



Appendix H

Operation & Maintenance Plans

Appendix H1
Water Reservoir



Water Storage and Treatment Facility Operation and Maintenance (O&M) Plan Hamlet of Qikiqtarjuaq, Nunavut

Prepared for

The Hamlet of Qikiqtarjuaq
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Water Storage and Treatment Facility
Operation and Maintenance (O&M) Plan
Hamlet of Qikiqtarjuaq, Nunavut

February 2006

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1.0 Introduction

The Hamlet of Qikiqtarjuaq (meaning “big island”), is a Community of approximately 599 people located on the eastern coast of Baffin Island and on an island known as Broughton Island in the territory of Nunavut. As illustrated in Figure 1, the Hamlet is located approximately 470 kilometers northeast of the Capital City of Iqaluit, a distance that is covered by plane in about one hour. The geographic coordinates for the Hamlet of Qikiqtarjuaq are 67°33’ north latitude and 64°02’ west longitude. As indicated on Figure 2, the community is situated on the northwest portion of Broughton Island.

Qikiqtarjuaq is located within the continuous permafrost zone. Maximal local depth of annual thaw of the active layer ranges from 0.6 to 1.6 meters, depending on the thickness and nature of the surface cover. Materials located beneath the thin active layer are perennially frozen to a substantial depth. Qikiqtarjuaq sits on glacial drift primarily composed of silty sand and gravels mixed with boulders.

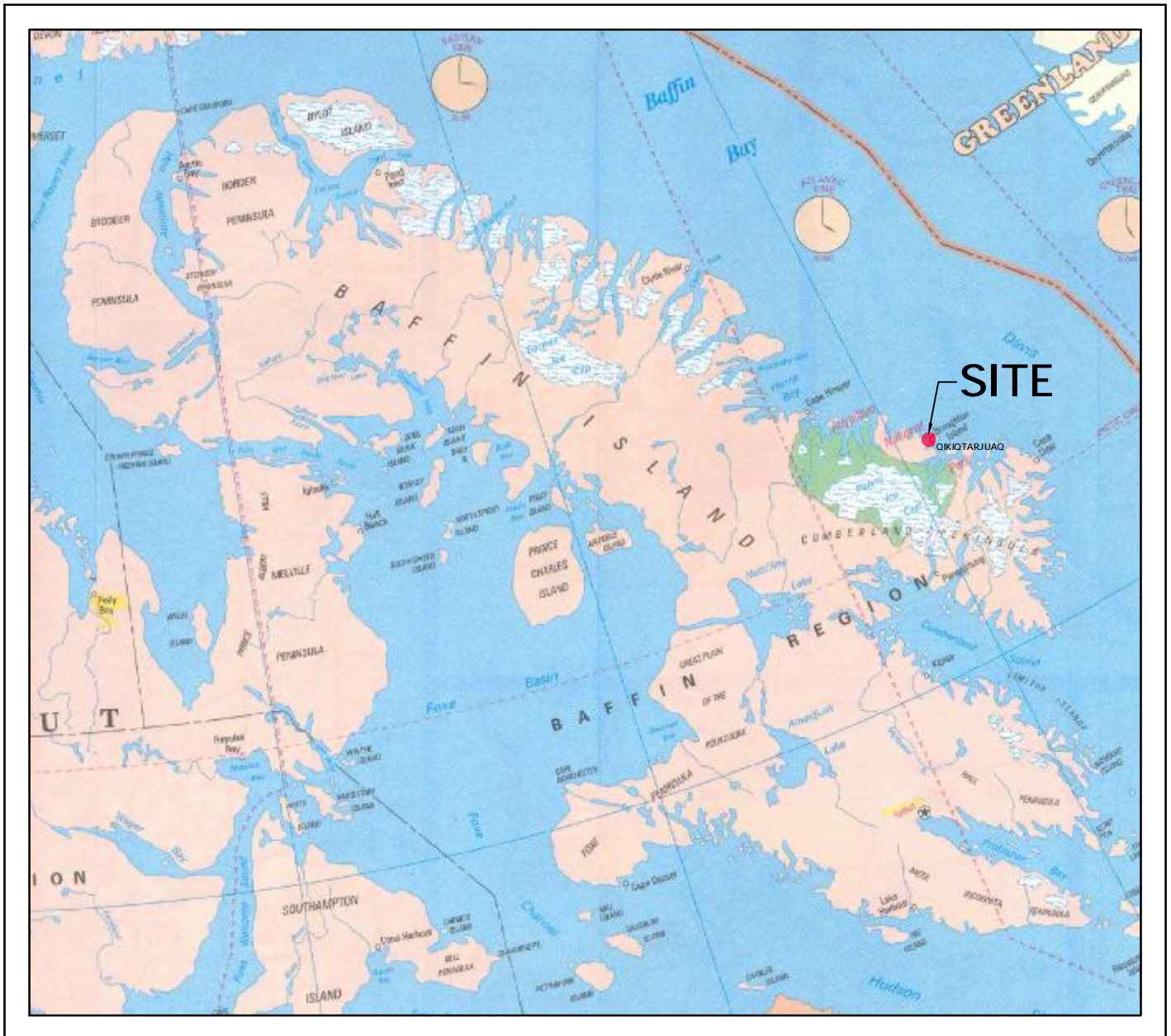
The vegetation present in Qikiqtarjuaq is typical of that evidenced on the Arctic tundra. Hardy grasses, mosses, and lichens sit in a thin organic layer on the surface, which is generally 0.2 m or less in thickness.

Qikiqtarjuaq receives an average of 39 mm of rainfall and 223 mm of snowfall per annum. July mean high and low temperatures are 7°C and 1°C, respectively. January mean high and low temperatures measure -21°C and -28°C, respectively. July and August are the only two months of the year that historically have had average daily temperatures above the freezing mark. Prevailing winds are generally north-northeast with an annual average velocity of 8.3 km/h. Climate normal information was obtained from Environment Canada’s website, and is available in Appendix A.

The Detailed Design Report (Nuna Burnside, 2006) for the Improvements to the Water, Wastewater, and Solid Waste Facilities determined the projected population and associated water supply requirements using information from the Nunavut Bureau of Statistics. The tables with the detailed calculations are available for inspection in Appendix B.

1.1 Purpose

The Hamlet of Qikiqtarjuaq operates their municipal water, sewage, and solid waste facilities under the Nunavut Water Board (NWB) License NWB3Q1K0106, dated November 28, 2000 (Appendix C). Part G, Section 1 requires that an Operation and Maintenance (O&M) Plan be submitted for the facilities in accordance with all applicable regulations and following applicable guidelines. This document provides a list of tasks and procedures that will assist the Hamlet’s operations staff in the O&M of the facility.



Map Reference:
Map of Canada
Published by the CAA

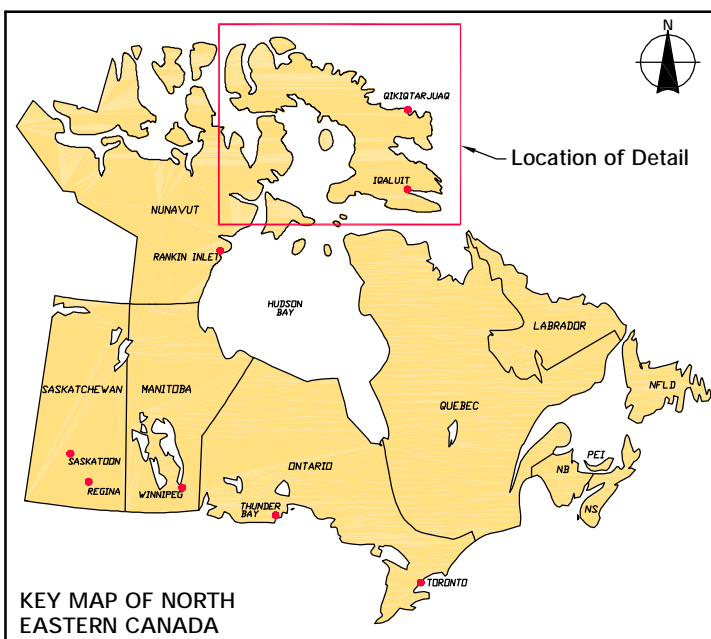


FIGURE 1 - SITE LOCATION MAP

THE HAMLET OF QIKIQTARJUAQ, NUNAVUT

WATER STORAGE & TREATMENT FACILITY

O&M PLAN

January 2006
Project Number: N-0 09439.0
Prepared by: K. Pridham

Verified by: M. Paznar

Burnside

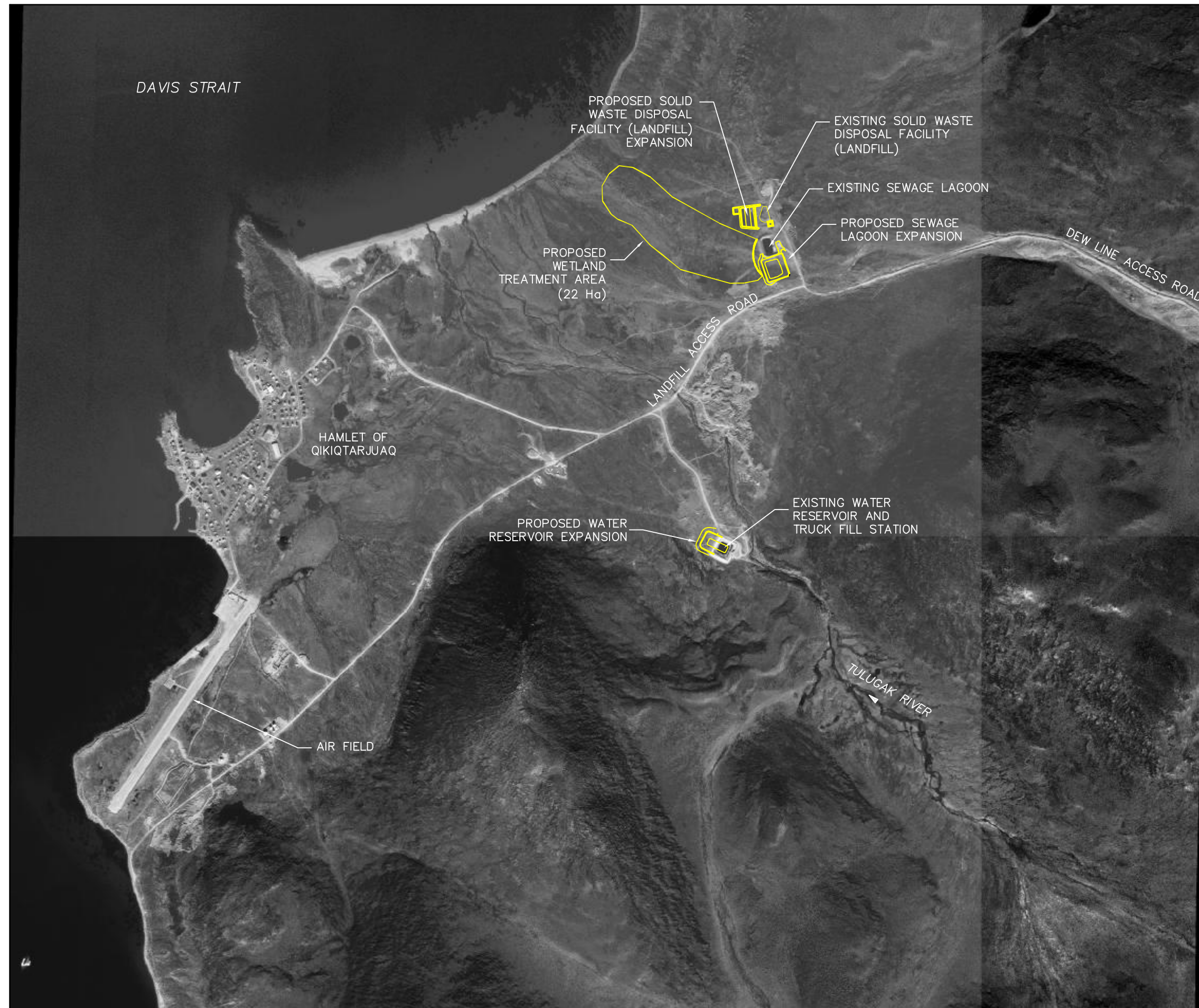
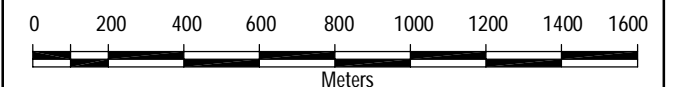
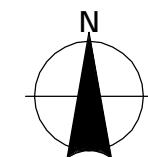


FIGURE 2
THE HAMLET OF QIKIQTARJUAQ
*WATER STORAGE
& TREATMENT FACILITY
O&M PLAN*

SATELLITE IMAGERY OF
ENTIRE COMMUNITY
AND INFRASTRUCTURE

Satellite Imagery Source:
September 2004 Satellite Image obtained from DigitalGlobe Inc.



1:20,000
January 2006
Project Number: N-0 09439.0

Projection: UTM Zone 20
Datum: NAD83

Prepared by: C. Sheppard

Verified by: M. Paznar

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The O&M Plan of the Water Storage And Treatment Facility will be used in conjunction with the normal operating procedures. This document provides a list of tasks and procedures that will assist the Hamlet's operations staff in the O&M of the facility.

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2.0 Background Information on Hamlet Operations

The Hamlet of Qikiqtarjuaq provides trucked water and sewage services, as well as regular solid waste pickup for the Community's residents, businesses, and institutions. Water is currently drawn from the Tulugak River during the summer, and from the reservoir, which is filled from the river during the remainder of the year (Figure 2). The earthen reservoir, which is located approximately 2.2 km from the Hamlet, was expanded in 1978/1979 to its current size of approximately 90 m x 90 m x 9 m and lined with a geosynthetic fabric.

The proposed water reservoir (Figure 3) will be approximately 90 m x 156 m x 9 m, and lined with a potable grade geomembrane liner system. This reservoir is designed to meet the projected needs of the community to the year 2027. Water is treated with chlorine prior to distribution to the Community via Hamlet owned tanker trucks. Water requirements for 2005 were 22,822 m³.

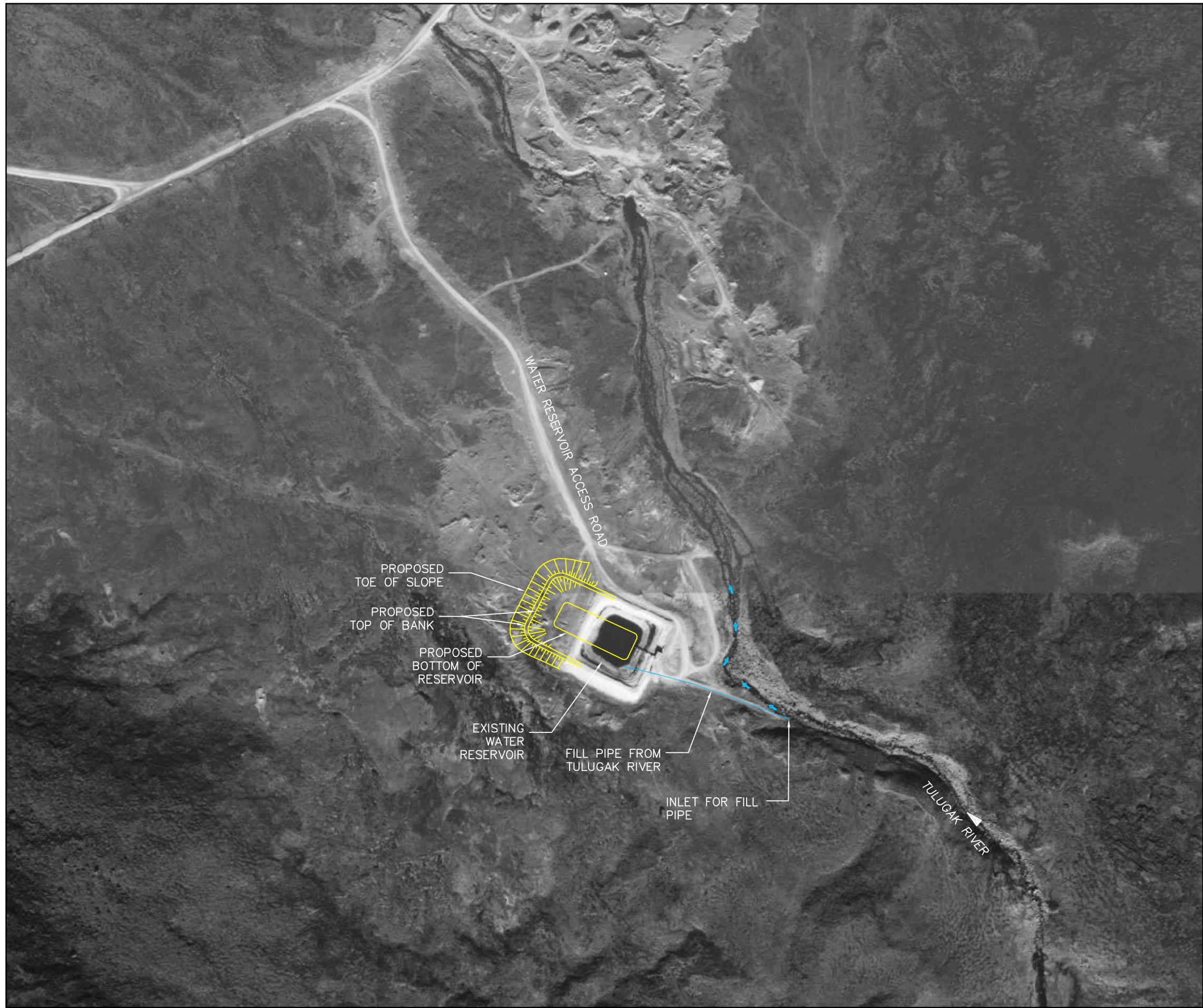


FIGURE 3

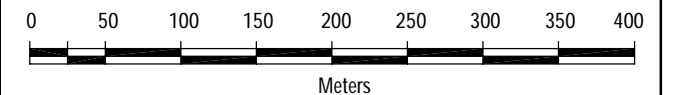
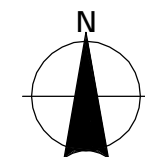
THE HAMLET OF QIKIQTARJUAQ
*WATER STORAGE
& TREATMENT FACILITY
O&M PLAN*

REGIONAL VIEW OF
WATER RESERVOIR

Legend

→ → → INTERPRETED SURFACE WATER FLOW DIRECTION

Satellite Imagery Source:
September 2004 Satellite Image obtained from DigitalGlobe Inc.



1:5,000
January 2006
Project Number: N-0 09439.0

Projection: UTM Zone 20
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3.0 Operation and Maintenance of the Water Treatment Facility

Satellite imagery of the proposed upgraded Water Storage And Treatment Facility operated by the Hamlet of Qikiqtarjuaq, which is described above, is provided in Figure 2. This Figure illustrates both the drainage pathway of the treatment wetland and the proximity to adjacent water bodies (in this case, the Davis Strait). The boundaries of the treatment wetland area are also illustrated in this figure.

In the event of emergency, guidance regarding containment and site emergency response can be obtained from the following sources (Table 1):

Table 1 – Emergency Contacts

Contact	Location	Telephone Number	Fax Number
INAC – Manager, Water Resources	Iqaluit	(867) 975-4550	(867) 979-6445
Hamlet of Qikiqtarjuaq – SAO	Qikiqtarjuaq	(867) 927-8832	(867) 927-8120
Government of Nunavut (Regional Engineer)	Pond Inlet	(867) 975-7314	
Environment Canada – Inspector	Iqaluit	(867) 975-4644	(867) 975-4594
Fire Department	Qikiqtarjuaq	(867) 927-4422	
RCMP Detachment	Qikiqtarjuaq	(867) 927-0123	
Community Health Center	Qikiqtarjuaq	(867) 927-8916	

3.1 Water Distribution Procedures

The following water distribution operational procedures shall be carried out by the Hamlet of Qikiqtarjuaq on a daily basis (weather dependent):

- Residential, institutional, and commercial water storage tanks shall be filled from Hamlet-operated water delivery vehicles, with water obtained from the Hamlet Water Storage And Treatment Facility
- Daily water usage volumes obtained from the Hamlet Water Storage and Treatment Facility, as well as trip counts shall be recorded on the recording form attached in Appendix D
- In the event of an accident, a spill of petroleum products or a fire during water distribution operations, *the Hamlet of Qikiqtarjuaq Environmental Emergency Response Plan* (Appendix E) shall be implemented.

3.2 Water Storage Facility Refilling Operational Procedures

The following operational procedures are to be carried out by the Hamlet of Qikiqtarjuaq, during refilling operations at the Hamlet Water Supply Facility reservoir:

- At the beginning of the season, collect water samples from the Tulugak River, and submit for chemical and microbiological analysis to confirm level of treatment is still adequate
- Raw water from the Tulugak River shall be transferred by gravity from the intake location (Figure 2) to the water reservoir
- Water transfer operations shall commence on or about July 1st, and cease when the reservoir has been filled to the NWB mandated freeboard of 1 meter
- During water transfer operations, the fill pipe and associated intake structures shall be inspected twice daily for defects or blockages, and repaired as necessary
- Upon completion of water transfer operations, the fill pipe and intake structures shall be secured, the reservoir berms inspected, and any required maintenance (as described below) performed.

3.3 Water Supply Facility Truckfill Station Operational Procedures

The following operational procedures are to be carried out by the Hamlet of Qikiqtarjuaq, during water treatment and truckfill operations at the Hamlet Water Storage and Treatment Facility:

- Untreated water from the reservoir at the Facility shall be transferred by submersible pump to the water distribution vehicles through the truckfill station, at a rate of approximately 1,000 L/min (minimum recommended for fire protection)
- The monitoring level of treatment shall be primary and secondary disinfection, through the addition of sodium hypochlorite
- The chlorine feed system shall be inspected daily
- Water being transferred to the distribution vehicles shall be dosed with sodium hypochlorite at a rate sufficient that a free chlorine residual of 0.2 mg/L, after thorough mixing and 20 minutes of contact time is maintained, in accordance with the Public Health Act (1992) and associated Regulations

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- Chlorine residuals shall be monitored daily, or as directed by a Public Health Inspector (as defined by the Public Health Act (1992))
- Facility generators and associated fuel storage shall be monitored daily.

3.4 Periodic and Seasonal Maintenance Procedures

The following procedures shall be undertaken by the Hamlet of Qikiqtarjuaq during periodic and seasonal maintenance operations at the Water Supply Facility:

- The roadway and truck pad shall be maintained by snow clearing in the winter and grading in the summer, and repaired as necessary
- Ditches and drainage channels at the Water Supply Facility shall be inspected during the summer for erosion and repaired as necessary
- Site warning signage, which identifies the boundaries of the Water Supply Facility shall be inspected weekly, and repaired or replaced as necessary
- The Truckfill Station at the Water Supply Facility shall be inspected for damage or displacement weekly, and repaired as necessary
- Any airborne litter shall be removed from the Water Supply Facility to the Hamlet landfill weekly, or as required
- The berms at the Water Supply Facility shall be inspected during the summer for erosion and settlement weekly, and repaired as necessary
- The liner of the Water Supply Facility shall be inspected annually, and repaired as necessary.

The activities described above shall be completed by Hamlet staff and the details of any repairs shall be reported in the Annual Report submitted to the Nunavut Water Board, in compliance with the Hamlet's Water License.

3.5 Facility Monitoring Procedures

Regular monitoring of the water provided from the Potable Water Treatment Facility is required. The Monitoring Program shall also include samples collected from the Hamlet Water Supply (the Tulugak River) during water transfer operations. Water samples collected shall be analyzed for the following parameters:

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- Ammonia Nitrogen (NH₃-N)
- pH
- Turbidity
- Total Suspended Solids (TSS)
- Nitrate-Nitrite (NO₃-NO₂)
- Total Phenols (Total-P)
- Total Hardness
- Magnesium (Mg)
- Sodium (Na)
- Total Arsenic (As)
- Total Copper (Cu)
- Total Cobalt (Co)
- Total Lead (Pb)
- Total Mercury (Hg)
- Total Coliforms (TC)
- *Escherichia coli* (*E.coli*)
- Colour
- Conductivity
- Chloride (Cl)
- Total Organic Carbon (TOC)
- Oil and Grease (OGG) (Visual)
- Total Alkalinity
- Calcium (Ca)
- Potassium (K)
- Sulphate (SO₄)
- Total Cadmium (Cd)
- Total Chromium (Cr)
- Total Iron (Fe)
- Total Manganese (Mn)
- Total Nickel (Ni)
- Heterotrophic Plat Count (HPC)

Any additional analytical parameters which are identified in the NWB water license, or by an Inspector (as defined in the *Nunavut Waters and Nunavut Surface Rights Tribunal Act*) or by a Public Health Inspector (as defined by the *Public Health Act* (1992)) shall also have samples collected and analyzed.

Daily monitoring of residual chlorine levels shall be undertaken, to facilitate and confirm the maintenance of a free chlorine residual in treated water in accordance with the *Public Health Act* (1992) and associated *Regulations*.

Water sampling completed by the Hamlet of Qikiqtarjuaq shall be in accordance with the *Hamlet of Qikiqtarjuaq Monitoring Program Quality Assurance/Quality Control (QA/QC) Plan*, which is attached to this Plan (Appendix F).

A monitoring station will be established at the Water Supply Facility. Monthly and annual quantities of water utilized will be measured and recorded in an official log book (Appendix D)

3.6 Annual Reporting Procedures

Results of analytical testing and monitoring are to be recorded on a regular basis by the staff. Copies of the analytical certificates and Chain of Custody forms are to be kept for future reference to determine the effectiveness of the treatment facility.

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4.0 References

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

Nuna Burnside Engineering and Environmental Ltd. January 2005. *Detailed Design of the Improvements to the Water Reservoir, Wastewater Lagoon and Solid Waste facility in the Hamlet of Qikiqtarjuaq*. Rankin Inlet, Nunavut.

Nunavut Water Board. September 2000. *Hamlet of Qikiqtarjuaq Water License NWB3QIK0106*. Gjoa Haven, Nunavut.

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Appendix A
Climate Normal Data

Appendix A: Climate Normals for Qikiqtarjuaq, Nunavut

<u>Temperature:</u>	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	Code
Daily Average (°C)	-24.8	-25.8	-23.5	-17.3	-8.4	-0.4	4.4	3.1	-2.5	-8.1	-15.8	-22.3		D
Standard Deviation	4.4	3.4	2.9	1.9	1.6	2.3	1.7	1.8	1.0	1.8	2.7	3.4		D
Daily Maximum (°C)	-21.9	-22.8	-20.2	-13.8	-5.3	2.4	7.3	5.9	-0.4	-5.9	-13.2	-19.4		D
Daily Minimum (°C)	-27.7	-28.8	-26.7	-20.8	-11.4	-3.1	1.4	0.4	-4.5	-10.4	-18.3	-25.1		D
Extreme Maximum (°C)	3.9	1.1	4.0	7.8	11.1	17.8	18.3	18.9	14.4	10.6	7.5	5.0		
Date (yyyy/dd)	1958/23	1960/11	1980/23	1975/29	1991/31	1973/29	1965/22+	1973/21	1962/04+	1984/16	1985/03	1967/17		
Extreme Minimum (°C)	-41.7	-42.8	-40.7	-34.3	-26.1	-12.2	-8.9	-7.8	-13.9	-24.4	-33.3	-39.2		
Date (yyyy/dd)	1961/11	1979/16	1985/01	1984/05	1970/07	1963/03+	1972/03+	1972/22	1972/29	1986/27	1957/16	1982/31		
<u>Precipitation: Precipitation:</u>														
Rainfall (mm)	0.0	0.0	0.0	0.0	0.4	3.4	16.3	15.9	2.9	0.3	0.0	0.0		D
Snowfall (cm)	6.8	6.8	5.7	16.0	31.4	15.2	10.5	10.2	30.0	45.8	37.1	7.3		D
Precipitation (mm)	6.8	6.8	5.7	16.0	31.8	18.6	26.8	26.1	32.9	46.1	37.1	7.3		D
Average Snow Depth (cm)	82	79	77	74	65	32	4	1	8	37	76	85	52	C
Median Snow Depth (cm)	83	79	77	74	66	32	3	1	5	36	78	85	52	C
Snow Depth at Month-end (cm)	79	78	74	71	58	13	3	2	20	56	86	83		D
Extreme Daily Rainfall (mm)	0.0	0.0	0.0	0.0	8.6	35.6	15.0	25.4	14.5	5.1	0.0	0.0		
Date (yyyy/dd)	1958/30+	1959/01+	1960/01+	1959/01+	1973/25	1966/27	1972/26	1959/07	1971/07	1968/05	1958/01+	1958/01+		

<u>Temperature:</u>	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	Code
Extreme Daily Snowfall (cm)	31.8	14.0	7.0	22.6	28.2	35.6	17.0	17.8	33.0	38.4	33.0	22.4		
Date (yyyy/dd)	1963/22	1970/15	1977/17	1968/16	1981/27	1973/21	1984/31	1968/07+	1967/18	1967/25	1969/05	1967/22		
Extreme Daily Precipitation (mm)	31.8	14.0	7.0	22.6	28.2	35.6	17.0	25.9	33.0	38.4	33.0	22.4		
Date (yyyy/dd)	1963/22	1970/15	1977/17	1968/16	1981/27	1966/27+	1984/31	1959/07	1967/18	1967/25	1969/05	1967/22		
Extreme Snow Depth (cm)	157.0	146.0	152.0	157.0	164.0	150.0	117.0	25.0	81.0	178.0	175.0	157.0		
Date (yyyy/dd)	1965/02+	1988/29	1988/04+	1988/21	1977/06	1970/01+	1973/01	1973/01	1967/19+	1964/31	1964/06	1964/27+		
<u>Days with Maximum Temperature: Days with Maximum Temperature:</u>														
<= 0 °C	30.7	28.2	30.8	29.3	26.7	11.2	1.5	3.1	19.2	29.7	29.9	30.9		D
> 0 °C	0.35	0.0	0.24	0.67	4.3	18.9	29.5	27.9	10.8	1.3	0.15	0.11		D
> 10 °C	0.0	0.0	0.0	0.0	0.05	1.5	7.5	5.4	0.47	0.0	0.0	0.0		D
> 20 °C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		D
> 30 °C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		D
> 35 °C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		D
<u>Days with Minimum Temperature: Days with Minimum Temperature:</u>														
> 0 °C	0.0	0.0	0.0	0.0	0.25	5.8	18.3	14.2	2.0	0.0	0.0	0.0		D
<= 2 °C	31.0	28.2	31.0	30.0	31.0	27.2	18.2	22.4	29.3	31.0	30.0	31.0		D
<= 0 °C	31.0	28.2	31.0	30.0	30.8	24.2	12.7	16.8	28.0	31.0	30.0	31.0		D
< -2 °C	31.0	28.2	31.0	30.0	30.4	19.5	6.0	9.5	25.0	30.7	30.0	31.0		D
< -10 °C	30.4	28.2	30.7	28.8	19.9	0.67	0.0	0.0	0.72	15.3	28.2	30.7		D

Temperature:	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	Code
< -20 °C	27.4	27.0	27.5	17.5	0.60	0.0	0.0	0.0	0.0	0.33	10.4	26.2		D
< - 30 °C	10.1	13.3	9.8	0.80	0.0	0.0	0.0	0.0	0.0	0.0	0.11	6.6		D
Days with Rainfall: Days with Rainfall:														
>= 0.2 mm	0.0	0.0	0.0	0.0	0.05	0.95	5.5	5.6	0.84	0.21	0.0	0.0		D
>= 5 mm	0.0	0.0	0.0	0.0	0.05	0.24	1.1	0.85	0.26	0.0	0.0	0.0		D
>= 10 mm	0.0	0.0	0.0	0.0	0.0	0.05	0.21	0.25	0.05	0.0	0.0	0.0		D
>= 25 mm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		D
Days With Snowfall: Days With Snowfall:														
>= 0.2 cm	4.0	3.5	3.2	6.2	9.1	4.9	2.9	3.5	8.6	13.6	9.5	4.3		D
>= 5 cm	0.35	0.30	0.14	1.0	1.8	1.1	0.72	0.65	1.8	3.1	2.5	0.30		D
>= 10 cm	0.05	0.0	0.0	0.19	0.81	0.19	0.22	0.25	0.65	0.84	0.85	0.10		D
>= 25 cm	0.0	0.0	0.0	0.0	0.05	0.05	0.0	0.0	0.0	0.0	0.05	0.0		D
Days with Precipitation: Days with Precipitation:														
>= 0.2 mm	4.0	3.5	3.2	6.2	9.1	5.8	7.7	8.3	9.5	13.7	9.5	4.3		D
>= 5 mm	0.35	0.30	0.14	1.0	1.8	1.3	1.9	1.7	2.0	3.1	2.5	0.30		D
>= 10 mm	0.05	0.0	0.0	0.19	0.86	0.29	0.47	0.50	0.68	0.84	0.85	0.10		D
>= 25 mm	0.0	0.0	0.0	0.0	0.05	0.05	0.0	0.0	0.0	0.0	0.05	0.0		D

<u>Temperature:</u>	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	Code
<u>Days with Snow Depth:</u> <u>Days with Snow Depth:</u>														
>= 1 cm	31.0	28.2	31.0	30.0	31.0	27.8	11.0	6.3	20.1	31.0	30.0	31.0		D
>= 5 cm	31.0	28.2	31.0	30.0	31.0	25.7	6.2	3.2	13.9	30.7	30.0	31.0		D
>= 10	31.0	28.2	31.0	30.0	31.0	23.2	3.3	1.3	9.2	30.0	30.0	31.0		D
>= 20	31.0	28.2	31.0	30.0	30.6	16.9	1.7	0.25	3.9	25.1	29.7	31.0		D
<u>Wind:</u> <u>Wind:</u>														
Maximum Hourly Speed	130.0	122.0	104.0	93.0	77.0	74.0	121.0	74.0	183.0	102.0	111.0	92.0		
Date (yyyy/dd)	1988/16	1996/19	1989/29	1998/14	1972/23	1987/27+	1956/22	1984/22	1997/24	1989/27	1977/05	1974/01		
Direction of Maximum Hourly Speed	NW	S	NW	SW	W	NW	SW	NW	S	NW	W	W	S	
<u>Degree Days:</u> <u>Degree Days:</u>														
Above 24 °C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		D
Above 18 °C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		D
Above 15 °C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		D
Above 10 °C	0.0	0.0	0.0	0.0	0.0	0.3	4.0	1.7	0.0	0.0	0.0	0.0		D
Above 5 °C	0.0	0.0	0.0	0.0	0.0	5.5	37.5	20.4	1.4	0.0	0.0	0.0		D
Above 0 °C	0.0	0.0	0.0	0.1	2.0	40.8	141.0	100.1	16.5	0.2	0.0	0.0		D
Below 0 °C	759.6	739.9	730.2	520.4	264.9	56.9	6.8	12.3	91.5	258.4	465.5	701.0		D
Below 5 °C	914.6	881.1	885.2	670.3	417.9	171.7	58.3	87.6	226.4	413.2	615.5	856.0		D

<u>Temperature:</u>	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	Code
Below 10 °C	1069.6	1022.3	1040.2	820.3	572.9	316.4	179.8	223.9	375.0	568.2	765.5	1011.0		D
Below 15 °C	1224.6	1163.4	1195.2	970.3	727.9	466.1	330.8	377.2	525.0	723.2	915.5	1166.0		D
Below 18 °C	1317.6	1248.1	1288.2	1060.3	820.9	556.1	423.8	470.2	615.0	816.2	1005.5	1259.0		D
<u>Humidex:</u> <u>Humidex:</u>														
Extreme Humidex	1.5	0.0	2.7	6.1	8.6	18.6	20.7	19.9	13.6	7.0	3.5	3.9		
Date (yyyy/dd)	1979/27	1963/04	1980/23	1975/29	1991/31	1973/29	1984/17	1973/21	1967/04	1984/15	1985/03	1967/17		
<u>Wind Chill:</u> <u>Wind Chill:</u>														
Extreme Wind Chill	-61.1	-61.0	-57.1	-49.2	-35.8	-21.1	-18.6	-15.5	-23.9	-32.8	-45.2	-54.2		
Date (yyyy/dd)	1961/11	1979/16	1964/13	1997/08	1999/01	1978/01	1972/04	1972/22	1997/24	1986/26	1956/28	1971/27		
<u>Humidity:</u> <u>Humidity:</u>														
Average Relative Humidity - 0600LST (%)	77.6	75.6	76.3	81.2	86.8	86.6	79.0	81.4	90.4	89.0	83.5	78.5		










Appendix A: Summary of 2004 Monthly Climatological Information for the Hamlet of Qikiqtarjuaq, Nunavut

QIKIQTARJUAQ A NUNAVUT

Latitude: 67° 33' N
Climate ID: 2400572

Longitude: 64° 1' W
WMO ID: 71338

Elevation: 06.40 m
TC ID: YVM

Monthly Data Report for 2004											
M o n t h	Mean Max Temp °C 	Mean Temp °C 	Mean Min Temp °C 	Extr Max Temp °C 	Extr Min Temp °C 	Total Rain mm 	Total Snow cm 	Total Precip mm 	Snow Grnd Last Day cm 	Dir of Max Gust 10's Deg	Spd of Max Gust km/h
<u>Jan</u>	-24.3	-28.7	-33.1	-15.5	-43.2	0.0	4.0	4.0	35		
<u>Feb</u>	-20.2	-24.9E	-29.4	-10.0	-40.2	0.0	5.0	5.0	41		
<u>Mar</u>	-24.3	-29.8	-35.2	-13.4	-45.5	0.0	6.2	6.2	47		
<u>Apr</u>	-11.4	-17.2	-22.9	-4.5	-31.5	0.0	34.0	34.0	61		
<u>May</u>	-1.2	-3.8	-6.4	6.5	-16.5	0.0	3.0	3.0	25		
<u>Jun</u>	4.7	1.8	-1.1	9.9	-7.2	Trace	Trace	Trace	0		
<u>Jul</u>	7.8	4.6	1.4	17.2	-1.7	1.0	6.0	7.0	0		
<u>Aug</u>	8.3	5.6	2.9	17.1	0.0	13.0	0.0	13.0	0		
<u>Sep</u>	4.4	2.0	-0.5	11.0	-11.0	6.0	13.0	19.0	4		
<u>Oct</u>	1.9	-1.0	-3.9	9.0S	-8.0	0.4	7.4	7.8	4		
<u>Nov</u>	-6.6	-10.6	-14.6	3.0	-24.5	0.0	91.0	91.0	54		
<u>Dec</u>	-22.4	-27.5	-32.6	-15.2	-40.8	0.0	2.0	2.0	48		
Sum						20.4	171.6	192.0			
Avg	-6.9	-10.8	-14.6								
Xtrm				17.2	-45.5						



Appendix B
Projected Water Requirements and
Sewage Generation Rates

Table 1 - Projected Water Consumption

Planning Year	Calendar Year	Projected Population	Projected Water Consumption	Projected Total Consumption Volume				10 Month Storage Requirement	Additional Capacity Required
			[Lpcd]	[Litres/day]	[Litres/year]	[m ³ /day]	[m ³ /year]	[m ³ /year]	[m ³]
Schematic	2005	599	102.4	61337	22388071	61	22388	18657	657
Detailed	2006	611	102.6	62718	22891977	63	22892	19077	1077
0	2007	624	102.9	64220	23440330	64	23440	19534	1534
	2008	637	103.2	65729	23991238	66	23991	19993	1993
	2009	650	103.5	67246	24544699	67	24545	20454	2454
	2010	663	103.7	68769	25100714	69	25101	20917	2917
	2011	677	104.0	70417	25702355	70	25702	21419	3419
5	2012	691	104.3	72074	26306958	72	26307	21922	3922
	2013	705	104.6	73738	26914522	74	26915	22429	4429
	2014	720	104.9	75531	27568771	76	27569	22974	4974
	2015	735	105.2	77333	28226420	77	28226	23522	5522
	2016	750	105.5	79144	28887469	79	28887	24073	6073
10	2017	765	105.8	80964	29551917	81	29552	24627	6627
	2018	781	106.2	82916	30264410	83	30264	25220	7220
	2019	797	106.5	84879	30980772	85	30981	25817	7817
	2020	813	106.8	86852	31701001	87	31701	26418	8418
	2021	830	107.2	88960	32470484	89	32470	27059	9059
15	2022	847	107.5	91080	33244334	91	33244	27704	9704
	2023	864	107.9	93212	34022551	93	34023	28352	10352
	2024	882	108.3	95483	34851305	95	34851	29043	11043
	2025	900	108.6	97767	35684955	98	35685	29737	11737
	2026	918	109.0	100064	36523501	100	36524	30436	12436
20	2027	937	109.4	102504	37413945	103	37414	31178	13178

Table 2 - Projected Sewage and Sludge Generation Rates

Planning Year	Calendar Year	Projected Population	Projected Sewage Generation	Projected Volume		Projected Sludge Volume	Cumulative Sludge Volume	BOD	TSS	T-PO ₄	TKN	Faecal Coliforms
			[Lpcd]	[Litres/day]	[Litres/year]	[m ³ /year]	[m ³]	[mg/L]	[mg/L]	[mg/L]	[mg/L]	[CFU/100 mL]
Schematic Design	2005	599	102.4	61,337	22,388,071	10.9	10.9	439.5	468.8	22.5	117.2	9.28E+07
0	2006	611	102.6	62,718	22,891,977	11.2	22.1	438.4	467.6	22.4	116.9	9.25E+07
	2007	624	102.9	64,220	23,440,330	11.4	33.5	437.2	466.4	22.3	116.6	9.23E+07
	2008	637	103.2	65,729	23,991,238	11.6	45.1	436.1	465.2	22.3	116.3	9.21E+07
	2009	650	103.5	67,246	24,544,699	11.9	57.0	435.0	464.0	22.2	116.0	9.18E+07
	2010	663	103.7	68,769	25,100,714	12.1	69.1	433.8	462.8	22.2	115.7	9.16E+07
5	2011	677	104.0	70,417	25,702,355	12.4	81.4	432.6	461.5	22.1	115.4	9.13E+07
	2012	691	104.3	72,074	26,306,958	12.6	94.0	431.4	460.2	22.1	115.0	9.11E+07
	2013	705	104.6	73,738	26,914,522	12.9	106.9	430.2	458.9	22.0	114.7	9.08E+07
	2014	720	104.9	75,531	27,568,771	13.1	120.0	429.0	457.6	21.9	114.4	9.06E+07
	2015	735	105.2	77,333	28,226,420	13.4	133.4	427.7	456.2	21.9	114.1	9.03E+07
10	2016	750	105.5	79,144	28,887,469	13.7	147.1	426.4	454.9	21.8	113.7	9.00E+07
	2017	765	105.8	80,964	29,551,917	14.0	161.1	425.2	453.5	21.7	113.4	8.98E+07
	2018	781	106.2	82,916	30,264,410	14.3	175.3	423.9	452.1	21.7	113.0	8.95E+07
	2019	797	106.5	84,879	30,980,772	14.5	189.9	422.5	450.7	21.6	112.7	8.92E+07
	2020	813	106.8	86,852	31,701,001	14.8	204.7	421.2	449.3	21.5	112.3	8.89E+07
15	2021	830	107.2	88,960	32,470,484	15.1	219.9	419.9	447.8	21.5	112.0	8.86E+07
	2022	847	107.5	91,080	33,244,334	15.5	235.3	418.5	446.4	21.4	111.6	8.83E+07
	2023	864	107.9	93,212	34,022,551	15.8	251.1	417.1	444.9	21.3	111.2	8.81E+07
	2024	882	108.3	95,483	34,851,305	16.1	267.2	415.7	443.4	21.2	110.8	8.78E+07
	2025	900	108.6	97,767	35,684,955	16.4	283.6	414.3	441.9	21.2	110.5	8.75E+07
20	2026	918	109.0	100,064	36,523,501	16.8	300.4	412.8	440.4	21.1	110.1	8.72E+07
	2027	937	109.4	102,504	37,413,945	17.1	317.5	411.3	438.8	21.0	109.7	8.68E+07

Appendix C

Nunavut Water Board License



P.O. Box 119
GJOA HAVEN, NT X0E 1J0

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TEL: (867) 360-6338
FAX: (867) 360-6369

NUNAVUT WATER BOARD
NUNAVUT IMALIRIYIN KATIMAYINGI

File No. NWB3QIK0106

November 28, 2000

Mr. Don Pickle
Senior Administrative Officer
Municipality of Qikiqtarjuaq
P.O. Box 4
Qikiqtarjuaq, Nunavut X0A 0B0
Email: pickle@nunanet.com

RE: NWB Licence No. NWB3QIK0106

Dear Mr. Pickle:

Please find attached Licence No. NWB3QIK0106 issued (**Motion: #2000-09-06**) by the Nunavut Water Board (NWB) pursuant to its authority under Article 13 of the *Agreement between the Inuit of the Nunavut Settlement Area and Her Majesty the Queen in Right of Canada*. The terms and conditions of the attached Licence related to water use and waste disposal are an integral part of this approval.

Any communication with respect to this licence shall be made in writing to the attention of:

Chief Administrative Officer
Nunavut Water Board
P. O. Box 119
Gjoa Haven, NU. X0B 1J0
Telephone No: (867) 360-6338
Fax No: (867) 360-6369

Inspection and enforcement of the terms and conditions of this licence are performed by:

Water Resources Officer
Nunavut District Office
Northern Affairs Program
Department of Indian Affairs
and Northern Development
P. O. Box 100
Iqaluit, NU. X0A 0H0
Telephone No: (867) 979-4405
Fax No: (867) 979-6445

The licensee shall submit all reports, plans and studies in quantities as required by the Chief Administrative Officer, contact the NWB for additional details.

Sincerely,

A handwritten signature in black ink, appearing to read 'P. di Pizzo', written over the printed name.

Philippe di Pizzo
Chief Administrative Officer

Enclosure: Licence No. NWB3QIK0106

cc: R. Beavers, Indian and Northern Affairs Canada
P. Smith, Indian and Northern Affairs Canada
Qikiqtani Inuit Association
G. Joudrey, Nunavut Impact Review Board
P. Pacholek, Environment Canada
C. Nichols, Sustainable Development
L. Coady, Nunavut Planning Commission
J. deGroot, Fisheries and Oceans
B. Segal, Baffin Health & Social Services

DECISION

LICENCE NUMBER: NWB3QIK0106

This is the decision of the Nunavut Water Board (NWB) with respect to an application for a Licence renewal dated April 11, 2000, made by:

Municipality of Qikiqtarjuaq

to allow for the use of water and disposal of waste into water for municipal undertakings by the Municipality at Qikiqtarjuaq, Nunavut.

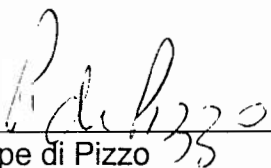
With respect to this application, the NWB gave notice to the public that the Municipality had filed an application for renewal of water licence N4L3-0640 issued by the Northwest Territories Water Board.

DECISION

After having been satisfied that the application was exempt from the requirement for screening by the Nunavut Impact Review Board in accordance with S.12.3.2 of the NLCA, the NWB decided that the application could go through the regulatory process. After reviewing the submission of the Applicant and the written and oral comments expressed by interested parties, the NWB, having given due regard to the facts and circumstances, the merits of the submissions made to it and to the purpose, scope and intent of the Nunavut Land Claims Agreement, decided to waive the requirement to hold a public hearing and furthermore to delegate its authority to approve the application to the Chief Administrative Officer pursuant to S. 13.7.5. of the NLCA and determined that:

Licence Number NWB3QIK0106 be issued subject to the terms and conditions contained therein. (Motion #:2000-09-06)

SIGNED this 28th day of November 2000 at Gjoa Haven, Nunavut.



Philippe di Pizzo
Chief Administrative Officer

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INTRODUCTION

Following an application for licence renewal filed by the Hamlet of Qikiqtarjuaq on April 11, 2000, the Nunavut Water Board conducted an initial assessment of the Municipality's submission and verified that the application was exempt from the requirement for screening by the Nunavut Impact Review Board in accordance with S.12.3.2 of the NLCA. The Board concluded that the application was complete and could go through the regulatory process.

In accordance with Article 13 of the Nunavut Land Claims Agreement (NLCA), the Board shall conduct a public hearing before approving an application, and shall accordingly give public notice of the application. Public notice of the application was given on April 12, 2000, and the application was distributed concurrently to local, territorial, and federal organizations and agencies. Submissions were made by Environment Canada (EC), Department of Indian and Northern Affairs (DIAND), and the Department of Community Government and Transportation (CGT). However, no public concerns were expressed, and the NWB waived the requirement to hold a public hearing in accordance with Section 13.7.2 of the NLCA. The authority to approve the application was delegated to the Chief Administrative Officer of the Board pursuant to S. 13.7.5 of the NLCA. After considering the submissions of interested parties, the NWB decided to issue licence NWB3QIK0106.

II. GENERAL CONSIDERATIONS

Term of the Licence

Consistent with the powers of the Northwest Territories Water Board under the Northern Inland Waters Act, the NWB may issue a licence for a term not exceeding twenty-five years. The Municipality requested a 10-year licence from the Board, whereas the Department of CGT suggested that issuing a shorter-term licence would allow the Hamlet and CGT to undertake the various studies and provide a plan of action to upgrade municipal facilities. The Board agrees with CGT, and furthermore believes that a shorter-term licence will allow the Municipality to establish a consistent compliance record. Consequently, the Board decides to issue a 5-year licence, which will allow the licensee to properly carry out the terms and conditions of the licence and to ensure that sufficient time is given to permit the licensee to develop, submit, and implement the plans required under the licence to the satisfaction of the NWB.

Annual Report

The requirements imposed on the licensee in this licence are for the purpose of ensuring that the NWB has an accurate annual update of municipal activities during a calendar year. This information is maintained on the public registry and is available to any interested parties upon request.

Operation and Maintenance Manual (O&M)

Under the previous water licence (N4L3-0640), the Municipality was required to submit for Board approval an Operation and Maintenance plan for waste disposal operations. At the time of application, the Board's Public Registry indicated that the Municipality had not complied with this licence condition.

The purpose of an Operation and Maintenance Manual is to assist the Municipality's staff in the proper operation and maintenance of the waste disposal facilities. The manual should demonstrate to the Nunavut Water Board that the Municipality is capable of operating and maintaining all waste disposal sites adequately. The Board decides to maintain the requirement for the submission of an Operation and Maintenance plan for all Sewage and Solid Waste Disposal Facilities. The plan shall be 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, October 1996"*

Abandonment and Restoration (A&R)

Under the previous water licence (N4L3-0640) the Municipality was required to submit for Board approval an abandonment and restoration plan for the abandoned Waste Disposal Facility. At the time of application, the Board's Public Registry indicated that the Municipality had not complied with this licence condition. However, the Board's Public Registry contains evidence that some reclamation of the site was undertaken in accordance with the "Sanitary Site Clean Up Broughton Island, NWT Report"¹. In its submission to the Board, Environment Canada noted that the Municipality's application indicated that erosion is beginning to expose the old dumpsite again. The Board accepts this evidence and orders the Municipality to ensure that sufficient cover is placed on the site and that erosion control measures will be implemented as required.

The Board also notes that based on population growth estimates and the remaining capacity of the current waste disposal site, planning for a new facility may be required within the term of this licence. In this event, the planning study shall also contemplate the reclamation of the current facility, and accordingly the NWB decides to include in this licence a requirement to include in such a study a separate section on the Abandonment and Restoration Plan for the current site.

Surveillance Network Program

The Surveillance Network Program is a monitoring program established to collect data on water quality to assess the effectiveness of waste treatment and detect any impact of waste disposal activities on water.

¹ Sanitary Site Clean Up, Broughton Island, NWT Report. Prepared by M.M. Dillon Limited for the Government of the Northwest Territories, Municipal and Community Affairs. December 1993.

The Board notes that there is a stream located between the solid waste disposal facility and the Sewage Disposal Facilities, and that runoff from the solid waste site may enter water. To ensure the protection of water, the Board requests the establishment of a SNP station (SNP Station 0640-8) in the stream above the waste disposal facilities and another (SNP Station 0640-9) in the stream below the waste disposal facilities.

The Board notes that this application does not include the disposal of tannery effluent to the Sewage Disposal Facilities and consequently removes from SNP station 0640-4 parameters normally associated with tannery effluents.

The application states that discharge from the lagoon occurs once per year for a short period. The Board requests that the licensee take three samples, one at the beginning, one midway through and one near the end of the discharge of effluent from the sewage lagoon. These samples shall be taken at SNP station 0640-6 and SNP station 0640-6A.

Studies

In their submission to the Board, the Department of Community Government and Transportation states that both the water reservoir and the Sewage Disposal Facilities would seem to be approaching their useful life and will require improvements to meet the needs of the community for the next 20 years. The Board accepts this evidence and decides to order the Municipality to submit for Board approval the Terms of Reference for conducting an assessment of the water reservoir and sewage disposal facility. The planning study results shall be submitted for Board approval at least 8 months prior to the expiration of this licence.

III. LICENCE NWB3QIK0106

Pursuant to 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

MUNICIPALITY OF QIKIQTARJUAQ

(Licensee)

of

QIKIQTARJUAQ, NUNAVUT, X0A 0B0

(Mailing Address)

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

Licence Number

NWB3QIK0106

Water Management Area

04

Location

QIKIQTARJUAQ, NUNAVUT

Purpose

WATER USE AND WASTE DISPOSAL

Description

MUNICIPAL UNDERTAKINGS

Quantity of Water Not to be Exceeded

35,000 CUBIC METRES ANNUALLY

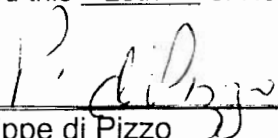
Date of Licence

January 1, 2001

Expiry Date of Licence

December 31, 2006

Dated this 28th of November 2000 at Gjoa Haven, Nunavut.


Philippe di Pizzo
Chief Administrative Officer

PART A: SCOPE, ENFORCEMENT & DEFINITIONS

1. Scope

- a. This Licence allows for the use of water and the disposal of waste into water for municipal undertakings at the Municipality of Qikiqtarjuaq, Nunavut (67°33'N, 64°02'W);
- 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 amended by the Governor in Council under a future Nunavut Waters 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, upon promulgation of such Regulations, to be automatically amended to conform with such Regulations; and
- c. Compliance with the terms and conditions of this Licence does not absolve the Licensee from responsibility for compliance with the requirements of all applicable Federal, Territorial and Municipal legislation.

2. Enforcement

- a. Subject to Part A, item 2 (d), failure to comply with this licence will be a violation of the *Northwest Territories Waters Act*, exposing the licensee to the enforcement measures and the penalties provided for in the Act.
- b. Subject to Part A, Item 2 (d), all inspection and enforcement services regarding this licence will be provided by inspectors appointed under the *Northwest Territories Waters Act*.
- c. Subject to Part A, Item 2 (d), inspectors appointed under the *Northwest Territories Waters Act* enjoy - with respect to this licence, and for the purpose of enforcing this licence, and with respect to the use of water and deposit or discharge of waste by the licensee - all powers, privileges and protections that are conferred upon them by the *Northwest Territories Waters Act* or by other applicable law.
- d. To the extent that the *Northwest Territories Waters Act* is, subsequent to the issuance of this licence, replaced with respect to water management in Nunavut by other federal legislation (including, without limitation, a regulation or order referred to in Section 10.10.2 of the *Nunavut Land Claims Agreement*), and to the extent that the other federal legislation is

consistent with the *Nunavut Land Claims Agreement*, the other federal legislation shall apply with respect to this licence and the *Northwest Territories Waters Act* shall cease to apply with respect to this licence.

3. Definitions

In this Licence: **NWB3QIK0106**

"Amendment" means a change to original terms and conditions of this licence requiring correction, addition or deletion of specific terms and conditions of the licence: medications inconsistent with the terms and conditions of this licence;

"Average Concentration" means the arithmetic mean of any four consecutive analytical results submitted to the Board in accordance with the sampling and analysis requirements specified in the "Surveillance Network Program";

"Average Concentration For Faecal Coliform" means the running geometric mean of any four consecutive analytical results submitted to the Board in accordance with the sampling and analysis requirements specified in the "Surveillance Network Program";

"Board" means the Nunavut Water Board established under the Nunavut Land Claims Agreement;

"Commercial Waste Water" means water and associated waste generated by the operation of a commercial enterprise, but does not include toilet wastes or greywater;

"Freeboard" means the vertical distance between water line and crest on a dam or dyke's upstream slope;

"Grab Sample" means a single water or wastewater sample taken at a time and place representative of the total discharge;

"Greywater" means all liquid wastes from showers, baths, sinks, kitchens and domestic washing facilities, but does not include toilet wastes;

"Honey Bags" A plastic or heavy paper bag that fits into a bucket toilet used to contain toilet waste.

"Inspector" means an Inspector designated by the Minister of Indian and Northern Affairs Canada in a manner consistent the *Northwest Territories Waters Act*;

"Licensee" means the holder of this Licence;

"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; changes to the operating system that are consistent with the terms of this Licence and do not require amendment;

"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;

"Pumpout Sewage" means all toilet wastes and/or greywater collected by means of a vacuum truck for disposal at an approved facility;

"Sewage" means all toilet wastes and greywater;

"Sewage Disposal Facilities" comprises the area and engineered structures designed to contain sewage;

"Solid Waste Disposal Facilities" comprises the area and associated structures designed to contain solid wastes;

"Toilet Wastes" means all human excreta and associated products, but does not include greywater;

"Waste" means any substance that, by itself or in combination with other substances found in water, would have the effect of altering the quality of any water to which the substance is added to an extent that is detrimental to its use by people or by any animal, fish or plant, or any water that would have that effect because of the quantity or concentration of the substance contained in it or because it has been treated or changed, by heat or other means;

"Waste Disposal Facilities" means all facilities designated for the disposal of waste, and includes the Sewage Disposal Facilities, Solid Waste Disposal Facilities, and Bagged Toilet Wastes Disposal Facilities; and

"Water Supply Facilities" comprises the area and associated intake infrastructure at the Municipality's reservoir and primary source, the Tulugak River.

PART B: GENERAL CONDITIONS

1. The Licensee shall file an Annual Report with the Board no later than March 31st of the year following the calendar year reported which shall contain the following information:

- a. tabular summaries of all data generated under the "Surveillance Network Program";
 - b. the monthly and annual quantities in cubic metres of fresh water obtained from all sources;
 - c. the monthly and annual quantities in cubic metres of each and all waste discharged;
 - d. the monthly and annual quantities of Sewage Solids removed from the Sewage Disposal Facilities for disposal;
 - e. a summary of modifications and/or major maintenance work carried out on the Water Supply and Waste Disposal Facilities, including all associated structures and facilities;
 - f. a list of unauthorized discharges and summary of follow-up action taken;
 - g. a summary of any abandonment and restoration work completed during the year and an outline of any work anticipated for the next year;
 - h. a summary of any studies requested by the Board that relate to waste disposal, water use or reclamation, and a brief description of any future studies planned;
 - i. updates or revisions to the approved Operation and Maintenance Plans; and
 - j. any other details on water use or waste disposal requested by the Board by November 1st of the year being reported.
2. The Licensee shall comply with the "Surveillance Network Program" annexed to this Licence, and any amendment to the said "Surveillance Network Program" as may be made from time to time, pursuant to the conditions of this Licence.
3. The "Surveillance Network Program" and compliance dates specified in the Licence may be modified at the discretion of the NWB Chief Administrative Officer.
4. Meters, devices or other such methods used for measuring the volumes of water used and waste discharged shall be installed, operated and maintained by the Licensee to the satisfaction of an Inspector.

5. The Licensee shall by September 1, 2001, post the necessary signs, where possible, to identify the stations of the "Surveillance Network Program." All postings shall be located and maintained to the satisfaction of an Inspector.
6. The Licensee shall by September 1, 2001, post signs in the appropriate areas to inform the public of the location of the Water Supply and Waste Disposal Facilities. All postings shall be located and maintained to the satisfaction of an Inspector.
7. The Licensee shall immediately report to the 24-Hour Spill Report Line (867-920-8130) any spills of Waste, which are reported to or observed by the Licensee, within the municipal boundaries or in the areas of the Water Supply or Waste Disposal Facilities.
8. The Licensee shall ensure a copy of this Licence is maintained at the municipal office at all times.

PART C: CONDITIONS APPLYING TO WATER USE

1. The Licensee shall obtain all fresh water from the Water Supply Facilities or as otherwise approved by the Board.
2. The annual quantity of water used for all purposes shall not exceed 35,000 cubic metres.
3. The Licensee shall maintain the Water Supply Facilities to the satisfaction of the Inspector.
4. The water intake hose used on the water pumps shall be equipped with a screen with a mesh size sufficient to ensure no entrainment of fish.

PART D: CONDITIONS APPLYING TO WASTE DISPOSAL

1. The Licensee shall direct Sewage to the Sewage Disposal Facilities or as otherwise approved by the Board.
2. All Sewage effluent discharged from the Sewage Disposal Facilities at "Surveillance Network Program" Station Number 0640-6 shall meet the following effluent quality standards:

Parameter	Maximum Average Concentration
Faecal Coliforms	1×10^4 CFU/100 ml
BOD ₅	120 mg/L
Total Suspended Solids	180 mg/L

The Waste discharged shall have a pH between 6 and 9, and no visible sheen of oil and grease.

3. A Freeboard limit of 1.0 metre, or as recommended by a qualified geotechnical engineer and as approved by the Board, shall be maintained at all dykes and earthfill structures.
4. All honey bags shall be disposed of to the satisfaction of an Inspector.
5. The Licensee shall advise an Inspector at least ten (10) days prior to initiating the decant of the Sewage Disposal Facilities.
6. The Sewage Disposal Facilities shall be maintained and operated in such a manner as to prevent structural failure.
7. The Licensee shall maintain the Sewage Disposal Facilities to the satisfaction of an Inspector.
8. The Licensee shall dispose of and contain all solid wastes at the Solid Waste Disposal Facilities or as otherwise approved by the Board.

PART E: CONDITIONS APPLYING TO MODIFICATIONS

1. The Licensee may, without written approval from the Board, carry out modifications to the Water Supply 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 sixty (60) days prior to beginning the modifications;
 - b. such modifications do not place the Licensee in contravention of the Licence;

- c. the Board has not, during the sixty (60) days following notification of the proposed modifications, informed the Licensee that review of the proposal will require more than sixty (60) days; and
 - d. the Board has not rejected the proposed modifications.
2. Modifications for which all of the conditions referred to in Part E, Item 1, have not been met may be carried out only with written approval from the Board.
 3. The Licensee shall provide to the Board site plans of the modifications referred to in this Licence within ninety (90) days of completion of the modifications.

PART F: CONDITIONS APPLYING TO CONSTRUCTION

1. Prior to construction of any dams, dykes or structures intended to contain, withhold, divert or retain water or wastes, the Licensee shall submit to the Board for review design drawings stamped by a qualified Engineer registered in Nunavut

PART G: CONDITIONS APPLYING TO OPERATION AND MAINTENANCE

1. The Licensee shall, within six (6) months of the issuance of this Licence, submit to the Board for approval, a plan for the Operation and Maintenance of the Sewage and Solid Waste Disposal Facilities in accordance with *"Guidelines for preparing an Operation and Maintenance Manual for Sewage and Solid Waste Disposal Facilities"* October 1996.
2. The Licensee shall implement the plan specified in Part G, Item 1 as and when approved by the Board.
3. If, during the period of this Licence, an unauthorized discharge of waste occurs, or if such a discharge is foreseeable, the Licensee shall:
 - a. employ the appropriate contingency plan as provided for in the Operation and Maintenance Plan;
 - b. report the incident immediately via the 24-Hour Spill Reporting Line, (867) 920-8130; and
 - c. submit to an Inspector a detailed report on each occurrence not later than thirty (30) days after initially reporting the event.

PART H: CONDITIONS APPLYING TO ABANDONMENT AND RESTORATION

1. The Licensee shall submit to the Board for approval an Abandonment and Restoration Plan at least six (6) months prior to abandoning any facilities, including but not limited to:
 - a. the water intake facilities;
 - b. the water treatment and waste disposal sites and facilities;
 - c. the petroleum and chemical storage areas;
 - d. any site affected by waste spills;

An Abandonment Plan shall include, among other things:

- i. measures to address leachate, if any;
 - ii. an implementation schedule;
 - iii. maps delineating all disturbed areas and site facilities;
 - iv. consideration of altered drainage patterns;
 - v. type and source of cover materials;
 - vi. future area use;
 - vii. hazardous wastes; and
 - viii. a proposal identifying measures by which restoration costs will be financed by the Licensee upon abandonment.
3. The Licensee shall implement the plan specified in Part H, Item 1 as and when approved by the Board.
4. The Licensee shall revise the Plan referred to in Part H, Item 1 if not approved. The revised Plan shall be submitted to the Board for approval within six (6) months of receiving notification of the Board's decision.
5. The Licensee shall complete the restoration work within the time schedule specified in the Plan, or as subsequently revised and approved by the Board.

PART I: CONDITIONS APPLYING TO STUDIES

1. The Licensee shall submit to the Board for approval, the terms of reference for a planning study to address long-term needs of the community with respect to the Water Supply and Waste Disposal Facilities.
2. The Licensee shall, 8 months prior to expiry of the licence, submit to the Board for approval the planning study prepared in accordance with the terms of reference approved by the Board pursuant to Part I, Item 1.
3. The proposal described in Part I, Item 3 shall be implemented as and when approved by the Board.

SCHEDULE I: SURVEILLANCE NETWORK PROGRAM

A. Location, Description, Sampling and Analysis Requirements

Station	Description	Sampling Requirements	Analysis Requirements
0640-1	Raw Water Supply intake at the Tulugak River	Not required	Not required
0640-2	Raw Water Supply intake at the Reservoir truck fill station	Not required	Not required
0640-3	Raw Sewage from pump-out truck	Not required	Not required
0640-4	Runoff below the abandoned Sewage disposal area prior to discharge to ocean	Not required	Not required
0640-5	Ocean water 5 metres from point where effluent enters ocean (abandoned site)	Not required	Not required
0640-6	Discharge from the Sewage Disposal Facilities at the point of discharge following treatment	Once at the beginning, middle and end of discharge	<div> <div> BOD Total Suspended Solids Conductivity Oil and Grease Magnesium Sodium Chloride Total Hardness Ammonia Nitrogen Total Cadmium Total Cobalt Total Chromium Total Copper Total Aluminum </div> <div> Faecal Coliform PH Nitrate-Nitrite Total Phenols Calcium Potassium Sulphate Total Alkalinity Total Zinc Total Iron Total Manganese Total Nickel Total Lead </div> </div>
0640-6A	Current Sewage Disposal Facilities effluent 5 meters prior to entering the ocean	Once at the beginning, middle and end of discharge	Same as STN 0640-6

Station	Description	Sampling Requirements	Analysis Requirements
0640-7	Runoff from the Solid Waste Disposal Facility	Annually during periods of open water	<p>pH</p> <p>Total Suspended Solids</p> <p>Nitrate-Nitrite</p> <p>Total Phenols</p> <p>Sodium</p> <p>Magnesium</p> <p>Total Arsenic</p> <p>Total Copper</p> <p>Total Iron</p> <p>Total Mercury</p> <p>Total Zinc</p> <p>Conductivity</p> <p>Ammonia Nitrogen</p> <p>Oil and Grease (Visual)</p> <p>Sulphate</p> <p>Potassium</p> <p>Calcium</p> <p>Total Cadmium</p> <p>Total Chromium</p> <p>Total Lead</p> <p>Total Nickel</p> <p>Total Organic Carbon</p>
0640-8	Unnamed stream located between the Sewage Disposal Facilities and Solid Waste Disposal Facilities; sample site above the facilities	Annually during periods of open water	Same as STN 0640-7
0640-9	Unnamed stream located between the Sewage Disposal Facilities and Solid Waste Disposal Facilities; sample site below the facilities	Annually during periods of open water	Same as STN 0640-7
0640-10	Runoff below reclaimed Solid Waste Disposal Facility	Annually	Same as STN 0640-7

B. General Requirements

1. The exact location of Surveillance Network Program stations can be developed with the assistance of the Inspector.
2. Additional sampling and analysis may be requested by an Inspector.
3. All sampling, sample preservation and analyses shall be conducted in accordance with methods prescribed in the current edition of "Standard Methods for the Examination of Water and Wastewater", or by such other methods approved by the Board.
4. All analyses shall be performed in a laboratory approved by the Board.

C. Flow and Volume Measurement Requirements

1. The monthly and annual quantities of water pumped from Surveillance Network Program Station Number 0640-2 shall be measured and recorded in cubic metres.
2. The annual quantities of sewage solids removed from the Sewage Disposal Facilities shall be measured and recorded.

D. Reports

1. The Licensee shall, unless otherwise requested by an Inspector, include all of the data and information required by the Surveillance Network Program in the Licensee's Annual Report, which Report shall be submitted to the Board on or before March 31st of the year following the calendar year being reported.

E. Modifications To The Surveillance Network Program

1. Modifications to the Surveillance Network Program may be made only upon written approval of the Chief Administrative Officer of the Board.

FIGURE 1 - Municipality of Qikiqtarjuaq Surveillance Network Program Stations
(To be provided following first inspection)

APPENDIX I

CORRESPONDENCE

- i. Letter received April 14 from the Municipality of Qikiqtarjuaq to the Nunavut Water Board, enclosing an application and supplemental questionnaire dated March 27, 2000 for the renewal of a municipal water licence for the Municipality of Qikiqtarjuaq.
- ii. Letter dated April 12, 2000 from NWB to the Municipality of Qikiqtarjuaq, acknowledging receipt of the application for licence renewal.
- iii. Letter dated April 18, 2000 from NWB to the Municipality of Qikiqtarjuaq, acknowledging receipt of additional information for the application for licence renewal.
- iv. Letter dated April 12, 2000 from the NWB to the Distribution List, providing notice of the application for licence renewal in English and Inuktitut.
- v. Letter dated May 29, 2000, from the Department of CGT, to the NWB, received May 30, 2000 regarding comments on the application for licence renewal in consideration for the proposed pilot project for a tannery in Qikiqtarjuaq.
- vi. Letter dated/received May 30, 2000, from the Department of CGT to the NWB, regarding comments on the application for licence renewal.
- vii. Letter dated May 29, 2000, from Environment Canada, to the NWB, received June 6, 2000, regarding comments on the application for licence renewal.
- viii. Email dated June 5, 2000, from Indian and Northern Affairs Canada to the NWB, regarding comments on the application for licence renewal.



Appendix D

Example Operation Log

Hamlet of Qikiqtarjuaq
Water Distribution Operations Log Sheet

Month: _____

Truck #: _____

Date	Number of Trips to the Water Reservoir	Quantity of Water Delivered (Liters)	Driver Signature
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
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Appendix E
Environmental Emergency
Contingency Plan



Environmental Emergency Contingency Plan for Water, Sewage, and Solid Waste Operations in the Hamlet of Qikiqtarjuaq, Nunavut

Prepared for

The Hamlet of Qikiqtarjuaq
P.O. Box 4, Qikiqtarjuaq NU X0A 0B0 Canada

Prepared by

Nuna Burnside Engineering and Environmental Ltd.
Box 175, 25 Third Avenue Rankin Inlet NU X0C 0G0 Canada
15 Townline Orangeville ON L9W 3R4 Canada

Revision Date

February 2006

File No: N-O 09439.0

The material in this report reflects best judgement in light of the information available at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions made based on it, are the responsibilities of such third parties. Nuna Burnside accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

Environmental Emergency Contingency Plan for
Water, Sewage, and Solid Waste Operations in the
Hamlet of Qikiqtarjuaq, Nunavut

February 2006

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Environmental Emergency Contingency Plan for
Water, Sewage, and Solid Waste Operations in the
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February 2006

Preamble

This Environmental Emergency Contingency Plan relating to the collection, transportation, storage, and treatment operations of sewage for the Hamlet of Qikiqtarjuaq, Nunavut, is effective from *BEGINNING DATE OF WATER LICENSE until EXPIRY DATE OF NEW WATER LICENSE*. This plan applies to all operations and spill events relating to sewage and petroleum, oil, and lubricating (POL) products in the Hamlet of Qikiqtarjuaq, Nunavut (formerly known as Broughton Island).

The following formal distribution will be made after this document receives approval:

- Hamlet of Qikiqtarjuaq:
 - Mayor and Council
 - Senior Administrative Officer (SAO)
 - Hamlet Operations Staff
 - Fire Department
 - Community Health Centre
 - RCMP Detachment.
- Nunavut Water Board.

Additional copies and updates of this plan may be obtained by writing to:

Hamlet of Qikiqtarjuaq
Senior Administrative Officer (SAO)
P.O. Box 4
Qikiqtarjuaq, NU X0A 0B0

February 2006

1.0 Introduction

1.1 Purpose of Plan

The impacts of spills can be catastrophic and may threaten or damage the environment, especially water resources. As such, the Government of Nunavut (GN) requires contingency plans to be written and fully implemented. The purpose of this *Environmental Emergency Contingency Plan* is to provide a plan of action for all spills of sewage, solid waste, and petroleum products that may occur as a result of water supply and distribution, sewage collection and treatment, and solid waste collection and disposal operations undertaken within the Hamlet of Qikiqtarjuaq, Nunavut.

