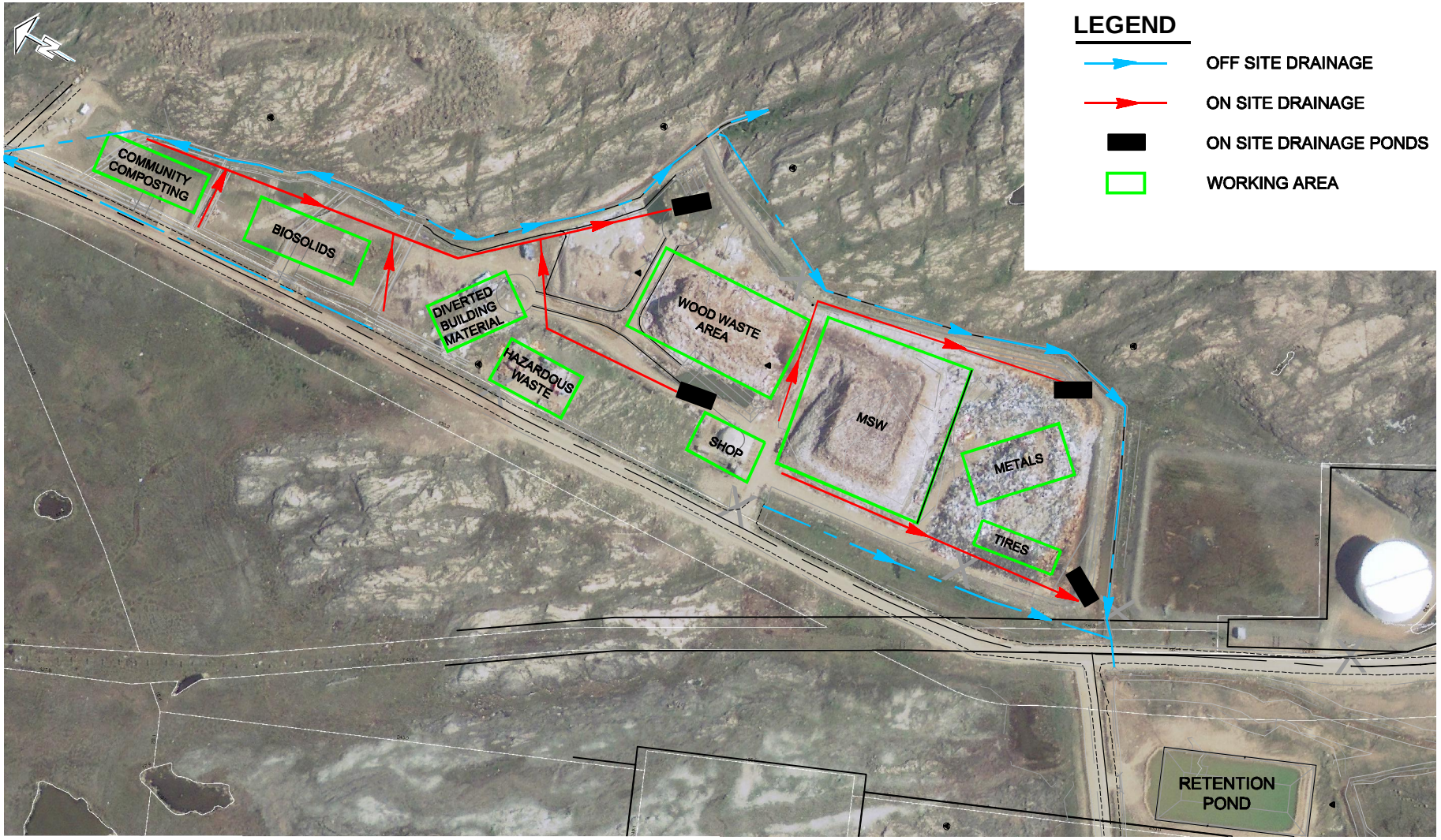

NOTES

1. FOUR ON SITE PONDS ARE EMPTIED BY PUMPING TO RETENTION POND; RETENTION POND IS CONTROLLED BI ANNUAL DISCHARGE AFTER LAB TESTING AND REGULATORY REVIEW.
2. COMMUNITY COMPOSTING IS AN AREA SET ASIDE FOR A FUTURE COMMUNITY PROGRAM.
3. BIOSOLID MANAGEMENT INCLUDES FREEZE THAW DE-WATERING AND COMPOSTING.

AECOM

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City of Iqaluit
Iqaluit SWMP 2011

Landfill Decommissioning Plan
Existing Condition Plan
Figure - 1.1

City of Iqaluit
Iqaluit SWMP 2011

Landfill Decommisioning Plan

LIST OF PROJECT DRAWINGS

Issued for Report

Issue Date: **11-07-14**

AECOM

Set No.: _____

PROJECT NUMBER	DRAWING NUMBER	ISSUE/REVISION
60196419	00-C-0000	A

SURVEY CONTROL POINTS			
STATION	NORTHING	EASTING	ELEVATION
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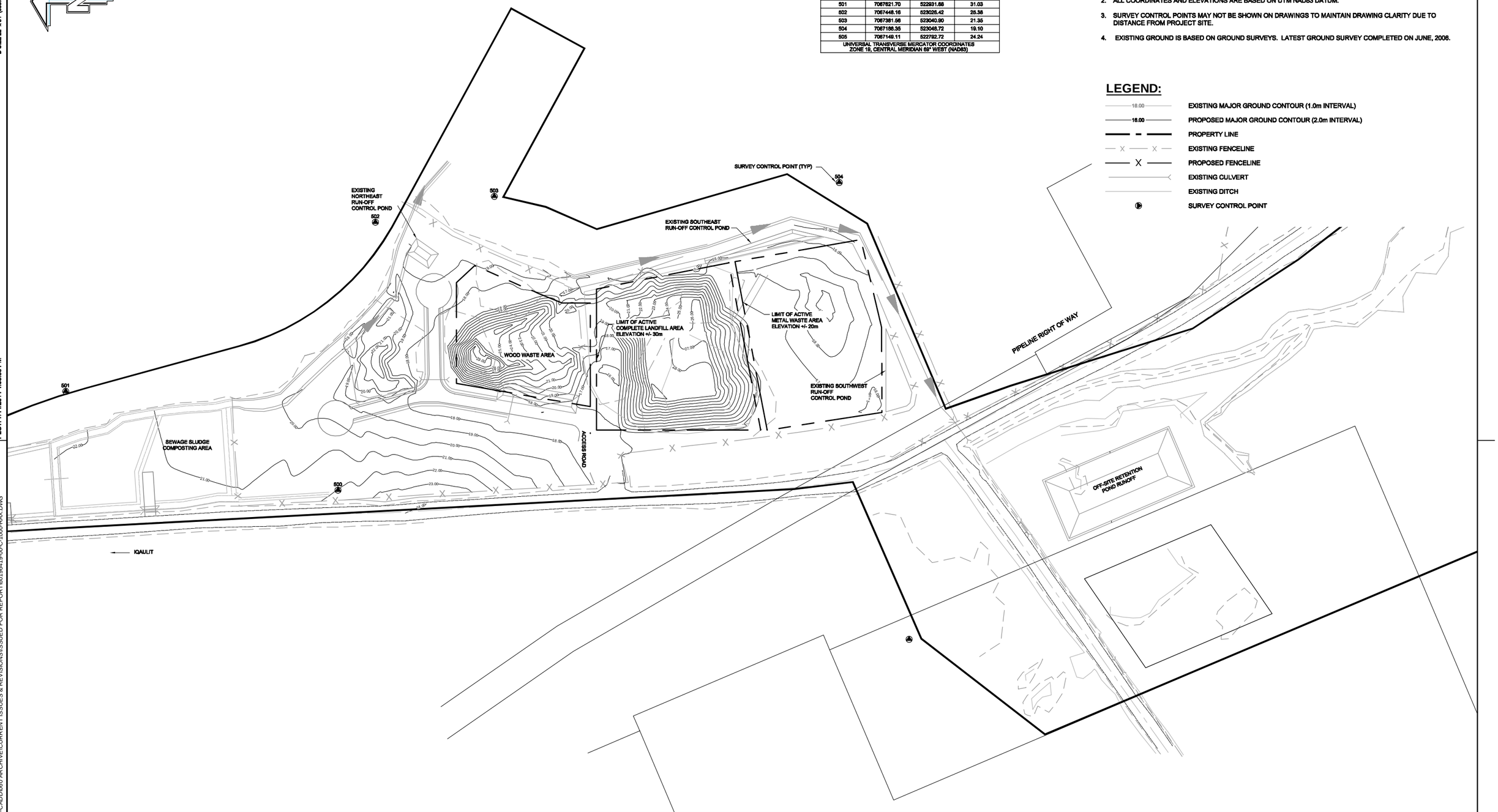
501	7067621.70	522931.68	31.03
502	7067448.16	523026.42	26.38
503	7067381.56	523040.90	21.35
504	7067188.35	523048.72	19.10
505	7067149.11	522792.72	24.24
UNIVERSAL TRANSVERSE MERCATOR COORDINATES ZONE 18, CENTRAL MERIDIAN 69° WEST (NAD83)			

GENERAL NOTES:

1. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
2. ALL COORDINATES AND ELEVATIONS ARE BASED ON UTM NAD83 DATUM.
3. SURVEY CONTROL POINTS MAY NOT BE SHOWN ON DRAWINGS TO MAINTAIN DRAWING CLARITY DUE TO DISTANCE FROM PROJECT SITE.
4. EXISTING GROUND IS BASED ON GROUND SURVEYS. LATEST GROUND SURVEY COMPLETED ON JUNE, 2006.

LEGEND:

- EXISTING MAJOR GROUND CONTOUR (1.0m INTERVAL)
- PROPOSED MAJOR GROUND CONTOUR (2.0m INTERVAL)
- PROPERTY LINE
- EXISTING FENCELINE
- PROPOSED FENCELINE
- EXISTING CULVERT
- EXISTING DITCH
- SURVEY CONTROL POINT



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PROFESSIONAL SEALS

I/R	YY/MM/DD	ISSUE/REVISION DESCRIPTION	DRN	CHK	DES	ENG	IDR	APP
A	11/07/14	Issued for Report	KHN		SR	SR		

AECOM

City of Iqaluit
Iqaluit SWMP 2011
Landfill Decommissioning Plan

Existing Conditions Plan

PROJECT NUMBER	DRAWING NUMBER	ISSUE/REVISION
60196419	00-C-1000	A

GENERAL NOTES:

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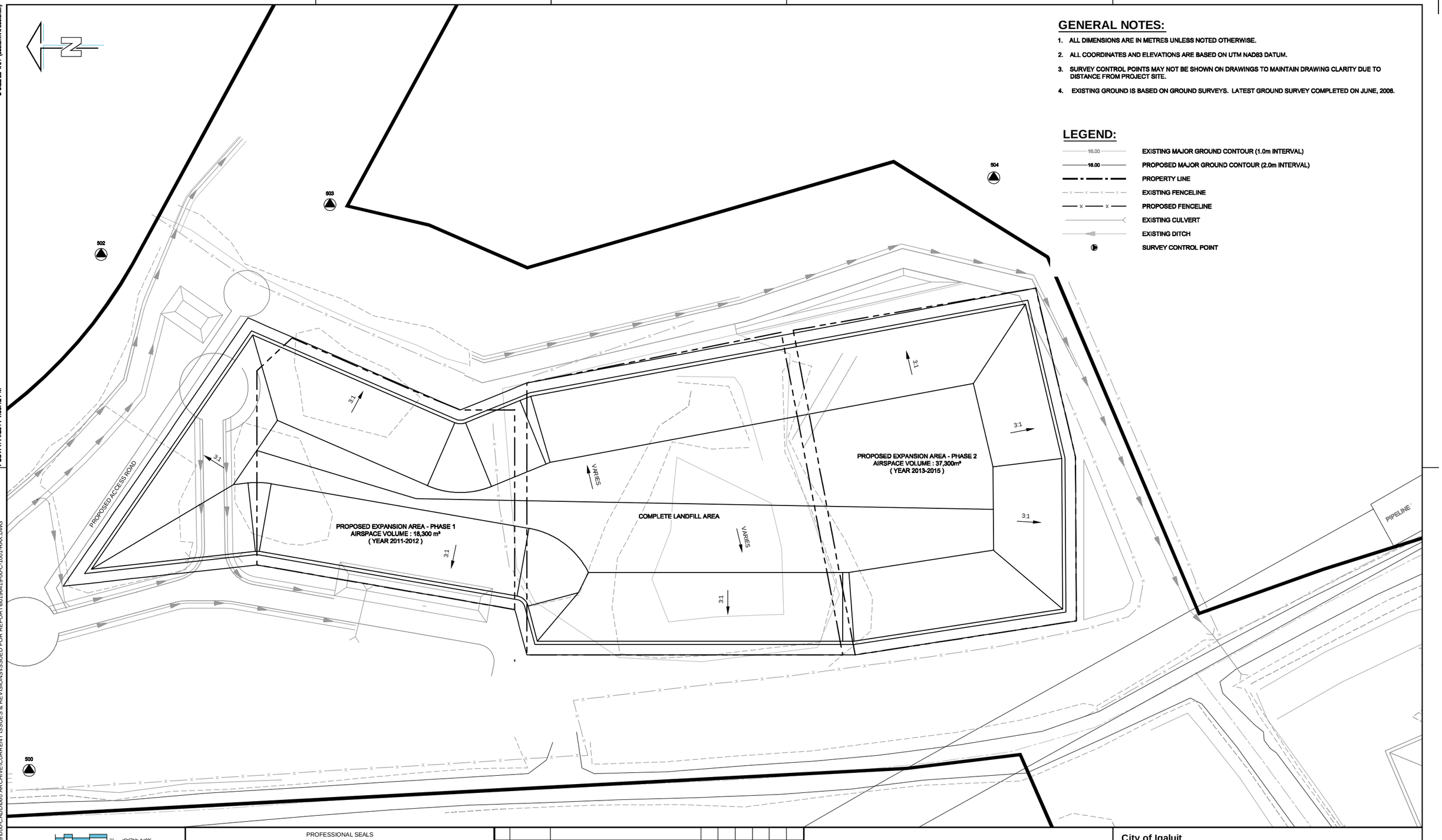
LEGEND:

- 16.00 — EXISTING MAJOR GROUND CONTOUR (1.0m INTERVAL)
- 16.00 — PROPOSED MAJOR GROUND CONTOUR (2.0m INTERVAL)
- PROPERTY LINE
- EXISTING FENCELINE
- PROPOSED FENCELINE
- EXISTING CULVERT
- EXISTING DITCH
- SURVEY CONTROL POINT



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PROFESSIONAL SEALS

I/R	YY/MM/DD	ISSUE/REVISION DESCRIPTION	DRN	CHK	DES	ENG	IDR	APP
A	11/07/14	Issued for Report	KHN		SR	SR		

AECOM

City of Iqaluit
Iqaluit SWMP 2011
Landfill Decommissioning Plan

Proposed Site Modification

PROJECT NUMBER	DRAWING NUMBER	ISSUE/REVISION
60196419	00-C-1001	A

GENERAL NOTES:

1. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
2. ALL COORDINATES AND ELEVATIONS ARE BASED ON UTM NAD83 DATUM.
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4. EXISTING GROUND IS BASED ON GROUND SURVEYS. LATEST GROUND SURVEY COMPLETED ON JUNE, 2006.

LEGEND:

- EXISTING MAJOR GROUND CONTOUR (1.0m INTERVAL)
- PROPOSED MAJOR GROUND CONTOUR (2.0m INTERVAL)
- PROPERTY LINE
- EXISTING FENCELINE
- PROPOSED FENCELINE
- EXISTING CULVERT
- EXISTING DITCH
- SURVEY CONTROL POINT

PROPOSED PUMP PAD

PROPOSED EXPANSION AREA - PHASE 1
AIRSPACE VOLUME : 18,300 m³
(YEAR 2011-2012)

PROPOSED EXPANSION AREA - PHASE 2
AIRSPACE VOLUME : 37,300m³
(YEAR 2013-2015)

COMPLETE LANDFILL AREA

PROPOSED ACCESS ROAD

A 00-C-1003
B 00-C-1003
C 00-C-1003
D 00-C-1003

500 501 502 503 504

0 5 10 15

PROFESSIONAL SEALS

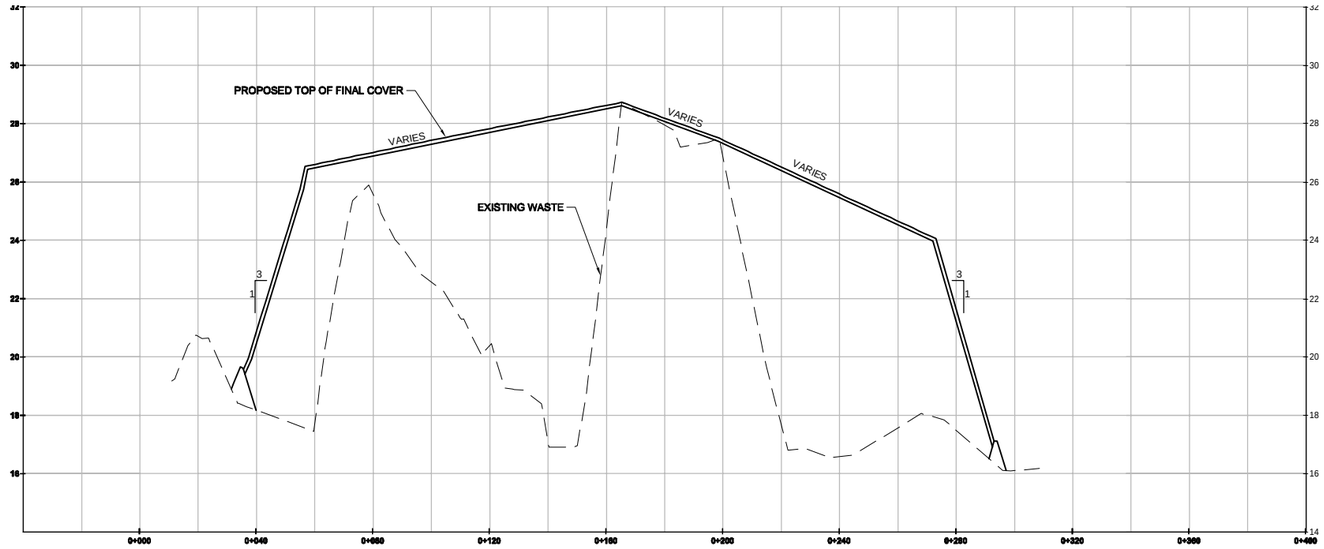
I/R	YY/MM/DD	ISSUE/REVISION DESCRIPTION	DRN	CHK	DES	ENG	IDR	APP
A	11/07/14	Issued for Report	KHN		SR	SR		

AECOM

City of Iqaluit
Iqaluit SWMP 2011
Landfill Decommissioning Plan

Proposed Final Contour

PROJECT NUMBER	DRAWING NUMBER	ISSUE/REVISION
60196419	00-C-1002	A



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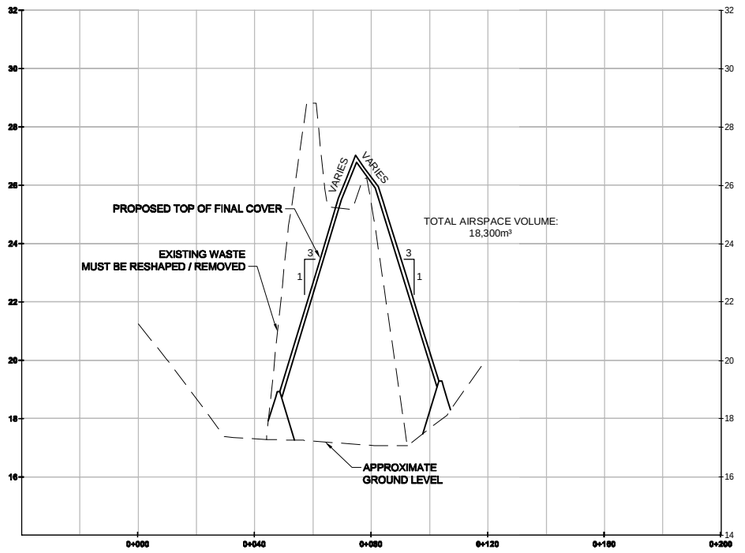

