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-RUT----

June 12, 2020

Our file - Notre référence
CIDM#1285841

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

Re: Crown-Indigenous Relations and Northern Affairs Canada's technical review of Government of Nunavut Community and Government Service's application for water licence #3AM-RUT---- for municipal undertakings – Hamlet of Resolute Bay

Dear Mr. Dwyer,

Thank you for your April 29, 2020 invitation for technical review comments 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) 975-3876 or by e-mail at sarah.forte@canada.ca or Godwin Okonkwo at (867) 975-4550 and godwin.okonkwo@canada.ca.

Sincerely,

Sarah Forté

Sarah Forté
Water Management Specialist

Canada

Technical Review Memorandum

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

From: Sarah Forté, Water Management Specialist, Water Resources Division, Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC)

Date: June 12, 2020

Re: Crown-Indigenous Relations and Northern Affairs Canada's technical review of Government of Nunavut Community and Government Service's application for water licence #3AM-RUT---- for municipal undertakings – Hamlet of Resolute Bay

Region: ☐ Kitikmeot ☐ Kivalliq ☒ Qikiqtani

A. BACKGROUND

The Government of Nunavut Community and Government Services' (GN-CGS) has applied to renew their Type B water licence 3BM-RUT1520 for the use of water and deposit of waste by utilidor in the Hamlet of Resolute Bay. The increase in water quantity requested means a Type A water licence would be required, identified as 3AM-RUT---- by the Nunavut Water Board.

The utilidor system in Resolute Bay includes a pump station at Char Lake, intake pipes, water treatment plant at Signal Hill, water distribution and sewer lines, fire hydrants, access vaults and a macerator unit. The entire system is undergoing renovation: in 2016 the buried utilities were replaced; and a new pump station and water treatment plant are scheduled for construction in 2020; and a wastewater treatment plant is planned for 2024.

CIRNAC submitted information requests on March 26, 2020 as part of the completeness check. The applicant responded on April 14, 2020 and provided further documents on April 28, 2020 and June 3, 2020.

B. RESULTS OF REVIEW

On behalf of CIRNAC Water Resources, the following comments and recommendations are provided for the Board's consideration:

1. Quantity of water requested

References

Applicant's Response to CIRNA Comment, Government of Nunavut – Community and Government services, April 14, 2020.

Char Lake Hydrology Study, EXP Services Inc, August 25, 2014.

Comment

The amendment application requests authorization to withdraw 550 m^3/day or 200 750 m^3 annually from Char Lake. In their April 14, 2020 response, the applicant changed the request to 150 000 m^3 annually and proposed the meter in the Char Lake pump station may not be functioning correctly.

The quantity of water requested should meet the community's needs for the proposed duration of the licence. Given the reported water use in 2019 was 191 355 m^3 and had increased 20% annually over the past two years, the proponent's requested quantities do not seem sufficient.

Char Lake's replenishment capacity should also be considered when making the request. EXP's 2014 hydrology study developed estimates of the lake's yield, as listed in the table below.

Event	Estimated Watershed Yield (m^3)	Watershed Yield Net of Lake Evaporation (m^3)
20 year return	204 000	200 000
100 year return	168 000	164 000
Lowest observed annual precipitation	166 000	162 000
Typical (Climate Normals)	342 000	338 000

Recommendation

1) CIRNAC recommends the applicant demonstrate how 150 000 m^3/year will be sufficient to meet the community's needs for the proposed duration of the licence. The applicant should explain the increase over 2 years as well as provide evidence for how they determined their proposed quantity.

2. Plans for Char Lake pump house

References

2018 Water Licence Inspection Form, Crown-Indigenous Relations and Northern Affairs Canada, 2019

3BM-RUT1520 Amendment No. 1: Decommissioning and Remediation of Char Lake Pump House and Construction of New Pump Station at Char Lake, Nunavut Water Board, April 26, 2018.

Applicant's Response to CIRNA Comment, Government of Nunavut – Community and Government Services, April 14, 2020.

Char Lake Pump House and Upgrade to Signal Hill Water Treatment Plant (Pump House), EXP Services Inc., January 2018.

Government of Nunavut, Resolute Bay Char Lake/Signal Hill Rehabilitation, Project 11-2008, EXP Services Inc., May 2011.

Government of Nunavut, Resolute Bay Signal Hill Water Treatment Plant, EXP Services Inc., October 2018.

Resolute Bay New Char Lake Pump House Specifications, Project No.CGSHQ-1201201, Government of Nunavut, no date.

