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Building Nunavut Together
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Bâtir le Nunavut ensemble
Nunavut

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Department of Community and Government Services
Nunalingni Kavamatkunnilu Pivikhaqautikkut
Ministère des Services Communautaires et gouvernementaux

April 24, 2020

Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU X0B 1L0
Attention: Richard Dwyer, Manager of Licensing, Manager of Licensing

RE: **Explanation to the Technical comments, letter by CIRNAC, dated March 25, 2020**
3BM-CAM 1520 – Renewal Application, Hamlet of Cambridge Bay

Dear Richard

Please find our respond and explanation of the comments by CIRNAC as below:

Comments 1: Water quantity requested

Authorization to withdraw 257 m3 /day or 94 000 m3 /year from Water Lake requested. The winter lake volume is estimated at 650 000 m3 while the summer lake volume is 1 765 000 m3 . The Fisheries and Oceans' protocol for winter water withdrawal limit is not to exceed 10% of the available water volume. According to the estimate provided, 10% of the winter volume would be 65 000 m3 , so the requested quantity is 14.5% of the winter volume.

Our explanation:

- The winter withdrawal more than 10% of the water is not true.
- The winter water withdrawal volume estimate from December – through- April.
  The quantity of winter volume is: 33,754 m3
  (Dec 6,898 + Jan 6,472 + Feb 6,386 + Mar 7,040 + Apr 6,958) m3 = 33,754 m3
  Reference: Annual Water withdrawal Report 2019 (attached)

This conclude that the average withdrawal of water in winter is only 5.20% of the available volume in the Lake. [**calculation: (33,754/65,000) x100 = 5.20 %]**
The requested water volume of 94,000 m3 is Annual (Jan-Dec) withdrawal, not only for winter season

Comments 2: Water quality at waste management facility

Four of the six samples at CAM-6 had pH values outside the 6 - 9 range with values ranging from 9.36-10.20. The treatment through the retention cell causes pH to increase; for 3 of 6 samples, pH is within criteria at CAM-3 in the sewage lagoon and above 9.0 at CAM-5, when leaving the retention cell.

Our explanation:
The sewage water samples result from CAM-3 within the limit (6-9) states the fact of raw sewage has attained preliminary treatment while staying inside in winter and it leverage the authority to allow for

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decanting effluent water. The CAM-5 is in the waiting cell (outside) where a possible run-off from nearby Metal waste (metal components) when summer freshet. Also, residual substrate from the previous year decanted effluent results an increase of initial P^H level. Ultimately, this elevated P^H also reduced through polishing by sunlight on vegetation enriched wetland and filtration through a gravel layer ex-filtration berm before entering the CAM-6 station area. An increased P^H at CAM-6 perhaps during the early start of decanting and reduces later the full duration of decanting. We note that new recommendation for P^H level 6-10.

The station CAM-4 is inside the Solid Waste facility and required samples only when the water needed to be pumped out into the Lagoon; otherwise, ponding water dries naturally. The Solid waste facility has only house waste (kitchen garbage and food wastes mainly), therefore, trace metal components are not more in the sample.

The Licensee also has started reducing metals heap by crushing down to smaller pieces and burying into trenches on down sides then covering with sand-gravels. These activities will reduce overrun flow into the wetland area. In addition, a peripheral berm and fence installation is in the plan to be carried with minimal access into the metal dump.

Comments 3: Licence term

The licensee has diligently been managing waste and water in the Hamlet; submitting annual reports with monitoring results regularly and has being responsive to the Inspector's requests.

Our explanation:

The Licensee has submitted all Annual reports of previous years including 2019. These Annual reports has covered and reflected annual water supply, sewage waste deposition, O&M manuals and any other information requested by the CIRNAC inspector through annual site visits.

Best Regards,

Shah Alam, P. Eng. E.P. CAMP
Municipal Planning Engineer,
Government of Nunavut, Community and Government Services
Kitikmeot Region, Cambridge Bay, Nu
Phone: 867-983-4156, fax: 867-983-4124
salam@gov.nu.ca<mailto:salam@gov.nu.ca>

CC: Marla Limosin, Chief Administrative Officer, Hamlet of Cambridge Bay, NU
Sarah Forté Water Management Specialist, Resource Management Directorate Nunavut
Baba Pedersen, Resource Management /Water Resource Officer, AANDC

ANNUAL REPORT- 2018

YEAR BEING REPORTED: 2019

The following information is compiled pursuant to the requirements of Part B, Item 1 of Water Licence 3BM- CAM 1520 issued to the Hamlet of Cambridge Bay

i) - iii) tabular summaries of all data generated under the "Monitoring Program"; monthly and annual quantities in cubic metres of freshwater obtained from all sources; monthly and annual quantities in cubic metres of each and all wastes discharged;

Attached are quantities of water used as reported in our on Tap Water Delivery System and the estimated discharge of sewage waste based on quantities used.