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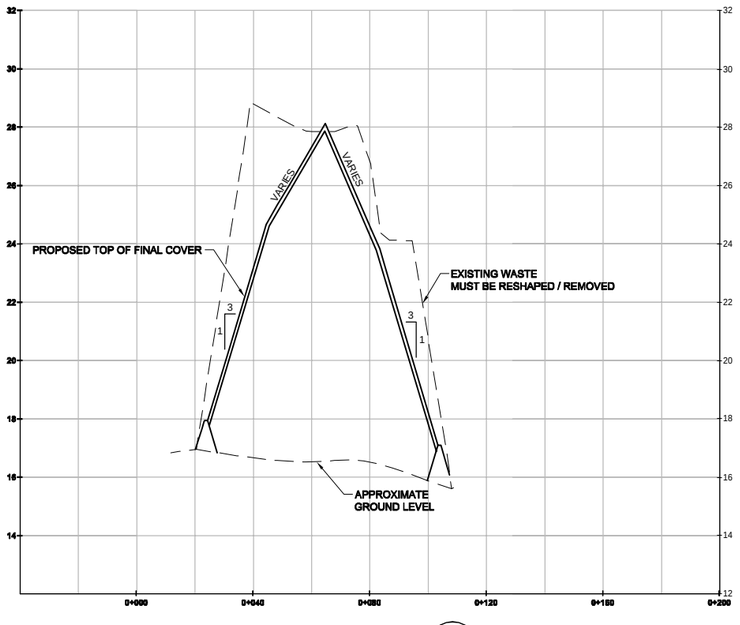

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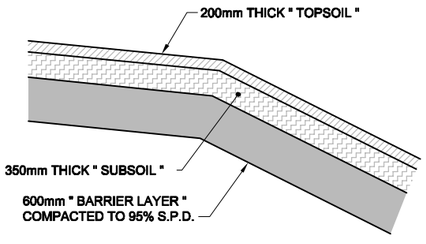


TYPICAL FINAL COVER DETAIL

SCALE: NTS

PROFESSIONAL SEALS

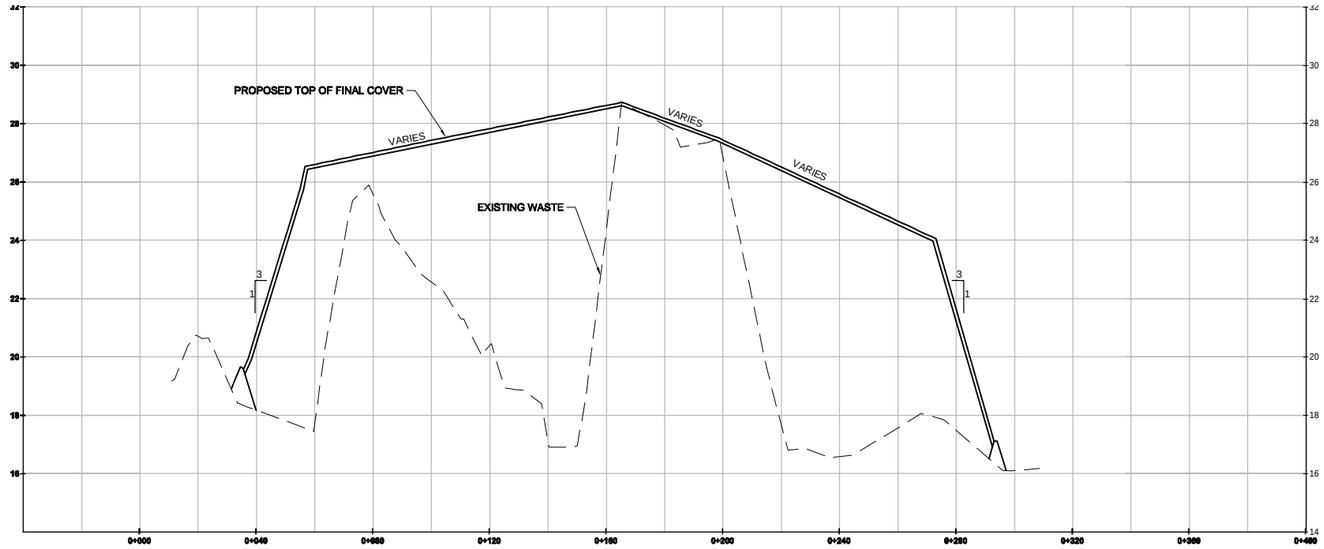
I/R	YY/MM/DD	ISSUE/REVISION DESCRIPTION	DRN	CHK	DES	ENG	IDR	APP
A	11/07/14	Issued for Report	KHN		SR	SR		

AECOM

City of Iqaluit
Iqaluit SWMP 2011
Landfill Decommissioning Plan

Cross Sections and Detail

PROJECT NUMBER	DRAWING NUMBER	ISSUE/REVISION
60196419	00-C-1003	A



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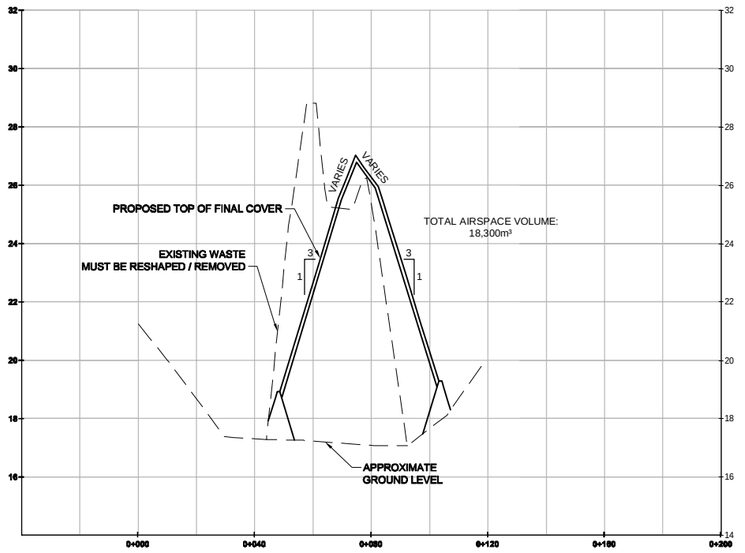

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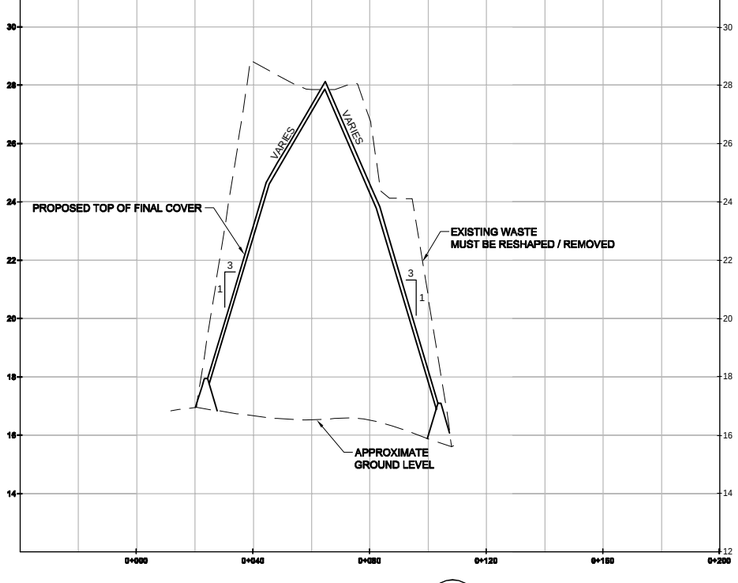

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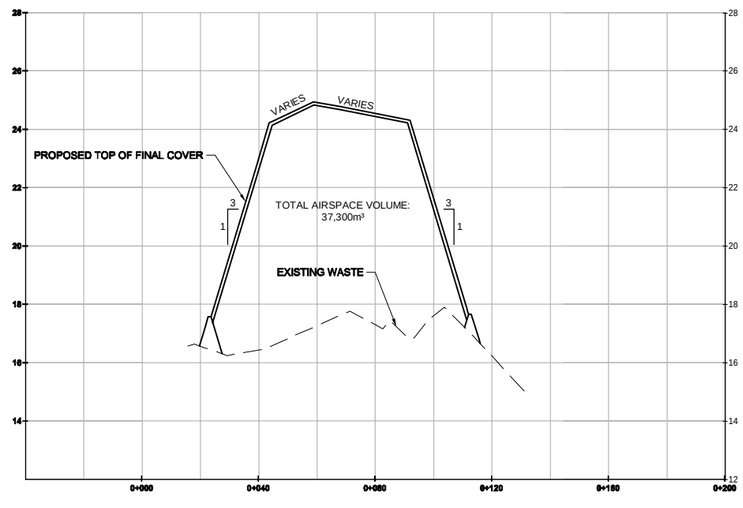

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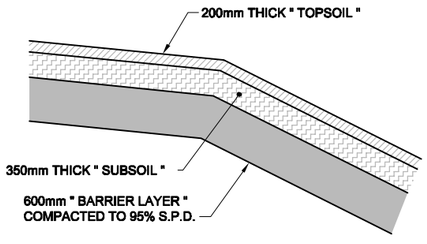


TYPICAL FINAL COVER DETAIL
SCALE: NTS

PROFESSIONAL SEALS

I/R	YY/MM/DD	ISSUE/REVISION DESCRIPTION	DRN	CHK	DES	ENG	IDR	APP
A	11/07/14	Issued for Report	KHN		SR	SR		

AECOM

City of Iqaluit
Iqaluit SWMP 2011
Landfill Decommissioning Plan

Cross Sections and Detail

PROJECT NUMBER	DRAWING NUMBER	ISSUE/REVISION
60196419	00-C-1003	A

Appendix B

Design Calculations and Cost Estimate

Table B.1 - Population and Waste Projections

Year	Population	Waste Generated (m^3)[b]	Accumulated Waste (m^3)	Waste Generated (tonnes)[c]	Accumulated Waste (tonnes)
2006[a]	**6,520**	71,394		7,139	
2007[a]	**6,802**	74,482		7,448	
2008	6,997	76,620		7,662	
2009[a]	7,198	78,818		7,882	
2010[a]	7,405	81,085		8,108	
2011[a]	**7,618**	**83,412**	**83,412**	**8,341**	**8,341**
2012	7,836	85,806	169,218	8,581	16,922
2013	8,061	88,268	257,486	8,827	25,749
2014	8,292	90,802	348,288	9,080	34,829
2015[a]	**8,532**	**93,425**	**441,713**	**9,343**	**44,171**
2016	8,777	96,107	96,107	9,611	9,611
2017	9,029	98,865	194,972	9,886	19,497
2018	9,288	101,702	296,674	10,170	29,667
2019	9,554	104,621	401,295	10,462	40,130
2020[a]	**9,830**	**107,639**	**508,934**	**10,764**	**50,893**
2021	10,112	110,728	619,662	11,073	61,966
2022	10,402	113,906	733,567	11,391	73,357
2023	10,701	117,175	850,742	11,717	85,074
2024	11,008	120,538	971,279	12,054	97,128
2025[a]	**11,326**	**124,020**	**1,095,299**	**12,402**	**109,530**
2026	11,651	127,579	1,222,878	12,758	122,288
2027	11,985	131,241	1,354,119	13,124	135,412
2028	12,329	135,007	1,489,126	13,501	148,913
2029	12,683	138,882	1,628,008	13,888	162,801
2030[a]	**13,050**	**142,898**	**1,770,905**	**14,290**	**177,091**
2031	13,425	146,999	1,917,904	14,700	191,790
2032	13,810	151,218	2,069,122	15,122	206,912
2033	14,206	155,557	2,224,679	15,556	222,468
2034	14,614	160,022	2,384,701	16,002	238,470
2035	**15,033**	**164,615**	**2,549,316**	**16,461**	**254,932**
2036	15,465	169,339	2,718,655	16,934	271,865

a Calculation based on available airspace for accepted waste, determined by design

[a] Source : City of Iqaluit General Plan By Law 703, October 2010. Table 1 - Medium Projection, page 16.

[a] Average annual rate of 2.87% was used to estimate the population (General Plan By Law 703)

[b] Assumed waste generation rate is 0.03 m^3/person/day or 1,095 m^3/person/year

[c] Density of uncompacted waste is 100 kg/m^3

Table B.2 - Estimate of Total Air Space Required

Year	Design of waste disposal		Waste disposal volume (density of 700 kg/m^3)		Soil cover volume required (waste to soil cover ratio12:1)		Total air space required		Total air space required	
	Yearly	Accumulated	Yearly	Accumulated	Yearly	Accumulated	Yearly	Accumulated	Yearly	Accumulated
	tonnes	tonnes	m^3	m^3	m^3	m^3	m^3	m^3	Tonnes	Tonnes
2011	8,341	8,341	11,916	11,916	993	993	12,909	12,909	9,036	9,036
2012	8,581	16,922	12,258	24,174	1,021	2,014	13,279	26,188	9,296	18,332
2013	8,827	25,749	12,610	36,784	1,051	3,065	13,661	39,849	9,562	27,894
2014	9,080	34,829	12,972	49,755	1,081	4,146	14,053	53,902	9,837	37,731
2015	9,343	44,171	13,346	63,102	1,112	5,258	14,459	68,360	10,121	47,852
2016[a]	**9,611**	**9,611**	**13,730**	**13,730**	**1,144**	**1,144**	**14,874**	**14,874**	**10,412**	**10,412**
2017	9,886	19,497	14,124	27,853	1,177	2,321	15,301	30,174	10,710	21,122
2018	10,170	29,667	14,529	42,382	1,211	3,532	15,740	45,914	11,018	32,140
2019	10,462	40,130	14,946	57,328	1,245	4,777	16,191	62,105	11,334	43,474
2020	10,764	50,893	15,377	72,705	1,281	6,059	16,658	78,764	11,661	55,134
2021	11,073	61,966	15,818	88,523	1,318	7,377	17,136	95,900	11,996	67,130
2022	11,391	73,357	16,272	104,795	1,356	8,733	17,628	113,528	12,340	79,470
2023	11,717	85,074	16,739	121,535	1,395	10,128	18,134	131,662	12,694	92,164
2024	12,054	97,128	17,220	138,754	1,435	11,563	18,655	150,317	13,058	105,222
2025	12,402	109,530	17,717	156,471	1,476	13,039	19,194	169,511	13,435	118,657
2026	12,758	122,288	18,226	174,697	1,519	14,558	19,744	189,255	13,821	132,478
2027	13,124	135,412	18,749	193,446	1,562	16,120	20,311	209,566	14,218	146,696
2028	13,501	148,913	19,287	212,732	1,607	17,728	20,894	230,460	14,626	161,322
2029	13,888	162,801	19,840	232,573	1,653	19,381	21,494	251,954	15,046	176,368
2030	14,290	177,091	20,414	252,986	1,701	21,082	22,115	274,069	15,481	191,848
2031	14,700	191,790	21,000	273,986	1,750	22,832	22,750	296,818	15,925	207,773
2032	15,122	206,912	21,603	295,589	1,800	24,632	23,403	320,221	16,382	224,155
2033	15,556	222,468	22,222	317,811	1,852	26,484	24,074	344,296	16,852	241,007
2034	16,002	238,470	22,860	340,672	1,905	28,389	24,765	369,061	17,336	258,343
2035	16,461	254,932	23,516	364,188	1,960	30,349	25,476	394,537	17,833	276,176
2036	16,934	271,865	24,191	388,379	2,016	32,365	26,207	420,744	18,345	294,521

[a] New landfill is expected to be constructed in 2015. Thus, waste generated in 2016 will be disposed at the new landfill.

Table B.3 - Area Required

Description	Quantity	Quantity	Unit
Total waste generation 2016 to 2036 (20 years)	2,718,655		m^3
Total waste generation until 2036 with the density of 100 kg/m^3	271,865		tonnes
Airspace requirement until 2036 with a density of 400 and 700 kg/m^3		**Density**	
for future landfill	700	400	kg/m^3
Total airspace for requirement for accepted waste	388,379	679,664	m^3
Total "soil" requirement for cover material (waste to soil ratio of 12:1)	32,365	56,639	m^3
Total airspace for the future landfill (in m^3)	420,744	736,302	m^3
Total airspace for the future landfill (in tonnes)	294,521	294,521	tonnes
Area requirement for the future landfill with average height of 15 m			
Determined by design; H =	15	15	m
Determined by design; L =	400	500	m
Calculated; W =	220	350	m
Landfill Cell Area =	**88,000**	**175,000**	**m^2**
Additional space for utilities, road, temporary recycle compound, etc. is assumed 30% of the area required			
Additional Area =	**26,400**	**52,500**	**m^2**
Total Area required =	**114,400**	**227,500**	**m^2**
L =	500	500	m
W =	229	455	m
Area requirement determined by design for 20 years lifespan:			
L =	**500**	**500**	**m**
W =	**250**	**500**	**m**
A =	**125,000**	**250,000**	**m^2**

Table B.4 - Construction Sequence and Site Utilization

Year	Waste disposed[a] (tonnes)	Accumulated Waste (tonnes)	Created Airspace Capacity (tonnes)	Accumulated Airspace Capacity (tonnes)	Capacity Remaining at year end[b] (tonnes)	Estimated Airspace Remaining at year end[c] (m^3)	Note
2011	9,036	9,036					Utilized Stage 1
2012	9,296	18,332					Utilized Stage 1
2013	9,562	27,894					Utilized Stage 2
2014	9,837	37,731					Utilized Stage 2
2015	10,121	47,852					Utilized Stage 2 and closed entire West 40 landfill; and Construct New Landfill in New Site
2016	10,412	10,412	294,521	284,109	284,109	405,871	Open and Operate New Landfill
2017	10,710	21,122		284,109	273,399	390,570	
2018	11,018	32,140		273,399	262,381	374,830	
2019	11,334	43,474		262,381	251,047	358,639	
2020	11,661	55,134		251,047	239,386	341,981	
2021	11,996	67,130		239,386	227,391	324,844	
2022	12,340	79,470		227,391	215,051	307,216	
2023	12,694	92,164		215,051	202,357	289,082	
2024	13,058	105,222		202,357	189,299	270,427	
2025	13,435	118,657		189,299	175,864	251,234	
2026	13,821	132,478		175,864	162,042	231,489	
2027	14,218	146,696		162,042	147,825	211,178	
2028	14,626	161,322		147,825	133,199	190,284	
2029	15,046	176,368		133,199	118,153	168,791	
2030	15,481	191,848		118,153	102,673	146,675	
2031	15,925	207,773		102,673	86,748	123,926	
2032	16,382	224,155		86,748	70,366	100,523	
2033	16,852	241,007		70,366	53,514	76,449	
2034	17,336	258,343		53,514	36,178	51,683	
2035	17,833	276,176		36,178	18,345	26,207	
2036	18,345	294,521		18,345	0	(0)	Landfill Closed

[a] Waste to be disposed include soil cover

[b] Calculation based on airspace for accepted waste determined by design

[c] Conversion from metric tonnes to cubic meters using a compacted waste density of 700 kg/m^3

Table B.5 - Estimated Cost of West 40 Landfill Decommissioning Plan

No	Description	Unit	Approx. Quantity	Unit Price	Amount
A	**DECOMMISSIONIONG (CLOSURE) COST**				
1	Reporting: closure and post-closure plan	Lump Sum	1	$50,000	$50,000
2	General Requirements Includes: - Mobilization and demobilization - All other works for construction intent	Lump Sum	1	$200,000	$200,000
3	Surveying	Cash Allowance	1	$50,000	$50,000
4	Final Cover Construction				
a)	Barrier Layer: 600 mm gravel/shales from nearest quary				
	- Not Available onsite	m^2	5,382	$20	$107,640
	- QA/QC	day	30	$1,200	$36,000
b)	Subsoil 350 mm thick mulch: supply and placement	m^2	5,382	$10	$53,820
c)	Topsoil 200 mm thick biosolid: supply, placement and seeding	m^2	5,382	$10	$53,820
5	Monitoring Wells Construction - six wells	Lump Sump	6	$1,000	$6,000
6	Miscellaneous Activities Removal of:				
	- Site Building	Lump Sum	1	$20,000	$20,000
	- Recycle area	Lump Sum	1	$10,000	$10,000
	- Tire, Wood, Metal, and Appliance Piles	Lump Sum	1	$50,000	$50,000
	Sub Total Closure Cost				**$637,280**
	Professional Service (Design and Construction)			**10%**	**$63,728**
	Contingency Plan			**20%**	**$127,456**
	TOTAL CLOSURE COST				**$828,464**
B	**POST-CLOSURE COST**				
1	Annual Groundwater Monitoring include inspection of: - Inspection of Cover, Vegetation, Site Security, and Surface Drainage - Lab Analysis - Reporting	Times/Year	2	$20,000	$40,000
2	Annual Report	Lump Sump	1	$10,000	$10,000
	Sub Total Post Closure Cost				**$50,000**
	Professional Service			**10%**	**$5,000**
	Contingency Plan			**20%**	**$10,000**
	TOTAL POST-CLOSURE COST PER YEAR				**$65,000**

