Crown-Indigenous Relations and Northern Affairs Canada
Relations Couronne-Autochtones et Affaires du Nord Canada

Water Resources Division
Resource Management Directorate
Nunavut Regional Office
P.O. Box 100
Iqaluit, NU, X0A 0H0

Your file - Votre référence
3AM-ARV1016

Our file - Notre référence
GCDocs # 99683171

January 20, 2022.

Mr. Richard Dwyer
Manager of Licensing
Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU, X0B 1J0
sent via e-mail: licensing@nwb-oen.ca

Re: Crown-Indigenous Relations and Northern Affairs Canada's technical review of Hamlet of Arviat Type A Water Licence renewal application for municipal undertakings – Type A Water Licence No. 3AM-ARV1016

Dear Mr. Dwyer,

Thank you for your December 10, 2021 invitation for the technical review on the above referenced application. The Water Resources Division of Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) examined the application and the results of our review are provided in the enclosed memorandum for the Nunavut Water Board's consideration.

Comments have been provided pursuant to CIRNAC's mandated responsibilities under the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* and the *Department of Crown-Indigenous Relations and Northern Affairs Act*.

If there are any questions or concerns, please contact me at (867) 975-4738 or by e-mail at vincent.okonkwo@rcaanc-cirnac.gc.ca or Andrew Keim at (867) 975-4550 or andrew.keim@rcaanc-cirnac.gc.ca.

Sincerely,

Vincent Okonkwo
Senior Environmental Assessment Specialist

Technical Review Memorandum

Date: January 20, 2022

To: Richard Dwyer, Manager of Licensing, Nunavut Water Board

From: Vincent Okonkwo, Senior Environmental Assessment Specialist, CIRNAC

Subject: Crown-Indigenous Relations and Northern Affairs Canada's technical review of Hamlet of Arviat Type A Water Licence renewal application for municipal undertakings – Type A Water Licence No. 3AM-ARV1016

Region: ☐ Kitikmeot ☒ Kivalliq ☐ Qikiqtani

A. Background

The Hamlet of Arviat is located in the Kivalliq region of Nunavut with a population of 2,772 (2016 census, Government of Nunavut).

On September 17, 2020, the Nunavut Water Board provided notification regarding a submission by the Government of Nunavut, Department of Community and Government Services' (GN-CGS) on behalf of the Hamlet of Arviat to renew its Type A water licence, 3AM-ARV1016., The licence is for the use of water and deposit of waste for municipal undertakings with a10-year term, valid till 2031.

The Hamlet's water source is Wolf Creek, located 8 km southwest of the Hamlet, from which water is drawn to fill three reservoirs with a total capacity of 235,393 m^3. The water treatment plant and truck fill station next to the reservoirs was upgraded in November 2019. The community's sewage is trucked to, and treated in a single cell sewage lagoon located approximately 2 km south of the community.

The total capacity of the lagoon is approximately 37,960 m3 and emergency spring decants (to prevent over topping and to protect the security and stability of the lagoon walls), have been necessary for the last four years. The domestic solid waste facility is co-located with the sewage lagoon. The Hamlet also operates a bulk metals facility and a hazardous waste facility.

The renewal application requests authorization to increase the annual withdrawal limit allowable in the current licence from 86,000 m^3 to 235,393 m^3 of water from Wolf Creek and continued use of the existing infrastructure.

On November 19, 2021, GN-CGS requested, on behalf of the Hamlet of Arviat, an update to its water licence renewal application to include:

- An upgrade and expansion of the existing wastewater treatment facility; and
- Amendment of the effluent limit at the final effluent discharge point ARV – 4 of the wetland treatment area.

Consequent to the change in scope, the water licence renewal process was paused in April 2021; so that the Nunavut Impact Review Board (NIRB) could screen the project and determine if further review is required. The screening was completed on August 17, 2021.

CIRNAC provides the following comments and recommendations pertaining to the application package. A summary of the subjects of recommendations can be found in Table 1. Documents reviewed as part of this submission can be found in Table 2 of Section B. Detailed technical review comments can be found in Section C.

Table 1: Summary of Recommendations

Recommendation Number	Subject
R-01	Over Capacity of the Solid Waste Management Facility
R-02	Lagoon Effluent Discharge Rate
R-03	Effluent Parameters Change Request
R-04	Lagoon Seepage Control
R-05	Monitoring Program Stations ARV-3, ARV-10 and ARV-11
R-06	Sludge Management Plan

B. DOCUMENTS REVIEWED

The following table (Table 2) provides a summary of the documents reviewed under the submission.