Month Reported	Quantity of Water Obtained from all sources (litres)	Quantity of Sewage Waste Discharged
January	6,472,525.31	Same
February	6,386,305.45	Same
March	7,040,042.49	Same
April	6,958,251.14	Same
May	7,095,196.57	Same
June	6,810,818.94	Same
July	6,772,398.16	Same
August	7,496,626.96	Same
September	7,065,695.62	Same
October	8,437,827.45	Same
November	6,865,583.00	Same
December	6,898,377.75	Same
ANNUAL TOTAL	**84,299,648.84**	Same

Note: Sewage waste discharge assumed not exceeding the water quantity and taken as maximum as 90%-95% of the water quantity

Comments by CIRNAC

3BM-CAM1520 Water License Renewal

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
3BM-CAM1520

March 25, 2020

Our file - Notre référence
CIDM#1284396

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 comments on the Hamlet of Cambridge Bay's renewal application for water licence #3BM-CAM1520 for municipal undertakings – Hamlet of Cambridge Bay

Dear Mr. Dwyer,

Thank you for your February 25, 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.

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, CIRNAC

Date: March 25, 2020

Re: Crown-Indigenous Relations and Northern Affairs Canada's comments on the Hamlet of Cambridge Bay's renewal application for water licence #3BM-CAM1520 for municipal undertakings – Hamlet of Cambridge Bay

Region: ☒ Kitikmeot ☐ Kivalliq ☐ Qikiqtani

A. BACKGROUND

On February 25, 2020, the Nunavut Water Board provided notification of the Hamlet of Cambridge Bay's submission of a renewal application for their Type B water licence 3BM-CAM1520 for the use of water and deposit of waste in the Hamlet of Cambridge Bay.

The Hamlet's water source is Water Lake, approximately 3 km to the north of the community, which feeds a new water treatment plant, in operation since 2017. The licensee has recently submitted the Water Treatment Plant Operations and Maintenance Manual, on which Crown-Indigenous and Relations Northern Affairs Canada (CIRNAC) submitted comments on March 5, 2020. There are direct feed pressure lines to schools, the CHARS facility, the Helen Maksagak centre and the Health Centre. All other buildings and residences are serviced by trucked water.

Trucks are also used to collected sewage, which is treated in a system that includes a primary lagoon, a retention lagoon and a wetland. The landfill is adjacent to the lagoon and drains into the same wetland.

The Hamlet is requesting for a 10-year renewal for an increased volume of water using all the same facilities as are authorized under the present licence.

B. RESULTS OF REVIEW

CIRNAC noted that this application was well prepared. The "Description and explanation" section of the application, as well as the poster detailing waste management improvements in the community, helped us in our review. On behalf of CIRNAC Water Resources, the following comments and recommendations are provided for the Board's consideration:

1. Water quantity requested

Comment:
Authorization to withdraw 257 m^3/day or 94 000 m^3/year from Water Lake is requested in Box 13 of the application. The executive summary states the winter lake volume is estimated at 650 000 m^3 while the summer lake volume is 1 765 000 m^3.

The Fisheries and Oceans' protocol for winter water withdrawal limit is not to exceed 10% of the available water volume. According to the estimate provided, 10% of the winter volume would be 65 000 m^3, so the requested quantity is 14.5% of the winter volume.

Recommendation:
CIRNAC recommends that the Board and proponent contact the department of Fisheries and Oceans' for further guidance before authorizing or withdrawing the requested quantity of water.

2. Water quality at waste management facility

Comment:
With their annual reports, the Hamlet has provided the water quality monitoring results required by the water licence more regularly since 2015. This is helpful for evaluating the performance of waste management practises and brings to light some concerns.

As mentioned above, the sewage and solid waste facilities in Cambridge Bay are co-located, and they share some water management features. Section 6.5 of the Solid Waste Disposal Facility Operations and Maintenance (O&M) Manual: "*surface water collecting in control ponds can be pumped into the lagoon*." The 2018 annual reports confirms this practise is used: "*Sometime waste run-off required to pump out to sewage lagoon when snow melts or rains flooded the waste facility*." Additionally, surface water draining from the landfill is directed via a ditch to the wetland that also receives treated sewage from the retention lagoon (personal communication, B.Pedersen, March 13, 2020). These features are illustrated in figure C-14 of appendix D in the Solid Waste O&M Manual and the figure below.