This *Environmental Emergency Contingency Plan* will assist in implementing corrective options quickly to minimize environmental damage. Furthermore, it defines the responsibilities of key personnel and outlines procedures to effectively and efficiently contain and recover spills of sewage, solid waste, and petroleum products arising from water, sewage, and solid waste; collection, transportation, storage, and treatment operations. It will assist the Hamlet in meeting the regulatory requirements related to reporting events to the appropriate authorities within the prescribed time period.

Sewage, solid waste, and petroleum, oil and lubricating (POL) products that currently, or potentially, fall within the Scope of this *Environmental Emergency Contingency Plan* are as follows:

- Sewage (as defined in the Nunavut Water Board (NWB) water license)
- Solid waste (as defined in the Nunavut Water Board (NWB) water license)
- Gasoline
- Diesel fuel
- Hydraulic fluid
- Lubricating oil.

1.2 Objectives

The objectives of this Emergency Spill Contingency Plan are to:

- Provide a plan including procedures so that the Hamlet and their Incident Spill Response Team can rapidly respond to a spill situation and minimize injury to individuals and environmental damage
- Comply with all existing regulations
- Cooperate with other groups and agencies

Environmental Emergency Contingency Plan for
Water, Sewage, and Solid Waste Operations in the
Hamlet of Qikiqtarjuaq, Nunavut

February 2006

- Be prepared and able to provide an integrated team approach with all involved departments and agencies
- Keep staff, government officials, and Hamlet residents informed.

1.3 Hamlet of Qikiqtarjuaq Environmental Policy

It is the policy of the Hamlet of Qikiqtarjuaq to fully comply with all applicable legislation to ensure the protection of the environment of the territory of Nunavut. The legislation includes, but is not limited to, the:

- Environmental Protection Act, Section 34 – Spill Contingency Planning and Reporting Regulations
- Nunavut Waters and Nunavut Surface Rights Tribunal Act.

The Hamlet will cooperate with other groups committed to protecting the environment and shall ensure that Hamlet employees, regulatory authorities, and the public are informed on the policies and procedures developed to help protect the environment and the citizens of the Hamlet of Qikiqtarjuaq.

February 2006

2.0 Site Description

2.1 General Site Description

This *Environmental Emergency Contingency Plan* is to be implemented within the Municipal boundaries of the Hamlet of Qikiqtarjuaq, Nunavut.

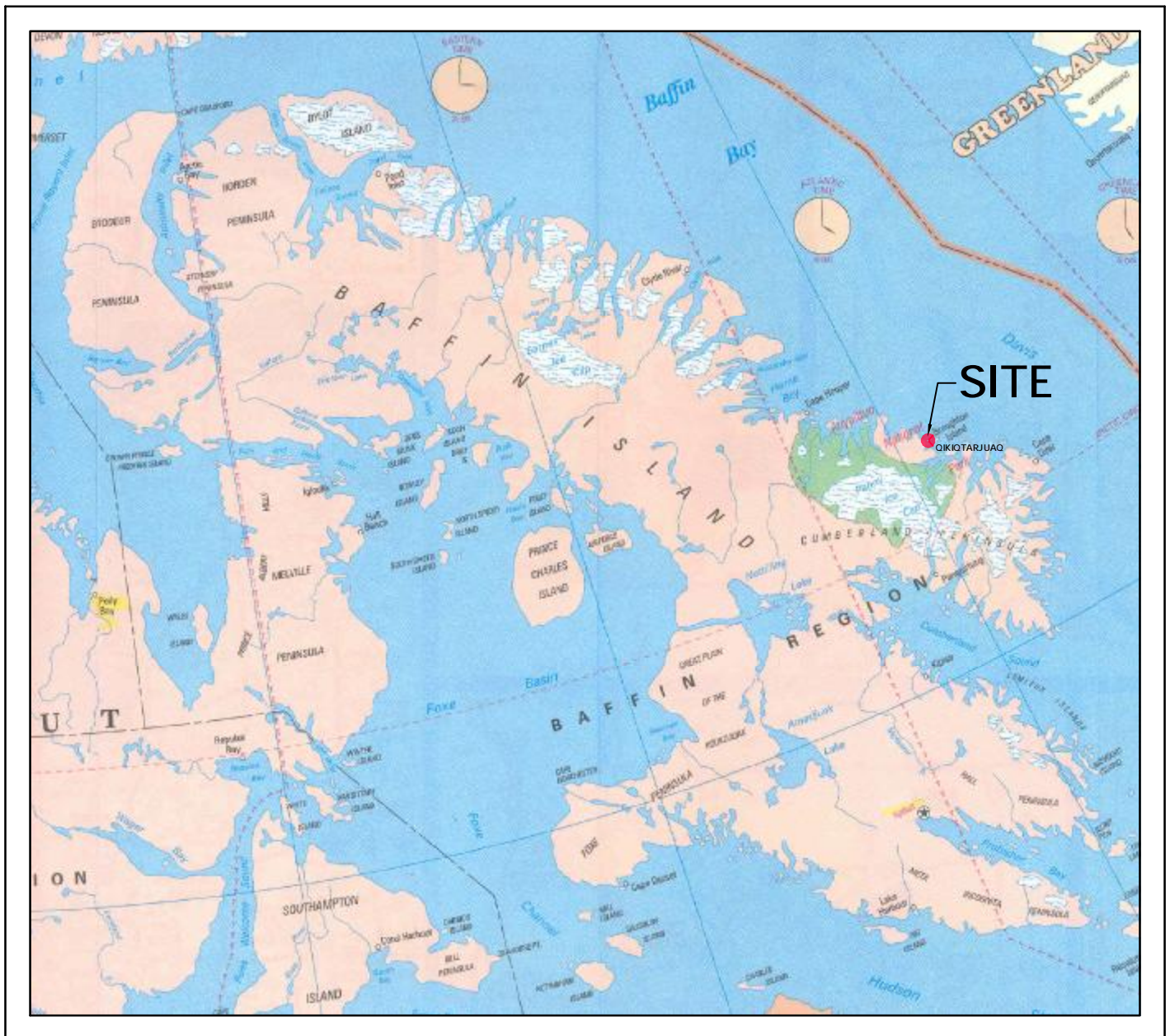
The Hamlet of Qikiqtarjuaq (meaning “big island”), is a Community of approximately 599 people located on the eastern coast of Baffin Island and on an island known as Broughton Island in the territory of Nunavut. As illustrated in Figure 1, the Hamlet is located approximately 470 kilometers northeast of the Capital City of Iqaluit, a distance that is covered by plane in about one hour. The geographic coordinates for the Hamlet of Qikiqtarjuaq are 67°33’ north latitude and 64°02’ west longitude. As indicated on Figure 2, the community is situated on the northwest portion of Broughton Island.

2.2 Sewage Collection, Water Supply, Treatment and Distribution, and Storage

The Hamlet provides trucked water service for the community. Historically, water is drawn from the Tulugak River during the summer, and from the lined earthen reservoir (Figure 3) for the remainder of the year. The water is chlorinated as it is pumped into the tanker delivery trucks through the truck fill station. The truck fill station operates by diesel generator and has an above ground storage (AST) tank on-site.

Sewage is collected in the Hamlet of Qikiqtarjuaq by vacuum truck, and transported to the Sewage Treatment Facility (Figure 4) operated by the Hamlet of Qikiqtarjuaq located approximately 2.3 km from the Hamlet. Wastewater is collected from customer holding tanks and discharged to the wastewater lagoon located to the east of the community north of the DEW Line Access Road.

The Hamlet of Qikiqtarjuaq provides regular solid waste pickup for the Community’s residents, businesses, and institutions. Collection occurs on a daily basis throughout the Hamlet, to minimize the potential for attraction of foxes and polar bears. Solid waste is trucked to the Hamlet’s Solid Waste Disposal facility (Figure 5), which is currently permitted by the Nunavut Water Board (NWB). The current Facility is located adjacent to the sewage lagoon.



Map Reference:
Map of Canada
Published by the CAA

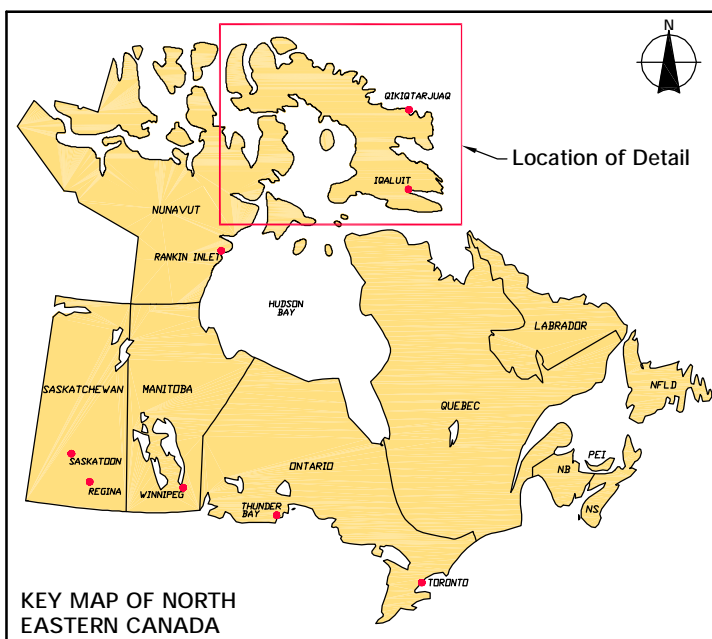


FIGURE 1 - SITE LOCATION MAP

THE HAMLET OF QIKIQTARJUAQ, NUNAVUT

ENVIRONMENTAL EMERGENCY CONTINGENCY PLAN

January 2006
Project Number: N-0 09439.0

Prepared by: K. Pridham

Verified by: M. Paznar

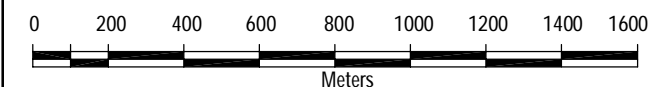
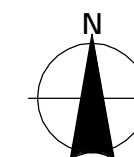
Burnside



FIGURE 2
THE HAMLET OF QIKIQTARJUAQ
*ENVIRONMENTAL EMERGENCY
CONTINGENCY PLAN*

SATELLITE IMAGERY OF
ENTIRE COMMUNITY
AND INFRASTRUCTURE

Satellite Imagery Source:
September 2004 Satellite Image obtained from DigitalGlobe Inc.



1:20,000
January 2006
Project Number: N-0 09439.0

Projection: UTM Zone 20
Datum: NAD83

Prepared by: C. Sheppard

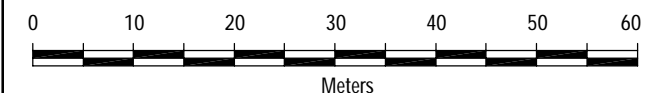
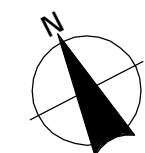
Verified by: M. Paznar





FIGURE 3
THE HAMLET OF QIKIQTARJUAQ
*ENVIRONMENTAL EMERGENCY
CONTINGENCY PLAN*
WATER RESERVOIR SITE

Satellite Imagery Source:
September 2004 Satellite Image obtained from DigitalGlobe Inc.



1:750
January 2006
Project Number: N-O 09439.0

Projection: UTM Zone 20
Datum: NAD83

Prepared by: C. Sheppard

Verified by: M. Paznar





FIGURE 4

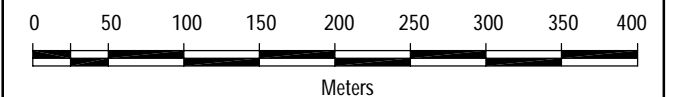
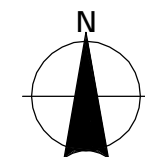
THE HAMLET OF QIKIQTARJUAQ
ENVIRONMENTAL EMERGENCY
CONTINGENCY PLAN

REGIONAL VIEW OF
SEWAGE LAGOON & SOLID
WASTE DISPOSAL FACILITY
(LANDFILL)

Legend

— — — — — INTERPRETED EXISTING SURFACE WATER
FLOW DIRECTION

Satellite Imagery Source:
September 2004 Satellite Image obtained from DigitalGlobe Inc.



1:5,000
January 2006
Project Number: N-0 09439.0

Projection: UTM Zone 20
Datum: NAD83

Prepared by: C. Sheppard

Verified by: M. Paznar



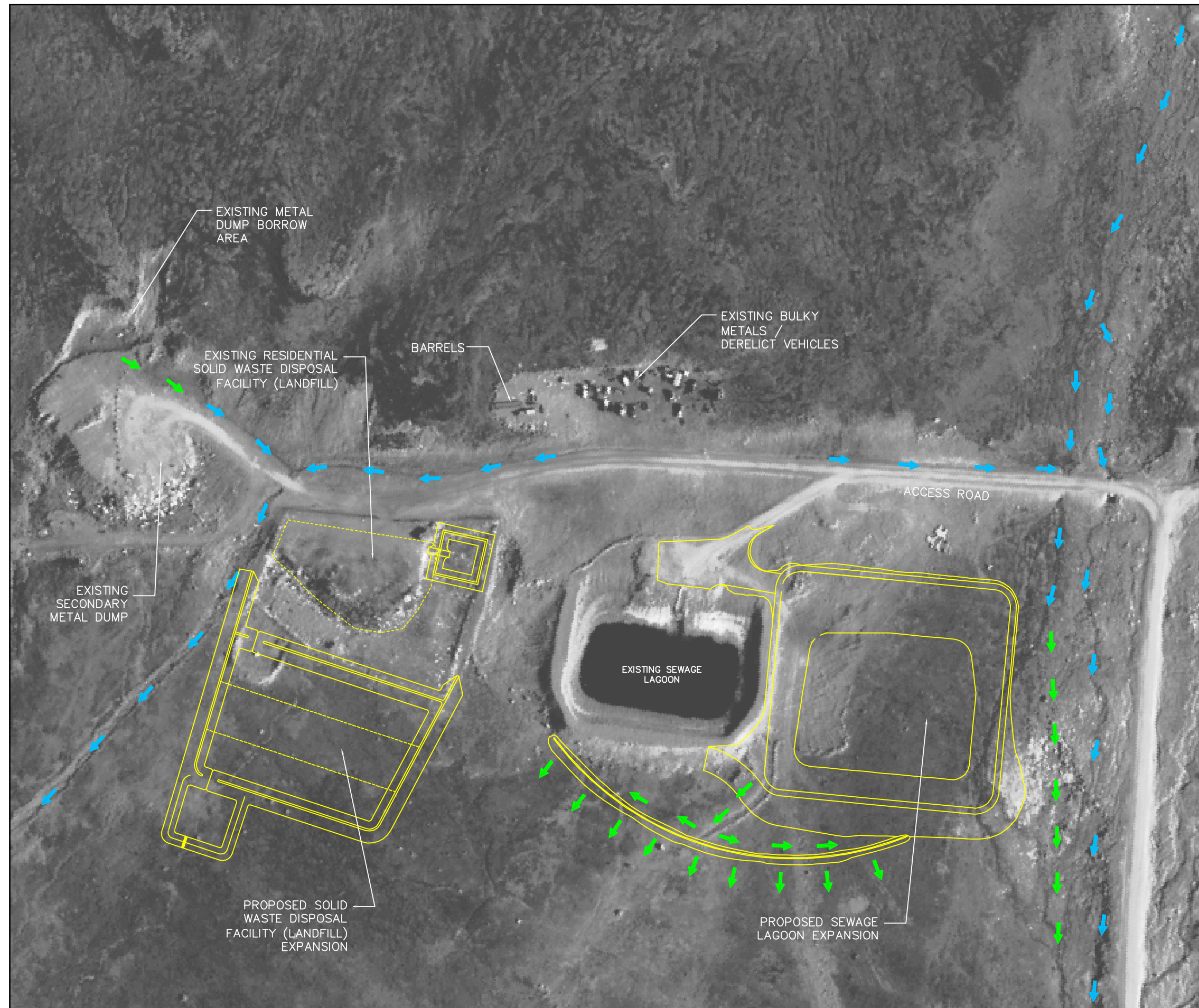


FIGURE 5

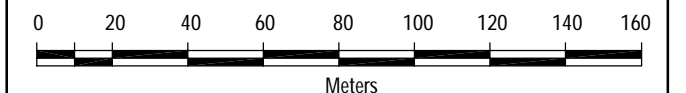
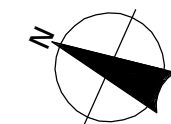
THE HAMLET OF QIKIQTARJUAQ
ENVIRONMENTAL EMERGENCY
CONTINGENCY PLAN

SOLID WASTE DISPOSAL
FACILITY (LANDFILL)

Legend

- → EXISTING SURFACE WATER FLOW DIRECTION
- → PROPOSED SURFACE WATER FLOW DIRECTION

Satellite Imagery Source:
September 2004 Satellite Image obtained from DigitalGlobe Inc.



1:2,000
January 2006
Project Number: N-0 09439.0

Projection: UTM Zone 20
Datum: NAD83

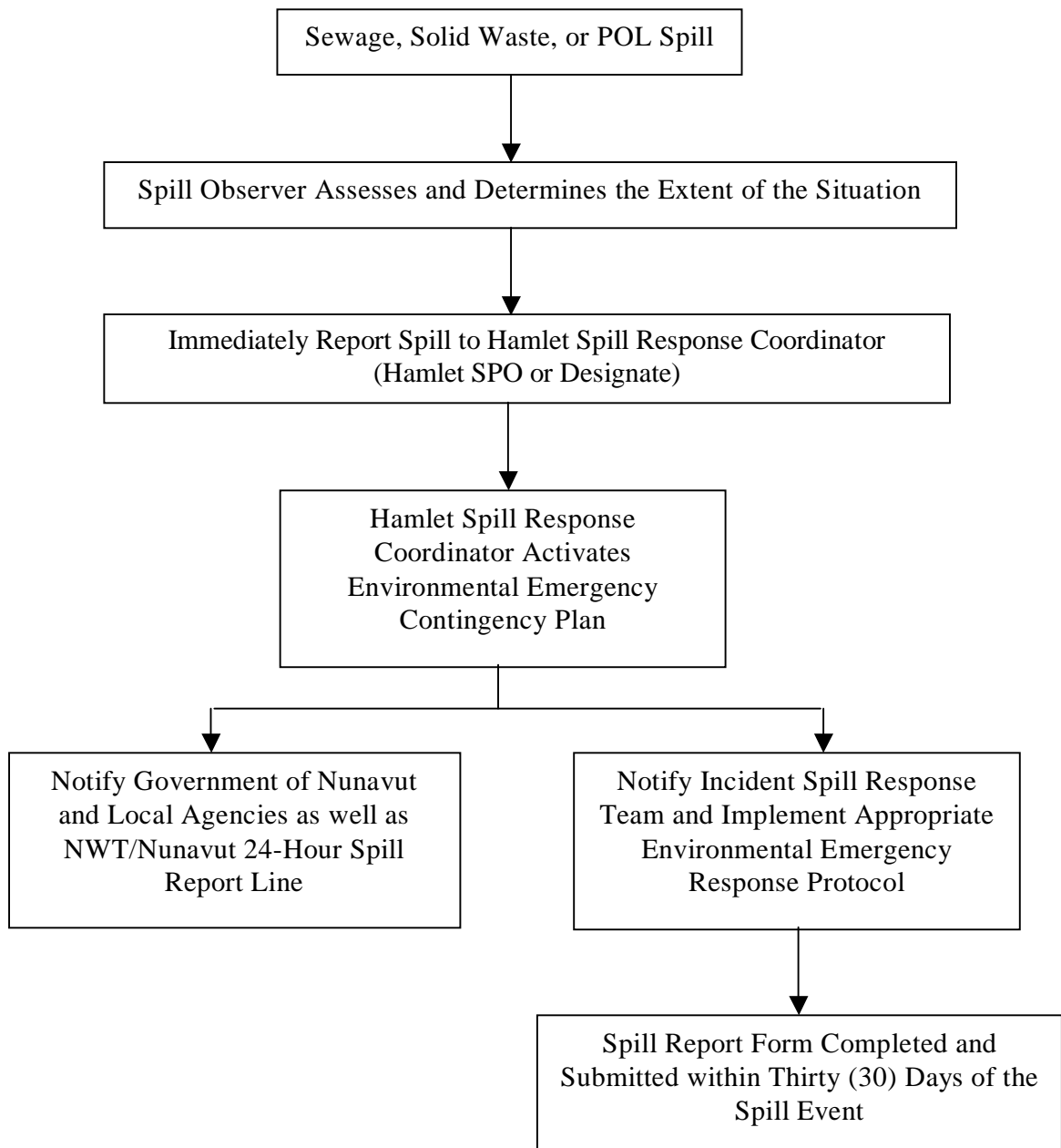
Prepared by: C. Sheppard

Verified by: M. Paznar

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3.0 Spill Response Organization

The following is a flow chart to illustrate the sequence of events that must be followed in the event of a sewage, solid waste, or POL spill occurring during supply, distribution, collection, transportation, storage, and treatment operations:



Emergency Response Flow Chart

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3.1 Incident Spill Response Team

The Hamlet Senior Administrative Officer (SAO) or his/her Designate will serve as the Spill Response Coordinator for the Hamlet in the event of a sewage or POL spill during collection and transport operations. The SAO of the Hamlet of Qikiqtarjuaq will appoint and train appropriate personnel to make up the Incident Spill Response Team, which normally consist of the following personnel:

- Spill Response Coordinator Hamlet SAO (or Designate)
- Hamlet Works Personnel Will generally vary from 3-7 people throughout the year

The responsibilities of the Spill Response Coordinator are as follows:

1. Assume complete authority over the spill scene and coordinate all personnel involved
2. Evaluate the spill situation and develop overall plan of action
3. Activate the *Environmental Emergency Contingency Plan* for the Hamlet of Qikiqtarjuaq
4. Immediately report the spill to the NWT/Nunavut 24-Hour Spill Report Line at (867) 920-8130, and other applicable regulatory or assistance agencies
5. Provide regulatory agencies with information regarding the status of the clean-up activities
6. Act as a spokesperson on behalf of the Hamlet of Qikiqtarjuaq with regulatory agencies, the public, and the media
7. Prepare and submit a report on the spill incident to regulatory agencies within 30 days of the event.

3.2 Contact Information

A complete listing of contact information, including telephone numbers of standard regulatory agencies, Hamlet personnel, and assistance agencies who may be contacted to supply resources, expertise, and advise needed to deal with a spill emergency is included in Appendix A.

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4.0 Spill Reporting Procedure

The Spill Response Coordinator must be notified immediately by any individual who is aware of any spill either by phone, radio, or in person.

The following is the incident reporting procedures once the Spill Response Coordinator activates this Environmental Emergency Spill Contingency Plan:

1. Report spill immediately to the 24-Hour NWT/Nunavut Spill Report Line Phone (867) 920-8130 (Section 4.1)
2. Report immediately to the INAC Manager, Water Resources in Iqaluit at (867) 975-4550
3. Notify Hamlet of Qikiqtarjuaq Fire Department
4. Fill out the NWT/Nunavut Spill Report Form (Appendix B) within thirty (30) days of the spill event occurring.

4.1 NWT/Nunavut Spill Report Line

All spills as defined in this document must be reported immediately to the 24-hour NWT/Nunavut Spill Report Line. Gather the following information prior to making the call:

- Date and time of spill (if known)
- Location and map coordinates (if known) and direction of flow of spill materials if moving
- Party responsible for spill
- Product/material spilled and estimate of the quantity
- Cause of spill
- If the spill has been stopped or if it is continuing
- Extent of contaminated area
- Factors affecting spill or recovery, such as weather conditions or terrain
- If containment of spill is available
- Action taken or proposed
- If assistance is required
- Possible hazards to person, property or environment (e.g. fire, drinking water, fish, wildlife, etc.).

The information collected should be brief, and quick estimates made so the Spill Report Line and the Spill Response Coordinator can assess the situation. The information is similar to that required in boxes B, D, E, F, G, H, I, J, K, L, M, N, O, and P on the spill report form that must be completely fill out in thirty days, and available in Appendix B.

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5.0 Action Plans

5.1 Initial Action

The instructions to be followed by the first person on the spill scene are as follows:

1. Always be alert and consider your safety first
2. If possible, estimate the volume of material that has been spilled
3. Assess the hazard of people in the vicinity of the spill
4. If possible, and safety permits, attempt to stop the release of product to minimize potential for environmental impacts
5. Immediately report the spill to the Spill Response Coordinator
6. Resume any effective action to contain, mitigate, or terminate the flow of the spilled material.

5.2 Environmental Health Protection and Mitigation Measures

The environmental protection and mitigation measures outlined in the following sections are to be taken by all personnel responding to a spill event and to reduce the chance of environmental impairment and health hazards due to spill, release, or other incident.

5.2.1 General Procedures

The following general clean-up procedures shall apply for all spill areas within the Hamlet:

- Always wear personnel protective equipment (PPE)
- Smoking is prohibited during all spill response activities
- Eliminate all ignition sources
- Contain spills on soil or rock by construction of earthen dykes using available material. If soil is not available, place sorbent materials or a boom in the path of the spill. As the sorbent barrier becomes saturated, continually replace it. Fuel or other liquids lying in pools, or trenches are to be removed with pumps, buckets, or skimmers
- If the ground is snow covered, create snow dykes, and line with a chemically-compatible liner for containment and recover of liquid
- For fuels on water, deploy containment booms, and recovery as much fuel as possible with a work boat and skimmer if the area has less than 1/10th ice cover. If the area is ice infested, burn any fuel spills using igniters
- Apply sorbets, if necessary
- Assess potential for disturbance of wildlife, fish, and archaeological sites by spill or clean-up operations

Environmental Emergency Contingency Plan for
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- Notify environmental authorities to discuss available and feasible disposal and clean-up options
- Conduct required clean-up operations
- Assess and appropriately treat any areas disturbed by clean-up activities with laboratory testing
- Ensure the site has been completely restored and cease operations, only when all work is finalized and laboratory testing confirmed.

Specific procedures relating to mitigating measures for specific contaminants following below:

5.3 Mitigative Measures: Sewage, Gasoline, Diesel Fuel, Hydraulic Fluid, Lubricating Oil and Aviation Fuel

If possible, and safety permits, stop the flow of product, which is occurring, and eliminate all ignition sources. ***Smoking is prohibited during all spill response activities.***

5.3.1 POL Spill on Soil, Gravel, Rock, or Vegetation

- Build a containment berm using soil material or snow and place a plastic tarp at the foot of the berm for easy capture of the spill after all vapors have dissipated
- Remove the spill by using absorbent pads or excavating the soil, gravel or snow
- Remove spill splashed on vegetation using particulate absorbent material
- If soil, gravel, or vegetation are to be removed from the site, the Hamlet shall contact regulatory agencies for approval before commencing with the removal.

5.3.2 POL Spill On Water

- Use containment boom to capture spill for recovery after vapors have dissipated
- Use absorbent pads to capture small spills
- Use a petroleum skimmer for larger spills.

5.3.3 POL Spill on Ice and Snow

- Build a containment berm around spill using snow
- Remove spill using absorbent pads or particulate sorbent material
- The contaminated ice and snow must be scraped and shoveled into plastic buckets with lids, 205 litre drums, and/or polypropylene bags.

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5.3.4 POL-Contaminated Material Storage and Transfer

All contaminated water, ice, snow, soil, and clean up supplies will be stored in closed, labeled containers. All containers will be stored in a well ventilated area away from incompatible materials.

5.3.5 Disposal

Contact Federal and Territorial regulatory agencies to identify appropriate disposal methods before disposing of contaminated material. ***No contaminated material is to be disposed of in any Facility operated by the Hamlet of Qikiqtarjuaq without the express written consent of the Nunavut Water Board.***

5.4 Mitigative Measures: Ethylene Glycol Antifreeze

If possible, and safety permits, stop the flow of product, which is occurring.

5.4.1 Ethylene Glycol Spill on Soil, Gravel, Rock, or Vegetation

- Build a containment berm using soil material or snow and place a plastic tarp at the foot of the berm for easy capture of the spill
- Remove the spill by using absorbent pads or excavating the soil, gravel, or snow
- Remove spill splashed on vegetation using particulate absorbent material
- If soil, gravel, and/or vegetation must be removed from the spill site, the Hamlet shall contact the appropriate regulatory agencies for approval before commencing with the removal.

5.4.2 Ethylene Glycol Spill On Water

Use containment boom to capture spill, and pump contaminated water into 205 L drums.

5.4.3 Ethylene Glycol Spill On Ice and Snow

- Build a containment berm around spill using snow
- Remove spill using particulate sorbent material
- The contaminated sorbent material, ice and snow must be scraped and shoveled into plastic buckets with lids, 205 litre drums, and/or polypropylene bags.

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5.4.4 Ethylene Glycol Storage and Transfer

All contaminated water, ice, snow, soil, and clean up supplies will be stored in closed, labeled containers. All containers will be stored in a well ventilated area away from incompatible materials.

5.4.5 Disposal

Contact Federal and Territorial regulatory agencies to identify appropriate disposal methods before disposing of contaminated material. ***No contaminated material is to be disposed of in any Facility operated by the Hamlet of Qikiqtarjuaq without the express written consent of the Nunavut Water Board.***

5.5 Mitigative Measures: Sewage

If possible, and safety permits, stop the flow of product, which is occurring.

5.5.1 Sewage Spill on Soil, Gravel, Rock, or Vegetation

- Build a containment berm using soil material or snow and place a plastic tarp at the foot of the berm for easy capture of the spill, and to prevent sewage from entering any water body
- Remove the spill by using vacuum trucks or excavating the soil, gravel, or snow
- If soil, gravel, and/or vegetation must be removed from the spill site, the Hamlet shall contact the appropriate regulatory agencies for approval before commencing with the removal.

5.5.2 Sewage Spill into Water

- Use containment boom to capture spill, and pump contaminated water into vacuum trucks
- Deposit contaminated water to the Hamlet sewage lagoon
- Monitor the affected water body sampling at a minimum for Biological Oxygen Demand (BOD), Total Suspended Solids (TSS), ammonia (NH₃), and faecal coliforms (FC).

5.5.3 Sewage Spill on Ice and Snow

- Build a containment berm around spill using snow
- Remove spilled sewage and contaminated snow and ice to the Hamlet sewage lagoon.

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5.5.4 Sewage Storage and Transfer

All contaminated water, ice, snow, soil, and clean-up supplies will be deposited to the Hamlet sewage lagoon or landfill facility, as appropriate.

5.6 Mitigative Measures: Solid Waste

5.6.1 Solid Waste Spill on Soil, Gravel, Rock, or Vegetation

- Physically remove the spilled solid waste from the waste, and deposit to the approved Hamlet Solid Waste Disposal Facility
- If soil, gravel, or vegetation are to be removed from the site, the Hamlet shall contact regulatory agencies for approval before commencing with the removal.

5.6.2 Solid Waste Spill into Water

- Use containment boom to capture soil for recovery
- Physically remove the spilled solid waste from the water, and deposit to the approved Hamlet Solid Waste Disposal Facility
- Capture any sheen from the water using absorbent pads or skimmer, and deposit any used absorbent pads to the approved Hamlet Solid waste Disposal facility.

5.6.3 Solid Waste Spill on Ice and Snow

- Build a containment berm around spill using snow
- Physically remove the spilled solid waste and deposit to the approved Hamlet Solid Waste Disposal Facility
- If soil, gravel, or vegetation are to be removed from the site, the Hamlet shall contact regulatory agencies for approval before commencing with the removal.

5.6.4 Disposal

Any solid waste shall be removed to the approved Hamlet Solid Waste Disposal Facility.

5.7 Spill Recovery Assessment

In order to determine whether a spill has been successfully remediated, samples of the soil and/or water within the spill containment area and surrounding the area, are to be collected and sent to an accredited Canadian Association of Environmental Analytic Laboratories (CAEAL) laboratory to be analyzed for the chemical parameters contained in the spill material. If concentrations of the spill chemicals are not detected, or are at

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concentrations below the applicable Territorial, Federal, or CCME regulations/criteria, the spill clean-up will be determined a success. Clean-up operations may then cease.

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6.0 Spill Response Resource Inventory

6.1 Additional Personnel Available

In addition to Hamlet staff, approximately 10 people are available from the Qikiqtarjuaq Fire Department, to assist in spill response and clean-up activities. Personnel from the local RCMP Detachment will be available for securing the site from unauthorized individuals, closing roads, etc. The Community Health Centre have personnel to assist in the treatment of anyone injured during the emergency.

6.2 Spill Response Equipment Inventory

Equipment available within the community to assist in responding to a hazardous materials spill includes heavy equipment (i.e. vacuum trucks, dozer, front end loader, and grader), as well as various hand held tools including shovels. In addition, three spill kits should be available on site during spill incident response operations. Each spill kit should contain the following supplies.

Composition of Spill Kit

	Quantity
• 360 litre polyethylene over pack drum	1
• oil sorbent booms (5" X 10')	6
• oil sorbent sheets (16.5" X 20" X 3/8")	100
• drain cover (36" X 36" X 1/16")	1
• Caution tape (3" X 500')	1
• 1 lb plugging compound	1
• Nitrile gloves (pair)	4
• Safety goggles (pair)	4
• Tyvek coveralls (pair)	4
• instruction booklet	1
• printed disposable bags (24" X 48")	10

Sorbent capacity of each spill kit is 240 litres.

All equipment is generally stored at the Hamlet Operations Yard/Garage. Some equipment may be stored in other areas throughout the community while being used to complete tasks.

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7.0 Training

All employees working for the Hamlet of Qikiqtarjuaq should be trained in the safe operation of all machinery and tools to help prevent sewage and hazardous material spills. All employees on site should also be trained for initial spill incident response. Annual refresher exercises should be conducted to review the procedures of this *Environmental Emergency Contingency Plan*, with all individuals involved in the Incident Spill Response Team, including members of the local volunteer fire department, RCMP Detachment, and Community Health Centre.

Incident Spill Response Team training should include the following aspects:

- Spill awareness and prevention
- Methods of detection
- Types of spills and seasonal considerations
- Reporting procedures and initial responses
- Spill response kit familiarization
- Clean-up and site remediation methods
- Occupational health and safety including proper selection and use of PPE's.

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8.0 Annual Review of this Environmental Emergency Contingency Plan

As part of the preparation of the Annual Report to the Nunavut Water Board for the Water License, the Hamlet should review and update the information contained within this plan. The purpose of the update is to ensure all changes to regulations are incorporated into this plan, along with the use of any new technology or method advances, to prevent or stop a spill and to mitigate and/or remediate a spill. This ensures that the plan adapts as the Hamlet grows, to ensure the community is properly prepared in the event of an incident.

Finally, it is recommended that annual refresher training of personnel be completed after any revisions to this document have been approved. This will familiarize personnel with the updated plan, and to provide a rapid and coordinated response.

Environmental Emergency Contingency Plan for
Water, Sewage, and Solid Waste Operations in the
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9.0 References

Nunavut Water Board, September 2000. *Hamlet of Qikiqtarjuaq Water License NWB3Q1K0106*. Goja Haven, Nunavut.

Nunavut Water Board, November 2004. *Guidelines for Spill Contingency Planning*. Goja Haven, Nunavut.

Northwest Territories, Date Unknown. *Contingency Planning and Spill Reporting in the NWT: A Guide to the New Regulations*, Yellowknife, Northwest Territories.

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Appendix A

Contact Information

Appendix A
Contact Information

Contact	Location	Telephone	Fax
Hamlet of Qikiqtarjuaq Senior Administrative Officer or Designate	Qikiqtarjuaq	(867) 927-8832	(867) 927-8120
Northwest Territories/Nunavut 24 Hour Spill Report Line	Iqaluit	(867) 920-8130	(867) 873-6924
Indian and Northern Affairs Canada Water Resources Manger Nunavut Regional Office	Iqaluit	(867) 975-4550	(867) 975-4585
Nunavut Water Board	Gjoa Haven	(867) 360-6338	(867) 360-6369
Environment Canada Environment Protection Branch Inspector	Iqaluit	(867) 975-4644	(867) 975-4594
Manager Pollution Control and Air Quality Environmental Protection Government of Nunavut	Iqaluit	(867) 975-5907	(867) 975-5981
Indian and Northern Affairs Canada Land Administration Minister Nunavut Regional Office	Iqaluit	(867) 975-4280	(867) 975-4286
Department of Fisheries and Oceans Canada Nunavut Regional Office	Iqaluit	(867) 979-8000	(867) 979-8039
Fire Department	Qikiqtarjuaq	(867) 927-4422	N/A
Royal Canadian Mounted Police (RCMP) Detachment	Qikiqtarjuaq	(867) 927-0123	N/A
Community Health Centre	Qikiqtarjuaq	(867) 927-8916	N/A

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Appendix B
NWT Spill Report



NWT SPILL REPORT

(Oil, Gas, Hazardous Chemicals or other Materials)

24 – Hour Report Line
Phone: (867) 920-8130
Fax: (867) 873-6924

A Report Date and Time		B Date and Time of spill (if known)		C <input type="checkbox"/> Original Report <input type="checkbox"/> Update no. _____		Spill Number	
D Location and map coordinates (if known) and direction (if moving)							
E Partly responsible for spill							
F Product(s) spilled and estimated quantities (provide metric volumes/weights if possible)							
G Cause of spill							
H Is spill terminated? <input type="checkbox"/> yes <input type="checkbox"/> no		I If spill is continuing, give estimated rate		J Is further spillage possible? <input type="checkbox"/> yes <input type="checkbox"/> no		K Extent of contaminated area (in square meters if possible)	
L Factors effecting spill or recovery (weather conditions, terrain, snow cover, etc.)				M Containment (natural depression, dikes, etc.)			
N Action, if any, taken or proposed to contain, recover, clean up or dispose of product(s) and contaminated materials							
O Do you require assistance? <input type="checkbox"/> no <input type="checkbox"/> yes, describe:				P Possible hazards to person, property, or environment; eg: fire, drink water, fish or wildlife			
Q Comments or recommendations						FOR SPILL LINE USE ONLY	
						Lead agency	
						Spill significance	
						Lead Agency contact and time 	
Is this file now closed? <input type="checkbox"/> yes <input type="checkbox"/> no							
Reported by		Position. Employer, Location			Telephone		
Reported to		Position. Employer, Location			Telephone		



Appendix F
Monitoring Program Quality
Assurance/Quality Control Plan



Quality Assurance/Quality Control Plan for
Hamlet Water Reservoir, Sewage Lagoon, and
Solid Waste Disposal Facility Monitoring Program
Hamlet of Qikiqtarjuaq, Nunavut

Prepared for

The Hamlet of Qikiqtarjuaq
P.O. Box 4, Qikiqtarjuaq NU X0A 0B0 Canada

Prepared by

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Box 175, 25 Third Avenue Rankin Inlet NU X0C 0G0 Canada
15 Townline Orangeville ON L9W 3R4 Canada

Revised Date

February 2006

File No: N-O 09439.0

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- B Notification of Laboratory Form
- C Annual Report for the Hamlet of Qikiqtarjuaq

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1.0 Introduction

The Hamlet of Qikiqtarjuaq (meaning “big island”), is a Community of approximately 599 people located on the eastern coast of Baffin Island and on an island known as Broughton Island in the territory of Nunavut. As illustrated in Figure 1, the Hamlet is located approximately 470 kilometers northeast of the Capital City of Iqaluit, a distance that is covered by plane in about one hour. The geographic coordinates for the Hamlet of Qikiqtarjuaq are 67°33’ north latitude and 64°02’ west longitude. As indicated on Figure 2, the community is situated on the northwest portion of Broughton Island.

The Hamlet provides trucked water and sewage services, along with regular solid waste collection for the residents, businesses and institutions. Historically, water is drawn from the Tulugak River during the summer, and from the lined earthen reservoir for the remainder of the year. Sewage is collected by truck from individual holding tanks at each building and discharged to the unlined sewage lagoon located to the east of the community north of the DEW Line Access Road. Sewage treatment is provided by a retention lagoon, with the treated effluent charge flowing north towards the ocean through a naturally occurring wetland treatment area. Solid waste is disposed of at a facility located adjacent to the sewage lagoon. The solid waste disposal facility includes areas for bulky metals/derelect vehicles, barrels, metal dump borrow, secondary metal, and residential solid waste.

1.1 Purpose

The Quality Assurance/Quality Control Plan has been prepared to meet the requirements of the Monitoring Program developed for the Hamlet of Qikiqtarjuaq to comply with licensing requirements. A copy of the current license is included in Appendix A.

Quality Assurance (QA) and Quality Control (QC) are vitally important components of environmental management for the Hamlet of Qikiqtarjuaq. Contact information for the Hamlet is provided in Appendix B.

1.2 Objectives

The Plan has been developed to achieve the following objectives:

- To ensure that all samples taken in the field will follow procedures and controls in order to maintain a high quality, so that the results obtained represent both the physical and chemical nature of the samples being taken
- To ensure best management practices (BMP) are used throughout the sampling program

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- To ensure all samples are delivered promptly to an accredited laboratory for analysis.

This document describes the procedures and controls to be used by Hamlet operations staff when conducting environmental sampling to meet the requirements of the license.

Although the QA/QC Plan is submitted to the NWB as a condition of the water license, it is primarily intended to be read, understood, and implemented by Hamlet operations personnel responsible for environmental quality monitoring. The procedures should be applied to **all** water quality samples taken by the Hamlet.

1.3 Quality Assurance and Quality Control

Quality Assurance is a set of operating principles that, if strictly followed during sample collection and analysis, will produce data of known and defensible quality (Wilson, 1995). As such the accuracy of the analytical results can be stated with a high level of confidence. A high level of quality assurance can be achieved by applying the following principles:

- Personnel involved in water sampling and analysis are well trained
- Facilities and equipment required for sampling are suitable, well maintained, and always kept clean
- Standard procedures are developed and implemented for the collection, transportation and analysis of samples, based on recognized BMP
- Laboratory and field instruments are calibrated according to manufacturers recommendations or recognized as good operating practice
- Supplies used in sampling and analysis are of consistent high quality and are not expired
- Quality Control (QC) procedures are development and implemented based on good operating practices to assess quality of analytical data and provide warning of unacceptable errors
- Implement prompt remedial action when deficiencies are identified
- Results of the monitoring program are reported in the Annual report as required in the water license. Annual report is required to be submitted by March 31 for the pervious calendar year to the NWB sample form can be found in Appendix C.

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Quality Control (QC) is a set of specific procedures used to measure the quality of the data produced and correct deficiencies in the sampling or analyses, as they occur. Quality control is used by the analyst and sampler to achieve standards of measurement for the three principles components of quality: precision, accuracy and reliability.

1.4 Lab Accreditation

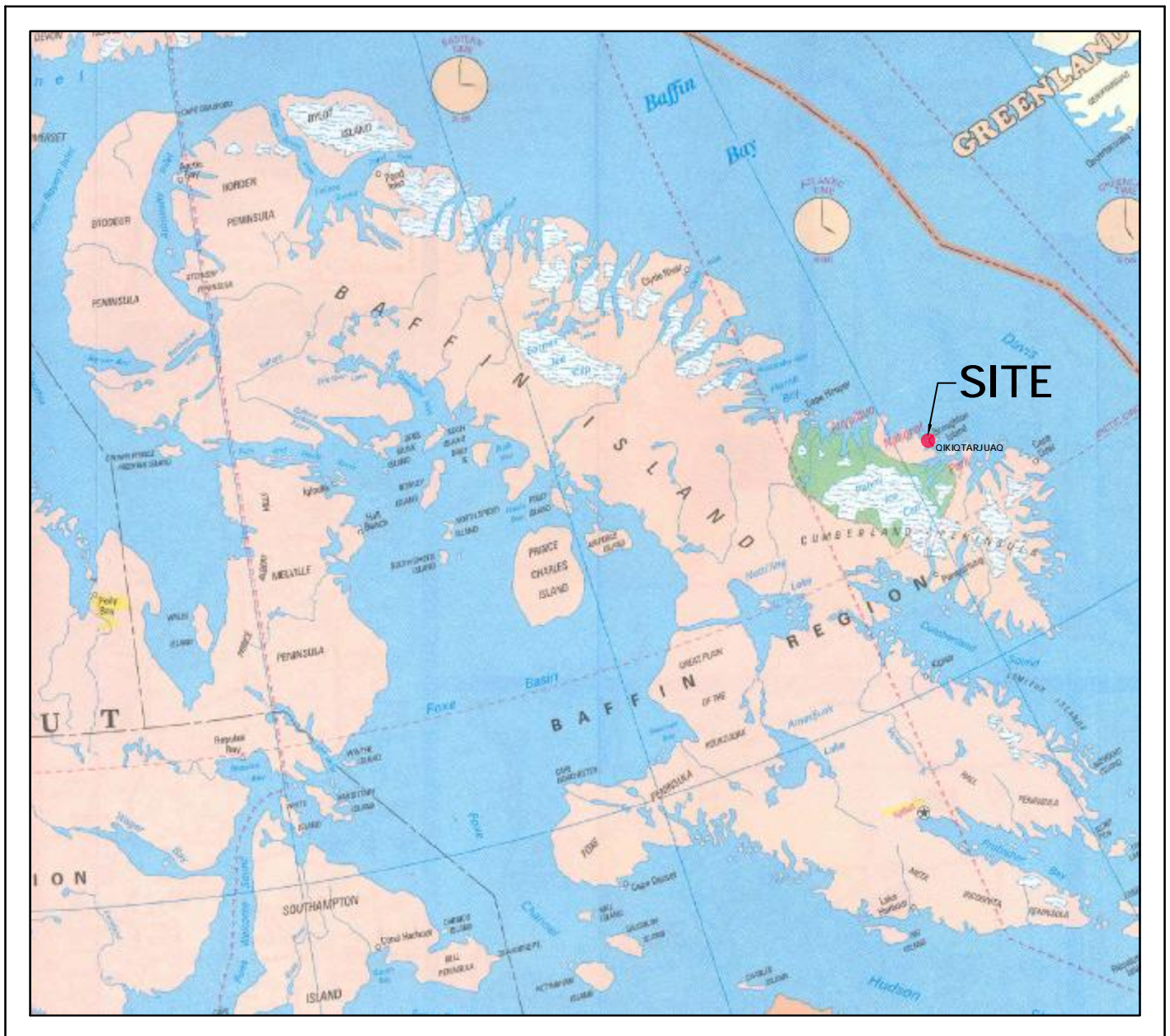
All analyses shall be conducted in laboratories, which are accredited by the Canadian Association of Environmental Analytical Laboratories (CAEAL), unless otherwise approved by an Analyst. The Contact information for the DIAND Analyst for Nunavut is provided in Appendix A.

The following is the contact information for the Laboratory retained by the Hamlet of Qikiqtarjuaq to complete analysis:

Name of Laboratory	_____
Address	_____

Phone No.	_____
Fax No.	_____

Prior to sampling being undertaken by representatives of the Hamlet, the Hamlet shall notify the NWB of the Laboratory to be used to perform the analysis. This is required as per the Water License.



Map Reference:
Map of Canada
Published by the CAA

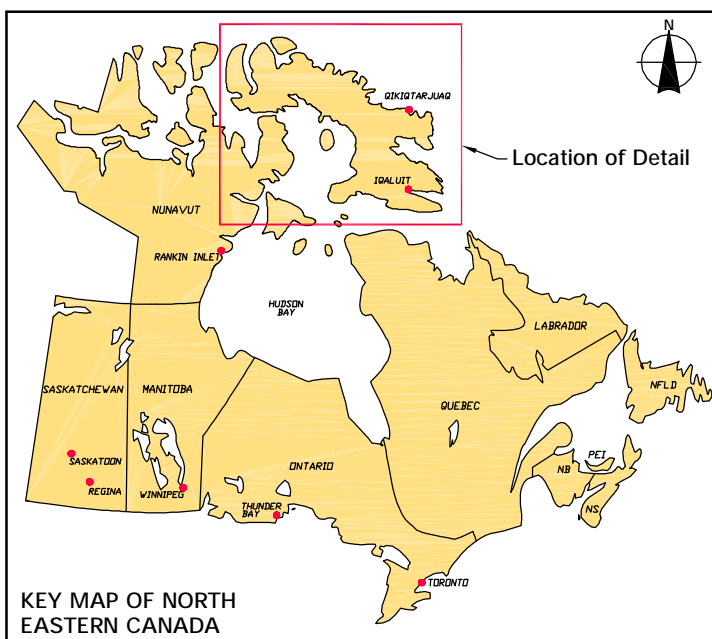


FIGURE 1 - SITE LOCATION MAP

THE HAMLET OF QIKIQTARJUAQ, NUNAVUT

QUALITY ASSURANCE/QUALITY CONTROL PLAN

January 2006
Project Number: N-O 09439.0

Prepared by: K. Pridham

Verified by: M. Paznar

Burnside



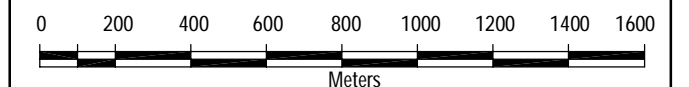
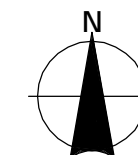
FIGURE 2
THE HAMLET OF QIKIQTARJUAQ
*QUALITY ASSURANCE/QUALITY CONTROL
PLAN*

SATELLITE IMAGERY OF
ENTIRE COMMUNITY
AND INFRASTRUCTURE

Legend

X QIK - 1 SAMPLING STATION LOCATION

Satellite Imagery Source:
September 2004 Satellite Image obtained from DigitalGlobe Inc.



1:20,000
January 2006
Project Number: N-O 09439.0

Projection: UTM Zone 20
Datum: NAD83

Prepared by: C. Sheppard

Verified by: M. Paznar



February 2006

2.0 Field Sampling

2.1 Sample Collection

Effluent and surface water sampling by the Hamlet of Qikiqtarjuaq is conducted to provide information for the Hamlet for effective environmental management and to monitor regulatory compliance.

2.1.1 Sampling Location and Frequency

The Monitoring Program of the water license prescribes the specific effluent and surface water monitoring program for the Hamlet. It includes detailed information such as where to take samples, how often to take samples and what parameters will be analyzed on the collected samples. The proposed Monitoring Program is summarized in Table 1.

Table 1: Surveillance Network Program for Water License NWB3Q1K0106

Station	Description	Frequency	Analysis Requirements
QIK -1	Raw water supply intake at the Tulugak River	Monthly from May to August prior to refilling reservoir	<p>Measure volume of water drawn from river</p> <ul style="list-style-type: none"> • Total Ammonia-N • Total Organic Carbon (TOC) • Total Suspended Solids • Chloride (Cl) • Nitrate (N) • Total Arsenic (As) • Total Chromium (Cr) • Total Copper (Cu) • Total Lead (Pb) • Total Mercury (Hg) • Total Sodium (Na) Microbiological • Heterotrophic plate count (HPC) • Coliform • Colour • pH • Turbidity • Nitrite (N) • Sulphate (SO₄) • Total Cadmium (Cd) • Total Cobalt (Co) • Total Iron (Fe) • Total Manganese (Mn) • Total Nickel (Ni) • Total Zinc (Zn) • Background • Escherichia coli (E.coli)

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Station	Description	Frequency	Analysis Requirements
QIK - 2	Raw water supply intake at the reservoir truck fill station	Monthly from May to August	Measure volume of water drawn from reservoir
QIK - 3	Raw sewage from pump out truck	Monthly from May to August	Amount deposited to lagoon
QIK - 4	Discharge from the FINAL DISCHARGE POINT OF SEWAGE DISPOSAL FACILITIES	Monthly during periods of flow	<ul style="list-style-type: none"> • BOD • Total Suspended Solids • Conductivity • Oil and Grease • Magnesium • Sodium • Chloride • Total Hardness • Ammonia Nitrogen • Total Cadmium • Total Cobalt • Total Chromium • Total Copper • Total Aluminum • Faecal Coliform • pH • Nitrate-Nitrite • Total Phenols • Calcium • Potassium • Sulphate • Total Alkalinity • Total Zinc • Total Iron • Total Manganese • Total Nickel • Total Lead
QIK - 5	Runoff from the Solid Waste Disposal Facility	Monthly during periods of flow	Same as STN QIK - 4

The sampling stations will be clearly identified in the field by posted signs. All signs shall be in the Official Languages of Nunavut, and shall be located and maintained to the satisfaction of an Inspector. Each sampling location must have their Global Positioning System (GPS) coordinates determined. Table 2 provides an estimate of the GPS coordinates based on the satellite imagery shown in Figure 2. These locations must be confirmed by the Inspection, and the coordinates updated if necessary.

Table 2: GPS Locations of SNP Sampling Stations

Station	GPS Coordinates (Easting, Northing)
QIK - 1	458912, 7493383
QIK - 2	458740, 7493463
QIK - 3	458962, 7495017
QIK - 4	458091, 7495340
QIK - 5	458754, 7495176

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Samples shall be taken at the same location on each sampling occasion, unless the Inspector has approved a new location.

Additional sampling and analysis may be requested by an Inspector.

Note: The License also describes the sampling station QIK-1 as the raw water supply prior to treatment. The Hamlet is not required to take samples at this site to comply with the water license. Samples for QIK-1 shall be taken by the Indian and Northern Affairs Canada (INAC) and/or GN Environmental Health Office (EHO).

2.1.2 Sample Planning

To understand what sample containers, sampling techniques, and preservation methods are required, Hamlet personnel first need to understand what parameters will be analyzed in the laboratory. Table 3 is a summary of parameters required in the License, which are grouped according to their different sampling requirements:

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Table 3: Parameters Examined in NWB Water Licenses

Group	Description	Parameter
I	Microbiological	Biological Oxygen Demand (BOD) Fecal Coliform (FC)
II	General Water Chemistry	pH Conductivity Total Alkalinity Total Suspended Solids (TSS) Ammonia Nitrogen (NH ₃ -N) Nitrate-Nitrite (NO ₃ -NO ₂) Oil and Grease (OGG) (Visual) Sulphate (SO ₄) Sodium (Na) Total Organic Carbon (TOC) Potassium (K) Magnesium (Mg) Calcium (Ca) Total Hardness Chloride (Cl)
	Total Metals (except Mercury):	Total Nickel (Ni) Total Aluminum (Al) Total Arsenic (As) Total Cadmium (Cd) Total Copper (Cu) Total Cobalt (Co) Total Chromium (Cr) Total Iron (Fe) Total Lead (Pb) Total Manganese (Mn) Total Zinc (Zn)
III		Total Mercury (Hg)
IV		Total Phenols (Total-P)

It is strongly recommended that the Hamlet seek advice for the sizes and types of buffers required for analysis of the parameters required. Furthermore, it is recommended that the laboratory pre-fill the sample collection bottles with the proper preservative to minimize error in the field.

All of the samples taken will be grab samples. Samples will normally be taken from natural lakes, streams, treatment ponds, or process streams. Where possible, samples

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shall be taken from just below the surface to avoid floating debris, which may contaminate the sample.

Freshwater Streams, Surface Drainage, and Wetlands

The samples shall be collected as close to the middle of the stream where water flows freely and is free of debris. After getting into position, the sampler shall wait to allow any stirred sediment that occurred from entering the stream to settle or wash away. The sample bottle shall be partially filled with the water to be sampled and rinsed with the lid in place at least three times. Rinse water shall be emptied downstream of the sampling point, so that stream sediments remain undisturbed. **Prior to sampling for oil/grease, bacteria, and for any bottles containing preservative, the bottles shall not be rinsed.**

If possible, bottles shall be plunged into the stream to a depth of approximately half the total stream depth, and allow it to fill with the mouth of the bottle facing upstream. Where stream is too shallow to allow for sample bottle to be filled completely, without disturbing bottom sediment of the streambed. The sampler may use a smaller container that has been properly rinsed to transfer sample to the larger bottle. Do not use a smaller sample bottle containing preservatives.

When taking the sample, sufficient room shall be left to allow for the addition of preservatives, if required.

Lakes or Ponds

Surface sampling shall be collected using the same procedures as streams. Sample bottles shall be plunged to approximately 150 mm (6 inches) below the water surface.

Although not currently required under the Monitoring Program, information on water quality at various depths in lakes or ponds may be required. If an Inspector requests that this sampling be carried out, specific procedures shall be implemented in accordance with accepted sampling and good engineering practice.

Process Streams

When sampling a process stream (i.e. valve or pipe discharge) the sampler shall collect a grab sample or a set of composite samples collected over an extended period of time. In the case of sampling from a valve, valves shall be open and running for a least one-minute before taking the sample to ensure that a representative sample of the process stream is taken.

2.1.3 Sample Container Selection

Sample containers vary in size and material of construction depending on the specific type of analysis to be conducted. Sample containers for each analysis are shown in Table

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2. Sample containers to be used shall be obtained directly from the laboratory, which shall provide new containers to the Hamlet specific for the sampling program requested by the Hamlet. The laboratory will provide the correct sizes and types of bottles based on the parameters required. The Hamlet shall **contact the laboratory at least one month prior to sampling event** in order to ensure that containers are available for sampling. Refer to Section 1.3 for laboratory contact information.

2.1.4 Field Sampling Log

The individual collecting the water sample shall record the following at the time of sampling:

- Date of sampling
- Time of sampling
- Weather conditions
- Monitoring Station Number (i.e. QIK-2, QIK-3, QIK-4, etc.)
- Results of any Field measurements
- Sampler shall also indicate if sample used preservatives
- Any unusual conditions
- Any deviation from standard procedures.

2.1.5 Field Measurements

No field measurements are required as part of the Hamlet sampling program, however, it is strongly recommended that the following parameters be sampled immediately on site using appropriate portable field equipment:

- pH
- Temperature
- Dissolved oxygen
- Total alkalinity
- Turbidity
- Chlorine residuals.

It is important that separate equipment be used to sample between potable water and non-potable water (i.e. surface water). Furthermore, all instruments, glassware, etc. should be cleaned between each sample following manufacturer's recommended guidelines and/or BMPs.

2.1.6 Sampling Procedures

The sampling procedures described in Table 4 shall be used to collect water samples appropriate to the sampling location.

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Table 4: General Procedures for Sample Collection

	BIOLOGICAL	PHYSICAL	INORGANIC	ORGANIC
Phase 1: Sample Program Design	Step 1: Choose sample locations, sample frequency, and analytes to be measured Step 2: Contact laboratory used for analysis and get advice and information for sampling program Step 3: Contact manager of sample location facility; determine all safety requirements Step 4: Create sample identification system			
Phase 2: Sample Program Preparation	Step 1: Obtain sample containers, storage containers, distilled water, Personal Protective Equipment (PPE), and other required equipment Step 2: Create sample labels and apply to sample containers Step 3: Plan first sampling event - arrange all transportation and notify laboratory			
	♻ 1000 mL plastic or glass container for BOD ♻ 300 mL plastic or glass container for fecal coliform	♻ Have equipment needed for any flow or temperature measurements ♻ 200 mL plastic or glass container for suspended solids	♻ Electrode meter for dissolved oxygen and pH ♻ 1000 mL nitric acid rinsed container, nitric acid for preservation, and filter for metals ♻ Specific containers and preservatives for nutrients or other analytes	♻ 1000 mL plastic or glass container, hydrochloric or sulfuric acid, for oil and grease
Phase 3: Sample Collection	Step 1: Keep sample containers closed until used Step 2: Record the date, time, location, geographic position, weather conditions, and other details in a field notebook at each sample location Step 3: Fill out the sample label, including: sample ID, location, date, time, and name of sample collector Step 4: Collect sample using appropriate container, by filling without rinsing, immediately close and keep cool Step 5: Pack all samples and provide a sample information sheet listing all contents in the storage container Step 6: Label the storage container with the recipient, WATER SAMPLES, FRAGILE, THIS END UP, and any TDG or WHMIS labels required			
	♻ BOD - fill container completely and refrigerate, Fecal coliform - leave space at top of container, refrigerate ♻ Maximum storage time: BOD - 24 hrs, Fecal Coliforms - 30 hrs,	♻ TSS - Refrigerate ♻ Maximum storage time: TSS - 7 days, temperature - 0.25 hrs	♻ Fill container and leave a small (1% of volume) air space at the top, refrigerate ♻ Maximum storage time: ammonia - 7 days, nitrate and phosphate - 48 hrs, metals - indefinite, DO and pH - 0.25 hrs	♻ Fill container to top and refrigerate ♻ Maximum storage time: oil and grease - 28 days
Phase 4: Sample Transportation	Step 1: Fill out the "sampler" portion of the Chain of Custody form Step 2: Ensure that all personnel handling the samples fill out a subsequent section of the Chain of Custody form Step 3: Transport the samples to lab for analysis as quickly as possible Step 4: Verify that the lab has received the samples and analysis is underway			

Note: Sizes and types of sample collection containers (bottles) are a suggestion only. The laboratory may suggest and use other sizes and types. Follow the suggestions of a CAEAL accredited laboratory.

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2.1.7 Sample Identification

All samples collected are to be labeled according to standard identification procedures (Name of sampler, time and date of sampling, sample identifier, sampling method and type of sample). **Sample labels shall be water-resistant, and prepared prior to going into the field.** An example of a typical Label is provided in Figure 3.

Figure 3: Example of Water Sample Label

Name of Sampler:	Gill Evans	Sample #:	1 of 15
Date of Collection:	1 May 2006 (0900 hrs)		
Type of Sample:	Grab Water Sample for Microbiological Analysis		
Parameter to be analyzed:	BOD		
Preservation method used:	no preservatives		
Temperature:	11°C	pH:	7.04
Sample Location:	QIK-4		
	Hamlet of Qikiqtarjuaq		
	Qikiqtarjuaq, NU		
	Phone: (867) 927-8943		

2.1.8 Sample Preservation

To obtain good results from a sampling program, time is critical. All samples are to be shipped to the Laboratory that has been contracted to carry out the analysis the same day as they are collected. Samples must be protected from breakage, and shall be shipped in an insulated cooler that can be provided by the Laboratory. **If samples cannot be shipped until the next day, due to unavoidable events such as weather or mechanical problems with transport aircraft, all samples must be stored in a refrigerator at 4°C.** Samples must not be frozen.

In all cases where samples cannot be delivered to the lab on the same day, specific preservatives must be added to the samples to prevent chemical changes that may alter the concentration of the parameters of interest. The samples must be preserved within two hours of sampling. Usually, samples can be preserved away from the field at the end of the site visit. In most cases, the laboratory can fill the bottles with preservative, and then ship them to the Hamlet to be filled and sent back for analysis.

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For the Hamlet of Qikiqtarjuaq, Table 5 provides the appropriate preservation methods for the parameters to be assessed.

Table 5: Sample Preservation

Type of Sample	Preservation Required
Group I Microbiological	Store in refrigerator at 4°C. Ship to Lab the same day as collected
Group II General Water Chemistry	Store in refrigerator at 4°C. Ship to Lab the same day as collected
Group II Total Metals (except mercury)	Acidify with 5 mL of <20 percent nitric acid. Store in refrigerator at 4°C. Ship to Lab the same day as collected
Group III Total Mercury	Acidify with 2 mL of 1:1 sulfuric acid and 5 percent potassium dichromate Store in refrigerator at 4°C. Ship to Lab the same day as collected
Group IV Total Phenols	Acidify with 4 mL of 1:1 sulfuric acid. Store in refrigerator at 4°C. Ship to Lab the same day as collected

Note: 1000 mL = 1 Liter

2.1.9 Sample Transportation

The main objective of the sampler is to minimize any chemical changes to the sample between the time it is collected and delivery to the laboratory. Heat, light and agitation can all impact the water chemistry and the samples shall be protected from these effects.

Effluent and surface water samples shall be stored and transported at a temperature of 4°C. Coolers and ice packs need to be available and are usually provided by the laboratory. Upon arrival at the laboratory, samples shall be refrigerated as soon as possible.

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3.0 Quality Control

Most commercial laboratories undertake QA/QC procedures with the volume of sample sent for analysis. Reports are usually provided with the Certificates of Analysis. It is recommended that the suggested QA/QC protocols by the laboratory be followed.

To ensure that the monitoring program maintains accepted quality control, field blanks and duplicate samples may be suggested by the laboratory. These samples are collected and analyzed for the sample parameters as the monitoring program in the license as part of a quality control check on monitoring activities.

The Field Blanks shall accompany the sampler into the field, labeled as field blanks, preserved in the field and submitted to the laboratory with the field samples.

3.1 Replicate or Duplicate Samples

Replicate or duplicate samples is the collection of more than one sample for a given sampling station subject to specific analysis. Standard procedures used for the routine sampling shall be applied. The replicate or duplicate samples are useful in identifying problems with accuracy and sampling methods.

Once per operating season for each active monitoring station a set of duplicate samples will be taken, representing as many of the routine analysis as possible. Where possible this shall be carried out in conjunction with the sampling undertaken by an INAC Inspector.

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4.0 Laboratory Analysis/Reporting

The laboratory will perform the analysis of all samples as outlined in the License. The results shall be received by the Hamlet within the time frame agreed to with the laboratory. The results shall be submitted the NWB for review with the Annual report. The results shall contain the limits of Detection used for analysis of each parameter as supplied by the laboratory.

The Hamlet may request clarification of the Analysis be contacting the NWB Technical Advisor and a review of the analysis will be provided upon request.

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5.0 Glossary

Quality Assurance (QA): is the definitive program for laboratory operation that specifies the measures required to produce defensible data of known precision and accuracy. QA includes quality control and quality assessment activities.

Quality Control (QC): is a set of measures within a sample analysis methodology to assure that the process is in control.

Quality Assessment: is a process to determine the quality of the laboratory measurements through internal and external QC evaluations. It includes performance evaluation samples, laboratory inter-comparisons samples and performance audits.

February 2006

6.0 References

Nunavut Water Board. *Water License NWB3QIK0106*. Gjoa have, Nunavut.

Wilson, Neal. 1995. *Soil Water and Ground Water Sampling*. CRC Press: New York, USA.

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Appendix A

Contact Information

APPENDIX A

Contact Information

Nunavut Water Board Contact:

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

Inspector Contact:

Water Resources Manager
Nunavut District, Nunavut Region
Department of Indian and Northern Affairs Canada
P.O. Box 100
Iqaluit, NU X0A 0H0
Telephone: (867) 975-4550
Fax: (867) 979-6445

Analyst Contact:

Laboratory Manager
Taiga Laboratories
Department of Indian and Northern Affairs Canada
4601 - 52 Avenue, P.O. Box 1500
Yellowknife, NT X1A 2R3
Telephone: (867) 669-2780
Fax: (867) 669-2718



Appendix B
Notification of Laboratory Form

APPENDIX B
Notification of Laboratory Form

Attention: Technical Advisor
Nunavut Water Board

Re: Notification of Laboratory
Water License NWB3QIK0106

Dear Sir/Madame,

The following CAEAL-certified laboratory has been retained by the Hamlet of Qikiqtarjuaq to complete the sample analysis required by Water License NWB3QIK0106:

Name of Laboratory : _____

Address : _____

: _____

: _____

Phone # : _____

Fax # : _____

Regards,

Name (print) : _____

Signature : _____ Date : _____

Please send this form, once completed, to the Nunavut Water Board at the following address:

Nunavut Water Board
c/o Technical Advisor
PO Box 119
Gjoa Haven, NU X0B 1J0
Telephone: (867) 360-6338
Fax: (867) 360-6369
Email: srtech@nwb.nunavut.ca

Appendix C
Annual Report for the
Hamlet of Qikiqtarjuaq

APPENDIX C
Annual Report for the Hamlet of Qikiqtarjuaq

Year Being Reported: _____

The following information is compiled pursuant to the requirements of Part B, Item 1 of Water License NWB3QIK0106 issued to the Hamlet of Qikiqtarjuaq.

Tabular summaries of all data generated under the Monitoring Program, monthly and annual quantities in cubic meters of freshwater obtained from all sources, monthly and annual quantities in cubic meters of each and all wastes discharged.

Attached to this document are results for Monitoring Station QIK-1, QIK-2, QIK-3, QIK-4, and QIK-5 as well as detailed chemical, physical, and biological analysis required at QIK-2 and QIK-5 (for the months of May to August, inclusive).

Month Reported	Quantity of Water Obtained From all Sources (m³)	Quantity of Sewage Waste Discharged (m³)
January		
February		
March		
April		
May		
June		
July		
August		
September		
October		
November		
December		
Annual Total		

Please indicate volumes in cubic meters – 1 cubic meter equals 1,000 liters.

A summary of modifications and/or maintenance work carried out on the Water Supply and Waste Disposal Facilities, including all associated structures and facilities.

A list of unauthorized discharges and summary of follow up action taken.

A summary of any abandonment and restoration work completed during the year, and an outline of any work anticipated for the next year.

A summary of any studies requested by the Board that relate to waste disposal, water use or reclamation, and a brief description of any future studies planned.

Any other details on water use or waste disposal required by the Board by November 1st of the year being reported.

Updates or revisions to the approved Operation and Maintenance Plans.

Additional information that the licensee deems useful.

Follow up regarding inspection/compliance concerns.

Appendix H2
Sewage Lagoon



Sewage Treatment Facility Operation and Maintenance (O&M) Plan Hamlet of Qikiqtarjuaq, Nunavut

Prepared for

The Hamlet of Qikiqtarjuaq
P.O. Box 4, Qikiqtarjuaq NU X0A 0B0 Canada

Prepared by

Nuna Burnside Engineering and Environmental Ltd.
Box 175, 25 Third Avenue Rankin Inlet NU X0C 0G0 Canada
15 Townline Orangeville ON L9W 3R4 Canada

Revision Date

February 2006

File No: N-O 09439.0

The material in this report reflects best judgement in light of the information available at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions made based on it, are the responsibilities of such third parties. Nuna Burnside accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

Sewage Treatment Facility
Operation and Maintenance (O&M) Plan
Hamlet of Qikiqtarjuaq, Nunavut

February 2006

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3.0	Operation and Maintenance of the Sewage Treatment Facility.....	7
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- 3 Regional View of Sewage Lagoon and Solid Waste Disposal Facility (Landfill)

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- A Climate Normal Data
- B Projected Water Requirements and Sewage Generation Rates
- C Nunavut Water Board License
- D Example Operation Log
- E Environmental Emergency Contingency Plan
- F Monitoring Program Quality Assurance/Quality Control Plan

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1.0 Introduction

The Hamlet of Qikiqtarjuaq (meaning “big island”), is a Community of approximately 599 people located on the eastern coast of Baffin Island and on an island known as Broughton Island in the territory of Nunavut. As illustrated in Figure 1, the Hamlet is located approximately 470 kilometers northeast of the Capital City of Iqaluit, a distance that is covered by plane in about one hour. The geographic coordinates for the Hamlet of Qikiqtarjuaq are 67°33’ north latitude and 64°02’ west longitude. As indicated on Figure 2, the community is situated on the northwest portion of Broughton Island.

Qikiqtarjuaq is located within the continuous permafrost zone. Maximal local depth of annual thaw of the active layer ranges from 0.6 to 1.6 meters, depending on the thickness and nature of the surface cover. Materials located beneath the thin active layer are perennially frozen to a substantial depth. Qikiqtarjuaq sits on glacial drift primarily composed of silty sand and gravels mixed with boulders.