Note:
Assumed inflation rate of 3%.
Calculated in July 14, 2011

Table B6 - Estimated Maintenance Cost for 25 Years Post-Closure

Year	Initial Cost	Years	Annual Cost	Accumulated Cost	Note
2011	$65,000	0	$65,000		
2012		1	$66,950		
2013		2	$68,959		
2014		3	$71,027		
2015		4	$73,158	$73,158	Landfill Closed
2016		5	$75,353	$148,511	
2017		6	$77,613	$226,124	
2018		7	$79,942	$306,066	
2019		8	$82,340	$388,406	
2020		9	$84,810	$473,216	
2021		10	$87,355	$560,571	
2022		11	$89,975	$650,546	
2023		12	$92,674	$743,221	
2024		13	$95,455	$838,675	
2025		14	$98,318	$936,994	
2026		15	$101,268	$1,038,262	
2027		16	$104,306	$1,142,567	
2028		17	$107,435	$1,250,003	
2029		18	$110,658	$1,360,661	
2030		19	$113,978	$1,474,639	
2031		20	$117,397	$1,592,036	
2032		21	$120,919	$1,712,955	
2033		22	$124,547	$1,837,502	
2034		23	$128,283	$1,965,785	
2035		24	$132,132	$2,097,916	
2036		25	$136,096	$2,234,012	
2037		26	$140,178	$2,374,190	
2038		27	$144,384	$2,518,574	
2039		28	$148,715	$2,667,290	
2040		29	$153,177	$2,820,466	

Note:
Assumed inflation rate of 3%.
Calculated in June 20, 2011

Appendix C

Monitoring and Inspection Forms

Closed Landfill Inspection Report

Section 1:

Facility:		
Owner:		
Location:		
Legal Land Description:		
Approximate closure date:	Approximate size	
Inspector:	Inspection date:	
Other people present:		

Section 2 Vegetation:

Type(s) of growth (check all that apply): □ grasses □ herbaceous plants □ moss	Remarks:
Condition of growth: □ Excellent (thick growth) □ Good □ Poor (thin growth, bare soil, mosses)	Remarks:
Invasive plants present? □ Yes □ No	Remarks:
Dead spots present? □ Yes □ No	Remarks:

Section 3 Final Cover Condition:

Is there subsidence (depressions in the cap)? □ Yes □ No	Remarks:
Is there any evidence of water ponding on the cap? □ Yes □ No	Remarks:
Are there colored leachate seeps through the cap? □ Yes □ No	Remarks:
Are there colored leachate seeps at toe slope? □ Yes □ No	Remarks:
Are there signs of burrowing animals? □ Yes □ No	Remarks:
Is there any waste pushing through the cap? □ Yes □ No	Remarks:
Does the cap cover all of the solid waste? □ Yes □ No	Remarks:
Is there evidence of erosion? □ Yes □ No	Remarks:
Is there ATV damage to the cap or vegetation? □ Yes □ No	Remarks:

Section 4 Drainage and Surface Water:

Conditions/Stability of streams/swales/ditches etc. □ Excellent (unobstructed) □ Good □ Poor (overgrown or sediment filled)	Remarks:
Is there evidence of colored leachate in surface waters? □ Yes □ No	Remarks:
Is there surface water monitoring? □ Yes □ No	Remarks:

Section 5 Other Facility Conditions:

Access road condition: □ Excellent □ Good □ Poor	Remarks:
Gates and fences: □ Present □ Not present	Remarks:
Gate and fence condition: □ Excellent □ Good □ Poor	Remarks:

Section 6 Structures:

Are there man made structures on the cover? □ Yes □ No	Remarks

Section 7 General cleanliness of the site:

Is there litter present? □ Yes □ No	Remarks:
Is there evidence of unauthorized dumping? □ Yes □ No	Remarks

Section 8 Maintenance:

Is there an ongoing maintenance program? □ Yes □ No	Remarks:
Comments on the effectiveness:	

Section 9 Other Information:

- Attach a hand drawn site sketch made on plain paper 8 1/2" x 11"
- Attach labeled photographs of landfill conditions and any nearby development
- Describe any corrective actions planned or taken as a result of conditions noted during the inspection (attached additional pages if necessary):

Appendix G: Solid Waste By-Law

THE CORPORATION OF THE CITY OF IQALUIT, NU

BY-LAW No. 709

SOLID WASTE BY-LAW AMENDMENT

BEING a By-law of the Municipal Corporation of the City of Iqaluit in Nunavut to amend By-law #341, being the Solid Waste By-law, and specifically Schedule "C" thereto, in respect to fees charge for Commercial/Government/Institutional and Residential Garbage Collection Rates.

WHEREAS the *Cities, Towns and Villages Act,* R.S.N.W.T., c.8, Sections 85 through 88, 169, 173 and 182 through 187 provide that municipalities may regulate, establish and operate garbage facilities and provide collection, removal and disposal of garbage, provide for the sale or re-use of any waste by-product, levy and collect fees for the garbage services and impose punishment for offences

NOW THEREFORE, the City Council of the Municipal Corporation of the City of Iqaluit, in a regular session duly assembled, enacts as follows:

1. Schedule "C" of By-law No. 635 shall be replaced by Schedule "C" of this bylaw.
2. Schedule "C", Section 1 of By-law No. 341 be amended by deleting:

Commercial

F – 6 days per week (excluding Statutory Holidays)	$200.00 monthly per business unit
G – Bi-Weekly	$100.00 monthly per business unit

Government/Institutional

H – 5 days per week (excluding Statutory Holidays)	$100.00 monthly per business unit

Residential & Non-Profit

$27.50 monthly/unit

And replacing it with:

Commercial/Government/Institutional

Minimum charge (based on daily volume of 0.5 cubic metres or less)

F – 6 days per week (excluding Statutory Holidays)	$300.00
G – Bi-weekly	$200.00

And a $25.00 charge per cubic metre over and above the minimum charge

Residential & Non-Profit

Based on collections twice per week excluding Statutory Holidays

$30.00 monthly/unit

EFFECTIVE DATE

This By-law shall come into effect on the Third and Final Reading.

THIS BY-LAW READ a First Time this 14 day of September, 2010, A.D.

_____
Elisapee Sheutiapik
Mayor

_____
John Hussey
Chief Administrative Officer

THIS BY-LAW READ a Second Time this 14 day of September, 2010 A.D.

_____
Elisapee Sheutiapik
Mayor

_____
John Hussey
Chief Administrative Officer

THIS BY-LAW READ a Third and Final Time this 28 day of September, 2010 A.D.

_____
David Ell
Deputy Mayor

_____
John Mabberi-Mudonyi
A/Chief Administrative Officer

By-law No.

SCHEDULE “C”

All General Commercial Garbage		$50.00/m3
Car/Truck Body		$200.00

IMPORTANT NOTE: Car/truck body and snowmobiles will be considered “unacceptable waste” and will not be accepted at the Municipal Landfill effective July 1, 2006.

Snowmobile		$60.00
Large Appliances (White Goods)		$50.00
Fridge/Freezer/air handling units (includes Freon removal)		$85.00
Bulky items larger than truck body		$50.00/m3
Automotive Battery		$15.00
Oil Tank	(welding cut costs)	$50.00
Tires		$15.00/each
Segregated Salvageable Wood	(handling charge)	$ 5.00
Disposal of Construction Debris		$100.00/m3

THE CORPORATION OF THE CITY OF IQALUIT, NU

BY-LAW # 651

SOLID WASTE BY-LAW AMENDMENT

BEING a By-law of the Municipal Corporation of the City of Iqaluit in Nunavut to amend By-law # 341, being the Solid Waste By-law, and specifically Schedule "C" thereto, in respect to fees charge for Commercial/Government/Institutional Garbage Collection Rates.

WHEREAS the *Cities, Towns and Villages Act,* R.S.N.W.T., c.8, Sections 85 through 88, 169, 173 and 182 through 187 provide that municipalities may regulate, establish and operate garbage facilities and provide collection, removal and disposal of garbage, provide for the sale or re-use of any waste by-product, levy and collect fees for the garbage services and impose punishment for offences

NOW THEREFORE, the City Council of the Municipal Corporation of the City of Iqaluit, in a regular session duly assembled, enacts as follows:

THAT Schedule "C", Section 1 of By-law # 341 be amended by deleting:

Commercial/Government/Institutional

F	5 days per week (excluding Statutory Holidays)	$100 /M/BU
G	Bi-weekly	$ 60 /M/BU
H	No pick up	$0.00

And replacing it with:

Commercial

F – 6 days per week (excluding Statutory Holidays)	$200.00 monthly per business unit
G – Bi-Weekly	$100.00 monthly per business unit

Government/Institutional

H – 5 days per week (excluding Statutory Holidays)	$100.00 monthly per business unit

EFFECTIVE DATE

This By-law shall come into effect on the Third and Final Reading.

THIS BY-LAW READ a First Time this 27th day of February, 2007 A.D.

_____
Elisapee Sheutiapik
Mayor

_____
John Hussey
A/Chief Administrative Officer

THIS BY-LAW READ a Second Time this 27th day of February, 2007 A.D.

_____
Elisapee Sheutiapik
Mayor

_____
John Hussey
A/Chief Administrative Officer

THIS BY-LAW READ a Third and Final Time this 13th day of March, 2007 A.D.

_____
Elisapee Sheutiapik
Mayor

_____
Michele Bertol
A/Chief Administrative Officer

THE CORPORATION OF THE CITY OF IQALUIT, NU

BY-LAW # 635

SOLID WASTE BY-LAW AMENDMENT

BEING a By-law of the Municipal Corporation of the City of Iqaluit in Nunavut to amend Schedule "C" of By-law # 341, being the Solid Waste By-law;

WHEREAS pursuant to the provisions of the Cities, Towns and Villages Act, R.S.N.W.T. 1988, c. C-8, as amended by S.Nu. 2003, c.2 s. 85 (1) (d) provide for the establishment and operation of a system for the collection, removal and disposal of garbage;

NOW THEREFORE, the City Council of the Municipal Corporation of the City of Iqaluit, in a regular session duly assembled, enacts as follows:

1. Schedule "C" of the Solid Waste By-law # 341 is hereby amended by Schedule "C" of this By-law.

2. The Municipal Landfill hours shall be from Tuesday to Saturday – 8:00 AM to 5:00 PM (Closed Noon to 1:00 PM)

3. The Municipal Landfill shall be closed to the Public on Sunday, Monday and any Statutory Holiday.

4. By-law # 378 is hereby repealed.

EFFECTIVE DATE

This By-law shall come into effect on the Third and Final Reading.

THIS BY-LAW READ a First Time this 23rd day of May, 2006

_____
Elisapee Sheutiapik
Mayor

_____
A/Chief Administrative Officer

THIS BY-LAW READ a Second Time this 23rd day of May, 2006

_____
Elisapee Sheutiapik
Mayor

_____
A/Chief Administrative Officer

THIS BY-LAW READ a Third and Final Time this ____ day of _____, 2006

_____
Elisapee Sheutiapik
Mayor

_____
A/Chief Administrative Officer

BY-LAW # 635

SCHEDULE "C"

	Fee Amount
Up to ½ tonne pick-up truck (if above includes salvageable wood not segregated $25/load surcharge)	$25 per load
Over ½ tonne pick-up truck (if above includes salvageable wood not segregated $35/load surcharge)	$50 per load
Over 1.5 tonne truck up to 2 tonnes	$100 per load
Car/truck body	$200

Important Note:
Car/truck body and snowmobiles will be considered "unacceptable waste" and will not be accepted at the Municipal Landfill, Effective July 1, 2006.

Snowmobile	$60
Large Appliances (White Goods)	$50
Fridge/freezer/air handling units (Includes Freon removal)	$85
Bulky Items larger than truck body 15m3	$250 per item up to
Bulky Items over 15m3	$50m3
Automotive Battery	$15
Oil Tank costs)	$50 (welding cut
Tires	$15 each
Segregated Salvageable Wood	$5 (handling charge)
Disposal of Construction Debris	$100 per cubic meter

THE CORPORATION OF THE CITY OF IQALUIT, NU

BY-LAW #544

AMENDMENT TO SOLID WASTE BY-LAW

A By-law of the City of Iqaluit, a municipal corporation in Nunavut to waive municipal service charges for collection of waste, pursuant to the provisions of the Cities, Towns and Villages Act, R.S.N.W.T. 1988, c. C-8, s.65(1) and 85 (1)(d)

A by-law is necessary to waive municipal service charges for collection of waste due to non-collection during the labour dispute f5om April 17 to July 31, 2001 as it was not included in the Essential Service Agreement.

NOW THEREFORE, the Council fo the City of Iqaluit in a session duly assembled, enacts as follows:

1. For a period of April 17, 2001 to July 31, 2001, only that Council waive municipal services collection charges for Residential, Commercial, Government and Industrial waste.

This By-law amends By-law 341 for a period of April 17, 2001 to July 31, 2001.

THIS BY-LAW READ A FIRST TIME this__14___day of__August____, 2001. A.D.

_____
MAYOR

_____
CHIEF ADMINISTRATIVE OFFICER

THIS BY-LAW READ A SECOND TIME this__14___day of__August____, 2001. A.D.

_____
MAYOR

_____
CHIEF ADMINISTRATIVE OFFICER

THIS BY-LAW READ A THIRD AND FINAL TIME this_28_day_ August_, 2001.A.D.

_____
MAYOR

_____
CHIEF ADMINISTRATIVE OFFICER

BY-LAW 341 - SOLID WASTE BY-LAW

INDEX

THE CORPORATION OF THE TOWN OF IQALUIT, N.W.T.

BY-LAW 341

BEING A BY-LAW of the incorporated Town of Iqaluit in the Northwest Territories to provide for the regulation, collection and disposal of solid waste.

WHEREAS the Cities, Towns and Villages Act, R.S.N.W.T., 1988,c.C-8, Sections 85 through 88, 169, 173 and 182 through 187 provides that Municipalities may; regulate, establish and operate garbage facilities, provide for the collection, removal and disposal of garbage, provide for sale or reuse of any waste by-product, levi and collect fees for garbage services and impose punishment for offenses.

NOW, THEREFORE PURSUANT to the provisions of the Cities, Towns and Villages Act, and notwithstanding any by-laws, sections thereof, resolutions or prior enactments,

THE COUNCIL OF THE TOWN OF IQALUIT, in regular session duly assembled, enacts as follows:

PART I, INTERPRETATION

101. Short Title

This by-law may be cited as the **Solid Waste By-Law.**

102. Severability

If any provision of this by-law is declared invalid because of any word, phrase, clause, sentence, paragraph or section of this By-Law or any documents which form part of this By-Law or an application thereof to any person or circumstance is declared invalid, the remaining provisions shall not be affected thereby but shall remain in force.

103. Definitions

In this by-law, unless the content otherwise requires;

"at cost"	means the posted equipment and manpower rates of the Town, as adjusted from time to time, and any administrative overhead costs plus 15%.

"authorized contractor"	means a contractor, authorized by By-Law, to perform solid waste services, on behalf of the Town of Iqaluit in accordance with specified terms, conditions and fees.
"bulky waste"	means waste which will not normally fit into a garbage box.
"combustible waste"	means waste suitable for burning that can be readily burned without appreciably endangering operations or the environment.
"commercial"	means a single premise used for the purpose of carrying on a business for profit and represented by the owner(s) and/or tenant(s).
"commercial/government/industrial hazardous waste"	means solid waste generated by commercial, government or industrial organizations which could be flammable, toxic, corrosive, explosive, or otherwise has the potential for endangering municipal operations, the community or the surrounding environment.
"construction debris"	means unwanted, useless, abandoned, discarded or rejected goods or materials of every kind that are normally generated on a construction site but, excluding sewage and/or commercial, government and industrial hazardous waste.
"Council"	means the Council of the Town of Iqaluit.
"covered"	means secured in such a fashion that wind, animals or birds cannot scatter.
"covered conveyance"	means a vehicle used to transport solid waste to the waste facility where the waste is contained so that it cannot fall out, be blown out or otherwise scattered.
"garbage"	means the same as "solid waste".

"garbage room/building"	means a locked room or building, as per any specifications relating to this by-law, used exclusively for the temporary holding of garbage in readiness for scheduled collection.
"government"	means a single premise used for the purpose of government and represented by senior official(s) and/or elected representative(s).
"honey bag"	means bagged raw sewage.
"household hazardous waste"	means solid wastes generated only in residential domiciles which are flammable, toxic, corrosive, explosive, or otherwise has the potential for endangering municipal operations, the community or the environment.
"household waste"	means solid waste normally generated in or from residential domiciles but, excluding hazardous waste.
"industrial"	means a single premise used for manufacturing and represented by the owner(s) and/or tenant(s).
"land fill"	means a duly licensed site used for the disposal of municipal type solid waste.
"littering"	means disposing of garbage in any area other than prescribed by this by-law.
"Manager"	means the Senior Administrative Officer of the Town of Iqaluit or their designate.
"municipal type solid waste"	means garbage which can be hand placed in garbage truck but, does not include sewage or hazardous waste.
"residential"	means a single domicile represented by the owner(s) or tenant(s). This also includes "not for profit" premises.

"segregate"	means the separation of solid waste into combustible, salvageable, recyclable, bulky, metal or hazardous waste.
"solid waste"	means unwanted, useless, abandoned, discarded or rejected goods or materials of every kind but, excluding sewage and/or commercial, government and industrial hazardous waste.
"solid waste facility"	refers to the Town operated modified sanitary land fill, which is clearly marked with signs, which is located in the West 40 between an old abandoned waste site and fuel tank #22. The site is referred to as site #3 in the Town Waste Management Plan.
"Town"	means the Town of Iqaluit or its duly authorized contractor(s).
"waste container"	means a covered garbage box, locked garbage room or house and dumpsters as specified in any specifications relating to this by-law.
"waste generator"	means one who produces waste of any nature which relates to and is under the control of this by-law.

PART II, GENERAL PROVISIONS

201. Authority to Provide Municipal Services

No person or contractor, except those authorized by By-Law, shall directly or indirectly engage in the provision of municipal solid waste services within the Town.

202. Authority and Duties of the Manager

(1) The Manager is authorized and directed to;

(a) supervise, control and administer the provisions and regulations and to do all things necessary to fulfil their responsibilities and duties under this by-law;

(b) control all contracting, construction, operation, maintenance and regulatory compliance related to the provision of solid waste services;

(c) perform all acts that may be necessary for the efficient management, operation and protection of the municipality;

(d) enter upon private property for the purpose of this by-law; and

(e) levy tariffs, fines and penalties as well as take any other legal actions necessary to enforce this by-law.

(2) The Manager may prescribe;

(a) orders,

(b) specifications for

(i) waste containers
(ii) segregation of waste
(iii) and other specifications,

(c) waste collection days, and

(d) hours of operation and service.

(3) The Manager may prescribe forms for;

(a) application for service,

(b) termination of service,

(c) receipt of service,

(d) charges for service,

(e) description, volume and type of waste,

(f) violations,

(g) any other forms and information sheets necessary to carry out the provisions of this by-law.

203. Financing and Accounting

(1) All costs for the provision of solid waste services shall be financed through tariffs, service charges, fees, (as per Schedule "C") loans, and grants, subsidies or other funding provided to the Town by the Government of the Northwest Territories and/or others.

(2) All monies collected for solid waste services shall only be used to provide waste services to customers including administration, operation, maintenance, training, extension, repair, capital improvements and regulatory compliance.

(3) All monies collected for the provision of solid waste services shall be separately accounted for and disbursed by action of the Council.

