Hamlet of Cambridge Bay Water Licence Renewal Application

Submitted to the Nunavut Water Board

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Submitted by

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1. COMMUNITY BACKGROUND

The Hamlet of Cambridge Bay is located at 69^0 07' 01" N latitude and 105^0 03' 15" W longitudes, on the south shore of Victoria Island within the Kitikmeot region of Nunavut. It is a zone of continuous permafrost, on carbonates, shale and sandstones (Paleozoic sedimentary rocks), dominated by sags and swells, knolls of dry debris and depression filled with snow or water. Bedrock is generally exposed at sporadic locations close near to sea level. Wildlife in the area mainly ground squirrels, lemmings, arctic foxes and numerous species of birds and fishes.

Climate of Cambridge Bay is reasonable summers and extremely cold winter, average mean temperature in January and July about -35^0C and 12^0C. Reported ground temperature below 3m depth is -9^0C, snow fall average 140 cm and mean precipitation 220 mm.

Description of Undertaking

The Hamlet of Cambridge Bay is applying for renewal of Water Licence 3BM-CAM-0914, which expires in March 31, 2014, for providing water supply, sewage disposal and solid waste management services to the resident of Cambridge Bay and its business offices. Water is drawn from the Water Lake and delivered to resident and business location through horizontal buried line and truck-fill. Trucked Sewage collect from house sewage tank and depose into the retention lagoon where raw sewage stays at least a year before decanting to secondary cell and finally flows into ocean through wetland natural remediation. Solid waste pile at MSW dump site until grade and push down with cover materials in summer, where the metal compost in metal dump. Batteries and hazardous materials store in wooden box and inside lined cell within the facility until ship out by the contractor.

2. WATER SUPPLY, TREATMENT AND DISTRIBUTION

The selected raw water source was determined to be the Water Lake located about 1.5 km North from town. Water is drawn from the Water Lake through twin intake pumphouse, deliver to in-town water plant elevated tank and partly to 4-buildings (GN office at Enokhok Centre, Killinik High School, Group Home and Health Centre) through horizontal buried line. Water distributes to household water tank through truck fill from the water tank. A second truck-fill facility also available at the pumphouse outside for emergency water delivery. To meet the requirement and Guideline of drinking water, water treats by adding chlorine at pumphouse before delivering to town plant and emergency truck-fill at pump house. Water delivers to resident for seven (7) days a week, 8:00 am to 5:00 pm regular hours with emergency supply after regular operation.

2.1 WATER DEMAND:

Water consumption from 2011 through 2013 (as of today) are shown below (from Annual Reports to NWB)

Table1: Water consumption

Year	Total Volume (m3/year)
2011	72,525
2012	74,048
2013 (up to Dec 20)	76,166

Based on these years consumption, it looks the daily maximum intake quantity 237 m3 (237,000 L) at this time. Any further increase in demand will be informed to the Board for amendment.

3. SEWAGE DISPOSAL

Sewage collect from community household sewage tank by sewage vacuum truck and then discharge into the primary cell of sewage lagoon. The lagoon is located at 2 km from the community and has an approximate volume of 190,000m^3. The lagoon system comprises a series of two cells- (i) the primary cell receives raw sewage from truck discharge and keep it for almost a year and (ii) the detention cell receives sewage from primary cell over the semi-submerge berm when sewage melt in summer and use decant pump for discharging remediated sewage water into the remediation waiting cell outside the sewage lagoon detention cell partitioned with an engineered berm. Sewage and effluent remain frozen during the period November – May. Remediated effluent from the waiting cell finally runs onto short length wetland which ends to ocean. The remediation process mostly happened naturally by receiving sunlight and BOD from air.

3.1 Sampling Results Taken from Sewage Treatment System

The sewage treatment system at Cambridge Bay consists of three steps- (i) partial remediation at the secondary cell where melted sewage stay and wait for decanting until the summer. (ii) decanted effluent pass through granular gravel filter before collecting into the waiting cell and thus retains almost suspended and colloidal particles & sludge (iii) natural remediation at waiting cell and throughout the wetland where receives BOD. Samples collect from each level of the treatment step and send for test at Taiga lab in Yellowknife. The following are stations from samples taken in summer 2012. Based on these results fecal coliforms, BOD_5 and total suspended solids within the MAC limits of parameters identified in the water licence requirements. Please refer to results in the Tabular form. The laboratory analysis report has results for SNP locations CAM-3 (solid waste leachate), CAM-4 (sewage effluent from retention cell before decanting), CAM-5(discharge point from effluent waiting cell) and CAM-6(outfall from wetland).

4. SOLID WASTE DISPOSAL

The new solid waste site is located near the lagoon with 8 ft. high fenced all around. There are no water bodies within the local vicinity of the solid waste disposal facility. Leachate run-off from the solid waste site collect and retain in the sump inside the facility until a pump decanting into the sewage lagoon if require. Run-off from old metal dump retain within the site by a separated berm from sewage lagoon and to decant into the effluent waiting cell if requires unless dry up inside during the summer.

The solid waste site has two areas- the general municipal waste and the second area for bulky waste and metal dump. The general municipal waste area is fenced and a gate monitoring gate with surveillance cameras with operator attendance. The facility remains open for public dumping anytime of the day with recording and direction by the operator. The second area is the metal dump area where items such as scrap vehicles, appliances, tires and other parts of abandoned vehicles disposed of. This area has no fence and no isolated cell, but pile in isolated heap.

4.1 Water Quality Results of Leachate from Solid Waste Site

The leachate samples obtained from the solid waste site (CAM-3) and wetland streams (CAM5 and CAM-6 where metal dump leachate mix with sewage effluent) monitoring stations of municipal waste and bulky waste site during June- Aug 2013. Leachate samples were analyzed for parameters in accordance with the licence and results were compared to the Canadian Environmental Quality Guidelines (CEQG) provided by the Canadian Council of Ministers of the Environment (CCME).
Leachate from the solid waste facility decants into sewage lagoon secondary cell where it remediates partly and complete throughout the vegetated wetland until reach to the end to ocean.

5. Hazardous Waste Management

Most hazardous materials such as batteries, paint, halogen bulb etc. are store inside wooden box with plastic sheet all around and remain in the metals dump area until ship out. Empty drum, spill oil-sand and contaminated soil store inside the lined cell for natural remediation.