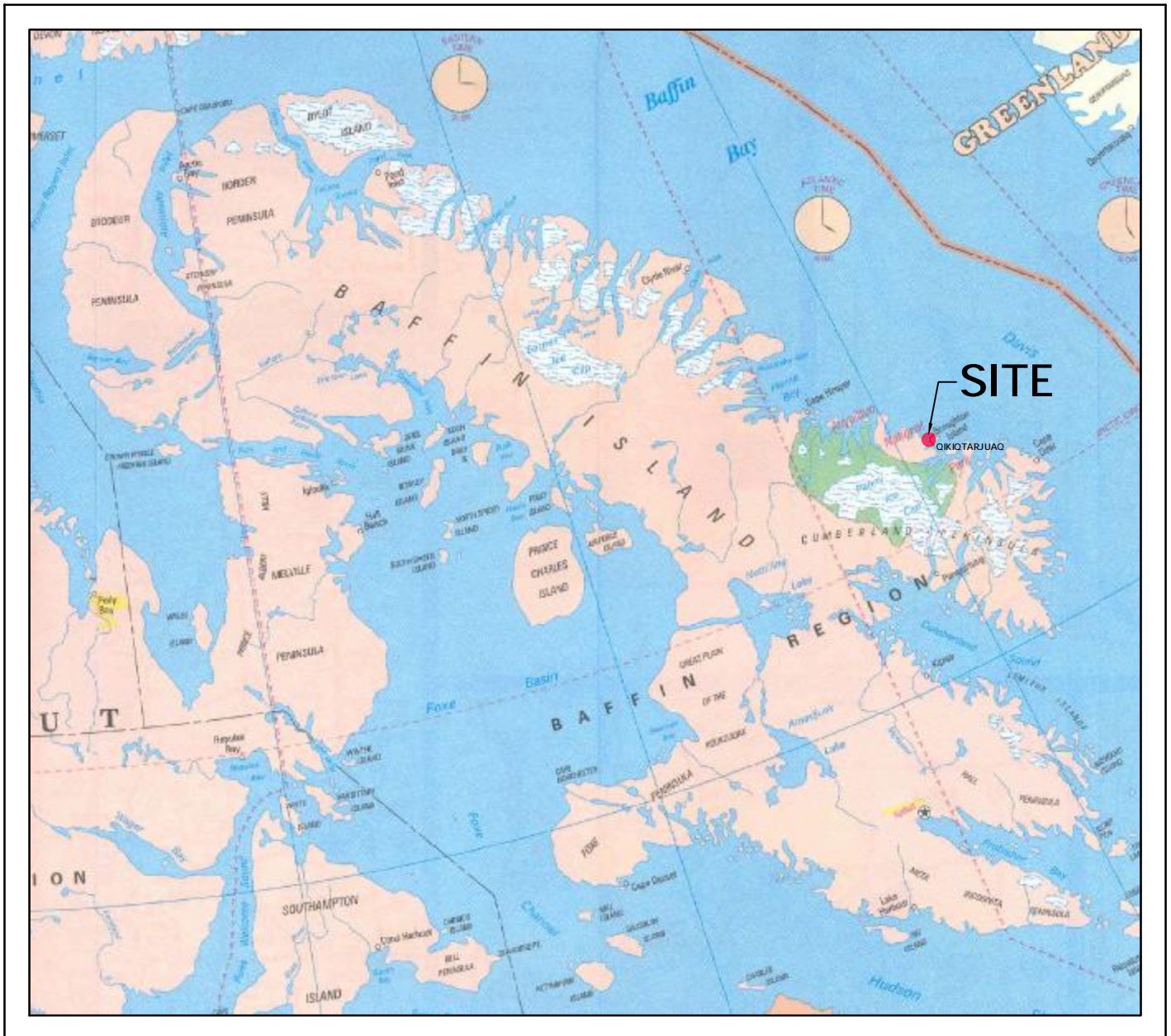
The vegetation present in Qikiqtarjuaq is typical of that evidenced on the Arctic tundra. Hardy grasses, mosses, and lichens sit in a thin organic layer on the surface, which is generally 0.2 m or less in thickness.

Qikiqtarjuaq receives an average of 39 mm of rainfall and 223 mm of snowfall per annum. July mean high and low temperatures are 7°C and 1°C, respectively. January mean high and low temperatures measure -21°C and -28°C, respectively. July and August are the only two months of the year that historically have had average daily temperatures above the freezing mark. Prevailing winds are generally north-northeast with an annual average velocity of 8.3 km/h. Climate normal information was obtained from Environment Canada’s website, and is available in Appendix A.

The Detailed Design Report (Nuna Burnside, 2006) for the Improvements to the Water, Wastewater, and Solid Waste Facilities determined the projected population, and associated water requirements and sewage generation rates using information from the Nunavut Bureau of Statistics. The tables with the detailed calculations are available for inspection in Appendix B.

1.1 Purpose

The Hamlet of Qikiqtarjuaq operates their municipal water, sewage, and solid waste facilities under the Nunavut Water Board (NWB) License NWB3Q1K0106, dated November 28, 2000 (Appendix C). Part G, Section 1 requires that an Operation and Maintenance (O&M) Plan be submitted for the facilities in accordance with all applicable regulations and following applicable guidelines. This document is created based on the



Map Reference:
Map of Canada
Published by the CAA

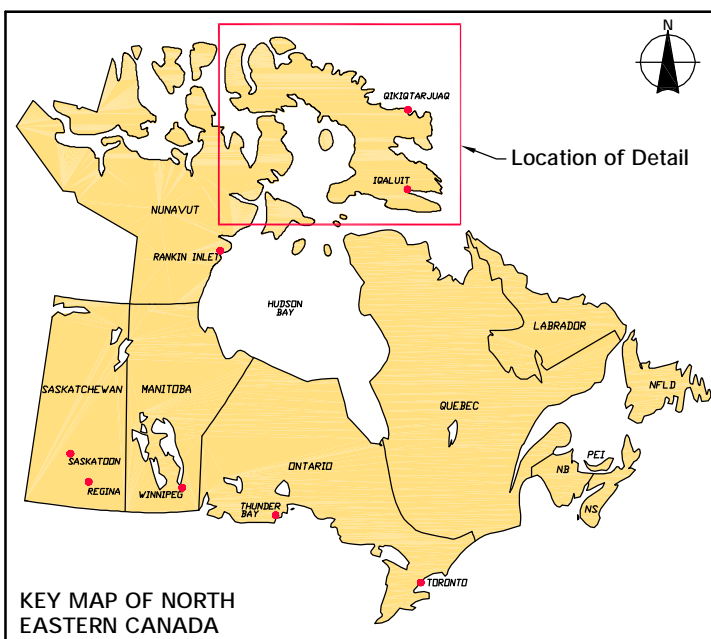


FIGURE 1 - SITE LOCATION MAP

THE HAMLET OF
OIKIQTARJUAQ, NUNAVUT

SEWAGE TREATMENT FACILITY O&M PLAN

January 2006
Project Number: N-O 09439.0

Prepared by: K. Pridham

Verified by: M. Paznar

Burnside

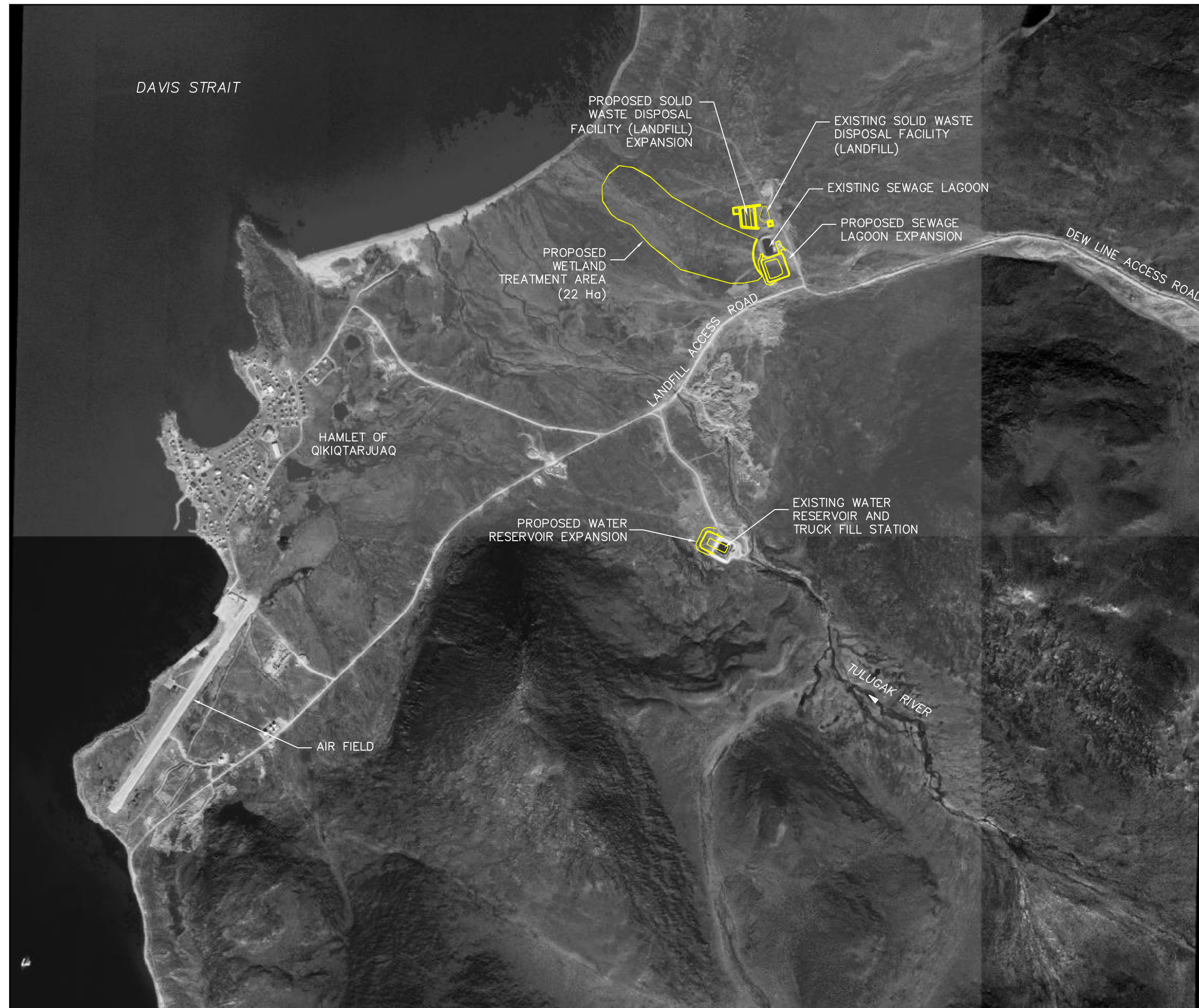
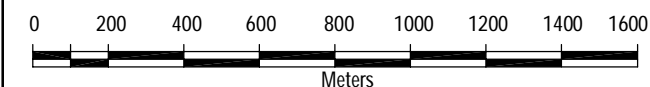
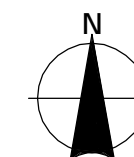


FIGURE 2
THE HAMLET OF QIKIQTARJUAQ
*SEWAGE TREATMENT FACILITY
O&M PLAN*

SATELLITE IMAGERY OF
ENTIRE COMMUNITY
AND INFRASTRUCTURE

Satellite Imagery Source:
September 2004 Satellite Image obtained from DigitalGlobe Inc.



1:20,000
January 2006
Project Number: N-0 09439.0

Projection: UTM Zone 20
Datum: NAD83

Prepared by: C. Sheppard

Verified by: M. Paznar



Sewage Treatment Facility
Operation and Maintenance (O&M) Plan
Hamlet of Qikiqtarjuaq, Nunavut

February 2006

improvements proposed for the sewage treatment system, which an amendment and renewal to the NWB license is being requested.

The O&M Plan of the sewage disposal facility will be used in conjunction with the normal operating procedures. This document provides a list of tasks and procedures that will assist the Hamlet's operations staff in the O&M of the facility.

February 2006

2.0 Background Information on Hamlet Operations

The Hamlet of Qikiqtarjuaq provides trucked water and sewage services, as well as regular solid waste pickup for the Community's residents, businesses, and institutions.

The Sewage Treatment Facility operated by the Hamlet of Qikiqtarjuaq is located approximately 2.3 km from the Hamlet. Sewage is collected by truck from customer holding tanks and discharged to the sewage lagoon located to the east of the community north of the DEW Line Access Road. The Hamlet currently utilizes an engineered facultative lagoon originally designed to hold sewage for 365 days, with an annual discharge in mid-August. The existing unlined earthen lagoon was constructed in 1992 (Figure 3). The design intent was for a 20-year lagoon to be constructed as two independent cells, but only one cell was built. The current single-cell lagoon is approximately 96 m x 70m x 4 m, with a total volume of 17,127 m³, and a working capacity of 10,558 m³. The contemplated double-celled lagoon will have an approximate useable storage capacity of 38,850 m³. Sewage effluent from the lagoon will be discharged overland, annually, through a large wetland treatment area, to the Final Discharge Point, which is located approximately 1 km from the Initial Discharge Point of the Sewage Treatment Facility.

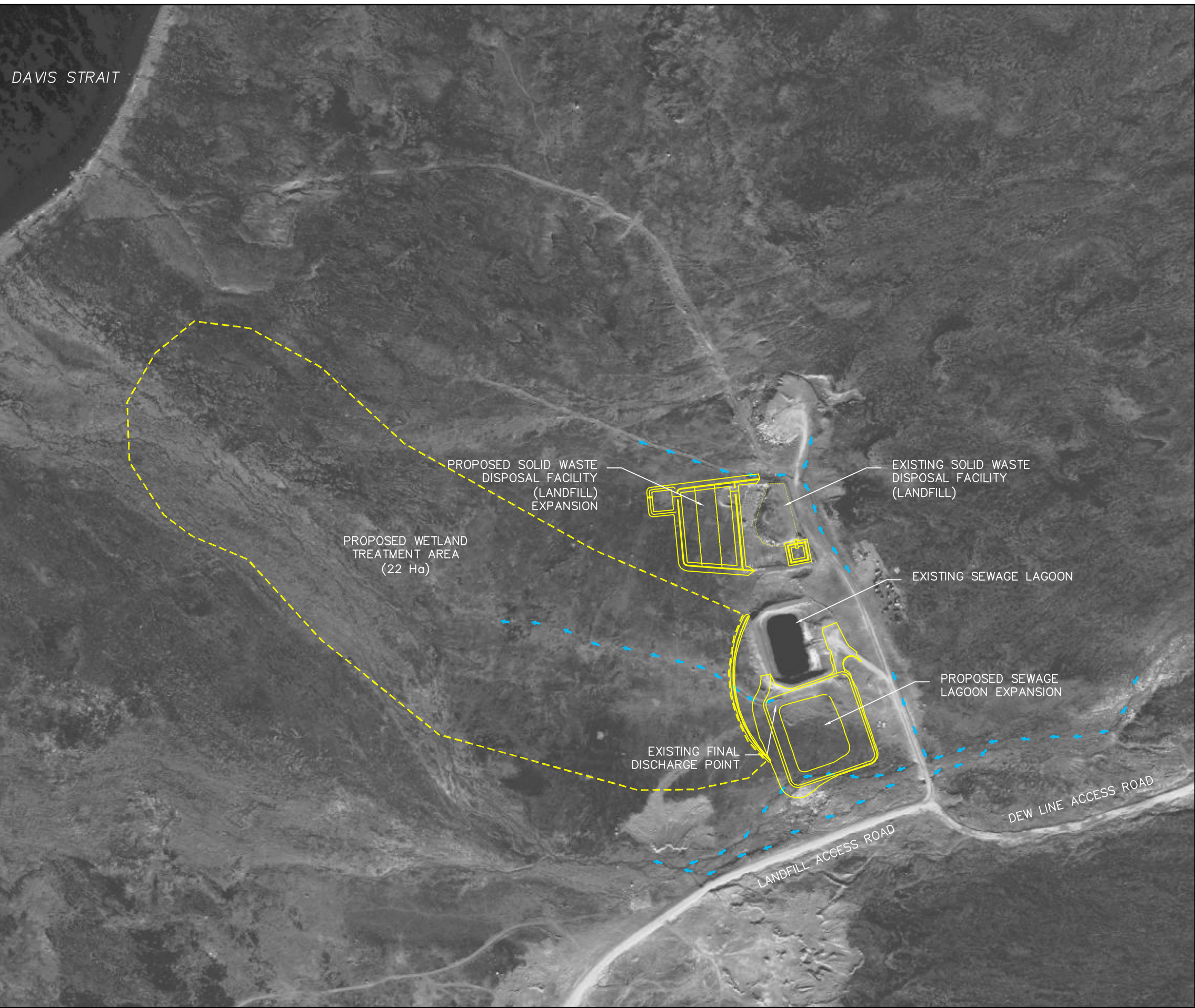


FIGURE 3

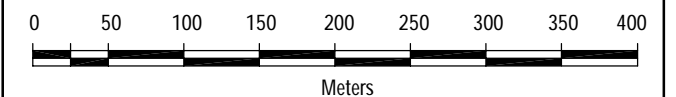
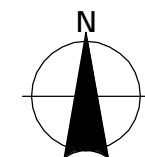
THE HAMLET OF QIKIQTARJUAQ
SEWAGE TREATMENT FACILITY
O&M PLAN

REGIONAL VIEW OF
SEWAGE LAGOON & SOLID
WASTE DISPOSAL FACILITY
(LANDFILL)

Legend

--- INTERPRETED EXISTING SURFACE WATER
FLOW DIRECTION

Satellite Imagery Source:
September 2004 Satellite Image obtained from DigitalGlobe Inc.



1:5,000
January 2006
Project Number: N-O 09439.0

Projection: UTM Zone 20
Datum: NAD83

Prepared by: C. Sheppard

Verified by: M. Paznar



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3.0 Operation and Maintenance of the Sewage Treatment Facility

Satellite imagery of the Sewage Treatment Facility operated by the Hamlet of Qikiqtarjuaq, which is described above, is provided in Figure 2. This Figure illustrates both the drainage pathway of the treatment wetland and the proximity to adjacent water bodies (in this case, the Davis Strait). The boundaries of the treatment wetland area are also illustrated in this figure.

In the event of emergency, guidance regarding containment and site emergency response can be obtained from the following sources (Table 1):

Table 1 – Emergency Contacts

Contact	Location	Telephone Number	Fax Number
INAC – Manager, Water Resources	Iqaluit	(867) 975-4550	(867) 979-6445
Hamlet of Qikiqtarjuaq – SAO	Qikiqtarjuaq	(867) 927-8832	(867) 927-8120
Government of Nunavut (Regional Engineer)	Pond Inlet	(867) 975-7314	
Environment Canada – Inspector	Iqaluit	(867) 975-4644	(867) 975-4594
Fire Department	Qikiqtarjuaq	(867) 927-4422	
RCMP Detachment	Qikiqtarjuaq	(867) 927-0123	
Community Health Center	Qikiqtarjuaq	(867) 927-8916	

3.1 Sewage Collection Procedures

The following sewage collection operational procedures shall be carried out by the Hamlet of Qikiqtarjuaq on a daily basis dependent upon weather conditions:

- Household and commercial sewage holding tanks will be pumped out using a vacuum truck and hauled to the Sewage Lagoon Storage Facility
- Sewage from the vacuum truck will be discharged to the Sewage Lagoon Storage Facility, via a flume designed to prevent erosion of the lagoon wall
- Daily waste volumes deposited to the Sewage Lagoon Storage Facility (and trip counts) shall be recorded on the recording form attached in Appendix D

Sewage Treatment Facility
Operation and Maintenance (O&M) Plan
Hamlet of Qikiqtarjuaq, Nunavut

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- In the event of an accident, a spill of sewage or petroleum products or a fire during sewage collection operations, the *Hamlet of Qikiqtarjuaq Environmental Emergency Response Plan* (Appendix E) shall be implemented.

3.2 Lagoon Operation Procedures

The following operational procedures shall be carried out by the Hamlet of Qikiqtarjuaq, during lagoon decant and wetland treatment operations:

- Household and commercial sewage deposited to the Sewage Lagoon Storage Facility shall be decanted to the Wetland Treatment Facility via the outlet discharge piping over a 60 day period (approximately 650 m³/day)
- Decant operations shall occur between June 15th and October 1st, dependant on weather conditions
- The Hamlet of Qikiqtarjuaq shall advise an Inspector and the Nunavut Water Board at least 10 days prior to starting decant operations of the wastewater lagoon
- During decant operations, the sewage lagoon decant control structures and treatment wetland drainage features shall be inspected daily for defects or blockages, and repaired immediately as necessary
- During decant operations, effluent quality monitoring shall be undertaken in accordance with the terms and conditions outlined in the NWB water license, or at the direction of an Inspector as defined in the *Nunavut Waters and Nunavut Surface Rights Tribunal Act*
- Upon completion of decanting operations, the decant structure valves shall be closed, the lagoon berms inspected, and any required maintenance (as described below) performed

3.3 Periodic and Seasonal Maintenance Procedures

The following procedures shall be undertaken by the Hamlet of Qikiqtarjuaq during periodic and seasonal maintenance operations at the Sewage Treatment Facility:

- The roadway and truck pad shall be maintained by snow clearing in the winter and grading in the summer in addition to be repaired as necessary
- Ditches and drainage channels shall being inspected for erosion (once per month) during the summer, and repaired as necessary

Sewage Treatment Facility
 Operation and Maintenance (O&M) Plan
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- Site warning signage, which identifies the boundaries of the Sewage Treatment Facility (which includes the Sewage Lagoon Storage Facility and the Wetland Treatment Areas) shall be inspected weekly, and repaired or replaced as necessary
- The discharge flume to the Sewage Lagoon Storage Facility shall be inspected for damage or displacement monthly, and repaired as necessary
- Any airborne litter shall be removed from the Sewage Treatment Facility to the Hamlet landfill in the Spring and Autumn, or as required
- The Sewage Lagoon Storage Facility shall be inspected for erosion and settlement monthly, and repaired as necessary
- The Sewage Lagoon Storage Facility shall be inspected following decant operations, to determine the thickness of sludge which has accumulated in the lagoon since the previous inspection
- Desludging of the lagoons shall occur every 5 to 10 years or as required based on the determination of the sludge thickness.

The activities described above shall be completed by Hamlet staff and the details of any repairs shall be reported in the Annual Report submitted to the Nunavut Water Board, in compliance with the Hamlet's Water License.

3.4 Facility Monitoring Procedures

As outlined in the NWB water license, regular monitoring of the effluent from the Sewage Treatment Facility is required. The Monitoring Program is to include effluent samples collected at the Final Discharge Point of the Wetland Treatment Facility, during the months of June to October, inclusive. Effluent samples collected shall be analyzed for the following parameters:

- | | |
|---|---|
| • Biological Oxygen Demand (BOD) | • Faecal Coliforms (FC) |
| • Total Suspended Solids (TSS) | • pH |
| • Conductivity | • Nitrate-Nitrite (NO ₃ -NO ₂) |
| • Oil and Grease (OGG) (Visual) | • Total Phenols (Total-P) |
| • Magnesium (Mg) | • Calcium (Ca) |
| • Sodium (Na) | • Potassium (K) |
| • Chloride (Cl) | • Sulphate (SO ₄) |
| • Total Hardness | • Total Alkalinity |
| • Ammonia Nitrogen (NH ₃ -N) | • Total Zinc (Zn) |
| • Total Cadmium (Cd) | • Total Iron (Fe) |

Sewage Treatment Facility
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- Total Cobalt (Co)
- Total Chromium (Cr)
- Total Copper (Cu)
- Total Aluminum (Al)
- Total Mercury (Hg)
- Total Manganese (Mn)
- Total Nickel (Ni)
- Total Lead (Pb)
- Total Arsenic (As)
- Total Organic Carbon (TOC)

Additional analytical parameters, which are identified in the NWB water license, or by an Inspector as defined in the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* shall also have samples collected and analyzed.

Sampling completed by the Hamlet of Qikiqtarjuaq shall be in accordance with the Hamlet of Qikiqtarjuaq Monitoring Program Quality Assurance/Quality Control (QA/QC) Plan, which is appended to this Plan (Appendix F).

A monitoring station will be established at the point where raw wastewater is off-loaded by the vacuum trucks. Monthly and annual quantities of raw wastewater offloaded will be measured and recorded in the official operations logbook on a form similar to that presented in Appendix D.

3.5 Annual Reporting Procedures

Results of analytical testing and monitoring are to be recorded on a regular basis by the Hamlet's operation staff. Copies of the analytical certificates and Chain of Custody forms are to be kept for future reference to determine the effectiveness of the treatment facility.

Sewage Treatment Facility
Operation and Maintenance (O&M) Plan
Hamlet of Qikiqtarjuaq, Nunavut

February 2006

4.0 References

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

National Research Council. August 2004. *National Guide to Sustainable Municipal Infrastructure: Optimization of Lagoon Operations*. Ottawa, Ontario.

Nuna Burnside Engineering and Environmental Ltd. January 2005. *Detailed Design of the Improvements to the Water Reservoir, Wastewater Lagoon and Solid Waste facility in the Hamlet of Qikiqtarjuaq*. Rankin Inlet, Nunavut.

Nunavut Water Board. September 2000. *Hamlet of Qikiqtarjuaq Water License NWB3QIK0106*. Gjoa Haven, Nunavut.

J:\2006\F\NUNA\08983\Reports\Sewage\Report.doc

Appendix A
Climate Normal Data

Appendix A: Climate Normals for Qikiqtarjuaq, Nunavut

<u>Temperature:</u>	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	Code
Daily Average (°C)	-24.8	-25.8	-23.5	-17.3	-8.4	-0.4	4.4	3.1	-2.5	-8.1	-15.8	-22.3		D
Standard Deviation	4.4	3.4	2.9	1.9	1.6	2.3	1.7	1.8	1.0	1.8	2.7	3.4		D
Daily Maximum (°C)	-21.9	-22.8	-20.2	-13.8	-5.3	2.4	7.3	5.9	-0.4	-5.9	-13.2	-19.4		D
Daily Minimum (°C)	-27.7	-28.8	-26.7	-20.8	-11.4	-3.1	1.4	0.4	-4.5	-10.4	-18.3	-25.1		D
Extreme Maximum (°C)	3.9	1.1	4.0	7.8	11.1	17.8	18.3	18.9	14.4	10.6	7.5	5.0		
Date (yyyy/dd)	1958/23	1960/11	1980/23	1975/29	1991/31	1973/29	1965/22+	1973/21	1962/04+	1984/16	1985/03	1967/17		
Extreme Minimum (°C)	-41.7	-42.8	-40.7	-34.3	-26.1	-12.2	-8.9	-7.8	-13.9	-24.4	-33.3	-39.2		
Date (yyyy/dd)	1961/11	1979/16	1985/01	1984/05	1970/07	1963/03+	1972/03+	1972/22	1972/29	1986/27	1957/16	1982/31		
<u>Precipitation: Precipitation:</u>														
Rainfall (mm)	0.0	0.0	0.0	0.0	0.4	3.4	16.3	15.9	2.9	0.3	0.0	0.0		D
Snowfall (cm)	6.8	6.8	5.7	16.0	31.4	15.2	10.5	10.2	30.0	45.8	37.1	7.3		D
Precipitation (mm)	6.8	6.8	5.7	16.0	31.8	18.6	26.8	26.1	32.9	46.1	37.1	7.3		D
Average Snow Depth (cm)	82	79	77	74	65	32	4	1	8	37	76	85	52	C
Median Snow Depth (cm)	83	79	77	74	66	32	3	1	5	36	78	85	52	C
Snow Depth at Month-end (cm)	79	78	74	71	58	13	3	2	20	56	86	83		D
Extreme Daily Rainfall (mm)	0.0	0.0	0.0	0.0	8.6	35.6	15.0	25.4	14.5	5.1	0.0	0.0		
Date (yyyy/dd)	1958/30+	1959/01+	1960/01+	1959/01+	1973/25	1966/27	1972/26	1959/07	1971/07	1968/05	1958/01+	1958/01+		

<u>Temperature:</u>	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	Code
Extreme Daily Snowfall (cm)	31.8	14.0	7.0	22.6	28.2	35.6	17.0	17.8	33.0	38.4	33.0	22.4		
Date (yyyy/dd)	1963/22	1970/15	1977/17	1968/16	1981/27	1973/21	1984/31	1968/07+	1967/18	1967/25	1969/05	1967/22		
Extreme Daily Precipitation (mm)	31.8	14.0	7.0	22.6	28.2	35.6	17.0	25.9	33.0	38.4	33.0	22.4		
Date (yyyy/dd)	1963/22	1970/15	1977/17	1968/16	1981/27	1966/27+	1984/31	1959/07	1967/18	1967/25	1969/05	1967/22		
Extreme Snow Depth (cm)	157.0	146.0	152.0	157.0	164.0	150.0	117.0	25.0	81.0	178.0	175.0	157.0		
Date (yyyy/dd)	1965/02+	1988/29	1988/04+	1988/21	1977/06	1970/01+	1973/01	1973/01	1967/19+	1964/31	1964/06	1964/27+		
<u>Days with Maximum Temperature: Days with Maximum Temperature:</u>														
<= 0 °C	30.7	28.2	30.8	29.3	26.7	11.2	1.5	3.1	19.2	29.7	29.9	30.9		D
> 0 °C	0.35	0.0	0.24	0.67	4.3	18.9	29.5	27.9	10.8	1.3	0.15	0.11		D
> 10 °C	0.0	0.0	0.0	0.0	0.05	1.5	7.5	5.4	0.47	0.0	0.0	0.0		D
> 20 °C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		D
> 30 °C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		D
> 35 °C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		D
<u>Days with Minimum Temperature: Days with Minimum Temperature:</u>														
> 0 °C	0.0	0.0	0.0	0.0	0.25	5.8	18.3	14.2	2.0	0.0	0.0	0.0		D
<= 2 °C	31.0	28.2	31.0	30.0	31.0	27.2	18.2	22.4	29.3	31.0	30.0	31.0		D
<= 0 °C	31.0	28.2	31.0	30.0	30.8	24.2	12.7	16.8	28.0	31.0	30.0	31.0		D
< -2 °C	31.0	28.2	31.0	30.0	30.4	19.5	6.0	9.5	25.0	30.7	30.0	31.0		D
< -10 °C	30.4	28.2	30.7	28.8	19.9	0.67	0.0	0.0	0.72	15.3	28.2	30.7		D

Temperature:	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	Code
< -20 °C	27.4	27.0	27.5	17.5	0.60	0.0	0.0	0.0	0.0	0.33	10.4	26.2		D
< - 30 °C	10.1	13.3	9.8	0.80	0.0	0.0	0.0	0.0	0.0	0.0	0.11	6.6		D
Days with Rainfall: Days with Rainfall:														
>= 0.2 mm	0.0	0.0	0.0	0.0	0.05	0.95	5.5	5.6	0.84	0.21	0.0	0.0		D
>= 5 mm	0.0	0.0	0.0	0.0	0.05	0.24	1.1	0.85	0.26	0.0	0.0	0.0		D
>= 10 mm	0.0	0.0	0.0	0.0	0.0	0.05	0.21	0.25	0.05	0.0	0.0	0.0		D
>= 25 mm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		D
Days With Snowfall: Days With Snowfall:														
>= 0.2 cm	4.0	3.5	3.2	6.2	9.1	4.9	2.9	3.5	8.6	13.6	9.5	4.3		D
>= 5 cm	0.35	0.30	0.14	1.0	1.8	1.1	0.72	0.65	1.8	3.1	2.5	0.30		D
>= 10 cm	0.05	0.0	0.0	0.19	0.81	0.19	0.22	0.25	0.65	0.84	0.85	0.10		D
>= 25 cm	0.0	0.0	0.0	0.0	0.05	0.05	0.0	0.0	0.0	0.0	0.05	0.0		D
Days with Precipitation: Days with Precipitation:														
>= 0.2 mm	4.0	3.5	3.2	6.2	9.1	5.8	7.7	8.3	9.5	13.7	9.5	4.3		D
>= 5 mm	0.35	0.30	0.14	1.0	1.8	1.3	1.9	1.7	2.0	3.1	2.5	0.30		D
>= 10 mm	0.05	0.0	0.0	0.19	0.86	0.29	0.47	0.50	0.68	0.84	0.85	0.10		D
>= 25 mm	0.0	0.0	0.0	0.0	0.05	0.05	0.0	0.0	0.0	0.0	0.05	0.0		D

<u>Temperature:</u>	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	Code
<u>Days with Snow Depth:</u> <u>Days with Snow Depth:</u>														
>= 1 cm	31.0	28.2	31.0	30.0	31.0	27.8	11.0	6.3	20.1	31.0	30.0	31.0		D
>= 5 cm	31.0	28.2	31.0	30.0	31.0	25.7	6.2	3.2	13.9	30.7	30.0	31.0		D
>= 10	31.0	28.2	31.0	30.0	31.0	23.2	3.3	1.3	9.2	30.0	30.0	31.0		D
>= 20	31.0	28.2	31.0	30.0	30.6	16.9	1.7	0.25	3.9	25.1	29.7	31.0		D
<u>Wind:</u> <u>Wind:</u>														
Maximum Hourly Speed	130.0	122.0	104.0	93.0	77.0	74.0	121.0	74.0	183.0	102.0	111.0	92.0		
Date (yyyy/dd)	1988/16	1996/19	1989/29	1998/14	1972/23	1987/27+	1956/22	1984/22	1997/24	1989/27	1977/05	1974/01		
Direction of Maximum Hourly Speed	NW	S	NW	SW	W	NW	SW	NW	S	NW	W	W	S	
<u>Degree Days:</u> <u>Degree Days:</u>														
Above 24 °C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		D
Above 18 °C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		D
Above 15 °C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		D
Above 10 °C	0.0	0.0	0.0	0.0	0.0	0.3	4.0	1.7	0.0	0.0	0.0	0.0		D
Above 5 °C	0.0	0.0	0.0	0.0	0.0	5.5	37.5	20.4	1.4	0.0	0.0	0.0		D
Above 0 °C	0.0	0.0	0.0	0.1	2.0	40.8	141.0	100.1	16.5	0.2	0.0	0.0		D
Below 0 °C	759.6	739.9	730.2	520.4	264.9	56.9	6.8	12.3	91.5	258.4	465.5	701.0		D
Below 5 °C	914.6	881.1	885.2	670.3	417.9	171.7	58.3	87.6	226.4	413.2	615.5	856.0		D

<u>Temperature:</u>	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	Code
Below 10 °C	1069.6	1022.3	1040.2	820.3	572.9	316.4	179.8	223.9	375.0	568.2	765.5	1011.0		D
Below 15 °C	1224.6	1163.4	1195.2	970.3	727.9	466.1	330.8	377.2	525.0	723.2	915.5	1166.0		D
Below 18 °C	1317.6	1248.1	1288.2	1060.3	820.9	556.1	423.8	470.2	615.0	816.2	1005.5	1259.0		D
<u>Humidex:</u> <u>Humidex:</u>														
Extreme Humidex	1.5	0.0	2.7	6.1	8.6	18.6	20.7	19.9	13.6	7.0	3.5	3.9		
Date (yyyy/dd)	1979/27	1963/04	1980/23	1975/29	1991/31	1973/29	1984/17	1973/21	1967/04	1984/15	1985/03	1967/17		
<u>Wind Chill:</u> <u>Wind Chill:</u>														
Extreme Wind Chill	-61.1	-61.0	-57.1	-49.2	-35.8	-21.1	-18.6	-15.5	-23.9	-32.8	-45.2	-54.2		
Date (yyyy/dd)	1961/11	1979/16	1964/13	1997/08	1999/01	1978/01	1972/04	1972/22	1997/24	1986/26	1956/28	1971/27		
<u>Humidity:</u> <u>Humidity:</u>														
Average Relative Humidity - 0600LST (%)	77.6	75.6	76.3	81.2	86.8	86.6	79.0	81.4	90.4	89.0	83.5	78.5		










Appendix A: Summary of 2004 Monthly Climatological Information for the Hamlet of Qikiqtarjuaq, Nunavut

QIKIQTARJUAQ A NUNAVUT

Latitude: 67° 33' N
Climate ID: 2400572

Longitude: 64° 1' W
WMO ID: 71338

Elevation: 06.40 m
TC ID: YVM

Monthly Data Report for 2004											
M o n t h	Mean Max Temp °C 	Mean Temp °C 	Mean Min Temp °C 	Extr Max Temp °C 	Extr Min Temp °C 	Total Rain mm 	Total Snow cm 	Total Precip mm 	Snow Grnd Last Day cm 	Dir of Max Gust 10's Deg	Spd of Max Gust km/h
<u>Jan</u>	-24.3	-28.7	-33.1	-15.5	-43.2	0.0	4.0	4.0	35		
<u>Feb</u>	-20.2	-24.9E	-29.4	-10.0	-40.2	0.0	5.0	5.0	41		
<u>Mar</u>	-24.3	-29.8	-35.2	-13.4	-45.5	0.0	6.2	6.2	47		
<u>Apr</u>	-11.4	-17.2	-22.9	-4.5	-31.5	0.0	34.0	34.0	61		
<u>May</u>	-1.2	-3.8	-6.4	6.5	-16.5	0.0	3.0	3.0	25		
<u>Jun</u>	4.7	1.8	-1.1	9.9	-7.2	Trace	Trace	Trace	0		
<u>Jul</u>	7.8	4.6	1.4	17.2	-1.7	1.0	6.0	7.0	0		
<u>Aug</u>	8.3	5.6	2.9	17.1	0.0	13.0	0.0	13.0	0		
<u>Sep</u>	4.4	2.0	-0.5	11.0	-11.0	6.0	13.0	19.0	4		
<u>Oct</u>	1.9	-1.0	-3.9	9.0S	-8.0	0.4	7.4	7.8	4		
<u>Nov</u>	-6.6	-10.6	-14.6	3.0	-24.5	0.0	91.0	91.0	54		
<u>Dec</u>	-22.4	-27.5	-32.6	-15.2	-40.8	0.0	2.0	2.0	48		
Sum						20.4	171.6	192.0			
Avg	-6.9	-10.8	-14.6								
Xtrm				17.2	-45.5						



Appendix B
Projected Water Requirements and
Sewage Generation Rates

Table 1 - Projected Water Consumption

Planning Year	Calendar Year	Projected Population	Projected Water Consumption	Projected Total Consumption Volume				10 Month Storage Requirement	Additional Capacity Required
			[Lpcd]	[Litres/day]	[Litres/year]	[m ³ /day]	[m ³ /year]	[m ³ /year]	[m ³]
Schematic	2005	599	102.4	61337	22388071	61	22388	18657	657
Detailed	2006	611	102.6	62718	22891977	63	22892	19077	1077
0	2007	624	102.9	64220	23440330	64	23440	19534	1534
	2008	637	103.2	65729	23991238	66	23991	19993	1993
	2009	650	103.5	67246	24544699	67	24545	20454	2454
	2010	663	103.7	68769	25100714	69	25101	20917	2917
	2011	677	104.0	70417	25702355	70	25702	21419	3419
5	2012	691	104.3	72074	26306958	72	26307	21922	3922
	2013	705	104.6	73738	26914522	74	26915	22429	4429
	2014	720	104.9	75531	27568771	76	27569	22974	4974
	2015	735	105.2	77333	28226420	77	28226	23522	5522
	2016	750	105.5	79144	28887469	79	28887	24073	6073
10	2017	765	105.8	80964	29551917	81	29552	24627	6627
	2018	781	106.2	82916	30264410	83	30264	25220	7220
	2019	797	106.5	84879	30980772	85	30981	25817	7817
	2020	813	106.8	86852	31701001	87	31701	26418	8418
	2021	830	107.2	88960	32470484	89	32470	27059	9059
15	2022	847	107.5	91080	33244334	91	33244	27704	9704
	2023	864	107.9	93212	34022551	93	34023	28352	10352
	2024	882	108.3	95483	34851305	95	34851	29043	11043
	2025	900	108.6	97767	35684955	98	35685	29737	11737
	2026	918	109.0	100064	36523501	100	36524	30436	12436
20	2027	937	109.4	102504	37413945	103	37414	31178	13178

Table 2 - Projected Sewage and Sludge Generation Rates

Planning Year	Calendar Year	Projected Population	Projected Sewage Generation	Projected Volume		Projected Sludge Volume	Cumulative Sludge Volume	BOD	TSS	T-PO ₄	TKN	Faecal Coliforms
			[Lpcd]	[Litres/day]	[Litres/year]	[m ³ /year]	[m ³]	[mg/L]	[mg/L]	[mg/L]	[mg/L]	[CFU/100 mL]
Schematic Design	2005	599	102.4	61,337	22,388,071	10.9	10.9	439.5	468.8	22.5	117.2	9.28E+07
0	2006	611	102.6	62,718	22,891,977	11.2	22.1	438.4	467.6	22.4	116.9	9.25E+07
	2007	624	102.9	64,220	23,440,330	11.4	33.5	437.2	466.4	22.3	116.6	9.23E+07
	2008	637	103.2	65,729	23,991,238	11.6	45.1	436.1	465.2	22.3	116.3	9.21E+07
	2009	650	103.5	67,246	24,544,699	11.9	57.0	435.0	464.0	22.2	116.0	9.18E+07
	2010	663	103.7	68,769	25,100,714	12.1	69.1	433.8	462.8	22.2	115.7	9.16E+07
5	2011	677	104.0	70,417	25,702,355	12.4	81.4	432.6	461.5	22.1	115.4	9.13E+07
	2012	691	104.3	72,074	26,306,958	12.6	94.0	431.4	460.2	22.1	115.0	9.11E+07
	2013	705	104.6	73,738	26,914,522	12.9	106.9	430.2	458.9	22.0	114.7	9.08E+07
	2014	720	104.9	75,531	27,568,771	13.1	120.0	429.0	457.6	21.9	114.4	9.06E+07
	2015	735	105.2	77,333	28,226,420	13.4	133.4	427.7	456.2	21.9	114.1	9.03E+07
10	2016	750	105.5	79,144	28,887,469	13.7	147.1	426.4	454.9	21.8	113.7	9.00E+07
	2017	765	105.8	80,964	29,551,917	14.0	161.1	425.2	453.5	21.7	113.4	8.98E+07
	2018	781	106.2	82,916	30,264,410	14.3	175.3	423.9	452.1	21.7	113.0	8.95E+07
	2019	797	106.5	84,879	30,980,772	14.5	189.9	422.5	450.7	21.6	112.7	8.92E+07
	2020	813	106.8	86,852	31,701,001	14.8	204.7	421.2	449.3	21.5	112.3	8.89E+07
15	2021	830	107.2	88,960	32,470,484	15.1	219.9	419.9	447.8	21.5	112.0	8.86E+07
	2022	847	107.5	91,080	33,244,334	15.5	235.3	418.5	446.4	21.4	111.6	8.83E+07
	2023	864	107.9	93,212	34,022,551	15.8	251.1	417.1	444.9	21.3	111.2	8.81E+07
	2024	882	108.3	95,483	34,851,305	16.1	267.2	415.7	443.4	21.2	110.8	8.78E+07
	2025	900	108.6	97,767	35,684,955	16.4	283.6	414.3	441.9	21.2	110.5	8.75E+07
20	2026	918	109.0	100,064	36,523,501	16.8	300.4	412.8	440.4	21.1	110.1	8.72E+07
	2027	937	109.4	102,504	37,413,945	17.1	317.5	411.3	438.8	21.0	109.7	8.68E+07

Appendix C

Nunavut Water Board License



P.O. Box 119
GJOA HAVEN, NT X0E 1J0

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TEL: (867) 360-6338
FAX: (867) 360-6369

NUNAVUT WATER BOARD
NUNAVUT IMALIRIYIN KATIMAYINGI

File No. NWB3QIK0106

November 28, 2000

Mr. Don Pickle
Senior Administrative Officer
Municipality of Qikiqtarjuaq
P.O. Box 4
Qikiqtarjuaq, Nunavut X0A 0B0
Email: pickle@nunanet.com

RE: NWB Licence No. NWB3QIK0106

Dear Mr. Pickle:

Please find attached Licence No. NWB3QIK0106 issued (**Motion: #2000-09-06**) by the Nunavut Water Board (NWB) pursuant to its authority under Article 13 of the *Agreement between the Inuit of the Nunavut Settlement Area and Her Majesty the Queen in Right of Canada*. The terms and conditions of the attached Licence related to water use and waste disposal are an integral part of this approval.

Any communication with respect to this licence shall be made in writing to the attention of:

Chief Administrative Officer
Nunavut Water Board
P. O. Box 119
Gjoa Haven, NU. X0B 1J0
Telephone No: (867) 360-6338
Fax No: (867) 360-6369

Inspection and enforcement of the terms and conditions of this licence are performed by:

Water Resources Officer
Nunavut District Office
Northern Affairs Program
Department of Indian Affairs
and Northern Development
P. O. Box 100
Iqaluit, NU. X0A 0H0
Telephone No: (867) 979-4405
Fax No: (867) 979-6445

The licensee shall submit all reports, plans and studies in quantities as required by the Chief Administrative Officer, contact the NWB for additional details.

Sincerely,

A handwritten signature in black ink, appearing to read 'P. di Pizzo', written over the printed name.

Philippe di Pizzo
Chief Administrative Officer

Enclosure: Licence No. NWB3QIK0106

cc: R. Beavers, Indian and Northern Affairs Canada
P. Smith, Indian and Northern Affairs Canada
Qikiqtani Inuit Association
G. Joudrey, Nunavut Impact Review Board
P. Pacholek, Environment Canada
C. Nichols, Sustainable Development
L. Coady, Nunavut Planning Commission
J. deGroot, Fisheries and Oceans
B. Segal, Baffin Health & Social Services

DECISION

LICENCE NUMBER: NWB3QIK0106

This is the decision of the Nunavut Water Board (NWB) with respect to an application for a Licence renewal dated April 11, 2000, made by:

Municipality of Qikiqtarjuaq

to allow for the use of water and disposal of waste into water for municipal undertakings by the Municipality at Qikiqtarjuaq, Nunavut.

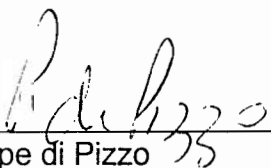
With respect to this application, the NWB gave notice to the public that the Municipality had filed an application for renewal of water licence N4L3-0640 issued by the Northwest Territories Water Board.

DECISION

After having been satisfied that the application was exempt from the requirement for screening by the Nunavut Impact Review Board in accordance with S.12.3.2 of the NLCA, the NWB decided that the application could go through the regulatory process. After reviewing the submission of the Applicant and the written and oral comments expressed by interested parties, the NWB, having given due regard to the facts and circumstances, the merits of the submissions made to it and to the purpose, scope and intent of the Nunavut Land Claims Agreement, decided to waive the requirement to hold a public hearing and furthermore to delegate its authority to approve the application to the Chief Administrative Officer pursuant to S. 13.7.5. of the NLCA and determined that:

Licence Number NWB3QIK0106 be issued subject to the terms and conditions contained therein. (Motion #:2000-09-06)

SIGNED this 28th day of November 2000 at Gjoa Haven, Nunavut.



Philippe di Pizzo
Chief Administrative Officer

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INTRODUCTION

Following an application for licence renewal filed by the Hamlet of Qikiqtarjuaq on April 11, 2000, the Nunavut Water Board conducted an initial assessment of the Municipality's submission and verified that the application was exempt from the requirement for screening by the Nunavut Impact Review Board in accordance with S.12.3.2 of the NLCA. The Board concluded that the application was complete and could go through the regulatory process.

In accordance with Article 13 of the Nunavut Land Claims Agreement (NLCA), the Board shall conduct a public hearing before approving an application, and shall accordingly give public notice of the application. Public notice of the application was given on April 12, 2000, and the application was distributed concurrently to local, territorial, and federal organizations and agencies. Submissions were made by Environment Canada (EC), Department of Indian and Northern Affairs (DIAND), and the Department of Community Government and Transportation (CGT). However, no public concerns were expressed, and the NWB waived the requirement to hold a public hearing in accordance with Section 13.7.2 of the NLCA. The authority to approve the application was delegated to the Chief Administrative Officer of the Board pursuant to S. 13.7.5 of the NLCA. After considering the submissions of interested parties, the NWB decided to issue licence NWB3QIK0106.

II. GENERAL CONSIDERATIONS

Term of the Licence

Consistent with the powers of the Northwest Territories Water Board under the Northern Inland Waters Act, the NWB may issue a licence for a term not exceeding twenty-five years. The Municipality requested a 10-year licence from the Board, whereas the Department of CGT suggested that issuing a shorter-term licence would allow the Hamlet and CGT to undertake the various studies and provide a plan of action to upgrade municipal facilities. The Board agrees with CGT, and furthermore believes that a shorter-term licence will allow the Municipality to establish a consistent compliance record. Consequently, the Board decides to issue a 5-year licence, which will allow the licensee to properly carry out the terms and conditions of the licence and to ensure that sufficient time is given to permit the licensee to develop, submit, and implement the plans required under the licence to the satisfaction of the NWB.

Annual Report

The requirements imposed on the licensee in this licence are for the purpose of ensuring that the NWB has an accurate annual update of municipal activities during a calendar year. This information is maintained on the public registry and is available to any interested parties upon request.

Operation and Maintenance Manual (O&M)

Under the previous water licence (N4L3-0640), the Municipality was required to submit for Board approval an Operation and Maintenance plan for waste disposal operations. At the time of application, the Board's Public Registry indicated that the Municipality had not complied with this licence condition.

The purpose of an Operation and Maintenance Manual is to assist the Municipality's staff in the proper operation and maintenance of the waste disposal facilities. The manual should demonstrate to the Nunavut Water Board that the Municipality is capable of operating and maintaining all waste disposal sites adequately. The Board decides to maintain the requirement for the submission of an Operation and Maintenance plan for all Sewage and Solid Waste Disposal Facilities. The plan shall be 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, October 1996"*

Abandonment and Restoration (A&R)

Under the previous water licence (N4L3-0640) the Municipality was required to submit for Board approval an abandonment and restoration plan for the abandoned Waste Disposal Facility. At the time of application, the Board's Public Registry indicated that the Municipality had not complied with this licence condition. However, the Board's Public Registry contains evidence that some reclamation of the site was undertaken in accordance with the "Sanitary Site Clean Up Broughton Island, NWT Report"¹. In its submission to the Board, Environment Canada noted that the Municipality's application indicated that erosion is beginning to expose the old dumpsite again. The Board accepts this evidence and orders the Municipality to ensure that sufficient cover is placed on the site and that erosion control measures will be implemented as required.

The Board also notes that based on population growth estimates and the remaining capacity of the current waste disposal site, planning for a new facility may be required within the term of this licence. In this event, the planning study shall also contemplate the reclamation of the current facility, and accordingly the NWB decides to include in this licence a requirement to include in such a study a separate section on the Abandonment and Restoration Plan for the current site.

Surveillance Network Program

The Surveillance Network Program is a monitoring program established to collect data on water quality to assess the effectiveness of waste treatment and detect any impact of waste disposal activities on water.

¹ Sanitary Site Clean Up, Broughton Island, NWT Report. Prepared by M.M. Dillon Limited for the Government of the Northwest Territories, Municipal and Community Affairs. December 1993.

The Board notes that there is a stream located between the solid waste disposal facility and the Sewage Disposal Facilities, and that runoff from the solid waste site may enter water. To ensure the protection of water, the Board requests the establishment of a SNP station (SNP Station 0640-8) in the stream above the waste disposal facilities and another (SNP Station 0640-9) in the stream below the waste disposal facilities.

The Board notes that this application does not include the disposal of tannery effluent to the Sewage Disposal Facilities and consequently removes from SNP station 0640-4 parameters normally associated with tannery effluents.

The application states that discharge from the lagoon occurs once per year for a short period. The Board requests that the licensee take three samples, one at the beginning, one midway through and one near the end of the discharge of effluent from the sewage lagoon. These samples shall be taken at SNP station 0640-6 and SNP station 0640-6A.

Studies

In their submission to the Board, the Department of Community Government and Transportation states that both the water reservoir and the Sewage Disposal Facilities would seem to be approaching their useful life and will require improvements to meet the needs of the community for the next 20 years. The Board accepts this evidence and decides to order the Municipality to submit for Board approval the Terms of Reference for conducting an assessment of the water reservoir and sewage disposal facility. The planning study results shall be submitted for Board approval at least 8 months prior to the expiration of this licence.

III. LICENCE NWB3QIK0106

Pursuant to 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

MUNICIPALITY OF QIKIQTARJUAQ

(Licensee)

of

QIKIQTARJUAQ, NUNAVUT, X0A 0B0

(Mailing Address)

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

Licence Number

NWB3QIK0106

Water Management Area

04

Location

QIKIQTARJUAQ, NUNAVUT

Purpose

WATER USE AND WASTE DISPOSAL

Description

MUNICIPAL UNDERTAKINGS

Quantity of Water Not to be Exceeded

35,000 CUBIC METRES ANNUALLY

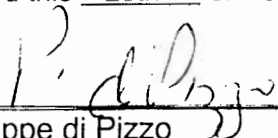
Date of Licence

January 1, 2001

Expiry Date of Licence

December 31, 2006

Dated this 28th of November 2000 at Gjoa Haven, Nunavut.


Philippe di Pizzo
Chief Administrative Officer

PART A: SCOPE, ENFORCEMENT & DEFINITIONS

1. Scope

- a. This Licence allows for the use of water and the disposal of waste into water for municipal undertakings at the Municipality of Qikiqtarjuaq, Nunavut (67°33'N, 64°02'W);
- 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 amended by the Governor in Council under a future Nunavut Waters 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, upon promulgation of such Regulations, to be automatically amended to conform with such Regulations; and
- c. Compliance with the terms and conditions of this Licence does not absolve the Licensee from responsibility for compliance with the requirements of all applicable Federal, Territorial and Municipal legislation.

2. Enforcement

- a. Subject to Part A, item 2 (d), failure to comply with this licence will be a violation of the *Northwest Territories Waters Act*, exposing the licensee to the enforcement measures and the penalties provided for in the Act.
- b. Subject to Part A, Item 2 (d), all inspection and enforcement services regarding this licence will be provided by inspectors appointed under the *Northwest Territories Waters Act*.
- c. Subject to Part A, Item 2 (d), inspectors appointed under the *Northwest Territories Waters Act* enjoy - with respect to this licence, and for the purpose of enforcing this licence, and with respect to the use of water and deposit or discharge of waste by the licensee - all powers, privileges and protections that are conferred upon them by the *Northwest Territories Waters Act* or by other applicable law.
- d. To the extent that the *Northwest Territories Waters Act* is, subsequent to the issuance of this licence, replaced with respect to water management in Nunavut by other federal legislation (including, without limitation, a regulation or order referred to in Section 10.10.2 of the *Nunavut Land Claims Agreement*), and to the extent that the other federal legislation is

consistent with the *Nunavut Land Claims Agreement*, the other federal legislation shall apply with respect to this licence and the *Northwest Territories Waters Act* shall cease to apply with respect to this licence.

3. Definitions

In this Licence: **NWB3QIK0106**

"Amendment" means a change to original terms and conditions of this licence requiring correction, addition or deletion of specific terms and conditions of the licence: medications inconsistent with the terms and conditions of this licence;

"Average Concentration" means the arithmetic mean of any four consecutive analytical results submitted to the Board in accordance with the sampling and analysis requirements specified in the "Surveillance Network Program";

"Average Concentration For Faecal Coliform" means the running geometric mean of any four consecutive analytical results submitted to the Board in accordance with the sampling and analysis requirements specified in the "Surveillance Network Program";

"Board" means the Nunavut Water Board established under the Nunavut Land Claims Agreement;

"Commercial Waste Water" means water and associated waste generated by the operation of a commercial enterprise, but does not include toilet wastes or greywater;

"Freeboard" means the vertical distance between water line and crest on a dam or dyke's upstream slope;

"Grab Sample" means a single water or wastewater sample taken at a time and place representative of the total discharge;

"Greywater" means all liquid wastes from showers, baths, sinks, kitchens and domestic washing facilities, but does not include toilet wastes;

"Honey Bags" A plastic or heavy paper bag that fits into a bucket toilet used to contain toilet waste.

"Inspector" means an Inspector designated by the Minister of Indian and Northern Affairs Canada in a manner consistent the *Northwest Territories Waters Act*;

"Licensee" means the holder of this Licence;

"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; changes to the operating system that are consistent with the terms of this Licence and do not require amendment;

"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;

"Pumpout Sewage" means all toilet wastes and/or greywater collected by means of a vacuum truck for disposal at an approved facility;

"Sewage" means all toilet wastes and greywater;

"Sewage Disposal Facilities" comprises the area and engineered structures designed to contain sewage;

"Solid Waste Disposal Facilities" comprises the area and associated structures designed to contain solid wastes;

"Toilet Wastes" means all human excreta and associated products, but does not include greywater;

"Waste" means any substance that, by itself or in combination with other substances found in water, would have the effect of altering the quality of any water to which the substance is added to an extent that is detrimental to its use by people or by any animal, fish or plant, or any water that would have that effect because of the quantity or concentration of the substance contained in it or because it has been treated or changed, by heat or other means;

"Waste Disposal Facilities" means all facilities designated for the disposal of waste, and includes the Sewage Disposal Facilities, Solid Waste Disposal Facilities, and Bagged Toilet Wastes Disposal Facilities; and

"Water Supply Facilities" comprises the area and associated intake infrastructure at the Municipality's reservoir and primary source, the Tulugak River.

PART B: GENERAL CONDITIONS

1. The Licensee shall file an Annual Report with the Board no later than March 31st of the year following the calendar year reported which shall contain the following information:

- a. tabular summaries of all data generated under the "Surveillance Network Program";
 - b. the monthly and annual quantities in cubic metres of fresh water obtained from all sources;
 - c. the monthly and annual quantities in cubic metres of each and all waste discharged;
 - d. the monthly and annual quantities of Sewage Solids removed from the Sewage Disposal Facilities for disposal;
 - e. a summary of modifications and/or major maintenance work carried out on the Water Supply and Waste Disposal Facilities, including all associated structures and facilities;
 - f. a list of unauthorized discharges and summary of follow-up action taken;
 - g. a summary of any abandonment and restoration work completed during the year and an outline of any work anticipated for the next year;
 - h. a summary of any studies requested by the Board that relate to waste disposal, water use or reclamation, and a brief description of any future studies planned;
 - i. updates or revisions to the approved Operation and Maintenance Plans; and
 - j. any other details on water use or waste disposal requested by the Board by November 1st of the year being reported.
2. The Licensee shall comply with the "Surveillance Network Program" annexed to this Licence, and any amendment to the said "Surveillance Network Program" as may be made from time to time, pursuant to the conditions of this Licence.
3. The "Surveillance Network Program" and compliance dates specified in the Licence may be modified at the discretion of the NWB Chief Administrative Officer.
4. Meters, devices or other such methods used for measuring the volumes of water used and waste discharged shall be installed, operated and maintained by the Licensee to the satisfaction of an Inspector.

5. The Licensee shall by September 1, 2001, post the necessary signs, where possible, to identify the stations of the "Surveillance Network Program." All postings shall be located and maintained to the satisfaction of an Inspector.
6. The Licensee shall by September 1, 2001, post signs in the appropriate areas to inform the public of the location of the Water Supply and Waste Disposal Facilities. All postings shall be located and maintained to the satisfaction of an Inspector.
7. The Licensee shall immediately report to the 24-Hour Spill Report Line (867-920-8130) any spills of Waste, which are reported to or observed by the Licensee, within the municipal boundaries or in the areas of the Water Supply or Waste Disposal Facilities.
8. The Licensee shall ensure a copy of this Licence is maintained at the municipal office at all times.

PART C: CONDITIONS APPLYING TO WATER USE

1. The Licensee shall obtain all fresh water from the Water Supply Facilities or as otherwise approved by the Board.
2. The annual quantity of water used for all purposes shall not exceed 35,000 cubic metres.
3. The Licensee shall maintain the Water Supply Facilities to the satisfaction of the Inspector.
4. The water intake hose used on the water pumps shall be equipped with a screen with a mesh size sufficient to ensure no entrainment of fish.

PART D: CONDITIONS APPLYING TO WASTE DISPOSAL

1. The Licensee shall direct Sewage to the Sewage Disposal Facilities or as otherwise approved by the Board.
2. All Sewage effluent discharged from the Sewage Disposal Facilities at "Surveillance Network Program" Station Number 0640-6 shall meet the following effluent quality standards:

Parameter	Maximum Average Concentration
Faecal Coliforms	1×10^4 CFU/100 ml
BOD ₅	120 mg/L
Total Suspended Solids	180 mg/L

The Waste discharged shall have a pH between 6 and 9, and no visible sheen of oil and grease.

3. A Freeboard limit of 1.0 metre, or as recommended by a qualified geotechnical engineer and as approved by the Board, shall be maintained at all dykes and earthfill structures.
4. All honey bags shall be disposed of to the satisfaction of an Inspector.
5. The Licensee shall advise an Inspector at least ten (10) days prior to initiating the decant of the Sewage Disposal Facilities.
6. The Sewage Disposal Facilities shall be maintained and operated in such a manner as to prevent structural failure.
7. The Licensee shall maintain the Sewage Disposal Facilities to the satisfaction of an Inspector.
8. The Licensee shall dispose of and contain all solid wastes at the Solid Waste Disposal Facilities or as otherwise approved by the Board.

PART E: CONDITIONS APPLYING TO MODIFICATIONS

1. The Licensee may, without written approval from the Board, carry out modifications to the Water Supply 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 sixty (60) days prior to beginning the modifications;
 - b. such modifications do not place the Licensee in contravention of the Licence;

- c. the Board has not, during the sixty (60) days following notification of the proposed modifications, informed the Licensee that review of the proposal will require more than sixty (60) days; and
 - d. the Board has not rejected the proposed modifications.
- 2. Modifications for which all of the conditions referred to in Part E, Item 1, have not been met may be carried out only with written approval from the Board.
- 3. The Licensee shall provide to the Board site plans of the modifications referred to in this Licence within ninety (90) days of completion of the modifications.

PART F: CONDITIONS APPLYING TO CONSTRUCTION

- 1. Prior to construction of any dams, dykes or structures intended to contain, withhold, divert or retain water or wastes, the Licensee shall submit to the Board for review design drawings stamped by a qualified Engineer registered in Nunavut

PART G: CONDITIONS APPLYING TO OPERATION AND MAINTENANCE

- 1. The Licensee shall, within six (6) months of the issuance of this Licence, submit to the Board for approval, a plan for the Operation and Maintenance of the Sewage and Solid Waste Disposal Facilities in accordance with "*Guidelines for preparing an Operation and Maintenance Manual for Sewage and Solid Waste Disposal Facilities*" October 1996.
- 2. The Licensee shall implement the plan specified in Part G, Item 1 as and when approved by the Board.
- 3. If, during the period of this Licence, an unauthorized discharge of waste occurs, or if such a discharge is foreseeable, the Licensee shall:
 - a. employ the appropriate contingency plan as provided for in the Operation and Maintenance Plan;
 - b. report the incident immediately via the 24-Hour Spill Reporting Line, (867) 920-8130; and
 - c. submit to an Inspector a detailed report on each occurrence not later than thirty (30) days after initially reporting the event.

PART H: CONDITIONS APPLYING TO ABANDONMENT AND RESTORATION

1. The Licensee shall submit to the Board for approval an Abandonment and Restoration Plan at least six (6) months prior to abandoning any facilities, including but not limited to:
 - a. the water intake facilities;
 - b. the water treatment and waste disposal sites and facilities;
 - c. the petroleum and chemical storage areas;
 - d. any site affected by waste spills;

An Abandonment Plan shall include, among other things:

- i. measures to address leachate, if any;
 - ii. an implementation schedule;
 - iii. maps delineating all disturbed areas and site facilities;
 - iv. consideration of altered drainage patterns;
 - v. type and source of cover materials;
 - vi. future area use;
 - vii. hazardous wastes; and
 - viii. a proposal identifying measures by which restoration costs will be financed by the Licensee upon abandonment.
3. The Licensee shall implement the plan specified in Part H, Item 1 as and when approved by the Board.
4. The Licensee shall revise the Plan referred to in Part H, Item 1 if not approved. The revised Plan shall be submitted to the Board for approval within six (6) months of receiving notification of the Board's decision.
5. The Licensee shall complete the restoration work within the time schedule specified in the Plan, or as subsequently revised and approved by the Board.

PART I: CONDITIONS APPLYING TO STUDIES

1. The Licensee shall submit to the Board for approval, the terms of reference for a planning study to address long-term needs of the community with respect to the Water Supply and Waste Disposal Facilities.
2. The Licensee shall, 8 months prior to expiry of the licence, submit to the Board for approval the planning study prepared in accordance with the terms of reference approved by the Board pursuant to Part I, Item 1.
3. The proposal described in Part I, Item 3 shall be implemented as and when approved by the Board.

SCHEDULE I: SURVEILLANCE NETWORK PROGRAM

A. Location, Description, Sampling and Analysis Requirements

Station	Description	Sampling Requirements	Analysis Requirements
0640-1	Raw Water Supply intake at the Tulugak River	Not required	Not required
0640-2	Raw Water Supply intake at the Reservoir truck fill station	Not required	Not required
0640-3	Raw Sewage from pump-out truck	Not required	Not required
0640-4	Runoff below the abandoned Sewage disposal area prior to discharge to ocean	Not required	Not required
0640-5	Ocean water 5 metres from point where effluent enters ocean (abandoned site)	Not required	Not required
0640-6	Discharge from the Sewage Disposal Facilities at the point of discharge following treatment	Once at the beginning, middle and end of discharge	BOD Total Suspended Solids Conductivity Oil and Grease Magnesium Sodium Chloride Total Hardness Ammonia Nitrogen Total Cadmium Total Cobalt Total Chromium Total Copper Total Aluminum Faecal Coliform PH Nitrate-Nitrite Total Phenols Calcium Potassium Sulphate Total Alkalinity Total Zinc Total Iron Total Manganese Total Nickel Total Lead
0640-6A	Current Sewage Disposal Facilities effluent 5 meters prior to entering the ocean	Once at the beginning, middle and end of discharge	Same as STN 0640-6

Station	Description	Sampling Requirements	Analysis Requirements
0640-7	Runoff from the Solid Waste Disposal Facility	Annually during periods of open water	<p>pH</p> <p>Total Suspended Solids</p> <p>Nitrate-Nitrite</p> <p>Total Phenols</p> <p>Sodium</p> <p>Magnesium</p> <p>Total Arsenic</p> <p>Total Copper</p> <p>Total Iron</p> <p>Total Mercury</p> <p>Total Zinc</p> <p>Conductivity</p> <p>Ammonia Nitrogen</p> <p>Oil and Grease (Visual)</p> <p>Sulphate</p> <p>Potassium</p> <p>Calcium</p> <p>Total Cadmium</p> <p>Total Chromium</p> <p>Total Lead</p> <p>Total Nickel</p> <p>Total Organic Carbon</p>
0640-8	Unnamed stream located between the Sewage Disposal Facilities and Solid Waste Disposal Facilities; sample site above the facilities	Annually during periods of open water	Same as STN 0640-7
0640-9	Unnamed stream located between the Sewage Disposal Facilities and Solid Waste Disposal Facilities; sample site below the facilities	Annually during periods of open water	Same as STN 0640-7
0640-10	Runoff below reclaimed Solid Waste Disposal Facility	Annually	Same as STN 0640-7

B. General Requirements

1. The exact location of Surveillance Network Program stations can be developed with the assistance of the Inspector.
2. Additional sampling and analysis may be requested by an Inspector.
3. All sampling, sample preservation and analyses shall be conducted in accordance with methods prescribed in the current edition of "Standard Methods for the Examination of Water and Wastewater", or by such other methods approved by the Board.
4. All analyses shall be performed in a laboratory approved by the Board.

C. Flow and Volume Measurement Requirements

1. The monthly and annual quantities of water pumped from Surveillance Network Program Station Number 0640-2 shall be measured and recorded in cubic metres.
2. The annual quantities of sewage solids removed from the Sewage Disposal Facilities shall be measured and recorded.

D. Reports

1. The Licensee shall, unless otherwise requested by an Inspector, include all of the data and information required by the Surveillance Network Program in the Licensee's Annual Report, which Report shall be submitted to the Board on or before March 31st of the year following the calendar year being reported.

E. Modifications To The Surveillance Network Program

1. Modifications to the Surveillance Network Program may be made only upon written approval of the Chief Administrative Officer of the Board.

FIGURE 1 - Municipality of Qikiqtarjuaq Surveillance Network Program Stations
(To be provided following first inspection)

APPENDIX I

CORRESPONDENCE

- i. Letter received April 14 from the Municipality of Qikiqtarjuaq to the Nunavut Water Board, enclosing an application and supplemental questionnaire dated March 27, 2000 for the renewal of a municipal water licence for the Municipality of Qikiqtarjuaq.
- ii. Letter dated April 12, 2000 from NWB to the Municipality of Qikiqtarjuaq, acknowledging receipt of the application for licence renewal.
- iii. Letter dated April 18, 2000 from NWB to the Municipality of Qikiqtarjuaq, acknowledging receipt of additional information for the application for licence renewal.
- iv. Letter dated April 12, 2000 from the NWB to the Distribution List, providing notice of the application for licence renewal in English and Inuktitut.
- v. Letter dated May 29, 2000, from the Department of CGT, to the NWB, received May 30, 2000 regarding comments on the application for licence renewal in consideration for the proposed pilot project for a tannery in Qikiqtarjuaq.
- vi. Letter dated/received May 30, 2000, from the Department of CGT to the NWB, regarding comments on the application for licence renewal.
- vii. Letter dated May 29, 2000, from Environment Canada, to the NWB, received June 6, 2000, regarding comments on the application for licence renewal.
- viii. Email dated June 5, 2000, from Indian and Northern Affairs Canada to the NWB, regarding comments on the application for licence renewal.



Appendix D

Example Operation Log

Hamlet of Qikiqtarjuaq
Sewage Disposal Operations Log Sheet

Month: _____

Truck #: _____

Date	Number of Trips to the Sewage Lagoon	Quantity of Sewage Discharged (Liters)	Driver Signature
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
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Appendix E
Environmental Emergency
Contingency Plan



Environmental Emergency Contingency Plan for Water, Sewage, and Solid Waste Operations in the Hamlet of Qikiqtarjuaq, Nunavut

Prepared for

The Hamlet of Qikiqtarjuaq
P.O. Box 4, Qikiqtarjuaq NU X0A 0B0 Canada

Prepared by

Nuna Burnside Engineering and Environmental Ltd.
Box 175, 25 Third Avenue Rankin Inlet NU X0C 0G0 Canada
15 Townline Orangeville ON L9W 3R4 Canada

Revision Date

February 2006

File No: N-O 09439.0

The material in this report reflects best judgement in light of the information available at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions made based on it, are the responsibilities of such third parties. Nuna Burnside accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

Environmental Emergency Contingency Plan for
Water, Sewage, and Solid Waste Operations in the
Hamlet of Qikiqtarjuaq, Nunavut

February 2006

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Environmental Emergency Contingency Plan for
Water, Sewage, and Solid Waste Operations in the
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February 2006

Preamble

This Environmental Emergency Contingency Plan relating to the collection, transportation, storage, and treatment operations of sewage for the Hamlet of Qikiqtarjuaq, Nunavut, is effective from *BEGINNING DATE OF WATER LICENSE until EXPIRY DATE OF NEW WATER LICENSE*. This plan applies to all operations and spill events relating to sewage and petroleum, oil, and lubricating (POL) products in the Hamlet of Qikiqtarjuaq, Nunavut (formerly known as Broughton Island).

The following formal distribution will be made after this document receives approval:

- Hamlet of Qikiqtarjuaq:
 - Mayor and Council
 - Senior Administrative Officer (SAO)
 - Hamlet Operations Staff
 - Fire Department
 - Community Health Centre
 - RCMP Detachment.
- Nunavut Water Board.

Additional copies and updates of this plan may be obtained by writing to:

Hamlet of Qikiqtarjuaq
Senior Administrative Officer (SAO)
P.O. Box 4
Qikiqtarjuaq, NU X0A 0B0

February 2006

1.0 Introduction

1.1 Purpose of Plan

The impacts of spills can be catastrophic and may threaten or damage the environment, especially water resources. As such, the Government of Nunavut (GN) requires contingency plans to be written and fully implemented. The purpose of this *Environmental Emergency Contingency Plan* is to provide a plan of action for all spills of sewage, solid waste, and petroleum products that may occur as a result of water supply and distribution, sewage collection and treatment, and solid waste collection and disposal operations undertaken within the Hamlet of Qikiqtarjuaq, Nunavut.

This *Environmental Emergency Contingency Plan* will assist in implementing corrective options quickly to minimize environmental damage. Furthermore, it defines the responsibilities of key personnel and outlines procedures to effectively and efficiently contain and recover spills of sewage, solid waste, and petroleum products arising from water, sewage, and solid waste; collection, transportation, storage, and treatment operations. It will assist the Hamlet in meeting the regulatory requirements related to reporting events to the appropriate authorities within the prescribed time period.

Sewage, solid waste, and petroleum, oil and lubricating (POL) products that currently, or potentially, fall within the Scope of this *Environmental Emergency Contingency Plan* are as follows:

- Sewage (as defined in the Nunavut Water Board (NWB) water license)
- Solid waste (as defined in the Nunavut Water Board (NWB) water license)
- Gasoline
- Diesel fuel
- Hydraulic fluid
- Lubricating oil.

1.2 Objectives

The objectives of this Emergency Spill Contingency Plan are to:

- Provide a plan including procedures so that the Hamlet and their Incident Spill Response Team can rapidly respond to a spill situation and minimize injury to individuals and environmental damage
- Comply with all existing regulations
- Cooperate with other groups and agencies

Environmental Emergency Contingency Plan for
Water, Sewage, and Solid Waste Operations in the
Hamlet of Qikiqtarjuaq, Nunavut

February 2006

- Be prepared and able to provide an integrated team approach with all involved departments and agencies
- Keep staff, government officials, and Hamlet residents informed.

1.3 Hamlet of Qikiqtarjuaq Environmental Policy

It is the policy of the Hamlet of Qikiqtarjuaq to fully comply with all applicable legislation to ensure the protection of the environment of the territory of Nunavut. The legislation includes, but is not limited to, the:

- Environmental Protection Act, Section 34 – Spill Contingency Planning and Reporting Regulations
- Nunavut Waters and Nunavut Surface Rights Tribunal Act.

