

Executive Summary of the Water Licensed Facilities of the Municipality of Igloolik

The Municipality of Igloolik (Municipality) is situated on Igloolik Island in the Foxe Basin in the Qikiqtaaluk Region of Nunavut and is operating under water licence No. 3BM-IGL1520 Type “B” which expired on March 30, 2020. The Municipality has applied for a water licence renewal for a 10-year term considering water permit volume of 102,800 m³. The new licence will be Type “A” following the recent new guidelines of the Nunavut Water Board.

The requirement of the application is to submit operations and maintenance (O&M) documentation for the Municipality’s water and sanitation facilities along with quality assurance/quality control (QA/QC) procedures, and a spill contingency plan (SCP). The SCP and O&M manuals have been prepared for the (1) water reservoir, (2) water supply pipeline, (3) water treatment plant/truck fill station (WTP/TFS), (4) wastewater treatment facility, and (5) solid waste facility. The O&M manuals provide a framework for the Municipality staff to operate and maintain the water and sanitation facilities in a manner that will protect public health and prevent adverse environmental impacts. The manuals are governed by the water licence, applicable regulations and incorporate review comments from the July 2020 water licence technical sessions with Crown Indigenous Relations and Northern Affairs Canada (CIRNAC), Environment and Climate Change Canada (ECCC), Nunavut Water Board (NWB), Government of Nunavut - Community and Government Services (GN-CGS), and the Municipality. The current population of Igloolik is approximately 1,682 according to the 2016 census with the population projection of 2547 in the year 2030. Annual water consumption records provided by the Municipality indicate the maximum raw water volume withdrawn from a source between 2014 and 2019 of about 55,085 m³, still less than 60,000 m³ annual withdrawal. To fill the empty reservoir (excluding the dead zone), 102,800 m³ of water are required to be withdrawn from the South Lake. The reservoir is recommended to be made empty in a 10-year interval or earlier when water quality will deteriorate and silts from the bottom of the reservoir might be needed to be removed. Safety and environmental protection should be reviewed prior to carrying any operational procedures.

Water Reservoir. The water reservoir is used to store a year-round supply of raw water for the Municipality. The capacity of the reservoir is 102,800 m³ that was developed through an excavation into bedrock about 2 km southwest of the community. The reservoir has an active storage depth of 8.5 m, a footprint of 16,100 m² and the design freeboard 0.5 m. The reservoir is filled between early July through early or mid-September each year from a source water lake through a water supply pipeline. The water is withdrawn from the reservoir to the water treatment plant/truckfill through an intake piping that extends into the reservoir. The operation and maintenance of the reservoir includes filling and withdrawing to the WTP/TFS and monitoring and inspection during filling of the reservoir, with monitoring of the water levels and overall condition of the reservoir. Inspections are conducted bi-annually at the spring start up and at the fall shutdown and maintenance activities are undertaken for the reservoir and surrounding area. Fish Lake is the secondary water source located more than 15 km away from the town. This water source was used a few years ago due to an emergency.

Water Supply Pipeline. The water supply pipeline is used to fill the water reservoir and extends approximately 2 km from an intake at the South Lake to the reservoir. The pipeline is a 200 mm diameter HDPE that is supported on a 2 m wide pipe bed along the alignment. A fish screen is used on the intake and a flow meter is situated near the intake pump. The operation and maintenance of the pipeline includes connecting the pipeline along its alignment, delivering and connecting the pumping system, starting and operating the pumping, shutting down the pumping system after the operations complete, and winterizing the system by draining the pipeline and storage of the pump. The pumping system, pipeline, the intake and outlet are monitored continuously when the pump is operating and inspected bi-annually and periodically by municipalities staff. Maintenance and repairs are conducted during warmer months to make sure that continuous operation is maintained during the filling of the reservoir and include the pipeline, erosion of the supporting ground and the access road. This water supply pipeline line runs over a 600 mm diameter culvert located on the small water course. The water supply pipeline was built along the access road from the water reservoir to South Lake. The Municipality maintains this access road on an as-needed basis.