(4) Bills for tariffs, service charges, fees and all other penalties and/or charges levied under this by-law are due and payable not later than thirty (30) days after the date of mailing.

(5) Overdue accounts shall have interest charged at the same rates that are charged for overdue taxes as established by the prevailing Town Taxation By-Law.

204. Service Area

(1) The Town shall provide municipal type solid waste collection services to premises within the built up areas of the Town.

(2) Collection of municipal type solid waste outside the service area will only be provided at cost and when such services will not impede the provision of this service within the designated service area.

205. Description of Service

(1) The Town shall collect municipal type solid waste, within the service area, from residences, commercial establishments, industrial establishments and government locations on a scheduled basis.

(2) The Town shall operate and maintain a solid waste facility, known as the Town Land Fill, for municipal type waste, household hazardous waste and bulky waste, which is located at site 3 in the West 40. All solid waste, with the exception of raw sewage and/or commercial, government and industrial generated hazardous waste, shall be disposed of at the Town Land Fill.

(3) Notwithstanding subsections (1) and (2), when in the opinion of the manager, or regulatory agencies, the environment or public health and safety are seriously impaired, the manager may;

(a) restrict or terminate municipal type solid waste collection,

(b) restrict or terminate operation of the solid waste facility.

(4) The Town shall make every reasonable effort to provide safe, continuous and efficient solid waste services; nevertheless, the Town shall not be liable for damages, including business losses,

(a) caused by restriction or termination of municipal type solid waste collection,

(b) caused by restriction or termination of operation of the solid waste facility,

(c) caused through noncompliance with specifications,

(d) caused by impeded access to waste containers,

(e) caused by the interference or cessation of solid waste services in connection with the repair, expansion, replacement, or proper operation and maintenance of the solid waste collection system or solid waste disposal facility,

(f) caused by the interference or cessation of service due to adverse weather conditions, road conditions or vehicle mechanical problems,

(g) caused by improper segregation of waste,

(h) generally for any accident due to the operation of the municipal system, unless such action has been shown to be directly due to the negligence of the Town or its employees,

(i) caused by the interference or cessation of service due to any contravention of this by-law.

(5) The Town shall conduct a mass participation annual spring clean-up of litter and unsightly bulky waste.

(6) The Town shall conduct a household hazardous waste round up four (4) times per year.

(7) The Town shall not collect, transport, handle, store nor dispose of commercial, government or industrial generated hazardous waste.

(8) Collection, transportation, handling, storage and disposal of commercial, government or industrial generated hazardous waste is the sole responsibility of the generator and must be done in accordance with all applicable legislation.

(9) Stockpiling of any commercial, government or industrial generated hazardous waste must not be left to accumulate, within Town boundaries, for over four (4) years.

(10) No-one shall indiscriminately dispose of hazardous waste.

(11) The Town shall not collect, handle nor dispose of honey bags.

(12) Anyone who litters must clean up their litter immediately upon notification by the manager and/or be liable to a fine as specified in schedule "A".

(13) Should a building or structure have been damaged by fire or other means, the owner must, within one hundred and twenty (120) days, apply to the Town for the necessary permits to restore, repair, or demolish the structure or the building may be deemed to be construction debris under the terms of this by-law.

206. Authority to Restrict Service

(1) The Manager may, without notice, cease or restrict service to any customer or part of Town should he decide that an emergency makes such action necessary.

(2) The Manager may, in a non-emergency situation, including adverse weather conditions, scheduled repairs, or alteration of the collection or disposal system, restrict service to any customer or part of the Town, provided that the Manager shall, when it is practical to do so, provide public notice of such intended cessation or restriction of service to all affected customers.

(3) The Manager may discontinue service for any of the following reasons;

(a) failure to establish service,

(b) fraud in establishing service,

(c) non-payment of charges or fees levied pursuant to this by-law,

(d) failure to provide a deposit, if required,

(e) failure to provide unimpeded access; or

(f) contravention of any other section of this by-law.

(4) When service is discontinued, neither the Town nor its employees or any municipal officials shall be liable for any costs or damages resulting from the discontinuance of service.

(5) Where this by-law authorises service to be discontinued, the Manager shall, when it is practical to do so, give notice prior to service being discontinued. Such notice shall indicate the infraction, remedy, and the date that service will be discontinued unless remedy is made. When service is discontinued, service shall not be reinstated until such time as there is no longer a contravention of this by-law or any outstanding service charges and fees, and a specified reinstatement service fee is paid to the Town.

207. Notification

(1) Notice from the Town to a customer or owner for bills due, contravention of any provisions of this by-law, or for any other reasons, shall be in writing to the last known address.

(2) Notice to the Town shall be made in writing to the Municipal Office, except that notice of complaint may be made by telephone or in person.

208. Effective Date

(1) This by-law shall come into effect April 1, 1995 and shall remain in effect until it is repealed.

PART III, ESTABLISHMENT AND TERMINATION OF SERVICE

301. To Establish Waste Collection Service

(1) Subject to subsection (2), every person requiring establishment of service, shall submit to the Manager an application for service form and the appropriate fees specified in Schedule C.

(2) Where premises are occupied by a tenant or lessee, the Manager may require that the application for service be submitted by the owner of the premises.

(3) Where a premise has multiple occupancies the application for service shall be submitted, along with detailed drawings and specifications for waste containment, by the owner of the premise.

(4) An application for service must allow a minimum of five (5) working days prior to date when service is expected.

(5) An application for service will not be required for units which were already obtaining service at the effective date of this by-law.

302. Content of Application for Waste Collection Service

The application for service shall include such particulars as the following;

(a) location of the premise,

(b) date applicant will be ready for service,

(c) type of waste storage erected or intended for erection,

(d) whether the premise had been previously serviced,

(e) name and mailing address to which notices and bills are to be sent,

(f) whether the applicant is owner or tenant of, or agent for the premises,

(g) category of customer and applicable rate,

(h) agreement to abide by and accept all the provisions of this by-law,

(i) any other fees or service charges,

(j) detailed drawings and specifications for garbage rooms or buildings, and

(h) any other information in such detail and form the Manager deems appropriate.

303. Deposit

As a condition of providing services the Manager may require a deposit from the applicant provided that;

(a) the amount of the deposit shall be determined by the Manager based on the expected service charge for a ninety (90) day period,

(b) the deposit shall be refunded after it has been held for a twelve consecutive month period during which all bills for service have been paid within the time allowed,

(c) the deposit, less the amount of any unpaid balance due to the Town, shall be refunded upon discontinuance of service, and

(d) interest of six (6) percent per year will be paid on any deposit.

304. Application to Terminate Service

(1) In order to terminate service, the customer shall submit to the Manager a written request stating the date the applicant desires to terminate service and any other information and in such form as may be prescribed by the Manager.

(2) All applications for termination of service must allow a minimum of five (5) working days prior to the date termination of service is required.

(3) The Town may continue to levy service charges in accordance with this by-law until services are terminated.

PART IV, RESPONSIBILITIES OF THE WASTE GENERATOR

401. Residential Waste

(1) Every residential generator of municipal type waste shall maintain, in good condition, sufficient covered or enclosed waste containers as per Town specifications.

(2) All waste placed in a waste container must first be placed in a garbage bag.

(3) All waste containers shall be kept within the property boundaries of the lot or parcel of land on which the serviced premises are located and be positioned adjacent to the public roadway.

(4) Every waste generator shall maintain, at his own expense, unimpeded access to their waste containers, including the removal of ice, snow, mud, vehicles, pets and yard materials and, the sanding of icy patches.

(5) Any person having garbage upon their premise or lands shall dispose of it in the manner prescribed by the Manager.

(6) No person shall dispose of hot ashes, burning matter or loose waste in any waste container.

(7) No person shall dispose of any explosive, inflammable, dangerous or hazardous waste in any waste container or any other place without the express authority of the Manager who shall designate the manner and place it shall be disposed of.

(8) Household hazardous waste shall be stored by the residential waste generator until the Town holds a "Household Hazardous Waste Round-up" when these wastes shall be brought to an area prescribed by the Manager for disposal.

(9) Subject to subsections (15) and (16) of this section, no person shall burn any waste of any nature within the boundaries of the Town. This excludes barbecues or cooking fires.

(10) Any construction or building material being used or stored on private property must be stored on the said property, in a neat and orderly fashion or it may be defined as construction debris under the terms of this by-law.

(11) Subject to subsection (12) of this section, all debris on a construction or work site must be segregated and placed in covered containers, on a daily basis, then hauled in a covered conveyance to the Town Land Fill site.

(12) Where a waste container is not available, all debris on a construction or demolition site shall be segregated, hauled in a covered conveyance and disposed of at the Town Land Fill site on a daily basis.

(13) Notwithstanding section 205. subsection (5) and (6), and subsections (8), (10), (11) and (12) of this section, no person other than the Town or its authorized contractor shall directly or indirectly remove and/or dispose of any residential waste within the boundaries of the Town.

(14) Bulky wastes, generated by residential generators, must be segregated, removed and disposed of at the Town Landfill.

(15) The Town may carry out controlled burning of waste for volume reduction and/or training.

(16) The Fire Department may grant permission for the supervised burning of bon-fires on special occasions.

(17) All premises which utilize a garbage room or building shall ensure that all waste is stored in secured and segregated waste containers.

(18) Conditions of the operations and maintenance manual for the Town Land Fill site and directions of the Waste Facility Operator are to be strictly observed by all residential users.

402. Commercial/Government/Industrial Waste

(1) Every commercial, government or industrial generator of municipal type waste shall maintain, in good condition, sufficient covered or enclosed waste containers as per Town specifications.

(2) All waste placed in a waste container must first be segregated then placed in garbage bags or baled.

(3) All waste containers shall be kept within the property boundaries of the lot or parcel of land on which the serviced premises are located and be positioned adjacent to the public roadway.

(4) Every commercial, government or industrial waste generator shall maintain, at his own expense, unimpeded access to their waste containers, including the removal of ice, snow, mud, vehicles, pets and yard materials and, the sanding of icy patches.

(5) Any commercial, government or industrial establishment having litter or unsightly garbage upon their premise or lands shall dispose of it in the manner prescribed by the Manager.

(6) No commercial, government or industrial establishment shall dispose of hot ashes, burning matter or loose waste in any waste container.

(7) Subject to subsection (8) and (9) of this section, no commercial, government or industrial establishment shall dispose of any explosive, inflammable, dangerous or hazardous waste in any waste container or any other place without the express authority of the Manager who shall designate the manner and place it shall be disposed of.

(8) Collection, transportation, handling, storage and disposal of commercially, governmentally or industrially generated hazardous waste is the sole responsibility of the generator and must be done in accordance with all applicable legislation.

(9) Stockpiling of any commercially, governmentally or industrially generated hazardous waste must not be left to accumulate, within Town boundaries, for over four (4) years.

(10) Subject to subsections (17) and (18) of this section, no commercial, government or industrial establishment shall burn any waste of any nature within the boundaries of the Town. This excludes barbecues or cooking fires.

(11) Any construction or building material being used or stored on private property must be stored on the said property, in a neat and orderly fashion or it may be defined as construction debris under the terms of this by-law.

(12) Subject to subsection (8) and (13) of this section, all construction debris on a construction or work site must be segregated and placed in covered containers, on a daily basis, then hauled in a covered conveyance to the Town Land Fill site.

(13) Subject to subsection (8) of this section, where a waste container is not available, all debris on a construction or demolition site shall be segregated, hauled in a covered conveyance and disposed of at the Town Land Fill site on a daily basis.

(14) Commercial establishments shall segregate, remove and dispose of all bulky wastes, generated by them, at the Town land fill.

(15) The Town may dispose of construction debris and/or bulky wastes if it has not been properly disposed of within twenty four (24) hours of notification to do so, and the premise owner charged "at cost" for work performed by or on behalf of the Town.

(16) Notwithstanding section 205. subsection (5) and (6), and subsections (7), (8), (12), (13) and (14) of this section, no person other than the Town or its authorized contractor shall directly or indirectly remove and/or dispose of any commercial, government or industrial municipal type waste within the boundaries of the Town.

(17) The Town may carry out controlled burning of waste for volume reduction and/or training.

(18) The Fire Department may grant permission for the supervised burning of bon-fires on special occasions.

(19) All premises which utilize a garbage room or building shall ensure that all waste is stored in secured and segregated waste containers.

(20) Conditions of the operations and maintenance manual for the Town Land Fill site and directions of the Waste Facility Operator are to be strictly observed by all commercial, government or industrial users.

PART V, ENFORCEMENT

501. Penalty Provisions

(1) A By-law Officer employed by the Town is authorized to issue a violation Ticket to any person who the By-law Officer has reasonable and probable grounds to believe and has contravened any provision in this By-law.

(2) Any person who contravenes any provision of the By-law is guilty of an offence and is liable on summary conviction to a fine as set out in Schedule "A" of this By-law.

(3) Any Commercial Business, Government or Industry who contravenes any provision of the By-law is guilty of an offence and is liable on summary conviction to a fine as set out in Schedule "B" of this By-law.

(4) Every person who contravenes any of the provisions of this By-law is guilty of an offence, punishable on summary conviction and is liable to a fine of not less than One Hundred ($100.00) Dollars or more than Two Thousand ($2,000.00) Dollars and in default of fine imposed, a period of imprisonment not exceeding six (6) months.

(5) Every Commercial Business, Government or Industry who contravenes any of the provisions of this By-law is guilty of an offence, punishable on summary conviction and is liable to a fine of not less than One Thousand ($1000.00) Dollars or more than Ten Thousand ($10,000.00) Dollars and in default of fine imposed, a period of imprisonment not exceeding six (6) months.

(6) A By-law Officer who has reasonable and probable grounds to believe that a person, business, government or industry is violating or has violated any provision of this By-law may give such person written notice of intention to prosecute in the form of a ticket as defined in the Summary Convictions Act and amendments thereto, setting forth the date, and place of the offence; briefly stating the nature of the offence ; stating that payment may be made under section __V__ of this By-law.

(7) A person, business, government or industry who has received a ticket pursuant to section __V__ in respect of an alleged offence under this By-law may after receipt of such ticket in lieu of prosecution under this By-law, pay to the Town such penalty as is set out in the appropriate Schedule "A" or "B" attached hereto and which forms part of this By-law.

PART VI, REPEAL

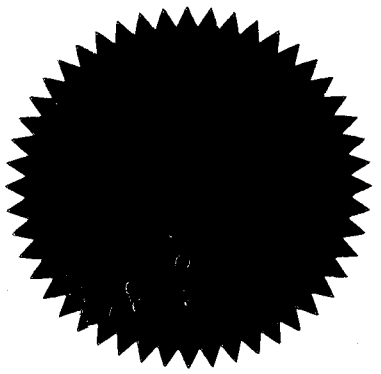
601. Repeal

(1) On the effective date this by-law repeals by-laws 169 and 333.

THIS BY-LAW NUMBER 341 IS READ A FIRST TIME this 13 day of March, 1995 A.D. by the Council of the Town of Iqaluit, N.W.T.

THIS BY-LAW NUMBER 341 IS READ A SECOND TIME this 13 day of March, 1995 A.D. by the Council of the Town of Iqaluit, N.W.T.

THIS BY-LAW NUMBER 341 IS READ A THIRD AND FINAL TIME this 27th day of March, 1995 A.D. by the Council of the Town of Iqaluit, N.W.T.



MAYOR

SENIOR ADMINISTRATIVE OFFICER

SCHEDULE "A" OF BY-LAW 341

FINES FOR INDIVIDUALS

Sections		Amount
205(4)10	indiscriminate disposal of hazardous waste	$500.00
205(12)	littering	$500.00
401(1)	failing to provide a waste container	$100.00
401(2)	failing to place garbage in proper container	$100.00
401(5)	failing to dispose as directed	$250.00
401(6)	placing burning items in waste container	$500.00
401(7)	placing hazardous waste in unsuitable container	$500.00
401(9)	burning waste within town boundaries without permission of Fire department	$500.00
401(10)	storing garbage on property in untidy manner	$200.00
401(11)	unsegregated garbage	$500.00
401(11)	uncontained construction debris	$500.00
401(12)	hauling waste in uncovered conveyance	$500.00
401(17)	unsecured waste storage container	$200.00
401(18)	non-observation of directions	$300.00

SCHEDULE "B" OF BY-LAW 341

FINES FOR CORPORATIONS

Sections		AMOUNT
205(4)10	indiscriminate disposal of hazardous waste	$10,000.00
205(12)	littering	$ 5,000.00
402(1)	failing to provide a waste container	$ 1,000.00
402(2)	failing to properly put garbage in container	$ 1,000.00
402(5)	failing to dispose as directed	$ 2,500.00
402(6)	placing burning items in waste container	$ 2,500.00
402(7)	unsuitable hazardous waste storage	$10,000.00
402(8)	improper hazardous waste procedures	$10,000.00
402(9)	stockpiling hazardous waste for over 4 yrs.	$10,000.00
402(10)	burning waste within town boundaries without permission of Fire department	$ 5,000.00
402(11)	storing garbage on property in untidy manner	$ 2,000.00
402(12)	unsegregated garbage uncontained construction debris	$ 3,000.00 $ 5,000.00
402(12) & (13)	hauling garbage in uncovered conveyance	$ 5,000.00
402(19)	unsecured or segregated waste storage	$ 2,500.00
402(20)	non-observation of directions	$ 3,000.00

SCHEDULE "C" OF BY-LAW 341

TARIFFS AND FEES

(1) Subject to subsection II, the rates payable by customers for collection and disposal of municipal type solid waste are as follows:

CATEGORY OF CUSTOMER;

Residential and Non-Profit;
(based on collections twice per week excluding Statutory Holidays)

1.	- single and duplex units (separate storage) (under 35 cubic feet)	$27.50/M/U
2.	- triplex to six-plex units (separate storage) (under 35 cubic feet)	$27.50/M/U
3.	- triplex to six-plex units (combined storage) (35 cubic feet up to 200 cubic feet)	$25.00/M/U
4.	- Larger than six-plex (separate storage) (under 35 cubic feet)	$27.50/M/U
5.	- larger than six-plex (combined storage) (200 cubic feet and over)	$22.50/M/U

Commercial;
(based on five collections per week excluding Statutory Holidays)

6.	- single business (separate storage of 35 cubic ft. or under)	$60.00/M/B
7.	- single business (separate storage of over 35 cubic ft. and under 200 cubic ft.)	$75.00/M/B
8.	- single business (200 cubic ft. & over)	$100.00/M/B
9.	- multiple businesses (combined storage of under 200 cubic ft.)	$70.00/M/B
10.	- multiple businesses (combined storage of 200 cubic ft. & over)	$65.00/M/B

Government/Industrial;
(based on five collections per week excluding Statutory Holidays)

11.	- separate storage of 35 cubic ft. or under	$60.00/M/U
12.	- separate storage of over 35 cubic ft. and under 200 cubic ft.	$75.00/M/U
13.	- separate storage of 200 cubic ft. & over	$100.00/M/U

SCHEDULE "C" By-Law 341 continued

(2)	Unscheduled garbage collection fee/collection	$125.00
(3)	Application for service fee	$ 15.00
(4)	Reinstatement of service fee	$ 15.00
(5)	Tipping fees at Town Land Fill;	
	- up to 1/2 ton pick-up truck	$ 5.00/load
	- over 1/2 ton to 1 ton pick-up truck	$10.00/load
	- over 1 ton to 15 ton truck	$25.00/load
	- over 15 ton truck	$35.00/load
	- car body	$10.00/car
	- pick-up truck body	$15.00/truck
	- bulky items larger than pu truck body	$25.00/item
	- designated contractor fee	$150.00/load
(6)	Wood salvage	$1.00/cubic ft.
(7)	Other miscellaneous salvage	Nominal fee to be determined
(8)	Recyclable materials	Market value at time of sale
(9)	Late payment fee	Interest will be charged at the same rate as that charged for overdue taxes as established by the prevailing Town Taxation By-Law.
(10)	Disposal of construction debris or bulky waste	"at cost"

NOTE; **M = month**
B = business
U = unit (single)

Appendix H: Iqaluit Water License

P.O. Box 119
Gjoa Haven, NU X0B 1J0 ᓄᓇᕗᑦ ᐃᒪᓕᕆᔨᒃᑯᑦ ᑲᑎᒪᔨᖏᑦ
Tel: (867) 360-6338 NUNAVUT WATER BOARD
Fax: (867) 360-6369 NUNAVUT IMALIRIYIN KATIMAYINGI

May 15, 2006 File No: 3AM-IQA0611

By Courier, Email and Regular Mail

Honourable Jim Prentice
Minister
Indian and Northern Affairs Canada
Ottawa ON K1A 0H0

Subject: License No. 3AM-IQA0611

Dear Mr. Prentice,

Please find enclosed Licence 3AM-IQA0611 duly issued by the Nunavut Water Board (NWB). Reasons for Decision are also attached for your information. As per Section 56(1) of the Nunavut Waters and Nunavut Surface Rights Tribunal Act, the issuance of this Licence is subject to your approval.