The Hamlet will cooperate with other groups committed to protecting the environment and shall ensure that Hamlet employees, regulatory authorities, and the public are informed on the policies and procedures developed to help protect the environment and the citizens of the Hamlet of Qikiqtarjuaq.

February 2006

2.0 Site Description

2.1 General Site Description

This *Environmental Emergency Contingency Plan* is to be implemented within the Municipal boundaries of the Hamlet of Qikiqtarjuaq, Nunavut.

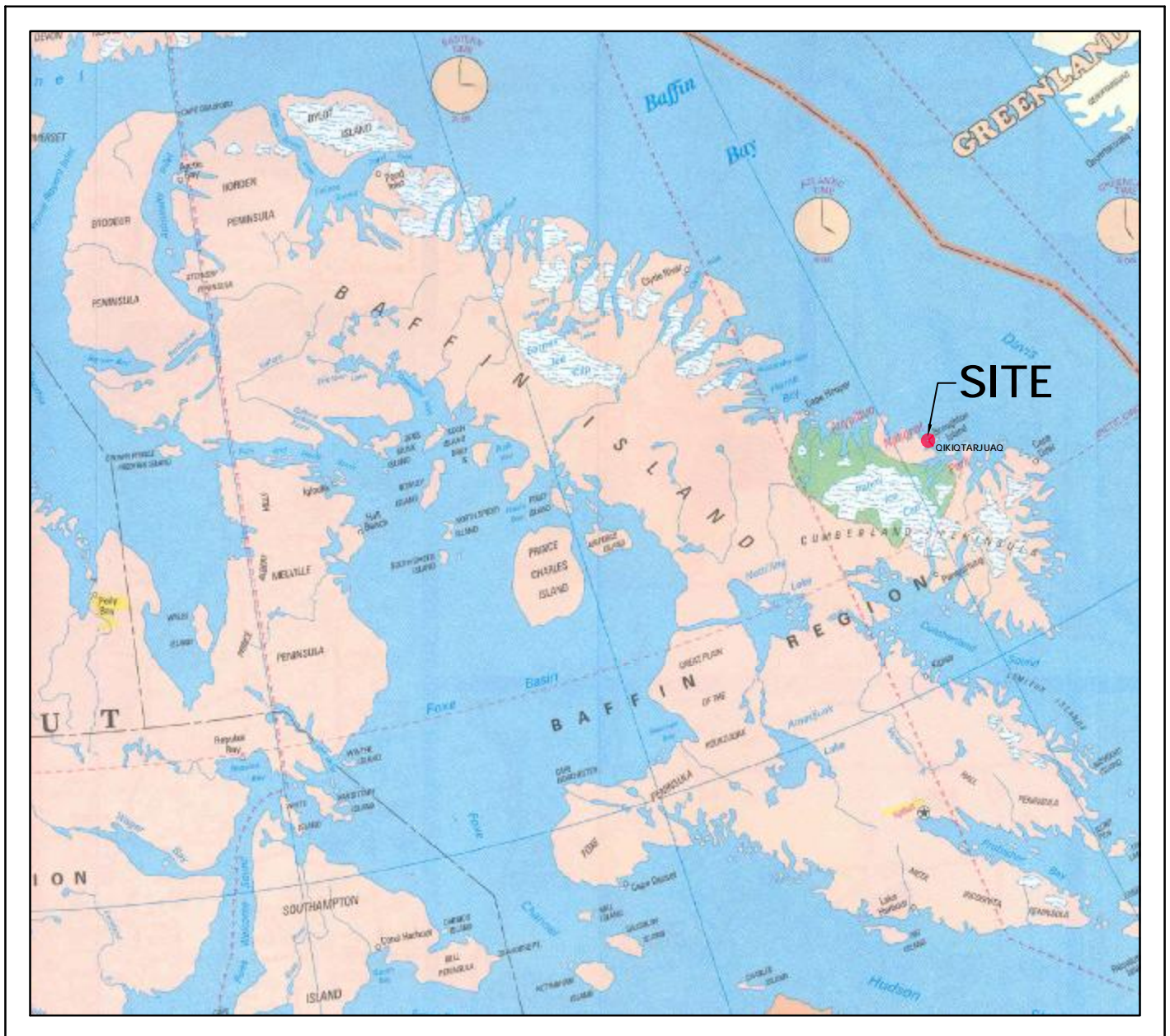
The Hamlet of Qikiqtarjuaq (meaning “big island”), is a Community of approximately 599 people located on the eastern coast of Baffin Island and on an island known as Broughton Island in the territory of Nunavut. As illustrated in Figure 1, the Hamlet is located approximately 470 kilometers northeast of the Capital City of Iqaluit, a distance that is covered by plane in about one hour. The geographic coordinates for the Hamlet of Qikiqtarjuaq are 67°33’ north latitude and 64°02’ west longitude. As indicated on Figure 2, the community is situated on the northwest portion of Broughton Island.

2.2 Sewage Collection, Water Supply, Treatment and Distribution, and Storage

The Hamlet provides trucked water service for the community. Historically, water is drawn from the Tulugak River during the summer, and from the lined earthen reservoir (Figure 3) for the remainder of the year. The water is chlorinated as it is pumped into the tanker delivery trucks through the truck fill station. The truck fill station operates by diesel generator and has an above ground storage (AST) tank on-site.

Sewage is collected in the Hamlet of Qikiqtarjuaq by vacuum truck, and transported to the Sewage Treatment Facility (Figure 4) operated by the Hamlet of Qikiqtarjuaq located approximately 2.3 km from the Hamlet. Wastewater is collected from customer holding tanks and discharged to the wastewater lagoon located to the east of the community north of the DEW Line Access Road.

The Hamlet of Qikiqtarjuaq provides regular solid waste pickup for the Community’s residents, businesses, and institutions. Collection occurs on a daily basis throughout the Hamlet, to minimize the potential for attraction of foxes and polar bears. Solid waste is trucked to the Hamlet’s Solid Waste Disposal facility (Figure 5), which is currently permitted by the Nunavut Water Board (NWB). The current Facility is located adjacent to the sewage lagoon.



Map Reference:
Map of Canada
Published by the CAA

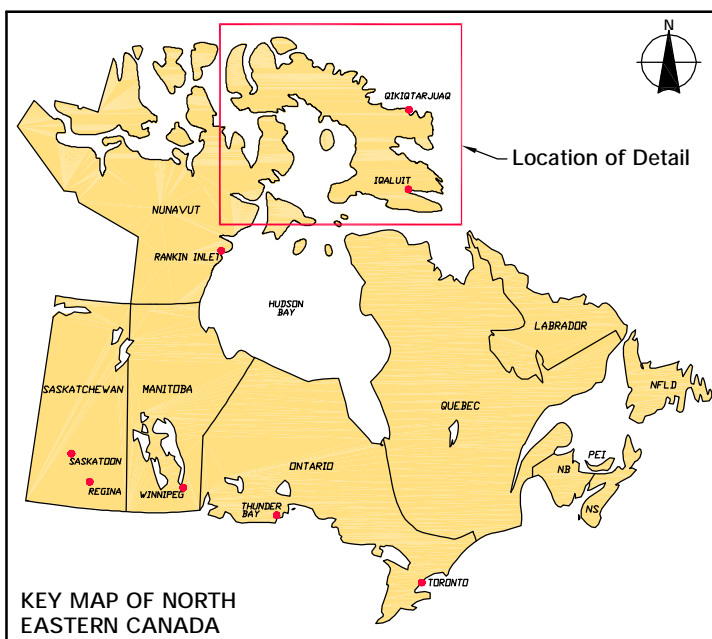


FIGURE 1 - SITE LOCATION MAP

THE HAMLET OF QIKIQTARJUAQ, NUNAVUT

ENVIRONMENTAL EMERGENCY CONTINGENCY PLAN

January 2006
Project Number: N-0 09439.0

Prepared by: K. Pridham

Verified by: M. Paznar

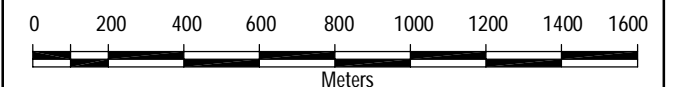
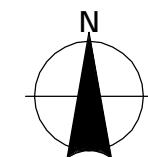
Burnside



FIGURE 2
THE HAMLET OF QIKIQTARJUAQ
ENVIRONMENTAL EMERGENCY
CONTINGENCY PLAN

SATELLITE IMAGERY OF
ENTIRE COMMUNITY
AND INFRASTRUCTURE

Satellite Imagery Source:
September 2004 Satellite Image obtained from DigitalGlobe Inc.



1:20,000
January 2006
Project Number: N-0 09439.0

Projection: UTM Zone 20
Datum: NAD83

Prepared by: C. Sheppard

Verified by: M. Paznar



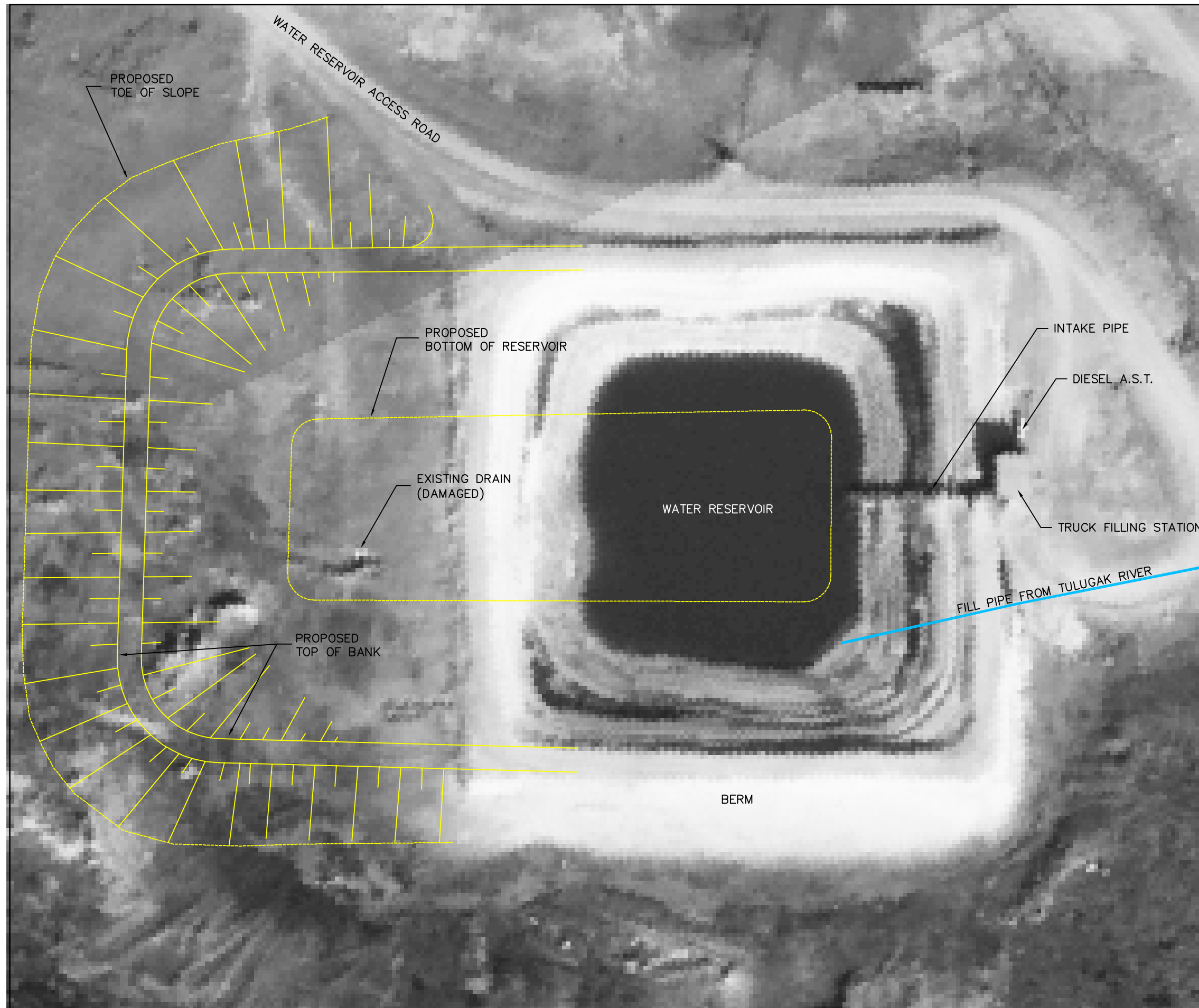
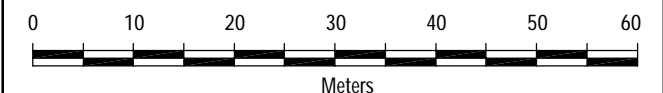
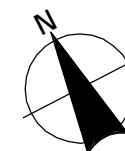


FIGURE 3
THE HAMLET OF QIKIQTARJUAQ
*ENVIRONMENTAL EMERGENCY
CONTINGENCY PLAN*
WATER RESERVOIR SITE

Satellite Imagery Source:
September 2004 Satellite Image obtained from DigitalGlobe Inc.



1:750
January 2006
Project Number: N-O 09439.0

Projection: UTM Zone 20
Datum: NAD83

Prepared by: C. Sheppard

Verified by: M. Paznar





FIGURE 4

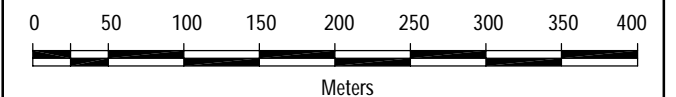
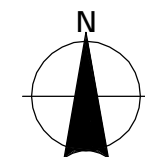
THE HAMLET OF QIKIQTARJUAQ
ENVIRONMENTAL EMERGENCY
CONTINGENCY PLAN

REGIONAL VIEW OF
SEWAGE LAGOON & SOLID
WASTE DISPOSAL FACILITY
(LANDFILL)

Legend

--- INTERPRETED EXISTING SURFACE WATER
FLOW DIRECTION

Satellite Imagery Source:
September 2004 Satellite Image obtained from DigitalGlobe Inc.



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January 2006
Project Number: N-0 09439.0

Projection: UTM Zone 20
Datum: NAD83

Prepared by: C. Sheppard

Verified by: M. Paznar



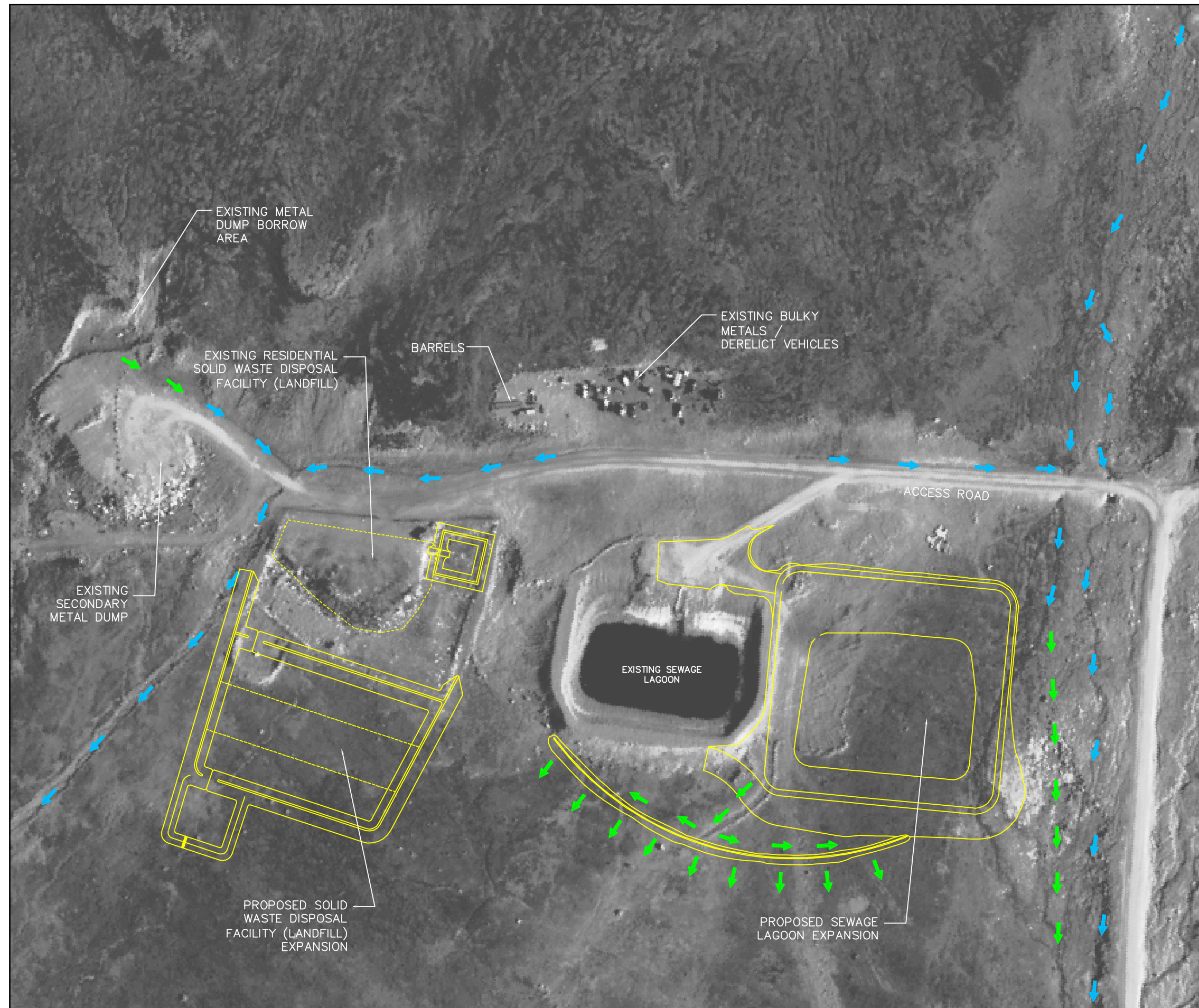


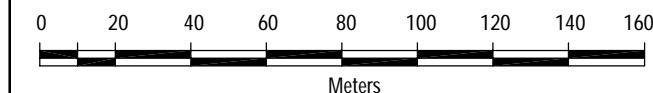
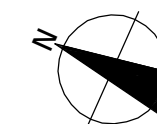
FIGURE 5
THE HAMLET OF QIKIQTARJUAQ
ENVIRONMENTAL EMERGENCY
CONTINGENCY PLAN

SOLID WASTE DISPOSAL
FACILITY (LANDFILL)

Legend

- → EXISTING SURFACE WATER FLOW DIRECTION
- → PROPOSED SURFACE WATER FLOW DIRECTION

Satellite Imagery Source:
 September 2004 Satellite Image obtained from DigitalGlobe Inc.



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 January 2006
 Project Number: N-0 09439.0

Projection: UTM Zone 20
 Datum: NAD83

Prepared by: C. Sheppard

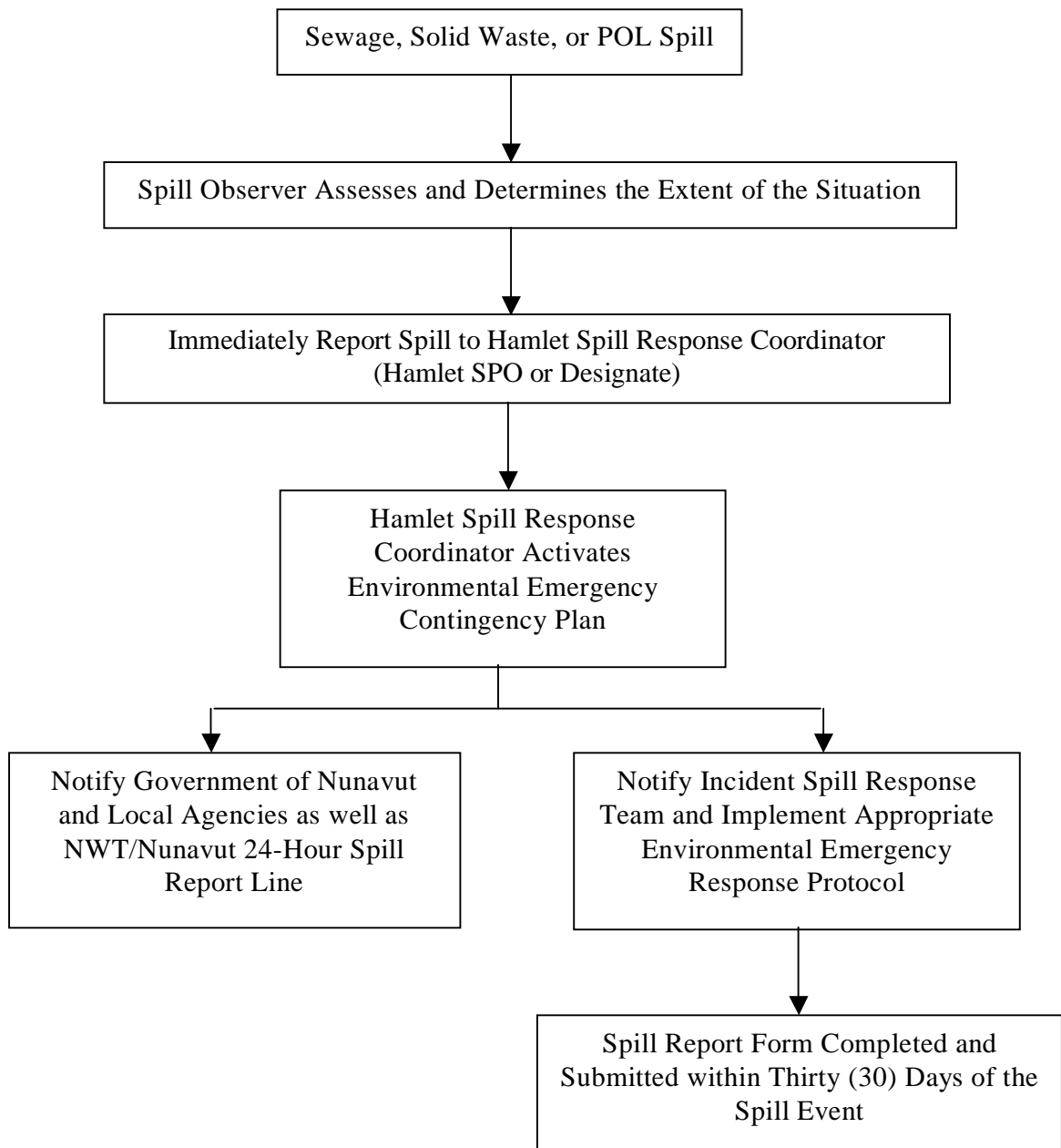
Verified by: M. Paznar



February 2006

3.0 Spill Response Organization

The following is a flow chart to illustrate the sequence of events that must be followed in the event of a sewage, solid waste, or POL spill occurring during supply, distribution, collection, transportation, storage, and treatment operations:



Emergency Response Flow Chart

February 2006

3.1 Incident Spill Response Team

The Hamlet Senior Administrative Officer (SAO) or his/her Designate will serve as the Spill Response Coordinator for the Hamlet in the event of a sewage or POL spill during collection and transport operations. The SAO of the Hamlet of Qikiqtarjuaq will appoint and train appropriate personnel to make up the Incident Spill Response Team, which normally consist of the following personnel:

- Spill Response Coordinator Hamlet SAO (or Designate)
- Hamlet Works Personnel Will generally vary from 3-7 people throughout the year

The responsibilities of the Spill Response Coordinator are as follows:

1. Assume complete authority over the spill scene and coordinate all personnel involved
2. Evaluate the spill situation and develop overall plan of action
3. Activate the *Environmental Emergency Contingency Plan* for the Hamlet of Qikiqtarjuaq
4. Immediately report the spill to the NWT/Nunavut 24-Hour Spill Report Line at (867) 920-8130, and other applicable regulatory or assistance agencies
5. Provide regulatory agencies with information regarding the status of the clean-up activities
6. Act as a spokesperson on behalf of the Hamlet of Qikiqtarjuaq with regulatory agencies, the public, and the media
7. Prepare and submit a report on the spill incident to regulatory agencies within 30 days of the event.

3.2 Contact Information

A complete listing of contact information, including telephone numbers of standard regulatory agencies, Hamlet personnel, and assistance agencies who may be contacted to supply resources, expertise, and advise needed to deal with a spill emergency is included in Appendix A.

February 2006

4.0 Spill Reporting Procedure

The Spill Response Coordinator must be notified immediately by any individual who is aware of any spill either by phone, radio, or in person.

The following is the incident reporting procedures once the Spill Response Coordinator activates this Environmental Emergency Spill Contingency Plan:

1. Report spill immediately to the 24-Hour NWT/Nunavut Spill Report Line Phone (867) 920-8130 (Section 4.1)
2. Report immediately to the INAC Manager, Water Resources in Iqaluit at (867) 975-4550
3. Notify Hamlet of Qikiqtarjuaq Fire Department
4. Fill out the NWT/Nunavut Spill Report Form (Appendix B) within thirty (30) days of the spill event occurring.

4.1 NWT/Nunavut Spill Report Line

All spills as defined in this document must be reported immediately to the 24-hour NWT/Nunavut Spill Report Line. Gather the following information prior to making the call:

- Date and time of spill (if known)
- Location and map coordinates (if known) and direction of flow of spill materials if moving
- Party responsible for spill
- Product/material spilled and estimate of the quantity
- Cause of spill
- If the spill has been stopped or if it is continuing
- Extent of contaminated area
- Factors affecting spill or recovery, such as weather conditions or terrain
- If containment of spill is available
- Action taken or proposed
- If assistance is required
- Possible hazards to person, property or environment (e.g. fire, drinking water, fish, wildlife, etc.).

The information collected should be brief, and quick estimates made so the Spill Report Line and the Spill Response Coordinator can assess the situation. The information is similar to that required in boxes B, D, E, F, G, H, I, J, K, L, M, N, O, and P on the spill report form that must be completely fill out in thirty days, and available in Appendix B.

February 2006

5.0 Action Plans

5.1 Initial Action

The instructions to be followed by the first person on the spill scene are as follows:

1. Always be alert and consider your safety first
2. If possible, estimate the volume of material that has been spilled
3. Assess the hazard of people in the vicinity of the spill
4. If possible, and safety permits, attempt to stop the release of product to minimize potential for environmental impacts
5. Immediately report the spill to the Spill Response Coordinator
6. Resume any effective action to contain, mitigate, or terminate the flow of the spilled material.

5.2 Environmental Health Protection and Mitigation Measures

The environmental protection and mitigation measures outlined in the following sections are to be taken by all personnel responding to a spill event and to reduce the chance of environmental impairment and health hazards due to spill, release, or other incident.

5.2.1 General Procedures

The following general clean-up procedures shall apply for all spill areas within the Hamlet:

- Always wear personnel protective equipment (PPE)
- Smoking is prohibited during all spill response activities
- Eliminate all ignition sources
- Contain spills on soil or rock by construction of earthen dykes using available material. If soil is not available, place sorbent materials or a boom in the path of the spill. As the sorbent barrier becomes saturated, continually replace it. Fuel or other liquids lying in pools, or trenches are to be removed with pumps, buckets, or skimmers
- If the ground is snow covered, create snow dykes, and line with a chemically-compatible liner for containment and recover of liquid
- For fuels on water, deploy containment booms, and recovery as much fuel as possible with a work boat and skimmer if the area has less than 1/10th ice cover. If the area is ice infested, burn any fuel spills using igniters
- Apply sorbets, if necessary
- Assess potential for disturbance of wildlife, fish, and archaeological sites by spill or clean-up operations

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Water, Sewage, and Solid Waste Operations in the
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- Notify environmental authorities to discuss available and feasible disposal and clean-up options
- Conduct required clean-up operations
- Assess and appropriately treat any areas disturbed by clean-up activities with laboratory testing
- Ensure the site has been completely restored and cease operations, only when all work is finalized and laboratory testing confirmed.

Specific procedures relating to mitigating measures for specific contaminants following below:

5.3 Mitigative Measures: Sewage, Gasoline, Diesel Fuel, Hydraulic Fluid, Lubricating Oil and Aviation Fuel

If possible, and safety permits, stop the flow of product, which is occurring, and eliminate all ignition sources. ***Smoking is prohibited during all spill response activities.***

5.3.1 POL Spill on Soil, Gravel, Rock, or Vegetation

- Build a containment berm using soil material or snow and place a plastic tarp at the foot of the berm for easy capture of the spill after all vapors have dissipated
- Remove the spill by using absorbent pads or excavating the soil, gravel or snow
- Remove spill splashed on vegetation using particulate absorbent material
- If soil, gravel, or vegetation are to be removed from the site, the Hamlet shall contact regulatory agencies for approval before commencing with the removal.

5.3.2 POL Spill On Water

- Use containment boom to capture spill for recovery after vapors have dissipated
- Use absorbent pads to capture small spills
- Use a petroleum skimmer for larger spills.

5.3.3 POL Spill on Ice and Snow

- Build a containment berm around spill using snow
- Remove spill using absorbent pads or particulate sorbent material
- The contaminated ice and snow must be scraped and shoveled into plastic buckets with lids, 205 litre drums, and/or polypropylene bags.

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5.3.4 POL-Contaminated Material Storage and Transfer

All contaminated water, ice, snow, soil, and clean up supplies will be stored in closed, labeled containers. All containers will be stored in a well ventilated area away from incompatible materials.

5.3.5 Disposal

Contact Federal and Territorial regulatory agencies to identify appropriate disposal methods before disposing of contaminated material. ***No contaminated material is to be disposed of in any Facility operated by the Hamlet of Qikiqtarjuaq without the express written consent of the Nunavut Water Board.***

5.4 Mitigative Measures: Ethylene Glycol Antifreeze

If possible, and safety permits, stop the flow of product, which is occurring.

5.4.1 Ethylene Glycol Spill on Soil, Gravel, Rock, or Vegetation

- Build a containment berm using soil material or snow and place a plastic tarp at the foot of the berm for easy capture of the spill
- Remove the spill by using absorbent pads or excavating the soil, gravel, or snow
- Remove spill splashed on vegetation using particulate absorbent material
- If soil, gravel, and/or vegetation must be removed from the spill site, the Hamlet shall contact the appropriate regulatory agencies for approval before commencing with the removal.

5.4.2 Ethylene Glycol Spill On Water

Use containment boom to capture spill, and pump contaminated water into 205 L drums.

5.4.3 Ethylene Glycol Spill On Ice and Snow

- Build a containment berm around spill using snow
- Remove spill using particulate sorbent material
- The contaminated sorbent material, ice and snow must be scraped and shoveled into plastic buckets with lids, 205 litre drums, and/or polypropylene bags.

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5.4.4 Ethylene Glycol Storage and Transfer

All contaminated water, ice, snow, soil, and clean up supplies will be stored in closed, labeled containers. All containers will be stored in a well ventilated area away from incompatible materials.

5.4.5 Disposal

Contact Federal and Territorial regulatory agencies to identify appropriate disposal methods before disposing of contaminated material. ***No contaminated material is to be disposed of in any Facility operated by the Hamlet of Qikiqtarjuaq without the express written consent of the Nunavut Water Board.***

5.5 Mitigative Measures: Sewage

If possible, and safety permits, stop the flow of product, which is occurring.

5.5.1 Sewage Spill on Soil, Gravel, Rock, or Vegetation

- Build a containment berm using soil material or snow and place a plastic tarp at the foot of the berm for easy capture of the spill, and to prevent sewage from entering any water body
- Remove the spill by using vacuum trucks or excavating the soil, gravel, or snow
- If soil, gravel, and/or vegetation must be removed from the spill site, the Hamlet shall contact the appropriate regulatory agencies for approval before commencing with the removal.

5.5.2 Sewage Spill into Water

- Use containment boom to capture spill, and pump contaminated water into vacuum trucks
- Deposit contaminated water to the Hamlet sewage lagoon
- Monitor the affected water body sampling at a minimum for Biological Oxygen Demand (BOD), Total Suspended Solids (TSS), ammonia (NH₃), and faecal coliforms (FC).

5.5.3 Sewage Spill on Ice and Snow

- Build a containment berm around spill using snow
- Remove spilled sewage and contaminated snow and ice to the Hamlet sewage lagoon.

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5.5.4 Sewage Storage and Transfer

All contaminated water, ice, snow, soil, and clean-up supplies will be deposited to the Hamlet sewage lagoon or landfill facility, as appropriate.

5.6 Mitigative Measures: Solid Waste

5.6.1 Solid Waste Spill on Soil, Gravel, Rock, or Vegetation

- Physically remove the spilled solid waste from the waste, and deposit to the approved Hamlet Solid Waste Disposal Facility
- If soil, gravel, or vegetation are to be removed from the site, the Hamlet shall contact regulatory agencies for approval before commencing with the removal.

5.6.2 Solid Waste Spill into Water

- Use containment boom to capture soil for recovery
- Physically remove the spilled solid waste from the water, and deposit to the approved Hamlet Solid Waste Disposal Facility
- Capture any sheen from the water using absorbent pads or skimmer, and deposit any used absorbent pads to the approved Hamlet Solid waste Disposal facility.

5.6.3 Solid Waste Spill on Ice and Snow

- Build a containment berm around spill using snow
- Physically remove the spilled solid waste and deposit to the approved Hamlet Solid Waste Disposal Facility
- If soil, gravel, or vegetation are to be removed from the site, the Hamlet shall contact regulatory agencies for approval before commencing with the removal.

5.6.4 Disposal

Any solid waste shall be removed to the approved Hamlet Solid Waste Disposal Facility.

5.7 Spill Recovery Assessment

In order to determine whether a spill has been successfully remediated, samples of the soil and/or water within the spill containment area and surrounding the area, are to be collected and sent to an accredited Canadian Association of Environmental Analytic Laboratories (CAEAL) laboratory to be analyzed for the chemical parameters contained in the spill material. If concentrations of the spill chemicals are not detected, or are at

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concentrations below the applicable Territorial, Federal, or CCME regulations/criteria, the spill clean-up will be determined a success. Clean-up operations may then cease.

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6.0 Spill Response Resource Inventory

6.1 Additional Personnel Available

In addition to Hamlet staff, approximately 10 people are available from the Qikiqtarjuaq Fire Department, to assist in spill response and clean-up activities. Personnel from the local RCMP Detachment will be available for securing the site from unauthorized individuals, closing roads, etc. The Community Health Centre have personnel to assist in the treatment of anyone injured during the emergency.

6.2 Spill Response Equipment Inventory

Equipment available within the community to assist in responding to a hazardous materials spill includes heavy equipment (i.e. vacuum trucks, dozer, front end loader, and grader), as well as various hand held tools including shovels. In addition, three spill kits should be available on site during spill incident response operations. Each spill kit should contain the following supplies.

Composition of Spill Kit

	Quantity
• 360 litre polyethylene over pack drum	1
• oil sorbent booms (5" X 10')	6
• oil sorbent sheets (16.5" X 20" X 3/8")	100
• drain cover (36" X 36" X 1/16")	1
• Caution tape (3" X 500')	1
• 1 lb plugging compound	1
• Nitrile gloves (pair)	4
• Safety goggles (pair)	4
• Tyvek coveralls (pair)	4
• instruction booklet	1
• printed disposable bags (24" X 48")	10

Sorbent capacity of each spill kit is 240 litres.

All equipment is generally stored at the Hamlet Operations Yard/Garage. Some equipment may be stored in other areas throughout the community while being used to complete tasks.

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7.0 Training

All employees working for the Hamlet of Qikiqtarjuaq should be trained in the safe operation of all machinery and tools to help prevent sewage and hazardous material spills. All employees on site should also be trained for initial spill incident response. Annual refresher exercises should be conducted to review the procedures of this *Environmental Emergency Contingency Plan*, with all individuals involved in the Incident Spill Response Team, including members of the local volunteer fire department, RCMP Detachment, and Community Health Centre.

Incident Spill Response Team training should include the following aspects:

- Spill awareness and prevention
- Methods of detection
- Types of spills and seasonal considerations
- Reporting procedures and initial responses
- Spill response kit familiarization
- Clean-up and site remediation methods
- Occupational health and safety including proper selection and use of PPE's.

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8.0 Annual Review of this Environmental Emergency Contingency Plan

As part of the preparation of the Annual Report to the Nunavut Water Board for the Water License, the Hamlet should review and update the information contained within this plan. The purpose of the update is to ensure all changes to regulations are incorporated into this plan, along with the use of any new technology or method advances, to prevent or stop a spill and to mitigate and/or remediate a spill. This ensures that the plan adapts as the Hamlet grows, to ensure the community is properly prepared in the event of an incident.

Finally, it is recommended that annual refresher training of personnel be completed after any revisions to this document have been approved. This will familiarize personnel with the updated plan, and to provide a rapid and coordinated response.

Environmental Emergency Contingency Plan for
Water, Sewage, and Solid Waste Operations in the
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9.0 References

Nunavut Water Board, September 2000. *Hamlet of Qikiqtarjuaq Water License NWB3Q1K0106*. Goja Haven, Nunavut.

Nunavut Water Board, November 2004. *Guidelines for Spill Contingency Planning*. Goja Haven, Nunavut.

Northwest Territories, Date Unknown. *Contingency Planning and Spill Reporting in the NWT: A Guide to the New Regulations*, Yellowknife, Northwest Territories.

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Appendix A

Contact Information

**Appendix A
Contact Information**

Contact	Location	Telephone	Fax
Hamlet of Qikiqtarjuaq Senior Administrative Officer or Designate	Qikiqtarjuaq	(867) 927-8832	(867) 927-8120
Northwest Territories/Nunavut 24 Hour Spill Report Line	Iqaluit	(867) 920-8130	(867) 873-6924
Indian and Northern Affairs Canada Water Resources Manager Nunavut Regional Office	Iqaluit	(867) 975-4550	(867) 975-4585
Nunavut Water Board	Gjoa Haven	(867) 360-6338	(867) 360-6369
Environment Canada Environment Protection Branch Inspector	Iqaluit	(867) 975-4644	(867) 975-4594
Manager Pollution Control and Air Quality Environmental Protection Government of Nunavut	Iqaluit	(867) 975-5907	(867) 975-5981
Indian and Northern Affairs Canada Land Administration Minister Nunavut Regional Office	Iqaluit	(867) 975-4280	(867) 975-4286
Department of Fisheries and Oceans Canada Nunavut Regional Office	Iqaluit	(867) 979-8000	(867) 979-8039
Fire Department	Qikiqtarjuaq	(867) 927-4422	N/A
Royal Canadian Mounted Police (RCMP) Detachment	Qikiqtarjuaq	(867) 927-0123	N/A
Community Health Centre	Qikiqtarjuaq	(867) 927-8916	N/A

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Appendix B
NWT Spill Report



NWT SPILL REPORT

(Oil, Gas, Hazardous Chemicals or other Materials)

24 – Hour Report Line
Phone: (867) 920-8130
Fax: (867) 873-6924

A Report Date and Time		B Date and Time of spill (if known)		C <input type="checkbox"/> Original Report <input type="checkbox"/> Update no. _____		Spill Number	
D Location and map coordinates (if known) and direction (if moving)							
E Partly responsible for spill							
F Product(s) spilled and estimated quantities (provide metric volumes/weights if possible)							
G Cause of spill							
H Is spill terminated? <input type="checkbox"/> yes <input type="checkbox"/> no		I If spill is continuing, give estimated rate		J Is further spillage possible? <input type="checkbox"/> yes <input type="checkbox"/> no		K Extent of contaminated area (in square meters if possible)	
L Factors effecting spill or recovery (weather conditions, terrain, snow cover, etc.)				M Containment (natural depression, dikes, etc.)			
N Action, if any, taken or proposed to contain, recover, clean up or dispose of product(s) and contaminated materials							
O Do you require assistance? <input type="checkbox"/> no <input type="checkbox"/> yes, describe:				P Possible hazards to person, property, or environment; eg: fire, drink water, fish or wildlife			
Q Comments or recommendations						FOR SPILL LINE USE ONLY	
						Lead agency	
						Spill significance	
						Lead Agency contact and time 	
Is this file now closed? <input type="checkbox"/> yes <input type="checkbox"/> no							
Reported by		Position. Employer, Location			Telephone		
Reported to		Position. Employer, Location			Telephone		



Appendix F
Monitoring Program Quality
Assurance/Quality Control Plan



Quality Assurance/Quality Control Plan for
Hamlet Water Reservoir, Sewage Lagoon, and
Solid Waste Disposal Facility Monitoring Program
Hamlet of Qikiqtarjuaq, Nunavut

Prepared for

The Hamlet of Qikiqtarjuaq
P.O. Box 4, Qikiqtarjuaq NU X0A 0B0 Canada

Prepared by

Nuna Burnside Engineering and Environmental Ltd.
Box 175, 25 Third Avenue Rankin Inlet NU X0C 0G0 Canada
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Revised Date

February 2006

File No: N-O 09439.0

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- B Notification of Laboratory Form
- C Annual Report for the Hamlet of Qikiqtarjuaq

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1.0 Introduction

The Hamlet of Qikiqtarjuaq (meaning “big island”), is a Community of approximately 599 people located on the eastern coast of Baffin Island and on an island known as Broughton Island in the territory of Nunavut. As illustrated in Figure 1, the Hamlet is located approximately 470 kilometers northeast of the Capital City of Iqaluit, a distance that is covered by plane in about one hour. The geographic coordinates for the Hamlet of Qikiqtarjuaq are 67°33’ north latitude and 64°02’ west longitude. As indicated on Figure 2, the community is situated on the northwest portion of Broughton Island.

The Hamlet provides trucked water and sewage services, along with regular solid waste collection for the residents, businesses and institutions. Historically, water is drawn from the Tulugak River during the summer, and from the lined earthen reservoir for the remainder of the year. Sewage is collected by truck from individual holding tanks at each building and discharged to the unlined sewage lagoon located to the east of the community north of the DEW Line Access Road. Sewage treatment is provided by a retention lagoon, with the treated effluent charge flowing north towards the ocean through a naturally occurring wetland treatment area. Solid waste is disposed of at a facility located adjacent to the sewage lagoon. The solid waste disposal facility includes areas for bulky metals/derelect vehicles, barrels, metal dump borrow, secondary metal, and residential solid waste.

1.1 Purpose

The Quality Assurance/Quality Control Plan has been prepared to meet the requirements of the Monitoring Program developed for the Hamlet of Qikiqtarjuaq to comply with licensing requirements. A copy of the current license is included in Appendix A.

Quality Assurance (QA) and Quality Control (QC) are vitally important components of environmental management for the Hamlet of Qikiqtarjuaq. Contact information for the Hamlet is provided in Appendix B.

1.2 Objectives

The Plan has been developed to achieve the following objectives:

- To ensure that all samples taken in the field will follow procedures and controls in order to maintain a high quality, so that the results obtained represent both the physical and chemical nature of the samples being taken
- To ensure best management practices (BMP) are used throughout the sampling program

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- To ensure all samples are delivered promptly to an accredited laboratory for analysis.

This document describes the procedures and controls to be used by Hamlet operations staff when conducting environmental sampling to meet the requirements of the license.

Although the QA/QC Plan is submitted to the NWB as a condition of the water license, it is primarily intended to be read, understood, and implemented by Hamlet operations personnel responsible for environmental quality monitoring. The procedures should be applied to **all** water quality samples taken by the Hamlet.

1.3 Quality Assurance and Quality Control

Quality Assurance is a set of operating principles that, if strictly followed during sample collection and analysis, will produce data of known and defensible quality (Wilson, 1995). As such the accuracy of the analytical results can be stated with a high level of confidence. A high level of quality assurance can be achieved by applying the following principles:

- Personnel involved in water sampling and analysis are well trained
- Facilities and equipment required for sampling are suitable, well maintained, and always kept clean
- Standard procedures are developed and implemented for the collection, transportation and analysis of samples, based on recognized BMP
- Laboratory and field instruments are calibrated according to manufacturers recommendations or recognized as good operating practice
- Supplies used in sampling and analysis are of consistent high quality and are not expired
- Quality Control (QC) procedures are development and implemented based on good operating practices to assess quality of analytical data and provide warning of unacceptable errors
- Implement prompt remedial action when deficiencies are identified
- Results of the monitoring program are reported in the Annual report as required in the water license. Annual report is required to be submitted by March 31 for the pervious calendar year to the NWB sample form can be found in Appendix C.

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Quality Control (QC) is a set of specific procedures used to measure the quality of the data produced and correct deficiencies in the sampling or analyses, as they occur. Quality control is used by the analyst and sampler to achieve standards of measurement for the three principles components of quality: precision, accuracy and reliability.

1.4 Lab Accreditation

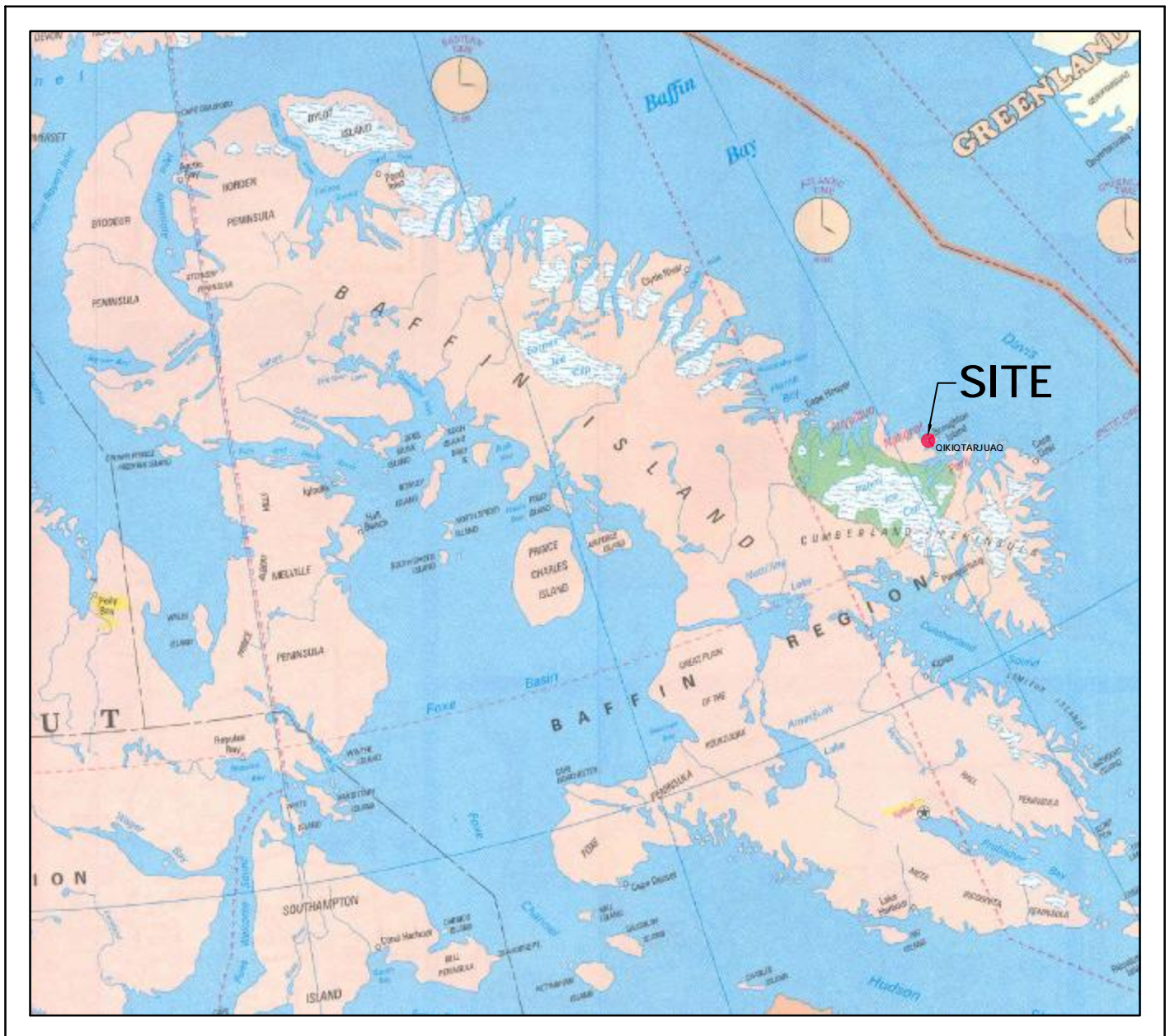
All analyses shall be conducted in laboratories, which are accredited by the Canadian Association of Environmental Analytical Laboratories (CAEAL), unless otherwise approved by an Analyst. The Contact information for the DIAND Analyst for Nunavut is provided in Appendix A.

The following is the contact information for the Laboratory retained by the Hamlet of Qikiqtarjuaq to complete analysis:

Name of Laboratory	_____
Address	_____

Phone No.	_____
Fax No.	_____

Prior to sampling being undertaken by representatives of the Hamlet, the Hamlet shall notify the NWB of the Laboratory to be used to perform the analysis. This is required as per the Water License.



Map Reference:
Map of Canada
Published by the CAA

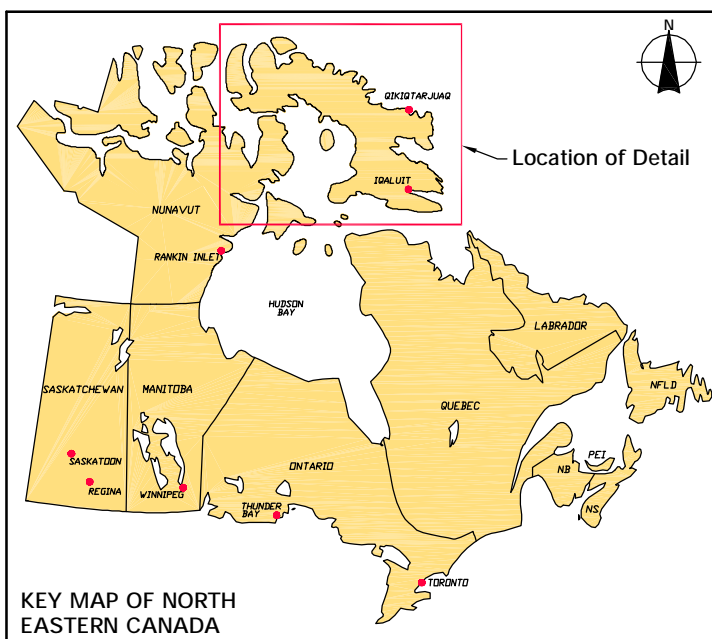


FIGURE 1 - SITE LOCATION MAP

THE HAMLET OF OIKIQTARJUAQ, NUNAVUT

QUALITY ASSURANCE/QUALITY CONTROL PLAN

January 2006
Project Number: N-O 09439.0

Prepared by: K. Pridham

Verified by: M. Paznar



BURNSIDE



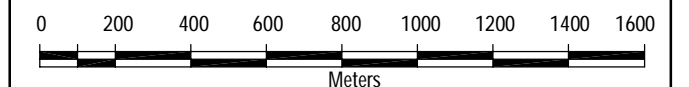
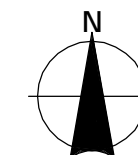
FIGURE 2
THE HAMLET OF QIKIQTARJUAQ
*QUALITY ASSURANCE/QUALITY CONTROL
PLAN*

SATELLITE IMAGERY OF
ENTIRE COMMUNITY
AND INFRASTRUCTURE

Legend

X QIK - 1 SAMPLING STATION LOCATION

Satellite Imagery Source:
September 2004 Satellite Image obtained from DigitalGlobe Inc.



1:20,000
January 2006
Project Number: N-0 09439.0

Projection: UTM Zone 20
Datum: NAD83

Prepared by: C. Sheppard

Verified by: M. Paznar



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2.0 Field Sampling

2.1 Sample Collection

Effluent and surface water sampling by the Hamlet of Qikiqtarjuaq is conducted to provide information for the Hamlet for effective environmental management and to monitor regulatory compliance.

2.1.1 Sampling Location and Frequency

The Monitoring Program of the water license prescribes the specific effluent and surface water monitoring program for the Hamlet. It includes detailed information such as where to take samples, how often to take samples and what parameters will be analyzed on the collected samples. The proposed Monitoring Program is summarized in Table 1.

Table 1: Surveillance Network Program for Water License NWB3Q1K0106

Station	Description	Frequency	Analysis Requirements
QIK -1	Raw water supply intake at the Tulugak River	Monthly from May to August prior to refilling reservoir	<p>Measure volume of water drawn from river</p> <ul style="list-style-type: none"> • Total Ammonia-N • Total Organic Carbon (TOC) • Total Suspended Solids • Chloride (Cl) • Nitrate (N) • Total Arsenic (As) • Total Chromium (Cr) • Total Copper (Cu) • Total Lead (Pb) • Total Mercury (Hg) • Total Sodium (Na) Microbiological • Heterotrophic plate count (HPC) • Coliform • Colour • pH • Turbidity • Nitrite (N) • Sulphate (SO₄) • Total Cadmium (Cd) • Total Cobalt (Co) • Total Iron (Fe) • Total Manganese (Mn) • Total Nickel (Ni) • Total Zinc (Zn) • Background • Escherichia coli (E.coli)

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Station	Description	Frequency	Analysis Requirements
QIK - 2	Raw water supply intake at the reservoir truck fill station	Monthly from May to August	Measure volume of water drawn from reservoir
QIK - 3	Raw sewage from pump out truck	Monthly from May to August	Amount deposited to lagoon
QIK - 4	Discharge from the FINAL DISCHARGE POINT OF SEWAGE DISPOSAL FACILITIES	Monthly during periods of flow	<ul style="list-style-type: none"> • BOD • Total Suspended Solids • Conductivity • Oil and Grease • Magnesium • Sodium • Chloride • Total Hardness • Ammonia Nitrogen • Total Cadmium • Total Cobalt • Total Chromium • Total Copper • Total Aluminum • Faecal Coliform • pH • Nitrate-Nitrite • Total Phenols • Calcium • Potassium • Sulphate • Total Alkalinity • Total Zinc • Total Iron • Total Manganese • Total Nickel • Total Lead
QIK - 5	Runoff from the Solid Waste Disposal Facility	Monthly during periods of flow	Same as STN QIK - 4

The sampling stations will be clearly identified in the field by posted signs. All signs shall be in the Official Languages of Nunavut, and shall be located and maintained to the satisfaction of an Inspector. Each sampling location must have their Global Positioning System (GPS) coordinates determined. Table 2 provides an estimate of the GPS coordinates based on the satellite imagery shown in Figure 2. These locations must be confirmed by the Inspection, and the coordinates updated if necessary.

Table 2: GPS Locations of SNP Sampling Stations

Station	GPS Coordinates (Easting, Northing)
QIK - 1	458912, 7493383
QIK - 2	458740, 7493463
QIK - 3	458962, 7495017
QIK - 4	458091, 7495340
QIK - 5	458754, 7495176

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Samples shall be taken at the same location on each sampling occasion, unless the Inspector has approved a new location.

Additional sampling and analysis may be requested by an Inspector.

Note: The License also describes the sampling station QIK-1 as the raw water supply prior to treatment. The Hamlet is not required to take samples at this site to comply with the water license. Samples for QIK-1 shall be taken by the Indian and Northern Affairs Canada (INAC) and/or GN Environmental Health Office (EHO).

2.1.2 Sample Planning

To understand what sample containers, sampling techniques, and preservation methods are required, Hamlet personnel first need to understand what parameters will be analyzed in the laboratory. Table 3 is a summary of parameters required in the License, which are grouped according to their different sampling requirements:

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Table 3: Parameters Examined in NWB Water Licenses

Group	Description	Parameter
I	Microbiological	Biological Oxygen Demand (BOD) Fecal Coliform (FC)
II	General Water Chemistry	pH Conductivity Total Alkalinity Total Suspended Solids (TSS) Ammonia Nitrogen (NH ₃ -N) Nitrate-Nitrite (NO ₃ -NO ₂) Oil and Grease (OGG) (Visual) Sulphate (SO ₄) Sodium (Na) Total Organic Carbon (TOC) Potassium (K) Magnesium (Mg) Calcium (Ca) Total Hardness Chloride (Cl)
	Total Metals (except Mercury):	Total Nickel (Ni) Total Aluminum (Al) Total Arsenic (As) Total Cadmium (Cd) Total Copper (Cu) Total Cobalt (Co) Total Chromium (Cr) Total Iron (Fe) Total Lead (Pb) Total Manganese (Mn) Total Zinc (Zn)
III		Total Mercury (Hg)
IV		Total Phenols (Total-P)

It is strongly recommended that the Hamlet seek advice for the sizes and types of buffers required for analysis of the parameters required. Furthermore, it is recommended that the laboratory pre-fill the sample collection bottles with the proper preservative to minimize error in the field.

All of the samples taken will be grab samples. Samples will normally be taken from natural lakes, streams, treatment ponds, or process streams. Where possible, samples

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shall be taken from just below the surface to avoid floating debris, which may contaminate the sample.

Freshwater Streams, Surface Drainage, and Wetlands

The samples shall be collected as close to the middle of the stream where water flows freely and is free of debris. After getting into position, the sampler shall wait to allow any stirred sediment that occurred from entering the stream to settle or wash away. The sample bottle shall be partially filled with the water to be sampled and rinsed with the lid in place at least three times. Rinse water shall be emptied downstream of the sampling point, so that stream sediments remain undisturbed. **Prior to sampling for oil/grease, bacteria, and for any bottles containing preservative, the bottles shall not be rinsed.**

If possible, bottles shall be plunged into the stream to a depth of approximately half the total stream depth, and allow it to fill with the mouth of the bottle facing upstream. Where stream is too shallow to allow for sample bottle to be filled completely, without disturbing bottom sediment of the streambed. The sampler may use a smaller container that has been properly rinsed to transfer sample to the larger bottle. Do not use a smaller sample bottle containing preservatives.

When taking the sample, sufficient room shall be left to allow for the addition of preservatives, if required.

Lakes or Ponds

Surface sampling shall be collected using the same procedures as streams. Sample bottles shall be plunged to approximately 150 mm (6 inches) below the water surface.

Although not currently required under the Monitoring Program, information on water quality at various depths in lakes or ponds may be required. If an Inspector requests that this sampling be carried out, specific procedures shall be implemented in accordance with accepted sampling and good engineering practice.

Process Streams

When sampling a process stream (i.e. valve or pipe discharge) the sampler shall collect a grab sample or a set of composite samples collected over an extended period of time. In the case of sampling from a valve, valves shall be open and running for a least one-minute before taking the sample to ensure that a representative sample of the process stream is taken.

2.1.3 Sample Container Selection

Sample containers vary in size and material of construction depending on the specific type of analysis to be conducted. Sample containers for each analysis are shown in Table

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2. Sample containers to be used shall be obtained directly from the laboratory, which shall provide new containers to the Hamlet specific for the sampling program requested by the Hamlet. The laboratory will provide the correct sizes and types of bottles based on the parameters required. The Hamlet shall **contact the laboratory at least one month prior to sampling event** in order to ensure that containers are available for sampling. Refer to Section 1.3 for laboratory contact information.

2.1.4 Field Sampling Log

The individual collecting the water sample shall record the following at the time of sampling:

- Date of sampling
- Time of sampling
- Weather conditions
- Monitoring Station Number (i.e. QIK-2, QIK-3, QIK-4, etc.)
- Results of any Field measurements
- Sampler shall also indicate if sample used preservatives
- Any unusual conditions
- Any deviation from standard procedures.

2.1.5 Field Measurements

No field measurements are required as part of the Hamlet sampling program, however, it is strongly recommended that the following parameters be sampled immediately on site using appropriate portable field equipment:

- pH
- Temperature
- Dissolved oxygen
- Total alkalinity
- Turbidity
- Chlorine residuals.

It is important that separate equipment be used to sample between potable water and non-potable water (i.e. surface water). Furthermore, all instruments, glassware, etc. should be cleaned between each sample following manufacturer's recommended guidelines and/or BMPs.

2.1.6 Sampling Procedures

The sampling procedures described in Table 4 shall be used to collect water samples appropriate to the sampling location.

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Table 4: General Procedures for Sample Collection

	BIOLOGICAL	PHYSICAL	INORGANIC	ORGANIC
Phase 1: Sample Program Design	Step 1: Choose sample locations, sample frequency, and analytes to be measured Step 2: Contact laboratory used for analysis and get advice and information for sampling program Step 3: Contact manager of sample location facility; determine all safety requirements Step 4: Create sample identification system			
Phase 2: Sample Program Preparation	Step 1: Obtain sample containers, storage containers, distilled water, Personal Protective Equipment (PPE), and other required equipment Step 2: Create sample labels and apply to sample containers Step 3: Plan first sampling event - arrange all transportation and notify laboratory			
	♻ 1000 mL plastic or glass container for BOD ♻ 300 mL plastic or glass container for fecal coliform	♻ Have equipment needed for any flow or temperature measurements ♻ 200 mL plastic or glass container for suspended solids	♻ Electrode meter for dissolved oxygen and pH ♻ 1000 mL nitric acid rinsed container, nitric acid for preservation, and filter for metals ♻ Specific containers and preservatives for nutrients or other analytes	♻ 1000 mL plastic or glass container, hydrochloric or sulfuric acid, for oil and grease
Phase 3: Sample Collection	Step 1: Keep sample containers closed until used Step 2: Record the date, time, location, geographic position, weather conditions, and other details in a field notebook at each sample location Step 3: Fill out the sample label, including: sample ID, location, date, time, and name of sample collector Step 4: Collect sample using appropriate container, by filling without rinsing, immediately close and keep cool Step 5: Pack all samples and provide a sample information sheet listing all contents in the storage container Step 6: Label the storage container with the recipient, WATER SAMPLES, FRAGILE, THIS END UP, and any TDG or WHMIS labels required			
	♻ BOD - fill container completely and refrigerate, Fecal coliform - leave space at top of container, refrigerate ♻ Maximum storage time: BOD - 24 hrs, Fecal Coliforms - 30 hrs,	♻ TSS - Refrigerate ♻ Maximum storage time: TSS - 7 days, temperature - 0.25 hrs	♻ Fill container and leave a small (1% of volume) air space at the top, refrigerate ♻ Maximum storage time: ammonia - 7 days, nitrate and phosphate - 48 hrs, metals - indefinite, DO and pH - 0.25 hrs	♻ Fill container to top and refrigerate ♻ Maximum storage time: oil and grease - 28 days
Phase 4: Sample Transportation	Step 1: Fill out the "sampler" portion of the Chain of Custody form Step 2: Ensure that all personnel handling the samples fill out a subsequent section of the Chain of Custody form Step 3: Transport the samples to lab for analysis as quickly as possible Step 4: Verify that the lab has received the samples and analysis is underway			

Note: Sizes and types of sample collection containers (bottles) are a suggestion only. The laboratory may suggest and use other sizes and types. Follow the suggestions of a CAEAL accredited laboratory.

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2.1.7 Sample Identification

All samples collected are to be labeled according to standard identification procedures (Name of sampler, time and date of sampling, sample identifier, sampling method and type of sample). **Sample labels shall be water-resistant, and prepared prior to going into the field.** An example of a typical Label is provided in Figure 3.

Figure 3: Example of Water Sample Label

Name of Sampler:	Gill Evans	Sample #:	1 of 15
Date of Collection:	1 May 2006 (0900 hrs)		
Type of Sample:	Grab Water Sample for Microbiological Analysis		
Parameter to be analyzed:	BOD		
Preservation method used:	no preservatives		
Temperature:	11°C	pH:	7.04
Sample Location:	QIK-4		
	Hamlet of Qikiqtarjuaq		
	Qikiqtarjuaq, NU		
	Phone: (867) 927-8943		

2.1.8 Sample Preservation

To obtain good results from a sampling program, time is critical. All samples are to be shipped to the Laboratory that has been contracted to carry out the analysis the same day as they are collected. Samples must be protected from breakage, and shall be shipped in an insulated cooler that can be provided by the Laboratory. **If samples cannot be shipped until the next day, due to unavoidable events such as weather or mechanical problems with transport aircraft, all samples must be stored in a refrigerator at 4°C.** Samples must not be frozen.

In all cases where samples cannot be delivered to the lab on the same day, specific preservatives must be added to the samples to prevent chemical changes that may alter the concentration of the parameters of interest. The samples must be preserved within two hours of sampling. Usually, samples can be preserved away from the field at the end of the site visit. In most cases, the laboratory can fill the bottles with preservative, and then ship them to the Hamlet to be filled and sent back for analysis.

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For the Hamlet of Qikiqtarjuaq, Table 5 provides the appropriate preservation methods for the parameters to be assessed.

Table 5: Sample Preservation

Type of Sample	Preservation Required
Group I Microbiological	Store in refrigerator at 4°C. Ship to Lab the same day as collected
Group II General Water Chemistry	Store in refrigerator at 4°C. Ship to Lab the same day as collected
Group II Total Metals (except mercury)	Acidify with 5 mL of <20 percent nitric acid. Store in refrigerator at 4°C. Ship to Lab the same day as collected
Group III Total Mercury	Acidify with 2 mL of 1:1 sulfuric acid and 5 percent potassium dichromate Store in refrigerator at 4°C. Ship to Lab the same day as collected
Group IV Total Phenols	Acidify with 4 mL of 1:1 sulfuric acid. Store in refrigerator at 4°C. Ship to Lab the same day as collected

Note: 1000 mL = 1 Liter

2.1.9 Sample Transportation

The main objective of the sampler is to minimize any chemical changes to the sample between the time it is collected and delivery to the laboratory. Heat, light and agitation can all impact the water chemistry and the samples shall be protected from these effects.

Effluent and surface water samples shall be stored and transported at a temperature of 4°C. Coolers and ice packs need to be available and are usually provided by the laboratory. Upon arrival at the laboratory, samples shall be refrigerated as soon as possible.

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3.0 Quality Control

Most commercial laboratories undertake QA/QC procedures with the volume of sample sent for analysis. Reports are usually provided with the Certificates of Analysis. It is recommended that the suggested QA/QC protocols by the laboratory be followed.

To ensure that the monitoring program maintains accepted quality control, field blanks and duplicate samples may be suggested by the laboratory. These samples are collected and analyzed for the sample parameters as the monitoring program in the license as part of a quality control check on monitoring activities.

The Field Blanks shall accompany the sampler into the field, labeled as field blanks, preserved in the field and submitted to the laboratory with the field samples.

3.1 Replicate or Duplicate Samples

Replicate or duplicate samples is the collection of more than one sample for a given sampling station subject to specific analysis. Standard procedures used for the routine sampling shall be applied. The replicate or duplicate samples are useful in identifying problems with accuracy and sampling methods.

Once per operating season for each active monitoring station a set of duplicate samples will be taken, representing as many of the routine analysis as possible. Where possible this shall be carried out in conjunction with the sampling undertaken by an INAC Inspector.

February 2006

4.0 Laboratory Analysis/Reporting

The laboratory will perform the analysis of all samples as outlined in the License. The results shall be received by the Hamlet within the time frame agreed to with the laboratory. The results shall be submitted the NWB for review with the Annual report. The results shall contain the limits of Detection used for analysis of each parameter as supplied by the laboratory.

The Hamlet may request clarification of the Analysis be contacting the NWB Technical Advisor and a review of the analysis will be provided upon request.

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5.0 Glossary

Quality Assurance (QA): is the definitive program for laboratory operation that specifies the measures required to produce defensible data of known precision and accuracy. QA includes quality control and quality assessment activities.

Quality Control (QC): is a set of measures within a sample analysis methodology to assure that the process is in control.

Quality Assessment: is a process to determine the quality of the laboratory measurements through internal and external QC evaluations. It includes performance evaluation samples, laboratory inter-comparisons samples and performance audits.

February 2006

6.0 References

Nunavut Water Board. *Water License NWB3QIK0106*. Gjoa have, Nunavut.

Wilson, Neal. 1995. *Soil Water and Ground Water Sampling*. CRC Press: New York, USA.

J:\2006\F\NUNA\08983\Reports\Quality Assurance Quality Control\Report.doc



Appendix A

Contact Information

APPENDIX A
Contact Information

Nunavut Water Board Contact:

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

Inspector Contact:

Water Resources Manager
Nunavut District, Nunavut Region
Department of Indian and Northern Affairs Canada
P.O. Box 100
Iqaluit, NU X0A 0H0
Telephone: (867) 975-4550
Fax: (867) 979-6445

Analyst Contact:

Laboratory Manager
Taiga Laboratories
Department of Indian and Northern Affairs Canada
4601 - 52 Avenue, P.O. Box 1500
Yellowknife, NT X1A 2R3
Telephone: (867) 669-2780
Fax: (867) 669-2718



Appendix B
Notification of Laboratory Form

APPENDIX B
Notification of Laboratory Form

Attention: Technical Advisor
Nunavut Water Board

Re: Notification of Laboratory
Water License NWB3QIK0106

Dear Sir/Madame,

The following CAEAL-certified laboratory has been retained by the Hamlet of Qikiqtarjuaq to complete the sample analysis required by Water License NWB3QIK0106:

Name of Laboratory : _____

Address : _____

: _____

: _____

Phone # : _____

Fax # : _____

Regards,

Name (print) : _____

Signature : _____ Date : _____

Please send this form, once completed, to the Nunavut Water Board at the following address:

Nunavut Water Board
c/o Technical Advisor
PO Box 119
Gjoa Haven, NU X0B 1J0
Telephone: (867) 360-6338
Fax: (867) 360-6369
Email: srtech@nwb.nunavut.ca

Appendix C
Annual Report for the
Hamlet of Qikiqtarjuaq

APPENDIX C
Annual Report for the Hamlet of Qikiqtarjuaq

Year Being Reported: _____

The following information is compiled pursuant to the requirements of Part B, Item 1 of Water License NWB3QIK0106 issued to the Hamlet of Qikiqtarjuaq.

Tabular summaries of all data generated under the Monitoring Program, monthly and annual quantities in cubic meters of freshwater obtained from all sources, monthly and annual quantities in cubic meters of each and all wastes discharged.

Attached to this document are results for Monitoring Station QIK-1, QIK-2, QIK-3, QIK-4, and QIK-5 as well as detailed chemical, physical, and biological analysis required at QIK-2 and QIK-5 (for the months of May to August, inclusive).

Month Reported	Quantity of Water Obtained From all Sources (m³)	Quantity of Sewage Waste Discharged (m³)
January		
February		
March		
April		
May		
June		
July		
August		
September		
October		
November		
December		
Annual Total		

Please indicate volumes in cubic meters – 1 cubic meter equals 1,000 liters.

A summary of modifications and/or maintenance work carried out on the Water Supply and Waste Disposal Facilities, including all associated structures and facilities.

A list of unauthorized discharges and summary of follow up action taken.

A summary of any abandonment and restoration work completed during the year, and an outline of any work anticipated for the next year.

A summary of any studies requested by the Board that relate to waste disposal, water use or reclamation, and a brief description of any future studies planned.

Any other details on water use or waste disposal required by the Board by November 1st of the year being reported.

Updates or revisions to the approved Operation and Maintenance Plans.

Additional information that the licensee deems useful.

Follow up regarding inspection/compliance concerns.

Appendix H3
Solid Waste Management Facility



**Solid Waste Facility
Operation and Maintenance (O&M) Plan
Hamlet of Qikiqtarjuaq, Nunavut**

Prepared for

The Hamlet of Qikiqtarjuaq
P.O. Box 4, Qikiqtarjuaq NU X0A 0B0 Canada

Prepared by

Nuna Burnside Engineering and Environmental Ltd.
Box 175, 25 Third Avenue Rankin Inlet NU X0C 0G0 Canada
15 Townline Orangeville ON L9W 3R4 Canada

Revision Date

February 2006

File No: N-O 09439.0

The material in this report reflects best judgement in light of the information available at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions made based on it, are the responsibilities of such third parties. Nuna Burnside accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

Solid Waste Facility
Operation and Maintenance (O&M) Plan
Hamlet of Qikiqtarjuaq, Nunavut

February 2006

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A	Climate Normal Data
B	Projected Waste Quantity Calculations
C	Nunavut Water Board License
D	Waste Disposal Site Forms
E	Environmental Emergency Contingency Plan
F	Monitoring Program Quality Assurance/Quality Control Plan

Solid Waste Facility
Operation and Maintenance (O&M) Plan
Hamlet of Qikiqtarjuaq, Nunavut

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1.0 Introduction

The operation and maintenance of the Solid Waste Disposal Facility will occur as a component of normal Hamlet of Qikiqtarjuaq operating procedures.

