

Project Proposal of the Municipality of Pangnirtung Water Licensed facilities under Water Licence # 3BM-PAN 1417.

Introduction: The Municipality of Pangnirtung is located in the Canadian territory of Nunavut, and lies on the south-eastern shore of the Pangnirtung Fiord, which itself is located at Latitude 66°09'00" N and Longitude 65°40'34" W on the eastern side of Baffin Island. In total, the municipal boundary covers an area of 7.5km². In 2016, the Hamlet had a population of 1,811 and total of 433 private dwellings.

The current Water Licence with a permit of water extraction volume for 74,000 cubic meters annually was issued on Sep. 14, 2014 and will be expired on Sep.15, 2017. This type B Water Licence #3BM-PAN 1417 (proposed renewal Type A considering storage volume annually will exceed 60,000cubic metres.) contains three facilities: Water Supply, Wastewater Treatment and Waste management. Water for municipal use is pumped from Duval River, stored in the water storage reservoir and trucked delivery to the residents. The waste water of the Community is treated in a mechanical treatment Plant. Solid waste from the Municipality is currently disposed of in a landfill site which is nearing its life capacity.

Drinking Water Supply:

Water Truck Fill Station: The Municipality has built a new Water Truck filling station. The old station is still there for an emergency. This new station has the following components:

1. Two intake pipes; (2) Two truck fill arms and (3) CT approach as;
 - a. CT Value = 12 mg·min/L
 - b. **CT = Concentration * Time**

Where the concentration of residual chlorine is in mg/L and the time the water is in contact with the chlorine is in minutes.

- b. Flow Rate = 1,000 L/min
- c. Contact time = 12 minutes
- d. Baffle factor =1.0

The predicted production flow for the design horizon of the facility is 200,907 m³ per annum. To facilitate uninterrupted truck filling at two truck fill arms, the CT pipe is sized to carry 15,000L of water.

The water delivery process of the truck fill station has been broken down to several building blocks that make up the complete system. These building blocks are:

- (1) Pumping; (2) Filtering; (3) Chlorination; (4) Water reservoir; (5) Delivery system to trucks; (6) Emergency power; and (7) Controls and auxiliary equipment.

Wastewater Treatment Plant (WWTP):

The Community wastewater is treated by a Mechanical Treatment Plant. Construction of the WWTP started in 2003 and became operational in 2005. Originally, the process was a Rotating Biological Contactor (RBC) which failed for various reasons. The process was converted to a "conventional" activated sludge system that was enhanced using the media from the RBC. However, it was determined later that the process, as it was configured, was undersized for the municipal flow; being expected to treat the process wastewater from the fish-processing plant was beyond its capabilities. An earlier attempt had been made to try and incorporate the fish plant process effluent with the municipal wastewater for treatment at the WWTP but the plant was unable to perform properly.

A Design Brief was completed (early 2013) by exp Services Inc. and outlined the design criteria and included several suggested processes that could provide the level of treatment required; the Membrane Bioreactor (MBR) process was recommended as it required the smallest footprint (considering the need to enclose the process for winter operations). During the design phase, the recommended process was sized to accept the fish plant processing wastewater. As well,

an important aspect of WWTP operation is appropriate solids management and providing the means to waste excess biosolids. This was achieved using large GeoTubes™ which simplifies this operation.

The Pang WWTP has been operational since 2015 and is working well. The plant effluent quality is better and achieving BOD₅ and TSS concentrations <10mg/L/10mg/L). exp Services Inc. along with GE Process water (membrane supplier) is retained for consultancy services to provide extended care technical support, training and operations oversight.

exp has also prepared a Hamlet-wide Spill Contingency Plan (SCP) and a wastewater treatment plant Bypass Contingency Plan (BCP). The SPC addresses how the Municipal employees should respond to a spill of petroleum (or similar) products. The BCP instructs the WWTP plant personnel in how to respond to various unit process shutdown requirements (for maintenance purposes) or failures within the treatment system. Most of the BCP scenarios would allow for the continuation of full treatment; a few would result in partial treatment until the underlying issue is addressed. It would be rare for a complete plant bypass to be required.

Landfill site and Metal waste site:

The Municipality of Pangnirtung maintains two separate wastes sites. Metal wastes and domestic wastes (Landfill). All residential and business waste is disposed at the Hamlet's landfill site, which is located to the northeast of the Hamlet's built-up area and is toward Auyuittuq National Park. The landfill site is bermed and fenced and designed to operate as a modified landfill. The existing facility has an area for disposal for biological solids, such as sludge from the sewage treatment facility and/or animal carcasses. In addition, the Hamlet collects and stores household hazardous waste, such as car batteries in a Sea-container located at the landfill. Waste disposed of at the landfill is compacted using the Hamlet's landfill site loaders, which is covered on a periodic basis. Approximately 2,350 tons of commercial and residential solid waste and sewage sludge is disposed each year. The Hamlet faces a number of waste management issues, some of which are compounded by the Hamlet's geographic location. However, the landfill is now reaching its capacity, and new waste management solutions are required.

The metal waste site is located just opposite to the landfill site and separated by the access road stationed at the toe of the hill. The metals are mostly separated and segregated. The Capital Project for waste management is expected in 2020-2021. This new Capital project will be designed to minimize the waste management issues and concerns of the Community. Water Licence will be amended accordingly to capture capital projects.