Water Treatment Plant / Truck Fill Station. The WTP/TFS is used to treat the raw water from the water reservoir and to deliver to water trucks for distribution in the community. The building system of the WTP/TFS includes HVAC system, drainage and plumbing, and process elements such as submersible pumps, heat trace, chlorination injection system and water filters. The civil infrastructure of the WTP/TFS includes building site (access, turn around, parking), exterior elements (roof, exterior walls, foundation, windows and doors) and interior elements (interior walls, ceilings, floors). The operation of the WTP/TFS incorporates a process train of strainers followed by cartridge filters with nominal sizes of 20 and 5 microns. The filtered water is chlorinated and conveyed to a 15,000-liter contact tank, which is used to fill the water trucks for delivery to the community residents. The maintenance of the WTP/TFS includes the dual intakes into the reservoir, the mechanical and control systems associated with the water treatment processes, the mechanical and plumbing systems associated with building, the building systems, the 80-kW back-up generator and the truckfill arms used to fill the water trucks.

Wastewater Treatment Facility (Sewage Lagoon System). The sewage lagoon system is used to treat the wastewater collected by the Municipality. The engineered sewage lagoon system consists of three independent cells providing one-year retention storage capacity and decanted in the fall of each year. Effluent is pumped to a wetland that provides supplemental treatment. The design life of the sewage lagoon system is 20 years and the active volumes of the three cells are: 53,200 m³ for Cell A, and 35,500 m³ for Cell B and Cell C. Cell A is a new cell and Cells B and C were constructed from original three cells and keyed into the original cell berms. The berms incorporate an impermeable geomembrane liner installed on the internal slopes. The main aspects of the O&M include operation procedures for the collection of sewage, discharge of sewage into the lagoon cells, decanting the lagoon cells, and managing sludge. Additional activities include monitoring and inspection of truck discharge points, water levels, sewage color, perimeter berms, lagoon infrastructure, and effluent sampling.

Solid Waste Facility (SWF). The SWF is a non-engineered facility used to dispose of municipal solid waste generated in the community. The landfill operates as a sanitary landfill with limited diversion of hazardous waste and bulky waste and construction waste. The municipal solid waste is periodically compacted and covered. The main aspects of the operation are applying the operating principles for solid waste acceptance and handling, landfilling methods, various types of wastes including hazardous waste, waste material cover and water control. The operation also includes monitoring of surface runoff from the SWF at the monitoring program stations and checking the SWF perimeter for any seepages which should be sampled and tested, if present. The landfill has a landfill emergency response plan in an event of fire, evacuation, medical emergencies, spills, prohibited waste and contaminated runoff impacts.

Quality Assurance/Quality Control (QA/QC). The QA/QC program is used to maintain standards in the monitoring programs for the wastewater treatment and disposal, water supply and treatment, and solid waste disposal described in the respective O&M manuals. The program describes QA and QC processes and procedures applied during field activities to accurately reflect the attributes of the water, wastewater, and runoff being tested. Field QC addresses cross contamination as a common source of error in sampling procedures, sample handling, and storage and shipping. Field QC samples may include field blanks labelled as such to trace sources of artificially introduced contamination, or blind duplicates not labelled as such to ensure analytical precision. Laboratory QC is applied by laboratories after the samples have been received to enable the laboratory produce accurate and reproducible results on an ongoing basis. The samples are collected in laboratory-supplied bottles and jars and analyzed at a laboratory certified by the Canadian Association for Laboratory Accreditation (CALA). All analytical reports are to include QA/QC reports. The Municipality has been using the services of Caduceon Environmental Laboratories - an accredited laboratory in Ottawa.

Spill Contingency Plan (SCP). The SCP is used to address the proper responses to the anticipated types of spills that may occur during the routine operation and maintenance activities of the Municipality's facilities associated with wastewater treatment and disposal, water supply and treatment, and solid waste disposal. The SCP presents potential contaminants and spill scenarios, existing preventative measures, and response organization. The SCP action plan includes potential impacts from and procedures for containing chemical spills such as sodium hypochlorite used to treat the water, and petroleum spills such as diesel fuel used to power equipment. The SCP provides contact information in case of spill, spill kit locations and spill reporting procedures. The SCP also includes the standard spill kit requirements.