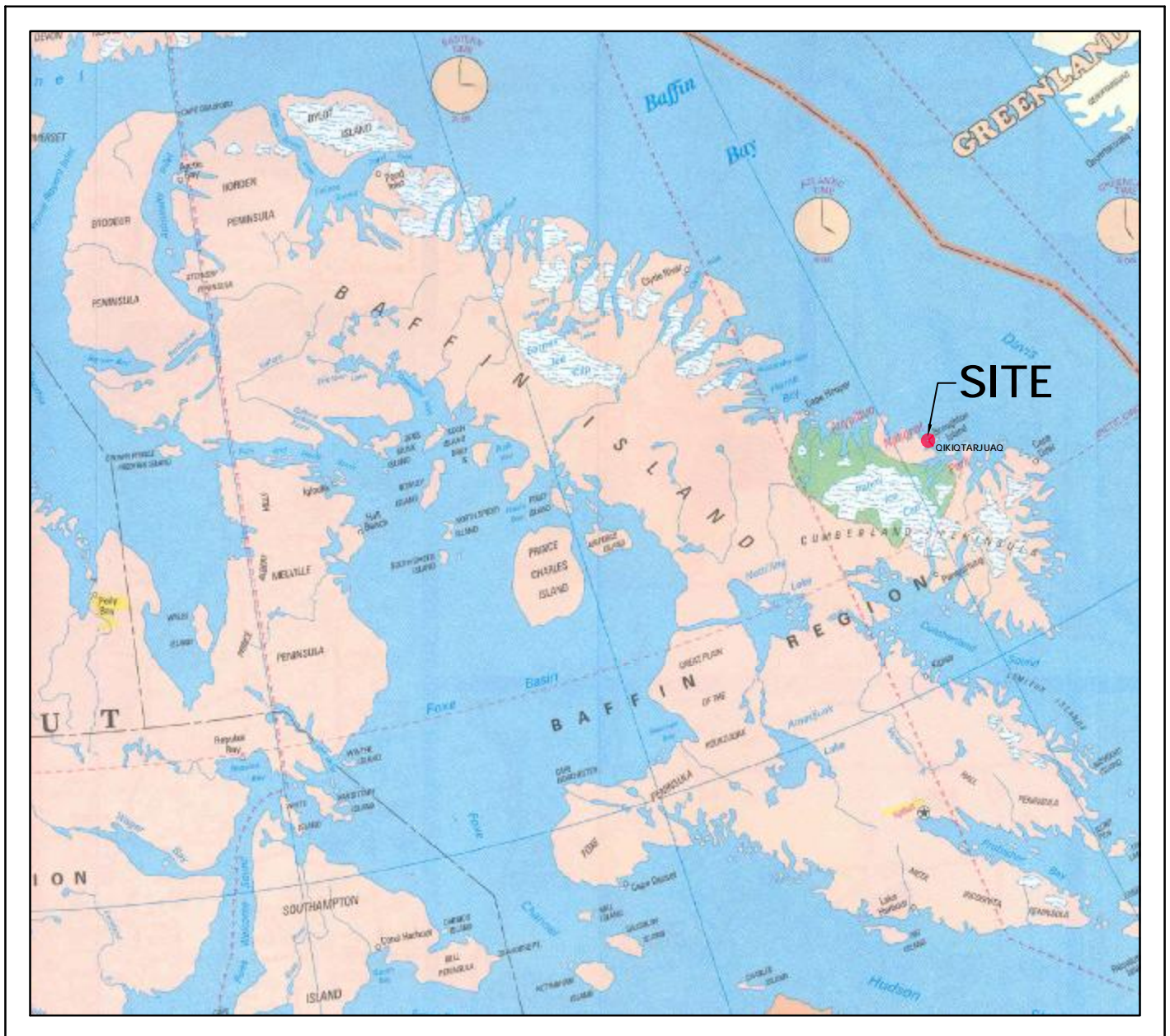
The Hamlet of Qikiqtarjuaq (meaning “big island”), is a Community of approximately 599 people located on the eastern coast of Baffin Island on Broughton Island, Nunavut (Figure 1). The Hamlet is located approximately 470 kilometers northeast of the City of Iqaluit, at 67°33’ N and 64°02’ W. The layout of the community is displayed in Figure 2.

Qikiqtarjuaq is located within the continuous permafrost zone. Maximal local depth of annual thaw of the active layer ranges from 0.6 to 1.6 meters, depending on the thickness and nature of the surface cover. Materials located beneath the thin active layer are perennially frozen to a substantial depth. Qikiqtarjuaq sits on glacial drift primarily composed of silty sand and gravels mixed with boulders.

The vegetation present in Qikiqtarjuaq is typical of that evidenced on the Arctic tundra. Hardy grasses, mosses, and lichens sit in a thin organic layer on the surface, which is generally 0.2 m or less in thickness.

Qikiqtarjuaq receives an average of 39 mm of rainfall and 223 mm of snowfall *per annum*. July mean high and low temperatures are 7°C and 1°C, respectively. January mean high and low temperatures measure -21°C and -28°C, respectively. Prevailing winds are generally north-northeast with an annual average velocity of 8.3 km/h. Climate normal information has been obtained from Environment Canada, and is presented in Appendix A.

Projected population and solid waste generation rates are provided in Appendix B.



Map Reference:
Map of Canada
Published by the CAA

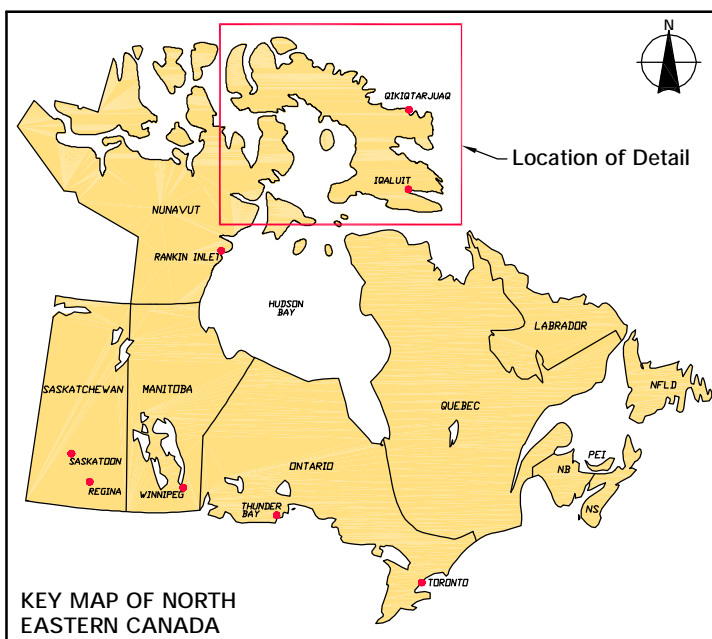


FIGURE 1 - SITE LOCATION MAP

THE HAMLET OF QIKIQTARJUAQ, NUNAVUT SOLID WASTE DISPOSAL FACILITY O&M PLAN

January 2006
Project Number: N-0 09439.0
Prepared by: K. Pridham

Verified by: M. Paznar

Burnside

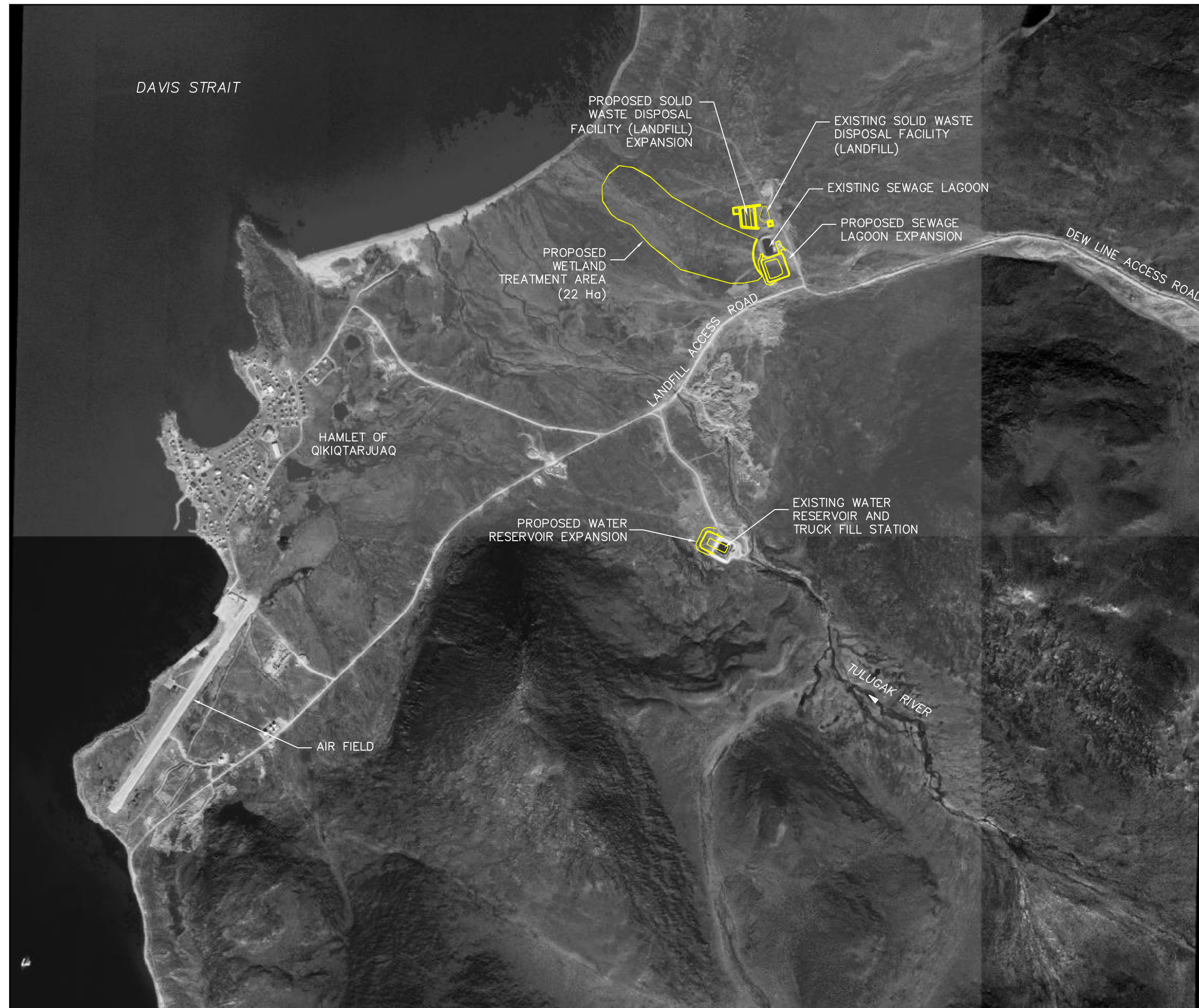
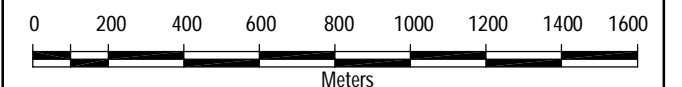
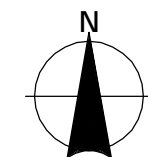


FIGURE 2
THE HAMLET OF QIKIQTARJUAQ
*SOLID WASTE
DISPOSAL FACILITY
O&M PLAN*

SATELLITE IMAGERY OF
ENTIRE COMMUNITY AND
INFRASTRUCTURE

Satellite Imagery Source:
September 2004 Satellite Image obtained from DigitalGlobe Inc.



1:20,000
January 2006
Project Number: N-0 09439.0

Projection: UTM Zone 20
Datum: NAD83

Prepared by: C. Sheppard

Verified by: M. Paznar



Solid Waste Facility
Operation and Maintenance (O&M) Plan
Hamlet of Qikiqtarjuaq, Nunavut

February 2006

2.0 Background Information on Hamlet Operations

The Hamlet of Qikiqtarjuaq provides regular solid waste pickup for the Community's residents, businesses, and institutions. Collection occurs on a daily basis throughout the Hamlet, to minimize the potential for attraction of foxes and polar bears. Solid waste is deposited in the Hamlet's Solid Waste Disposal Facility, which is currently permitted by the Nunavut Water Board (NWB License No. NWB3QIK0106, dated November 28, 2000 (Appendix C)). The Facility is located approximately 2.3 km east of the community north of the DEW Line Access Road. Waste is collected by the Hamlet-owned garbage truck and transported to the waste disposal facility. Access to the Solid Waste Disposal Facility is unmanned and public sorting/ scavenging of the waste is allowed. Specific areas for the segregation of hazardous and bulky waste (the Hazardous Waste Segregation Facility and the Bulky Waste Disposal Area, respectively) are provided. The Hazardous Waste Segregation Facility is located within the fenced area at the landfill, while the Bulky Waste Disposal Area is located in an adjacent, but unfenced, area.

Solid Waste Facility
Operation and Maintenance (O&M) Plan
Hamlet of Qikiqtarjuaq, Nunavut

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3.0 Operation and Maintenance of the Solid Waste Disposal Facility

Satellite imagery of the Solid Waste Disposal Facility operated by the Hamlet of Qikiqtarjuaq, which is described above, is provided in Figure 3. This Figure illustrates both the drainage pathway of the area adjacent to the Solid Waste Disposal Facility and the proximity to adjacent water bodies (the Davis Strait).

In the event of emergency, guidance regarding containment and site emergency response can be obtained from the following sources (see Table 1):

Table 1 – Emergency Contacts

Contact	Location	Telephone Number	Fax Number
INAC – Manager, Water Resources	Iqaluit	(867) 975-4550	(867) 979-6445
Hamlet of Qikiqtarjuaq – SAO	Qikiqtarjuaq	(867) 927-8832	(867) 927-8120
Government of Nunavut (Regional Engineer)	Pond Inlet	(867) 975-7314	
Environment Canada – Inspector	Iqaluit	(867) 975-4644	(867) 975-4594
Fire Department	Qikiqtarjuaq	(867) 927-4422	
RCMP Detachment	Qikiqtarjuaq	(867) 927-0123	
Community Health Center	Qikiqtarjuaq	(867) 927-8916	

3.1 Solid Waste Collection Procedures

The following solid waste collection operational procedures shall be carried out by the Hamlet of Qikiqtarjuaq on a daily basis (weather dependant):

- Household and commercial solid waste will be collected daily by Hamlet staff using a Ford F-450 equipped with a Haul-All compactor, and hauled to the Solid Waste Disposal Facility
- Solid waste shall be discharged to the approved Solid Waste Disposal Facility
- Hazardous waste observed by the collection staff shall be segregated in the Hazardous Waste Segregation Facility for later disposal in an approved facility
- Daily waste volumes deposited to the Solid Waste Disposal Facility (and trip counts) shall be recorded on the Waste Placement Form provided in Appendix D
- In the event of an accident, a spill of solid waste or petroleum products or a fire during solid waste collection operations, the *Hamlet of Qikiqtarjuaq Environmental Emergency Response Plan* (Appendix E) shall be implemented.

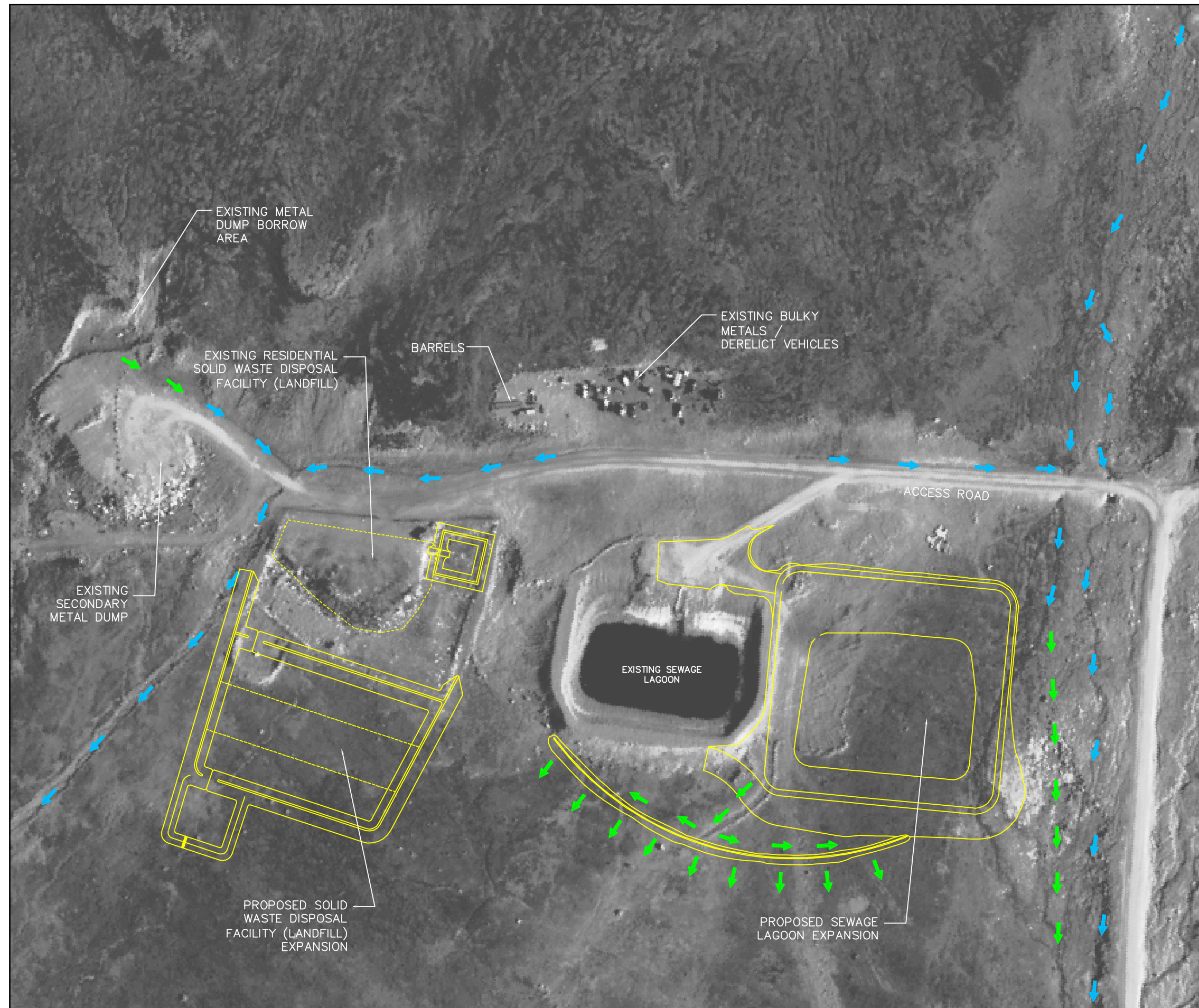


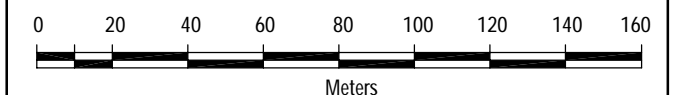
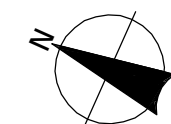
FIGURE 3
THE HAMLET OF QIKIQTARJUAQ
SOLID WASTE
DISPOSAL FACILITY
O&M PLAN

SOLID WASTE DISPOSAL
FACILITY (LANDFILL)

Legend

→ → INTERPRETED SURFACE WATER FLOW DIRECTION

Satellite Imagery Source:
 September 2004 Satellite Image obtained from DigitalGlobe Inc.



1:2,000
 January 2006
 Project Number: N-0 09439.0

Projection: UTM Zone 20
 Datum: NAD83

Prepared by: C. Sheppard

Verified by: M. Paznar

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3.2 Landfill Operation

Waste Receiving

The collection vehicles will progress to the tipping area. If possible, wastes should not to be tipped directly onto burning or smoldering waste. Wastes may be tipped or unloaded into the day's burn area as determined by staff (if unlit) or adjacent to the burn area, if lit, smoldering or hot. The staff will perform a cursory inspection of the waste to ensure that it does not contain visible hazardous or bulky waste. If such waste is noted, it will be segregated in the appropriate locations of the approved Hazardous Waste Segregation Facility or the Bulky Waste Disposal Area.

The staff will record the number of trips to the Solid Waste Disposal Facility per day and estimate the approximate quantity in cubic metres on the Waste Placement Forms included as Appendix D. If waste is present on site that has been tipped by others, an estimate of the quantity shall be made and recorded. Records are to be delivered to the Hamlet office once per week, where they will be retained on file for inclusion in the Annual Report.

Burning

It has been indicated that the burning of waste is a necessity to prevent odour (since the ability to cover waste is limited due to the short operational season), eliminate flies, and to reduce potential problems with scavengers, such as bears and foxes. In order to minimize the potential for impacts from fires the following rules are to be followed:

- Establish the burn area before each burn and demarcate it with box horses or safety cones. Acceptable burn areas shall be located:
 - At least 15 m away from the hazardous waste segregation area
 - At least 10 m from the fence line, roads and areas that may be visited by the members of the community
 - Not on previously filled areas unless it can be determined that a suitable thickness of cover material is present
- Ensure that the weather is acceptable for burning. The following guidelines are recommended:
 - Wind levels should be checked. If loose paper or debris can be lifted and carried off site (moderate breezes or greater), burning shall be avoided
 - The wind direction should be checked, to ensure that smoke does not drift towards the Hamlet, or workers in the vicinity (i.e., the Sewage Treatment Lagoon)
 - If heavy rain is present, burning should be avoided (as it may result in poor combustion and greater potential to generate by-products).

The site operators shall stay upwind of the fire at all times.

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3.3 Landfill Construction and Development

3.3.1 Regular Operation

Prior to waste handling, the equipment operator will confirm that the waste is no longer hot or burning. As required, using a dozer or a loader, the general municipal wastes will be pushed down the landfill slope towards the working face of the landfill, observing the following operating principles:

- All waste shall be removed from the tipping and burn areas
- The waste shall be pushed as close to the intermediate berm or working face as possible, preferably against the intermediate berm or working face. Once the waste is pushed up the intermediate berm, the waste shall become the new working face until a new lift is advanced vertically.

Figures 4 to 10 illustrates the progress for landfill development.

3.3.2 Annual Shaping

Fine shaping of the landfill area will occur once per year, as early in the summer as feasible. During the annual shaping, the surface of the landfill slope will be graded using a dozer and loader so that it has an even grade and the waste will be pushed towards the berm or working face so that the footprint is minimized. The following operating principles should be observed during the annual shaping:

- The waste shall be pushed and packed against the berm and working face
- The waste shall not be pushed any higher than the height of the berm
- The dozer or loader shall make repeated passes down the slope until the landfill slope (i.e., the east slope) is 3:1 or shallower, but not shallower than 10:1 (5%)
- The surface drainage shall remain generally towards the northeast.

Once the final grades of the waste are established, interim cover will be placed over the waste. This will entail importing sand, gravel and cobbles from any convenient borrow location and placing over the waste to a thickness of 0.2 m. A grader may be used to attain a smoother interim surface.

An invert (opening) is present to ensure that water does not accumulate within the landfill base. As necessary due to filling, this invert may need to be re-cut.

If the operator is having trouble with development the landfill slopes at a 3:1, they may elect to develop an interim berm on top of the lift to assist in vertical development (refer to Figures 4 through 11). In areas where the intermediate berm is located on top of an existing lift of waste, the new berm shall be offset from the outside edge of the lower lift

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by at least 1 m. However, it would be preferable if vertical lifts were avoided, in that they will consume landfill space.

When the waste is at the top of the berm and the landfill slope is 3:1 or shallower, then a new intermediate berm will be constructed approximately 30 m from the toe of the previous intermediate berm. This new berm will form the working face for the next phase of waste placement. As before, the intermediate berm will be constructed using sand, gravel and cobble material from any convenient borrow source. The top of the intermediate berm will be 1 m wide, and the inside slope (landfill side) will be at 2:1, while the outside slope is at a 3:1.

The final configuration of the landfill is shown on Figure 11.

If during the operation, there is a complaint (i.e., odours, smoke in the community), actions will be taken to assess and mitigate the problem. As every situation may be unique, it is important to consider the complaint and address it to the extent possible. Some examples include:

- In the case of odours, cover may need to be applied
- If smoke is drifting towards the community or people in the area, the fire should be extinguished (if possible) and relit when the wind conditions are more favourable
- If leachate is running off the site, it must be contained within the Water Retention Area.

All complaints should be logged and included in the annual report.

3.4 Bulky Metals Disposal Area Construction and Development

Periodically usually metals shall be relocated from the 'scrap yard' and tipped into the Bulky Metals Disposal Area. All bulky metals should be inspected to ensure that they contain no liquids (i.e., gasoline, radiator fluid) or hazardous substances (i.e., batteries). These shall be removed and relocated to the hazardous waste storage area. It is generally recommended that the materials be placed at the bottom of the cell using the access road, instead of tipped over the edge to minimize the potential for damage. As the material accumulates, tipping may be necessary. In this case staff must ensure that all personnel are out of the way, access to any roads along the bottom of the cells should be blocked and the materials shall be carefully pushed over the tip. Wastes should never be tipped directly over the edge, as serious injury may result if vehicles slip over the edge of the slope.

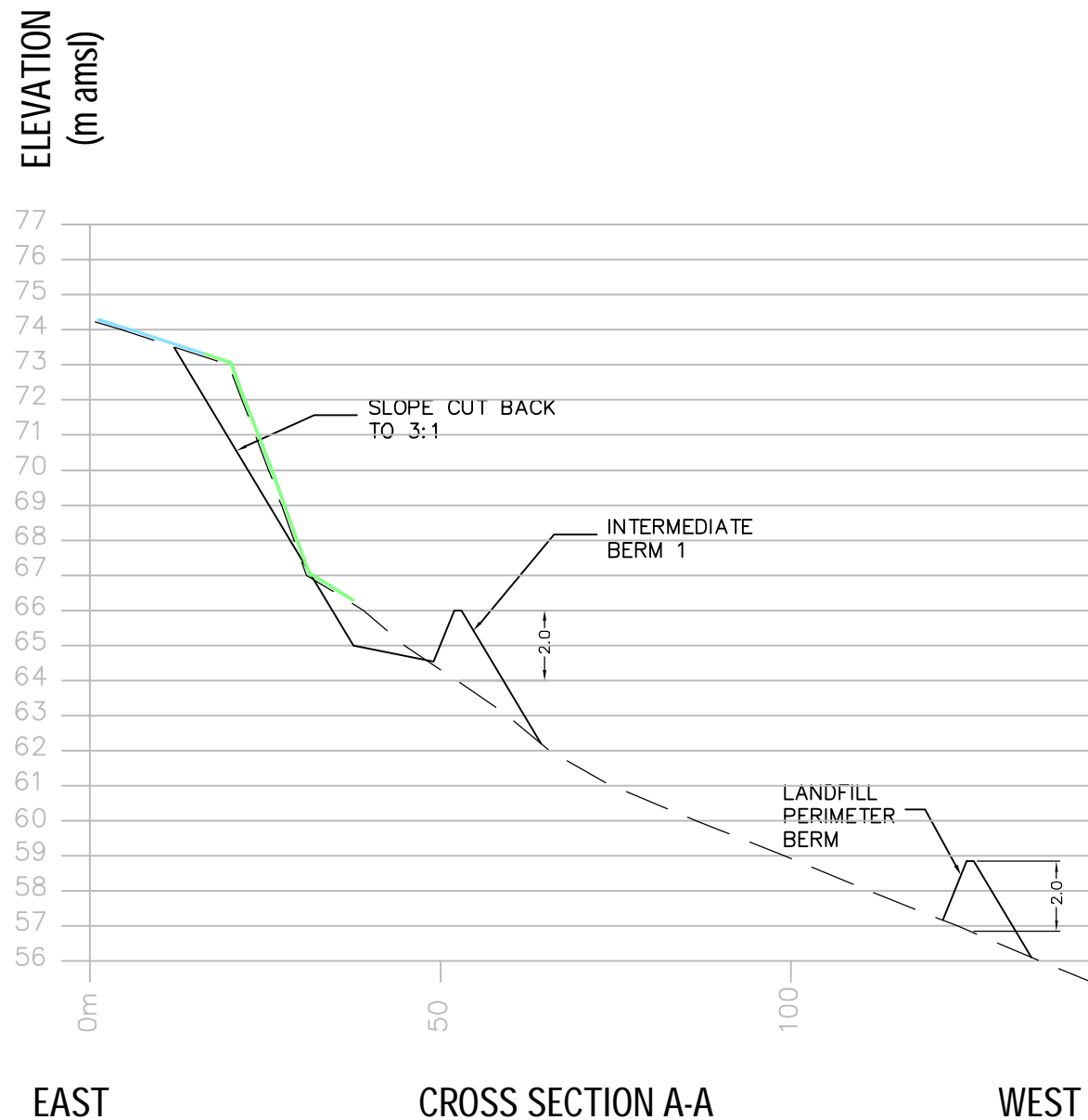
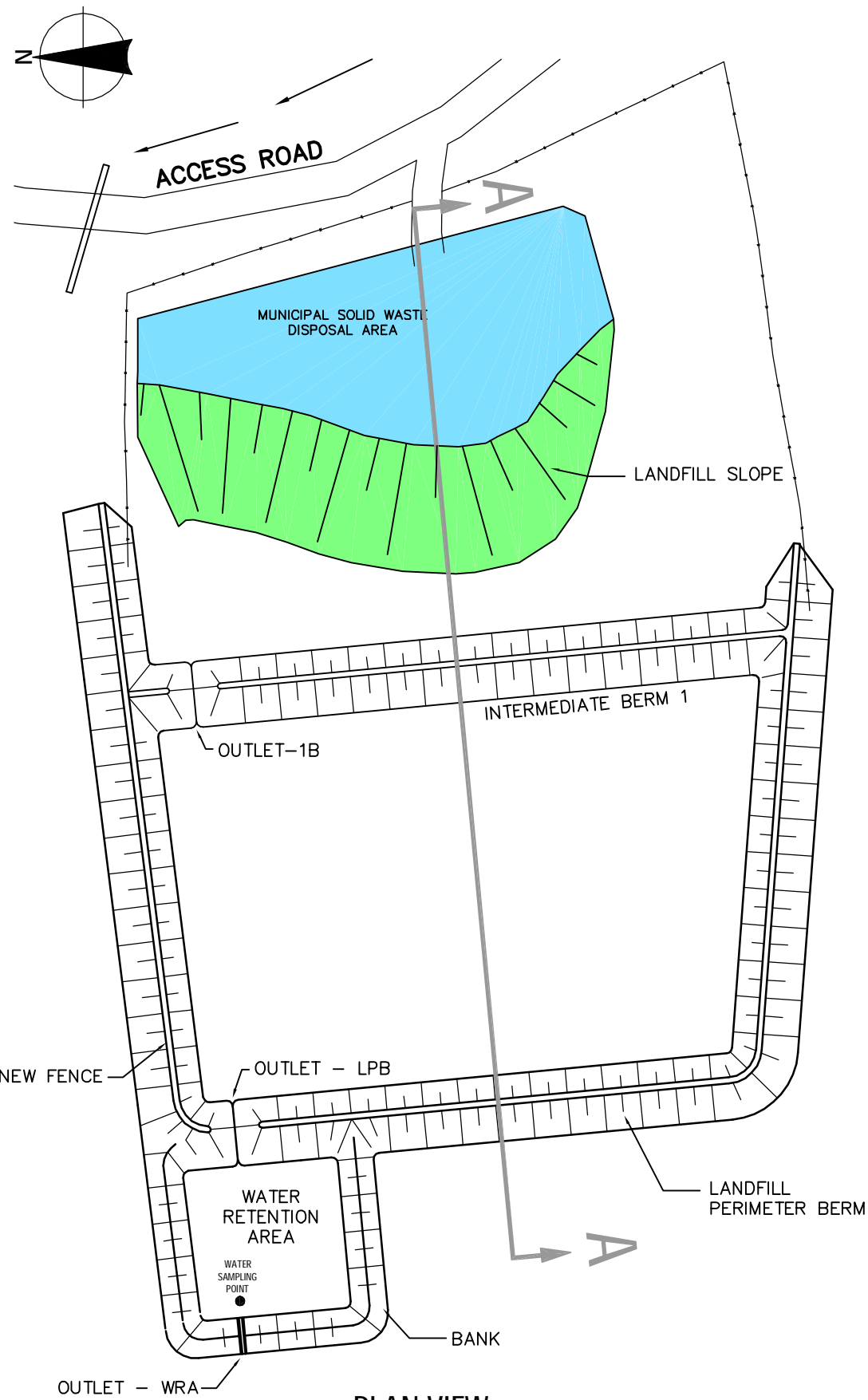
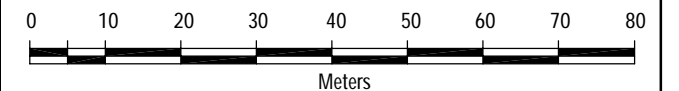


FIGURE 4
THE HAMLET OF QIKIQTARJUAQ
SOLID WASTE
DISPOSAL FACILITY
O&M PLAN
LANDFILL DEVELOPMENT 1
INITIAL SITE REDEVELOPMENT

Legend

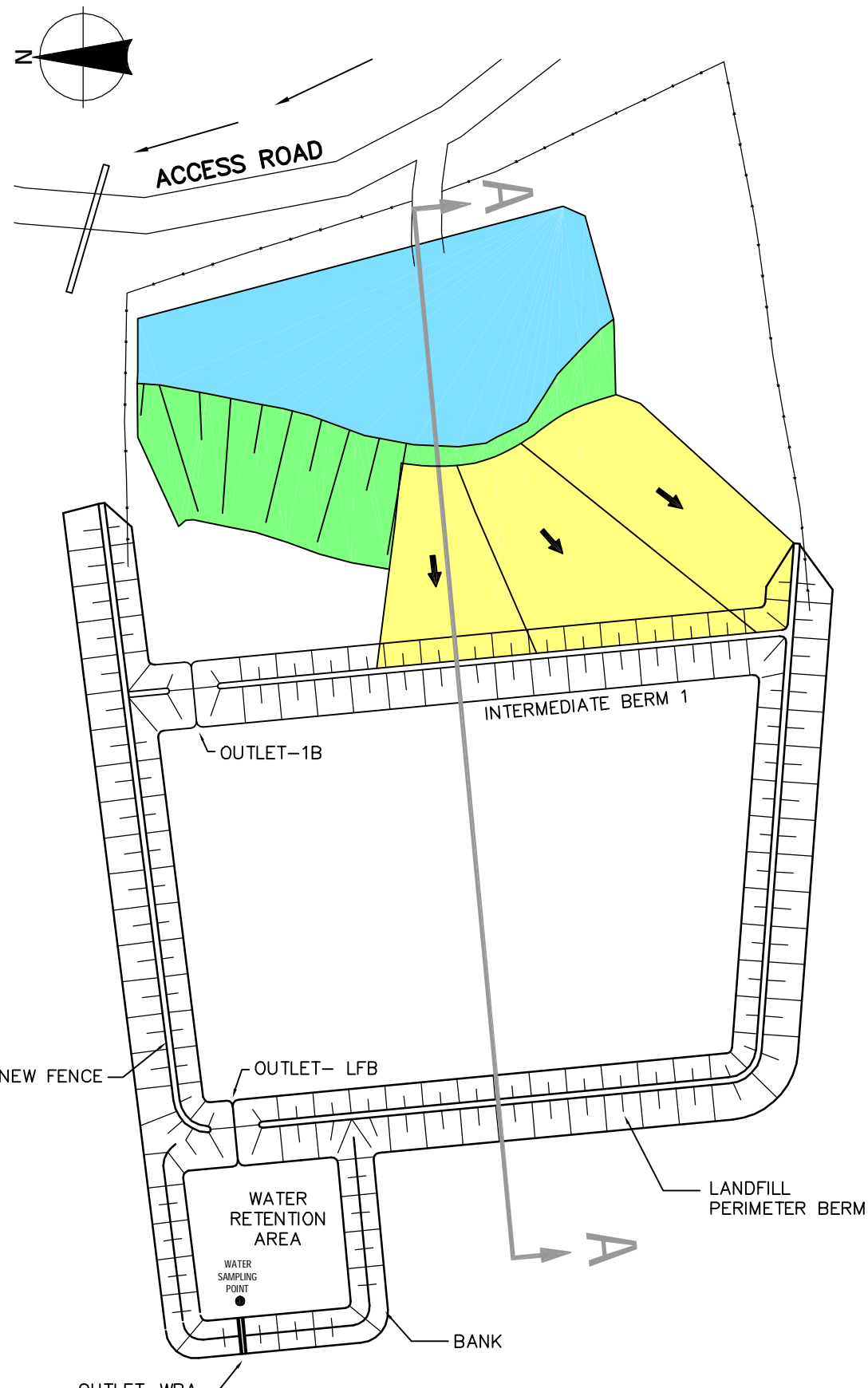
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- LANDFILL SIDE SLOPE



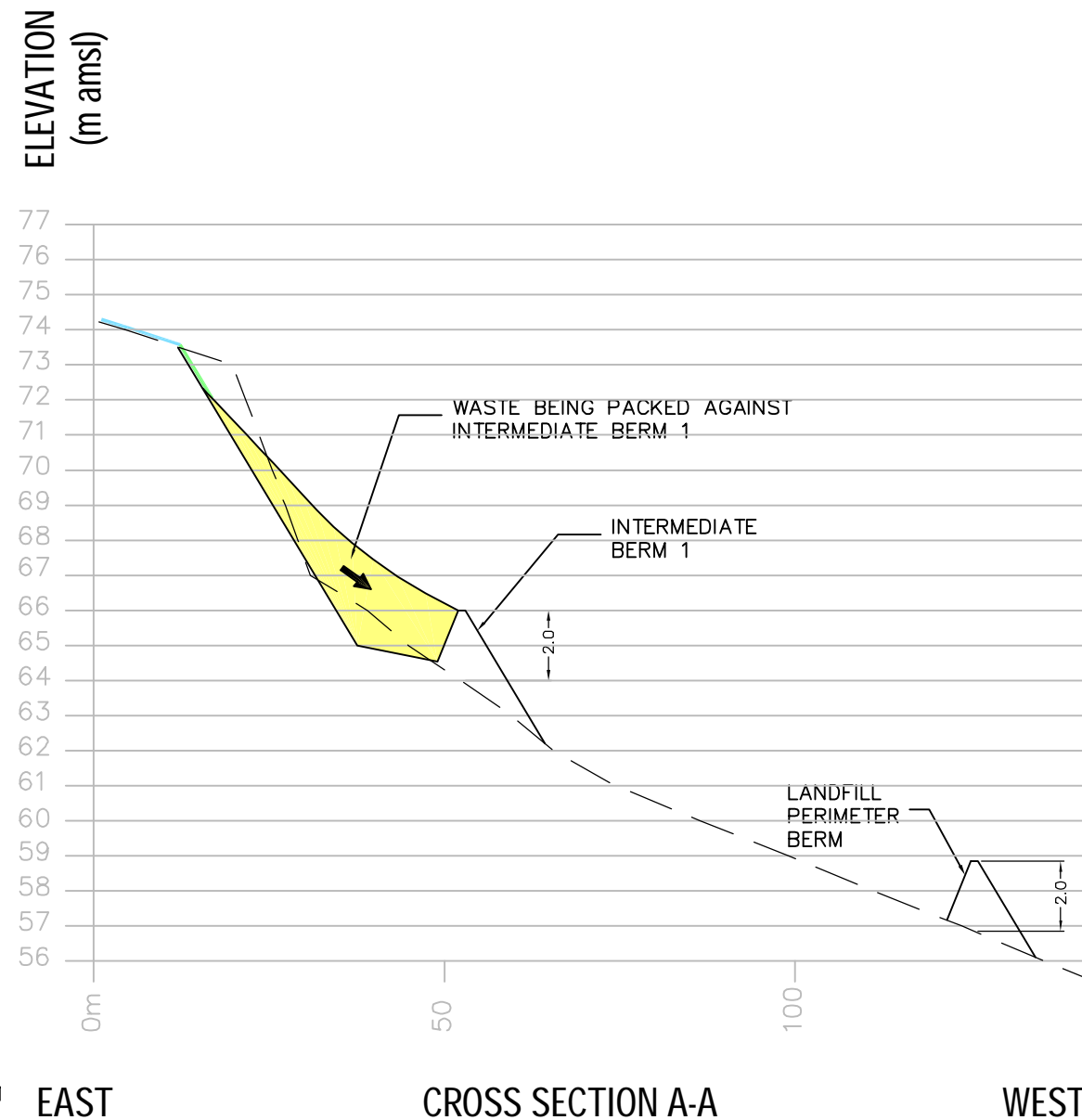
February 2006
Project Number: F0E 08 983

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Verified by: K. Hunter



PLAN VIEW
SCALE 1:1000



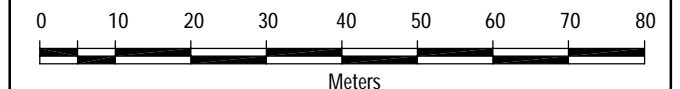
CROSS SECTION A-A
HORIZONTAL SCALE 1:1000
VERTICAL SCALE 1:200

FIGURE 5
THE HAMLET OF QIKIQTARJUAQ
SOLID WASTE
DISPOSAL FACILITY
O&M PLAN

LANDFILL DEVELOPMENT 2
FILL TO INTERMEDIATE BERM 1

Legend

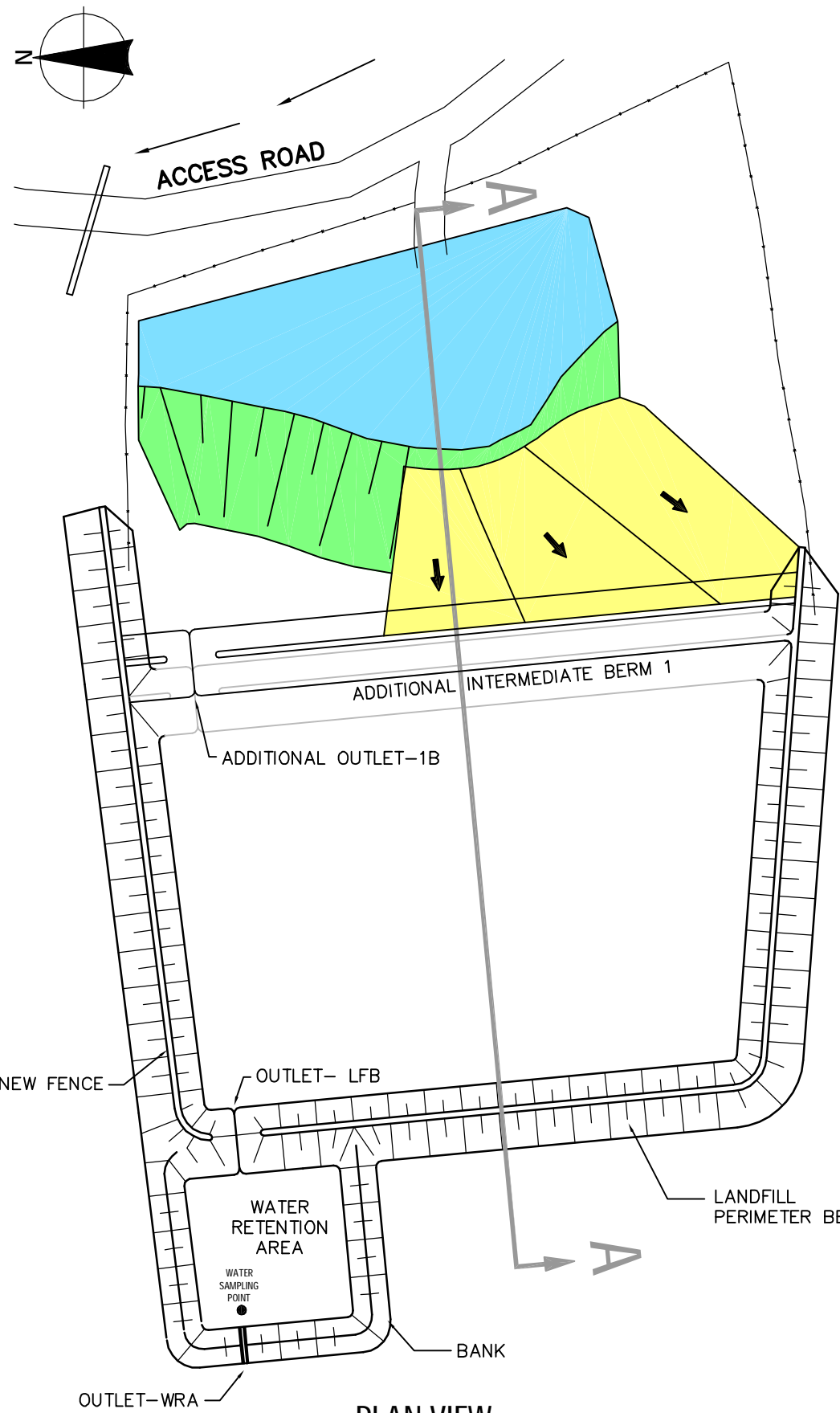
- LANDFILL TIPPING AREA
- LANDFILL SIDE SLOPE
- WASTE CELLS No. 1



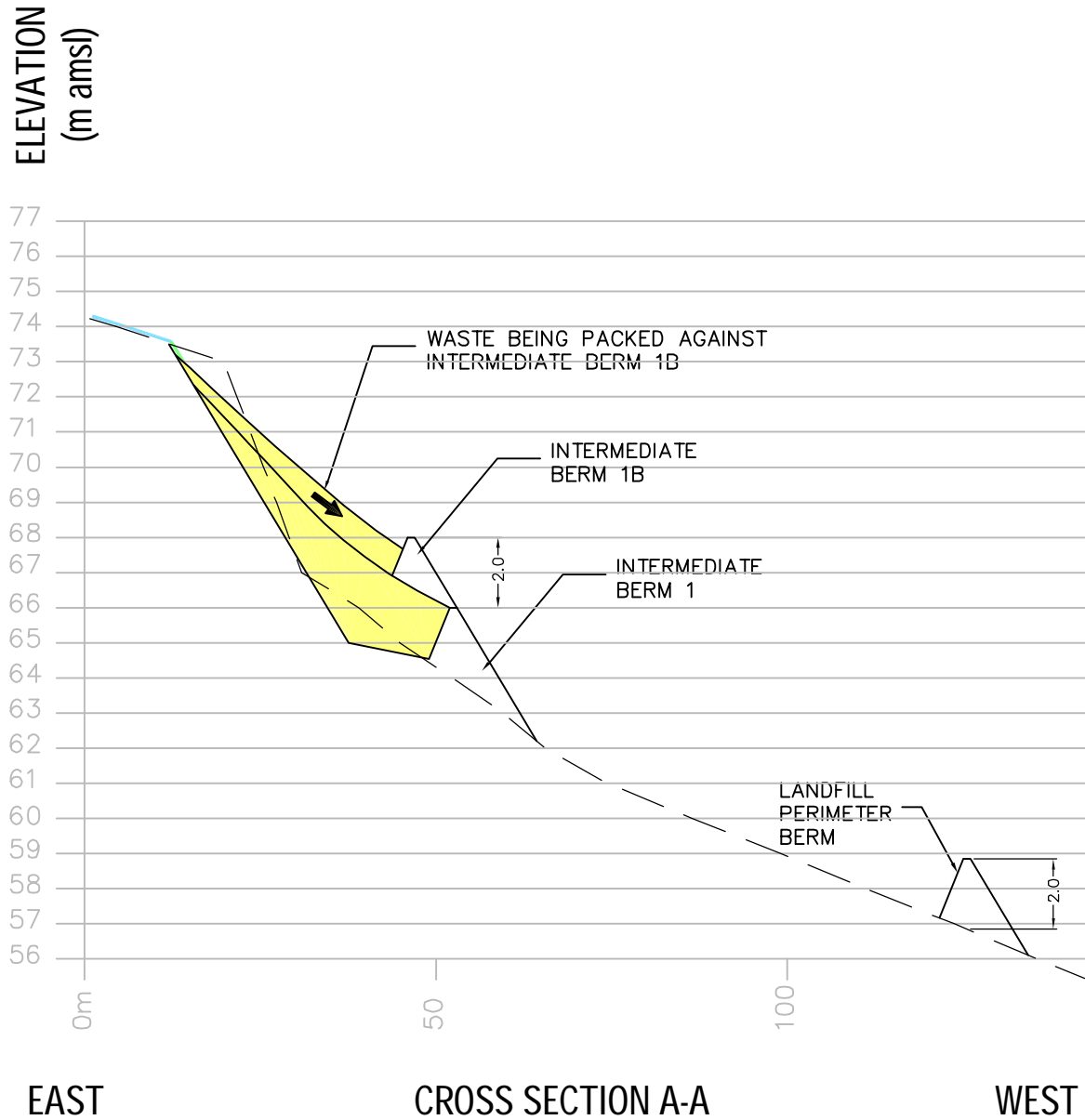
February 2006
Project Number: F0E 08 983

Prepared by: C. Sheppard

Verified by: K. Hunter



PLAN VIEW
SCALE 1:1000



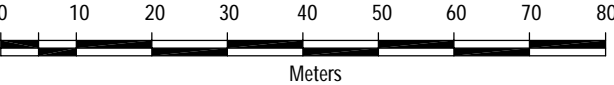
CROSS SECTION A-A
HORIZONTAL SCALE 1:1000
VERTICAL SCALE 1:200

NOTE
SITE OPERATORS MAY ELECT TO INSTALL AN ADDITIONAL VERTICAL BERM IF CONSTRUCTION WASTES WITH 3:1 SLOPE IS PROBLEMATIC

FIGURE 6
THE HAMLET OF QIKIQTARJUAQ
SOLID WASTE
DISPOSAL FACILITY
O&M PLAN

LANDFILL DEVELOPMENT 2B
OPTIONAL CONSTRUCTION OF
ADDITIONAL BERM

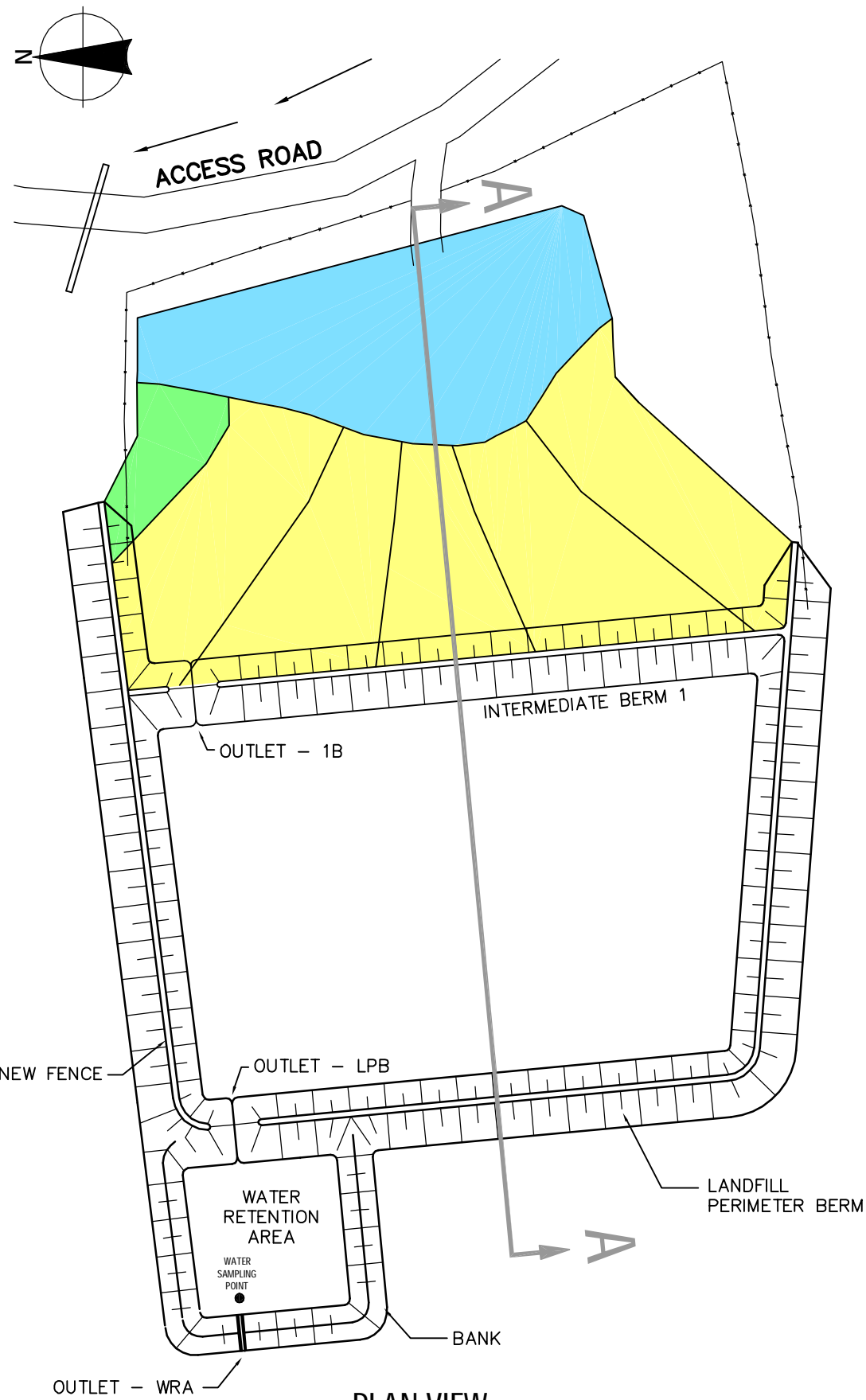
- Legend**
- LANDFILL TIPPING AREA
 - LANDFILL SIDE SLOPE
 - WASTE CELLS No. 1



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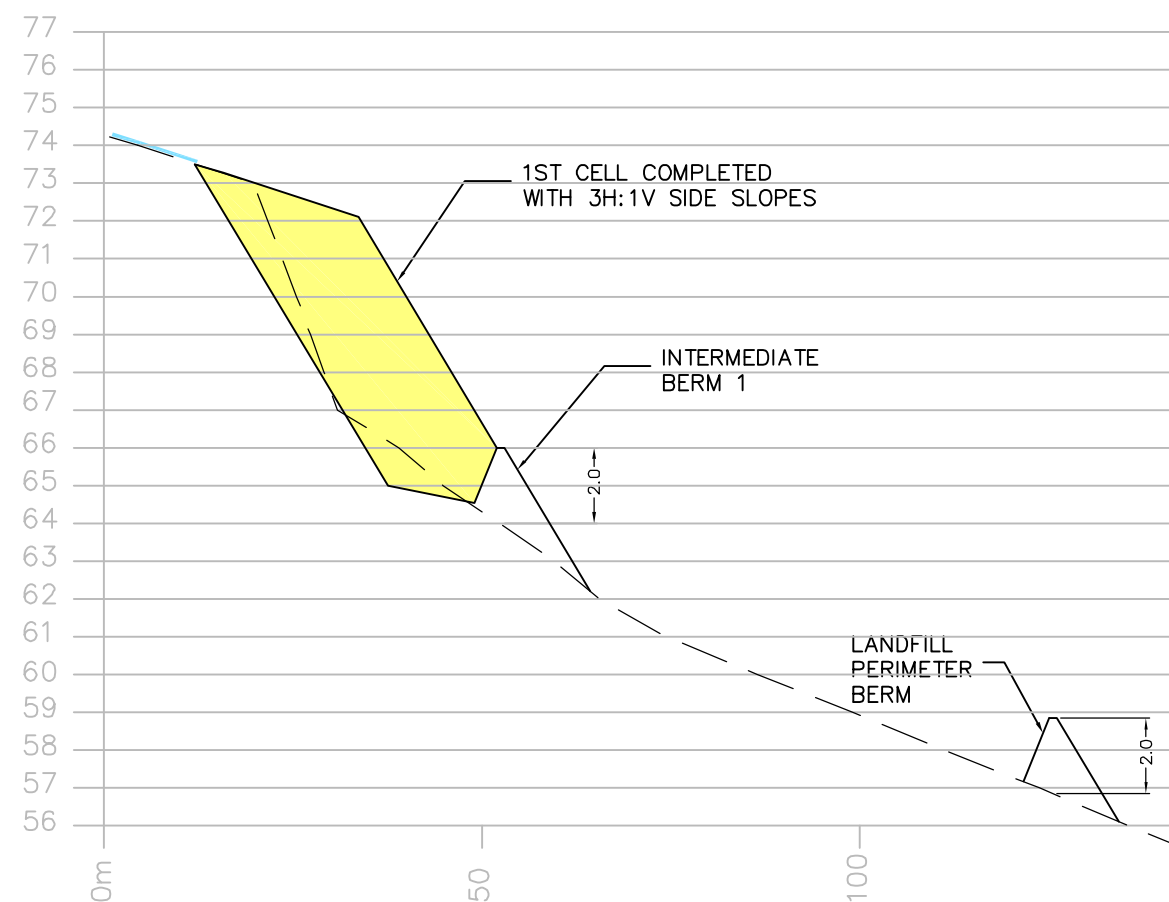




PLAN VIEW

SCALE 1:1000

ELEVATION
(m amsl)

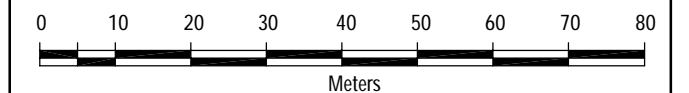


CROSS SECTION A-A

HORIZONTAL SCALE 1:1000
VERTICAL SCALE 1:200

Legend

- LANDFILL TIPPING AREA
- LANDFILL SIDE SLOPE
- WASTE CELLS No. 1



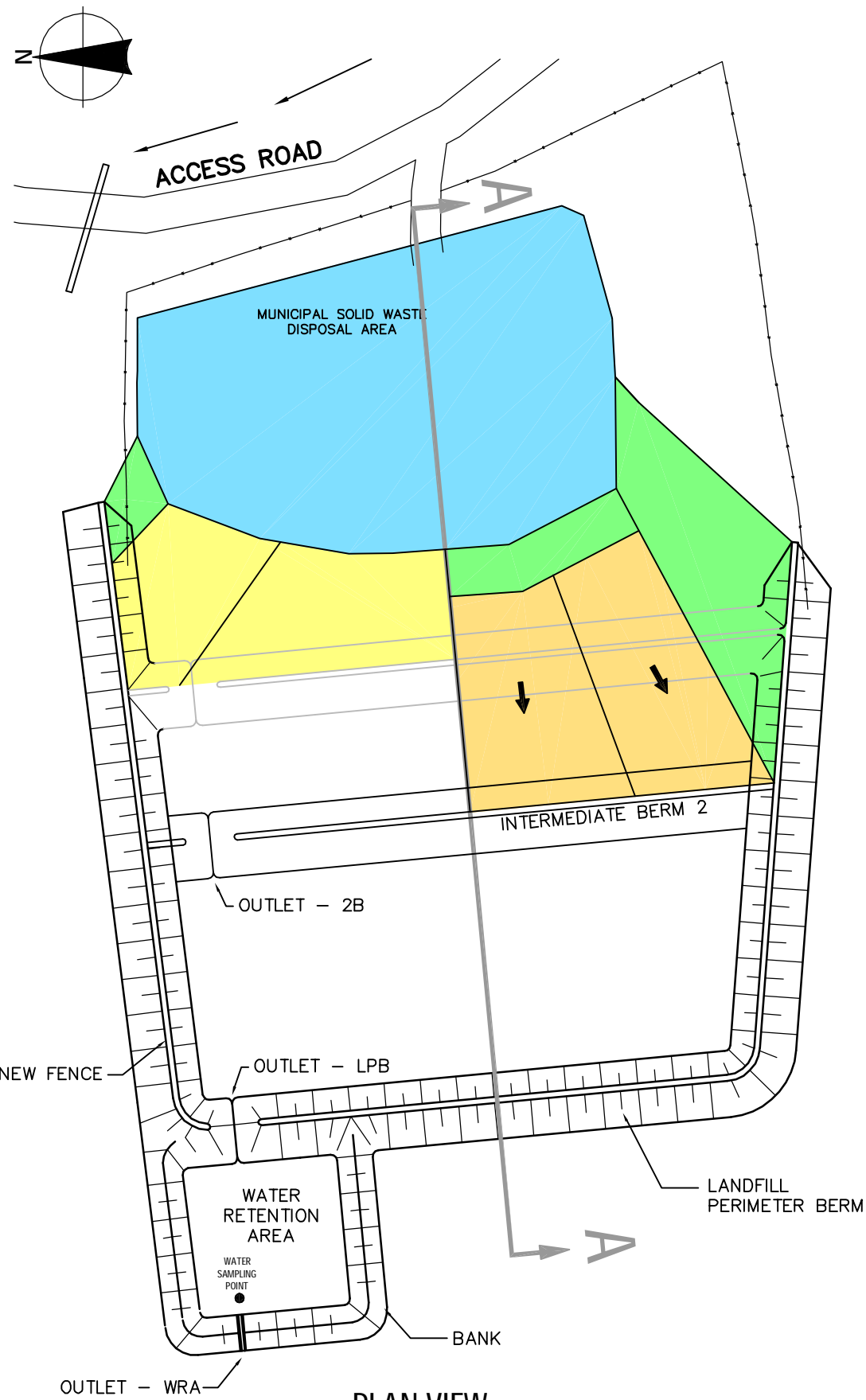
February 2006
Project Number: F0E 08 983

Prepared by: C. Sheppard

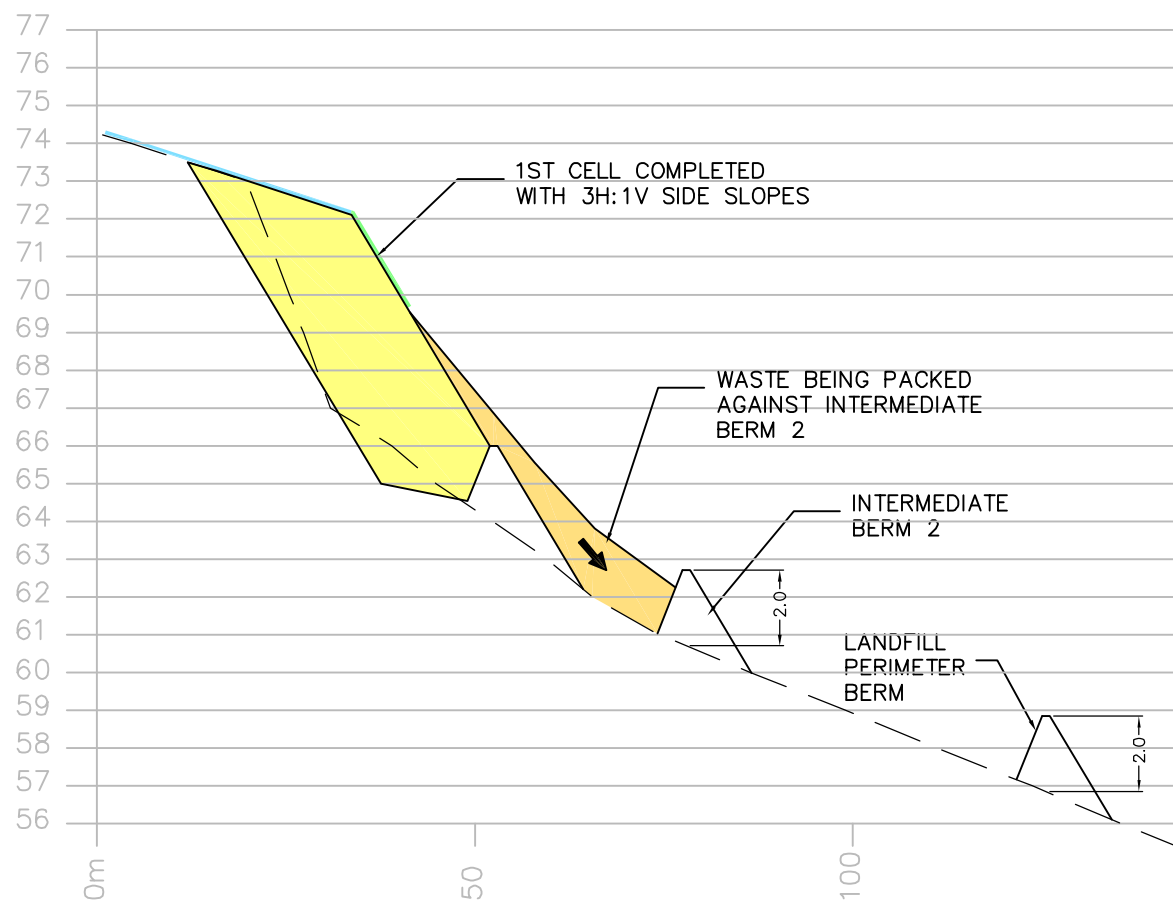
Verified by: K. Hunter

ᑎᓄᓐᓐ BURNSIDE

FIGURE 7
THE HAMLET OF QIKIQTARJUAQ
SOLID WASTE
DISPOSAL FACILITY
O&M PLAN
LANDFILL DEVELOPMENT 3
1ST WASTE CELL COMPLETED



ELEVATION
(m amsl)



EAST

WEST

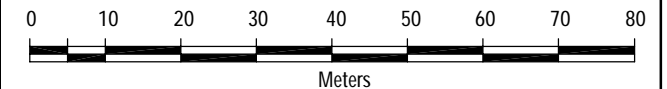
FIGURE 8

THE HAMLET OF QIKIQTARJUAQ SOLID WASTE DISPOSAL FACILITY O&M PLAN

LANDFILL DEVELOPMENT 4 BEGIN FILLING TO INTERMEDIATE BERM 2

Legend

- LANDFILL TIPPING AREA
- LANDFILL SIDE SLOPE
- WASTE CELLS No. 1
- WASTE CELLS No. 2

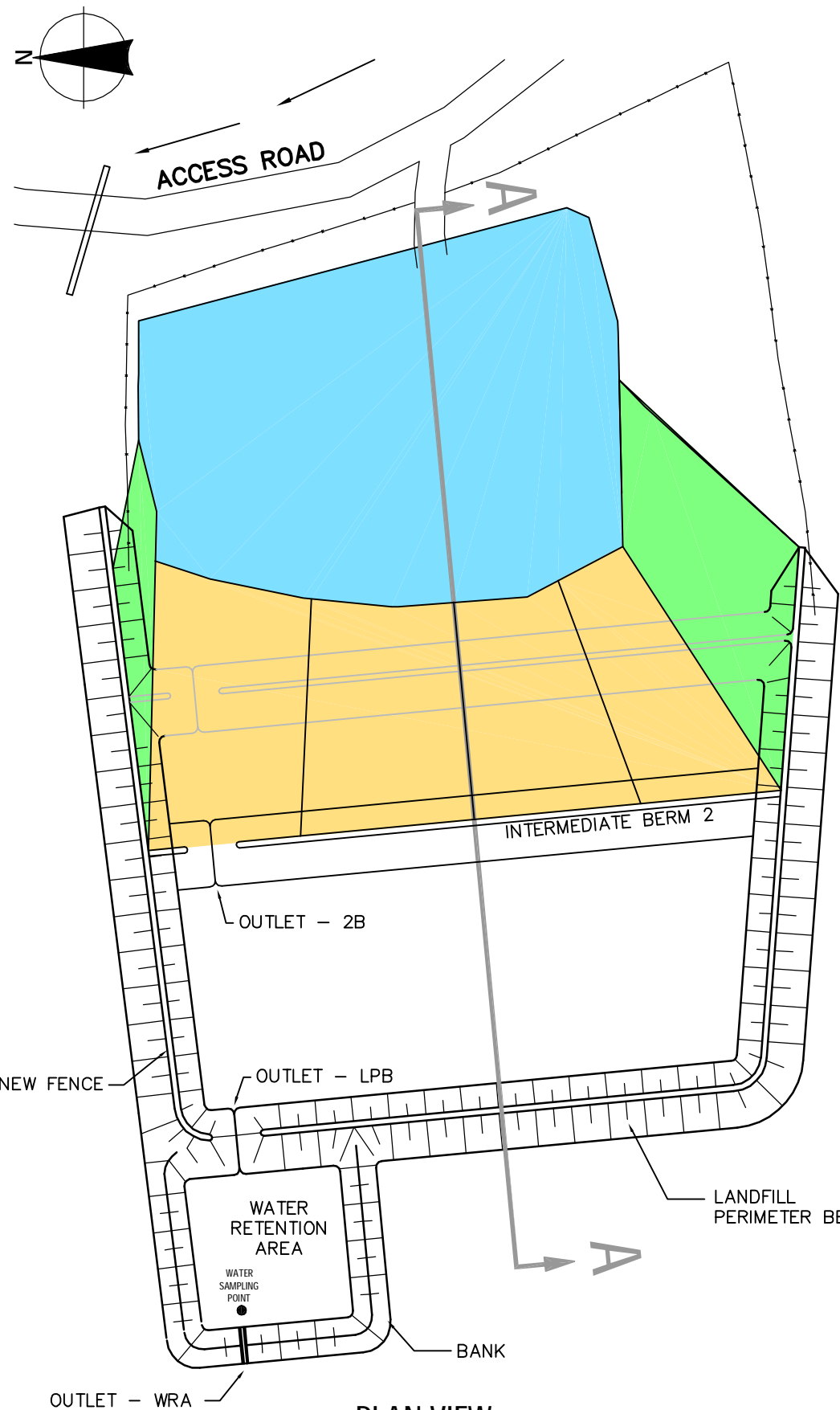


February 2006
Project Number: F0E 08 983

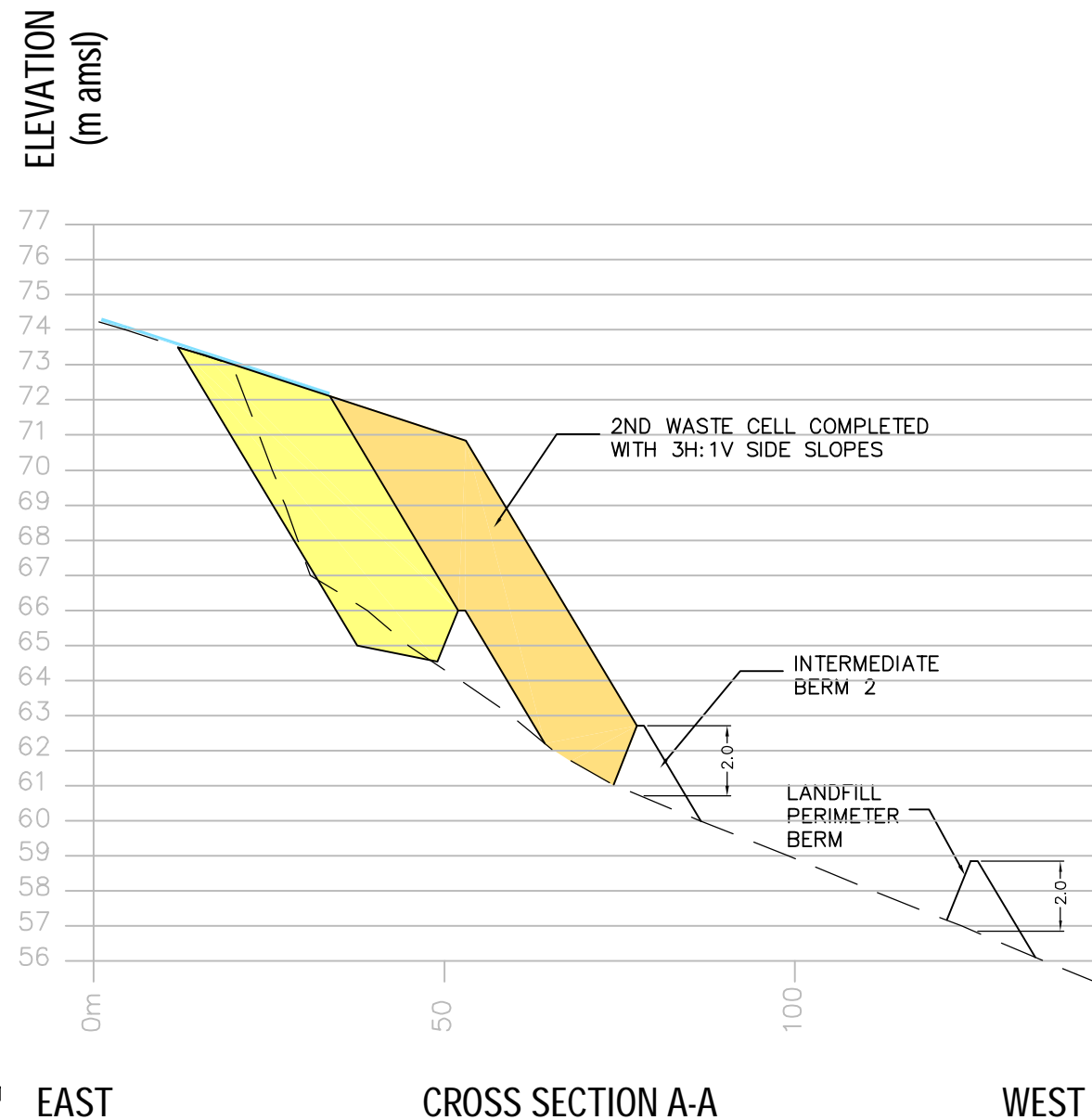
Prepared by: C. Sheppard

Verified by: K. Hunter

ᑎᓄᓐᓐ **BURNSIDE**



PLAN VIEW
SCALE 1:1000



CROSS SECTION A-A
HORIZONTAL SCALE 1:1000
VERTICAL SCALE 1:200

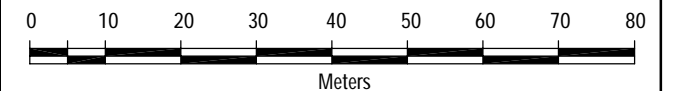
FIGURE 9

THE HAMLET OF QIKIQTARJUAQ
*SOLID WASTE
DISPOSAL FACILITY
O&M PLAN*

LANDFILL DEVELOPMENT 5
2ND WASTE CELL COMPLETED

Legend

- LANDFILL TIPPING AREA
- LANDFILL SIDE SLOPE
- WASTE CELLS No. 1
- WASTE CELLS No. 2

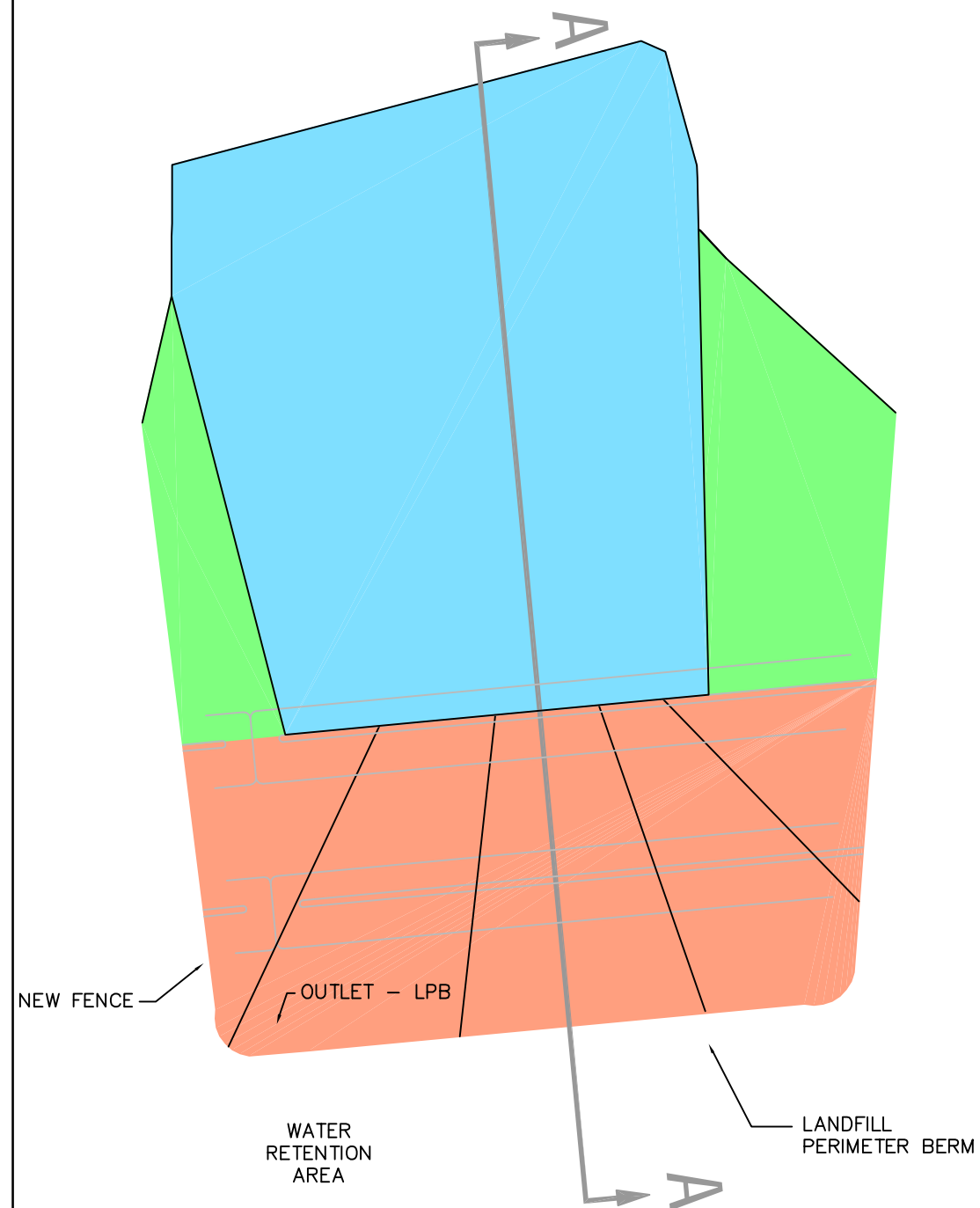
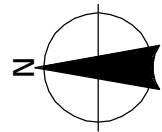