Please contact me should you have any questions regarding this licence.

Sincerely,

Lootie Toomasie
Chair

Attachment: Reasons for Decision

c.c. City of Iqaluit
Distribution List - Qikiqtani
NWB Public Registry

NUNAVUT WATER BOARD WATER LICENCE

Pursuant to the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* and the *Agreement Between the Inuit of the Nunavut Settlement Area and Her Majesty the Queen in right of Canada*, the Nunavut Water Board, hereinafter referred to as the Board, hereby grants to

City of Iqaluit
(Licensee)

P.O. Box 460
Iqaluit, NU X0A 0H0
(Mailing Address)

hereinafter called the Licensee, the right to alter, divert or otherwise use water or dispose of waste for a period subject to restrictions and conditions contained within this Licence:

Licence Number/Type:	3AM-IQA0611 TYPE "A"
Water Management Area:	NUNAVUT 05
Location:	NUNAVUT
Classification of Undertaking:	MUNICIPAL UNDERTAKING
Description:	WATER USE AND WASTE DISPOSAL
Quantity of Water not to be Exceeded:	1,100,000 CUBIC METRES ANNUALLY
Date of Issuance of Licence:	MAY 15, 2006
Expiry of Licence:	MAY 15, 2011

This License issued and recorded at Gjoa Haven, Nunavut includes and is subject to the annexed conditions.

Lootie Toomasie
Chairman

APPROVED BY: **Minister of Indian and Northern Affairs Canada**

EFFECTIVE DATE OF LICENCE:

PART A: SCOPE, DEFINITIONS AND ENFORCEMENT

1. Scope

a. This Licence entitles the City of Iqaluit (the "Licensee"), to use water and dispose of waste associated for municipal undertakings as summarized below.

The Licensee may conduct activities at the City of Iqaluit, Nunavut, (63°45' N, 68°31' W) including:

Water Use

i. Use, management and protection of the Lake Geraldine drainage basin;
ii. Raising of the Lake Geraldine dam by 2.0 m to meet over-winter storage capacity;
iii. Extension of the two berms adjacent to the Lake Geraldine dam and construction of a new berm to the south of the Lake Geraldine dam;

Solid Waste Management

iv. Landfill expansion into the northern adjacent site in the West 40 Landfill site;
v. Management and protection of waters surrounding the West 40 Landfill site;
vi. Management, collection, and monitoring of leachate from the West 40 Landfill site and adjacent Sludge Management Facility;
vii. Improved drainage works at the West 40 Landfill site;
viii. Management and operation of current and future solid waste facilities;
ix. Closure and restoration of current landfills and waste disposal sites;

Wastewater Management

x. Upgrading, maintenance, operation and monitoring of the Sewage Lagoon;
xi. Construction, operation, maintenance and monitoring of a Wastewater Treatment Plant;
xii. Construction, operation, maintenance, and monitoring of a Sludge Management Facility;
xiii. Closure and restoration of the Sewage Lagoon; and
xiv. Contingency measures for wastewater and landfill management.

b. This Licence is issued subject to the conditions contained herein with respect to the taking of water and the depositing of waste of any type in any waters or in any place under any conditions where such waste or any other waste that results from the deposits of such waste may enter any waters. Whenever new Regulations are made or existing Regulations are amended by the Governor in Council under the *Nunavut Waters and Nunavut Surface Rights Tribunal Act*, or other statutes imposing more stringent conditions relating to the quantity or type of waste that may be so deposited or under which any such waste may be so deposited, this Licence shall be deemed to be subject to such requirements.

c. Compliance with the terms and conditions of this Licence does not absolve the Licensee from responsibility for compliance with all applicable legislation, guidelines and directives.

2. Definitions

Please refer to Schedule A

3. Enforcement

a. Failure to comply with this Licence will be a violation of the *Act*, subjecting the Licensee to the enforcement measures and the penalties provided for in the *Act*;

b. All inspection and enforcement services regarding this Licence will be provided by Inspectors appointed under the *Act*;

c. For the purpose of enforcing this Licence and with respect to the use of water and deposit or discharge of waste by the Licensee, Inspectors appointed under the *Act*, hold all powers, privileges and protections that are conferred upon them by the *Act* or by other applicable law; and

d. The Inspector shall undertake the following:
    i. Sixty 60 days following receipt of the Licensees Annual report submitted in accordance with Part B, Item 1, the Inspector shall submit to the Board an annual report which will include, among other things:
        1. Compliance with all conditions of this Licence;
        2. Monitoring as identified in Schedule C;
        3. Emergency discharges authorized in accordance with Part E, Item 18 and 19;
        4. Unauthorized discharges report and notification received in accordance with Part H, Item 5 (c); and
        5. Any additional details the Inspector deems relevant in accordance with Part A, Item 3(c).

PART B: GENERAL CONDITIONS

1. The Licensee shall file an Annual Report with the Board no later than March 31 for the year following the calendar year being reported. The Annual Report shall be developed in accordance with Schedule B.

2. The Licensee shall keep a copy of this Licence at City Hall, the Water Supply Facility and Waste Disposal Facilities at all times.

3. The Licensee shall file an application for Licence renewal one (1) year prior to the expiry of this Licence. In addition to the application, the Licensee shall include:

a. Complete water balance for Lake Geraldine prepared by an Engineer; and
b. Assessment of recharge needs for long term water demands.

4. Any communication with respect to this Licence shall be made in writing and shall reference the Licence number and the specific term and condition, to the attention of:

Manager of Licensing
Nunavut Water Board
P. O. Box 119
Gjoa Haven, NU X0B 1J0
Telephone: (867) 360-6338
Fax: (867) 360-6369
Email: licensing@nwb.nunavut.ca

5. Any notice made to an Inspector shall be made in writing to the attention of:

Water Resources Officer
Nunavut District Office
Indian and Northern Affairs Canada
P.O. Box 100
Iqaluit, NU X0A 0H0
Telephone: (867) 975-4298
Fax: (867) 979-6445

6. The Licensee shall submit one (1) electronic and one (1) signed paper copy of all reports, studies, and plans to the Board unless otherwise requested by the Board. Reports or studies submitted to the Board by the Licensee shall include a detailed executive summary in English and Inuktitut.

7. It is the responsibility of the Licensee to ensure that the receipt of any documents or correspondence submitted by the Licensee to the Board is properly acknowledged by the Manager of Licensing.

PART C: CONDITIONS APPLYING TO SECURITY

1. The Licensee is not required to post security for this undertaking.

PART D: CONDITIONS APPLYING TO WATER USE AND WATER MANAGEMENT PLANS

1. The Licensee is authorized to use water for municipal purposes from Lake Geraldine or as otherwise approved by the Board.

2. The total annual quantity of water used for all purposes from Lake Geraldine shall not exceed 1,100,000 m^3 or as otherwise approved by the Board.

3. The Licensee shall equip the water intake(s) with a screen with a mesh size sufficient such that no entrainment of fish can occur.

4. The Licensee shall ensure that the rate of water withdrawal is such that fish do not become impinged on the screen.

5. The Licensee shall undertake a Dam Safety Inspection of the Lake Geraldine Reservoir between July and September bi-annually starting in 2008. A final report shall be submitted to the Board for review no later than 60 days following the site inspection and include a cover letter from the Licensee indicating how and when recommendations and/or deficiencies identified in the Inspection Report will be addressed.

6. The Licensee shall take steps necessary to prevent and mitigate erosion and the release of sediment into water flowing into and from Lake Geraldine.

PART E: CONDITIONS APPLYING TO WASTE DISPOSAL AND WASTE MANAGEMENT PLANS

Wastewater

1. The Licensee is authorized to use the Sewage Lagoon to treat and dispose of municipal wastewater until the Wastewater Treatment Plant is commissioned, or as otherwise approved by the Board.

2. The Licensee shall provide at least ten (10) days written notice to an Inspector and the Board prior to any planned discharges from the Sewage Lagoon.

3. The Licensee shall ensure that any discharges from the Wastewater Treatment Facilities meet the following Effluent quality criteria:

   a. Until notification is provided in accordance with Part E, Item 3(d), all discharges by the Licensee from the Sewage Lagoon at monitoring Station Number IQA-01 shall comply with the following effluent quality criteria:

      All Effluent discharges shall have a pH between 6 and 9.

Parameter	Maximum Average Concentration	Maximum Concentration of Any Grab Sample
Biological Oxygen Demand (5 day) - BOD_5	120 mg/L	180 mg/L
Total Suspended Solid	180 mg/L	270 mg/L
Oil and Grease	No visible sheen	

   b. All discharges by the Licensee from the Wastewater Treatment Plant at monitoring Station Number IQA-02 shall comply with the following Effluent quality criteria:

      All Effluent discharges shall have a pH between 6 and 9.

Parameter	Maximum Average Concentration	Maximum Concentration of Any Grab Sample
Biological Oxygen Demand (5 day) - BOD_5	30 mg/L	45
Total Suspended Solid	30 mg/L	45
Oil and Grease	No visible sheen	

c. All surface runoff during construction of any facilities designed to withhold, divert, or retain water or wastewater shall comply with the following criteria:

All Effluent discharges shall have a pH between 6 and 9.

Parameter	Maximum Average Concentration	Maximum Concentration of Any Grab Sample
Total Suspended Solids –TSS	50.0 mg/L	100.0 mg/L

d. The Licensee shall confirm compliance as part of the commissioning phase for the Wastewater Treatment Plant. Upon completion of commissioning, final results and notification of intent shall be made in writing to the Inspector.

4. Undiluted Effluent shall be non-acutely toxic under the "Rainbow Trout, *Oncorhynchus mykiss* (as per Environment Canada's Environmental Protection Series Biological Test Method EPS/1/RM/13)".

5. Upon commissioning of the Wastewater Treatment Plant, the Sewage Lagoon shall be considered as a back up facility only. Any discharges from the back-up Sewage Lagoon shall be considered emergency discharges and shall require authorization from an Inspector in accordance with Part E, Item 20 and 21.

6. The Licensee shall submit to the Board for approval an Operation and Maintenance Manual for the Wastewater Treatment Facilities by December 31, 2007. The manual shall be prepared in accordance with the "*Guidelines for the Preparation of an Operation and Maintenance Manual for Sewage and Solid Waste Disposal Facilities in the Northwest Territories* (GNWT 1996)". The manual shall also cover the operation and maintenance of the Sludge Management Facility.

7. The Licensee shall submit to the Board for approval the "Final Assessment of the Sludge Management Pilot Project', completed by an Engineer, within 30 days following notification in accordance with Part E, Item 3(d).

8. The Licensee shall undertake a Dam Safety Inspection of the Sewage Lagoon, completed by an Engineer, once before October 31, 2006, then between July and September bi-annually starting in 2008 until notification has been provided in accordance with Part E Item 3(d). A final report shall be submitted to the Board for review no later than 60 days following the site inspection and include a cover letter from the Licensee indicating how and when recommendations and/or deficiencies identified in the Inspection Report will be addressed.

Solid Waste

9. The Licensee shall dispose of and contain all municipal solid waste at the West 40 Landfill site or as otherwise approved by the Board.

10. The Licensee shall submit to the Board for review by March 31, 2010, a Long-term Solid

Waste Management Plan. The plan shall include, but not limited to, the following:
a. Options for solid waste disposal and discussion of preferred alternative; and
b. Selection of a site for solid waste disposal.

11. The Licensee shall implement the approved "Revision 2-City of Iqaluit Solid Waste Facility Operation and Maintenance Manual (April 2005)" upon the effective date of this Licence.

12. The Licensee shall review all Operation and Maintenance Manuals annually and revise them as necessary to reflect changes due to best practices in operation and technology. Any proposed changes to the manual shall be submitted to the Board for approval. Proposed changes shall be submitted as an addendum to the approved manual as part of the Annual Report requirement Part B, Item 1.

13. In the event that any plan, manual, or report referred to in this Part is not approved by the Board, the Licensee shall provide a revised version to the Board within 30 days of notification by the Board.

14. Further to Part E, Item 13, the Licensee shall implement the documents referred to in this Part as and when approved by the Board.

15. The Licensee shall submit an addendum to the manual referred to in Part E, Item 11 that will include details for contaminated soils and hazardous waste, including, but not limited to: types, volumes ultimate disposal, emergency response, thresholds, and maximum amounts accepted to the facility.

16. The Licensee shall collect and contain all leachate within the West 40 Landfill.

17. At least 90 days prior to any proposed release, discharge or transfer of leachate from the West 40 Landfill, the Licensee shall submit to the Board for approval a report prepared by an Engineer that will include at minimum a discussion of available treatment options, proposed discharge criteria in relation to the proposed discharge location(s) and discharge volumes, and a monitoring programme.

18. The Inspector may authorize an emergency discharge if the Licensee submits to the Inspector, at least 15 days prior to the planned discharge, the following:
a. Reason for discharge;
b. Identification of the Final Discharge Point;
c. Proposed sampling and analysis; and
d. Proposed mitigation measures.

19. For any emergency discharge authorized by the Inspector, the Licensee shall submit to the Board and to the Inspector a report that includes, among other things, an analysis of results of the emergency discharge in the Monthly monitoring report required by Part I, Item 11.

PART F: CONDITIONS APPLYING TO CONSTRUCTION

General

1. The Licensee shall insure that any material used in construction is free of contaminants such that it will not cause detrimental or significant effects to water.

2. The Licensee shall maintain shoreline stability during construction.

3. All final designs and drawings shall be qualified by an Engineer confirming that:
   a. The works are designed under sound engineering principles;
   b. Design limitations are understood and communicated within the report; and
   c. All measures will be taken to minimize impact to water.

4. The Licensee shall, within 90 days of completion of any structure designed to contain, withhold, divert or retain waters or wastes, submit to the Board for approval, a construction report prepared by an Engineer that shall include as-built drawings, documentation of field decisions that deviate from original plans, and any data used to support these decisions.

5. The Licensee shall ensure that all construction of engineered structures will be supervised and field-checked by an Engineer in such a manner that the project specification can be enforced and, where required, the quality control measures can be followed. The Licensee shall also ensure that the construction records of all engineered structures are maintained and made available at the request of the Board and/or an Inspector.

6. During construction and excavation, if contamination of surface and/or ground water is encountered, the Licensee shall notify the Inspector immediately and implement the Spill Contingency Plan.

Water Supply

7. The Licensee shall takes steps necessary to prevent and mitigate erosion and the release of sediment into water flowing into and from Lake Geraldine during construction of the new berms and expansion of the Lake Geraldine dam.

8. The Licensee shall submit to the Board for approval, the final design and drawings by an Engineer, within 30 days of the effective date of the Licence, for the Lake Geraldine Raw Water Storage Phase II. The Licensee shall ensure that such facilities are designed and constructed to engineering standards such that at a minimum they comply with the Canadian Dam Safety Guidelines. The Design shall be qualified in accordance with Part F, Item 3.

9. The Licensee shall undertake a dam safety review of the Lake Geraldine Raw Water Storage Phase II Upgrade, completed by an Engineer, in accordance with the Canadian Dam Safety Guidelines prior to October 31, 2006. The final report shall be submitted to the Board for review no later than 60 days following the safety review and shall include a cover letter from the Licensee indicating how and when recommendations or deficiencies identified in the safety review will be addressed.

Solid Waste

10. The Licensee shall submit to the Board for approval, within 30 days of the effective date of the Licence, a Drainage Improvement and Management Design and drawings prepared by an Engineer for all operations in the West 40 Landfill site. The Design shall be qualified in accordance with Part F, Item 3.

11. The Licensee shall submit to the Board for approval, within 30 days of the effective date of the Licence, the Final Design for the West 40 Landfill Northern Expansion and drawings by an Engineer. The Design shall be qualified in accordance with Part F, Item 3.

12. The Licensee shall submit to the Board for approval, within 60 days of the effective date of the Licence, the Final Design for the Sludge Management Facility and drawings by an Engineer. The Design shall be qualified in accordance with Part F, Item 3.

Wastewater

13. The Licensee shall submit to the Board for approval, within 30 days of the effective date of this Licence, the Final Design for the Rehabilitation of the West Berm of the Sewage Lagoon prepared by an Engineer, and an implementation schedule for the recommendations of the Dam Safety Inspection (2005). The Design shall be qualified in accordance with Part F, Item 3.

14. The Licensee shall submit to the Board for review, within 10 days of the effective date of the Licence, the Final Design for Phase I of the Wastewater Treatment Plant stamped by an Engineer and qualified in accordance with Part F, Item 3, and As-built drawings.

PART G: CONDITIONS APPLYING TO MODIFICATIONS

1. The Licensee may, without written consent from the Board, carry out Modifications to the Water Supply Facilities and Waste Disposal Facilities provided that such Modifications are consistent with the terms of this Licence and the following requirements are met:

    a. the Licensee has notified the Board in writing of such proposed Modifications at least 60 days prior to beginning the Modifications;

    b. such Modifications do not place the Licensee in contravention of the Licence or the *Act*;

    c. the Board has not, during the 60 days following notification of the proposed Modifications, informed the Licensee that review of the proposal will require more than 60 days; and

    d. The Board has not rejected the proposed Modifications.

2. Modifications for which all of the conditions referred to in Part G, Item 1 have not been met can be carried out only with written approval from the Board.

3. The Licensee shall provide as-built plans and drawings of the Modifications referred to in this Licence within 90 days of completion of the Modification. These plans and drawings shall be stamped by an Engineer.

PART H: CONDITIONS APPLYING TO CONTINGENCY PLANNING

1. The Licensee shall implement the approved "*City of Iqaluit Spill Contingency Plan (Updated Dillon 2004)*," upon the effective date of this Licence.

2. The Licensee shall implement the approved "*Sewage Lift Station Contingency Plan (Dillon 2003)*" upon the effective date of this Licence.

3. In accordance with Part H, Item 4, the Licensee shall submit an addendum to reflect any changes in operation of the new Wastewater Treatment Plant and Sludge Management Facility.

4. The Licensee shall review the Contingency Plans annually and revise them as necessary to reflect changes in operation and technology. Any proposed changes to the plans shall be submitted to the Board for approval. Proposed changes may be submitted as addenda to the approved plans as part of the Annual Report requirement Part B, Item 2.

5. If, during the period of this Licence, an unauthorized discharge of Waste and/or Effluent occurs, or if such a discharge is foreseeable, the Licensee shall:

   a. Employ the appropriate Contingency Plan;

   b. Report the incident immediately via the 24-Hour Spill Reporting Line (867) 920-8130; and

   c. Submit to an Inspector a detailed written report on each occurrence no later than thirty (30) days after initially reporting to the Spill Reporting Line.

PART I: CONDITIONS APPLYING TO MONITORING

General

1. The Licensee shall install meters or such devices, or use such methods for measuring the volumes or flow of Water used and Effluent discharged. The meters and measuring devices or methods shall be operated and maintained to the satisfaction of an Inspector.

2. The Licensee shall maintain the necessary signs to identify the stations of the Monitoring Program to the satisfaction of an Inspector.

3. The Licensee shall collect the samples referred to in this Part without delay. If at any time, the period specified for collecting samples was extended due to unforeseen circumstances, safety concerns or access problems and render the collection of samples impracticable, the Licensee shall notify an Inspector of the circumstances.

4. The Licensee shall submit to the Board for approval a Monitoring Program for the water supply, Wastewater Treatment Plant, and West 40 Landfill site, including the Sludge Management Facilities. The Program shall include, but not be limited to, the requirements listed in Schedule C.
   a. The monitoring program for Lake Geraldine shall be submitted 30 days from the effective date of this Licence;
   b. The monitoring program for the Wastewater Treatment Plant shall be submitted 60 days following notification of commissioning; and
   c. The monitoring program for the entire West 40 Landfill site shall be submitted no later than March 31, 2007.

