



November 19, 2021

Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU X0B 1L0

Attention: Richard Dwyer, Manager of Licensing

Dear Richard,

The Municipality of Arviat is requesting to include the upgrade and expansion of the existing wastewater treatment facility and the amendment of the effluent limits at the final effluent discharge point ARV-4 in the ongoing application process to amend and renew the 3AM-ARV1016 water license. Screening for these additional items was completed by Nunavut Impact Review Board on August 17, 2021.

The expansion of the existing sewage treatment facility will effectively service the growing population in Arviat until the design horizon of 2040. A business case was completed in 2021, which recommended a dual lagoon system, with seasonal effluent pump out to the wetland treatment area. The requested amendment to the effluent limits at the end of the wetland is based on the most comprehensive research completed to date on passive wastewater systems in Nunavut and considers the significant change to the hydrologic regime that will be influenced by the seasonal pump out, rather than the exfiltration berm currently in place.

This business case projected the flow and loadings based on the population growth, proposed the treated effluent goals and standards, reviewed and selected the most suitable location and treatment technologies, conducted a conceptual level geotechnical investigation and environment assessment, sized the lagoon system and conducted a conceptual schematic design. The treatment goals for the lagoon-wetland effluent criteria were established as 100, 120, and 1.25 mg/L for carbonaceous biochemical oxygen demand (CBOD), total suspended solids, and un-ionized ammonia as nitrogen, respectively, based on a multi-year research project completed by Centre for Water Resources Studies at Dalhousie University and the resulting *Recommendation for the Development of Nunavut Wastewater Management Standards* (EXP, 2018).

Given an estimated population of 2,657 residents in 2016 (Statistics Canada, 2016), the design population to be serviced by the expanded lagoon was projected to be 4,338 people in 2040. This

population will contribute a design flow rate of 434 m³/day at the end of the design horizon, requiring active storage volumes of 130,200 m³ and 158,410 m³ for 10 and 12 months of storage, respectively. The business case recommends that a new lagoon cell be constructed directly adjacent to the existing lagoon to provide a storage capacity of 7 months (95,000 m³). The existing lagoon will be demolished and replaced with a new impermeable cell with an effective storage capacity of 5 months (67,000 m³) bringing the total effective storage capacity to approximate 12 months. The lagoon discharge point into the wetland treatment area will remain at the same location but will be by controlled manual pump out. An updated Operations and Maintenance Plan will be submitted to NWB once the new lagoon is commissioned.

This supplementary amendment submission includes the following documents that can be found at:

<https://app.ca.e-builder.net/public/publicLanding.aspx?QS=9b0b7b42a9ab4e1f91589d82d9aa4205>

- Arviat Lagoon Business Case
- NPC Letter of Conformity Determination
- NIRB Screening Decision cover letter and report in English and Inuktitut
- 3AM-ARV1016 Plan for Compliance 2021
- Effluent Parameter Amendment Justification
- Solid Waste Management Facility OM Plan – updated with engineering drawings
- Arviat raw water reservoir as-built drawings

Regards,



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