Response to Comments and Recommendations
Water Licence 3BM-ARC1924
March 7, 2025

Supporting documentation referenced in Licensee Response accessible at: https://app.ca.e-builder.net/public/publicLanding.aspx?QS=ea091421a11a427399db6cd9d0eedd75

<table>
<tr><th>Agency</th><th>Date</th><th>Page(s) No.</th><th>Comment / Recommendation ID</th><th>Comment / Recommendation</th><th>Licensee Response</th></tr>
<tr><td>NWB</td><td>Feb-06-2025</td><td>N/A</td><td>N/A</td><td>The application requests an increase in water use from 59,000 cubic metres to 75,000 cubic metres to meet future water demand. Can you please confirm if the current capacity of the sewage lagoon will be sufficient to accommodate the increase in sewage quantity due to the increased demand?</td><td>The existing lagoon capacity is 59,900 cubic metres. The required winter storage capacity of the lagoon for treatment is 10 months and annual decanting may take place from August to September.

As delivered water is ultimately discharged to the sewage lagoon, the delivered water records can be used to determine sewage generation volumes. The water delivered for the years 2019 to 2023 during the months October to July are as follows:
<table>
<tr><th>Year</th><th>Sewage Generation (m^3)</th></tr>
<tr><td>2019</td><td>22273.51</td></tr>
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The year 2020 corresponded to the highest year of sewage generation, which is equal to 38.1% of the sewage lagoon capacity

The population of Arctic Bay from 2019 to 2023 according the Nunavut Bureau of Statistics was as follows:
<table>
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					2019 | 989 2020 | 1040 2021 | 1076 2022 | 1067 2023 | 1106 Using the population statistics, the sewage generation per capita over the last 5 years was as follows: **Year** | **Sewage Generation Rate from October to July (m^3/person)** 2019 | 22.52 2020 | 21.95 2021 | 20.21 2022 | 21.11 2023 | 19.76 The highest sewage generation rate was in 2019. If this rate is applied for the projected 2047 population of 1418, the estimated sewage generation volume from October to July will be 31935.12 m^3. The amount of process wastewater from the new water treatment plant is anticipated to equal 0.533 m^3/person/month. In 2047, this would amount to a process wastewater generation volume of 7562.67 m^3. **Therefore, the total volume of wastewater added to the lagoon for the 2046/2047 winter**

					season is equal to 39,497.79 m^3. Equivalent to 65.9% of the sewage lagoon capacity. The request to withdraw 75,000 cubic metres annually is a design parameter of the new water plant. The municipality is not expected to require that amount of water based on historical water withdrawal rates. The new water treatment plant only requires additional process waste. Furthermore, the GN has initiated the process to request planning funding to increase the lagoon capacity.
NWB	Feb-06-2025	N/A	N/A	As per the Licence *"The hazardous Waste, which is not in secondary containment and has an ephemeral steam running through it, has been of a particular concern. The Board acknowledges the Licensee's commitment to address this deficiency through constructing a culvert across the access road to divert the Water to the wetland."* Can you please confirm if the culvert has been constructed or if any other measures have been taken to address the abovementioned issue?	The Licensee constructed a berm to divert water away from the solid waste site. The berm was damaged last year and will be repaired during summer 2025.  It is expected additional secondary containment for hazardous waste will be added, as the existing water treatment plant will be moved to the solid waste site, when the new water treatment plant is

					commissioned pending final agreement between the municipality and with awarded contractor.
NWB	Feb-06-2025	N/A	N/A	The Environmental Emergency Contingency Plan does not specify the estimated quantity of potentially hazardous materials. The inventory table provided specifies the quantity as "Unknown". While the Board understands that the applicant may not be able to provide the exact quantities of potentially hazardous material that maybe present in the community, the applicant is requested to update the inventory table to include the approximate quantities.	Please see updated Environmental Emergency Contingency Plan.
NWB	Feb-06-2025	N/A	N/A	The Board recommends including a map in the Environmental Emergency Contingency Plan as per section 3.1 of 'NWB Technical Guide 4-Developing a Spill Contingency Plan'.	Please see updated Environmental Emergency Contingency Plan.
NWB	Feb-06-2025	N/A	N/A	The Environmental Emergency Contingency Plan does not specify the	Please see updated Environmental Emergency Contingency Plan.

				exact location and number of spill kits available to be used in case of a spill. This information is necessary to easily locate the spill kits in case of an emergency. The applicant is requested to update the plan with the location and number of spill kits available in the community.	
NWB	Feb-06-2025	N/A	N/A	The Board does not recommend open-burning solid waste to manage waste. The Board requests that the applicant explore other alternatives, such as incineration, and update the O&M Plan for Solid Waste Disposal Facilities accordingly. Meanwhile, the applicant is requested to maintain proper records as per GN's 'Environmental Guideline for the Burning and Incineration of Solid Waste'.	The best management practices as per the GN's *Environmental Guideline for the Burning and Incineration of Solid Waste* for record keeping of solid waste burning and open-burning practices have been added to the O&M Plan for the Solid Waste Disposal Facility. The solid waste facility previously approved O&M Plan included of segregating solid waste, capping and covering, and open-burning. A study of alternatives for waste management will be conducted at the point of the next solid waste facility capital upgrade project. Changing to incineration would be a capital project that is not part of the scope of this amendment renewal. The Licensee requests that the Plan including open-burning continue to be accepted.
NWB	Feb-06-2025	N/A	N/A	The QAQC Plan does not include an acceptance letter from an accredited lab. The applicant is requested to	Please see updated Environmental Monitoring and QA/QC Plan.