5. All analyses shall be conducted as described in the most recent edition of "*Standard Methods for the Examination of Water and Wastewater*", or by such other methods as approved by the Board.

6. All laboratory analyses shall be performed at a laboratory accredited according to ISO/IEC Standard 17025. The accreditation shall be current and in good standing.

7. The Licensee shall submit to the Board for approval, within 90 days of the effective date of this License, a Quality Assurance/Quality Control (QA/QC) Plan prepared in accordance with "*Quality Assurance (QA) and Quality Control(QC) Guidelines For Use By Class "A" Licensees in Meeting SNP Requirements and for Submission of a QA/QC Plan (INAC, 1996)*".

8. In the event that the plan and/or monitoring program(s) referred to in this Part are not approved by the Board, the Licensee shall provide a revised version to the Board for review within 30 days of notification by the Board.

9. The Licensee shall implement the plans and monitoring programs referred to in this Part as and when approved by the Board.

10. The Licensee shall annually review the approved plans and monitoring programs referred to in this Part and modify them as necessary. Any proposed changes shall be submitted to the Board for approval. Proposed changes may be submitted as addenda to the approved plans or programs as part of the Annual Report requirement Part B, Item 1.

11. The Licensee shall, within 60 days following the month being reported, submit to the Board a "Monthly General Monitoring Report" of all data and information required under Schedule C, including the results of the QA/QC program.

12. There should be at least one inspection of all facilities defined within the scope of this license annually between July and September. The Inspector shall submit a detailed inspection report with supporting photographs and sampling results as required under Schedule C to the Board no later than 90 days following the date of inspection.

13. Additional monitoring may be requested by the Board and/or the Inspector.

14. The Licensee shall increase sampling frequency if results of such sampling indicate that the Effluent Quality Requirements provided in Part C have been exceeded, or as

requested by the Board or directed by an Inspector.

15. The Monitoring Criteria and compliance dates specified in the Licence may be modified at the discretion of the Board and do not constitute an application for amendment as defined in the *Act*.

PART J: CONDITIONS APPLYING TO ABANDONMENT AND RESTORATION

1. The Licensee shall submit to the Board for review, within 90 days of the effective date of the Licence, a conceptual Abandonment and Restoration Plan for the West 40 Landfill site prepared in accordance with industry best practices.

2. The Plan referred to in Part J, Item 1 shall be updated annually and submitted in accordance with Part B, Item 1.

3. The Licensee shall submit to the Board for approval, one year prior to expiry of this Licence or one year before the West 40 Landfill site will reach capacity, a Final Abandonment and Restoration Plan prepared by an Engineer in accordance with industry best practices.

4. Further to Part J, Item 1 and 3, the Conceptual and Final Abandonment and Restoration Plans shall include, among other things, a presentation of data and a discussion of environment conditions existing before the use of the site by the Licensee as a municipal landfill, as well as remediation objectives.

5. In the event that the Plan referred to in Part J, Item 1, is not approved by the Board, the Licensee shall provide a revision to the Board for review within 30 days of notification by the Board.

6. The Licensee shall implement the Plan referred to in Part J, Item 1 as and when approved by the Board.

7. The Licensee shall notify the Board in writing of its intent to proceed with final closure of any water use or waste disposal facility within the scope of this Licence at least one year prior to implementation of final closure.

8. Further to this Part, the Licensee shall submit to the Board for approval 6 months following notification of final closure, a Final Abandonment and Restoration Plan completed by an Engineer in accordance with Part F, Item 3.

SCHEDULES

The following schedules provide instructive details to the conditions appearing in more general terms in the main body of the Licence and are spelled out in this format for greater clarity.

Schedule A - Definitions

In this Licence: 3AM-IQA0611

"**Act**" means the *Nunavut Waters and Nunavut Surface Rights Tribunal Act*;

"**Amendment**" means a change to any terms and condition of this Licence, through application to the NWB, requiring correction, addition or deletion of specific terms and conditions of the Licence except for Schedule C;

"**Bioassay**" means the test to determine acute toxicity under the "Rainbow Trout, *Oncorhynchus mykiss* (as per Environment Canada's Environmental Protection Series Biological Test Method EPS/1/RM/13)";

"**Board**" means the Nunavut Water Board established under Article 13 the *Nunavut Land Claims Agreement* and under Section 14 of the *Act*;

"**Chief Administrative Officer**" means the Executive Director of the Nunavut Water Board;

"**Construction**" means any activities undertaken to construct or build any component of, or associated with, the water and waste disposal facilities within the City of Iqaluit;

"**Compliance**" means effluent must comply with the Licence effluent quality criteria. Compliance is defined as follows:

a) the arithmetic mean of all parameters measured in the last four (4) samples collected in the same season shall not exceed the effluent quality criteria;
b) of the samples referred to in (a) above, three (3) shall not exceed the effluent quality criteria; and
c) of the samples referred to in (a) above, no sample shall exceed one hundred and fifty (150) percent of the effluent quality criteria; and.

"**Dam Safety Guidelines**" means the *Canadian Dam Association (CDA) Dam Safety Guidelines (DSG), January 1999* or subsequent approved editions;

"**Deleterious Substance**" means a substance as defined in Section 34(1) of the *Fisheries Act;*

"**Deposit**" means the placement of solids materials on land or in water;

"**Discharge**" means the release of any water or waste to the receiving environment;

"**Drainage Basin**" means a geographical area determined by the watershed limits of the systems of water, including surface and underground water, flowing into a common terminus;

"**Effective Date of Licence**" means the date on which the Minister of Indian and Northern Affairs Canada approves the Licence;

"**Effluent**" means the liquid discharge from all site water or waste management facilities;

"**Engineer**" means a professional engineer registered to practice in Nunavut in accordance with the *Engineering, Geological and Geophysical Act (Nunavut)* S.N.W.T. 1998, c.38, s.5 with the ability to stamp, sign and appropriately qualify the design and its limitations;

"**Final Discharge Point**" means the final point of control for any discharge of effluent;

"**Lake Geraldine Reservoir**" means the infrastructure required for extraction, storage, of water for the City of Iqaluit;

"**Grab Sample**" means an undiluted quantity of material collected at a particular time and place that may be representative of the total substance being sampled at the time and place it was collected;

"**Inspector**" means an Inspector designated by the Minister under Section 85 (1) of the *Act*;

"**Licence**" means this Type "A" Water Licence 3AM-IQA0611, issued by the Nunavut Water Board in accordance with the *Act*, to City of Iqaluit;

"**Licensee**" means to whom Licence 3AM-IQA0611 is issued to or assigned;

"**Maximum Average Concentration**" means the average concentration of any four consecutively collected samples taken from the identical sampling location and taken during any given timeframe;

"**Minister**" means the Minister of Indian and Northern Affairs Canada;

"**Modification**" means an alteration to a physical work that introduces a new structure or eliminates an existing structure and does not alter the purpose or function of the work, but does not include an expansion;

"**Nunavut Land Claims Agreement**" (NLCA) means the "*Agreement Between the Inuit of the Nunavut Settlement Area and Her Majesty the Queen in Right of Canada*," including its preamble and schedules, and any amendments to that agreement made pursuant to it;

"**Reclamation**" means the process of converting disturbed land back to its former or other productive use;

"**Receiving Environment**" means both the aquatic and terrestrial environments that receive any discharge;

"**Regulations**" means the *Northwest Territories Water Regulations SOR/93-303 8 June, 1993.*

"**Sewage**" means all toilet wastes and greywater;

"**Sewage Lagoon**" means a facility and associated structures designed to treat sewage in the City of Iqaluit since 1978;

"**Sludge Management Facility**" means the facility for the disposal and treatment of sludges generated by the Wastewater Treatment Plant;

"**Surface Drainage**" means all surface waters resulting from the flow over, through or out of an operations area and is collected by means of engineered structures;

"**Use**" means use as defined in section 4 of the *Act*;

"**Waste**" means waste as defined in section 4 of the *Act*;

"**Wastewater**" means the water generated by site activities or originates on-site that requires treatment or any other water management activity;

"**Wastewater Treatment Facilities**" means the Sewage Lagoon and the Wastewater Treatment Plant;

"**Wastewater Treatment Plant**" means the engineered system designed for the containment and treatment of sewage for the City of Iqaluit located adjacent to the Sewage Lagoon;

"**Water**" means water as defined in section 4 of the *Act*;

"**Water Licence Application**" means, for the purposes of this License, the totality of the NWB Public Register opened as a result of the filing of the application dated January 2004;

"**Water Treatment Plant**" means the engineered system designed for the treatment of raw water from Lake Geraldine Reservoir for the City of Iqaluit;

"**West 40 Landfill**" means a facility, designed to permanently contain inert solid waste materials, in operation at the time of application (2004), the West 40 Landfill Northern Expansion and the Sludge Management Facility; and

"**West 40 Landfill Northern Expansion**" means the facility designed to permanently contain inert solid waste materials located adjacent to the West 40 Landfill.

Schedule B - General Conditions

1. The Annual Report referred to in Part B, Item 1 shall include the following:

   a. The monthly and annual quantities in cubic metres of water obtained from Lake Geraldine;
   b. The monthly and annual quantities in cubic metres of any discharges from the Wastewater Treatment Facilities;
   c. The monthly and annual quantities in cubic metres of sludge removed from the Wastewater Treatment Plant;
   d. A summary report which includes all data and information generated under the Monitoring Program, including the QA/QC program, in an electronic and printed format acceptable to the Board;
   e. A summary of construction activities conducted;
   f. A summary of any modification and/or major maintenance work and/or demolition work carried out and any associated structures;
   g. A summary of all work carried out under the Managements Plans in accordance with this Licence;
   h. A progress report and revisions (if applicable) to any studies requested by the Board that relate to waste management, water use or reclamation and a brief description of any future studies planned by the Licensee including, an executive summary in terms understandable to the general public, translated into Inuktitut;
   i. Any addendums to the approved Contingency Plans and the approved Operation and Maintenance Manuals;
   j. A list and description including volumes, Spill Report Line identification number of all un-authorized discharges, spills and summaries of follow-up action taken;
   k. Any revisions to approved Closure and Reclamation Plan(s);
   l. A summary of any closure and reclamation work undertaken and an outline of any work anticipated for the next year, including any changes to implementation and scheduling;
   m. A summary of actions taken to address concerns or deficiencies listed in the inspection reports and/or compliance reports filed by an Inspector;
   n. Update on implementation of recommendation(s) from any Dam Safety Inspection and/or Review;
   o. A brief update on the implementation plan of all facilities within the scope of this Licence including projected implementation and status of Phase II of the Wastewater Treatment Plant; and
   p. Any details on water use or waste disposal requested by the Board by November 1st of the year being reported.

Schedule C - Conditions Applying to Monitoring

1. The Monitoring Plan, referred to in Part I, Item 4 of the Licence, shall include, but not necessarily be limited to, the following:

Table 1 - Water Quality Parameters

Test Group	Analytical Parameters	Measurement Units
Routine - **R**	Alkalinity, Acidity, Chloride, Carbonate, Bicarbonate, Total Hardness, Hydroxide, Sulphate, Total Suspended Solids (TSS), Total Dissolved Solids (TDS) Total Organic Carbon (TOC), Total Inorganic (TIC) pH (field and lab) ORP (field) Conductivity (field and lab) Temperature (field) Turbidity	mg/L pH units mV uS/cm °C NTU
Effluent **E**	Total Suspended Solids (TSS), Temperature (field), Conductivity (field and lab), pH (field and lab)	mg/L °C uS/cm pH units
Site Specific **SS**	Chlorinated Paraffins, LC50 Bioassay	ng/L
ICP- ICP Metals Scan (Total) metal scan that shall include at a minimum	Al, Sb, As, Ba, Be, Cd, Cr, Co, Cu, Fe, Pb, Li, Mn, Mo, Ni, Se, Sn, Ag, Sr, Tl, Ti, U, V, Zn, Hg	mg/L
Nutrients – **N**	Ammonia-N, Nitrate-N, Nitrite-N Total Phosphorus, Orthophosphate	mg N/L mg/L
Biological –**B**	Biochemical Oxygen Demand Total and Fecal Coliform	mg/L CFU/100mL (colony forming units)
Potable Water - **PW**	Fecal Coliform ICP Metals (Total and dissolved) Total Suspended Solids –TSS	CFU/100mL mg/L mg/L
Soil - **S**	Total PCB, Fractional Hydrocarbon, BTEX (Benzene, Toluene, Ethylbenzene and Xylene)	mg/L

Table 2[1] - Water Quality Monitoring Criteria

Station	Location	Phase	Test Group Water Chemistry (refer to Table 1)	Frequency[2]	Flow Measurement	Frequency	Responsible Party[3]
IQA-01	Raw Water Supply from Lake Geraldine Reservoir at the Water Treatment Plant Prior to Treatment	Operation	R, PW	MO	Yes	M	L
			R, PW	A			I
IQA-01(#)	To be provided in accordance with Part I, Item 4 for Lake Geraldine water levels.						L
IQA-02	Final Discharge Point from the Sewage Lagoon	Operation	B, N, E	BiM	Yes	M	L
			ICP, SS	A			L
			B, N, E, ICP, SS	A			I
IQA-03	Influent to the Sewage Lagoon	Operation	B, N, E, ICP, SS	A			L
IQA-04	Final Discharge Point from the Wastewater Treatment Plant	Operation	B, N, E	BiM	Yes	M	L
			ICP	Q			L
			SS	A			L
			B, N, E, ICP, SS	A			I
IQA-05	Influent to the Wastewater Treatment Plant	Operation	B, N, E, ICP, SS	A			L
IQA-06	Sludge at the Wastewater Treatment Plant	Operation	B, E, N, ICP	M	Yes	M	L
IQA-07	Surface Water entering the West 40 Landfill site	To be provided in accordance with Part I, Item 4					L
IQA-08	Final Discharge Point from the West 40 Landfill	To be provided in accordance with Part E, Item 17					L
		To be provided by the Board following compliance with Part E, Item 17					I
IQA-08(#)	To be provided in accordance with Part E, Item 17, Part F, Item 10, and Part I, Item 4 for the entire West 40 Landfill area						L
IQA -09	Contaminated soils accepted at the West 40 Landfill site	Operation	ICP, S	A			I

[1] Table 2 may be modified by the Board and re-issued where necessary. Re-issuance is not considered an Amendment to the application or Licence as defined in the *Act*.
[2] Frequency: MO=monthly during open water season; BiM=Bi-monthly, Q = Quarterly, A = Annually
[3] Responsible Party: I = Inspector, L = Licensee

Appendix I: Landfill Emergency Response Plan

Landfill Emergency Response Plan

1. Overview

1.1 Introduction

The purpose of the landfill emergency response plan sets out appropriate procedures to address foreseeable emergencies. The key elements of this plan are:

1. What is the nature and severity of the emergency?
2. What is to be done?
3. Who does it?

The emergency response plan addresses the following items:

- Fires (Section 2);
- Accidents and Medical Emergencies (Section 3); and
- Environmental and Operational Emergencies (Section 4).

1.2 Emergency Plan Updates

The Departments of Public Works, and Emergency and Protective Services will review the emergency plan annually or following an emergency incident to ensure that:

- Emergency response procedures for the landfill are effective and updated as necessary;
- Appropriate individuals are appointed to manage emergency situations;
- Regular fire prevention meetings are conducted with all landfill employees and the Fire Department; and
- Regular safety and emergency meetings are held with landfill employees.

1.3 Emergency Coordination

The key to success of the emergency plan is to assign a responsible person to take charge of an emergency situation. The Landfill Foreman is designated to have the primary responsibility to manage emergency situations at the landfill.

The Landfill Foreman will have full authority of the emergency until Emergency and Protective Services arrives. This, together with proper training of operating personnel, practice drills to test emergency response activities, and continual review and updating of the plan, will be undertaken to ensure an efficient and effective response to any emergency that may occur.

The Landfill Foreman's responsibilities include to:

- Declare an emergency;
- Review and update the emergency response procedures;
- Ensure that all emergency response procedures are appropriate;

- Respond to all emergencies and contact appropriate emergency response agencies;
- Establish control of the emergency prior to the arrival of appropriate emergency response agencies;
- Direct personnel and site visitors to a safe marshalling area;
- Liaise with the emergency response representatives upon their arrival;
- Correct any potential emergency or unsafe situations; and
- Complete necessary documentation with respect to emergencies.

The Landfill Foreman will report any emergency or contingency situations to the Superintendent. The Superintendent will contact appropriate agencies to report incidents related to environmental or health and safety issues associated with the emergency or contingency activities.

2. Evacuation Procedures

In the event that an area or structure at the landfill must be evacuated due to a fire, gaseous, or other situations, landfill employees, customers, and site visitors will be evacuated via the closest exit and will proceed to a designated marshalling area.

In the event of a fire or gaseous release from active areas of the landfill, the Landfill Foreman will direct all staff and site visitors to immediately leave the area and proceed to the designated marshalling area. Visitors will be requested to remain at the marshalling area until otherwise notified.

The marshalling area is to be designated for each emergency situation according to the nature of the emergency, the location of the emergency, and the location of a safe exit route. A marshalling area must not be used when it is unsafe or is downwind of a fire or gaseous release.

Marshalling areas are:

1. Primary: The road outside the main gate and building; and
2. An alternate area designated by the Landfill Foreman.

When the evacuation is complete, the Landfill Foreman will proceed to the marshalling area.

The prime consideration for the Landfill Foreman is to ensure that all employees and site visitors are safely evacuated. The Landfill Foreman will:

- Await appropriate emergency response personnel; and
- As required, establish perimeter security, conduct searches, and/or take other actions that may be warranted by specific circumstances.

It is imperative that all employees and visitors remain at the marshalling area until the Landfill Foreman gives permission to return to the working disposal areas or to leave the site.

3. Fire

3.1 Fire Prevention

The landfill will be operated in a manner that will minimize the potential for landfill fires. Fire prevention techniques will include:

- Thoroughly compacting all waste;
- Maintaining a comprehensive load checking program to prevent the dumping of hot/burning, explosives or combustible waste;
- Maintaining a program of separating the dumping of ash barrels from general waste tipping face;
- Site inspection, in particular of the working face, with regard to any trail of smoke etc before finishing work;
- Training employees on early fire hazard recognition; and
- Conducting emergency response drills at least bi-annually, which are to be documented and reviewed with landfill staff.

NOTE: FOR ALL FIRE OCCURANCES, AN INCIDENT REPORT MUST BE COMPLETED AND FILED, WITH A COPY SENT TO THE SAFETY OFFICER

3.2 General Fire Response Procedures

Fires may occur at the following locations:

- Fires in the site building;
- Fires in the recycling storage area or hazardous waste storage compounds; or
- Fires at the active landfill working face.

All fires will be reported as an emergency situation. Should an emergency occur, employees shall report to the primary marshalling area. Should the primary marshalling area be inaccessible, employees shall report alternate safe site as directed by the Landfill Foreman.

3.3 General Instructions

The greatest danger lies not in fighting the fire, but in the panic that arises from a fire. Spend a few minutes getting a handle on the situation. A landfill fire will not travel fast, so a 10 minute delay is not going to make any difference to the outcome of the fire. Go through the steps to notify the appropriate authorities and follow the basic steps in the fire control plan, including:

- Contact other nearby employees;
- Summon the appropriate landfill equipment;
- Notify Emergency Services and tell them the location and type of fire and whether or not it looks like it will spread out of the immediate area;
- Notify surrounding property owners, particularly if it appears that the fire could spread beyond the landfill;
- When Emergency Services arrive, follow their instructions;
- Do not fight fire alone; and
- Do not place yourself or others in danger while fighting the fire.

3.4 General Fire-Fighting Guidelines

A landfill fire is controlled better with the use of a bulldozer and dirt. If it is safe to do so, dig out to the source and isolate the burning waste. Then either let it burn out or cover with dirt. Lots of water will not necessarily extinguish the fire and can cause more problems than it solves.

- Do not overuse water. Remember that most landfill fires can be controlled with a relatively small amount of water. In most cases, soil is more effective than water to smother the fire;
- If two or more water trucks are being used, try to use shifts so that at least one water truck is at the fire at all times;
- Do not waste time trying to fight a large fire with a fire extinguisher;
- Do not approach any fire with a tractor unless a water truck is close by for backup;
- Never risk personal injury or death attempting to save a machine or building; and
- Remember, SAFETY FIRST.