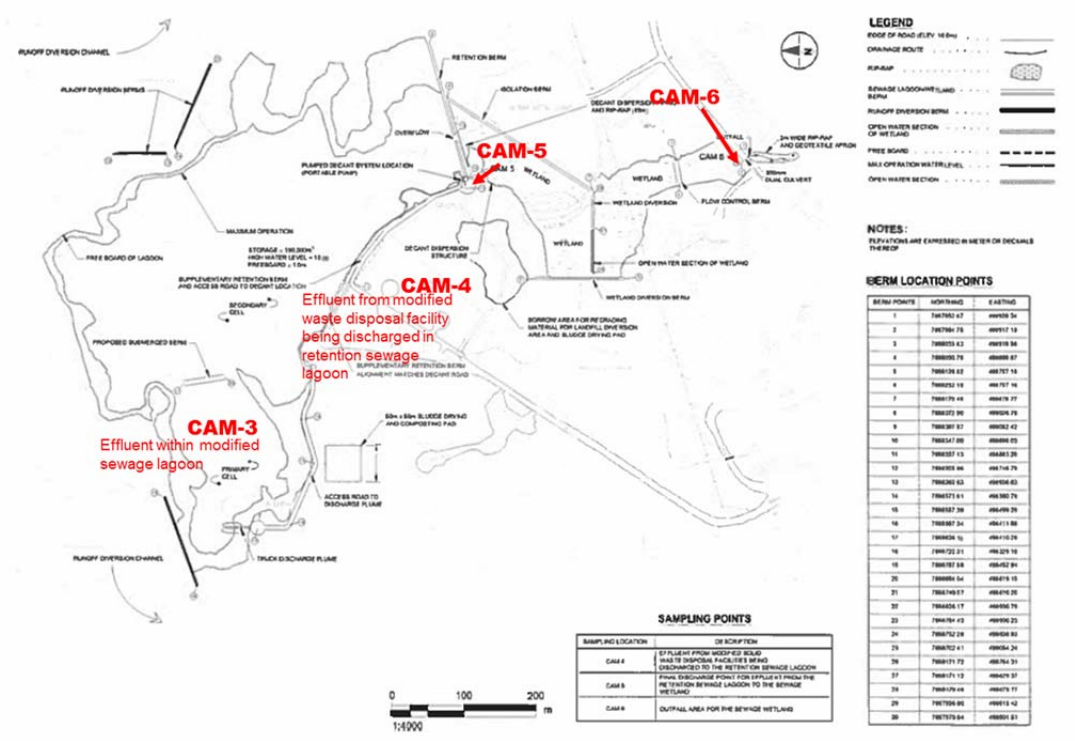

Figure of sampling stations taken from Sewage Lagoon O&M Manual

Part D Item 5 of the current water licence requires sampling at station CAM-5 and sets discharge criteria for station CAM-6. These station locations are identified in the figure above. The licensee has provided water quality results for CAM-5 in 2015, 2016, 2017 and 2018, while results for CAM-6 are available for 2015, 2016 and 2018. Four of the six samples at CAM-6 had pH values outside the 6 - 9 range set by the licence, with values ranging from 9.36-10.20. The treatment through the retention cell causes pH to increase; for 3 of 6 samples, pH is within criteria at CAM-3 in the sewage lagoon and above pH 9.0 at CAM-5, when leaving the retention cell for the same dates.

The water licence has no discharge criteria for metals. However, metal concentrations in the effluent of the waste disposal facility at CAM-4 are elevated, as might be expected from contact water at a landfill. Iron concentrations are on average 10 570 µg/L (range 322 - 24 500 µg/L) and though they are reduced in the wetland, concentrations are still high at the final discharge point CAM-6 (average 544 µg/L, range 301 - 739 µg/L). These iron concentrations are above the Guidelines for the discharge of treated municipal wastewater in the Northwest Territories and the Canadian water quality guidelines for the protection of aquatic life (CWQG-PAL) in freshwater – long term, which are both 300 µg/L. Copper is the other metal with concentrations with concentrations at the final discharge point CAM-6 (average 6.0 µg/L, range 3.4 – 12.6 µg/L) regularly above the CWQG-PAL. The guideline for copper is variable depending on water hardness, and for the samples measured it is almost always 4 µg/L. The 2015 CAM-6 samples also have elevated aluminum, cadmium and lead concentrations, but it was a single occurrence, and concentrations at CAM-4 on the same date are not elevated.

Recommendation:
CIRNAC recommends the licensee explore options to reduce pH of the retention cell effluent to meet licence discharge criteria. Additionally, CIRNAC recommends the licensee explore options to reduce metal concentrations in landfill contact water.
CIRNAC also recommends discharge criteria be re-considered to include metal concentrations if applicable, since the effluent tested is in part from a landfill.

3. Licence term

Comment:
The licensee is requesting their licence be renewed for a 10-year term.

The licensee has diligently been managing waste and water in the Hamlet; submitting annual reports with monitoring results regularly, and has being responsive to the Inspector's requests.

Recommendation:
CIRNAC supports the licensee's request for a 10-year term.

C. REFERENCES

Canadian Environmental Quality Guidelines, Water Quality Guidelines for the Protection of Aquatic Life, Canadian Council of Ministers of the Environment, 2020.

DFO Protocol for Winter Water Withdrawal from Ice-covered Waterbodies in the Northwest Territories and Nunavut, Fisheries and Oceans Canada, 2010.

Guidelines for the Discharge of Treated Municipal Wastewater in the Northwest Territories, Northwest Territories Water Board, 1992.

Municipal Solid Waste Disposal Facility Operation and Maintenance Manual, Hamlet of Cambridge Bay, February 2014.

Sewage Lagoon Operation and Maintenance Manual, Hamlet of Cambridge Bay, December 2013.

Water Licence Renewal Application 3BM-CAM1520, Hamlet of Cambridge Bay, GN-CGS, February 3, 2020