Comment

The most recent water licence amendment required an Environmental Management Plan 60 days in advance of construction or decommissioning activities to address concerns about potential environmental impacts including mobilization of total suspended solids and hydrocarbon impacted soils into Char Lake. The applicant informed us the intake to the pump station has already been replaced though no plan was provided.

A Decommissioning and Remediation Plan for the old pump house is also a requirement of the 2018 water licence amendment. This plan has yet to be provided and remains relevant because concerns raised in 2018 are still present.

The applicant recently submitted design plans for the rehabilitation of water treatment plant and plans for its upgrade. These, along with the drawings for the pump house previously submitted, provide the information requested by CIRNAC for work planned for 2020.

The following observations were made on the construction drawings and specifications for the pump house submitted to the Board in February 2018,:

a) Section A-A on drawing C-100 shows the intake pipe assembly with a minimum cover of 600mm, and the profile shows the pipes being installed with no granular cover. This may have a future impact on the integrity of the insulation.
b) The location where the metal jacket listed in the specifications (section 33 11 16) is to be installed is not clearly identified on drawing C-100. Installing a metal jacket on exposed water intake pipes could help avoid any damage to the polyurethane insulation.

Recommendations

2.1) CIRNAC recommends the applicant provide the required Environmental Management Plan before proceeding with any further work.

2.2) CIRNAC recommends the applicant provide a Decommissioning and Remediation Plan for the old pump house before undertaking decommissioning work. This plan needs to address how hydrocarbon impacted soil from a historical spill will be handled.

2.3) CIRNAC recommends the applicant consider construction designs that will ensure integrity of the water intake pipe insulation when building the pump house.

3. Wastewater treatment plant

References

2014-2019 Annual Reports for the Hamlet of Resolute Bay, Government of Nunavut – Community and Government Services, March 2015-2020.

3AM-RUT---- Water Licence Application Executive Summary, Government of Nunavut – Community and Government Services, January 20, 2020.

BMS Blivet™ – *How It Works*, Blivet Marketing Services (North America) Ltd., accessed on June 5, 2020 at http://bmsna.com/downloads.html.

Resolute Bay Wastewater Treatment Pre-Design Report (Rev 2), EXP Services Inc., April 23, 2020.

Comment

The applicant plans to build and commission a new mechanical wastewater treatment plant in 2024. They have provided a memo outlining design considerations for the plant, which concludes with a recommendation to replace the flow meter at the Char Lake pump house and install a measuring device in the flume of the macerator building. CIRNAC agrees with these recommendations as they will provide flow information that is critical to properly sizing the wastewater treatment system. They are also necessary to meet the monitoring requirements of the water licence.

The proposed new wastewater treatment plant would also receive wastewater from the airport site that is currently directed to a sewage lagoon covered under water licence 3BM-YRB1621. Accurate data on the quantity of sewage from the airport site is also necessary to properly sizing the system.

Characteristics of influent to be treated is also an essential consideration for designing a wastewater treatment system. The pre-design report memo includes a table of recommended influent wastewater characteristics, based on a pre-design study completed in 2012. The recommended influent wastewater characteristics are different than both the wastewater in Resolute Bay as reported in their annual reports, and the design influent characteristics of the rotating biological contractor treatment process proposed. The values are compiled in the table below for easier comparison.

Parameter	Unit	Recommended influent	Average from annual reports[1]	Expected influent for BMS Blivet
Biochemical oxygen demand (BOD_5)	mg/L	110	32	250
Total suspended solids (TSS)	mg/L	125	29	300
Ammonia (NH_3-N)	mg/L	12	4	

[1] Average of 22 sample results collected between 2014 and 2019. The November 6, 2017 results were excluded because the water was brackish water indicating possible contamination.

CIRNAC has questions about how a packaged mechanical system will be effective at treating dilute influent, the characterization of wastewater from the airport site and how it is being accounted for. Some of these may be answered in the 2012 pre-design study which we were unable to locate on the Board's registry. In the 2020 memo it is referred to as: *Wastewater Treatment Plant – Design Brief, EXP Services Inc., 2012*.

Recommendations

3.1) CIRNAC recommends the applicant follow the recommendation of their consultant to replace the flow meter at the Char Lake pump house and install a measuring device in the flume of the macerator building.

3.2) CIRNAC recommends the applicant speak to the reliability of sewage volume discharge estimates for the lagoon. Should these measurements be unreliable, the applicant should take steps to gather data of the necessary quality.