3.5 Small Contained Fires

- Do not attempt to fight a fire alone;
- Secure the area and re-direct customers to a safe area;
- Work with other site staff to extinguish the fire ONLY if safe to do so;
- If the fire becomes uncontained, or if it gives off toxic fumes, do not attempt to extinguish the fire; and wait for the Emergency Services to arrive.

3.6 Uncontained Fires

- Do not attempt to fight the fire;
- Follow evacuation procedures; and
- Call the Fire Department: (867) 979-5650.

3.7 Site Building Fires

Prevention

- Staff training and awareness.
- Coordination with the Fire Department.

Response

Action	Time Frame	Who?	Resources
Evacuate building	Immediately	All staff	
Call Emergency Services & Superintendent	Immediately	Landfill Foreman/Operator	
Secure area	Immediately	Landfill Foreman/Operator	

3.8 Fires at the Working Face

Prevention

- Staff training and awareness.
- Waste acceptance procedures and policies.
- Diversion of hot loads, combustible and/or explosive material from working face.
- Application of cover soils to minimize size of the active working face.

Response

Action	Time Frame	Who?	Resources
Evacuate and secure the area	Immediately	Landfill Foreman	Site staff
Call: • Emergency Services • Superintendent	Immediately	Landfill Foreman	Site staff
Isolate the burning wastes	As soon as it is determined safe to do so	Landfill Foreman Emergency Services	Landfill Equipment
Determine the nature and extent of the fire	Immediately	Landfill Foreman Emergency Services	Site staff
Excavate, remove, and soak the burning waste	As soon as it is determined safe to do so	Landfill Foreman and Emergency Services	Site staff Fire Department Water Truck Water pumps
Cover the burning area	Immediately after the source of burning waste has been excavated and removed, and as soon as it is safe to do so	Landfill Foreman and Emergency Services	Site staff Fire Department Landfill equipment
Appoint staff for fire guard	After fire is extinguished	Landfill Foreman	Site staff Fire Department
Confirm the fire is extinguished	Immediately	Landfill Foreman	Fire Department
Review the cause of fire and prepare appropriate mitigative measures	Within 1 month	Landfill Foreman Superintendent Director of Emergency and Protective Services	Site staff Fire Department

3.9 Stored Material Fires

Prevention

- Site security.
- Separation of stored materials according to the Fire Code.

Response

Action	Time Frame	Who?	Resources
Evacuate and secure the area	Immediately	Landfill Foreman	Site staff
Call: • EMS • Superintendent •	Immediately	Landfill Foreman Superintendent	Site staff
Determine the nature of the burning material and potential for emission of toxic fumes	Immediately	Landfill Foreman	Fire Department Safety Officer Superintendent Material Safety Data Sheets (MSDS)
Isolate the burning material	Immediately when safe to do so	Landfill Foreman Emergency Services	Fire Department Landfill Equipment
Determine the nature and extent of the fire	Immediately	Emergency Services	Site staff
Extinguish the fire as appropriate; according to the nature of the material	As soon as it is safe to do so	Emergency Services	Site staff Fire Department Landfill equipment Water truck Water pumps Safety Officer MSDS
Confirm the fire is extinguished	Immediately	Emergency Services	Fire Department
Review cause of fire and prepare appropriate mitigative measures	within 1 month	Landfill Foreman Superintendent Director of Emergency and Protective Services	Site staff Fire Department

4. Medical Emergencies

All injuries, even minor ones, should be considered important and should be reported as a safety incident to the Landfill Foreman.

First Aid should be applied in a manner that is appropriate to the nature of the injury. If the injury requires medical assistance, the individual should be taken to a medical emergency centre or an ambulance service contacted.

A medical doctor should be consulted for all injuries that may result in infections as a result of working with waste materials. This includes injuries such as cuts and scrapes, skin punctures with sharp items, and fire or chemical burns.

If the person injured on-site is a customer or visitor, Landfill Foreman employees are to provide any assistance necessary and will apply appropriate First Aid.

NOTE: FOR ALL MEDICAL EMERGENCY OCCURRENCES AN ACCIDENT/INCIDENT REPORT MUST BE COMPLETED AND FILED, WITH A COPY SENT TO THE SAFETY OFFICER AND WSCC.

4.1 Minor Medical Injuries

Prevention

- Safety plan and procedures;
- Employee safety training and awareness; and
- First Aid training.

Response Plan

Action	Time Frame	Who?	Resources
Apply appropriate First Aid	Immediately	Trained First Aider	
Recommend that the injured person consult a physician	Immediately	Trained First Aider	
Take the injured person to a medical emergency centre or contact an ambulance service if deemed appropriate	Immediately	Trained First Aider Emergency Services	
Contact Safety Officer and Superintendent	Immediately	Landfill Foreman	
Report Injury to WSCC	Within 3 days	Landfill Foreman Safety Officer	
Record injury in the daily report	To the end of the work day	Landfill Foreman	Landfill Foreman
Review cause of the injury and prepare appropriate mitigative measures	Within 1 month	Landfill Foreman Superintendent Director of Emergency and Protective Services	Landfill Foreman Occupational Health and Safety Committee

4.2 Serious Medical Injury

Prevention

- Safety plan and procedures.
- Employee safety training and awareness.
- First Aid training.

Response Plan

Action	Time Frame	Who?	Resources
Assess site conditions for personal safety and safety of others, and take appropriate actions to secure unsafe areas	Immediately	Landfill Foreman Trained First Aider	Landfill Foreman
Attend to the injured person and apply First Aid	Immediately when safe to do so	Trained First Aider	
Contact: • Emergency Services/ Ambulance • Superintendent • Safety Officer • WSCC	Immediately	Trained First Aider Landfill Foreman	
Stay with the injured person until medical assistance arrives	Duration of medical emergency	Trained First Aider	
Report to WSCC	Within 24 hours	Landfill Foreman Safety Officer	
Record injury in the daily report	By the end of the work day	Landfill Foreman or Designated Alternate	Landfill Foreman
Conduct an investigation to determine the cause of injury and prepare appropriate mitigative measures	Investigate immediately following the incident Complete mitigative measures within 1 month of the incident	Landfill Foreman Superintendent Director of Emergency and Protective Services	Site Personnel Occupational Health and Safety

4.3 Vehicle or Equipment Accidents

All vehicle accidents should be reported to Municipal Enforcement and an investigation as to the cause should be carried out. Following the investigation, appropriate mitigative measure should be determined and implemented to avoid future accidents.

Prevention

- Safety plan and procedures.
- Employee safety training and awareness.
- Traffic control signs.
- Vehicle spotting during heavy traffic situations.

Response Plan

Action	Time Frame	Who?	Resources
Report the accident to the Landfill Foreman	Immediately	All employees	
If damage is minor, have the vehicle driver report the accident to the Iqaluit Municipal Enforcement Department	Immediately	Landfill Foreman	Accident Investigation Program
If the damage is significant, call the Iqaluit Municipal Enforcement Department	Immediately	Landfill Foreman	Accident Investigation Program
If an injury is involved, the RCMP ((867) 979-1111), and implement medical response actions	Immediately	Landfill Foreman	Accident Investigation Program
Secure the area for a follow-up investigation	Immediately	Landfill Foreman RCMP or Iqaluit Municipal Enforcement	Accident Investigation Program
Record the injury in the daily report	By the end of the work day	Landfill Foreman or Designated Alternate	Landfill Foreman Accident Investigation Program
Conduct an investigation into the cause of the accident and prepare appropriate mitigative measures	Within 1 month of the accident	Landfill Foreman Superintendent RCMP Director of Emergency and Protective Services	Occupational Health and Safety Accident Investigation Program

5. Environmental and Operational Contingencies

Environmental and Operational contingencies may vary in nature and degree of seriousness. Therefore, actual situations will dictate the appropriate actions and responses that should be undertaken. Generally, the response plan includes the following steps:

- Secure and contain the problem;
- Verify and validate the problem;
- Investigate the cause and potential risk;
- Assess appropriate corrective actions;
- Implement the corrective action; and
- Review operations procedures and preventative measures.

5.1 Spills

In the event of a spill, the Landfill Foreman is to immediately implement the spill response plan. The Superintendent should be notified of the nature of the release as well as the activities and corrective actions being taken.

A spill report must be filled out and sent to the Spill Line once the spill is contained and clean up has started. Please see Appendix B: Forms for a copy of the Spill Report Form that includes contact information.

5.2 Prohibited Wastes Delivered to the Landfill

Prevention

- Waste acceptance policies and procedures.
- Employee training and awareness.

Response Plan

Action	Time Frame	Who?	Resources
Deny entry of the load	Immediately	Landfill Foreman	Operations and Maintenance Plan Waste Acceptance Procedures NWB
Determine if load is safe for transport on local roads	Immediately	Landfill Foreman	Transport Canada Transport of Dangerous Goods Regulations
Inform the waste generator of the infraction	Immediately	Landfill Foreman	
Document the nature of incident and actions taken	Within 1 hour	Landfill Foreman	Daily Activity Log Book Hazardous Material Load Check Form
Review waste acceptance procedures and implement necessary mitigative measures	Within 1 month	Landfill Foreman Superintendent	Safety Officer

5.3 Prohibited Waste Discovered at the Landfill

Prevention

- Waste acceptance policies and procedures.
- Employee training and awareness.

Response Plan

Action	Time Frame	Who?	Resources
Isolate waste and cease operations in the area of the waste	Immediately	Landfill Foreman	Safety Officer Environmental Consultant
Construct containment around perimeter of the waste if necessary	Immediately	Landfill Foreman	Landfill equipment
Determine how to safely handle the waste	Immediately	Landfill Foreman	MSDS Safety Officer Superintendent
Determine source of waste, and if possible the waste hauler and generator	Within 1 week	Landfill Foreman	Daily Activity Log Book Staff observations Tipping Receipt Book
If identified, contact the hauler and waste generator to review options	Within 1 to 2 weeks	Landfill Foreman	
Document nature of incident and actions taken	Within 1 hour	Landfill Foreman	Daily Activity Log Book Hazardous Material Load Check Form
Inform Nunavut Water Board	When results have been confirmed	Landfill Foreman	
Review waste acceptance procedures and practices, and implement mitigative measures	Within 1 month	Landfill Foreman Superintendent	Safety Officer

5.4 Hot Loads Delivered to the Landfill

Prevention

- Waste acceptance policies and procedures; and
- Employee training and awareness.

Response Plan

Action	Time Frame	Who?	Resources
Direct the load to the designated area away from the working face	Immediately	Landfill Foreman	
Contain burning material within soil berms	Immediately	Operating staff	
Apply appropriate measures to extinguish the fire: wet, smother with soil, or allow to burn out	Within 1 hour	Landfill Foreman	Water truck Landfill Equipment
Monitor fire	For duration of fire	Landfill Foreman	
Remove extinguished material and dispose at working face	Within 2 to 3 days after being extinguished	Landfill Foreman	Landfill Equipment

5.5 Elevated Parameters Detected in Surface Water Monitoring System

Prevention

- Annual groundwater monitoring program; and
- Environmental auditing.

Response Plan

Action	Time Frame	Who?	Resources
Re-sample to verify or validate	Within 1 month	Landfill Foreman Environmental Consultant	Environmental Consultant Laboratory
Assess the nature and risk of the problem	Following re-sampling	Landfill Foreman Environmental Consultant	Environmental Consultant AANDC Water Inspector NWB
Investigate corrective measures	Following assessment of the problem	Superintendent	Environmental Consultant AANDC Water Inspector NWB
Implement corrective measures	Following assessment of the problem	Superintendent	Environmental Consultant AANDC Water Inspector NWB

5.6 Leachate Seepage through Cover System

Prevention

- Minimize leachate generation by application of intermediate and final cover;
- Remove or penetrate intermediate cover before overfilling and/or implement vertical drain; and
- Prohibition of liquid waste disposal.

Response Plan

Action	Time Frame	Who?	Resources
Isolate the area and implement containment to prevent leachate from entering off-site and on-site drainage systems	Immediately	Landfill Foreman	Environmental Consultant AANDC Water Inspector NWB
Investigate the cause of the seep	Within 2 days	Landfill Foreman	Environmental Consultant
Investigate corrective measures	Within 1 week	Landfill Foreman	Environmental Consultant AANDC Water Inspector NWB
Implement corrective measures	Within 2 weeks	Landfill Foreman	Environmental Consultant
Review operating procedures and revise if appropriate	Within 2 months	Landfill Foreman Superintendent	Environmental Consultant

5.7 Breach of the Final Cover System Prevention

- Inspection of final cover, twice a year, for vegetative growth, animal burrows, erosion, settlement, or cracking.

Response Plan

Action	Time Frame	Who?	Resources
Identify the nature and significance of the problem	Within 1 month	Landfill Foreman	Environmental Consultant
Develop a corrective plan for the breach	Within 2 to 6 months	Landfill Foreman	Environmental Consultant
Reconstruct the breached area	Within 2 to 6 months	Landfill Foreman Superintendent	Environmental Consultant

5.8 Wind-Blown Litter

Prevention

- Encourage covers on inbound loads;
- Maintain as small a working face as is practical;
- Maintain portable litter catchment fences around active areas; and
- Maintain perimeter fencing.

Response Plan

Action	Time Frame	Who?	Resources
Review working face and litter catchment fence placement	Immediately	Landfill Foreman	Environmental Consultant
Implement off-site litter pick-up	Within 1 week	Landfill Foreman	Temporary staff
Implement on-site litter pick-up	Within 1 month	Landfill Foreman	Temporary staff
Review litter control program and revise if necessary	Within 2 month	Landfill Foreman Superintendent	Environmental Consultant

5.9 Extreme Dust Emissions

Prevention

- Paved access road to disposal area;
- Controlled speed limits on on-site gravel roads;
- Road maintenance;
- Seed soil stockpiles;
- Cover inbound loads;
- Special handling procedures for waste loads prone to emission of dust; and
- Employee training and awareness.

Response Plan

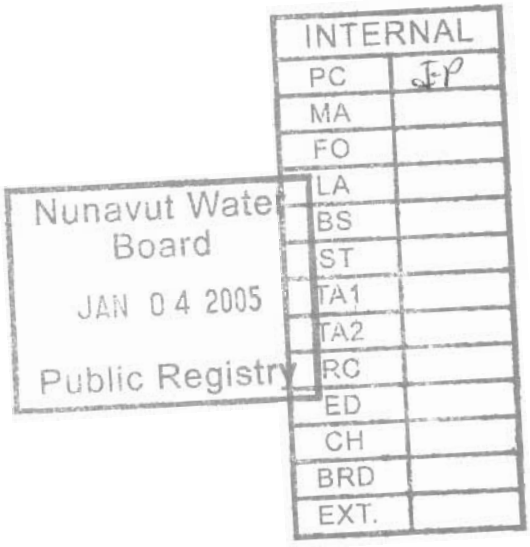
Action	Time Frame	Who?	Resources
Apply water to road surfaces as necessary	Within 2 hours	Landfill Foreman	
Deposit dusty loads in sheltered area	Upon unloading	Vehicle Foreman	
Pre-wet waste load	Prior to delivery when pre-arranged with waste generator	Waste Generator	
Cover dusty wastes with other waste or soil	Immediately upon unloading	Landfill Foreman	
Review waste handling procedures with waste generator for a specific problem material	Immediately	Landfill Foreman Superintendent	

Appendix J: Spill Contingency Plan

City of Iqaluit

Spill Contingency Plan

Updated: November, 2004



DILLON CONSULTING LIMITED
98-5064-01

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1.0 INTRODUCTION

The purpose of this spill contingency plan is to outline a formal practical response system which can be implemented immediately in the event of a deleterious material, such as sewage or fuels, being spilled to the natural environment. **The scope of the document includes spills resulting from activities carried out by the City of Iqaluit or from the failure of a system component in the City's infrastructure only.** This plan is intended to promote the safe handling of potentially hazardous materials to minimize health hazards, environmental damage and clean up costs. The plan is written so it can be easily understood and be reasonably comprehensive in providing access to all information required for handling a spill.

Included with this plan is a one page "If You Discover a Spill" response sheet that is intended to be carried in City vehicles and posted in municipal work areas. In an emergency situation, prompt action is important and quick access to a response checklist may reduce the seriousness of a spill.

A sites plan has been included in Appendix A showing the existing layout of all buildings and waste handling/disposal facilities in the City.

2.0 REPORTING PROCEDURES

City of Iqaluit employees have access to mobile radios and key personnel can be reached through dispatch by pager on a 24-hour basis. The dispatch number is monitored 24 hours a day. **All spills that are determined to be the responsibility of the City and only these spills are reported to the dispatch number.**

All spills exceeding reportable quantities are to be reported immediately to the NWT 24-hour Spill Report Line (867)920-8130. Spill Report Line personnel will provide direction and will ensure that an investigation is undertaken by the appropriate government authority. Appendix C contains a listing of material and the quantities that are reportable in the event of a spill:

The following are contact numbers for municipal response personnel:

CITY OF IQALUIT			
CONTACT	**PAGER #**	**WORK #**	**CELL #**
Dispatch	N/A	979-5650	
Chief Administrative Officer (CAO)	N/A	979-5666	N/A
Director of Public Works	N/A	975-8509	975-1877
Operations Superintendent, Public Works	N/A	979-5653	975-1774
Director of Engineering	N/A	975-8501	N/A
Fire Chief	45	979-5657	975-1446
Chief By-Law	N/A	979-5670	975-1930
Uttilidor Foreman	32	979-5648	975-1443
Garage/Roads Foreman	12	979-5638	975-1463
Truck Sewer Water Foreman	N/A	979-5612	975-1473

Equipment may be dispatched for City spill clean-up by the Director of Public Works only. As and when contracts are negotiated on a yearly basis with local contractors to provide equipment and manpower to the City of Iqaluit. See Appendix G for a list of current as and when contracts.

The 24-Hour Spill Line is currently being run by the GNWT-Resources, Wildlife and Economic Development division. Callers to the spill line will be provided with expert advice regarding hazardous materials spills. The personnel at the spill line will also ensure that the government agencies with jurisdiction over the spill are contacted.

EXTERAL ASSISTANCE – GOVERNMENT RESOURCES	
AGENCY	**TELEPHONE #**
24-Hour Spill Line	(867)920-8130

The effectiveness of this spill contingency plan will greatly depend upon the following factors:

- The proper distribution of the plan to those personnel most likely to encounter a spill or release of deleterious substance during the course of their normal work,
- Training of these same personnel as to the objectives and contents of this plan and how they should react upon encountering a spill or system failure that may result in a subsequent release of deleterious substances.
- Training of the response personnel as to what steps they are required to take in the event of the plan being put into action.

2.1 Spill Finder's Response

a. Be alert and consider your personal safety first,

b. Assess the hazard to persons in the vicinity of the spill and where possible take action to control danger to human life. If possible, identify the material or products involved in this particular incident,

c. If the spill crates a fire, explosion or other hazard to human life, remove all potential ignition sources, if possible, evacuate the area, contact the RCMP,

d. If safe and practical try to take appropriate action to stop the release of material,

e. Contact Dispatch and report the spill,

f. Mark the spill scent to warn the public and prevent access.

2.2 Director of Public Works Response

Once notified by the Fire Department or Dispatch, the Director of Public Works shall:

a. Proceed to the spill location.

b. Liaise with the Fire Chief.

The Fire Chief and Director of Public Works are then responsible to ensure the following steps are carried out:

a. Make the necessary arrangements for first aid and removal of injured personnel. Take the necessary action, where possible, to secure the site to protect human safety.

b. If not already done and if it is safe to do so, take the appropriate action to stop the flow or release of material. If at all possible take the necessary action to contain or prevent the spread of the spilled material.

c. Gather information on the status of the situation,

d. Fill out as completely as possible, a spill report form (attached) and then contact the 24 Hour Spill Line at (867) -920-8130,

e. If required, contact the CAO.

The Director of Public Works will be the overall municipal coordinator for any spill response action, and as such he will:

- Work in conjunction with the lead agency to coordinate clean up personnel,
- Be responsible for evaluating the initial situation and assessing the magnitude of the problem,
- Activate the response plan and call out the key personnel in the response team, as deemed appropriate, to meet the situation.
- Assist in developing the overall plan of action for containment and clean up of the specific incident and delegate the responsibility for implementing the plan.
- Ensure that the assigned responsibilities are carried out and that coordination exists between supervisory team members,
- Assess the requirements for men, equipment, materials and tools to contain the spill in light of what resources are immediately available. The urgency will depend on the nature and magnitude of the spill.

