



Nunavut Planning Commission Application
Long Term Water Project – Raw Water Supply and Storage
Geotechnical Investigation Proposal



NUNAVUT PLANNING COMMISSION APPLICATION
LONG TERM WATER PROGRAM – RAW WATER SUPPLY AND STORAGE
GEOTECHNICAL INVESTIGATION PROPOSAL

Date: May 5, 2023

1. Project Summary – Raw Water Supply and Storage

The City of Iqaluit requires extensive upgrades to its water supply and distribution infrastructure to address the challenges of a growing population faced with adverse climate changes affecting the sources of drinking water. The Lake Geraldine reservoir is not sufficient to supply nor store the amount of water needed to support the current growth rate of the city, so additional water resources and storage are needed. To compensate for the demand shortfall, Unnamed Lake (UNL) 5km Northeast from Lake Geraldine has been identified as a potential permanent water supply source to accommodate the additional over-winter storage requirements.

Water from UNL is planned to be pumped and delivered via conveyance pipes to a new water earth berm type storage reservoir adjacent to Lake Geraldine. The planned work consists of three main aspects which are the raw water extraction, raw water conveyance and raw water storage. A preliminary study has identified a preferred intake and pumping site location at UNL along with two (2) routing options for the conveyance pipe which will require further investigation. The investigation will consist of a geotechnical investigation to further study the areas of interest and ensure an appropriate design for the project requirements.

The purpose of this proposal is to seek approval to complete upfront geotechnical investigations that will be required to support future design and permitting activities for the project.

2. Geotechnical Investigations:

In order to advance preliminary engineering for the recommended base solution it will be necessary to perform geotechnical field investigations and reporting, to establish existing site features and underground conditions. This is a major factor in Northern Canada due to factors such as climate change which then affects permafrost levels and general ground conditions. The geotechnical investigation will study the surface and subsurface conditions of the future pump station, the conveyance pipe, and the reservoir to determine if the sites are adequate to proceed with design and construction activities.

Final reporting will include parameters that state the physical characteristics of the ground and ground water conditions, as well as the most likely ground behavior to be encountered during the various excavation, ground treatment and preparation, piling and trenching, foundation installations, and granular filling operations. A drilled borehole program will be implemented to augment the field investigation and will consist of an estimated total of 24 boreholes (12 boreholes at 5m depth and 12 boreholes at 10m depth) are required. For the raw water conveyance pipe there are two alignment options identified in prior studies. Both alignments are roughly the same distance and therefore will require on average 12 boreholes in total for a geotechnical study. Six (6) of those boreholes at 5-meter depth and six (6) of those at 10-meter depth along the line.

Some of those mentioned 12 boreholes will also include the pump station structure for the geotechnical study. The new reservoir will require the other 12 boreholes, 6 at 5m depths and 6 at 10m depths. The locations will be based on consultation recommendation and on-site conditions/survey. There will also be a contingency of 10 additional boreholes which will also be dependent on consultants' recommendation of the necessary study prior to construction.

All geotechnical investigations are anticipated to be completed within the City's existing municipal boundary.

3. Material & Labor Use

- Borehole Drilling Machine
- Flatbed Truck
- Diesel
- Petrol
- Support Vehicle
- Anti-Freeze
- Approximately a team of 5 workers

4. Risk Management:

To mitigate risks during the geotechnical investigations there are procedures and guidelines that are to be followed. There are anticipated drawbacks such as weather conditions and access/logistics that can be prevented by scheduling the reports to be done at the appropriate time of year. The prominent risks to take into account are with regards to the on-site investigations such as drilling/borehole activities. A health and safety plan will also have to be prepared and provided by the geotechnical consultant. The safety plan shall include any necessary procedures that revolve around the general works, access, digging/drilling and other geotechnical works. The plan will also include any material or equipment safety that may be used on the geotechnical study.

5. Environmental Impact:

There are no foreseen environmental impacts that can occur from a geotechnical investigation; however, procedures will still be put in place for safeguarding. Another major risk comes in the form of an environmental spill from machinery. An emergency spill contingency plan will be distributed among workers prior to work starting in case of any mishaps. The plan will include any immediate action to be taken as well as the proper disposal of the spill if it were to occur. Portable toilets will also be set on site for health and safety purposes.