Table 2: Documents Reviewed

Document Title	Author, File No., Rev., Date
200914 2019 Annual Report	Hamlet of Arviat, 2019

Document Title	Author, File No., Rev., Date
210507 2020 Annual Report	Hamlet of Arviat, May 17, 2020
211119 NPC Letter File # 149528 Municipal Water Licence Amendment	Solomon Amuno, Senior Planner, Nunavut Planning Commission, April 16, 2021
211119 Plan for Compliance 2021	Hamlet of Arviat, June 30, 2021
210817 Cover Letter Screening Decision Report	Kaviq Kaluraq, Chairperson Nunavut Impact Review Board, August, 17 2021
211119 Cover Letter Water Licence Amendment	Elan Chalmers, Municipal Planning Officer, Government of Nunavut Community and Government Services, November 19, 2021
200916 Arviat Executive Summary English	Department Community and Government Services, Government of Nunavut, 2020
200901 Application for Water Licence Amendment	Nunavut Water Board, September 14, 2020
210329 Water Treatment Plant As-Built-Part 1	Hamlet of Arviat, January 21, 2021
210329 Water Treatment Plant As-Built – Part 2	Hamlet of Arviat, May 12, 2020
211119 Reservoir As Built	Hamlet of Arviat, May 12, 2020
200914 Arviat DWG Issued for Tender	Hamlet of Arviat, May 26, 2017
211119 Business Case for Arviat Wastewater	Nunami Stantec Ltd, April 23, 2021
210329 Hamlet of Arviat Environmental Emergency Contingency Plan	Hamlet of Arviat, January 2021
210329 Hamlet of Arviat Environmental Monitoring Program and QAQC Plan	Hamlet of Arviat, January 2021
210329 Sewage Treatment Facility O&M Plan	Hamlet of Arviat, March 2021
211119 Solid Waste Management Facility Operation and Maintenance Plan	Hamlet of Arviat, October 2021

Document Title	Author, File No., Rev., Date
210329 Operation & Maintenance Manual Arviat Water Treatment Plant	Hamlet of Arviat, January 26, 2021
211119 Effluent Parameters	Hamlet of Arviat, November 18, 2021
201027 Final Report Treatment Performance of Municipal Wastewater Stabilization Ponds in Nunavut	Center of Water Resources Studies Dalhousie University, September 18, 2015
201027 Review of Wastewater Research in Nunavut	Justine Lywood Plus Arctic Consulting, June 20, 2019
201027 Recommendations for the Development of Nunavut Municipal Wastewater Management Standards	Exp Services Inc, October 2017
200914 Wolf Creek 2019 Hydrologic Assessment	Palmer, March 4, 2020
190319 CIRNAC Inspection Report	Steve England CIRNAC, June 27, 2018
150715 AANDC Compliance Review Comments	Steve England CIRNAC, July 15, 2015
101231 Solid Waste Management Report	Nuna Burnside Engineering and Environmental Ltd, December 2010
101231 Sewage Disposal Facility Report	Nuna Burnside Engineering and Environmental Ltd, December 2010

C. RESULTS OF REVIEW

CIRNAC provides the following comments and recommendations for the Board's consideration:

1. Over Capacity of the Solid Waste Management Facility

Comment:
In section 5 of the solid waste management facility operation and maintenance plan, the Licensee states that:

"The site has exceeded its useful lifespan and has been considered over capacity for several years. Furthermore, leachate is not captured and may be impacting the surrounding environment. The Hamlet has done considerable work on the organization of the site since the time that this licence was last renewed, but a new solid waste site will be required to address the capacity and environmental concerns. The new solid waste management facility is currently in the schematic design phase, with expected construction in 2024".

On November 22, 2021, the Licensee sent a response letter to the NWB that a feasibility study conducted on the solid waste facility, it determined that the project cannot proceed as originally intended due to a lack of adequate funding.

CIRNAC notes that overcapacity and leachate at the site have been a concern for several years.

Recommendation:
(R-01) CIRNAC recommends that the Licensee provide the detailed steps that it plans to take to address the overcapacity issue at the solid waste management facility (SWMF) until such time as a new facility can be constructed.

2. Lagoon Effluent Discharge Rate

Comment:
The Licensee states that controlled manual seasonal effluent pump out will be adopted in order to discharge effluent into the wetland treatment area, rather than the exfiltration berm currently in place.

CIRNAC notes that the rate of discharge and the frequency of the effluent discharge will likely negatively affect the concentration of the effluent parameters within the receiving environment.