Additionally, it will be the Director of Public Works responsibility to ensure that all City spill response personnel receive adequate training in order to fulfill their responsibilities as part of the spill response team.

3.0 SITE INFORMATION AND FAILURE PREVENTION

3.1 Sewage Spills

It is the purpose of this section to outline possible failures of the waste handling/treatment system and the control measures in place to prevent such failures. The location of the lift stations and force main are shown in Figure 1 in Appendix A. Material that is released due to a spill will be collected and disposed of in the sewage lagoon.

3.1.1 Sewage Lift Station

There are two lift stations currently servicing the sewage system in Iqaluit. Lift Station No. 1 is located by the break water and Lift Station No. 2 is located by the sea lift beach. In the event of a pump shut down, both sewage lift stations will eventually overflow into Koojesse Inlet. The pumps are electrically powered, and will not operate if there is a power failure.

In the event of a pump shutdown, there is approximately 20 minutes storage capacity in the wet wells before the sewage will overflow. Each lift station is equipped with fluid high level alarms that trigger auto dialers which contact the 20 Hour Dispatch number. Sewage trucks are dispatched to manually pump out the wet wells. The lift stations are equipped with diesel powered pumps and piping that may be connected for manual operation during power outages.

The lift stations are physically checked on a daily basis.

3.1.2 Sewage Force Main

The sewage force main is routed entirely beneath the ground surface and is not monitored.

3.1.3 Sewage Lagoon

The sewage lagoon is located at the head of Koojesse Inlet on the southwest side of the Municipality. Sewage is conducted to the lagoon by truck and through the force main. The inlet is located on the north side of the lagoon. Outflow from the lagoon is primarily through the west dyke, which was designed to be "leaky". Seepage through the dyke provides some level of solids removal. The effluent discharges directly into Koojesse Inlet.

3.2 Fuel and Gasoline Storage

Diesel fuel and gasoline is stored n aboveground self-contained tanks at the main municipal garage. Diesel is kept in a 20,000L tank and gasoline is kept in a 4,500L tank. Spill clean-up material at the garage consists of "Absorball" pellets which are taken to the landfill and burned after use.

A 2,000L above ground self contained tank is located adjacent to the water treatment plant. It is used to store heating fuel.

The fuel storage tanks are not located near areas that are considered environmentally sensitive.

3.3 Chlorine Gas

Chlorine gas is stored at the water treatment plant. Two class A response suites, 2 Scott pack and personal chlorine detectors are stored at this location. A fixed chlorine detector is also mounted in the storage area.

3.4 Calcium Chloride

Calcium chloride for use on the roads is stored in Tyvex bags at the main garage.

3.5 Glycol

Glycol in 45 gallon drums is stored at the main garage. There are generally no more than 10 drums present at any given time.

3.6 Hydrofluosilicic Acid

Hydrofluosilicic acid for fluoridating the City water supply is stored at the water treatment plant.

3.7 Lime

A maximum of 150 – 25lb bags of lime are stored at the water treatment center for use in controlling the pH of the municipal water supply.

3.8 Sodium Hypochlorite, 12%

Up to 12-20L containers of sodium hypochlorite are stored at the entrance to the water treatment plant.

3.9 Propane

Two 40lb propane cylinders, used to fuel the Zamboni, are stored in the Zamboni room at the arena.

4.0 Sodium Hydroxide Solution

(Caustic Soda 50%) is stored at the water treatment plant.

4.1 Carus UPZ 985

(Zinc Ortho Phosphate) is stored at the water treatment plant.

4.0 SYSTEM COMPONENT FAILURE PREVENTION

4.1 Sewage Lift Station

The lift stations are physically checked on a daily basis. The wet wells are equipped with high fluid level alarms connected to an autodialed which contacts the dispatch number. In the event of pump shutdown, the wet wells have approximately 20 minutes worth of storage capacity before they overflow.

Diesel pumps and piping are located in the stations, and may be installed for emergency operations when the electrical pumps are down. Sewage trucks are on call and may be mobilized by Dispatch in case of pump shutdown.

4.2 Sewage Force Main

The sewage force main is completely buried and is not monitored.

4.3 Sewage Lagoon

The sewage lagoon is routinely checked seven days per week for levels and leaks. If problems are suspected, the frequency of monitoring would increase.

4.4 Chlorine Gas Storage

A fixed chlorine gas detector is installed in the chlorine gas storage room.

5.0 RESPONSE TEAM, ACTION AND EQUIPMENT

Key personnel have been identified for emergency spill response. They are identified below with their key role in the event of a spill:

Director of Public Works	-	Manpower, Loaders and Trucks
Chief Administrative Officer	-	Media
Fire Chief	-	Trucks, Fire Retardant Foam and Emergency Measures Organizations

The Director of Public Works and the Fire Chief work together to coordinate the mobilization of men and equipment as required to contain the spill. The Chief Administrative Officer is in charge of coordinating the information and messages flow to the media. The Fire Chief will provide men and equipment to assist in a spill response action. If the situation is deemed to require it, the Fire Chief will call out the Emergency Measures Organization (EMO).

The following details the response to be taken in case of a spill or leak at the locations outlined in section 3.

5.1 Sewage Spills

Should a sewage spill become apparent, the Director of Public Works would be responsible to:

- Ensure the public safety at all times and if required, notify the Fire Department and CAO,
- Contact the NWT 24-hour Spill Report Line (867)-920-8130,
- Mobilize staff to determine the cause of the problem, and act to stop the release of the sewage,
- Mobilize equipment as required to contain the spill through trenching, berming, etc. to prevent sewage from entering Koojesse Inlet.
- Clean up contaminated areas with suction trucks, loaders, dump trucks and absorbent materials as required.

5.2 Fuel and Gasoline Spills

In the event of a fuel or gasoline spill, the Fire Chief would be contacted by Dispatch and would be responsible to:

- Ensure the public safety at all times and notify the Director of Public Works and the CAO.

The Director of Public Works is then responsible to:

- Contact the NWT 24-hour Spill Report Line (867)-920-8130,
- Mobilize staff to determine the cause of the problem, and to act to stop the release of the product,
- Mobilize equipment as required to contain the spill through trenching, berming, etc.
- Clean up contaminated areas with hand tools, suction trucks, loaders, dump trucks and absorbent materials as required.

5.3 Chlorine Gas Leaks

In the event of a chlorine gas leak, the Fire Chief would be contacted by dispatch and would be responsible to:

- Ensure the public safety at all times and to notify the Director of Public Works and the CAO,

The Director of Public Works is then responsible to:

- Contact eh 24-hour Spill Report Line (867)-920-8130,
- Mobilize staff to determine the cause of the problem and to act to contain the material, if possible to do so in a safe manner, using the available capping tools,
- If the cylinder cannot be capped, arrange for their transport to a safe area and allow the gas to escape,
- Dispose of the faulty cylinders in such a manner as to minimize the risk to human health.

5.4 Hydrofluosilicic Acid

Spills of this material less than 5L will be cleaned up by the Water Treatment Plant Operator using acid neutralizing material. The Water Treatment Plant Operator will notify the Utilidor Foreman of the spill. For spills in excess of 5L, the Water Treatment Plant Operator will evacuate the immediate area and notify Dispatch. Dispatch will contact the Fire Department. The Fire Chief will then be responsible to:

- Ensure the public safety at all times and notify the Director of Public Works and the CAO.

Upon notification by the Fire Chief or Dispatch, the Director of Public Works will be responsible to:

- Contact the 24-hour Spill Report Line, (867)-920-8130,
- Mobilize staff to determine the cause of the problem and act to contain the material if possible to do so in a safe manner,
- Dispose of the neutralized material according to GNWT regulations.

5.5 Sodium Hypochlorite

Spills of this material less than 5L will be cleaned up by the Water Treatment Plant Operator using appropriate neutralizing material. The Water Treatment Plant Operator will notify the Utilidor Foreman of the spill. For spills in excess of 5L, the Water Treatment Plant Operator will evacuate the immediate area and notify Dispatch. Dispatch will contact the Fire Department. The Fire Chief will then be responsible to:

- Ensure the public safety at all times and notify the Director of Public Works and the CAO.

Upon notification by the Fire Chief or the Dispatch, the Director of Public Works will be responsible to:

- Contact the 24-hour Spill Report Line (867)-920-8130,
- Mobilize staff to determine the cause of the problem and act to contain the material if possible to do so n a safe manner.
- Dispose of the neutralized material according to GNWT regulations.

6.0 GENERAL SPILLS

The following sections provide general information on the handling of large volume spills to a variety of receptors. In Iqaluit, sewage and petroleum products are stored in sufficient quantities that a large volume spill could occur.

6.1 Sewage Spills

6.1.1 Containment on Land

Containment of large volume sewage spills on land is generally accomplished using minor earthworks such as earth dams or dykes and trenches.

Dykes and dams may be used to contain and direct spilled materials. The dam or dyke may be lined with a synthetic liner to render it impermeable to the spilled product. The location and size of the barrier should allow for the volume of material to be contained.

When the ground is thawed, trenches may be used to intercept and collect spilled materials. A synthetic liner may be placed on the trench floor and walls to contain the contaminant in the trench. The location and size of the trench should take into account the volume of material to be contained. Trenches placed down slope of the spill may be effective in containing both surface and subsurface movement of spilled material.

6.1.2 Containment on Surface Water

As sewage will readily mix with water it may prove impossible to contain the spill once water is reached. Strong action should be taken to prevent the material from entering a water body and to stop the material discharge at the source. Care should be taken to ensure public health and safety (eg. Protect water intakes, etc) and the long term environmental effects of the spill should be monitored.

If the water is flowing through a drainage ditch or smaller stream, a channel should be constructed to divert the water flow around the spill area. A dam should be constructed to contain the water the sewage has already entered.

6.1.3 Containment on Ice

Containment of spills on ice will be affected by the load bearing strength of the ice. If it is determined that the ice is safe to work on, containment will be achieved using dykes and dams constructed of earth or snow. The dam or dykes should be lined with plastic to make it impermeable to the sewage. Water may be sprayed on snow dams/dykes to form a impermeable ice layer. Absorbent materials may be used in conjunction with barriers to prevent further spread and seepage.

6.1.3 Containment on Snow

Snow will readily absorb liquids, which may facilitate the removal of spilled material to a recovery or disposal site. Saturated contaminated snow may be collected relatively easily and hauled away. Compacted snow can be used to create an effective physical barrier to reduce the spread of spilled materials.

Several types of snow containment structures may be constructed to contain spilled materials. Snow dykes and dams can be erected and then lined with an impermeable liner or sprayed with water to form an impermeable ice layer. Initially the snow around the perimeter of the spill can be compacted, eg. With a snowmobile, to slow the movement of contaminants. The saturated snow can be collected with hand tools or heavy equipment and removed to the sewage lagoon for disposal.

Caution should be exercised as spilled materials can migrate under snow cover for considerable distances and not be visible from above.

6.1.4 Material Removal

Removal of the spilled sewage may be accomplished using several techniques depending on the nature of the spill. Generally, methods used include suction. mechanical removal and the application of absorbent material.

Suction methods may be used initially if there is a significant quantity of free product on the ground. Equipment used to recover material in this fashion may include vacuum trucks, portable pumps or shop vacuums.

Suction screens may be required to prevent hose plugging and possible pump drainage.

Mechanical recovery using hand tools or heavy equipment should be used to collect soils or other loose material contaminated by the sewage. Caution should be exercised when using heavy equipment on a spill site as it is possible to cause a greater environmental impact from the operation of the equipment than from the spill itself.

Recovered liquids and saturated soils will be disposed of in the sewage lagoon.

6.2 Fuel and Gasoline Spills

Extreme caution should be exercised when containing and cleaning up spilled petroleum products due to high fire and explosion hazards associated with these materials.
Depending on the size of the spill and surrounding conditions, personal protective equipment such as rubber gloves (nitrile, neoprene, butyl rubber or PVC), rubber boots (neoprene or butyl rubber), chemical safety goggles and NIOSH/MSHA approved half mask respirators with organic vapor cartridges may be required. In poorly ventilated areas where there is the potential for vapors to concentrate, the use of heavy equipment should be carefully evaluated due to the potential explosion hazard.

6.2.1 Containment on Land

Containment of large volume fuel spills on land is generally accomplished using minor earthworks such as earth dams or dykes and trenches.

Dykes and dams may be used to contain and direct spilled materials. The dam or dyke may be lined with a synthetic liner to render it impermeable to the spilled product. The location and size of the barrier should allow for the volume of the material to be contained.

When the ground is thawed, trenches may be used to intercept and collect spilled materials. A synthetic liner may be placed on the trench floor and walls to contain the contaminant in the trench. This location and size of the trench should take into account the volume of material to be contained. Trenches placed down slope of the spill may be effective in containing both surface and subsurface movement of spilled material.

6.2.2 Containment on Surface Water

As diesel fuels and gasoline are less dense than water, they will float on the surface. Spills of these materials to surface water bodies may be contained using booms and their floating devices.

In standing water, booms should be deployed to contain the floating material close to the shore, thereby facilitating contaminant recovery. If the water is flowing, the booms should be stretched across the width of the water surface and angled against the current to allow for shore side collection.

If the water is flowing through a drainage ditch or smaller stream, an underpass or water bypass dam should be constructed. An earthen dam is constructed to completely stop the flow of water. Piping is then installed to allow water to flow through below the level of the floating fuel. Alternately, a channel may be constructed to divert the water flow around the spill area. A dam should be constructed to contain the water the fuel has already entered.

Weirs constructed of sheet metal, plywood, etc. may be constructed to prevent material flow through culverts or ditches. The sheet is inserted into the stream to below the level of the fuel. The water flows under the weir and spilled material will collect at the surface for removal.

If commercial booms are not readily available, improvising booms can be constructed of virtually any material that will float and form a barrier, eg. logs, inflated fire hoses, etc. These materials may be used alone or, preferably, as supports for absorbent materials.

6.2.3 Containment on or Under Ice

Containment of spills on ice will be affected by the load bearing strength of the ice. If it is determined that the ice is safe to work on, containment will be achieved using dykes and dams constructed of earth or snow. The dam or dyke should be lined with plastic to make it impermeable to the fuel. Water may be sprayed on snow dams/dykes to form an impermeable ice layer. Absorbent materials may be used in conjunction with barriers to prevent further spread and seepage.

If the spill penetrates the ice, containment becomes more difficult. If the water beneath the ice is standing, the ice will be broken to install a containment boom.

If the water is flowing slowly, ice slotting may be used. A trench is cut into the ice downstream of the spill and at an angle to the current to deflect and concentrate the spill. Spilled material that collects in the ice slot may be pumped out, absorbed or burned in place.

Vertical barriers, e.g. plywood sheets, may be inserted into the ice to deflect the movement of spilled material. Trenches should be cut in the ice at an angle to the direction of flow. The vertical barriers are inserted in the slots and allowed to freeze into place. The extent of the under ice spill may be monitored by boring observation holes into the ice with an auger.

6.2.4 Containment on Snow

Snow will readily absorb liquids, which may facilitate the removal of spilled material to a recovery or disposal site. Saturated contaminated snow may be collected relatively easily and hauled away. Compacted snow can be used to create an effective physical barrier to reduce the spread of spilled materials.

Several types of snow containment structures may be constructed to contain spilled material. Snow dykes and dams can be constructed and then lined with an impermeable liner or sprayed with water to form an impermeable ice layer. Initially the snow around the perimeter of the spill can be compacted, eg. with a snowmobile, to slow the movement of contaminants. The saturated snow can be collected with hand tools or heavy equipment and removed to the land fill for disposal or recovery.

Caution should be exercised as spilled material can migrate under snow cover for considerable distances and cannot be visible from above.

6.2.5 Fire or Explosion

The first step to be taken at a site where there is a fire or explosion risk, or if the material is on fire is to evacuate people from the surrounding area. Dykes or trenches are then constructed down slope of the spilled material to minimize spread of unburned liquids and/or the fire. The fire may then be extinguished using suitable methods and action may be taken to prevent further spillage, contain the material and begin clean-up procedures.

6.2.5 Material Removal

Removal of the spilled fuels may be accomplished using several techniques. Generally, methods used include suction, mechanical removal and the application of absorbent material.

Suction methods may be used initially if there is a significant quantity of free product on the ground or on the surface of a water body. Equipment used to recover material in this fashion may include vacuum trucks, portable pumps or shop vacuums.

Suction screens may be required to prevent hose plugging and possible dump damage.

Mechanical recovery using hand tools or heavy equipment should be used to collect soils or other loose material contaminated by the fuel. Caution should be exercised when using heavy equipment on a spill site as it is possible to cause a greater environmental impact from the operation of the equipment than from the material itself.

Absorbents may be used to soak up petroleum product. They are commonly used for final clean-up, recovery of small amounts of fuel or to remove fuel from places which are inaccessible to other spill clean up methods. Snow and soil can be used as absorbent material for a variety of petroleum products. The saturated absorbent can be collected mechanically and moved to a suitable disposal location.

Recovered liquids will be disposed of in accordance with appropriate GNWT regulations. Saturated soils and absorbents will be transported to the landfill for disposal

6.3 Chlorine Gas Leak

Chlorine is a very toxic gas. Appropriate personal safety equipment must be worn by personnel attempting to contain a leak. Two Class A response suites with Scott packs are located at the Fire Department for use in the event of a leak.

6.3.1 Containment and Disposal

Capping tools are available for sealing leaking cylinders. If a cylinder is capped successfully, it may be returned to the supplier for disposal. If the cylinder cannot be capped, remove the cylinder to a safe location downwind of any populated area and allow the gas to escape.

7.0 SPILL EQUIPMENT INVENTORY

7.1 Spill Equipment Inventory

The following is a listing of equipment owned by the City of Iqaluit that may be used in the event of a spill emergency. The usual location of the equipment is also indicated.

MUNICIPAL SPILL EMERGENCY EQUIPMENT	
EQUIPMENT	**STORAGE LOCATION**
2 Cat 950 Loaders	1 at the Municipal Garage 1 at 1552 Parking Garage
1 Rubber Tired Backhoe	Municipal Garage (outside)
2 Dump Trucks	1 at the Apex Parking Garage 1 at the Municipal Garage
1 Cat 814 Wheel Dozer	1 at the Air Bas Garage
2 Road Graders	1 at 1552 Parking Garage 1 at the Apex Parking Garage
1 Cat M322 Excavator with hammer	1 at the Municipal Garage (outside)
4 Sewage Trucks	4 at the Airbase Parking Garage
5 Water Trucks	1 at the Airbase Parking Garage 4 at the Apex Parking Garage
1 Cat 966 Loader	1 at the Apex Parking Garage

7.2 Resource Contact

The following is a listing of internal and external resources that may be contacted for aid in the event of a spill.

RESOURCES		
CONTACT	**CONTACT #**	**RESOURCE PROVIDED**
Fire Department: Volunteers	979-4422	Manpower, Trucks, Foam
Fire Department: Ambulance	979-4422	Medical, Rescue Equipment
Fire Department: EMO	979-4422	Evacuation, Rescue
24-Hour Spill Report Line	(867)-920-8130	Expert Advice
External Contractors	See Appendix G for As and When Contracts	Manpower, Equipment

8.0 TRAINIG EXERCISES

Training and communication exercises should be carried on an annual basis to determine the actual readiness and ability of the City to handle a spill emergency. The exercises should be served to train key personnel and determine any weaknesses in the plan prior to the occurrence of an emergency situation. A variety of scenarios should be tested, eg. sewage spills from the force main, sewage lagoon dam failures, chlorine gas leaks, fuel spills, etc. to ensure that appropriate action can be taken quickly.

The Fire Department and the Emergency Measures Organization (EMO) currently conduct disaster training exercises in the City of Iqaluit. Neither of these groups target hazardous materials scenarios specifically, but a spill situation is often included as part of the larger exercise.

The Worker's Compensation Board will provide funding for employees to participate in hazardous materials courses if contact with hazardous materials is a component of the employee's job description. Courses available include Materials Safety Data Sheets (MSDS), Workplace Hazardous Materials Systems (WHMIS) and First Aid.