3.3) CIRNAC recommends the applicant:

- submit the 2012 Wastewater Treatment Plant – Design brief for review by interested parties;
- describe the expected influent wastewater characteristics accounting for contributions from both the utilidor and airport site; and
- clarify how effectively a packaged mechanical treatment could treat wastewater if the influent characteristics differ from the manufacturer's expected influent.

3.4) CIRNAC recommends any renewed water licence include the requirement to submit design drawings and a brief for the new wastewater treatment plant at least 60 days prior to construction.

4. Operations and maintenance manuals

References

Applicant's Response to CIRNA Comment, Government of Nunavut – Community and Government Services, April 14, 2020.

New Water and Sewer System Resolute Bay, Nunavut, Operations and Maintenance Manual, EXP Services Inc, September 2016.

Operation and Maintenance Manual for Water and Sewer System, Utilidor System, Hamlet of Resolute Bay, Baffin Region, 1978.

Resolute Bay Wastewater Treatment Facility, Resolute Bay Site Visit, EXP Services, Inc., December 3, 2019.

Comment
There are currently no operation and maintenance manuals relevant to the infrastructure related to this water licence application.

In their response to our information requests, the applicant stated "*The updated O&M and as built drawings will be made available soon after the construction of the WTP* (water treatment plant) *is completed*."

The community's utillidor system was replaced in 2016, and the as-built construction drawings were submitted with this application. The 2016 Operation and Maintenance (O&M) Manual available on the Board's registry does not cover operation and maintenance of the utilidor system. It is rather a collection of various component drawings and manufacturer specifications and does not have any text. The 1978 O&M manual did include a section on operations, covering general system operations and start-up procedures. Similar sections for the new system should be included in the O&M manual.

No manual was found for operation of the macerator. The applicant's consultant noted that: "*the building macerator unit is open flow, and that the heater is exposed heating element, including thermostat. The fan is completely blocked off with insulation. There is not much smell at all (flow is diluted), but I did note to Bhabesh that this is definitely a hazard (explosion and to operators) as there is a ventilation issue*." An O&M manual should address how the risks from these hazards will be mitigated.

Recommendations
4.1) CIRNAC recommends any renewed water licence include the requirement to submit an O&M manual for the water treatment plant within a specified time of completion of the water treatment plant construction.

4.2) CIRNAC recommends the applicant be required to provide an O&M manual for the utilidor system.

4.3) CIRNAC recommends the applicant provides an O&M manual for sewage treatment that addresses the risks identified in the macerator building as soon as possible.

5. Reclamation plans for sewage treatment infrastructure

Reference
Applicant's Response to CIRNA Comment, Government of Nunavut – Community and Government Services, April 14, 2020.

Comment
Reclaiming old facilities will be necessary once the new wastewater treatment plant is constructed. The facilities will include the macerator building, the un-commissioned wastewater treatment plant (blue building), and the sewage lagoon.

Recommendation

5) CIRNAC recommends any renewed water licence include the requirement to submit a reclamation plan for obsolete infrastructure within a specified time of completion of the wastewater treatment plant construction.

6. Informing residents how to address leaks in utilidor laterals

References

Applicant's Response to CIRNA Comment, Government of Nunavut – Community and Government Services, April 14, 2020.

Resolute Bay Wastewater Treatment Facility Site Selection, EXP Services Inc., January 20, 2020.

Comment

During a public meeting on December 2, 2019, the applicant's consultant noted "*that the laterals are not the Contractors responsibility and there are reported leaks in some of these connections from the buildings to the lateral then to the Utilidor. It was identified that the laterals and associated connection to the buildings are not part of the service contract for the Utilidor. Individual building occupants don't know how to address leaks or whom to contact to get these leaks fixed.*"

The applicant has clarified they have not received complaints and "*if any complain is received from the Public, the individual homeowner and the Hamlet will be advised to work together and repair the line as soon as possible. ATCO is the local contractor and is always available to help them.*"

The proposal to help homeowners is good, but it appears that they are unaware of its existence. Presumably no complaints have been received because building occupants do not know whom to contact.

Fixing leaks in the utilidor system, including its laterals, is critical to keeping the water withdrawal quantities under control. Since there is already a proposed method of dealing with leaks in laterals, the missing step is informing the public whom to reach out to for help fixing leaks.

Recommendation

6) CIRNAC recommends the applicant describe how they plan to inform the public on actions to take when they notice leaks in the utilidor laterals.

7. Monitoring

References

2014-2019 Annual Reports for the Hamlet of Resolute Bay, Government of Nunavut – Community and Government Services, March 2015-2020.