<table>
<tr><td></td><td></td><td></td><td></td><td>submit one as per Part I, Item 11 of the Licence.</td><td></td></tr>
<tr><td>CIRNAC</td><td>Feb-10-2025</td><td>4</td><td>R-01</td><td>CIRNAC recommends the applicant provide confirmation that the lagoon is capable of holding the increased capacity too meet expected treatment times to meet discharge criteria.</td><td>As delivered water is ultimately discharged to the sewage lagoon, the delivered water records can be used to determine sewage generation volumes. The water delivered for the years 2019 to 2023 during the months October to July are as follows:
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Using the population statistics, the sewage generation per capita over the last 5 years was as follows:</td></tr>
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Year	Sewage Generation Rate from October to July (m^3/person)
2019	22.52
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The highest sewage generation rate was in 2019. If this rate is applied for the projected 2047 population of 1418, the estimated sewage generation volume from October to July will be 31935.12 m^3. The amount of process wastewater from the new water treatment plant is anticipated to equal 0.533 m^3/person/month. In 2047, this would amount to a process wastewater generation volume of 7562.67 m^3.

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The request to withdraw 75,000 cubic metres annually is a design parameter of the new water plant. The municipality is not expected to require that amount of water based on historical water withdrawal rates. The new water treatment plant only requires additional process waste.

					The existing lagoon capacity is 59,900 cubic metres. The required winter storage capacity of the lagoon for treatment to the effluent discharge criteria of 120 mg/L TSS and 100 mg/L cBOD is 10 months and annual decanting may take place from August to September. Please see Sections 1-7 and 1-8 of the uploaded report *Recommendations for the Development of Nunavut Municipal Wastewater Management Standards* dated October 2017 prepared by exp Services Inc., which supports the requested effluent discharge criteria. This document was prepared following extensive research completed by the GN in partnership with academic institutions. For nearly 15 years these technology based effluent quality limits have been the basis for the design of new wastewater treatment systems using lagoons and wetlands, and have been repeatedly presented to regulators (ECCC, CIRNAC, GN-Health and DOE, DFO) through workshops, meetings, and water licence applications. Furthermore, the GN has initiated the process to request planning funding to increase the lagoon capacity.
CIRNAC	Feb-10-2025	4	R-02	CIRNAC recommends the applicant address the issues of non-compliance prior to the Board considering any	The Licensee requests that the 23-year renewal be considered, which corresponds to the design life of the new water treatment plant.

				application for a renewal water licence. Additionally, CIRNAC recommends that the applicant water licence renewal application be reduced to 5 years until such time that the new water e treatment plant is constructed and the non compliance issues are addressed adequately.	Furthermore, the capacity of the lagoon would be adequate through to 2047 based on historical water consumption rates for the community plus the anticipated additional water for the new treatment process, as per the response to CIRNAC recommendation R-01. The municipality is required to provide essential services of water delivery and waste management for the public health and safety of the community. A 23-year renewal terms aligns with infrastructure lifecycle and allows the Licensee to expend effort on ensuring compliance rather than the bureaucratic application process.
CIRNAC	Feb-10-2025	4-5	R-03	CIRNAC recommends the applicant fix or install the required flowmeter to record proper water quantity measures from all sources.	The Licensee will install a new flowmeter within the existing water treatment plant the next 6 months. The new water treatment plant will have a flowmeter to measure the quantity of water obtained from all sources. The new water treatment plant is expected to begin the construction phase in Spring 2025 and completed by Fall 2027.
CIRNAC	Feb-10-2025	5	R-04	CIRNAC recommends the water board keep this condition with the new water licence.	It was requested to remove Part B, Item 1-e: " Assessment of the geotechnical and geothermal performance of the Wastewater Treatment Facility including an analyses of the results from the thermistor, standpipe and settlement monitoring stations, as required in Part I, Item 12" on the basis that the municipality does not have the technical capacity to meet the

					requirement as there is no geotechnical engineer staffed by the municipality. Furthermore, it is cost prohibitive for a geotechnical engineer to be contracted for monitoring and analysis. The municipality will continue to provide the results of ARC-11 but will not be able provide an analysis in the Annual Report.
CIRNAC	Feb-10-2025	5-6	R-05	CIRNAC recommends the applicant provide an update how mitigation measures taken to-date contain water run-off, and how waste disposal in general is being properly managed within the facility.	As responded to NWB: The Licensee constructed a berm to divert water away from the solid waste site. The berm was damaged last year and will be repaired during summer 2025.  It is expected additional secondary containment for hazardous waste will be added, as the existing water treatment plant will be moved to the solid waste site, when the new water treatment plant is commissioned pending final agreement between the municipality and with awarded contractor.

