Project Proposal for the 2nd Amendment of the Hamlet of Igloolik Water Licence # 3BM-IGL1520-Type B.

The Hamlet of Igloolik is located at 69°23'N and 81°46'W on Igloolik Island of the Foxe Basin within the Qikiqtani Region. The current population of Igloolik is 1,811. The Hamlet has a new Type B Water Licence # 3BM-IGL 1520 (March 31, 2015 to March 30, 2020) which includes a permit to withdraw 81,208 cubic meters annually from the source and up to a maximum of 299 cubic meters per day. The community's water supply system consists of South Lake (water source), a two kilometer long pipeline which transmits water to a storage reservoir and a water truckfill station located next to the reservoir.

South Lake is the designated potable water source of the Community and it is about 9 km away from town. Water is withdrawn from South Lake every summer to fill the water storage reservoir. Water is not withdrawn year round for a number of reasons including:

- South Lake freezes almost to depth each winter
- The lake sometimes becomes anoxic during winter months
- The water hauling distance is too long
- Winter access road maintenance is very costly.

For these reasons a water storage reservoir was constructed in the late 1970's at the site of a small lake. Over-winter storage was increased through mass excavation to provide more capacity in 1993 and in 1998. The water reservoir is recharged on a yearly basis with water pumped from South Lake through a 2 km overland pipeline. The existing capacity of the reservoir is 79,000 cubic meters.

In June of 2015, the Hamlet experienced a water shortfall in their water reservoir. As a result, an emergency system which included utilizing an alternate water source was implemented. The water in South Lake was not considered safe by GN Department of Health at that period because of anoxic conditions. At the time, Fish Lake was considered as an alternate water source. A hose was purchased and shipped to the community and a portable pumping station was assembled at Fish Lake. Fish Lake is about 27 km from the existing reservoir. Water was pumped from Fish Lake, filled the truck tank, and transported to the reservoir to ensure the Hamlet had enough water until South Lake water was further tested and accepted for refilling the reservoir.

This project proposal is for an amendment of the Water License #3BM-IGL 1520 for the followings:

1. Expansion of the existing water reservoir
2. Construction of a new intake line from South Lake to the reservoir and a new truckfill station

3. Include Fish Lake as an alternate water source

1. Expansion of the Reservoir

In response to the water shortfall a risk assessment was undertaken by the consultant exp Services Inc. to determine the water reservoir's ability to meet the over-winter requirements of the Hamlet. The drawdown analysis undertaken as part of this risk assessment was based upon actual consumption rates from 2014 and indicated that there would be minimal water available at the end of June 2016. The drawdown analysis did not account for any water consumption other than potable water however the Hamlet uses water from the reservoir for dust control and firefighting purposes. The report concluded that if the reservoir was filled properly the water reservoir should meet the Hamlet's water storage requirements for the 2015/2016 over-winter period, but with minimal reserve. However, because the results were concluded to be outside the accuracy of the drawdown analysis for the reservoir, based on the precision of the information and assumptions, the Hamlet is at risk of running out of water during the 2015/2016 overwinter period. The report concluded that the water reservoir is at the limits of its ability to meet the water demand of the Hamlet.

Based on the results of the risk analysis CGS assigned the consultant to design an expansion of the reservoir. The expansion will maximize the current footprint of the natural lake and together with lowering the intake pipe and reducing the freeboard provide approximately 102,800 m3 of over winter storage. This provides 125 liters per person per day (lpcd) for a population of 2761 which corresponds to the 20 year design horizon.

The risk analysis studied South Lake and its ability to provide sufficient water to annually replenish the Hamlet's reservoir. South lake has a watershed area of 213 ha and a surface area of 17 ha. Considering precipitation and evaporation, the net quantity of water available to the community from South Lake is 140,000m3 annually which meets the 20 year demand using a conservative water consumption prediction.

2. Intake Line and Truckfill Station

The current water treatment includes chlorine injection only. The new truckfill station will include filtration and chlorine disinfection. The current pipeline is at the end of its lifespan and has had many patchwork repairs in the recent years. Replacement of this pipeline will allow the community to fill the reservoir more efficiently.

The design of the new truck fill station with 2 km intake pipe line is complete and this project is ready for tendering. These new infrastructures will not have any impact on the water use rates. The new intake line may actually reduce the amount of water withdrawn from South Lake as the pipeline will not have any leaks.

3. Fish Lake as an Alternate Water Source

A hydrology study was also conducted on Fish Lake and considered this source is sustainable. The chemical analysis of the Fish lake raw water is in favour accepting Fish Lake as the secondary water source of the Community. This source might be used in case of emergency only because of the long hauling distance, traveling time and excessive road maintenance cost.