NWB Renewal Licence No. 3BM-RUT1520, Nunavut Water Board, March 30, 2015

Comment

Over the last six years, the applicant has been collecting between 1 and 7 samples per year at station RUT-2 (Effluent - Sewage Disposal Facility) and reporting results. Most years have 3-4 samples. There are sufficient data to be able to spot outliers and form an idea of the variability, which will help inform the wastewater treatment system design.

The licence under renewal requires monthly samples at station RUT-2, and CIRNAC is of the opinion that until a water treatment plant is built, the sampling frequency could be reduced because data available indicate it is not very variable. Quarterly sampling might be sufficient to flag any significant change.

Recommendation

7) CIRNAC recommends any renewed water licence reduce the sampling frequency required at station RUT-2 until a water treatment plant is built.

8. Quality Assurance/Quality Control Plan

References

NWB Renewal Licence No. 3BM-RUT1520, Nunavut Water Board, March 30, 2015

Quality Assurance / Quality Control Plan, Hamlet of Resolute Bay Utilidor System, Resolute Bay, Nunavut, 2020.

Comment

A Quality Assurance/Quality Control (QA/QC) Plan detailing how the monitoring should be done was provided with the application. CIRNAC notes:

a) **Section 2.1, Table 2.1:** Station RUT-2 is identified as volume only. This is a direct transcription of the water licence, in which there seems to be a formatting error that cut off a word indicating water quality sampling is also necessary at RUT-2. Since Part H, Item 6 details what parameters must be analysed monthly, quality sampling is also necessary at RUT-2.
b) **Section 2.4, Table 2.4:** The water licence includes two sets of effluent quality criteria, one applicable for wastewater flows greater than 600 Lcd (liters per capita per day) and one applicable for wastewater flows between 150 and 600 Lcd. Table 2.4 of the QA/QC Plan only presents the criteria for lower flows, and based on the annual water consumption reported in 2019 and the population reported at the beginning of the plan, flows are on the order of 1850 Lcd and the more stringent criteria should apply.
c) **Appendix D:** The laboratory accreditations provided both expired last year.

In section 2.3.3 of the plan, the list of parameters to be analyzed for RUT-2 samples includes a few which are not required by the licence, which is not a problem. CIRNAC is surprised with the inclusion of "*LC50 Bioassay (R Trout) for PAN-3*" and seeks clarification on what motivated this addition in case there are water quality concerns we have not considered.

Recommendations

8.1) CIRNAC recommends any renewed water licence include the requirement to submit an updated QA/QC Plan to address the three deficiencies noted above and incorporate a criteria for Faecal Coliform into Table 2.4.

8.2) CIRNAC recommends the applicant provide rationale for adding toxicity testing to the list of parameters to analyze at station RUT-2.

9. Spill Contingency Plan

References

Applicant's Response to CIRNA Comment, Government of Nunavut – Community and Government services, April 14, 2020.

Resolute Bay Map, submitted to the Nunavut Water Board on June 3, 2020.

Spill Contingency Plan, Hamlet of Resolute Bay, Resolute Bay, Nunavut, 2020.

Comment

A Spill Contingency Plan was included with the application material. In response to CIRNAC's information requests, the applicant has provided a map locating the community's principal infrastructure.

CIRNAC notes certain sections of the manual do not seem to have been adapted for Resolute Bay. Specifically:

a) **Section 7.4:** Instructions to: "*Obtain a Permit to Burn through the Pangnirtung Fire Department.*"

b) **Section 8.3:** Four spill kit locations are identified: "*the solid waste disposal facility, the municipal garage, the Wastewater Treatment Plant, and the Water Treatment Plant (see Drawing SK-1, in Appendix B).*" These do not correspond to infrastructure presented on the Resolute Bay Map. Specifically:

   i. It is not clear if the solid waste disposal facility refers to the municipal dump or the metal dump. Given that these are ~8 km apart, kits should be available at both locations.

   ii. It is not clear where the municipal garage is. Perhaps it is co-located with the Hamlet Office.

   iii. There is no wastewater treatment plant as of yet, it would be better to refer to the macerator so the kit location is clear to people using the plan.

Recommendation

9) CIRNAC recommends any renewed water licence include the requirement to submit an updated Spill Contingency Plan to incorporate the map and address the deficiencies in sections 7.4 and 8.3 noted above.

C. GENERAL COMMENT

Despite measures and restrictions in place to reduce COVID-19 transmission, the applicant has been able to provide many of the documents requested for the technical review. We would like to thank them for their efforts and acknowledge the increased pressures and challenges brought on by these difficult times. CIRNAC is open to delaying further steps in this application process should it be requested by the applicant or by other parties.