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Project Number: F0E 08 983

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ELEVATION
(m amsl)

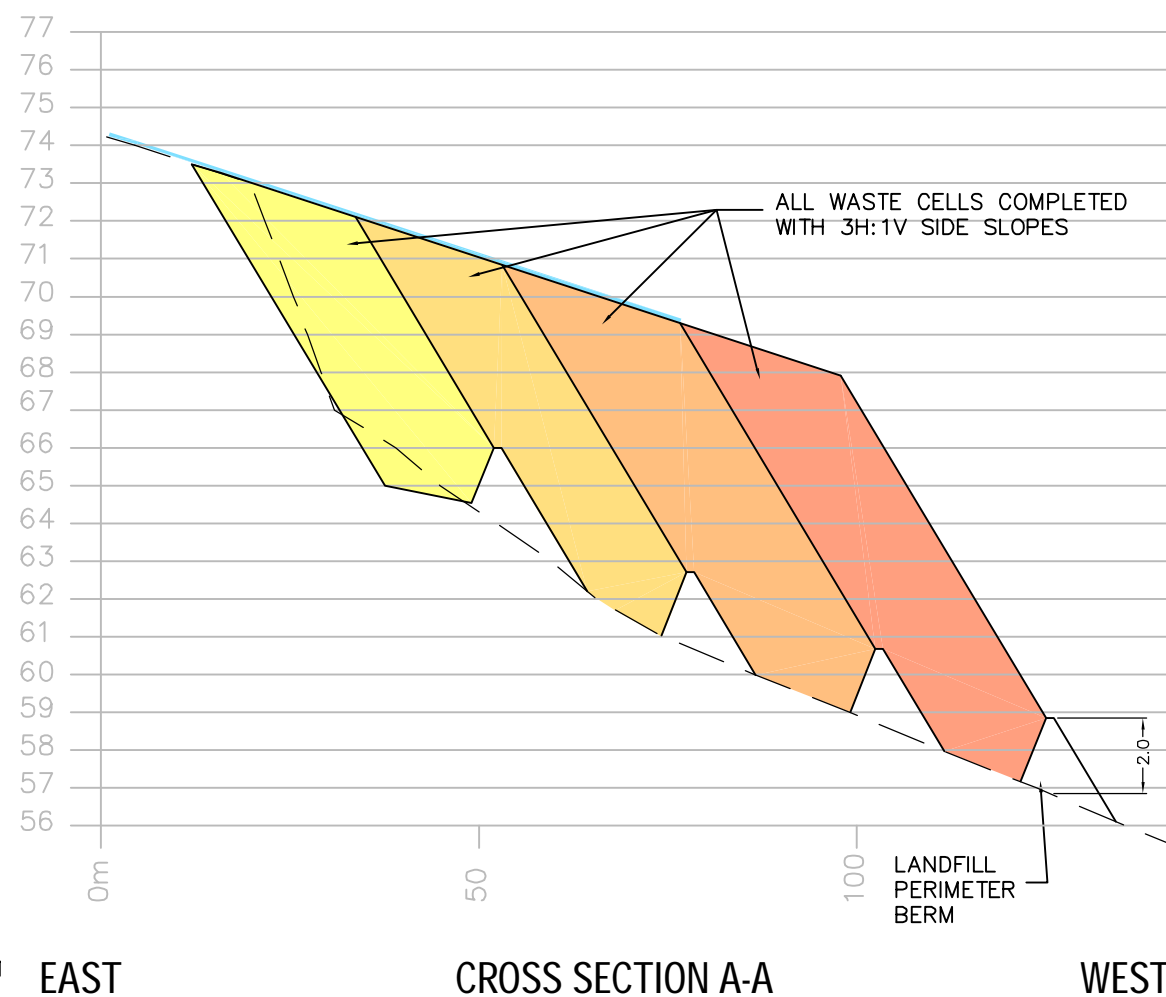


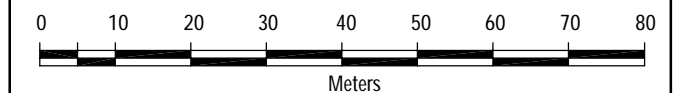
FIGURE 10

THE HAMLET OF QIKIQTARJUAQ SOLID WASTE DISPOSAL FACILITY O&M PLAN

LANDFILL DEVELOPMENT 6 ALL WASTE CELLS COMPLETED

Legend

- LANDFILL TIPPING AREA
- LANDFILL SIDE SLOPE
- WASTE CELLS No. 1
- WASTE CELLS No. 2
- WASTE CELLS No. 3
- WASTE CELLS No. 4

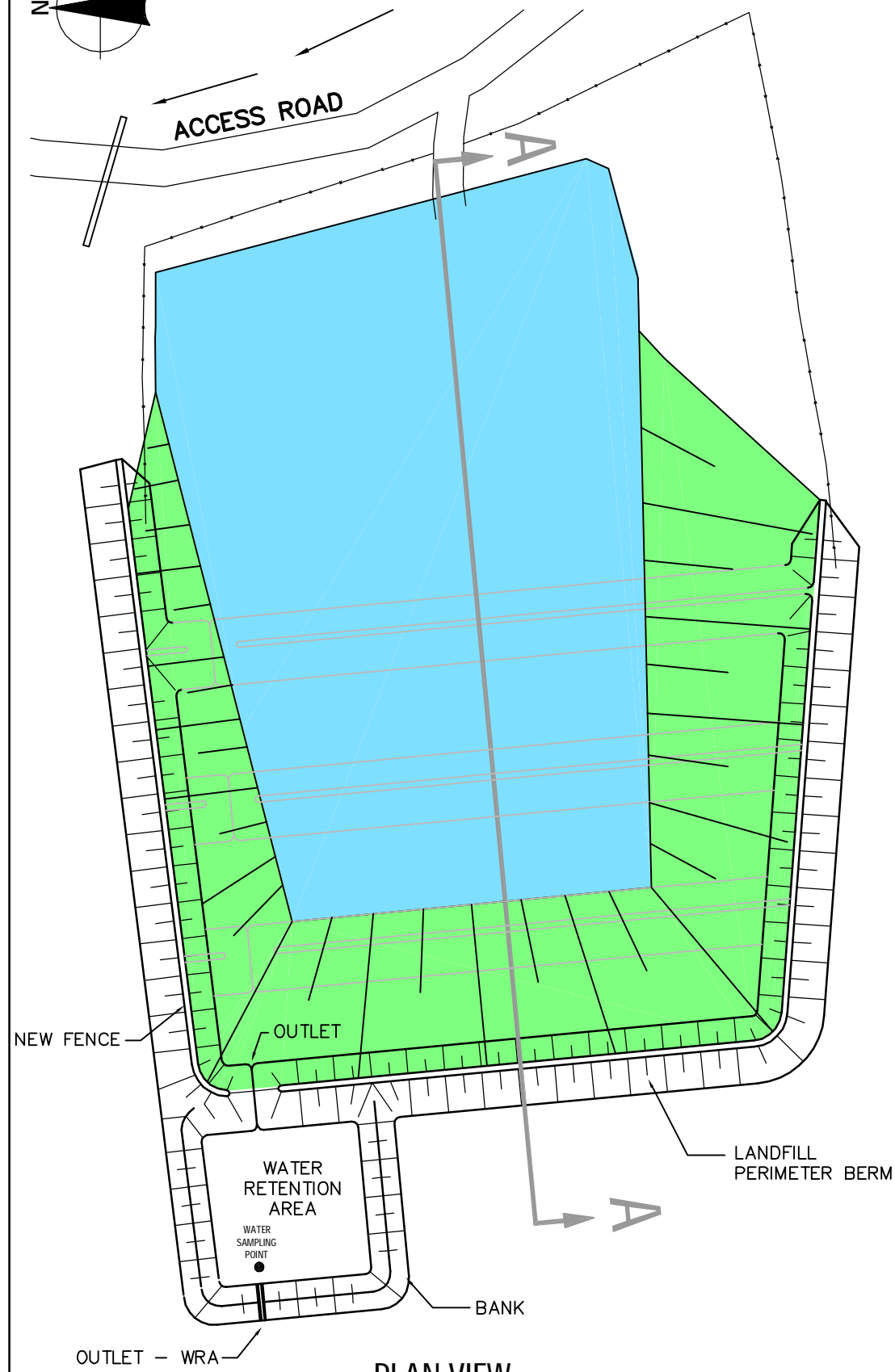
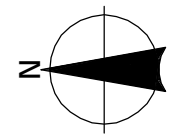


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Verified by: K. Hunter

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ELEVATION
(m amsl)

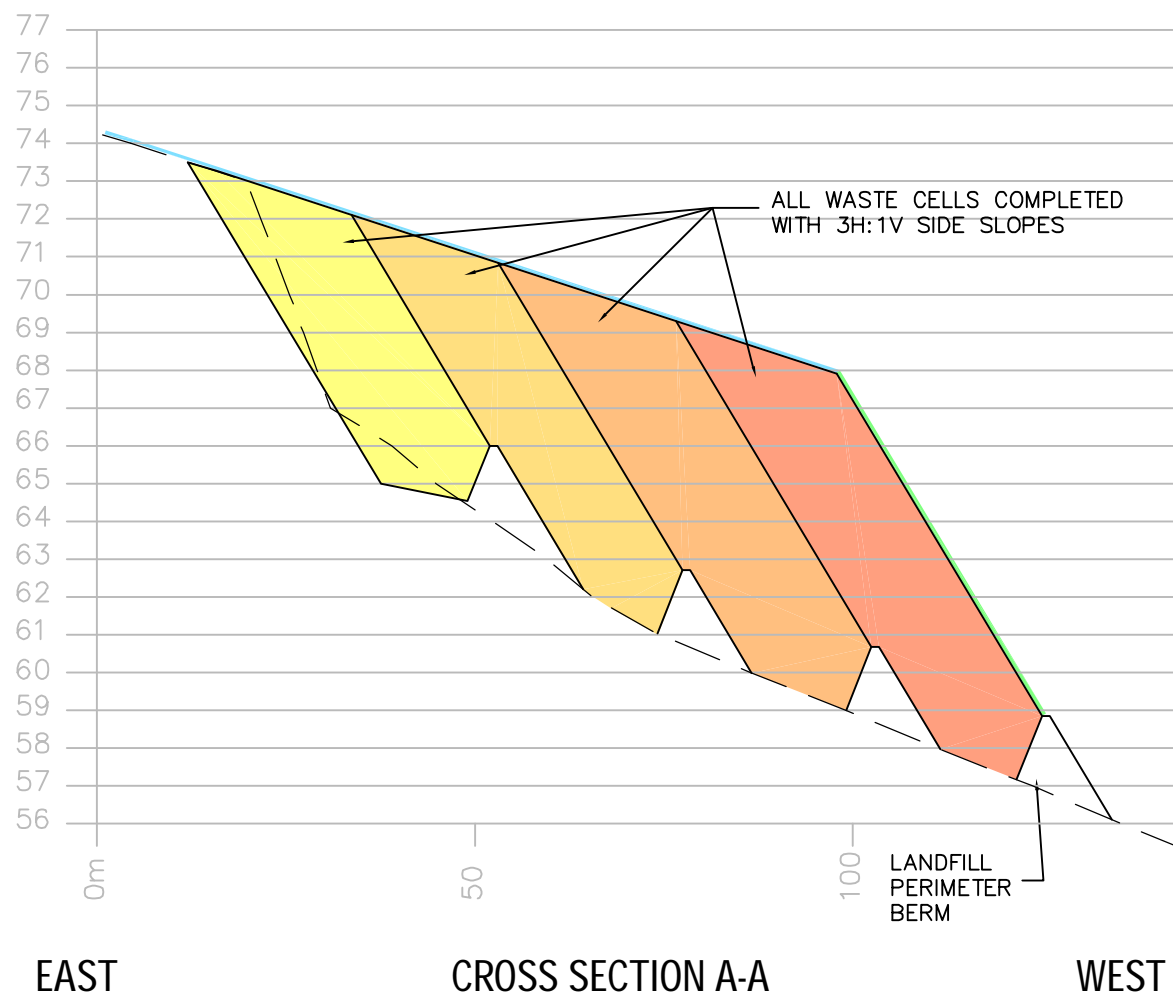


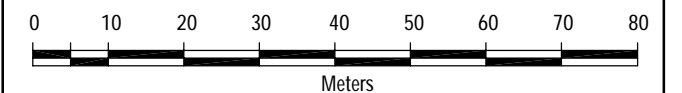
FIGURE 11

THE HAMLET OF QIKIQTARJUAQ
*SOLID WASTE
DISPOSAL FACILITY
O&M PLAN*

LANDFILL DEVELOPMENT 7
FINAL SITE CONFIGURATION

Legend

- LANDFILL TIPPING AREA
- LANDFILL SIDE SLOPE
- WASTE CELLS No. 1
- WASTE CELLS No. 2
- WASTE CELLS No. 3
- WASTE CELLS No. 4



February 2006
Project Number: F0E 08 983

Prepared by: C. Sheppard

Verified by: K. Hunter

Burnside

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When warranted, cover shall be placed over the bulky metals. Cover material, comprising sand, gravel, cobbles and any locally available material shall be end dumped near the tip and then pushed over the accumulated wastes. Vehicles should refrain from driving on the surface until the slopes are less than 3:1, at which time the surface can be graded until stable.

3.5 Periodic and Seasonal Maintenance Procedures

The staff shall undertake weekly inspections and repair any items that are noted. A weekly inspection form is included in Appendix D. This will include the following activities:

- The roadway and truck pad shall be maintained by snow clearing in the winter and grading in the summer, and repaired as necessary
- Ditches and drainage channels shall be inspected for erosion, and repaired as necessary
- Site warning signage, which identifies the boundaries of the Solid Waste Disposal Facility (which includes the Municipal Solid Waste Disposal Area, Hazardous Waste Segregation Area and the Bulky Metals Disposal Area) shall be inspected, and repaired or replaced as necessary
- Any airborne litter outside of the litter-control fences (which are located on top of the berms at the Facility) shall be removed, and deposited to the Municipal Solid Waste Disposal Area, or as required
- Litter that has accumulated against the fences shall be removed and placed into the Municipal Solid Waste Disposal Area
- After rain events and following the spring thaw, inspect that site for leachate breakout. Cover the face if possible and ensure that leachate is being contained within the water retention area
- The berms and final cover at the Solid Waste Disposal Facility shall be inspected for erosion and settlement
- The fences at the Solid Waste Disposal Facility shall be inspected for damage, and repaired as necessary.

All details of any repairs shall be reported in the Annual Report.

3.6 Facility Monitoring Procedures

As outlined in the NWB water license, regular monitoring of runoff from the Solid Waste Disposal Facility is required. The Monitoring Program is to include effluent samples collected from the water collection pond during the months on June to September, inclusive. It is recognized that historically the water collection pond has not retained

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water for long periods. Typically the pond is dry after spring run-off. Effluent samples collected shall be analyzed for the following parameters:

BOD	Faecal Coliforms
pH	Conductivity
Total Suspended Solids	Ammonia Nitrogen
Nitrate-Nitrite	Oil and Grease
Total Phenols	Total Alkalinity
Total Hardness	Calcium
Magnesium	Potassium
Sodium	Sulphate
Total Arsenic	Total Cadmium
Total Copper	Total Chromium
Total Iron	Total Lead
Total Mercury	Total Nickel

In addition, any additional analytical parameters which are identified in the NWB water license, or by an Inspector (as defined in the *Nunavut Waters and Nunavut Surface Rights Tribunal Act*) shall be included.

It is recognized that it may take some time for results to be received from the appropriate laboratory. In the event that the water retention area fills to the invert with water, it should be inspected for odours, stain, or signs of visible impact (sheens, floating garbage). The invert may be blocked to facilitate additional water accumulation in this case, until the results are received.

Water sampling completed by the Hamlet of Qikiqtarjuaq shall be in accordance with the *Hamlet of Qikiqtarjuaq Monitoring Program Quality Assurance/Quality Control (QA/QC) Plan* which is attached to this Plan (Appendix F).

Results of analytical testing and monitoring are to be recorded on a regular basis by the staff. Copies of the analytical certificates and Chain of Custody forms are to be kept for future reference to determine the effectiveness of the treatment facility.

Monthly and annual quantities of solid waste offloaded will be estimated and recorded on the Waste Placement Form (Appendix D)

3.7 Emergency Procedures

The *Guidelines for the Preparation of an Operation and Maintenance Manual for Sewage and Solid Waste Disposal Facilities in the Northwest Territories* requires that the

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Operation and Maintenance Report include procedures to respond to emergencies. The following emergency procedures are considered:

Worker injury

In the event of a worker injury:

- Apply first aid
- Seek medical assistance, if necessary
- Report the injury to the employer
- Fill out all necessary forms regarding the necessary.

Spills

In the event of a liquid spill, prevent the flow of wastes to water courses with earthen dykes or other methods. If the spill can be collected (i.e., if pooled) scoop up and store in drums in the hazardous waste disposal area. If the spill has soaked into the ground, attempt to remove stained or impacted soil and store in drums.

Fires

In the event that grass or tundra does catch on fire, assess the situation. Do not attempt to fight a fire if it cannot be done safely. Standard fire fighting equipment available in the Hazardous Waste Depot can manage most small fires. Alternatively, sand and gravel can be thrown onto the fire either by hand, or by using available equipment (i.e., loader). Obtain help as necessary.

Refer to the Environmental Emergency Contingency Plan in Appendix E from details.

3.8 Annual Reporting Procedures

An annual report shall be prepared for the site submitted to the Nunavut Water Board, in compliance with the Hamlet's Water License. The report shall include:

- An overall description of the activities that occurred at the facility throughout the year, including both regular waste acceptance and annual shaping
- An estimate of the quantity of material received at the site
- A description of any maintenance or improvements that were completed at the site throughout the year
- A list of any complaints and actions taken to address them
- Analytical test results.

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4.0 References

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

GNWT Municipal and Community Affairs. April 2003. *Guidelines for the Planning, Design and Maintenance of Modified Solid Waste Site in the NWT*. Queen's Printer: Yellowknife, Northwest Territories.

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

GNWT Municipal and Community Affairs. April 2003. *Guidelines for the Planning, Design, Operations, and Maintenance of Modified Solid Waste Sites in the Northwest Territories*.

GNWT Public Health Act. 1990. *Consolidation of General Sanitation Regulations*. Queen's Printer: Yellowknife, Northwest Territories.

Government of Nunavut. January 2002. *Environmental Guidelines for Waste Antifreeze*.

Nunavut Water Board. September 2000. *Hamlet of Qikiqtarjuaq Water License NWB3QIK0106*. Gjoa Haven, Nunavut.

Nuna Burnside Engineering and Environmental Ltd. January 2005. *Detailed Design of the Improvements to the Water Reservoir, Wastewater Lagoon and Solid Waste facility in the Hamlet of Qikiqtarjuaq*. Rankin Inlet, Nunavut.

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Appendix A
Climate Normal Data

Appendix A: Climate Normals for Qikiqtarjuaq, Nunavut

<u>Temperature:</u>	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	Code
Daily Average (°C)	-24.8	-25.8	-23.5	-17.3	-8.4	-0.4	4.4	3.1	-2.5	-8.1	-15.8	-22.3		D
Standard Deviation	4.4	3.4	2.9	1.9	1.6	2.3	1.7	1.8	1.0	1.8	2.7	3.4		D
Daily Maximum (°C)	-21.9	-22.8	-20.2	-13.8	-5.3	2.4	7.3	5.9	-0.4	-5.9	-13.2	-19.4		D
Daily Minimum (°C)	-27.7	-28.8	-26.7	-20.8	-11.4	-3.1	1.4	0.4	-4.5	-10.4	-18.3	-25.1		D
Extreme Maximum (°C)	3.9	1.1	4.0	7.8	11.1	17.8	18.3	18.9	14.4	10.6	7.5	5.0		
Date (yyyy/dd)	1958/23	1960/11	1980/23	1975/29	1991/31	1973/29	1965/22+	1973/21	1962/04+	1984/16	1985/03	1967/17		
Extreme Minimum (°C)	-41.7	-42.8	-40.7	-34.3	-26.1	-12.2	-8.9	-7.8	-13.9	-24.4	-33.3	-39.2		
Date (yyyy/dd)	1961/11	1979/16	1985/01	1984/05	1970/07	1963/03+	1972/03+	1972/22	1972/29	1986/27	1957/16	1982/31		
<u>Precipitation: Precipitation:</u>														
Rainfall (mm)	0.0	0.0	0.0	0.0	0.4	3.4	16.3	15.9	2.9	0.3	0.0	0.0		D
Snowfall (cm)	6.8	6.8	5.7	16.0	31.4	15.2	10.5	10.2	30.0	45.8	37.1	7.3		D
Precipitation (mm)	6.8	6.8	5.7	16.0	31.8	18.6	26.8	26.1	32.9	46.1	37.1	7.3		D
Average Snow Depth (cm)	82	79	77	74	65	32	4	1	8	37	76	85	52	C
Median Snow Depth (cm)	83	79	77	74	66	32	3	1	5	36	78	85	52	C
Snow Depth at Month-end (cm)	79	78	74	71	58	13	3	2	20	56	86	83		D
Extreme Daily Rainfall (mm)	0.0	0.0	0.0	0.0	8.6	35.6	15.0	25.4	14.5	5.1	0.0	0.0		
Date (yyyy/dd)	1958/30+	1959/01+	1960/01+	1959/01+	1973/25	1966/27	1972/26	1959/07	1971/07	1968/05	1958/01+	1958/01+		

<u>Temperature:</u>	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	Code
Extreme Daily Snowfall (cm)	31.8	14.0	7.0	22.6	28.2	35.6	17.0	17.8	33.0	38.4	33.0	22.4		
Date (yyyy/dd)	1963/22	1970/15	1977/17	1968/16	1981/27	1973/21	1984/31	1968/07+	1967/18	1967/25	1969/05	1967/22		
Extreme Daily Precipitation (mm)	31.8	14.0	7.0	22.6	28.2	35.6	17.0	25.9	33.0	38.4	33.0	22.4		
Date (yyyy/dd)	1963/22	1970/15	1977/17	1968/16	1981/27	1966/27+	1984/31	1959/07	1967/18	1967/25	1969/05	1967/22		
Extreme Snow Depth (cm)	157.0	146.0	152.0	157.0	164.0	150.0	117.0	25.0	81.0	178.0	175.0	157.0		
Date (yyyy/dd)	1965/02+	1988/29	1988/04+	1988/21	1977/06	1970/01+	1973/01	1973/01	1967/19+	1964/31	1964/06	1964/27+		
<u>Days with Maximum Temperature: Days with Maximum Temperature:</u>														
<= 0 °C	30.7	28.2	30.8	29.3	26.7	11.2	1.5	3.1	19.2	29.7	29.9	30.9		D
> 0 °C	0.35	0.0	0.24	0.67	4.3	18.9	29.5	27.9	10.8	1.3	0.15	0.11		D
> 10 °C	0.0	0.0	0.0	0.0	0.05	1.5	7.5	5.4	0.47	0.0	0.0	0.0		D
> 20 °C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		D
> 30 °C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		D
> 35 °C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		D
<u>Days with Minimum Temperature: Days with Minimum Temperature:</u>														
> 0 °C	0.0	0.0	0.0	0.0	0.25	5.8	18.3	14.2	2.0	0.0	0.0	0.0		D
<= 2 °C	31.0	28.2	31.0	30.0	31.0	27.2	18.2	22.4	29.3	31.0	30.0	31.0		D
<= 0 °C	31.0	28.2	31.0	30.0	30.8	24.2	12.7	16.8	28.0	31.0	30.0	31.0		D
< -2 °C	31.0	28.2	31.0	30.0	30.4	19.5	6.0	9.5	25.0	30.7	30.0	31.0		D
< -10 °C	30.4	28.2	30.7	28.8	19.9	0.67	0.0	0.0	0.72	15.3	28.2	30.7		D

Temperature:	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	Code
< -20 °C	27.4	27.0	27.5	17.5	0.60	0.0	0.0	0.0	0.0	0.33	10.4	26.2		D
< - 30 °C	10.1	13.3	9.8	0.80	0.0	0.0	0.0	0.0	0.0	0.0	0.11	6.6		D
Days with Rainfall: Days with Rainfall:														
>= 0.2 mm	0.0	0.0	0.0	0.0	0.05	0.95	5.5	5.6	0.84	0.21	0.0	0.0		D
>= 5 mm	0.0	0.0	0.0	0.0	0.05	0.24	1.1	0.85	0.26	0.0	0.0	0.0		D
>= 10 mm	0.0	0.0	0.0	0.0	0.0	0.05	0.21	0.25	0.05	0.0	0.0	0.0		D
>= 25 mm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		D
Days With Snowfall: Days With Snowfall:														
>= 0.2 cm	4.0	3.5	3.2	6.2	9.1	4.9	2.9	3.5	8.6	13.6	9.5	4.3		D
>= 5 cm	0.35	0.30	0.14	1.0	1.8	1.1	0.72	0.65	1.8	3.1	2.5	0.30		D
>= 10 cm	0.05	0.0	0.0	0.19	0.81	0.19	0.22	0.25	0.65	0.84	0.85	0.10		D
>= 25 cm	0.0	0.0	0.0	0.0	0.05	0.05	0.0	0.0	0.0	0.0	0.05	0.0		D
Days with Precipitation: Days with Precipitation:														
>= 0.2 mm	4.0	3.5	3.2	6.2	9.1	5.8	7.7	8.3	9.5	13.7	9.5	4.3		D
>= 5 mm	0.35	0.30	0.14	1.0	1.8	1.3	1.9	1.7	2.0	3.1	2.5	0.30		D
>= 10 mm	0.05	0.0	0.0	0.19	0.86	0.29	0.47	0.50	0.68	0.84	0.85	0.10		D
>= 25 mm	0.0	0.0	0.0	0.0	0.05	0.05	0.0	0.0	0.0	0.0	0.05	0.0		D

<u>Temperature:</u>	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	Code
<u>Days with Snow Depth:</u> <u>Days with Snow Depth:</u>														
>= 1 cm	31.0	28.2	31.0	30.0	31.0	27.8	11.0	6.3	20.1	31.0	30.0	31.0		D
>= 5 cm	31.0	28.2	31.0	30.0	31.0	25.7	6.2	3.2	13.9	30.7	30.0	31.0		D
>= 10	31.0	28.2	31.0	30.0	31.0	23.2	3.3	1.3	9.2	30.0	30.0	31.0		D
>= 20	31.0	28.2	31.0	30.0	30.6	16.9	1.7	0.25	3.9	25.1	29.7	31.0		D
<u>Wind:</u> <u>Wind:</u>														
Maximum Hourly Speed	130.0	122.0	104.0	93.0	77.0	74.0	121.0	74.0	183.0	102.0	111.0	92.0		
Date (yyyy/dd)	1988/16	1996/19	1989/29	1998/14	1972/23	1987/27+	1956/22	1984/22	1997/24	1989/27	1977/05	1974/01		
Direction of Maximum Hourly Speed	NW	S	NW	SW	W	NW	SW	NW	S	NW	W	W	S	
<u>Degree Days:</u> <u>Degree Days:</u>														
Above 24 °C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		D
Above 18 °C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		D
Above 15 °C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		D
Above 10 °C	0.0	0.0	0.0	0.0	0.0	0.3	4.0	1.7	0.0	0.0	0.0	0.0		D
Above 5 °C	0.0	0.0	0.0	0.0	0.0	5.5	37.5	20.4	1.4	0.0	0.0	0.0		D
Above 0 °C	0.0	0.0	0.0	0.1	2.0	40.8	141.0	100.1	16.5	0.2	0.0	0.0		D
Below 0 °C	759.6	739.9	730.2	520.4	264.9	56.9	6.8	12.3	91.5	258.4	465.5	701.0		D
Below 5 °C	914.6	881.1	885.2	670.3	417.9	171.7	58.3	87.6	226.4	413.2	615.5	856.0		D

<u>Temperature:</u>	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	Code
Below 10 °C	1069.6	1022.3	1040.2	820.3	572.9	316.4	179.8	223.9	375.0	568.2	765.5	1011.0		D
Below 15 °C	1224.6	1163.4	1195.2	970.3	727.9	466.1	330.8	377.2	525.0	723.2	915.5	1166.0		D
Below 18 °C	1317.6	1248.1	1288.2	1060.3	820.9	556.1	423.8	470.2	615.0	816.2	1005.5	1259.0		D
<u>Humidex:</u> <u>Humidex:</u>														
Extreme Humidex	1.5	0.0	2.7	6.1	8.6	18.6	20.7	19.9	13.6	7.0	3.5	3.9		
Date (yyyy/dd)	1979/27	1963/04	1980/23	1975/29	1991/31	1973/29	1984/17	1973/21	1967/04	1984/15	1985/03	1967/17		
<u>Wind Chill:</u> <u>Wind Chill:</u>														
Extreme Wind Chill	-61.1	-61.0	-57.1	-49.2	-35.8	-21.1	-18.6	-15.5	-23.9	-32.8	-45.2	-54.2		
Date (yyyy/dd)	1961/11	1979/16	1964/13	1997/08	1999/01	1978/01	1972/04	1972/22	1997/24	1986/26	1956/28	1971/27		
<u>Humidity:</u> <u>Humidity:</u>														
Average Relative Humidity - 0600LST (%)	77.6	75.6	76.3	81.2	86.8	86.6	79.0	81.4	90.4	89.0	83.5	78.5		










Appendix A: Summary of 2004 Monthly Climatological Information for the Hamlet of Qikiqtarjuaq, Nunavut

QIKIQTARJUAQ A NUNAVUT

Latitude: 67° 33' N
Climate ID: 2400572

Longitude: 64° 1' W
WMO ID: 71338

Elevation: 06.40 m
TC ID: YVM

Monthly Data Report for 2004											
M o n t h	Mean Max Temp °C 	Mean Temp °C 	Mean Min Temp °C 	Extr Max Temp °C 	Extr Min Temp °C 	Total Rain mm 	Total Snow cm 	Total Precip mm 	Snow Grnd Last Day cm 	Dir of Max Gust 10's Deg	Spd of Max Gust km/h
<u>Jan</u>	-24.3	-28.7	-33.1	-15.5	-43.2	0.0	4.0	4.0	35		
<u>Feb</u>	-20.2	-24.9E	-29.4	-10.0	-40.2	0.0	5.0	5.0	41		
<u>Mar</u>	-24.3	-29.8	-35.2	-13.4	-45.5	0.0	6.2	6.2	47		
<u>Apr</u>	-11.4	-17.2	-22.9	-4.5	-31.5	0.0	34.0	34.0	61		
<u>May</u>	-1.2	-3.8	-6.4	6.5	-16.5	0.0	3.0	3.0	25		
<u>Jun</u>	4.7	1.8	-1.1	9.9	-7.2	Trace	Trace	Trace	0		
<u>Jul</u>	7.8	4.6	1.4	17.2	-1.7	1.0	6.0	7.0	0		
<u>Aug</u>	8.3	5.6	2.9	17.1	0.0	13.0	0.0	13.0	0		
<u>Sep</u>	4.4	2.0	-0.5	11.0	-11.0	6.0	13.0	19.0	4		
<u>Oct</u>	1.9	-1.0	-3.9	9.0S	-8.0	0.4	7.4	7.8	4		
<u>Nov</u>	-6.6	-10.6	-14.6	3.0	-24.5	0.0	91.0	91.0	54		
<u>Dec</u>	-22.4	-27.5	-32.6	-15.2	-40.8	0.0	2.0	2.0	48		
Sum						20.4	171.6	192.0			
Avg	-6.9	-10.8	-14.6								
Xtrm				17.2	-45.5						



Appendix B
Projected Waste Quantity Calculations

Appendix B

Waste Quantity Calculations

Planning Year	Calendar Year	Projected Population [people]	Annual Volume of Solid Waste [m ³]	Cumulative Volume of Solid Waste [m ³]	Annual Volume of Combustible Solid Waste [m ³]	Annual Volume of Combustible Solid Waste After Burning [m ³]	Annual Volume of Uncombustible Solid Waste [m ³]	Total Annual Volume of Uncombustible and Combusted (Burned) Solid Waste [m ³]	Annual Volume of Compacted Waste [m ³]	Annual Volume of Cover Material [m ³]	Total Annual Volume of Compacted Waste and Cover Material [m ³]	Cumulative Landfill Volume {m ³ }
0	2006	599	3060.9	3060.9	2571.1	1542.7	489.7	2032.4	1524.3	304.9	1829.2	1,829.19
	2007	611	3122.2	6183.1	2622.7	1573.6	499.6	2073.1	1554.9	311.0	1865.8	3,695.02
	2008	624	3188.6	9371.7	2678.5	1607.1	510.2	2117.3	1587.9	317.6	1905.5	5,600.55
	2009	637	3255.1	12626.8	2734.3	1640.6	520.8	2161.4	1621.0	324.2	1945.2	7,545.78
	2010	650	3321.5	15948.3	2790.1	1674.0	531.4	2205.5	1654.1	330.8	1984.9	9,530.71
5	2011	663	3387.9	19336.2	2845.9	1707.5	542.1	2249.6	1687.2	337.4	2024.6	11,555.34
	2012	677	3459.5	22795.7	2906.0	1743.6	553.5	2297.1	1722.8	344.6	2067.4	13,622.72
	2013	691	3531.0	26326.7	2966.0	1779.6	565.0	2344.6	1758.4	351.7	2110.1	15,732.85
	2014	705	3602.6	29929.3	3026.1	1815.7	576.4	2392.1	1794.1	358.8	2152.9	17,885.73
	2015	720	3679.2	33608.5	3090.5	1854.3	588.7	2443.0	1832.2	366.4	2198.7	20,084.42
10	2016	735	3755.9	37364.3	3154.9	1892.9	600.9	2493.9	1870.4	374.1	2244.5	22,328.92
	2017	750	3832.5	41196.8	3219.3	1931.6	613.2	2544.8	1908.6	381.7	2290.3	24,619.22
	2018	765	3909.2	45106.0	3283.7	1970.2	625.5	2595.7	1946.8	389.4	2336.1	26,955.33
	2019	781	3990.9	49096.9	3352.4	2011.4	638.5	2650.0	1987.5	397.5	2385.0	29,340.30
	2020	797	4072.7	53169.6	3421.0	2052.6	651.6	2704.3	2028.2	405.6	2433.8	31,774.12
15	2021	813	4154.4	57324.0	3489.7	2093.8	664.7	2758.5	2068.9	413.8	2482.7	34,256.81
	2022	830	4241.3	61565.3	3562.7	2137.6	678.6	2816.2	2112.2	422.4	2534.6	36,791.41
	2023	847	4328.2	65893.5	3635.7	2181.4	692.5	2873.9	2155.4	431.1	2586.5	39,377.93
	2024	864	4415.0	70308.5	3708.6	2225.2	706.4	2931.6	2198.7	439.7	2638.4	42,016.35
	2025	882	4507.0	74815.5	3785.9	2271.5	721.1	2992.7	2244.5	448.9	2693.4	44,709.75
20	2026	900	4599.0	79414.5	3863.2	2317.9	735.8	3053.7	2290.3	458.1	2748.4	47,458.11
	2027	918	4691.0	84105.5	3940.4	2364.3	750.6	3114.8	2336.1	467.2	2803.3	50,261.44
	2028	937	4788.1	88893.6	4022.0	2413.2	766.1	3179.3	2384.5	476.9	2861.4	53,122.79
	2029	956	4885.2	93778.7	4103.5	2462.1	781.6	3243.7	2432.8	486.6	2919.4	56,042.16
	Design criteria	2030	976	4987.4	98766.1	4189.4	2513.6	3311.6	2483.7	496.7	2980.4	59,022.61

percentage remaining after burning

0.6

Appendix C

Nunavut Water Board License



P.O. Box 119
GJOA HAVEN, NT X0E 1J0

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TEL: (867) 360-6338
FAX: (867) 360-6369

NUNAVUT WATER BOARD
NUNAVUT IMALIRIYIN KATIMAYINGI

File No. NWB3QIK0106

November 28, 2000

Mr. Don Pickle
Senior Administrative Officer
Municipality of Qikiqtarjuaq
P.O. Box 4
Qikiqtarjuaq, Nunavut X0A 0B0
Email: pickle@nunanet.com

RE: NWB Licence No. NWB3QIK0106

Dear Mr. Pickle:

Please find attached Licence No. NWB3QIK0106 issued (**Motion: #2000-09-06**) by the Nunavut Water Board (NWB) pursuant to its authority under Article 13 of the *Agreement between the Inuit of the Nunavut Settlement Area and Her Majesty the Queen in Right of Canada*. The terms and conditions of the attached Licence related to water use and waste disposal are an integral part of this approval.

Any communication with respect to this licence shall be made in writing to the attention of:

Chief Administrative Officer
Nunavut Water Board
P. O. Box 119
Gjoa Haven, NU. X0B 1J0
Telephone No: (867) 360-6338
Fax No: (867) 360-6369

Inspection and enforcement of the terms and conditions of this licence are performed by:

Water Resources Officer
Nunavut District Office
Northern Affairs Program
Department of Indian Affairs
and Northern Development
P. O. Box 100
Iqaluit, NU. X0A 0H0
Telephone No: (867) 979-4405
Fax No: (867) 979-6445

The licensee shall submit all reports, plans and studies in quantities as required by the Chief Administrative Officer, contact the NWB for additional details.

Sincerely,

A handwritten signature in black ink, appearing to read 'P. di Pizzo', written over the printed name.

Philippe di Pizzo
Chief Administrative Officer

Enclosure: Licence No. NWB3QIK0106

cc: R. Beavers, Indian and Northern Affairs Canada
P. Smith, Indian and Northern Affairs Canada
Qikiqtani Inuit Association
G. Joudrey, Nunavut Impact Review Board
P. Pacholek, Environment Canada
C. Nichols, Sustainable Development
L. Coady, Nunavut Planning Commission
J. deGroot, Fisheries and Oceans
B. Segal, Baffin Health & Social Services

DECISION

LICENCE NUMBER: NWB3QIK0106

This is the decision of the Nunavut Water Board (NWB) with respect to an application for a Licence renewal dated April 11, 2000, made by:

Municipality of Qikiqtarjuaq

to allow for the use of water and disposal of waste into water for municipal undertakings by the Municipality at Qikiqtarjuaq, Nunavut.

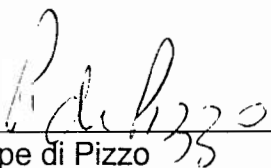
With respect to this application, the NWB gave notice to the public that the Municipality had filed an application for renewal of water licence N4L3-0640 issued by the Northwest Territories Water Board.

DECISION

After having been satisfied that the application was exempt from the requirement for screening by the Nunavut Impact Review Board in accordance with S.12.3.2 of the NLCA, the NWB decided that the application could go through the regulatory process. After reviewing the submission of the Applicant and the written and oral comments expressed by interested parties, the NWB, having given due regard to the facts and circumstances, the merits of the submissions made to it and to the purpose, scope and intent of the Nunavut Land Claims Agreement, decided to waive the requirement to hold a public hearing and furthermore to delegate its authority to approve the application to the Chief Administrative Officer pursuant to S. 13.7.5. of the NLCA and determined that:

Licence Number NWB3QIK0106 be issued subject to the terms and conditions contained therein. (Motion #:2000-09-06)

SIGNED this 28th day of November 2000 at Gjoa Haven, Nunavut.



Philippe di Pizzo
Chief Administrative Officer

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INTRODUCTION

Following an application for licence renewal filed by the Hamlet of Qikiqtarjuaq on April 11, 2000, the Nunavut Water Board conducted an initial assessment of the Municipality's submission and verified that the application was exempt from the requirement for screening by the Nunavut Impact Review Board in accordance with S.12.3.2 of the NLCA. The Board concluded that the application was complete and could go through the regulatory process.

In accordance with Article 13 of the Nunavut Land Claims Agreement (NLCA), the Board shall conduct a public hearing before approving an application, and shall accordingly give public notice of the application. Public notice of the application was given on April 12, 2000, and the application was distributed concurrently to local, territorial, and federal organizations and agencies. Submissions were made by Environment Canada (EC), Department of Indian and Northern Affairs (DIAND), and the Department of Community Government and Transportation (CGT). However, no public concerns were expressed, and the NWB waived the requirement to hold a public hearing in accordance with Section 13.7.2 of the NLCA. The authority to approve the application was delegated to the Chief Administrative Officer of the Board pursuant to S. 13.7.5 of the NLCA. After considering the submissions of interested parties, the NWB decided to issue licence NWB3QIK0106.

II. GENERAL CONSIDERATIONS

Term of the Licence

Consistent with the powers of the Northwest Territories Water Board under the Northern Inland Waters Act, the NWB may issue a licence for a term not exceeding twenty-five years. The Municipality requested a 10-year licence from the Board, whereas the Department of CGT suggested that issuing a shorter-term licence would allow the Hamlet and CGT to undertake the various studies and provide a plan of action to upgrade municipal facilities. The Board agrees with CGT, and furthermore believes that a shorter-term licence will allow the Municipality to establish a consistent compliance record. Consequently, the Board decides to issue a 5-year licence, which will allow the licensee to properly carry out the terms and conditions of the licence and to ensure that sufficient time is given to permit the licensee to develop, submit, and implement the plans required under the licence to the satisfaction of the NWB.

Annual Report

The requirements imposed on the licensee in this licence are for the purpose of ensuring that the NWB has an accurate annual update of municipal activities during a calendar year. This information is maintained on the public registry and is available to any interested parties upon request.

Operation and Maintenance Manual (O&M)

Under the previous water licence (N4L3-0640), the Municipality was required to submit for Board approval an Operation and Maintenance plan for waste disposal operations. At the time of application, the Board's Public Registry indicated that the Municipality had not complied with this licence condition.

The purpose of an Operation and Maintenance Manual is to assist the Municipality's staff in the proper operation and maintenance of the waste disposal facilities. The manual should demonstrate to the Nunavut Water Board that the Municipality is capable of operating and maintaining all waste disposal sites adequately. The Board decides to maintain the requirement for the submission of an Operation and Maintenance plan for all Sewage and Solid Waste Disposal Facilities. The plan shall be 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, October 1996"*

Abandonment and Restoration (A&R)

Under the previous water licence (N4L3-0640) the Municipality was required to submit for Board approval an abandonment and restoration plan for the abandoned Waste Disposal Facility. At the time of application, the Board's Public Registry indicated that the Municipality had not complied with this licence condition. However, the Board's Public Registry contains evidence that some reclamation of the site was undertaken in accordance with the "Sanitary Site Clean Up Broughton Island, NWT Report"¹. In its submission to the Board, Environment Canada noted that the Municipality's application indicated that erosion is beginning to expose the old dumpsite again. The Board accepts this evidence and orders the Municipality to ensure that sufficient cover is placed on the site and that erosion control measures will be implemented as required.

The Board also notes that based on population growth estimates and the remaining capacity of the current waste disposal site, planning for a new facility may be required within the term of this licence. In this event, the planning study shall also contemplate the reclamation of the current facility, and accordingly the NWB decides to include in this licence a requirement to include in such a study a separate section on the Abandonment and Restoration Plan for the current site.

Surveillance Network Program

The Surveillance Network Program is a monitoring program established to collect data on water quality to assess the effectiveness of waste treatment and detect any impact of waste disposal activities on water.

¹ Sanitary Site Clean Up, Broughton Island, NWT Report. Prepared by M.M. Dillon Limited for the Government of the Northwest Territories, Municipal and Community Affairs. December 1993.

The Board notes that there is a stream located between the solid waste disposal facility and the Sewage Disposal Facilities, and that runoff from the solid waste site may enter water. To ensure the protection of water, the Board requests the establishment of a SNP station (SNP Station 0640-8) in the stream above the waste disposal facilities and another (SNP Station 0640-9) in the stream below the waste disposal facilities.

The Board notes that this application does not include the disposal of tannery effluent to the Sewage Disposal Facilities and consequently removes from SNP station 0640-4 parameters normally associated with tannery effluents.

The application states that discharge from the lagoon occurs once per year for a short period. The Board requests that the licensee take three samples, one at the beginning, one midway through and one near the end of the discharge of effluent from the sewage lagoon. These samples shall be taken at SNP station 0640-6 and SNP station 0640-6A.

Studies

In their submission to the Board, the Department of Community Government and Transportation states that both the water reservoir and the Sewage Disposal Facilities would seem to be approaching their useful life and will require improvements to meet the needs of the community for the next 20 years. The Board accepts this evidence and decides to order the Municipality to submit for Board approval the Terms of Reference for conducting an assessment of the water reservoir and sewage disposal facility. The planning study results shall be submitted for Board approval at least 8 months prior to the expiration of this licence.

III. LICENCE NWB3QIK0106

Pursuant to 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

MUNICIPALITY OF QIKIQTARJUAQ

(Licensee)

of

QIKIQTARJUAQ, NUNAVUT, X0A 0B0

(Mailing Address)

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

Licence Number

NWB3QIK0106

Water Management Area

04

Location

QIKIQTARJUAQ, NUNAVUT

Purpose

WATER USE AND WASTE DISPOSAL

Description

MUNICIPAL UNDERTAKINGS

Quantity of Water Not to be Exceeded

35,000 CUBIC METRES ANNUALLY

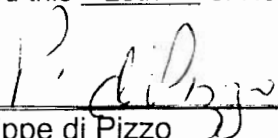
Date of Licence

January 1, 2001

Expiry Date of Licence

December 31, 2006

Dated this 28th of November 2000 at Gjoa Haven, Nunavut.


Philippe di Pizzo
Chief Administrative Officer

PART A: SCOPE, ENFORCEMENT & DEFINITIONS**1. Scope**

- a. This Licence allows for the use of water and the disposal of waste into water for municipal undertakings at the Municipality of Qikiqtarjuaq, Nunavut (67°33'N, 64°02'W);
- 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 amended by the Governor in Council under a future Nunavut Waters 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, upon promulgation of such Regulations, to be automatically amended to conform with such Regulations; and
- c. Compliance with the terms and conditions of this Licence does not absolve the Licensee from responsibility for compliance with the requirements of all applicable Federal, Territorial and Municipal legislation.

2. Enforcement

- a. Subject to Part A, item 2 (d), failure to comply with this licence will be a violation of the *Northwest Territories Waters Act*, exposing the licensee to the enforcement measures and the penalties provided for in the Act.
- b. Subject to Part A, Item 2 (d), all inspection and enforcement services regarding this licence will be provided by inspectors appointed under the *Northwest Territories Waters Act*.
- c. Subject to Part A, Item 2 (d), inspectors appointed under the *Northwest Territories Waters Act* enjoy - with respect to this licence, and for the purpose of enforcing this licence, and with respect to the use of water and deposit or discharge of waste by the licensee - all powers, privileges and protections that are conferred upon them by the *Northwest Territories Waters Act* or by other applicable law.
- d. To the extent that the *Northwest Territories Waters Act* is, subsequent to the issuance of this licence, replaced with respect to water management in Nunavut by other federal legislation (including, without limitation, a regulation or order referred to in Section 10.10.2 of the *Nunavut Land Claims Agreement*), and to the extent that the other federal legislation is

consistent with the *Nunavut Land Claims Agreement*, the other federal legislation shall apply with respect to this licence and the *Northwest Territories Waters Act* shall cease to apply with respect to this licence.

3. Definitions

In this Licence: **NWB3QIK0106**

"Amendment" means a change to original terms and conditions of this licence requiring correction, addition or deletion of specific terms and conditions of the licence: medications inconsistent with the terms and conditions of this licence;

"Average Concentration" means the arithmetic mean of any four consecutive analytical results submitted to the Board in accordance with the sampling and analysis requirements specified in the "Surveillance Network Program";

"Average Concentration For Faecal Coliform" means the running geometric mean of any four consecutive analytical results submitted to the Board in accordance with the sampling and analysis requirements specified in the "Surveillance Network Program";

"Board" means the Nunavut Water Board established under the Nunavut Land Claims Agreement;

"Commercial Waste Water" means water and associated waste generated by the operation of a commercial enterprise, but does not include toilet wastes or greywater;

"Freeboard" means the vertical distance between water line and crest on a dam or dyke's upstream slope;

"Grab Sample" means a single water or wastewater sample taken at a time and place representative of the total discharge;

"Greywater" means all liquid wastes from showers, baths, sinks, kitchens and domestic washing facilities, but does not include toilet wastes;

"Honey Bags" A plastic or heavy paper bag that fits into a bucket toilet used to contain toilet waste.

"Inspector" means an Inspector designated by the Minister of Indian and Northern Affairs Canada in a manner consistent the *Northwest Territories Waters Act*;

"Licensee" means the holder of this Licence;

"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; changes to the operating system that are consistent with the terms of this Licence and do not require amendment;

"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;

"Pumpout Sewage" means all toilet wastes and/or greywater collected by means of a vacuum truck for disposal at an approved facility;

"Sewage" means all toilet wastes and greywater;

"Sewage Disposal Facilities" comprises the area and engineered structures designed to contain sewage;

"Solid Waste Disposal Facilities" comprises the area and associated structures designed to contain solid wastes;

"Toilet Wastes" means all human excreta and associated products, but does not include greywater;

"Waste" means any substance that, by itself or in combination with other substances found in water, would have the effect of altering the quality of any water to which the substance is added to an extent that is detrimental to its use by people or by any animal, fish or plant, or any water that would have that effect because of the quantity or concentration of the substance contained in it or because it has been treated or changed, by heat or other means;

"Waste Disposal Facilities" means all facilities designated for the disposal of waste, and includes the Sewage Disposal Facilities, Solid Waste Disposal Facilities, and Bagged Toilet Wastes Disposal Facilities; and

"Water Supply Facilities" comprises the area and associated intake infrastructure at the Municipality's reservoir and primary source, the Tulugak River.

PART B: GENERAL CONDITIONS

1. The Licensee shall file an Annual Report with the Board no later than March 31st of the year following the calendar year reported which shall contain the following information:

- a. tabular summaries of all data generated under the "Surveillance Network Program";
 - b. the monthly and annual quantities in cubic metres of fresh water obtained from all sources;
 - c. the monthly and annual quantities in cubic metres of each and all waste discharged;
 - d. the monthly and annual quantities of Sewage Solids removed from the Sewage Disposal Facilities for disposal;
 - e. a summary of modifications and/or major maintenance work carried out on the Water Supply and Waste Disposal Facilities, including all associated structures and facilities;
 - f. a list of unauthorized discharges and summary of follow-up action taken;
 - g. a summary of any abandonment and restoration work completed during the year and an outline of any work anticipated for the next year;
 - h. a summary of any studies requested by the Board that relate to waste disposal, water use or reclamation, and a brief description of any future studies planned;
 - i. updates or revisions to the approved Operation and Maintenance Plans; and
 - j. any other details on water use or waste disposal requested by the Board by November 1st of the year being reported.
2. The Licensee shall comply with the "Surveillance Network Program" annexed to this Licence, and any amendment to the said "Surveillance Network Program" as may be made from time to time, pursuant to the conditions of this Licence.
3. The "Surveillance Network Program" and compliance dates specified in the Licence may be modified at the discretion of the NWB Chief Administrative Officer.
4. Meters, devices or other such methods used for measuring the volumes of water used and waste discharged shall be installed, operated and maintained by the Licensee to the satisfaction of an Inspector.

5. The Licensee shall by September 1, 2001, post the necessary signs, where possible, to identify the stations of the "Surveillance Network Program." All postings shall be located and maintained to the satisfaction of an Inspector.
6. The Licensee shall by September 1, 2001, post signs in the appropriate areas to inform the public of the location of the Water Supply and Waste Disposal Facilities. All postings shall be located and maintained to the satisfaction of an Inspector.
7. The Licensee shall immediately report to the 24-Hour Spill Report Line (867-920-8130) any spills of Waste, which are reported to or observed by the Licensee, within the municipal boundaries or in the areas of the Water Supply or Waste Disposal Facilities.
8. The Licensee shall ensure a copy of this Licence is maintained at the municipal office at all times.

PART C: CONDITIONS APPLYING TO WATER USE

1. The Licensee shall obtain all fresh water from the Water Supply Facilities or as otherwise approved by the Board.
2. The annual quantity of water used for all purposes shall not exceed 35,000 cubic metres.
3. The Licensee shall maintain the Water Supply Facilities to the satisfaction of the Inspector.
4. The water intake hose used on the water pumps shall be equipped with a screen with a mesh size sufficient to ensure no entrainment of fish.

PART D: CONDITIONS APPLYING TO WASTE DISPOSAL

1. The Licensee shall direct Sewage to the Sewage Disposal Facilities or as otherwise approved by the Board.
2. All Sewage effluent discharged from the Sewage Disposal Facilities at "Surveillance Network Program" Station Number 0640-6 shall meet the following effluent quality standards:

Parameter	Maximum Average Concentration
Faecal Coliforms	1×10^4 CFU/100 ml
BOD ₅	120 mg/L
Total Suspended Solids	180 mg/L

The Waste discharged shall have a pH between 6 and 9, and no visible sheen of oil and grease.

3. A Freeboard limit of 1.0 metre, or as recommended by a qualified geotechnical engineer and as approved by the Board, shall be maintained at all dykes and earthfill structures.
4. All honey bags shall be disposed of to the satisfaction of an Inspector.
5. The Licensee shall advise an Inspector at least ten (10) days prior to initiating the decant of the Sewage Disposal Facilities.
6. The Sewage Disposal Facilities shall be maintained and operated in such a manner as to prevent structural failure.
7. The Licensee shall maintain the Sewage Disposal Facilities to the satisfaction of an Inspector.
8. The Licensee shall dispose of and contain all solid wastes at the Solid Waste Disposal Facilities or as otherwise approved by the Board.

PART E: CONDITIONS APPLYING TO MODIFICATIONS

1. The Licensee may, without written approval from the Board, carry out modifications to the Water Supply 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 sixty (60) days prior to beginning the modifications;
 - b. such modifications do not place the Licensee in contravention of the Licence;

- c. the Board has not, during the sixty (60) days following notification of the proposed modifications, informed the Licensee that review of the proposal will require more than sixty (60) days; and
 - d. the Board has not rejected the proposed modifications.
- 2. Modifications for which all of the conditions referred to in Part E, Item 1, have not been met may be carried out only with written approval from the Board.
- 3. The Licensee shall provide to the Board site plans of the modifications referred to in this Licence within ninety (90) days of completion of the modifications.

PART F: CONDITIONS APPLYING TO CONSTRUCTION

- 1. Prior to construction of any dams, dykes or structures intended to contain, withhold, divert or retain water or wastes, the Licensee shall submit to the Board for review design drawings stamped by a qualified Engineer registered in Nunavut

PART G: CONDITIONS APPLYING TO OPERATION AND MAINTENANCE

- 1. The Licensee shall, within six (6) months of the issuance of this Licence, submit to the Board for approval, a plan for the Operation and Maintenance of the Sewage and Solid Waste Disposal Facilities in accordance with "*Guidelines for preparing an Operation and Maintenance Manual for Sewage and Solid Waste Disposal Facilities*" October 1996.
- 2. The Licensee shall implement the plan specified in Part G, Item 1 as and when approved by the Board.
- 3. If, during the period of this Licence, an unauthorized discharge of waste occurs, or if such a discharge is foreseeable, the Licensee shall:
 - a. employ the appropriate contingency plan as provided for in the Operation and Maintenance Plan;
 - b. report the incident immediately via the 24-Hour Spill Reporting Line, (867) 920-8130; and
 - c. submit to an Inspector a detailed report on each occurrence not later than thirty (30) days after initially reporting the event.

PART H: CONDITIONS APPLYING TO ABANDONMENT AND RESTORATION

1. The Licensee shall submit to the Board for approval an Abandonment and Restoration Plan at least six (6) months prior to abandoning any facilities, including but not limited to:
 - a. the water intake facilities;
 - b. the water treatment and waste disposal sites and facilities;
 - c. the petroleum and chemical storage areas;
 - d. any site affected by waste spills;

An Abandonment Plan shall include, among other things:

- i. measures to address leachate, if any;
 - ii. an implementation schedule;
 - iii. maps delineating all disturbed areas and site facilities;
 - iv. consideration of altered drainage patterns;
 - v. type and source of cover materials;
 - vi. future area use;
 - vii. hazardous wastes; and
 - viii. a proposal identifying measures by which restoration costs will be financed by the Licensee upon abandonment.
3. The Licensee shall implement the plan specified in Part H, Item 1 as and when approved by the Board.
4. The Licensee shall revise the Plan referred to in Part H, Item 1 if not approved. The revised Plan shall be submitted to the Board for approval within six (6) months of receiving notification of the Board's decision.
5. The Licensee shall complete the restoration work within the time schedule specified in the Plan, or as subsequently revised and approved by the Board.

PART I: CONDITIONS APPLYING TO STUDIES

1. The Licensee shall submit to the Board for approval, the terms of reference for a planning study to address long-term needs of the community with respect to the Water Supply and Waste Disposal Facilities.
2. The Licensee shall, 8 months prior to expiry of the licence, submit to the Board for approval the planning study prepared in accordance with the terms of reference approved by the Board pursuant to Part I, Item 1.
3. The proposal described in Part I, Item 3 shall be implemented as and when approved by the Board.

SCHEDULE I: SURVEILLANCE NETWORK PROGRAM

A. Location, Description, Sampling and Analysis Requirements

Station	Description	Sampling Requirements	Analysis Requirements
0640-1	Raw Water Supply intake at the Tulugak River	Not required	Not required
0640-2	Raw Water Supply intake at the Reservoir truck fill station	Not required	Not required
0640-3	Raw Sewage from pump-out truck	Not required	Not required
0640-4	Runoff below the abandoned Sewage disposal area prior to discharge to ocean	Not required	Not required
0640-5	Ocean water 5 metres from point where effluent enters ocean (abandoned site)	Not required	Not required
0640-6	Discharge from the Sewage Disposal Facilities at the point of discharge following treatment	Once at the beginning, middle and end of discharge	<div> <div> BOD Total Suspended Solids Conductivity Oil and Grease Magnesium Sodium Chloride Total Hardness Ammonia Nitrogen Total Cadmium Total Cobalt Total Chromium Total Copper Total Aluminum </div> <div> Faecal Coliform PH Nitrate-Nitrite Total Phenols Calcium Potassium Sulphate Total Alkalinity Total Zinc Total Iron Total Manganese Total Nickel Total Lead </div> </div>
0640-6A	Current Sewage Disposal Facilities effluent 5 meters prior to entering the ocean	Once at the beginning, middle and end of discharge	Same as STN 0640-6

Station	Description	Sampling Requirements	Analysis Requirements
0640-7	Runoff from the Solid Waste Disposal Facility	Annually during periods of open water	<p>pH</p> <p>Total Suspended Solids</p> <p>Nitrate-Nitrite</p> <p>Total Phenols</p> <p>Sodium</p> <p>Magnesium</p> <p>Total Arsenic</p> <p>Total Copper</p> <p>Total Iron</p> <p>Total Mercury</p> <p>Total Zinc</p> <p>Conductivity</p> <p>Ammonia Nitrogen</p> <p>Oil and Grease (Visual)</p> <p>Sulphate</p> <p>Potassium</p> <p>Calcium</p> <p>Total Cadmium</p> <p>Total Chromium</p> <p>Total Lead</p> <p>Total Nickel</p> <p>Total Organic Carbon</p>
0640-8	Unnamed stream located between the Sewage Disposal Facilities and Solid Waste Disposal Facilities; sample site above the facilities	Annually during periods of open water	Same as STN 0640-7
0640-9	Unnamed stream located between the Sewage Disposal Facilities and Solid Waste Disposal Facilities; sample site below the facilities	Annually during periods of open water	Same as STN 0640-7
0640-10	Runoff below reclaimed Solid Waste Disposal Facility	Annually	Same as STN 0640-7

B. General Requirements

1. The exact location of Surveillance Network Program stations can be developed with the assistance of the Inspector.
2. Additional sampling and analysis may be requested by an Inspector.
3. All sampling, sample preservation and analyses shall be conducted in accordance with methods prescribed in the current edition of "Standard Methods for the Examination of Water and Wastewater", or by such other methods approved by the Board.
4. All analyses shall be performed in a laboratory approved by the Board.

C. Flow and Volume Measurement Requirements

1. The monthly and annual quantities of water pumped from Surveillance Network Program Station Number 0640-2 shall be measured and recorded in cubic metres.
2. The annual quantities of sewage solids removed from the Sewage Disposal Facilities shall be measured and recorded.

D. Reports

1. The Licensee shall, unless otherwise requested by an Inspector, include all of the data and information required by the Surveillance Network Program in the Licensee's Annual Report, which Report shall be submitted to the Board on or before March 31st of the year following the calendar year being reported.

E. Modifications To The Surveillance Network Program

1. Modifications to the Surveillance Network Program may be made only upon written approval of the Chief Administrative Officer of the Board.

FIGURE 1 - Municipality of Qikiqtarjuaq Surveillance Network Program Stations
(To be provided following first inspection)

APPENDIX I CORRESPONDENCE

- i. Letter received April 14 from the Municipality of Qikiqtarjuaq to the Nunavut Water Board, enclosing an application and supplemental questionnaire dated March 27, 2000 for the renewal of a municipal water licence for the Municipality of Qikiqtarjuaq.
- ii. Letter dated April 12, 2000 from NWB to the Municipality of Qikiqtarjuaq, acknowledging receipt of the application for licence renewal.
- iii. Letter dated April 18, 2000 from NWB to the Municipality of Qikiqtarjuaq, acknowledging receipt of additional information for the application for licence renewal.
- iv. Letter dated April 12, 2000 from the NWB to the Distribution List, providing notice of the application for licence renewal in English and Inuktitut.
- v. Letter dated May 29, 2000, from the Department of CGT, to the NWB, received May 30, 2000 regarding comments on the application for licence renewal in consideration for the proposed pilot project for a tannery in Qikiqtarjuaq.
- vi. Letter dated/received May 30, 2000, from the Department of CGT to the NWB, regarding comments on the application for licence renewal.
- vii. Letter dated May 29, 2000, from Environment Canada, to the NWB, received June 6, 2000, regarding comments on the application for licence renewal.
- viii. Email dated June 5, 2000, from Indian and Northern Affairs Canada to the NWB, regarding comments on the application for licence renewal.



Appendix D

Waste Disposal Site Forms

Hamlet of Qikiqtarjuaq Waste Placement Form

[illegible]

Hamlet of Qikiqtarjuaq
-Weekly Solid Waste Disposal Facility Inspection Form-

Inspected by: _____ Date: _____
 Wind direction: _____ Temperature: _____
 Precipitation: _____ Ground cover: _____

	YES	NO
1. Is roadway and truck pad clear of snow?	_____	_____
2. Does roadway require grading?	_____	_____
3. Is there visible erosion on the berms?	_____	_____
4. Is all signage visible and in tact?	_____	_____
5. Is there litter on the fences?	_____	_____
6. Is there evidence of leachate break-out from the face of the landfill?	_____	_____
7. Are fences in good condition?	_____	_____
8. Has there been any evidence of scavenging?	_____	_____
9. Is there water accumulating in the Water Retention Area	_____	_____
10. Has any hazardous material been incorporated into the waste pile?	_____	_____
11. Does the waste require placement into the landfill?	_____	_____
12. Are there any problems on the site?	_____	_____

Appendix E
Environmental Emergency
Contingency Plan



Environmental Emergency Contingency Plan for Water, Sewage, and Solid Waste Operations in the Hamlet of Qikiqtarjuaq, Nunavut

Prepared for

The Hamlet of Qikiqtarjuaq
P.O. Box 4, Qikiqtarjuaq NU X0A 0B0 Canada

Prepared by

Nuna Burnside Engineering and Environmental Ltd.
Box 175, 25 Third Avenue Rankin Inlet NU X0C 0G0 Canada
15 Townline Orangeville ON L9W 3R4 Canada

Revision Date

February 2006

File No: N-O 09439.0

The material in this report reflects best judgement in light of the information available at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions made based on it, are the responsibilities of such third parties. Nuna Burnside accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

Environmental Emergency Contingency Plan for
Water, Sewage, and Solid Waste Operations in the
Hamlet of Qikiqtarjuaq, Nunavut

February 2006

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Environmental Emergency Contingency Plan for
Water, Sewage, and Solid Waste Operations in the
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February 2006

Preamble

This Environmental Emergency Contingency Plan relating to the collection, transportation, storage, and treatment operations of sewage for the Hamlet of Qikiqtarjuaq, Nunavut, is effective from *BEGINNING DATE OF WATER LICENSE until EXPIRY DATE OF NEW WATER LICENSE*. This plan applies to all operations and spill events relating to sewage and petroleum, oil, and lubricating (POL) products in the Hamlet of Qikiqtarjuaq, Nunavut (formerly known as Broughton Island).

The following formal distribution will be made after this document receives approval:

- Hamlet of Qikiqtarjuaq:
 - Mayor and Council
 - Senior Administrative Officer (SAO)
 - Hamlet Operations Staff
 - Fire Department
 - Community Health Centre
 - RCMP Detachment.
- Nunavut Water Board.

Additional copies and updates of this plan may be obtained by writing to:

Hamlet of Qikiqtarjuaq
Senior Administrative Officer (SAO)
P.O. Box 4
Qikiqtarjuaq, NU X0A 0B0

Environmental Emergency Contingency Plan for
Water, Sewage, and Solid Waste Operations in the
Hamlet of Qikiqtarjuaq, Nunavut

February 2006

1.0 Introduction

1.1 Purpose of Plan

The impacts of spills can be catastrophic and may threaten or damage the environment, especially water resources. As such, the Government of Nunavut (GN) requires contingency plans to be written and fully implemented. The purpose of this *Environmental Emergency Contingency Plan* is to provide a plan of action for all spills of sewage, solid waste, and petroleum products that may occur as a result of water supply and distribution, sewage collection and treatment, and solid waste collection and disposal operations undertaken within the Hamlet of Qikiqtarjuaq, Nunavut.

This *Environmental Emergency Contingency Plan* will assist in implementing corrective options quickly to minimize environmental damage. Furthermore, it defines the responsibilities of key personnel and outlines procedures to effectively and efficiently contain and recover spills of sewage, solid waste, and petroleum products arising from water, sewage, and solid waste; collection, transportation, storage, and treatment operations. It will assist the Hamlet in meeting the regulatory requirements related to reporting events to the appropriate authorities within the prescribed time period.

Sewage, solid waste, and petroleum, oil and lubricating (POL) products that currently, or potentially, fall within the Scope of this *Environmental Emergency Contingency Plan* are as follows:

- Sewage (as defined in the Nunavut Water Board (NWB) water license)
- Solid waste (as defined in the Nunavut Water Board (NWB) water license)
- Gasoline
- Diesel fuel
- Hydraulic fluid
- Lubricating oil.

1.2 Objectives

The objectives of this Emergency Spill Contingency Plan are to:

- Provide a plan including procedures so that the Hamlet and their Incident Spill Response Team can rapidly respond to a spill situation and minimize injury to individuals and environmental damage
- Comply with all existing regulations
- Cooperate with other groups and agencies

Environmental Emergency Contingency Plan for
Water, Sewage, and Solid Waste Operations in the
Hamlet of Qikiqtarjuaq, Nunavut

February 2006

- Be prepared and able to provide an integrated team approach with all involved departments and agencies
- Keep staff, government officials, and Hamlet residents informed.

1.3 Hamlet of Qikiqtarjuaq Environmental Policy

It is the policy of the Hamlet of Qikiqtarjuaq to fully comply with all applicable legislation to ensure the protection of the environment of the territory of Nunavut. The legislation includes, but is not limited to, the:

- Environmental Protection Act, Section 34 – Spill Contingency Planning and Reporting Regulations
- Nunavut Waters and Nunavut Surface Rights Tribunal Act.

The Hamlet will cooperate with other groups committed to protecting the environment and shall ensure that Hamlet employees, regulatory authorities, and the public are informed on the policies and procedures developed to help protect the environment and the citizens of the Hamlet of Qikiqtarjuaq.

February 2006

2.0 Site Description

2.1 General Site Description

This *Environmental Emergency Contingency Plan* is to be implemented within the Municipal boundaries of the Hamlet of Qikiqtarjuaq, Nunavut.

