1.0 Introduction

The Department of Community and Government Services, Government of Nunavut (GN-CGS) retained Nuna Burnside Engineering and Environmental Ltd. (Nuna Burnside) to undertake an evaluation of the water reservoir, sewage lagoon, and solid waste disposal facilities for the Municipality of Qikiqtarjuaq, Nunavut.

1.1 Purpose

As stated in the Terms of Reference (TOR), the immediate priorities for the Municipality are to ensure that ample safe drinking water is available to the community for a 20 year planning period. Furthermore, the community would like to implement improved waste management strategies that will comply with applicable laws, and will comply with foreseeable legislated amendments.

1.2 Existing Infrastructure and Facilities

The Municipality 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. A facultative lagoon provides sewage treatment. Effluent from the lagoon is discharged 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. This solid waste disposal facility includes areas for bulky metals/derelict vehicles, hazardous waste and residential waste.

1.3 Proposed Infrastructure and Facilities

Raw water is to be drawn from the Tulugak River to fill the reservoir in the summer. The raw water supply for the Municipality is to come from the reservoir. The existing reservoir is to be expanded to provide storage for domestic, institutional, commercial and industrial uses as well as for fire protection. Hydro is to be provided, in the future, to the truck fill station. Once hydro is available, the existing generators will be used to provide emergency standby power. Water is to continue to be trucked to the users from the reservoir.

A second sewage lagoon is to be constructed adjacent to the existing lagoon to meet the projected 20 year sewage production from the community. The effluent from the lagoons is to be discharged annually to a natural wetland treatment area immediately downstream of the lagoons. Sewage is to be trucked to the lagoon from holding tanks within the community.

Remediation of the existing solid waste disposal site and continued operation of the site for a 30 year planning period was recommended as the preferred option.

1.4 Population Data

Based on a growth rate of 2 percent and a 2005 base population of 599 people, the 20-year (2027) design population to be used for sizing all facilities in this project is 937 people

1.5 Proposed Scope of Work – Water Supply, Treatment and Storage Facility

To provide potable water to the community will involve:

- Expanding the existing reservoir by extending the sides of the existing reservoir and constructing a new end berm
- Removal of existing end berm along the northwest fence
- Relining the entire reservoir with a new liner
- Replacing the existing truck fill pumps with pumps capable of providing the required fire flow
- Providing filters to ensure the effectiveness of the disinfection system
- Supply and installation of a 300 mm HDPE gravity fill pipe
- Provision of signage to meet NWB requirements and safety guidelines.

1.6 Proposed Scope of Work – Sewage Facility

Sewage is collected daily by a vacuum truck and transported to the lagoon. The proposed upgrades to the system include:

- Constructing a second lagoon cell
- Revising the lagoon decant structure to prevent freezing
- Construction of a exfiltration trench to promote overland flow through the wetland
- Reconstruction of the off loading area
- Associated site drainage and grading
- Provision of signage to meet NWB requirements and safety guidelines.

1.7 Proposed Scope of Work – Solid Waste Facility

Due to the isolated nature of the Municipality, the waste stream is divided into the following components:

1. **Hazardous Wastes** – including batteries, waste oil, waste antifreeze, and other materials not suitable for landfilling

2. **Bulky Metals** – equipment machinery and metal materials no long deemed salvageable or recyclable by the Municipality.

3. **Municipal Solid Waste** – the remaining waste materials.

A storage area is provided near the landfill for equipment, machinery and metal materials that are deemed to have potential reuse/recycle value. These are kept out of the waste stream until they are no longer deemed usable, then they are transferred to the bulky metals disposal area.

The hazardous waste area is to consist of::

- A 15 m x 15 m bermed, lined and fenced containment area
- A 3 m wide lockable swing gate to provide access
- The containment area would include 100 mm of sand and gravel over the liner for protection

Due to the high cost of removing bulky metals from the community by sea lift backhaul, the disposal strategy is to dispose of this material by burial in the designated bulky metals disposal area. By segregating the material from the other waste steams, it provides the possibility for future excavation and backhaul for scrap. In addition, the bulky metals are deemed to have very low potential for an environmental impact, and are considered virtually inert materials. Disposal practices must include scrutiny to ensure oils, fuels, and other items that could cause an environmental impact are removed from the bulky metals waste steam prior to disposal. Based on the historic quantities of metals placed in the bulky metals area and discussions with Municipal staff, it is anticipated the bulky metals disposal volume with a 4:1 ratio of metals to cover material (20 percent cover by volume) will be approximately 24,000 m^3. This assumes continued use of the recyclable storage area and regular disposal until 2030.

The existing ditching in the northeast corner will be improved so that surface erosion of the area is minimized. Areas of existing surface erosion will be repaired with additional cover material.

Municipal solid waste arrives at the site and hazardous material is removed. The recommended design improvements for the municipal solid waste disposal area include:

- Constructing a 2 m high berm around the entire site
- Construction of a water retention area
- Construction of fence around the entire site
- Improvements to the drainage around the site
- Provision of signage to meet NWB requirements and safety guidelines.

1.8 NWB Licencing

Draft Operation and Maintenance Plans were submitted to the GN as part of the Detailed Design Report for submission to the NWB in support of the licensing application. Comments were received from the NWB following a review of the information provided. A report on the responses to the questions from the NWB has been prepared and submitted to the GN for submission to the NWB.

1.9 Environmental Screening

An Environmental Screening Decision Form has been completed for each of the facilities. The screening decision number for all three facilities (water, sewage, and solid waste) is "01" which means that the project may proceed since all potentially adverse effects are mitigable with known technology, and therefore will be rendered insignificant. The completed forms are included in Appendix J of the Detailed Design Report.

Detailed Design Report for the Improvements to the Water Reservoir,
Sewage Lagoon, and Solid Waste Disposal Facility
The Municipality of Qikiqtarjuaq, Nunavut

February 2007

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