Recommendation:
(R-02) CIRNAC recommends that Licensee clarify:

- The retention time of the effluent in the lagoon to achieve treatment goals before manual discharge by pumping.
- The pumping rate from the lagoon discharge point to the wetland treatment area.

3. Effluent Parameters change Request

Comment:
In section 9, Table 3 of the Sewage Treatment Facility Operation and maintenance Plan, the Licensee requests a change to the following effluent parameters: Biochemical Oxygen Demand (BOD_5) limit changed to 120 mg/L and Total Suspended Solid (TSS) changed to 100 mg/L.

In paragraph 3 of the November 18, 2021, change in effluent parameters rationale document, the Licensee states:

"The effluent will no longer be able to rely on dilution and quick passage through the wetland to meet its treatment objectives. As such, the Licensee is requesting that the effluent parameter limits be changed to cBOD/TSS of 100/120 mg/L in the upcoming licence amendment".

CIRNAC notes that the two parameters, BOD and TSS were interchanged in the two documents. This creates confusion for the reviewers and requires clarifications by the Licensee.

Recommendation:
(R-03) CIRNAC recommends that the licensee clarify the change in parameters being requested in the two documents and update the documents accordingly.

4. Lagoon Seepage Control

Comment:
The Licensee proposes using an impermeable synthetic liner as a seepage control mechanism in the lagoon to replace the exfiltration berm currently in use.

In section 6.1.3.5, of the business case for Arviat waste water, the Licensee states that:

"*Climate is the principal factor controlling the formation and persistence of permafrost. As the climate warms, shallow permafrost is also expected to warm (CSA PLUS 4011:19). Permafrost warming can lead to a deepening of the active layer and thawing of permafrost ground ice. The loss of volume caused by the melting of ground ice generates settlements and subsidence. It is well recognized that permafrost degradation can adversely affect buildings with shallow foundations (e.g., settlements and cracking) and/or provoke localized settlements and subsidence".*

CIRNAC notes that localized thawing of the permafrost shallow region as result of a warming climate could lead to the stretching of the impermeable liner thereby compromising its integrity and ability to control the seepage as intended. It will be helpful if the Licensee were to provide detailed plans as to how it intends preventing effluent from seeping past the liner in the event of localized thawing of the permafrost shallow region; which could lead to ground water contamination if not checked.

Recommendation:
(R-04) CIRNAC recommends that Licensee provide a detailed plan on how it intends to prevent seepage of the effluent into ground water in the event that localized thawing of the permafrost damages the impermeable liner.

5. Monitoring Program Stations ARV-3, ARV-10 and ARV-11

Comment:
In section 2.0, Table 1 of the Arviat Environmental Monitoring and QAQC Plan 2021, ARV-3 monitoring station is currently identified as **"Not Active"** while stations ARV-10 and ARV-11 are identified as **"Not Active please delete from licence".**

Monitoring station ARV-3 was designed to monitor raw sewage effluent concentration at the truck offload point and monitoring stations ARV-10 and ARV-11 were intended to monitor effluent from the final discharge point of the hydrocarbon impacted soil storage and treatment facility and effluent discharge from dewatering contaminated soil areas respectively.

CIRNAC notes that no rationale was provided by the Licensee as to why the stations are identified as inactive and required to be deleted from the water licence.

Recommendation:
(R-05) CIRNAC recommends that the licensee provide rationales as to why:

- the stations are being listed as "inactive", and;
- the Licensee is requesting that ARV-10 and ARV-11 monitoring stations be deleted from the licence.

6. Sludge Management Plan

Comment:
Part D, Item 5(e) of the Type A Water Licence states that:

"A Sludge Management Plan that addresses sludge assessment and disposal methods. The Plan shall be incorporated in to the Sewage Disposal Facility Operations and Maintenance Manual referred to in Part F Item 1b".

Section 6, of the Arviat Sewage Treatment Facility Operation and Maintenance Plan contained the sludge management plan as stipulated by the water licence but the Licensee did not provide details as to how and where the sludge would be disposed.

Recommendation:
(R-06) CIRNAC recommends that the Licensee update section 6 of its sewage treatment facility operation and maintenance plan to include acceptable methods of sludge disposal as required by the water licence.

D. REFERENCES

Department of Crown-Indigenous Relations and Northern Affairs Act. (2019).
Nunavut Waters and Nunavut Surface Rights Tribunal Act. (2019).Nunavut Water Board, August 23, 2010:Type A Water Licence No: 3AM-ARV1016, P 9, 15, 16, 17.