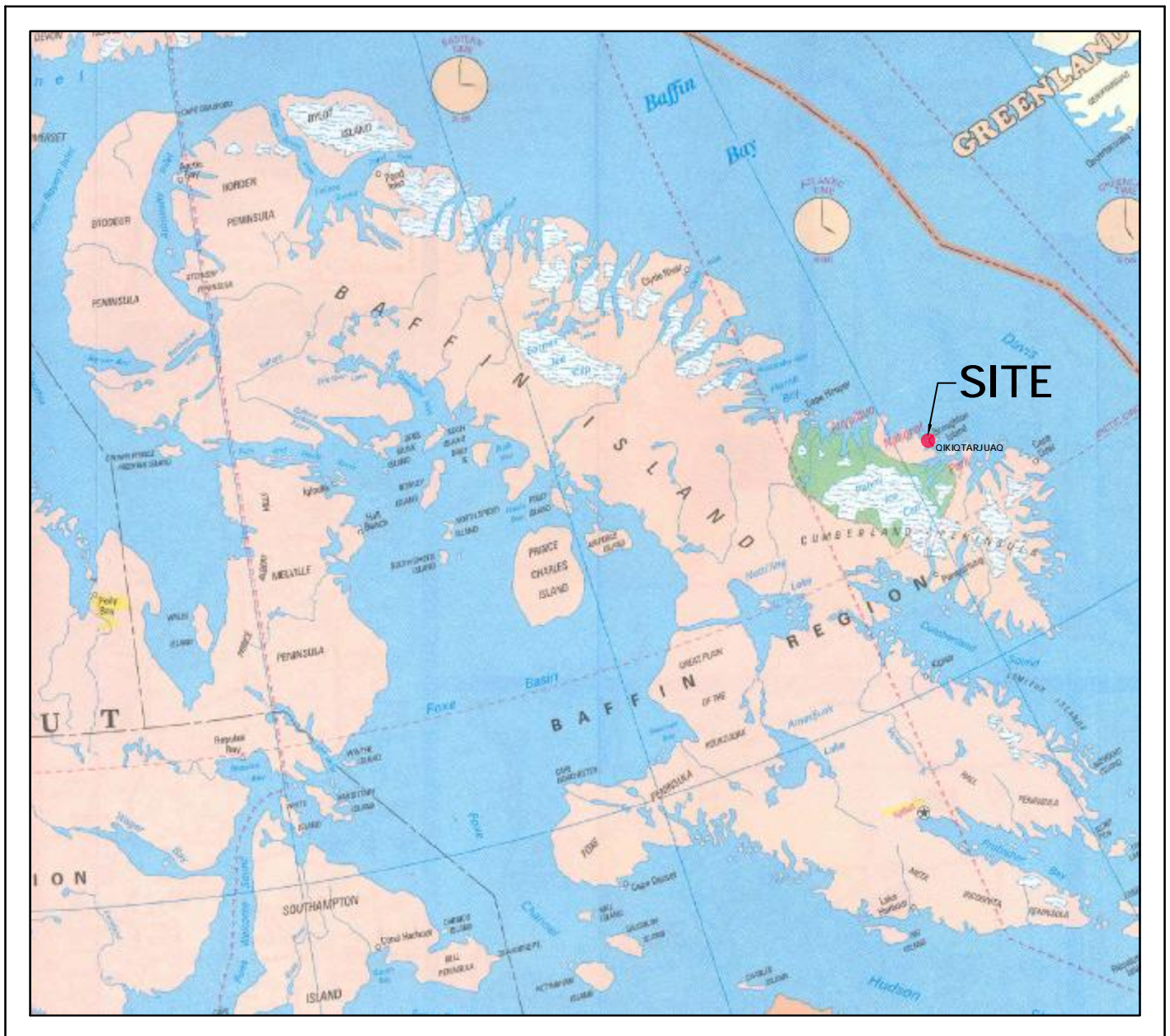
The Hamlet of Qikiqtarjuaq (meaning “big island”), is a Community of approximately 599 people located on the eastern coast of Baffin Island and on an island known as Broughton Island in the territory of Nunavut. As illustrated in Figure 1, the Hamlet is located approximately 470 kilometers northeast of the Capital City of Iqaluit, a distance that is covered by plane in about one hour. The geographic coordinates for the Hamlet of Qikiqtarjuaq are 67°33’ north latitude and 64°02’ west longitude. As indicated on Figure 2, the community is situated on the northwest portion of Broughton Island.

2.2 Sewage Collection, Water Supply, Treatment and Distribution, and Storage

The Hamlet provides trucked water service for the community. Historically, water is drawn from the Tulugak River during the summer, and from the lined earthen reservoir (Figure 3) for the remainder of the year. The water is chlorinated as it is pumped into the tanker delivery trucks through the truck fill station. The truck fill station operates by diesel generator and has an above ground storage (AST) tank on-site.

Sewage is collected in the Hamlet of Qikiqtarjuaq by vacuum truck, and transported to the Sewage Treatment Facility (Figure 4) operated by the Hamlet of Qikiqtarjuaq located approximately 2.3 km from the Hamlet. Wastewater is collected from customer holding tanks and discharged to the wastewater lagoon located to the east of the community north of the DEW Line Access Road.

The Hamlet of Qikiqtarjuaq provides regular solid waste pickup for the Community’s residents, businesses, and institutions. Collection occurs on a daily basis throughout the Hamlet, to minimize the potential for attraction of foxes and polar bears. Solid waste is trucked to the Hamlet’s Solid Waste Disposal facility (Figure 5), which is currently permitted by the Nunavut Water Board (NWB). The current Facility is located adjacent to the sewage lagoon.



Map Reference:
Map of Canada
Published by the CAA

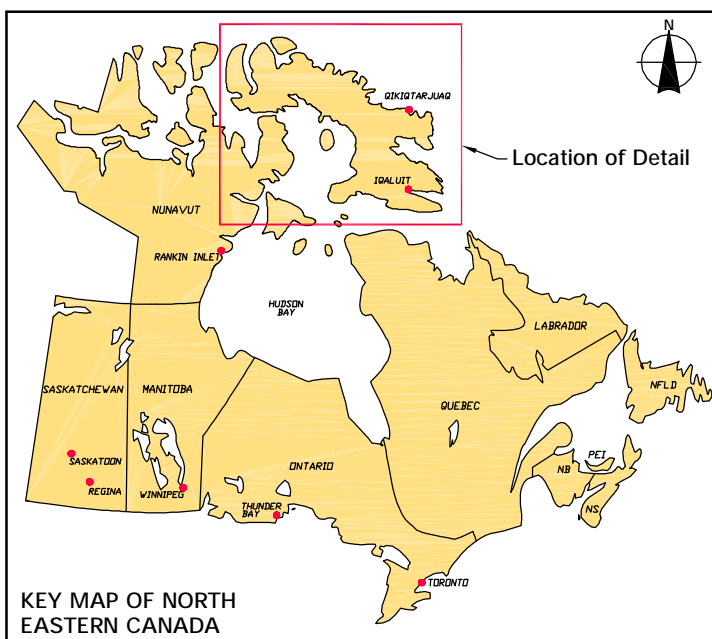


FIGURE 1 - SITE LOCATION MAP

THE HAMLET OF QIKIQTARJUAQ, NUNAVUT

ENVIRONMENTAL EMERGENCY CONTINGENCY PLAN

January 2006
Project Number: N-0 09439.0

Prepared by: K. Pridham

Verified by: M. Paznar

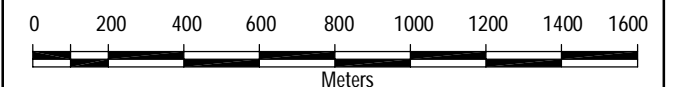
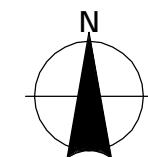
Burnside



FIGURE 2
THE HAMLET OF QIKIQTARJUAQ
*ENVIRONMENTAL EMERGENCY
CONTINGENCY PLAN*

SATELLITE IMAGERY OF
ENTIRE COMMUNITY
AND INFRASTRUCTURE

Satellite Imagery Source:
September 2004 Satellite Image obtained from DigitalGlobe Inc.



1:20,000
January 2006
Project Number: N-0 09439.0

Projection: UTM Zone 20
Datum: NAD83

Prepared by: C. Sheppard

Verified by: M. Paznar



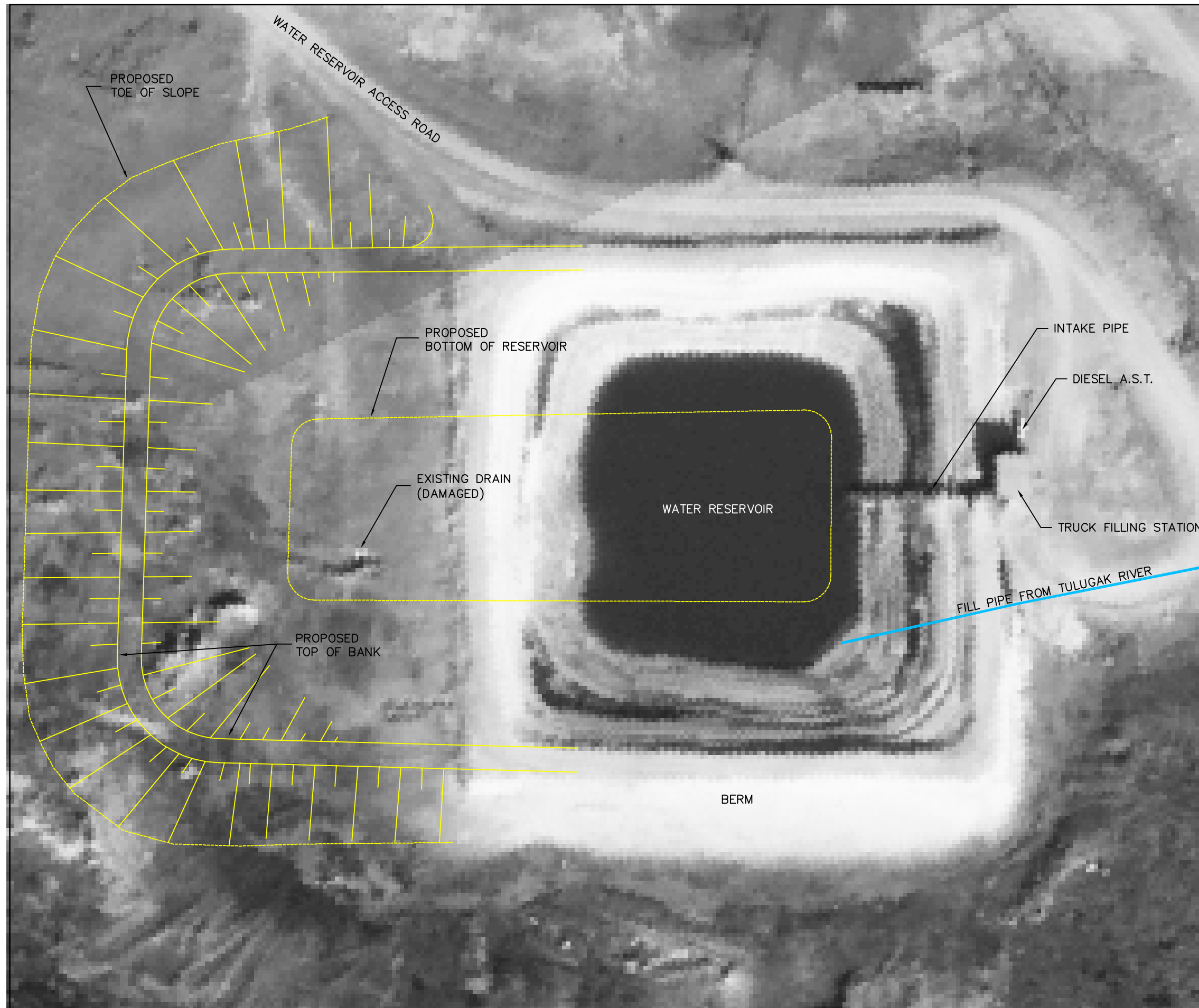
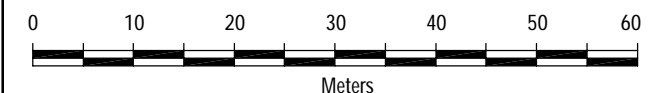
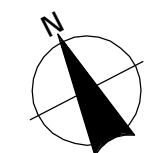


FIGURE 3
THE HAMLET OF QIKIQTARJUAQ
*ENVIRONMENTAL EMERGENCY
CONTINGENCY PLAN*
WATER RESERVOIR SITE

Satellite Imagery Source:
September 2004 Satellite Image obtained from DigitalGlobe Inc.



1:750
January 2006
Project Number: N-O 09439.0

Projection: UTM Zone 20
Datum: NAD83

Prepared by: C. Sheppard

Verified by: M. Paznar





FIGURE 4

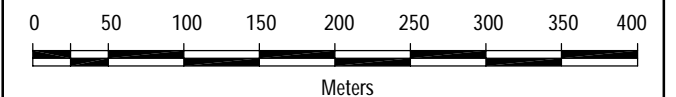
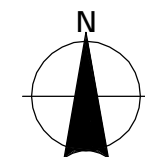
THE HAMLET OF QIKIQTARJUAQ
ENVIRONMENTAL EMERGENCY
CONTINGENCY PLAN

REGIONAL VIEW OF
SEWAGE LAGOON & SOLID
WASTE DISPOSAL FACILITY
(LANDFILL)

Legend

--- INTERPRETED EXISTING SURFACE WATER
FLOW DIRECTION

Satellite Imagery Source:
September 2004 Satellite Image obtained from DigitalGlobe Inc.



1:5,000
January 2006
Project Number: N-0 09439.0

Projection: UTM Zone 20
Datum: NAD83

Prepared by: C. Sheppard

Verified by: M. Paznar



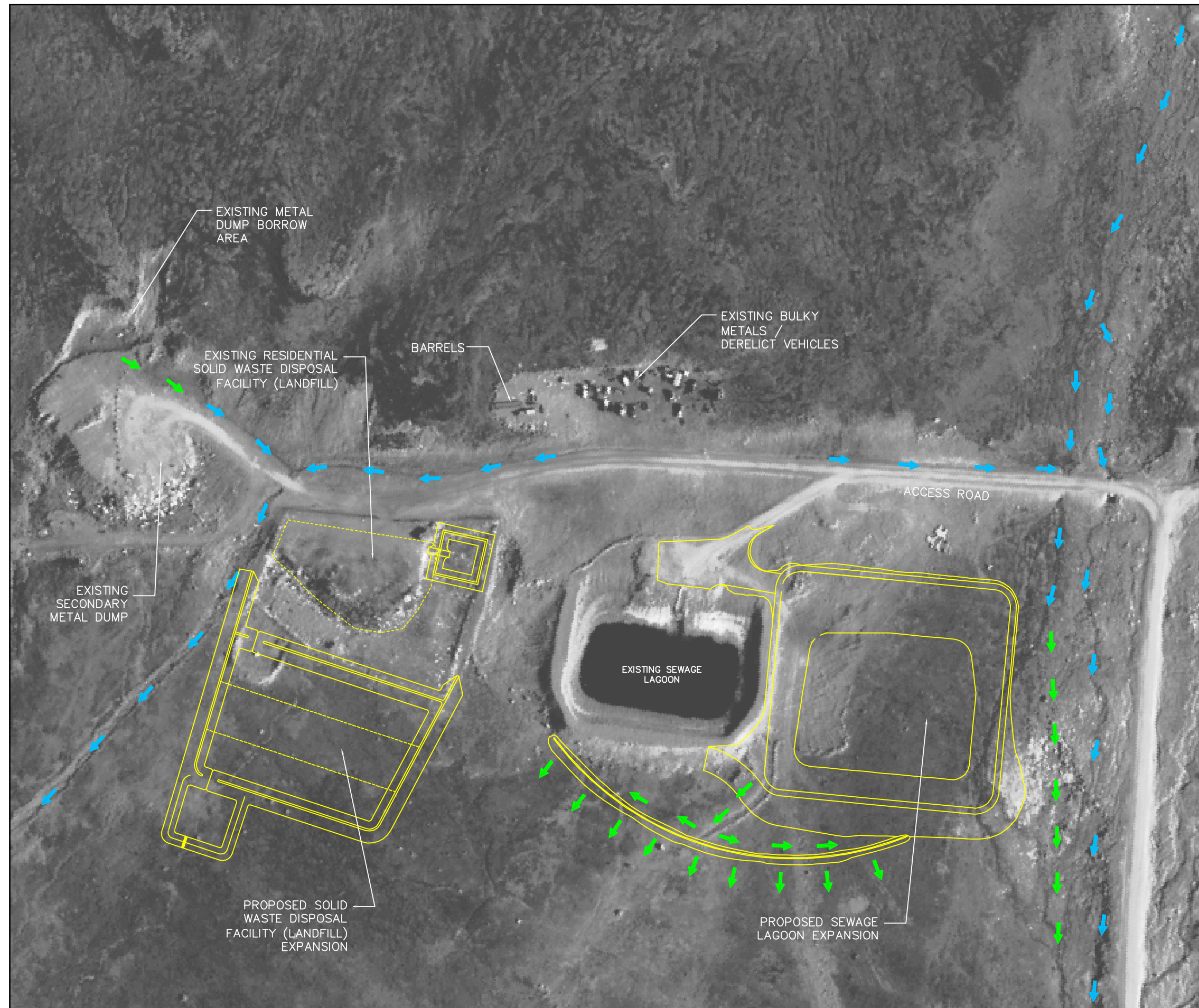
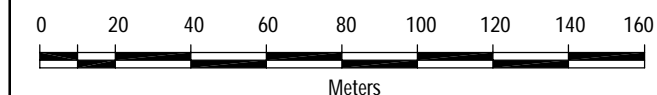
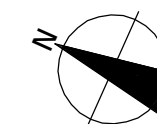


FIGURE 5
THE HAMLET OF QIKIQTARJUAQ
ENVIRONMENTAL EMERGENCY
CONTINGENCY PLAN
SOLID WASTE DISPOSAL
FACILITY (LANDFILL)

Legend

- → EXISTING SURFACE WATER FLOW DIRECTION
→ → PROPOSED SURFACE WATER FLOW DIRECTION

Satellite Imagery Source:
September 2004 Satellite Image obtained from DigitalGlobe Inc.



1:2,000
January 2006
Project Number: N-0 09439.0

Projection: UTM Zone 20
Datum: NAD83

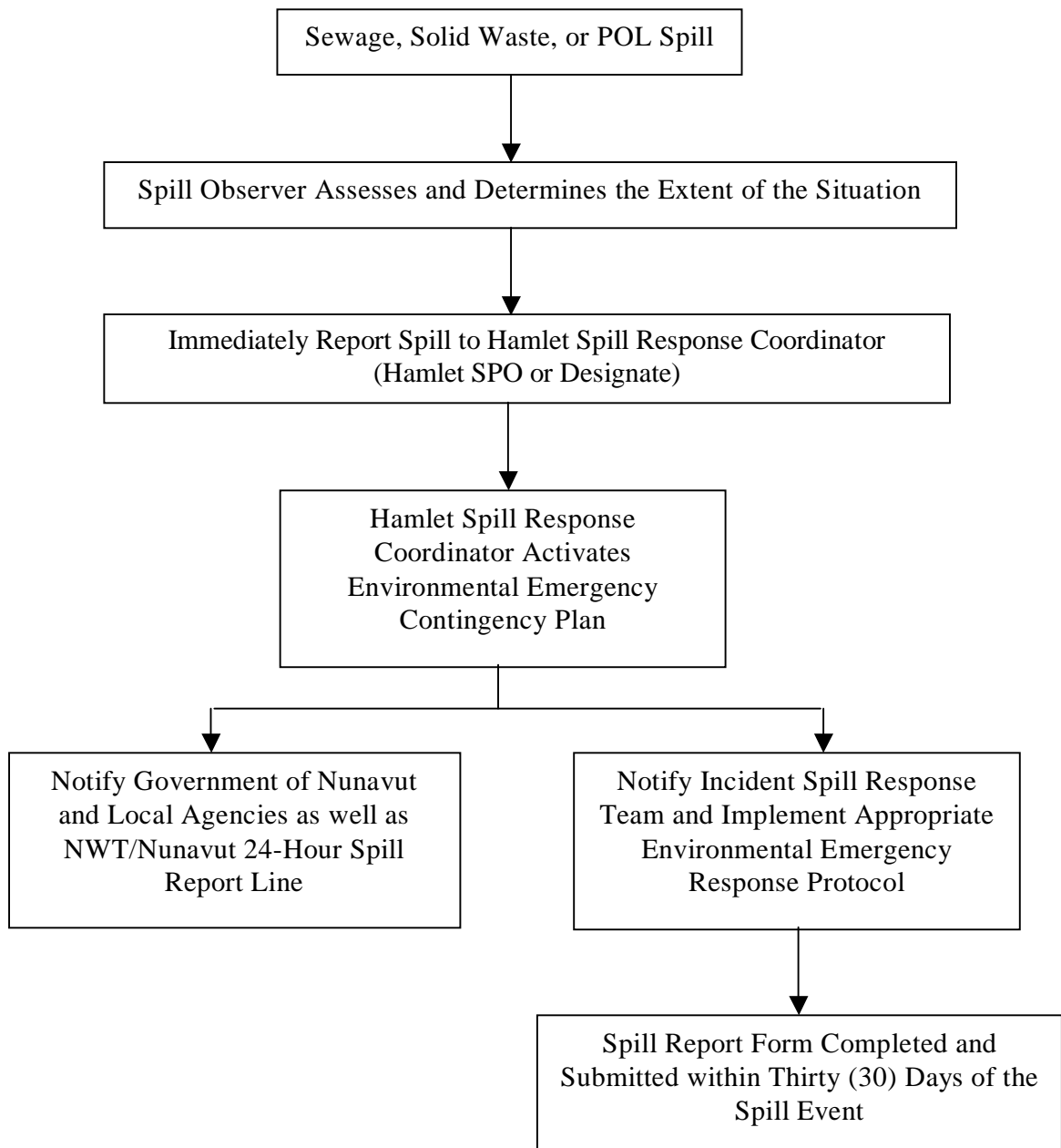
Prepared by: C. Sheppard

Verified by: M. Paznar

February 2006

3.0 Spill Response Organization

The following is a flow chart to illustrate the sequence of events that must be followed in the event of a sewage, solid waste, or POL spill occurring during supply, distribution, collection, transportation, storage, and treatment operations:



Emergency Response Flow Chart

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3.1 Incident Spill Response Team

The Hamlet Senior Administrative Officer (SAO) or his/her Designate will serve as the Spill Response Coordinator for the Hamlet in the event of a sewage or POL spill during collection and transport operations. The SAO of the Hamlet of Qikiqtarjuaq will appoint and train appropriate personnel to make up the Incident Spill Response Team, which normally consist of the following personnel:

- Spill Response Coordinator Hamlet SAO (or Designate)
- Hamlet Works Personnel Will generally vary from 3-7 people throughout the year

The responsibilities of the Spill Response Coordinator are as follows:

1. Assume complete authority over the spill scene and coordinate all personnel involved
2. Evaluate the spill situation and develop overall plan of action
3. Activate the *Environmental Emergency Contingency Plan* for the Hamlet of Qikiqtarjuaq
4. Immediately report the spill to the NWT/Nunavut 24-Hour Spill Report Line at (867) 920-8130, and other applicable regulatory or assistance agencies
5. Provide regulatory agencies with information regarding the status of the clean-up activities
6. Act as a spokesperson on behalf of the Hamlet of Qikiqtarjuaq with regulatory agencies, the public, and the media
7. Prepare and submit a report on the spill incident to regulatory agencies within 30 days of the event.

3.2 Contact Information

A complete listing of contact information, including telephone numbers of standard regulatory agencies, Hamlet personnel, and assistance agencies who may be contacted to supply resources, expertise, and advise needed to deal with a spill emergency is included in Appendix A.

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4.0 Spill Reporting Procedure

The Spill Response Coordinator must be notified immediately by any individual who is aware of any spill either by phone, radio, or in person.

The following is the incident reporting procedures once the Spill Response Coordinator activates this Environmental Emergency Spill Contingency Plan:

1. Report spill immediately to the 24-Hour NWT/Nunavut Spill Report Line Phone (867) 920-8130 (Section 4.1)
2. Report immediately to the INAC Manager, Water Resources in Iqaluit at (867) 975-4550
3. Notify Hamlet of Qikiqtarjuaq Fire Department
4. Fill out the NWT/Nunavut Spill Report Form (Appendix B) within thirty (30) days of the spill event occurring.

4.1 NWT/Nunavut Spill Report Line

All spills as defined in this document must be reported immediately to the 24-hour NWT/Nunavut Spill Report Line. Gather the following information prior to making the call:

- Date and time of spill (if known)
- Location and map coordinates (if known) and direction of flow of spill materials if moving
- Party responsible for spill
- Product/material spilled and estimate of the quantity
- Cause of spill
- If the spill has been stopped or if it is continuing
- Extent of contaminated area
- Factors affecting spill or recovery, such as weather conditions or terrain
- If containment of spill is available
- Action taken or proposed
- If assistance is required
- Possible hazards to person, property or environment (e.g. fire, drinking water, fish, wildlife, etc.).

The information collected should be brief, and quick estimates made so the Spill Report Line and the Spill Response Coordinator can assess the situation. The information is similar to that required in boxes B, D, E, F, G, H, I, J, K, L, M, N, O, and P on the spill report form that must be completely fill out in thirty days, and available in Appendix B.

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5.0 Action Plans

5.1 Initial Action

The instructions to be followed by the first person on the spill scene are as follows:

1. Always be alert and consider your safety first
2. If possible, estimate the volume of material that has been spilled
3. Assess the hazard of people in the vicinity of the spill
4. If possible, and safety permits, attempt to stop the release of product to minimize potential for environmental impacts
5. Immediately report the spill to the Spill Response Coordinator
6. Resume any effective action to contain, mitigate, or terminate the flow of the spilled material.

5.2 Environmental Health Protection and Mitigation Measures

The environmental protection and mitigation measures outlined in the following sections are to be taken by all personnel responding to a spill event and to reduce the chance of environmental impairment and health hazards due to spill, release, or other incident.

5.2.1 General Procedures

The following general clean-up procedures shall apply for all spill areas within the Hamlet:

- Always wear personnel protective equipment (PPE)
- Smoking is prohibited during all spill response activities
- Eliminate all ignition sources
- Contain spills on soil or rock by construction of earthen dykes using available material. If soil is not available, place sorbent materials or a boom in the path of the spill. As the sorbent barrier becomes saturated, continually replace it. Fuel or other liquids lying in pools, or trenches are to be removed with pumps, buckets, or skimmers
- If the ground is snow covered, create snow dykes, and line with a chemically-compatible liner for containment and recover of liquid
- For fuels on water, deploy containment booms, and recovery as much fuel as possible with a work boat and skimmer if the area has less than 1/10th ice cover. If the area is ice infested, burn any fuel spills using igniters
- Apply sorbets, if necessary
- Assess potential for disturbance of wildlife, fish, and archaeological sites by spill or clean-up operations

Environmental Emergency Contingency Plan for
Water, Sewage, and Solid Waste Operations in the
Hamlet of Qikiqtarjuaq, Nunavut

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- Notify environmental authorities to discuss available and feasible disposal and clean-up options
- Conduct required clean-up operations
- Assess and appropriately treat any areas disturbed by clean-up activities with laboratory testing
- Ensure the site has been completely restored and cease operations, only when all work is finalized and laboratory testing confirmed.

Specific procedures relating to mitigating measures for specific contaminants following below:

5.3 Mitigative Measures: Sewage, Gasoline, Diesel Fuel, Hydraulic Fluid, Lubricating Oil and Aviation Fuel

If possible, and safety permits, stop the flow of product, which is occurring, and eliminate all ignition sources. ***Smoking is prohibited during all spill response activities.***

5.3.1 POL Spill on Soil, Gravel, Rock, or Vegetation

- Build a containment berm using soil material or snow and place a plastic tarp at the foot of the berm for easy capture of the spill after all vapors have dissipated
- Remove the spill by using absorbent pads or excavating the soil, gravel or snow
- Remove spill splashed on vegetation using particulate absorbent material
- If soil, gravel, or vegetation are to be removed from the site, the Hamlet shall contact regulatory agencies for approval before commencing with the removal.

5.3.2 POL Spill On Water

- Use containment boom to capture spill for recovery after vapors have dissipated
- Use absorbent pads to capture small spills
- Use a petroleum skimmer for larger spills.

5.3.3 POL Spill on Ice and Snow

- Build a containment berm around spill using snow
- Remove spill using absorbent pads or particulate sorbent material
- The contaminated ice and snow must be scraped and shoveled into plastic buckets with lids, 205 litre drums, and/or polypropylene bags.

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5.3.4 POL-Contaminated Material Storage and Transfer

All contaminated water, ice, snow, soil, and clean up supplies will be stored in closed, labeled containers. All containers will be stored in a well ventilated area away from incompatible materials.

5.3.5 Disposal

Contact Federal and Territorial regulatory agencies to identify appropriate disposal methods before disposing of contaminated material. ***No contaminated material is to be disposed of in any Facility operated by the Hamlet of Qikiqtarjuaq without the express written consent of the Nunavut Water Board.***

5.4 Mitigative Measures: Ethylene Glycol Antifreeze

If possible, and safety permits, stop the flow of product, which is occurring.

5.4.1 Ethylene Glycol Spill on Soil, Gravel, Rock, or Vegetation

- Build a containment berm using soil material or snow and place a plastic tarp at the foot of the berm for easy capture of the spill
- Remove the spill by using absorbent pads or excavating the soil, gravel, or snow
- Remove spill splashed on vegetation using particulate absorbent material
- If soil, gravel, and/or vegetation must be removed from the spill site, the Hamlet shall contact the appropriate regulatory agencies for approval before commencing with the removal.

5.4.2 Ethylene Glycol Spill On Water

Use containment boom to capture spill, and pump contaminated water into 205 L drums.

5.4.3 Ethylene Glycol Spill On Ice and Snow

- Build a containment berm around spill using snow
- Remove spill using particulate sorbent material
- The contaminated sorbent material, ice and snow must be scraped and shoveled into plastic buckets with lids, 205 litre drums, and/or polypropylene bags.

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5.4.4 Ethylene Glycol Storage and Transfer

All contaminated water, ice, snow, soil, and clean up supplies will be stored in closed, labeled containers. All containers will be stored in a well ventilated area away from incompatible materials.

5.4.5 Disposal

Contact Federal and Territorial regulatory agencies to identify appropriate disposal methods before disposing of contaminated material. ***No contaminated material is to be disposed of in any Facility operated by the Hamlet of Qikiqtarjuaq without the express written consent of the Nunavut Water Board.***

5.5 Mitigative Measures: Sewage

If possible, and safety permits, stop the flow of product, which is occurring.

5.5.1 Sewage Spill on Soil, Gravel, Rock, or Vegetation

- Build a containment berm using soil material or snow and place a plastic tarp at the foot of the berm for easy capture of the spill, and to prevent sewage from entering any water body
- Remove the spill by using vacuum trucks or excavating the soil, gravel, or snow
- If soil, gravel, and/or vegetation must be removed from the spill site, the Hamlet shall contact the appropriate regulatory agencies for approval before commencing with the removal.

5.5.2 Sewage Spill into Water

- Use containment boom to capture spill, and pump contaminated water into vacuum trucks
- Deposit contaminated water to the Hamlet sewage lagoon
- Monitor the affected water body sampling at a minimum for Biological Oxygen Demand (BOD), Total Suspended Solids (TSS), ammonia (NH₃), and faecal coliforms (FC).

5.5.3 Sewage Spill on Ice and Snow

- Build a containment berm around spill using snow
- Remove spilled sewage and contaminated snow and ice to the Hamlet sewage lagoon.

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5.5.4 Sewage Storage and Transfer

All contaminated water, ice, snow, soil, and clean-up supplies will be deposited to the Hamlet sewage lagoon or landfill facility, as appropriate.

5.6 Mitigative Measures: Solid Waste

5.6.1 Solid Waste Spill on Soil, Gravel, Rock, or Vegetation

- Physically remove the spilled solid waste from the waste, and deposit to the approved Hamlet Solid Waste Disposal Facility
- If soil, gravel, or vegetation are to be removed from the site, the Hamlet shall contact regulatory agencies for approval before commencing with the removal.

5.6.2 Solid Waste Spill into Water

- Use containment boom to capture soil for recovery
- Physically remove the spilled solid waste from the water, and deposit to the approved Hamlet Solid Waste Disposal Facility
- Capture any sheen from the water using absorbent pads or skimmer, and deposit any used absorbent pads to the approved Hamlet Solid waste Disposal facility.

5.6.3 Solid Waste Spill on Ice and Snow

- Build a containment berm around spill using snow
- Physically remove the spilled solid waste and deposit to the approved Hamlet Solid Waste Disposal Facility
- If soil, gravel, or vegetation are to be removed from the site, the Hamlet shall contact regulatory agencies for approval before commencing with the removal.

5.6.4 Disposal

Any solid waste shall be removed to the approved Hamlet Solid Waste Disposal Facility.

5.7 Spill Recovery Assessment

In order to determine whether a spill has been successfully remediated, samples of the soil and/or water within the spill containment area and surrounding the area, are to be collected and sent to an accredited Canadian Association of Environmental Analytic Laboratories (CAEAL) laboratory to be analyzed for the chemical parameters contained in the spill material. If concentrations of the spill chemicals are not detected, or are at

Environmental Emergency Contingency Plan for
Water, Sewage, and Solid Waste Operations in the
Hamlet of Qikiqtarjuaq, Nunavut

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concentrations below the applicable Territorial, Federal, or CCME regulations/criteria, the spill clean-up will be determined a success. Clean-up operations may then cease.

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6.0 Spill Response Resource Inventory

6.1 Additional Personnel Available

In addition to Hamlet staff, approximately 10 people are available from the Qikiqtarjuaq Fire Department, to assist in spill response and clean-up activities. Personnel from the local RCMP Detachment will be available for securing the site from unauthorized individuals, closing roads, etc. The Community Health Centre have personnel to assist in the treatment of anyone injured during the emergency.

6.2 Spill Response Equipment Inventory

Equipment available within the community to assist in responding to a hazardous materials spill includes heavy equipment (i.e. vacuum trucks, dozer, front end loader, and grader), as well as various hand held tools including shovels. In addition, three spill kits should be available on site during spill incident response operations. Each spill kit should contain the following supplies.

Composition of Spill Kit

	Quantity
• 360 litre polyethylene over pack drum	1
• oil sorbent booms (5" X 10')	6
• oil sorbent sheets (16.5" X 20" X 3/8")	100
• drain cover (36" X 36" X 1/16")	1
• Caution tape (3" X 500')	1
• 1 lb plugging compound	1
• Nitrile gloves (pair)	4
• Safety goggles (pair)	4
• Tyvek coveralls (pair)	4
• instruction booklet	1
• printed disposable bags (24" X 48")	10

Sorbent capacity of each spill kit is 240 litres.

All equipment is generally stored at the Hamlet Operations Yard/Garage. Some equipment may be stored in other areas throughout the community while being used to complete tasks.

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7.0 Training

All employees working for the Hamlet of Qikiqtarjuaq should be trained in the safe operation of all machinery and tools to help prevent sewage and hazardous material spills. All employees on site should also be trained for initial spill incident response. Annual refresher exercises should be conducted to review the procedures of this *Environmental Emergency Contingency Plan*, with all individuals involved in the Incident Spill Response Team, including members of the local volunteer fire department, RCMP Detachment, and Community Health Centre.

Incident Spill Response Team training should include the following aspects:

- Spill awareness and prevention
- Methods of detection
- Types of spills and seasonal considerations
- Reporting procedures and initial responses
- Spill response kit familiarization
- Clean-up and site remediation methods
- Occupational health and safety including proper selection and use of PPE's.

February 2006

8.0 Annual Review of this Environmental Emergency Contingency Plan

As part of the preparation of the Annual Report to the Nunavut Water Board for the Water License, the Hamlet should review and update the information contained within this plan. The purpose of the update is to ensure all changes to regulations are incorporated into this plan, along with the use of any new technology or method advances, to prevent or stop a spill and to mitigate and/or remediate a spill. This ensures that the plan adapts as the Hamlet grows, to ensure the community is properly prepared in the event of an incident.

Finally, it is recommended that annual refresher training of personnel be completed after any revisions to this document have been approved. This will familiarize personnel with the updated plan, and to provide a rapid and coordinated response.

Environmental Emergency Contingency Plan for
Water, Sewage, and Solid Waste Operations in the
Hamlet of Qikiqtarjuaq, Nunavut

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9.0 References

Nunavut Water Board, September 2000. *Hamlet of Qikiqtarjuaq Water License NWB3Q1K0106*. Goja Haven, Nunavut.

Nunavut Water Board, November 2004. *Guidelines for Spill Contingency Planning*. Goja Haven, Nunavut.

Northwest Territories, Date Unknown. *Contingency Planning and Spill Reporting in the NWT: A Guide to the New Regulations*, Yellowknife, Northwest Territories.

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Appendix A

Contact Information

Appendix A
Contact Information

Contact	Location	Telephone	Fax
Hamlet of Qikiqtarjuaq Senior Administrative Officer or Designate	Qikiqtarjuaq	(867) 927-8832	(867) 927-8120
Northwest Territories/Nunavut 24 Hour Spill Report Line	Iqaluit	(867) 920-8130	(867) 873-6924
Indian and Northern Affairs Canada Water Resources Manager Nunavut Regional Office	Iqaluit	(867) 975-4550	(867) 975-4585
Nunavut Water Board	Gjoa Haven	(867) 360-6338	(867) 360-6369
Environment Canada Environment Protection Branch Inspector	Iqaluit	(867) 975-4644	(867) 975-4594
Manager Pollution Control and Air Quality Environmental Protection Government of Nunavut	Iqaluit	(867) 975-5907	(867) 975-5981
Indian and Northern Affairs Canada Land Administration Minister Nunavut Regional Office	Iqaluit	(867) 975-4280	(867) 975-4286
Department of Fisheries and Oceans Canada Nunavut Regional Office	Iqaluit	(867) 979-8000	(867) 979-8039
Fire Department	Qikiqtarjuaq	(867) 927-4422	N/A
Royal Canadian Mounted Police (RCMP) Detachment	Qikiqtarjuaq	(867) 927-0123	N/A
Community Health Centre	Qikiqtarjuaq	(867) 927-8916	N/A

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Appendix B
NWT Spill Report



NWT SPILL REPORT

(Oil, Gas, Hazardous Chemicals or other Materials)

24 – Hour Report Line
Phone: (867) 920-8130
Fax: (867) 873-6924

A Report Date and Time		B Date and Time of spill (if known)		C <input type="checkbox"/> Original Report <input type="checkbox"/> Update no. _____		Spill Number	
D Location and map coordinates (if known) and direction (if moving)							
E Partly responsible for spill							
F Product(s) spilled and estimated quantities (provide metric volumes/weights if possible)							
G Cause of spill							
H Is spill terminated? <input type="checkbox"/> yes <input type="checkbox"/> no		I If spill is continuing, give estimated rate		J Is further spillage possible? <input type="checkbox"/> yes <input type="checkbox"/> no		K Extent of contaminated area (in square meters if possible)	
L Factors effecting spill or recovery (weather conditions, terrain, snow cover, etc.)				M Containment (natural depression, dikes, etc.)			
N Action, if any, taken or proposed to contain, recover, clean up or dispose of product(s) and contaminated materials							
O Do you require assistance? <input type="checkbox"/> no <input type="checkbox"/> yes, describe:				P Possible hazards to person, property, or environment; eg: fire, drink water, fish or wildlife			
Q Comments or recommendations						FOR SPILL LINE USE ONLY	
						Lead agency	
						Spill significance	
						Lead Agency contact and time 	
Is this file now closed? <input type="checkbox"/> yes <input type="checkbox"/> no							
Reported by		Position. Employer, Location			Telephone		
Reported to		Position. Employer, Location			Telephone		



Appendix F
Monitoring Program Quality
Assurance/Quality Control Plan



Quality Assurance/Quality Control Plan for
Hamlet Water Reservoir, Sewage Lagoon, and
Solid Waste Disposal Facility Monitoring Program
Hamlet of Qikiqtarjuaq, Nunavut

Prepared for

The Hamlet of Qikiqtarjuaq
P.O. Box 4, Qikiqtarjuaq NU X0A 0B0 Canada

Prepared by

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Box 175, 25 Third Avenue Rankin Inlet NU X0C 0G0 Canada
15 Townline Orangeville ON L9W 3R4 Canada

Revised Date

February 2006

File No: N-O 09439.0

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1.0 Introduction

The Hamlet of Qikiqtarjuaq (meaning “big island”), is a Community of approximately 599 people located on the eastern coast of Baffin Island and on an island known as Broughton Island in the territory of Nunavut. As illustrated in Figure 1, the Hamlet is located approximately 470 kilometers northeast of the Capital City of Iqaluit, a distance that is covered by plane in about one hour. The geographic coordinates for the Hamlet of Qikiqtarjuaq are 67°33’ north latitude and 64°02’ west longitude. As indicated on Figure 2, the community is situated on the northwest portion of Broughton Island.

The Hamlet provides trucked water and sewage services, along with regular solid waste collection for the residents, businesses and institutions. Historically, water is drawn from the Tulugak River during the summer, and from the lined earthen reservoir for the remainder of the year. Sewage is collected by truck from individual holding tanks at each building and discharged to the unlined sewage lagoon located to the east of the community north of the DEW Line Access Road. Sewage treatment is provided by a retention lagoon, with the treated effluent charge flowing north towards the ocean through a naturally occurring wetland treatment area. Solid waste is disposed of at a facility located adjacent to the sewage lagoon. The solid waste disposal facility includes areas for bulky metals/derelect vehicles, barrels, metal dump borrow, secondary metal, and residential solid waste.

1.1 Purpose

The Quality Assurance/Quality Control Plan has been prepared to meet the requirements of the Monitoring Program developed for the Hamlet of Qikiqtarjuaq to comply with licensing requirements. A copy of the current license is included in Appendix A.

Quality Assurance (QA) and Quality Control (QC) are vitally important components of environmental management for the Hamlet of Qikiqtarjuaq. Contact information for the Hamlet is provided in Appendix B.

1.2 Objectives

The Plan has been developed to achieve the following objectives:

- To ensure that all samples taken in the field will follow procedures and controls in order to maintain a high quality, so that the results obtained represent both the physical and chemical nature of the samples being taken
- To ensure best management practices (BMP) are used throughout the sampling program

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- To ensure all samples are delivered promptly to an accredited laboratory for analysis.

This document describes the procedures and controls to be used by Hamlet operations staff when conducting environmental sampling to meet the requirements of the license.

Although the QA/QC Plan is submitted to the NWB as a condition of the water license, it is primarily intended to be read, understood, and implemented by Hamlet operations personnel responsible for environmental quality monitoring. The procedures should be applied to **all** water quality samples taken by the Hamlet.

1.3 Quality Assurance and Quality Control

Quality Assurance is a set of operating principles that, if strictly followed during sample collection and analysis, will produce data of known and defensible quality (Wilson, 1995). As such the accuracy of the analytical results can be stated with a high level of confidence. A high level of quality assurance can be achieved by applying the following principles:

- Personnel involved in water sampling and analysis are well trained
- Facilities and equipment required for sampling are suitable, well maintained, and always kept clean
- Standard procedures are developed and implemented for the collection, transportation and analysis of samples, based on recognized BMP
- Laboratory and field instruments are calibrated according to manufacturers recommendations or recognized as good operating practice
- Supplies used in sampling and analysis are of consistent high quality and are not expired
- Quality Control (QC) procedures are development and implemented based on good operating practices to assess quality of analytical data and provide warning of unacceptable errors
- Implement prompt remedial action when deficiencies are identified
- Results of the monitoring program are reported in the Annual report as required in the water license. Annual report is required to be submitted by March 31 for the pervious calendar year to the NWB sample form can be found in Appendix C.

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Quality Control (QC) is a set of specific procedures used to measure the quality of the data produced and correct deficiencies in the sampling or analyses, as they occur. Quality control is used by the analyst and sampler to achieve standards of measurement for the three principles components of quality: precision, accuracy and reliability.

1.4 Lab Accreditation

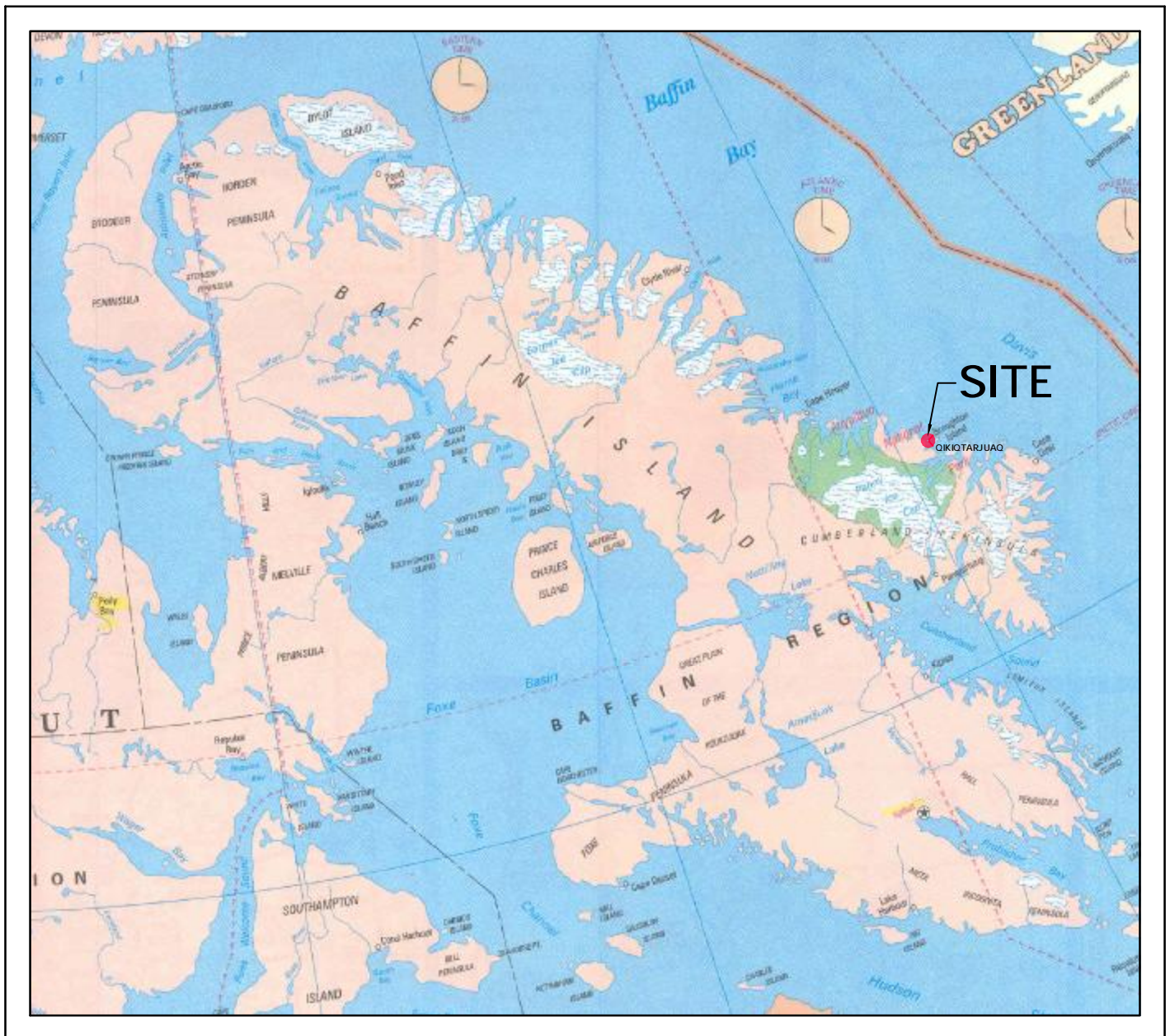
All analyses shall be conducted in laboratories, which are accredited by the Canadian Association of Environmental Analytical Laboratories (CAEAL), unless otherwise approved by an Analyst. The Contact information for the DIAND Analyst for Nunavut is provided in Appendix A.

The following is the contact information for the Laboratory retained by the Hamlet of Qikiqtarjuaq to complete analysis:

Name of Laboratory	_____
Address	_____

Phone No.	_____
Fax No.	_____

Prior to sampling being undertaken by representatives of the Hamlet, the Hamlet shall notify the NWB of the Laboratory to be used to perform the analysis. This is required as per the Water License.



Map Reference:
Map of Canada
Published by the CAA



FIGURE 1 - SITE LOCATION MAP

THE HAMLET OF
OIKIQTARJUAQ, NUNAVUT

QUALITY ASSURANCE/QUALITY CONTROL PLAN

January 2006
Project Number: N-O 09439.0

Prepared by: K. Pridham

Verified by: M. Paznar



BURNSIDE



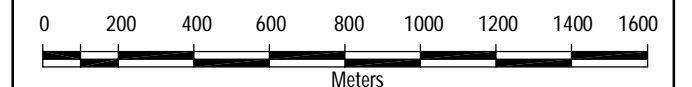
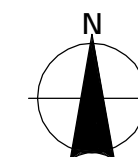
FIGURE 2
THE HAMLET OF QIKIQTARJUAQ
QUALITY ASSURANCE/QUALITY CONTROL
PLAN

SATELLITE IMAGERY OF
ENTIRE COMMUNITY
AND INFRASTRUCTURE

Legend

X QIK - 1 SAMPLING STATION LOCATION

Satellite Imagery Source:
 September 2004 Satellite Image obtained from DigitalGlobe Inc.



1:20,000
 January 2006
 Project Number: N-O 09439.0

Projection: UTM Zone 20
 Datum: NAD83

Prepared by: C. Sheppard

Verified by: M. Paznar

February 2006

2.0 Field Sampling

2.1 Sample Collection

Effluent and surface water sampling by the Hamlet of Qikiqtarjuaq is conducted to provide information for the Hamlet for effective environmental management and to monitor regulatory compliance.

2.1.1 Sampling Location and Frequency

The Monitoring Program of the water license prescribes the specific effluent and surface water monitoring program for the Hamlet. It includes detailed information such as where to take samples, how often to take samples and what parameters will be analyzed on the collected samples. The proposed Monitoring Program is summarized in Table 1.

Table 1: Surveillance Network Program for Water License NWB3Q1K0106

Station	Description	Frequency	Analysis Requirements
QIK -1	Raw water supply intake at the Tulugak River	Monthly from May to August prior to refilling reservoir	<p>Measure volume of water drawn from river</p> <ul style="list-style-type: none"> • Total Ammonia-N • Total Organic Carbon (TOC) • Total Suspended Solids • Chloride (Cl) • Nitrate (N) • Total Arsenic (As) • Total Chromium (Cr) • Total Copper (Cu) • Total Lead (Pb) • Total Mercury (Hg) • Total Sodium (Na) Microbiological • Heterotrophic plate count (HPC) • Coliform • Colour • pH • Turbidity • Nitrite (N) • Sulphate (SO₄) • Total Cadmium (Cd) • Total Cobalt (Co) • Total Iron (Fe) • Total Manganese (Mn) • Total Nickel (Ni) • Total Zinc (Zn) • Background • Escherichia coli (E.coli)

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Station	Description	Frequency	Analysis Requirements
QIK - 2	Raw water supply intake at the reservoir truck fill station	Monthly from May to August	Measure volume of water drawn from reservoir
QIK - 3	Raw sewage from pump out truck	Monthly from May to August	Amount deposited to lagoon
QIK - 4	Discharge from the FINAL DISCHARGE POINT OF SEWAGE DISPOSAL FACILITIES	Monthly during periods of flow	<ul style="list-style-type: none"> • BOD • Total Suspended Solids • Conductivity • Oil and Grease • Magnesium • Sodium • Chloride • Total Hardness • Ammonia Nitrogen • Total Cadmium • Total Cobalt • Total Chromium • Total Copper • Total Aluminum • Faecal Coliform • pH • Nitrate-Nitrite • Total Phenols • Calcium • Potassium • Sulphate • Total Alkalinity • Total Zinc • Total Iron • Total Manganese • Total Nickel • Total Lead
QIK - 5	Runoff from the Solid Waste Disposal Facility	Monthly during periods of flow	Same as STN QIK - 4

The sampling stations will be clearly identified in the field by posted signs. All signs shall be in the Official Languages of Nunavut, and shall be located and maintained to the satisfaction of an Inspector. Each sampling location must have their Global Positioning System (GPS) coordinates determined. Table 2 provides an estimate of the GPS coordinates based on the satellite imagery shown in Figure 2. These locations must be confirmed by the Inspection, and the coordinates updated if necessary.

Table 2: GPS Locations of SNP Sampling Stations

Station	GPS Coordinates (Easting, Northing)
QIK - 1	458912, 7493383
QIK - 2	458740, 7493463
QIK - 3	458962, 7495017
QIK - 4	458091, 7495340
QIK - 5	458754, 7495176

February 2006

Samples shall be taken at the same location on each sampling occasion, unless the Inspector has approved a new location.

Additional sampling and analysis may be requested by an Inspector.

Note: The License also describes the sampling station QIK-1 as the raw water supply prior to treatment. The Hamlet is not required to take samples at this site to comply with the water license. Samples for QIK-1 shall be taken by the Indian and Northern Affairs Canada (INAC) and/or GN Environmental Health Office (EHO).

2.1.2 Sample Planning

To understand what sample containers, sampling techniques, and preservation methods are required, Hamlet personnel first need to understand what parameters will be analyzed in the laboratory. Table 3 is a summary of parameters required in the License, which are grouped according to their different sampling requirements:

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Table 3: Parameters Examined in NWB Water Licenses

Group	Description	Parameter
I	Microbiological	Biological Oxygen Demand (BOD) Fecal Coliform (FC)
II	General Water Chemistry	pH Conductivity Total Alkalinity Total Suspended Solids (TSS) Ammonia Nitrogen (NH ₃ -N) Nitrate-Nitrite (NO ₃ -NO ₂) Oil and Grease (OGG) (Visual) Sulphate (SO ₄) Sodium (Na) Total Organic Carbon (TOC) Potassium (K) Magnesium (Mg) Calcium (Ca) Total Hardness Chloride (Cl)
	Total Metals (except Mercury):	Total Nickel (Ni) Total Aluminum (Al) Total Arsenic (As) Total Cadmium (Cd) Total Copper (Cu) Total Cobalt (Co) Total Chromium (Cr) Total Iron (Fe) Total Lead (Pb) Total Manganese (Mn) Total Zinc (Zn)
III		Total Mercury (Hg)
IV		Total Phenols (Total-P)

It is strongly recommended that the Hamlet seek advice for the sizes and types of buffers required for analysis of the parameters required. Furthermore, it is recommended that the laboratory pre-fill the sample collection bottles with the proper preservative to minimize error in the field.

All of the samples taken will be grab samples. Samples will normally be taken from natural lakes, streams, treatment ponds, or process streams. Where possible, samples

February 2006

shall be taken from just below the surface to avoid floating debris, which may contaminate the sample.

Freshwater Streams, Surface Drainage, and Wetlands

The samples shall be collected as close to the middle of the stream where water flows freely and is free of debris. After getting into position, the sampler shall wait to allow any stirred sediment that occurred from entering the stream to settle or wash away. The sample bottle shall be partially filled with the water to be sampled and rinsed with the lid in place at least three times. Rinse water shall be emptied downstream of the sampling point, so that stream sediments remain undisturbed. **Prior to sampling for oil/grease, bacteria, and for any bottles containing preservative, the bottles shall not be rinsed.**

If possible, bottles shall be plunged into the stream to a depth of approximately half the total stream depth, and allow it to fill with the mouth of the bottle facing upstream. Where stream is too shallow to allow for sample bottle to be filled completely, without disturbing bottom sediment of the streambed. The sampler may use a smaller container that has been properly rinsed to transfer sample to the larger bottle. Do not use a smaller sample bottle containing preservatives.

When taking the sample, sufficient room shall be left to allow for the addition of preservatives, if required.

Lakes or Ponds

Surface sampling shall be collected using the same procedures as streams. Sample bottles shall be plunged to approximately 150 mm (6 inches) below the water surface.

Although not currently required under the Monitoring Program, information on water quality at various depths in lakes or ponds may be required. If an Inspector requests that this sampling be carried out, specific procedures shall be implemented in accordance with accepted sampling and good engineering practice.

Process Streams

When sampling a process stream (i.e. valve or pipe discharge) the sampler shall collect a grab sample or a set of composite samples collected over an extended period of time. In the case of sampling from a valve, valves shall be open and running for a least one-minute before taking the sample to ensure that a representative sample of the process stream is taken.

2.1.3 Sample Container Selection

Sample containers vary in size and material of construction depending on the specific type of analysis to be conducted. Sample containers for each analysis are shown in Table

February 2006

2. Sample containers to be used shall be obtained directly from the laboratory, which shall provide new containers to the Hamlet specific for the sampling program requested by the Hamlet. The laboratory will provide the correct sizes and types of bottles based on the parameters required. The Hamlet shall **contact the laboratory at least one month prior to sampling event** in order to ensure that containers are available for sampling. Refer to Section 1.3 for laboratory contact information.

2.1.4 Field Sampling Log

The individual collecting the water sample shall record the following at the time of sampling:

- Date of sampling
- Time of sampling
- Weather conditions
- Monitoring Station Number (i.e. QIK-2, QIK-3, QIK-4, etc.)
- Results of any Field measurements
- Sampler shall also indicate if sample used preservatives
- Any unusual conditions
- Any deviation from standard procedures.

2.1.5 Field Measurements

No field measurements are required as part of the Hamlet sampling program, however, it is strongly recommended that the following parameters be sampled immediately on site using appropriate portable field equipment:

- pH
- Temperature
- Dissolved oxygen
- Total alkalinity
- Turbidity
- Chlorine residuals.

It is important that separate equipment be used to sample between potable water and non-potable water (i.e. surface water). Furthermore, all instruments, glassware, etc. should be cleaned between each sample following manufacturer's recommended guidelines and/or BMPs.

2.1.6 Sampling Procedures

The sampling procedures described in Table 4 shall be used to collect water samples appropriate to the sampling location.

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Table 4: General Procedures for Sample Collection

	BIOLOGICAL	PHYSICAL	INORGANIC	ORGANIC
Phase 1: Sample Program Design	Step 1: Choose sample locations, sample frequency, and analytes to be measured Step 2: Contact laboratory used for analysis and get advice and information for sampling program Step 3: Contact manager of sample location facility; determine all safety requirements Step 4: Create sample identification system			
Phase 2: Sample Program Preparation	Step 1: Obtain sample containers, storage containers, distilled water, Personal Protective Equipment (PPE), and other required equipment Step 2: Create sample labels and apply to sample containers Step 3: Plan first sampling event - arrange all transportation and notify laboratory			
	♻ 1000 mL plastic or glass container for BOD ♻ 300 mL plastic or glass container for fecal coliform	♻ Have equipment needed for any flow or temperature measurements ♻ 200 mL plastic or glass container for suspended solids	♻ Electrode meter for dissolved oxygen and pH ♻ 1000 mL nitric acid rinsed container, nitric acid for preservation, and filter for metals ♻ Specific containers and preservatives for nutrients or other analytes	♻ 1000 mL plastic or glass container, hydrochloric or sulfuric acid, for oil and grease
Phase 3: Sample Collection	Step 1: Keep sample containers closed until used Step 2: Record the date, time, location, geographic position, weather conditions, and other details in a field notebook at each sample location Step 3: Fill out the sample label, including: sample ID, location, date, time, and name of sample collector Step 4: Collect sample using appropriate container, by filling without rinsing, immediately close and keep cool Step 5: Pack all samples and provide a sample information sheet listing all contents in the storage container Step 6: Label the storage container with the recipient, WATER SAMPLES, FRAGILE, THIS END UP, and any TDG or WHMIS labels required			
	♻ BOD - fill container completely and refrigerate, Fecal coliform - leave space at top of container, refrigerate ♻ Maximum storage time: BOD - 24 hrs, Fecal Coliforms - 30 hrs,	♻ TSS - Refrigerate ♻ Maximum storage time: TSS - 7 days, temperature - 0.25 hrs	♻ Fill container and leave a small (1% of volume) air space at the top, refrigerate ♻ Maximum storage time: ammonia - 7 days, nitrate and phosphate - 48 hrs, metals - indefinite, DO and pH - 0.25 hrs	♻ Fill container to top and refrigerate ♻ Maximum storage time: oil and grease - 28 days
Phase 4: Sample Transportation	Step 1: Fill out the "sampler" portion of the Chain of Custody form Step 2: Ensure that all personnel handling the samples fill out a subsequent section of the Chain of Custody form Step 3: Transport the samples to lab for analysis as quickly as possible Step 4: Verify that the lab has received the samples and analysis is underway			

Note: Sizes and types of sample collection containers (bottles) are a suggestion only. The laboratory may suggest and use other sizes and types. Follow the suggestions of a CAEAL accredited laboratory.

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2.1.7 Sample Identification

All samples collected are to be labeled according to standard identification procedures (Name of sampler, time and date of sampling, sample identifier, sampling method and type of sample). **Sample labels shall be water-resistant, and prepared prior to going into the field.** An example of a typical Label is provided in Figure 3.

Figure 3: Example of Water Sample Label

Name of Sampler:	Gill Evans	Sample #:	1 of 15
Date of Collection:	1 May 2006 (0900 hrs)		
Type of Sample:	Grab Water Sample for Microbiological Analysis		
Parameter to be analyzed:	BOD		
Preservation method used:	no preservatives		
Temperature:	11°C	pH:	7.04
Sample Location:	QIK-4		
	Hamlet of Qikiqtarjuaq		
	Qikiqtarjuaq, NU		
	Phone: (867) 927-8943		

2.1.8 Sample Preservation

To obtain good results from a sampling program, time is critical. All samples are to be shipped to the Laboratory that has been contracted to carry out the analysis the same day as they are collected. Samples must be protected from breakage, and shall be shipped in an insulated cooler that can be provided by the Laboratory. **If samples cannot be shipped until the next day, due to unavoidable events such as weather or mechanical problems with transport aircraft, all samples must be stored in a refrigerator at 4°C.** Samples must not be frozen.

In all cases where samples cannot be delivered to the lab on the same day, specific preservatives must be added to the samples to prevent chemical changes that may alter the concentration of the parameters of interest. The samples must be preserved within two hours of sampling. Usually, samples can be preserved away from the field at the end of the site visit. In most cases, the laboratory can fill the bottles with preservative, and then ship them to the Hamlet to be filled and sent back for analysis.

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For the Hamlet of Qikiqtarjuaq, Table 5 provides the appropriate preservation methods for the parameters to be assessed.

Table 5: Sample Preservation

Type of Sample	Preservation Required
Group I Microbiological	Store in refrigerator at 4°C. Ship to Lab the same day as collected
Group II General Water Chemistry	Store in refrigerator at 4°C. Ship to Lab the same day as collected
Group II Total Metals (except mercury)	Acidify with 5 mL of <20 percent nitric acid. Store in refrigerator at 4°C. Ship to Lab the same day as collected
Group III Total Mercury	Acidify with 2 mL of 1:1 sulfuric acid and 5 percent potassium dichromate Store in refrigerator at 4°C. Ship to Lab the same day as collected
Group IV Total Phenols	Acidify with 4 mL of 1:1 sulfuric acid. Store in refrigerator at 4°C. Ship to Lab the same day as collected

Note: 1000 mL = 1 Liter

2.1.9 Sample Transportation

The main objective of the sampler is to minimize any chemical changes to the sample between the time it is collected and delivery to the laboratory. Heat, light and agitation can all impact the water chemistry and the samples shall be protected from these effects.

Effluent and surface water samples shall be stored and transported at a temperature of 4°C. Coolers and ice packs need to be available and are usually provided by the laboratory. Upon arrival at the laboratory, samples shall be refrigerated as soon as possible.

February 2006

3.0 Quality Control

Most commercial laboratories undertake QA/QC procedures with the volume of sample sent for analysis. Reports are usually provided with the Certificates of Analysis. It is recommended that the suggested QA/QC protocols by the laboratory be followed.

To ensure that the monitoring program maintains accepted quality control, field blanks and duplicate samples may be suggested by the laboratory. These samples are collected and analyzed for the sample parameters as the monitoring program in the license as part of a quality control check on monitoring activities.

The Field Blanks shall accompany the sampler into the field, labeled as field blanks, preserved in the field and submitted to the laboratory with the field samples.

3.1 Replicate or Duplicate Samples

Replicate or duplicate samples is the collection of more than one sample for a given sampling station subject to specific analysis. Standard procedures used for the routine sampling shall be applied. The replicate or duplicate samples are useful in identifying problems with accuracy and sampling methods.

Once per operating season for each active monitoring station a set of duplicate samples will be taken, representing as many of the routine analysis as possible. Where possible this shall be carried out in conjunction with the sampling undertaken by an INAC Inspector.

February 2006

4.0 Laboratory Analysis/Reporting

The laboratory will perform the analysis of all samples as outlined in the License. The results shall be received by the Hamlet within the time frame agreed to with the laboratory. The results shall be submitted the NWB for review with the Annual report. The results shall contain the limits of Detection used for analysis of each parameter as supplied by the laboratory.

The Hamlet may request clarification of the Analysis be contacting the NWB Technical Advisor and a review of the analysis will be provided upon request.

February 2006

5.0 Glossary

Quality Assurance (QA): is the definitive program for laboratory operation that specifies the measures required to produce defensible data of known precision and accuracy. QA includes quality control and quality assessment activities.

Quality Control (QC): is a set of measures within a sample analysis methodology to assure that the process is in control.

Quality Assessment: is a process to determine the quality of the laboratory measurements through internal and external QC evaluations. It includes performance evaluation samples, laboratory inter-comparisons samples and performance audits.

February 2006

6.0 References

Nunavut Water Board. *Water License NWB3QIK0106*. Gjoa have, Nunavut.

Wilson, Neal. 1995. *Soil Water and Ground Water Sampling*. CRC Press: New York, USA.

J:\2006\F\NUNA\08983\Reports\Quality Assurance Quality Control\Report.doc



Appendix A

Contact Information

APPENDIX A

Contact Information

Nunavut Water Board Contact:

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

Inspector Contact:

Water Resources Manager
Nunavut District, Nunavut Region
Department of Indian and Northern Affairs Canada
P.O. Box 100
Iqaluit, NU X0A 0H0
Telephone: (867) 975-4550
Fax: (867) 979-6445

Analyst Contact:

Laboratory Manager
Taiga Laboratories
Department of Indian and Northern Affairs Canada
4601 - 52 Avenue, P.O. Box 1500
Yellowknife, NT X1A 2R3
Telephone: (867) 669-2780
Fax: (867) 669-2718



Appendix B
Notification of Laboratory Form

APPENDIX B
Notification of Laboratory Form

Attention: Technical Advisor
Nunavut Water Board

Re: Notification of Laboratory
Water License NWB3QIK0106

Dear Sir/Madame,

The following CAEAL-certified laboratory has been retained by the Hamlet of Qikiqtarjuaq to complete the sample analysis required by Water License NWB3QIK0106:

Name of Laboratory : _____

Address : _____

: _____

: _____

Phone # : _____

Fax # : _____

Regards,

Name (print) : _____

Signature : _____ Date : _____

Please send this form, once completed, to the Nunavut Water Board at the following address:

Nunavut Water Board
c/o Technical Advisor
PO Box 119
Gjoa Haven, NU X0B 1J0
Telephone: (867) 360-6338
Fax: (867) 360-6369
Email: srtech@nwb.nunavut.ca

Appendix C
Annual Report for the
Hamlet of Qikiqtarjuaq

APPENDIX C
Annual Report for the Hamlet of Qikiqtarjuaq

Year Being Reported: _____

The following information is compiled pursuant to the requirements of Part B, Item 1 of Water License NWB3QIK0106 issued to the Hamlet of Qikiqtarjuaq.

Tabular summaries of all data generated under the Monitoring Program, monthly and annual quantities in cubic meters of freshwater obtained from all sources, monthly and annual quantities in cubic meters of each and all wastes discharged.

Attached to this document are results for Monitoring Station QIK-1, QIK-2, QIK-3, QIK-4, and QIK-5 as well as detailed chemical, physical, and biological analysis required at QIK-2 and QIK-5 (for the months of May to August, inclusive).

Month Reported	Quantity of Water Obtained From all Sources (m³)	Quantity of Sewage Waste Discharged (m³)
January		
February		
March		
April		
May		
June		
July		
August		
September		
October		
November		
December		
Annual Total		

Please indicate volumes in cubic meters – 1 cubic meter equals 1,000 liters.

A summary of modifications and/or maintenance work carried out on the Water Supply and Waste Disposal Facilities, including all associated structures and facilities.

A list of unauthorized discharges and summary of follow up action taken.

A summary of any abandonment and restoration work completed during the year, and an outline of any work anticipated for the next year.

A summary of any studies requested by the Board that relate to waste disposal, water use or reclamation, and a brief description of any future studies planned.

Any other details on water use or waste disposal required by the Board by November 1st of the year being reported.

Updates or revisions to the approved Operation and Maintenance Plans.

Additional information that the licensee deems useful.

Follow up regarding inspection/compliance concerns.

Appendix I
Cost Estimate Tables

SCHEDULE OF UNIT PRICES

Nuna Burnside Engineering and Environmental Ltd.

Project No. N-O 09439.0

Page No. 1

Contractor:

Address:

Hamlet of Qikiqtarjuaq

Contract Title:

Improvements to the Water Reservoir, Sewage Lagoon & Solid Waste

SCHEDULE A - MISCELLANEOUS ITEMS

ITEM NO.	DESCRIPTION	CONTRACT QUANTITY	UNIT	UNIT PRICE	CLASS B COST TOTAL
1	Mobilization/Demobilization (assume equipment is available within the Hamlet)	1	LS	\$50,000.00	\$50,000.00
2	Bonding & Insurance	1	LS	\$30,000.00	\$30,000.00
3	Construction Camp	1	LS	\$200,000.00	\$200,000.00
				SUBTOTAL:	\$280,000.00

SCHEDULE OF UNIT PRICES

Nuna Burnside Engineering and Environmental Ltd.

Project No. N-O 09439.0

Page No. 2

Contractor:

Address:

Hamlet of Qikiqtarjuaq

Contract Title:

Improvements to the Water Reservoir, Sewage Lagoon & Solid Waste

Schedule B - Water Reservoir

ITEM NO.	DESCRIPTION	CONTRACT QUANTITY	UNIT	UNIT PRICE	CLASS B COST TOTAL
	<u>PHASE 1</u>				
1	Electrical upgrades	1	LS	\$17,000.00	\$17,000.00
2	Replace reservoir intake pipe	1	LS	\$50,000.00	\$50,000.00
3	Replace river intake pipe	300	m(l)	\$200.00	\$60,000.00
4	Supply & place liners	20,000	m ²	\$40.00	\$800,000.00
5	Supply & place screened gravel	4,500	m ³	\$90.00	\$405,000.00
6	Replace gate, misc. fence repairs to existing	1	LS	\$2,500.00	\$2,500.00
7	Supply & place extended fencing	210	m(l)	\$50.00	\$10,500.00
7	Replace truck fill pumps	2	Ea	\$10,000.00	\$20,000.00
8	Signage	1	LS	\$3,000.00	\$3,000.00
9	Construct Berm (assumed borrow area within 50 m)	30,000	m ³	\$20.00	\$600,000.00
	<u>PHASE 2</u>				
10	Excavate & dispose of internal berm	15,000	m ³	\$20.00	\$300,000.00
				SUBTOTAL:	\$2,268,000.00

SCHEDULE OF UNIT PRICES

Nuna Burnside Engineering and Environmental Ltd.

Project No. N-O 09439.0

Page No. 3

Contractor:

Address:

Hamlet of Qikiqtarjuaq

Contract Title:

Improvements to the Water Reservoir, Sewage Lagoon & Solid Waste

SCHEDULE C - SEWAGE LAGOONS

ITEM NO.	DESCRIPTION	CONTRACT QUANTITY	UNIT	UNIT PRICE	CLASS B COST TOTAL
1	Granular 'A' for truck pad	40	m ³	\$100.00	\$4,000.00
2	Supply & place discharge flume	1	LS	\$10,000.00	\$10,000.00
3	Supply & place effluent discharge piping				
	i). Valves with sealed tube (200 mm) operators	1	LS	\$10,000.00	\$10,000.00
	ii). Piping (200 mm)	230	m(l)	\$150.00	\$34,500.00
4	Supply & place signage	1	LS	\$5,000.00	\$5,000.00
5	Exfiltration berm	180	m(l)	\$20.00	\$3,600.00
6	Berm construction (balance cut/fill)	25,000	m ³	\$20.00	\$500,000.00
				SUBTOTAL:	\$567,100.00

SCHEDULE OF UNIT PRICES

Nuna Burnside Engineering and Environmental Ltd.