CIRNAC	Feb-10-2025	6	R-06	CIRNAC recommends the applicant install a flow meter on the intake pipe immediately, to record accurate water volume and level measurements.	As responded to CIRNAC Recommendation R-03: The Licensee will install a new flowmeter within the existing water treatment plant the next 6 months. The new water treatment plant will have a flowmeter to measure the quantity of water obtained from all sources. The new water treatment plant is expected to begin the construction phase in Spring 2025 and completed by Fall 2027 Water level measurements can not be accomplished with a flowmeter.
CIRNAC	Feb-10-2025	6-7	R-07	CIRNAC recommends the applicant remove dilution as a form of treatment to cleaning up a sewage spill.	Please see updated Environmental Emergency Spill Contingency Plan.
CIRNAC	Feb-10-2025	7	R-08	CIRNAC recommends the applicant provide GPS coordinates of the sampling sites as identified in the Environmental Monitoring and QA/QC Plan.	Please see updated Environmental Monitoring and QA/QC Plan.
ECCC	Feb-07-2025	2	Topic 1	ECCC recommends retaining the compliance point at ARC-4 where control of flow of effluent from the lagoon can be maintained.	As responded to CIRNAC recommendation R-01: Please see Sections 1-7 and 1-8 in the uploaded report *Recommendations for the Development of Nunavut Municipal Wastewater Management*

					Standards dated October 2017 prepared by exp Services Inc., which provided the following findings and recommendations:
					• Natural wetlands are capable of achieving wastewater treatment
					• Site specific effluent discharge limitations should be considered
					• Technology-based limitations establish a minimum level of effluent quality that is attainable using demonstrated technologies that are economically available
					• Achievable limits for lagoon wetland systems:
					  ○ Limits: 100 mg/L $cBOD_5$; 120 mg/L TSS;
					  ▪ Systems application: Flows <2,500 m^3/day to well flushed marine receiving environments
					• The effluent discharge point considers only the location where the effluent enters the receiving waters (marine or fresh)
					• Wetland system final discharge points should be monitored and amended as required if flow patterns throughout the wetland are dynamic
					• Negligible environmental impacts from wastewater effluent have been observed

					The requested effluent criteria 120 mg/L TSS and 100 mg/L $cBOD_5$ is based on treatment from *both* the lagoon and the wetland. Furthermore, in 2022, during the technical review for 3AM-ARV2232, it was determined that moving the compliance point to the end of the wetland would be appropriate application of this research. These records are available on the NWB site and were uploaded to the folder for easy access as *Prior Discussion on Effluent Compliance Point*.
ECCC	Feb-07-2025	2-3	Topic 2	ECCC recommends the Proponent provide the following to support the request to discontinue sampling at ARC-7a: • Recent monitoring data from ARC-7a • A discussion and/or figure depicting the runoff flow path and proximity to surface waters.	There is no monitoring data to provide as the spot is normally too dry to sample. As written in the NIRB application (10QN050) for the permitting process for the water plant: "runoff from this site will be all-natural material mainly dust and sand in which runoff of this material already occurs in nature." Surface water runoff through the quarry would discharge to Admiralty Inlet located approximately 350 metres from the quarry. The quarry is no longer in use by the municipality and is not required to support municipal operations for water and waste. Furthermore, quarries are not normally part of municipal water licences.

ECCC	Feb-07-2025	3	Topic 3	ECCC recommends that: • The Proponent clarify whether an engineer must be present to sample ARC-11 • The Proponent clarify what information related to seepage monitoring at standpipes is expected to be included in the Dillon study. • ARC-11 is retained in the monitoring program to monitor for potential seepage from the lagoon.	The Licensee will continue monitoring ARC-11.
ECCC	Feb-07-2025	4	Topic 4	ECCC recommends that the Environmental Monitoring Program is updated to provide details on which guidelines will be used for interpretation of monitoring data.	As per the water licence, the effluent water quality criteria will be used. Please see updated Environmental Monitoring and QA/QC Plan.
ECCC	Feb-07-2025	4-5	Topic 5	ECCC recommends that the Proponent: • Prioritizes proper management of hazardous waste	As responded to CIRNAC recommendation R-05: The Licensee constructed a berm to divert water away from the solid waste site. The berm was

				such that hazardous waste does not interact with other wastes or the receiving environment (i.e. secondary containment) • Discusses measures that could be implemented to prevent runoff from hazardous waste to the sewage treatment wetland.	damaged last year and will be repaired during summer 2025.  It is expected additional secondary containment for hazardous waste will be added, as the existing water treatment plant will be moved to the solid waste site, when the new water treatment plant is commissioned pending final agreement between the municipality and with awarded contractor. Any runoff from the solid waste site does not migrate to the sewage treatment wetland.
DFO	Feb-14-2025	1-2	All other recommendations.	All other recommendations.	The Licensee accepts and will implement the recommendations.