Project No. N-O 09439.0

Page No. 4

Contractor:

Address:

Hamlet of Qikiqtarjuaq

Contract Title:

Improvements to the Water Reservoir, Sewage Lagoon & Solid Waste

SCHEDULE D - SOLID WASTE

ITEM NO.	DESCRIPTION	CONTRACT QUANTITY	UNIT	UNIT PRICE	CLASS B COST TOTAL
<u>PART 1: HOUSEHOLD HAZARDOUS WASTE DEPOT</u>					
1	40 mil HDPE Arctic Liner installed	350	m ²	\$40.00	\$14,000.00
2	Signage	2	Ea	\$2,000.00	\$4,000.00
3	Berm construction (1m high with 3:1 slopes) and surface preparation	225	m(l)	\$30.00	\$6,750.00
4	Fencing (1.8 m frost fence with poles) on berm	68	m(l)	\$50.00	\$3,400.00
5	Swing gates (1.8 m high fence to provide 3 m wide opening)	1	LS	\$1,000.00	\$1,000.00
6	Rehabilitate 10 m shipping container with liner and spill barrier (2 m x 10 m) installed	20	m ²	\$40.00	\$800.00
7	Shelving and vents for shipping container	1	Ea	\$1,000.00	\$1,000.00
8	Spill kit, fire extinguisher, emergency kit and tools	1	Ea	\$1,000.00	\$1,000.00
<u>PART 2: BULKY METALS DISPOSAL AREA</u>					
9	Signage	1	Ea	\$1,000.00	\$1,000.00
10	Compact and cover exposed metals, contour area to promote drainage (final cover to 600 mm, interim cover to 200 mm)	2,000	m ²	\$30.00	\$60,000.00
<u>Assumptions:</u> up slope ditching is part of landfill costing Cover material extracted from borrow area upslope of the disposal area					
				SUBTOTAL:	\$92,950.00

SCHEDULE OF UNIT PRICES

Nuna Burnside Engineering and Environmental Ltd.

Project No. N-O 09439.0

Page No. 5

Contractor:

Address:

Hamlet of Qikiqtarjuaq

Contract Title:

Improvements to the Water Reservoir, Sewage Lagoon & Solid Waste

SCHEDULE D - SOLID WASTE (CONTINUED)

ITEM NO.	DESCRIPTION	CONTRACT QUANTITY	UNIT	UNIT PRICE	CLASS B COST TOTAL
<u>PART 3: MUNICIPAL SOLID WASTE DISPOSAL SITE</u>					
11	Fencing (1.8 m post and wire) installed on berms (install 330 m and repair 110 m)	300	m(l)	\$50.00	\$15,000.00
12	Fencing (3 m post and wire) installed on down wind berm	100	m(l)	\$75.00	\$7,500.00
13	Sliding gate (1.8 m high fencing)	1	Ea	\$3,000.00	\$3,000.00
14	Signage	3	Ea	\$1,000.00	\$3,000.00
15	Ditching and swale to control run off up gradient of landfill and bulky metals disposal area (1.5 m deep with 3:1 slopes)	800	m(l)	\$40.00	\$32,000.00
16	Supply and install 1200 mm culvert under access road with appropriate bedding and cover	1	LS	\$20,000.00	\$20,000.00
17	Deepen existing swale on east side of access road	1	LS	\$2,000.00	\$2,000.00
18	Deepen existing swale on south side of landfill	1	LS	\$2,000.00	\$2,000.00
19	Cut and fill tipping face of landfill to grades shown on plan such that slopes do not exceed 3:1	1	LS	\$2,000.00	\$2,000.00
20	Create landfill perimeter berm using native soils around outside of landfill	330	m(l)	\$20.00	\$6,600.00
21	Create intermediate berm using native soils within the landfill cell	110	m(l)	\$20.00	\$2,200.00
22	Construct 625 m ² by 1.5 m deep bermed water retention area	1	LS	\$10,000.00	\$10,000.00
	<u>Assumptions:</u> Spill kit and emergency kit costed as part of household hazardous waste depot				
<u>PART 4: DERELICT VEHICLE/RECYCLING AREA</u>					
23	Signage	1	Ea	\$1,000.00	\$1,000.00
				SUBTOTAL:	\$106,300.00



Appendix J
CEAA Environmental Screening Report



Appendix J1 Water Reservoir

Indian and Northern Affairs Canada

Environmental Screening Report

CANADIAN ENVIRONMENTAL ASSESSMENT ACT

This form, when completed in full, constitutes an environmental screening report intended to meet the requirements of s. 16 of the *Canadian Environmental Assessment Act* (CEAA). It contains the following sections:

- 1) PROJECT IDENTIFICATION
- 2) LOCATION OF PROJECT
- 3) PROJECT JUSTIFICATION
- 4) PROJECT DESCRIPTION
- 5) CONSULTATION
- 6) EXISTING ENVIRONMENT
- 7) ENVIRONMENTAL EFFECTS AND MITIGATION MEASURES
- 8) CUMULATIVE EFFECTS ASSESSMENT
- 9) SUMMARY OR ENVIRONMENTAL EFFECTS
- 10) CEAA SCREENING DECISION
- 11) KEY REFERENCES & SOURCES
- 12) LIST OF ATTACHMENTS

The table on Page 2 will be completed by INAC staff. The proponent should complete the sections that follow, starting with "1. PROJECT IDENTIFICATION" on page 3.

Project Reference	
Section 5 Triggers	<p>Please identify the reason(s) for INAC involvement:</p> <ul style="list-style-type: none"> • CEEA s. 5.1(a) proponent • CEEA s. 5.1(b) funding • CEEA s. 5.1(c) granting an interest in land • CEEA s. 5.1(d)** regulatory function <p>-----</p> <p>**If a 5.1 (d) trigger, please specify the trigger, as per <i>Law List Regulations</i>:</p> <ul style="list-style-type: none"> • <i>Indian Act</i> subsection 18(2) • <i>Indian Act</i> subsection 28(2) • <i>Indian Act</i> paragraph 58(4)(b) • <i>Indian Act</i> subsection 35(1) • <i>Indian Act</i> subsection 39(1) • <i>Indian Mining Regulations</i> subsection 5(2) • <i>Indian Mining Regulations</i> subsection 6(1) • <i>Indian Reserve Waste Disposal Regulations</i> section 5 • <i>Indian Timber Regulations</i> subsection 5(1) • <i>Indian Timber Regulations</i> section 9 • <i>Indian Timber Regulations</i> subsection 22(1)
FEAC ¹ ("LEAD RA")	
Other RAs	
Expert FAs	
Project also subject to a provincial EA: YES/NO - (if YES, provide details)	
CEAR ² Reference #	
Env. Officer	
Reviewing Officer	
RCM & Directorate	

¹ FEAC - Federal Environmental Assessment Coordinator

² CEAR - Canadian Environmental Assessment Registry

1) PROJECT IDENTIFICATION

Location:	Hamlet of Qikiqtarjuaq, Nunavut
Project Title:	Improvements to Water Reservoir.
Project proponent(s):	Government of Nunavut, Community and Government Services

2) LOCATION

Detailed Location: <i>If project is not on reserve, specify latitude and longitude coordinates, and nearest town, highway, lake, etc.</i>	Broughton Island, Nunavut located on the eastern coast of Baffin Island, 470 kilometres northeast of Iqaluit. Approximately 566 residents. 67°33' north latitude and 64°02' west longitude. Project is on Hamlet land.
---	--

YES

All or part of the project is OFF Reserve Land (YES/NO)

Definition of Project Area <i>The geographical extent of the project, and those areas affected during construction and operation. For example:</i> <ul style="list-style-type: none"> - key transportation routes for equipment and materials - staging & refueling areas - main activity/construction site, traffic routes, etc. 	The community now draws its water from the Tulugak River, which flows in the northwest direction towards Davis Strait. The water is transported to the reservoir using a gravity fill pipe. The water is stored in a storage reservoir located to the east of the main community and south of the access road. The preferred water supply and storage reservoir option for this community involves deepening and expanding the existing reservoir away from the truck filling station (to the northwest). Therefore most of the work will take place in the immediate vicinity of the existing reservoir. The access route will remain the same as it is currently (water reservoir access roadway). (There is a roadway that is used to truck water from the existing reservoir to the community). It is assumed that refueling will take place at the existing fuel depot, in the main community.
---	---

Adjacent Land: <i>Land use and description to the North, East, South, and West of project</i>	N: There is a soil/borrow pit approximately 500 m to the north. The solid waste disposal area is approximately 1500 to the north. Remaining areas are vacant, undisturbed tundra.
	E: The Tulugak River flows northwesterly approximately 100 m south of the existing reservoir and proposed expansion. Remaining areas are vacant, undisturbed tundra.
	S: Vacant, undisturbed tundra.
	W: Vacant undisturbed tundra. The main community of Qikiqtarjuaq is more than 2 kilometres west of the site.

3) PROJECT JUSTIFICATION

Need for the Project:

Rationale: e.g. what problem is the project going to solve or what opportunity is the project going to provide?

There are deficiencies in the existing water supply system that services the Hamlet of Qikiqtarjuaq. The existing reservoir is too small to meet demands for the next 20 years.

Purpose of the Project:

What is going to be achieved by carrying out the project?

Ample safe drinking water will be made available to the community for a 20-year planning period.

Alternatives Considered:

Different ways to meet the project need and achieve the project purpose

Several options were considered:

- null option, not a viable solution due to existing system deficiencies
- deepen and expand existing reservoir on all four sides (more expensive than expansion on one side)
- deepen and expand the existing reservoir on one side (least expensive option that can meet future demands)
- construct a second reservoir at this location or another location (most costly alternative).

4) PROJECT DESCRIPTION

Proposed Start Date:

(year-month-day, if known)

July 2006

Estimated Completion Date:

October 2007

Estimated Total Cost:

Approximately \$1,500,000

Description of Project:

(attach/reference supporting material as required)

The preferred alternative has been selected. This option consists of pushing the berm out on one side of the reservoir and deepening it in order to increase its capacity to ensure that the water supply for this community accommodates future growth. The tasks required to undertake this project include:

- deepen the reservoir approximately 1 m
- push out 1 berm approximately 12 m
- extend the slope stabilization system
- replace of existing fuel tank
- electrical upgrades
- install, replace intake pipe
- fencing
- inspect/repair generators
- 2 metre wide berms surrounding the reservoir
- grade reservoir walls
- place 2 geotextile liners separated by crushed stone
- geomembrane liner
- install new double intake pipe.

**Project Management Team
Members & Affiliation**

Mr. Brian Duguay, Project Officer, Community and Government Services, Baffin Region
Nuna Burnside Engineering and Environmental Ltd., Mike O'Hara, P.Eng.
Lootie Toomasie, Mayor of Qikiqtarjuaq

5) CONSULTATION

(a) Government Departments, Agencies, Non-Governmental Organizations, Community Councils, etc.

Department, Agency, or Organization:	Contact Person & Telephone Number:	Nature of Consultation & Response Received:
Community and Government Services, Baffin Region	Brian Duguay, Project Officer	Was provided a copy of the Schematic Design Report identifying options available to meet the community's needs. Discussed and identified preferred alternative.
Community council and public works	Lootie Toomasie, Mayor	Held two meetings: July 8, 2005 and September 14, 2005 meeting minutes recorded. Approved the Schematic Design.

(b) Public Consultation, including Community Members

Public Consulted:	Method Used:	Date:	Details/Issues Raised:
Residents	Meetings with Hamlet and Hamlet public works staff	July 8 Sept 14, 2005.	The Hamlet residents concerns and comments were expressed through council. Concerns regarding water supply quantity and inability of existing system to meet demands.

6) EXISTING ENVIRONMENT

COMPONENT	DESCRIPTION <i>(describe features; indicate sensitivity to disturbance)</i>
6.1 PHYSICAL FEATURES - VALUED ECOSYSTEM COMPONENTS	
Topography/Terrain: <i>(hilly, flat)</i>	The area is generally flat in the vicinity of the reservoir as well as toward the community and Davis Strait. Further inland the terrain becomes more hilly.
Soil and Geology: <i>(soil type, quality and use; bedrock geology)</i>	Test pitting on site found the overburden to consist of coarse sand and gravel, with cobbles and small boulders. The underlying bedrock is described as felsic and rare mafic plutonic rock. The bedrock was not encountered during the field investigations. Permafrost was typically encountered at a depth of 2 m.
Surface Water: <i>(presence & quality)</i>	The Tulugak River flows northwesterly towards Davis Strait. It is approximately 100 south of the reservoir. The reservoir draws water from this river. The water quality is good. The river freezes completely during the winter.
Distance to Water:	<i>(from project area/activity, in metres):</i> approximately 100 m to the Tulugak River. In the winter the nearest water is the Ocean.
Aquatic Sediment/Substrate: <i>(type & quality)</i>	Not known
Groundwater: <i>(local use & quality)</i>	Groundwater not used. The entire area is permafrost below 2.0 m..
Air Quality: <i>(local air quality)</i>	Good.

COMPONENT	DESCRIPTION <i>(describe features; indicate sensitivity to disturbance)</i>
6.2 BIOLOGICAL FEATURES - VALUED ECOSYSTEM COMPONENTS	
Vegetation: <i>(e.g. forest, ground cover, aquatic plants)</i>	The existing facilities are located within areas of disturbed tundra that are covered in cobble, sand and gravel. Very limited amounts and diversity of vegetation are present on these sites. Small areas of undisturbed tundra will be disturbed to accommodate the proposed facilities. These areas are also sparsely vegetated.
Wetlands: <i>(e.g. fens, swamp)</i>	The preliminary review did not identify any existing wetlands in the Study Area, although the estuary of the Tulugak River to the west of the Study Area may contain some wetland characteristics.
Fish & Fish Habitat: <i>(types of habitat and common species found)</i>	The Tulugak River freezes solid in the winter months therefore it is not a fish habitat most of the year. Davis strait however is a significant habitat for many species. It is more than two kilometers from the site and will not be affected by this development. Fishing for char (<i>Salvelinus alpinus</i>) is an important part of daily life. Char is likely the primary fish species being harvested in the area. It is not expected that fish are present in the Tulugak River in the summer months.
Migratory Birds: <i>(e.g. waterfowl, songbirds)</i>	Several species of shorebirds and waterfowl are likely to be found in the general area, although it is unlikely that birds use the Study Area for nesting or staging given the limited amount of suitable habitat on the site. Greater concentrations of birds, both in terms of diversity and densities, are found in the two Important Bird Areas to the east of Qikiqtarjuaq (see Special Habitat Areas below).
Other Fauna: <i>(mammals/amphibians reptiles/insects; game & protected species)</i>	<p>Qikiqtarjuaq is located in Davis Strait off the east coast of Baffin Island. This rocky area is rich in marine mammal wildlife. Right Whale, Ring and Harp Seals, Beluga Whales, Narwhal, Walrus and Killer Whales all inhabit the waters off Qikiqtarjuaq, away from the study area. Hunting and fishing are still important parts of daily life in this area. Locals hunt Seals, Narwhal and Walrus, although this takes place some distance from the community of Qikiqtarjuaq, and away from the Study Area.</p> <p>Local people have been reported to consume a variety of terrestrial species including polar bear (<i>Ursus maritimus</i>) and, more rarely, carnivores such as arctic wolves (<i>Canis lupus arctos</i>) and arctic fox (<i>Alopex lagopus</i>). Musk ox (<i>Ovibos moschatus</i>) and Barren Ground Caribou (<i>Rangifer tarandus groenlandicus</i>) also have historic ranges that include the area, and are likely hunted by local people. Local people indicate these species do not frequent the Study Area. None of these species have status under the Species At Risk Act (SARA).</p>

COMPONENT	DESCRIPTION <i>(describe features; indicate sensitivity to disturbance)</i>
6.2 BIOLOGICAL FEATURES - VALUED ECOSYSTEM COMPONENTS	
Special Habitat Areas <i>(specially designated or protected habitats)</i>	<p>No special habitat areas were identified in the Study Area during the preliminary review. Two Important Bird Areas (IBAs) were identified to the east of Qikiqtarjuaq. The first of these, Cape Searle, is located approximately 80 km east of Qikiqtarjuaq. The second, Reid Bay, is located approximately 125 km east of Qikiqtarjuaq. Species of interest that have been recorded from these IBAs include: Northern Fulmar (<i>Fulmarus glacialis</i>), Glaucous Gull (<i>Larus hyperboreus</i>) and Black Guillemots (<i>Cepphus grille</i>) from Cape Searle; and, Black-legged Kittiwake (<i>Rissa tridactyla</i>), Iceland Gull (<i>Larus glaucoides</i>), Thick-billed Murre (<i>Uria lomvia</i>), Glaucous Gull, Northern Fulmar and Black Guillemots from Reid Bay.</p> <p>The Canadian Wildlife Service (CWS) has been trying to establish protection for the seabird colonies at Cape Searle and Reid Bay since the mid 1980s. In May 2000, the community of Qikiqtarjuaq and the CWS agreed to proceed on work to create these new NWAs.</p> <p>Information on the two IBAs is available at: http://www.bsc-eoc.org/iba/regional.jsp?region=NWT</p>
Species at Risk	No Species at Risk have been identified in close proximity to the Study Area. No threats to Species at Risk have been identified. See sections above.

COMPONENT	DESCRIPTION <i>(describe features; indicate sensitivity to disturbance)</i>
6.3 SOCIO-CULTURAL FEATURES – VALUED ECOSYSTEM COMPONENTS	
Sensitive Areas: <i>(e.g. residential zones, parkland, hospitals, schools)</i>	The reservoir is more than 2 kilometres from the main community. There are no known sensitive areas near the site.
Human Health and Safety: <i>(any persons whose health and safety may be affected by the construction and operation of the project)</i>	The reservoir is more than 2 kilometres from the main community therefore it is not likely to affect human health and safety. Improving the water supply system for the community will result in improved human health.
Traditional Land Use Activities: <i>(e.g. trapping, fishing, medicinal plant collection, ceremonial grounds)</i>	The area is already occupied by the existing reservoir therefore its expansion is not expected to cause an effect on traditional land use activities. Hamlet staff indicate the study area has no traditional land uses.
Aesthetics: <i>(general character of the surrounding area; and if the project is compatible)</i>	There is already a reservoir in this area and the project is removed from the main community therefore aesthetics are not an issue. The area has been designated by the Hamlet for use as a water reservoir.
Archaeological Resources: <i>(recorded, or potential)</i>	The area is removed from the main community and the site has already been developed Hamlet staff indicate there are no known archaeological resources in the study area.
Special Designations: <i>(parks, protected areas)</i>	There are no known areas with special designations in the vicinity of the or proposed reservoir expansion.

7) ENVIRONMENTAL EFFECTS AND MITIGATION MEASURES – SUMMARY

The next table summarizes the following:

(A)	List of Project Activities
	Key project activities associated with construction, operation, maintenance and decommissioning , if applicable. Includes locations, scheduling details, and estimates of magnitude and scale.
(B)	Potential Environmental Effect(s) associated with each project activity.
	<i>An Environmental Effect</i> is defined as:
	i) any <u>change that the project may cause in the environment</u> , Including any effect of any such change on health and socio-economic conditions, on physical and cultural heritage, on the current use of lands and resources for traditional purposes, or on any structure, site, or thing that is of historical, archaeological, paleontological or architectural significance; and ii) any <u>change to the project that may be caused by the environment</u> . (Example: ice break-up damaging a bridge or dock; freezing and bursting of unprotected water lines.)
(C)	Mitigation Measures
	<i>A Mitigation Measure</i> is:
	i) an action or provision made that will <u>eliminate, reduce or control the adverse environmental effects of the project</u> , and may include restoration, compensation or replacement of any damages or impacts.
(D)	Determination of Significance
	A determination of the significance of the environmental effects, taking into account appropriate mitigation measures if applicable. Mitigation measures are intended to prevent or reduce any potentially negative effects. The abbreviations used are:
	N/S - effect not significant, or rendered insignificant with mitigation SP - significant positive effect SN - significant negative effect U - outcome unknown or cannot be predicted, even with mitigation.

ENVIRONMENTAL EFFECTS AND MITIGATION MEASURES - SUMMARY				
(A) Key Project Activities		(B) Potential Environmental Effect(s)	(C) Mitigation Measures	(D)
1	Clearing and grubbing of expansion area and areas to be disturbed	a) Minor loss of vegetation b) Minor potential for soil erosion	a) Area cleared is small. b) Can prevent by limiting maximum area to be exposed, limiting delays, providing temporary drainage and buffers between project area and water bodies	N/S
2	Permanent replacement of reservoir fill pipe	a) Negligible loss of vegetation b) Minor potential for soil erosion c) Noise	a) Area cleared is very small. b) Can prevent by limiting maximum area to be exposed, limiting delays, providing temporary drainage and buffers between project area and water bodies c) Activities to be scheduled to avoid sensitive times for people and animals.	N/S
3	Installation of new intake pipe	a) Negligible loss of vegetation b) Minor potential for soil erosion c) Noise	a) Area cleared is very small. b) Can prevent by limiting maximum area to be exposed, limiting delays, providing temporary drainage and buffers between project area and water bodies c) Activities to be scheduled to avoid sensitive times for people and animals.	N/S
4	Deepening and expanding existing reservoir	a) Very minor loss of vegetation b) Minor potential for soil erosion	a) Area cleared is small. b) Can prevent by limiting maximum area to be exposed, limiting delays, providing temporary drainage and buffers between project area and water bodies	N/S
5	Replace existing fuel tank with a double walled tank and installation of a secondary containment liner.	a) Possible leaks or spills during replacement.	c) Follow regulations and guidelines. Ensure tanks are empty.	NP

ENVIRONMENTAL EFFECTS AND MITIGATION MEASURES - SUMMARY				
(A) Key Project Activities		(B) Potential Environmental Effect(s)	(C) Mitigation Measures	(D)
6.	Upgrade site fencing	a) Very minor loss of vegetation	a) a) Small area to be cleared.	NP

8) CUMULATIVE EFFECTS ASSESSMENT

The natural environment is interconnected, and does not recognize project boundaries or lines on maps. The impacts caused by one project, which may be considered minor and insignificant on their own, combined with other environmental impacts from other projects or developments planned or already underway in the area. Together, these impacts may combine to become significant, and adverse. The consideration and assessment of these “cumulative” effects is therefore an important part of the environmental assessment process.

The following table should be completed to help identify the potential for cumulative effects, and to assess their significance (e.g. N/S - not significant; SP - significant positive effect; SN - significant negative effect; U - unknown, unable to assess).

(A) <u>Other projects or developments planned, or underway in the area</u>	(B) <u>Potential Cumulative Effects:</u> <i>The potentially adverse impacts of this Project; which could combine with those from the other projects identified in (A)</i>	(C) <u>Mitigation Measures</u> <i>needed to effectively manage or prevent any cumulative, adverse effects; and</i> <u>Significance of residual impacts after mitigation (N/S, SP, SN, U)</u>
No known development sites within 1 kilometre of the site.		
Future development beyond 1 kilometre includes: <ul style="list-style-type: none"> - Expansion and upgrades to existing landfill site - Upgrade the existing waste water treatment lagoon 	Both of these development sites are removed from the water reservoir.	Cumulative impacts are not anticipated therefore mitigation measures are not required. All of these projects will improve environmental conditions therefore a positive impact is anticipated. SP.

9) SUMMARY OF ENVIRONMENTAL EFFECTS

Assuming that all mitigation measures are implemented as proposed in Sections 7 and 8, the following effects are predicted for the Valued Ecosystem Components identified in Section 6:

(N/S not significant; SP significant positive effect; SN significant negative effect; U unknown; N/A not applicable)

VALUED ECOSYSTEM COMPONENT	Summary of Effects <i>(check box)</i>					comments
	N/S	SP	SN	U	N/A	
Topography/terrain	√					
Soil/geology	√					
Aquatic sediment/substrate	√					
Surface water	√					
Groundwater					√	
Air quality	√					
Vegetation	√					
Wetlands					√	
Fish & fish habitat					√	
Migratory birds	√					
Other fauna	√					
Special habitat					√	
Sensitive areas					√	
Human health and safety	√					
Traditional land use activities					√	
Aesthetics	√					
Archaeological resources					√	
Specially-designated areas					√	

Screening Report Completed by:

Jim Walls

Name and signature

January 31, 2006

Date

10) CEEA SCREENING DECISION

- ☐ [00] DECISION PENDING. Assessment not final.
- ☒ [01] PROJECT MAY PROCEED. All potentially adverse effects are mitigable with known technology, and therefore will be rendered insignificant (CEAA s. 20(1)(a)).
- ☐ [02] PROJECT MAY NOT PROCEED. The project is likely to cause significant adverse environmental effects that cannot be justified in the circumstances (CEAA s.20(1)(b)).
- ☐ [03] ENVIRONMENTAL ASSESSMENT IS TO BE REFERRED TO THE MINISTER FOR MEDIATION OR A REVIEW PANEL, since it is uncertain whether the project is likely to cause significant adverse environmental effects (CEAA s. 20(1)(c)(i)); significant public concern has been raised, warranting a referral to a mediator or a review panel (CEAA s. 20(1)(c)(ii)); and/or public concerns warrant a reference to a mediator or a review panel (CEAA s. 20(1)(c)(iii)).

Reviewed and Recommended by:		
Representative of Council, or designate (<i>name & signature</i>)		Date
INAC Environmental Officer (<i>name & signature</i>)		Date
Other Federal RA(s) (<i>specify details</i>)		Date

INAC USE ONLY

SCREENING DECISION by LEAD RESPONSIBLE AUTHORITY (enter code):	
Approved by:	
INAC Responsibility Centre Manager (<i>name + signature</i>)	Date

11) KEY REFERENCES & SOURCES

Nuna Burnside Engineering and Environmental Ltd., “*Schematic Design for the Improvements of the Water Reservoir, Wastewater Lagoon and Solid Waste Disposal Facility, The Hamlet of Qikiqtarjuaq, Nunavut*”, September 2005. (file: N-O 09439).

Nuna Burnside Engineering and Environmental Ltd., “*Geotechnical Evaluation of Options for the Improvements of the Water Reservoir, Wastewater Lagoon and Solid Waste Disposal Facility, Supplement to the Schematic Design Report (September 2005), The Hamlet of Qikiqtarjuaq, Nunavut*”, November 2005. (file: N-O 09439).

Nuna Burnside Engineering and Environmental Ltd., “*Detailed Design Report for the Improvements to the Water Reservoir, Sewage Lagoon, and Solid Waste Disposal Facility, The Hamlet of Qikiqtarjuaq, Nunavut*”, February 2006. (file N-O 09439).

12) LIST OF ATTACHMENTS

Detailed Design Report listed above.

J:\2006\F\NUNA\08983\Reports\Detailed Design\Appendices\Appendix J1_CEEA Reservoir.doc



Appendix J2
Sewage Lagoon

Indian and Northern Affairs Canada

Environmental Screening Report

CANADIAN ENVIRONMENTAL ASSESSMENT ACT

This form, when completed in full, constitutes an environmental screening report intended to meet the requirements of s. 16 of the *Canadian Environmental Assessment Act* (CEAA). It contains the following sections:

- 1) PROJECT IDENTIFICATION
- 2) LOCATION OF PROJECT
- 3) PROJECT JUSTIFICATION
- 4) PROJECT DESCRIPTION
- 5) CONSULTATION
- 6) EXISTING ENVIRONMENT
- 7) ENVIRONMENTAL EFFECTS AND MITIGATION MEASURES
- 8) CUMULATIVE EFFECTS ASSESSMENT
- 9) SUMMARY OR ENVIRONMENTAL EFFECTS
- 10) CEAA SCREENING DECISION
- 11) KEY REFERENCES & SOURCES
- 12) LIST OF ATTACHMENTS

The table on Page 2 will be completed by INAC staff. The proponent should complete the sections that follow, starting with "1. PROJECT IDENTIFICATION" on page 3.

Project Reference	
Section 5 Triggers	<p>Please identify the reason(s) for INAC involvement:</p> <ul style="list-style-type: none"> • <i>CEAA</i> s. 5.1(a) proponent • <i>CEAA</i> s. 5.1(b) funding • <i>CEAA</i> s. 5.1(c) granting an interest in land • <i>CEAA</i> s. 5.1(d)** regulatory function <p>-----</p> <p>**If a 5.1 (d) trigger, please specify the trigger, as per <i>Law List Regulations</i>:</p> <ul style="list-style-type: none"> • <i>Indian Act</i> subsection 18(2) • <i>Indian Act</i> subsection 28(2) • <i>Indian Act</i> paragraph 58(4)(b) • <i>Indian Act</i> subsection 35(1) • <i>Indian Act</i> subsection 39(1) • <i>Indian Mining Regulations</i> subsection 5(2) • <i>Indian Mining Regulations</i> subsection 6(1) • <i>Indian Reserve Waste Disposal Regulations</i> section 5 • <i>Indian Timber Regulations</i> subsection 5(1) • <i>Indian Timber Regulations</i> section 9 • <i>Indian Timber Regulations</i> subsection 22(1)
FEAC ¹ ("LEAD RA")	
Other RAs	
Expert FAs	
Project also subject to a provincial EA: YES/NO - (if YES, provide details)	
CEAR ² Reference #	
Env. Officer	
Reviewing Officer	
RCM & Directorate	

¹ FEAC - Federal Environmental Assessment Coordinator

² CEAR - Canadian Environmental Assessment Registry

1) PROJECT IDENTIFICATION

Location:	Hamlet of Qikiqtarjuaq, Nunavut
Project Title:	Improvements to Wastewater Lagoon
Project proponent(s):	Government of Nunavut, Community and Government Services

2) LOCATION

Detailed Location: <i>If project is not on reserve, specify latitude and longitude coordinates, and nearest town, highway, lake, etc.</i>	Broughton Island, Nunavut located on the eastern coast of Baffin Island, 470 kilometres northeast of Iqaluit. Approximately 566 residents. 67°33' north latitude and 64°02' west longitude. Project is on Hamlet land.
---	--

YES

All or part of the project is OFF Reserve Land (YES/NO)

Definition of Project Area <i>The geographical extent of the project, and those areas affected during construction and operation. For example:</i> <ul style="list-style-type: none"> - key transportation routes for equipment and materials - staging & refueling areas - main activity/construction site, traffic routes, etc. 	Most of the work will take place in the immediate vicinity of the existing wastewater treatment facility. The current wastewater treatment facility will be upgraded with updated operational and maintenance procedures. The access route will remain the same as it is currently. It is assumed that refueling will take place at the existing fuel depot, in the main community.
---	---

Adjacent Land: <i>Land use and description to the North, East, South, and West of project</i>	N: The existing landfill site, metal dump/borrow area as well as a secondary metal dump are located to the north. Vacant undisturbed tundra is located further north.
	E: There is an access road followed by a bulky metals/derelict vehicle storage area. Vacant undisturbed tundra is located further east.
	S: Landfill access road to the south, a borrow pit further south followed by vacant, undisturbed tundra.
	W: Vacant undisturbed tundra. The main community of Qikiqtarjuaq is more than 2 kilometres west of the site.

3) PROJECT JUSTIFICATION

Need for the Project:
Rationale: e.g. what problem is the project going to solve or what opportunity is the project going to provide?

The community now operates a single wastewater lagoon with effluent discharge to a naturally occurring wetland that eventually discharges into Davis Strait. The drainpipe freezes and has to be thawed out every year to drain the lagoon. Effluent is discharged directly onto the ground at the base of the lagoon berm. This is the current point of discharge in accordance with the operating license. The lagoon is the only treatment available before the effluent is discharged into the natural environment. There are deficiencies in the existing wastewater treatment system that services the Hamlet of Qikiqtarjuaq.

- There is insufficient storage in the lagoon,
- There are operational issues associated with discharging into the natural wetland area that is in violation of Section 36(6) of the Fisheries Act.

There are maintenance issues associated with surface water flow and erosion that could result in berm failure.

Purpose of the Project:
What is going to be achieved by carrying out the project?

To provide a wastewater system for the community that can meet the regulatory requirements as well as the needs of the community over the next 20 years.

Alternatives Considered:
Different ways to meet the project need and achieve the project purpose

Several options were considered:

- Null option, not a viable solution due to existing system deficiencies (insufficient capacity and environmental concerns)
- Upgrade the current wastewater treatment facility with updated operational and maintenance procedures.
- Wastewater treatment facility relocation.

4) PROJECT DESCRIPTION

Proposed Start Date: <i>(year-month-day, if known)</i>	July 2006	Estimated Completion Date: October 2007
Estimated Total Cost:	Approximately \$700,000	
Description of Project: <i>(attach/reference supporting material as required)</i>	<p>The existing lagoon will be rehabilitated and a new lagoon constructed. A new wetland treatment area will also be constructed. The project will involve the following:</p> <ul style="list-style-type: none"> - The new lagoon will have a depth similar to the existing lagoon. - The size will be approximately 90 m long and 67 metres wide such that there is a common berm between the existing and proposed lagoon. - Construction of improved ditching around the site. - Creation of a wetland treatment area - Installation of the necessary drainage structures for decanting. - Supply and place appropriate signage. 	
Project Management Team Members & Affiliation	<p>Mr. Brian Duguay, Project Officer, Community and Government Services, Baffin Region Nuna Burnside Engineering and Environmental Ltd., Mike O'Hara, P.Eng. Lootie Toomasie, Mayor of Qikiqtarjuaq</p>	

5) CONSULTATION

(a) Government Departments, Agencies, Non-Governmental Organizations, Community Councils, etc.

Department, Agency, or Organization:	Contact Person & Telephone Number:	Nature of Consultation & Response Received:
Community and Government Services, Baffin Region	Brian Duguay, Project Officer	Was provided a copy of the Schematic Design Report identifying options available to meet the community's needs. Discussed and identified preferred alternative.
Community council and public works	Lootie Toomasie, Mayor	Held two meetings: July 8, 2005 and September 14, 2005. Meeting minutes recorded. Approved of the Schematic Design.

(b) Public Consultation, including Community Members

Public Consulted:	Method Used:	Date:	Details/Issues Raised:
Residents	Meetings with Hamlet council and Hamlet public works staff	July 8 Sept 14, 2005.	The Hamlet residents concerns and comments were expressed through council. Concerns regarding the lagoon and meeting future demands.

6) EXISTING ENVIRONMENT

COMPONENT	DESCRIPTION <i>(describe features; indicate sensitivity to disturbance)</i>
6.1 PHYSICAL FEATURES - VALUED ECOSYSTEM COMPONENTS	
Topography/Terrain: <i>(hilly, flat)</i>	The area is generally flat in the vicinity of the lagoon as well as toward the community and Davis Strait. Further inland the terrain becomes more hilly.
Soil and Geology: <i>(soil type, quality and use; bedrock geology)</i>	The underlying bedrock is described as felsic and rare mafic plutonic rock. The bedrock was not encountered during the field investigations. Permafrost was typically encountered at a depth of 2 m. Test pitting on site found the over burden to approximately 2.0 m to consist of coarse sand and gravel with cobbles and small boulders.
Surface Water: <i>(presence & quality)</i>	The Tulugak River as well as intermittent tributaries flows northwesterly towards Davis Strait. The Tulugak River is more than a kilometre south of the lagoon. Davis Strait is more than a kilometer west of the site. The surface water quality in the Tulugak River is good. The Tulugak River freezes completely during the winter.
Distance to Water:	<i>(from project area/activity, in metres):</i> There is low-lying, poorly drained area immediately west of the lagoon into which the lagoon is drained. This is only seasonally thawed and will be used for the engineered wetland treatment area.
Aquatic Sediment/Substrate: <i>(type & quality)</i>	Not known
Groundwater: <i>(local use & quality)</i>	Groundwater not used. The entire area is permafrost below approximately 2.0 m.
Air Quality: <i>(local air quality)</i>	Good

COMPONENT	DESCRIPTION <i>(describe features; indicate sensitivity to disturbance)</i>
6.2 BIOLOGICAL FEATURES - VALUED ECOSYSTEM COMPONENTS	
Vegetation: <i>(e.g. forest, ground cover, aquatic plants)</i>	The existing facilities are located within areas of disturbed tundra that are covered in cobble, sand and gravel. Very limited amounts and diversity of vegetation are present on these sites. Small areas of undisturbed tundra will be disturbed to accommodate some of the proposed facilities. These areas are also sparsely vegetated.
Wetlands: <i>(e.g. fens, swamp)</i>	The preliminary review did not identify any existing wetlands in the Study Area, although the estuary of the Tulugak River to the west of the Study Area may contain some wetland characteristics. The proposed project will establish a 10-hectare wetland treatment area, which will provide seasonal habitat for species of birds and other wildlife in the area.
Fish & Fish Habitat: <i>(types of habitat and common species found)</i>	The Tulugak River and tributaries freeze solid in the winter months therefore they are not fish habitat most of the year. Davis Strait however is a significant habitat for many species. It is more than one kilometer west of the site. Improvements to the existing system will significantly reduce the potential of impacting the fish habitat. Fishing for char (<i>Salvelinus alpinus</i>) is an important part of daily life. Char is likely the primary fish species being harvested in the area. It is not expected that fish are present in the Tulugak River in the summer months.
Migratory Birds: <i>(e.g. waterfowl, songbirds)</i>	Several species of shorebirds and waterfowl are likely to be found in the general area, although it is unlikely that birds use the Study Area for nesting or staging given the limited amount of suitable habitat on the site. Greater concentrations of birds, both in terms of diversity and densities, are found in the two Important Bird Areas to the east of Qikiqtarjuaq (see Special Habitat Areas below).
Other Fauna: <i>(mammals/amphibians reptiles/insects; game & protected species)</i>	<p>Qikiqtarjuaq is located in Davis Strait off the east coast of Baffin Island. This rocky area is rich in marine mammal wildlife. Right Whale, Ring and Harp Seals, Beluga Whales, Narwhal, Walrus and Killer Whales all inhabit the waters off Qikiqtarjuaq, away from the Study Area. Hunting and fishing are still important parts of daily life in this area. Locals hunt Seals, Narwhal and Walrus, although this takes place some distance from the community of Qikiqtarjuaq, and away from the Study Area.</p> <p>Local people have been reported to consume a variety of terrestrial species including Polar Bear (<i>Ursus maritimus</i>) and, more rarely, carnivores such as Arctic Wolves (<i>Canis lupus arctos</i>) and Arctic Fox (<i>Alopex lagopus</i>). Musk Ox (<i>Ovibos moschatus</i>) and Barren Ground Caribou (<i>Rangifer tarandus groenlandicus</i>) also have historic ranges that include the area, and are likely hunted by local people. Local people indicate these species do not frequent the Study Area. None of these species have status under the Species At Risk Act (SARA).</p>

COMPONENT	DESCRIPTION <i>(describe features; indicate sensitivity to disturbance)</i>
6.2 BIOLOGICAL FEATURES - VALUED ECOSYSTEM COMPONENTS	
Special Habitat Areas <i>(specially designated or protected habitats)</i>	<p>No special habitat areas were identified in the Study Area during the preliminary review. Two Important Bird Areas (IBAs) were identified to the east of Qikiqtarjuaq. The first of these, Cape Searle, is located approximately 80 km east of Qikiqtarjuaq. The second, Reid Bay, is located approximately 125 km east of Qikiqtarjuaq. Species of interest that have been recorded from these IBAs include: Northern Fulmar (<i>Fulmarus glacialis</i>), Glaucous Gull (<i>Larus hyperboreus</i>) and Black Guillemots (<i>Cepphus grille</i>) from Cape Searle; and, Black-legged Kittiwake (<i>Rissa tridactyla</i>), Iceland Gull (<i>Larus glaucoides</i>), Thick-billed Murre (<i>Uria lomvia</i>), Glaucous Gull, Northern Fulmar and Black Guillemots from Reid Bay.</p> <p>The Canadian Wildlife Service (CWS) has been trying to establish protection for the seabird colonies at Cape Searle and Reid Bay since the mid 1980s. In May 2000, the community of Qikiqtarjuaq and the CWS agreed to proceed on work to create these new NWAs.</p> <p>Information on the two IBAs is available at: http://www.bsc-eoc.org/iba/regional.jsp?region=NWT</p>
Species at Risk	No Species at Risk have been identified in close proximity to the sludge area. No threats to Species at Risk have been identified. Refer to sections above for details.

COMPONENT	DESCRIPTION <i>(describe features; indicate sensitivity to disturbance)</i>
6.3 SOCIO-CULTURAL FEATURES – VALUED ECOSYSTEM COMPONENTS	
Sensitive Areas: <i>(e.g. residential zones, parkland, hospitals, schools)</i>	The wastewater treatment facility is more than 2 kilometres from the main community. There are no known sensitive areas near the site.
Human Health and Safety: <i>(any persons whose health and safety may be affected by the construction and operation of the project)</i>	The wastewater treatment facility is more than 2 kilometres from the main community therefore it is not likely to affect human health and safety. Improving the wastewater treatment system for the community will result in improved human health reduced impact to the natural environment.
Traditional Land Use Activities: <i>(e.g. trapping, fishing, medicinal plant collection, ceremonial grounds)</i>	The area is already occupied by the existing lagoon although there is a proposed wetland area in a previously undisturbed area. Expansion is not expected to cause an impact to traditional land use activities. Hamlet staff indicate the area has no traditional land uses.
Aesthetics: <i>(general character of the surrounding area; and if the project is compatible)</i>	There is already a lagoon in this area and the project is removed from the main community therefore aesthetics are not an issue. The area has been designated by the community for information including the landfill, bulky metals disposal, and wastewater lagoon.
Archaeological Resources: <i>(recorded, or potential)</i>	The area is removed from the main community and the site has already been developed. Hamlet staff indicate there are no known archaeological resources in this area.
Special Designations: <i>(parks, protected areas)</i>	There are no known areas with special designations in the vicinity of the proposed wastewater treatment facility expansion.

7) ENVIRONMENTAL EFFECTS AND MITIGATION MEASURES – SUMMARY

The next table summarizes the following:

(A)	List of Project Activities
	Key project activities associated with construction, operation, maintenance and decommissioning , if applicable. Includes locations, scheduling details, and estimates of magnitude and scale.
(B)	Potential Environmental Effect(s) associated with each project activity.
	<i>An Environmental Effect</i> is defined as:
	i) any <u>change that the project may cause in the environment</u> , Including any effect of any such change on health and socio-economic conditions, on physical and cultural heritage, on the current use of lands and resources for traditional purposes, or on any structure, site, or thing that is of historical, archaeological, paleontological or architectural significance; and ii) any <u>change to the project that may be caused by the environment</u> . (Example: ice break-up damaging a bridge or dock; freezing and bursting of unprotected water lines.)
(C)	Mitigation Measures
	<i>A Mitigation Measure</i> is:
	i) an action or provision made that will <u>eliminate, reduce or control the adverse environmental effects of the project</u> , and may include restoration, compensation or replacement of any damages or impacts.
(D)	Determination of Significance
	A determination of the significance of the environmental effects, taking into account appropriate mitigation measures if applicable. Mitigation measures are intended to prevent or reduce any potentially negative effects. The abbreviations used are:
	N/S - effect not significant, or rendered insignificant with mitigation SP - significant positive effect SN - significant negative effect U - outcome unknown or cannot be predicted, even with mitigation.

ENVIRONMENTAL EFFECTS AND MITIGATION MEASURES - SUMMARY				
(A) Key Project Activities		(B) Potential Environmental Effect(s)	(C) Mitigation Measures	(D)
1	Clearing and grubbing of new lagoon area and areas to be disturbed	<ul style="list-style-type: none"> a) Very minor loss of vegetation b) Potential for soil erosion c) Dust 	<ul style="list-style-type: none"> a) Smallest possible area will be cleared b) Can prevent by limiting maximum area to be exposed, limiting delays, providing temporary drainage and buffers between project area and water bodies. Limiting work during spring thaw period c) Limit exposed area. Use water to control dust 	N/S
2	Construction of a new lagoon adjacent to the existing one and improve ditching.	<ul style="list-style-type: none"> a) Potential for soil erosion b) Noise c) Minimal odours d) Dust 	<ul style="list-style-type: none"> a) Can prevent by limiting maximum area to be exposed, limiting delays, providing temporary drainage and buffers between project area and water bodies. Limit work during spring thaw period b) Activities to be scheduled to avoid sensitive times for people and animals c) Activities to be scheduled to avoid sensitive times for people and animals d) Limit exposed area and use water to control dust 	N/P
3	Creation of a new wetland treatment area	<ul style="list-style-type: none"> a) None anticipated 	<ul style="list-style-type: none"> a) None anticipated 	N/P

ENVIRONMENTAL EFFECTS AND MITIGATION MEASURES - SUMMARY				
(A) Key Project Activities		(B) Potential Environmental Effect(s)	(C) Mitigation Measures	(D)
4	Installation of necessary drainage structures (for decanting)	a) Very minor loss of vegetation b) Minor potential for soil erosion	a) Area cleared is small. b) Can prevent by limiting maximum area to be exposed, limiting delays, providing temporary drainage and buffers between project area and water bodies	N/P
5.	Construction of an Exfiltration Berm	a) Potential for soil erosion b) Noise	a) Can prevent by limiting maximum area to be exposed, limiting delays, providing temporary drainage and buffers between project area and water bodies. Limit work during spring thaw period b) Activities to be scheduled to avoid sensitive times for people and animals.	N/P

8) CUMULATIVE EFFECTS ASSESSMENT

The natural environment is interconnected, and does not recognize project boundaries or lines on maps. The impacts caused by one project, which may be considered minor and insignificant on their own, combined with other environmental impacts from other projects or developments planned or already underway in the area. Together, these impacts may combine to become significant, and adverse. The consideration and assessment of these “cumulative” effects is therefore an important part of the environmental assessment process.

The following table should be completed to help identify the potential for cumulative effects, and to assess their significance (e.g. N/S - not significant; SP - significant positive effect; SN - significant negative effect; U - unknown, unable to assess).

(A) <u>Other projects or developments planned, or underway in the area</u>	(B) <u>Potential Cumulative Effects:</u> <i>The potentially adverse impacts of this Project; which could combine with those from the other projects identified in (A)</i>	(C) <u>Mitigation Measures</u> <i>needed to effectively manage or prevent any cumulative, adverse effects; and</i> <u>Significance of residual impacts after mitigation (N/S, SP, SN, U)</u>
Landfill site expansion is proposed approximately 100 m north of the site.	Both the wastewater treatment lagoon and the landfill site already exist at these locations. Upgrades to the existing landfill will involve similar activities of earth moving and construction. Cumulative impacts are expected to be minimal	This project will improve existing conditions as well as existing cumulative impacts. No mitigation required. NP.
Future development beyond 1 kilometre includes: <ul style="list-style-type: none"> - Upgrade the existing water reservoir 	This development site is removed from the water reservoir	No mitigation required. Cumulative impacts are not anticipated. N/S

9) SUMMARY OF ENVIRONMENTAL EFFECTS

Assuming that all mitigation measures are implemented as proposed in Sections 7 and 8, the following effects are predicted for the Valued Ecosystem Components identified in Section 6:

(N/S not significant; SP significant positive effect; SN significant negative effect; U unknown; N/A not applicable)

VALUED ECOSYSTEM COMPONENT	Summary of Effects <i>(check box)</i>					comments
	N/S	SP	SN	U	N/A	
Topography/terrain	√					
Soil/geology	√					
Aquatic sediment/substrate		√				
Surface water		√				
Groundwater					√	
Air quality	√					
Vegetation	√					
Wetlands		√				
Fish & fish habitat	√					
Migratory birds	√					
Other fauna	√					
Special habitat					√	
Sensitive areas					√	
Human health and safety		√				
Traditional land use activities					√	
Aesthetics	√					
Archaeological resources					√	
Specially-designated areas					√	

Screening Report Completed by:

Jim Walls

Name and signature

January 31, 2006

Date

10) CEEA SCREENING DECISION

☐

[00] DECISION PENDING. Assessment not final.

☒

[01] PROJECT MAY PROCEED. All potentially adverse effects are mitigable with known technology, and therefore will be rendered insignificant (*CEAA s. 20(1)(a)*).

☐

[02] PROJECT MAY NOT PROCEED. The project is likely to cause significant adverse environmental effects that cannot be justified in the circumstances (*CEAA s.20(1)(b)*).

☐

[03] ENVIRONMENTAL ASSESSMENT IS TO BE REFERRED TO THE MINISTER FOR MEDIATION OR A REVIEW PANEL, since it is uncertain whether the project is likely to cause significant adverse environmental effects (*CEAA s. 20(1)(c)(i)*); significant public concern has been raised, warranting a referral to a mediator or a review panel (*CEAA s. 20(1)(c)(ii)*); and/or public concerns warrant a reference to a mediator or a review panel (*CEAA s. 20(1)(c)(iii)*).

Reviewed and Recommended by:		
Representative of Council, or designate (<i>name & signature</i>)		Date
INAC Environmental Officer (<i>name & signature</i>)		Date
Other Federal RA(s) (<i>specify details</i>)		Date

INAC USE ONLY

SCREENING DECISION by LEAD RESPONSIBLE AUTHORITY (enter code):	
Approved by:	
INAC Responsibility Centre Manager (<i>name + signature</i>)	Date

11) KEY REFERENCES & SOURCES

Nuna Burnside Engineering and Environmental Ltd., “*Schematic Design for the Improvements of the Water Reservoir, Wastewater Lagoon and Solid Waste Disposal Facility, The Hamlet of Qikiqtarjuaq, Nunavut*”, September 2005. (file: N-O 09439)

Nuna Burnside Engineering and Environmental Ltd., “*Geotechnical Evaluation of Options for the Improvements of the Water Reservoir, Wastewater Lagoon and Solid Waste Disposal Facility, Supplement to the Schematic Design Report (September 2005), The Hamlet of Qikiqtarjuaq, Nunavut*”, November 2005. (file: N-O 09439)

Nuna Burnside Engineering and Environmental Ltd., “*Detailed Design Report for the Improvements to the Water Reservoir, Sewage Lagoon, and Solid Waste Disposal Facility, The Hamlet of Qikiqtarjuaq, Nunavut*”, February 2006. (file N-O 09439).

12) LIST OF ATTACHMENTS

Detailed Design Report listed above.

J:\2006\F\NUNA\08983\Reports\Detailed Design\Appendices\Appendix J2_CEEA Lagoon.doc



Appendix J3
Solid Waste Management Facility

Indian and Northern Affairs Canada

Environmental Screening Report

CANADIAN ENVIRONMENTAL ASSESSMENT ACT

This form, when completed in full, constitutes an environmental screening report intended to meet the requirements of s. 16 of the *Canadian Environmental Assessment Act* (CEAA). It contains the following sections:

- 1) PROJECT IDENTIFICATION
- 2) LOCATION OF PROJECT
- 3) PROJECT JUSTIFICATION
- 4) PROJECT DESCRIPTION
- 5) CONSULTATION
- 6) EXISTING ENVIRONMENT
- 7) ENVIRONMENTAL EFFECTS AND MITIGATION MEASURES
- 8) CUMULATIVE EFFECTS ASSESSMENT
- 9) SUMMARY OR ENVIRONMENTAL EFFECTS
- 10) CEAA SCREENING DECISION
- 11) KEY REFERENCES & SOURCES
- 12) LIST OF ATTACHMENTS

The table on Page 2 will be completed by INAC staff. The proponent should complete the sections that follow, starting with "1. PROJECT IDENTIFICATION" on page 3.

Project Reference	
Section 5 Triggers	<p>Please identify the reason(s) for INAC involvement:</p> <ul style="list-style-type: none"> • CEEA s. 5.1(a) proponent • CEEA s. 5.1(b) funding • CEEA s. 5.1(c) granting an interest in land • CEEA s. 5.1(d)** regulatory function <p>-----</p> <p>**If a 5.1 (d) trigger, please specify the trigger, as per <i>Law List Regulations</i>:</p> <ul style="list-style-type: none"> • <i>Indian Act</i> subsection 18(2) • <i>Indian Act</i> subsection 28(2) • <i>Indian Act</i> paragraph 58(4)(b) • <i>Indian Act</i> subsection 35(1) • <i>Indian Act</i> subsection 39(1) • <i>Indian Mining Regulations</i> subsection 5(2) • <i>Indian Mining Regulations</i> subsection 6(1) • <i>Indian Reserve Waste Disposal Regulations</i> section 5 • <i>Indian Timber Regulations</i> subsection 5(1) • <i>Indian Timber Regulations</i> section 9 • <i>Indian Timber Regulations</i> subsection 22(1)
FEAC ¹ ("LEAD RA")	
Other RAs	
Expert FAs	
Project also subject to a provincial EA: YES/NO - (if YES, provide details)	
CEAR ² Reference #	
Env. Officer	
Reviewing Officer	
RCM & Directorate	

¹ FEAC - Federal Environmental Assessment Coordinator

² CEAR - Canadian Environmental Assessment Registry

1) PROJECT IDENTIFICATION

Location:	Hamlet of Qikiqtarjuaq, Nunavut
Project Title:	Improvements to Solid Waste Disposal Facility
Project proponent(s):	Government of Nunavut, Community and Government Services

2) LOCATION

Detailed Location: <i>If project is not on reserve, specify latitude and longitude coordinates, and nearest town, highway, lake, etc.</i>	Broughton Island, Nunavut located on the eastern coast of Baffin Island, 470 kilometres northeast of Iqaluit. Approximately 566 residents. 67°33' north latitude and 64°02' west longitude. Project is on Hamlet land.
---	--

NO

All or part of the project is OFF Reserve Land (YES/NO)

Definition of Project Area <i>The geographical extent of the project, and those areas affected during construction and operation. For example:</i> - key transportation routes for equipment and materials - staging & refueling areas - main activity/construction site, traffic routes, etc.	Most of the work will take place in the immediate vicinity of the existing solid waste disposal site (landfill) and bulky metals disposal area. The current landfill site will be improved. The access route will remain the same as it is currently. It is assumed that refueling of any equipment will take place at the existing fuel depot (in the main community).
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Adjacent Land:	N: There is vacant undisturbed tundra.
<i>Land use and description to the North, East, South, and West of project</i>	E: There is an access road followed by a bulky metals/derelict vehicle storage area. Undisturbed, vacant. Tundra is further east.
	S: The existing wastewater lagoon and the landfill access road. Further to the south, a borrow pit followed by vacant, undisturbed tundra.
	W: Vacant undisturbed tundra. The main community of Qikiqtarjuaq is more than 2 kilometres west of the site.

3) PROJECT JUSTIFICATION

Need for the Project:

Rationale: e.g. what problem is the project going to solve or what opportunity is the project going to provide?

The community now operates a landfill site at this site. The site operates with a steep tipping face and needs expansion and rehabilitation to meet the needs of the Hamlet for the next 20 years.

Purpose of the Project:

What is going to be achieved by carrying out the project?

To provide a waste disposal system for the Hamlet that can meet the regulatory requirements as well as the needs of the remote community over the next 20 years.

Alternatives Considered:

Different ways to meet the project need and achieve the project purpose

Several options were considered:

- null option, not a viable solution. There are significant environmental and public health and safety issues that need to be addressed (steep tipping face, blown litter, lack of capacity)
- Remediation of the current site with updated operational maintenance procedures. (surface water management, operational issues and cover requirements can be addressed)
- Solid waste disposal facility relocation. This option is expensive but will create environmental issues in a new area and an access road will have to be built. Surface water, operational issues, litter and cover material issues will be addressed with this option.
-

4) PROJECT DESCRIPTION

Proposed Start Date: <i>(year-month-day, if known)</i>	July 2006	Estimated Completion Date: October 2007
Estimated Total Cost:	Approximately \$350,000	
Description of Project: <i>(attach/reference supporting material as required)</i>	<p>The existing landfill will be rehabilitated to better accommodate the needs of the community over the next 20 years. The project will involve the following:</p> <ul style="list-style-type: none"> - Improving surface water diversion ditching around the site. - Contouring the existing waste and covering exposed waste except for a small active disposal area - Application of additional cover (to be imported) - Establishment of new berms below the tipping face to contain the waste and cover - Construct a sedimentation pond for run-off collection and containment - Move and add fencing around the site. 	
Project Management Team Members & Affiliation	Mr. Brian Duguay, Project Officer, Community and Government Services, Baffin Region Nuna Burnside Engineering and Environmental Ltd., Jim Walls, P.Geo. Lootie Toomasie, Mayor of Qikiqtarjuaq	

5) CONSULTATION

(a) Government Departments, Agencies, Non-Governmental Organizations, Community Councils, etc.

Department, Agency, or Organization:	Contact Person & Telephone Number:	Nature of Consultation & Response Received:
Community and Government Services, Baffin Region	Brian Duguay, Project Officer	Was provided a copy of the Schematic Design Report identifying options available to meet the community's needs. Discussed and identified preferred alternative.
Community council and public works	Lootie Toomasie, Mayor	Held two meetings: July 8, 2005 and September 14, 2005 meeting minutes recorded. Issues identified included: blown litter from the site was found in the water reservoir, potential impacts on the "wetland" (poorly drained area used for wastewater treatment). Approved Schematic Design.

(b) Public Consultation, including Community Members

Public Consulted:	Method Used:	Date:	Details/Issues Raised:
Residents (via council)	Meetings with Hamlet council and Hamlet public works staff	July 8 Sept 14, 2005.	The Hamlet residents concerns and comments were expressed through council. Concerns regarding blown litter and the site's inability to meet future demands. The community also had concerns regarding the potential for impacting the poorly drained area (wetland) that is used for wastewater treatment.

6) EXISTING ENVIRONMENT

COMPONENT	DESCRIPTION <i>(describe features; indicate sensitivity to disturbance)</i>
6.1 PHYSICAL FEATURES - VALUED ECOSYSTEM COMPONENTS	
Topography/Terrain: <i>(hilly, flat)</i>	The area is generally flat in the vicinity of the landfill and toward the community and Davis Strait. Further inland the terrain becomes more hilly.
Soil and Geology: <i>(soil type, quality and use; bedrock geology)</i>	Test pitting on site identified approximately 2.0 m of coarse sand and gravel with cobbles and boulders. The underlying bedrock is described as felsic and rare mafic plutonic rock. The bedrock was not encountered during the field investigations. Permafrost was typically encountered at a depth of 2 m.
Surface Water: <i>(presence & quality)</i>	The Tulugak River as well as intermittent tributaries flow northwesterly towards Davis Strait. The Tulugak River is more than a kilometre south of the landfill. Davis Strait is more than a kilometer west of the site. The surface water quality in the Tulugak River is good. The Tulugak River freezes completely during the winter.
Distance to Water:	<i>(from project area/activity, in metres):</i> There is wetland area immediately west of the landfill. The landfill area drains towards this area. This is only seasonally thawed and will be utilized by the wastewater treatment system as an engineered wetland treatment area.
Aquatic Sediment/Substrate: <i>(type & quality)</i>	Not known
Groundwater: <i>(local use & quality)</i>	Groundwater not used. The entire area is permafrost below approximately 2.0 m.
Air Quality: <i>(local air quality)</i>	Good

COMPONENT	DESCRIPTION <i>(describe features; indicate sensitivity to disturbance)</i>
6.2 BIOLOGICAL FEATURES - VALUED ECOSYSTEM COMPONENTS	
Vegetation: <i>(e.g. forest, ground cover, aquatic plants)</i>	The existing facilities are located within areas of disturbed tundra that are covered in cobble, sand and gravel. Very limited amounts and diversity of vegetation are present on these sites. Small areas of undisturbed tundra will be disturbed to accommodate some of the proposed facilities. These areas are also sparsely vegetated.
Wetlands: <i>(e.g. fens, swamp)</i>	The preliminary review did not identify any existing wetlands in the Study Area, although the estuary of the Tulugak River to the west of the Study Area may contain some wetland characteristics. The adjacent wastewater treatment facility proposed for the community will establish a 10-hectare wetland treatment area, which will provide seasonal habitat for species of birds and other wildlife in the area.
Fish & Fish Habitat: <i>(types of habitat and common species found)</i>	The Tulugak River and tributaries freeze solid in the winter months therefore they are not a fish habitat most of the year. Davis Strait however is a significant habitat for many species. It is more than one kilometer west of the site. Improvements to the existing system will significantly reduce the potential of impacting the fish habitat. Fishing for char (<i>Salvelinus alpinus</i>) is an important part of daily life. Char is likely the primary fish species being harvested in the area. It is not expected that fish are present in the Tulugak River.
Migratory Birds: <i>(e.g. waterfowl, songbirds)</i>	Several species of shorebirds and waterfowl are likely to be found in the general area, although it is unlikely that birds use the Study Area for nesting or staging given the limited amount of suitable habitat on the site. Greater concentrations of birds, both in terms of diversity and densities, are found in the two Important Bird Areas to the east of Qikiqtarjuaq (see Special Habitat Areas below).
Other Fauna: <i>(mammals/amphibians reptiles/insects; game & protected species)</i>	<p>Qikiqtarjuaq is located in Davis Strait off the east coast of Baffin Island. This rocky area is rich in marine mammal wildlife. Right Whale, Ring and Harp Seals, Beluga Whales, Narwhal, Walrus and Killer Whales all inhabit the waters off Qikiqtarjuaq, away from the Study Area. Hunting and fishing are still important parts of daily life in this area. Locals hunt Seals, Narwhal and Walrus, although this takes place some distance from the community of Qikiqtarjuaq, and away from the Study Area.</p> <p>Local people have been reported to consume a variety of terrestrial species including Polar Bear (<i>Ursus maritimus</i>) and, more rarely, carnivores such as Arctic Wolves (<i>Canis lupus arctos</i>) and Arctic Fox (<i>Alopex lagopus</i>). Musk Ox (<i>Ovibos moschatus</i>) and Barren Ground Caribou (<i>Rangifer tarandus groenlandicus</i>) also have historic ranges that include the area, and are likely hunted by local people. Local people indicate species do frequent some of the Study Area. Scavengers are occasionally attracted to the site when waste is not burned and buried regularly. None of these species have status under the Species At Risk Act (SARA).</p>

COMPONENT	DESCRIPTION <i>(describe features; indicate sensitivity to disturbance)</i>
6.2 BIOLOGICAL FEATURES - VALUED ECOSYSTEM COMPONENTS	
Special Habitat Areas <i>(specially designated or protected habitats)</i>	<p>No special habitat areas were identified in the Study Area during the preliminary review. Two Important Bird Areas (IBAs) were identified to the east of Qikiqtarjuaq. The first of these, Cape Searle, is located approximately 80 km east of Qikiqtarjuaq. The second, Reid Bay, is located approximately 125 km east of Qikiqtarjuaq. Species of interest that have been recorded from these IBAs include: Northern Fulmar (<i>Fulmarus glacialis</i>), Glaucous Gull (<i>Larus hyperboreus</i>) and Black Guillemots (<i>Cepphus grille</i>) from Cape Searle; and, Black-legged Kittiwake (<i>Rissa tridactyla</i>), Iceland Gull (<i>Larus glaucoides</i>), Thick-billed Murre (<i>Uria lomvia</i>), Glaucous Gull, Northern Fulmar and Black Guillemots from Reid Bay.</p> <p>The Canadian Wildlife Service (CWS) has been trying to establish protection for the seabird colonies at Cape Searle and Reid Bay since the mid 1980s. In May 2000, the community of Qikiqtarjuaq and the CWS agreed to proceed on work to create these new NWAs.</p> <p>Information on the two IBAs is available at: http://www.bsc-eoc.org/iba/regional.jsp?region=NWT</p>
Species at Risk	No Species at Risk have been identified in close proximity to the study area. No threats to Species at Risk have been identified. Refer to above sections for details.

COMPONENT	DESCRIPTION <i>(describe features; indicate sensitivity to disturbance)</i>
6.3 SOCIO-CULTURAL FEATURES – VALUED ECOSYSTEM COMPONENTS	
Sensitive Areas: <i>(e.g. residential zones, parkland, hospitals, schools)</i>	The landfill is more than 2 kilometres from the main community. There are no known sensitive areas near the site although there is a poorly drained area to the west.
Human Health and Safety: <i>(any persons whose health and safety may be affected by the construction and operation of the project)</i>	The landfill is more than 2 kilometres from the main community therefore it is not likely to affect human health and safety. Improving the solid waste disposal system for the community will result in improved human health and reduced impact to the natural environment.
Traditional Land Use Activities: <i>(e.g. trapping, fishing, medicinal plant collection, ceremonial grounds)</i>	The area is already occupied by the existing landfill. Rehabilitation and expansion are not expected to cause an impact to traditional land use activities. Hamlet staff indicate the area has no traditional land uses.
Aesthetics: <i>(general character of the surrounding area; and if the project is compatible)</i>	There is already a landfill in this area and the project is removed from the main community therefore aesthetics are not an issue. The area has been designated by the community for infrastructure purposes including the landfill, bulky metals disposal, and wastewater lagoon.
Archaeological Resources: <i>(recorded, or potential)</i>	The area is removed from the main community and the site has already been developed. Hamlet staff indicate there are no known archaeological resources in this area.
Special Designations: <i>(parks, protected areas)</i>	There are no known areas with special designations in the vicinity of the existing or proposed landfill area.

7) ENVIRONMENTAL EFFECTS AND MITIGATION MEASURES – SUMMARY

The next table summarizes the following:

(A)	List of Project Activities
	Key project activities associated with construction, operation, maintenance and decommissioning , if applicable. Includes locations, scheduling details, and estimates of magnitude and scale.
(B)	Potential Environmental Effect(s) associated with each project activity.
	<i>An Environmental Effect</i> is defined as:
	i) any <u>change that the project may cause in the environment</u> , Including any effect of any such change on health and socio-economic conditions, on physical and cultural heritage, on the current use of lands and resources for traditional purposes, or on any structure, site, or thing that is of historical, archaeological, paleontological or architectural significance; and ii) any <u>change to the project that may be caused by the environment</u> . (Example: ice break-up damaging a bridge or dock; freezing and bursting of unprotected water lines.)
(C)	Mitigation Measures
	<i>A Mitigation Measure</i> is:
	i) an action or provision made that will <u>eliminate, reduce or control the adverse environmental effects of the project</u> , and may include restoration, compensation or replacement of any damages or impacts.
(D)	Determination of Significance
	A determination of the significance of the environmental effects, taking into account appropriate mitigation measures if applicable. Mitigation measures are intended to prevent or reduce any potentially negative effects. The abbreviations used are:
	N/S - effect not significant, or rendered insignificant with mitigation SP - significant positive effect SN - significant negative effect U - outcome unknown or cannot be predicted, even with mitigation.

ENVIRONMENTAL EFFECTS AND MITIGATION MEASURES - SUMMARY				
(A) Key Project Activities		(B) Potential Environmental Effect(s)	(C) Mitigation Measures	(D)
1	Ditching to divert run off around fill area	<ul style="list-style-type: none"> a) Minor loss of vegetation b) Potential for soil erosion c) Noise from operating equipment d) Dust. 	<ul style="list-style-type: none"> a) Smallest possible area will be cleared. b) Can prevent by limiting maximum area to be exposed, limiting delays, providing temporary drainage and buffers between project area and water bodies. Limiting work during spring thaw period. c) Limit activities to specified hours to reduce potential impacts on animals and humans d) Limit exposed area. Could also use water to control dust. 	N/P
2	Construction of a 2 m high berm around fill area.	<ul style="list-style-type: none"> a) Minor loss of vegetation b) Potential for soil erosion and dust c) Noise from equipment d) Dust. 	<ul style="list-style-type: none"> a) Smallest possible area will be cleared. b) Can prevent by limiting maximum area to be exposed, limiting delays, providing temporary drainage and buffers between project area and water bodies. Limiting work during spring thaw period c) Limit activities to specified hours to reduce potential impacts on animals and humans d) Limit exposed area. Could also use water to control dust. 	N/P

ENVIRONMENTAL EFFECTS AND MITIGATION MEASURES - SUMMARY				
(A) Key Project Activities		(B) Potential Environmental Effect(s)	(C) Mitigation Measures	(D)
3	Construction of a sedimentation pond to control impacted water on site.	<ul style="list-style-type: none"> a) Minor loss of vegetation b) Potential for soil erosion c) Noise from equipment d) Dust. 	<ul style="list-style-type: none"> a) Smallest possible area will be cleared. b) Can prevent by limiting maximum area to be exposed, limiting delays, providing temporary drainage and buffers between project area and water bodies. Limiting work during spring thaw period c) Limit activities to specified hours to reduce potential impacts on animals and humans. d) Limit exposed area. Could also use water to control dust. 	N/P
4	Reconfiguring the waste area and applying cover	<ul style="list-style-type: none"> a) Potential for soil erosion b) Noise from equipment c) Dust. 	<ul style="list-style-type: none"> a) Can prevent by limiting maximum area to be exposed, limiting delays, providing temporary drainage and buffers between project area and water bodies. Limiting work during spring thaw period b) Limit activities to specified hours to reduce potential impacts on animals and humans. c) Limit exposed area. Could also use water to control dust. 	N/S

8) CUMULATIVE EFFECTS ASSESSMENT

The natural environment is interconnected, and does not recognize project boundaries or lines on maps. The impacts caused by one project, which may be considered minor and insignificant on their own, combined with other environmental impacts from other projects or developments planned or already underway in the area. Together, these impacts may combine to become significant, and adverse. The consideration and assessment of these “cumulative” effects is therefore an important part of the environmental assessment process.

The following table should be completed to help identify the potential for cumulative effects, and to assess their significance (e.g. N/S - not significant; SP - significant positive effect; SN - significant negative effect; U - unknown, unable to assess).

(A) <u>Other projects or developments planned, or underway in the area</u>	(B) <u>Potential Cumulative Effects:</u> <i>The potentially adverse impacts of this Project; which could combine with those from the other projects identified in (A)</i>	(C) <u>Mitigation Measures</u> <i>needed to effectively manage or prevent any cumulative, adverse effects; and</i> <u>Significance of residual impacts after mitigation (N/S, SP, SN, U)</u>
Wastewater treatment plant expansion is proposed approximately 100 m south of the site.	Both the wastewater treatment lagoon and the landfill site already exist at this location. Upgrades to the wastewater lagoon will involve similar construction activities. Cumulative construction and operation impacts are expected to be minimal.	This project will improve the overall impacts from the existing landfill site. No mitigation required. SP.
Future development beyond 1 kilometre includes: - Upgrade/expand the existing water reservoir.	This development site is removed from the landfill site therefore cumulative impacts are not anticipated	No mitigation required. N/S.

9) SUMMARY OF ENVIRONMENTAL EFFECTS

Assuming that all mitigation measures are implemented as proposed in Sections 7 and 8, the following effects are predicted for the Valued Ecosystem Components identified in Section 6:

(N/S not significant; SP significant positive effect; SN significant negative effect; U unknown; N/A not applicable)

VALUED ECOSYSTEM COMPONENT	Summary of Effects <i>(check box)</i>					comments
	N/S	SP	SN	U	N/A	
Topography/terrain	√					
Soil/geology	√					
Aquatic sediment/substrate	√					
Surface water		√				
Groundwater					√	
Air quality	√					
Vegetation	√					
Wetlands		√				
Fish & fish habitat	√					
Migratory birds	√					
Other fauna	√					
Special habitat					√	
Sensitive areas					√	
Human health and safety		√				
Traditional land use activities					√	
Aesthetics	√					
Archaeological resources					√	
Specially-designated areas					√	

Screening Report Completed by:

Jim Walls

Name and signature

January 31, 2006

Date

10) CEAA SCREENING DECISION

☐

[00] DECISION PENDING. Assessment not final.

☒

[01] PROJECT MAY PROCEED. All potentially adverse effects are mitigable with known technology, and therefore will be rendered insignificant (*CEAA s. 20(1)(a)*).

☐

[02] PROJECT MAY NOT PROCEED. The project is likely to cause significant adverse environmental effects that cannot be justified in the circumstances (*CEAA s.20(1)(b)*).

☐

[03] ENVIRONMENTAL ASSESSMENT IS TO BE REFERRED TO THE MINISTER FOR MEDIATION OR A REVIEW PANEL, since it is uncertain whether the project is likely to cause significant adverse environmental effects (*CEAA s. 20(1)(c)(i)*); significant public concern has been raised, warranting a referral to a mediator or a review panel (*CEAA s. 20(1)(c)(ii)*); and/or public concerns warrant a reference to a mediator or a review panel (*CEAA s. 20(1)(c)(iii)*).

Reviewed and Recommended by:		
Representative of Council, or designate (<i>name & signature</i>)		Date
INAC Environmental Officer (<i>name & signature</i>)		Date
Other Federal RA(s) (<i>specify details</i>)		Date

INAC USE ONLY

SCREENING DECISION by LEAD RESPONSIBLE AUTHORITY (enter code):		
Approved by:		
INAC Responsibility Centre Manager (<i>name + signature</i>)		Date

11) KEY REFERENCES & SOURCES

Nuna Burnside Engineering and Environmental Ltd., “*Schematic Design for the Improvements of the Water Reservoir, Wastewater Lagoon and Solid Waste Disposal Facility, The Hamlet of Qikiqtarjuaq, Nunavut*”, September 2005. (file: N-O 09439)

Nuna Burnside Engineering and Environmental Ltd., “*Geotechnical Evaluation of Options for the Improvements of the Water Reservoir, Wastewater Lagoon and Solid Waste Disposal Facility, Supplement to the Schematic Design Report (September 2005), The Hamlet of Qikiqtarjuaq, Nunavut*”, November 2005. (file: N-O 09439)

Nuna Burnside Engineering and Environmental Ltd., “*Detailed Design Report for the Improvements to the Water Reservoir, Sewage Lagoon, and Solid Waste Disposal Facility, The Hamlet of Qikiqtarjuaq, Nunavut*”, February 2006. (file N-O 09439).

12) LIST OF ATTACHMENTS

Detailed Design Report listed above.

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