Water Resources Division
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Your file - Votre référence
3BM-NAU2126
Our file - Notre référence
GC Docs # : 110372073

March 3, 2023

Richard Dwyer
Manager of Licensing
Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU, X0B 1J0
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Re: Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) Response to Comments by Applicant Amendment Application for the Municipality of Naujaat, Type B Water Licence No. 3BM-NAU2126

Dear Mr. Dwyer,

Thank you for your February 13, and March 1, 2023 inquiries on whether the Applicant's responses addressed the technical review comments and recommendations submitted by Water Resources Division of CIRNAC on January 10th and 25th, 2023 for the amendment application for the Municipality of Naujaat, water licence no. 3BM-NAU2126.

Our comments to the Applicant's responses are discussed below, using the numbering from the technical review for easier cross referencing.

1. Scope of Application

Recommendation: (R-01) CIRNAC recommends that GN-CGS clarify the scope of the application and provide the Nunavut Water Board (the Board) any outstanding information on additional amendments before this amendment be approved.

Applicant's Response: The Applicant's response to CIRNAC's recommendation R-01 regarding the scope of the amendment application listed the following items:

a. Approval of the new lagoon and wetland treatment area
b. Request to amend the effluent quality limits

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c. Request to amend BOD5 to CBOD
d. Request for a 10-year license term
e. Request to remove daily solid waste reporting
f. Request to remove daily reporting requirement for water obtained from the Water Supply Facility
g. Request that the annual report which includes the CIRNAC report and any other inspection reports that have been reviewed by a CGS municipal engineer in that year be sufficient to meet the requirement to have engineered facilities inspected by an Engineer annually.
h. Request to remove clauses G-4 and G-5 concerning preparation of disturbed surfaces and reclamation of hydrocarbon contaminated areas, respectively, as those activities have been taken over by CIRNAC

CIRNAC's Comment: CIRNAC reviewed the information provided in the amendment application and did not find that the information provided supported the request for review of items e-h. Additionally, CIRNAC provided comments on previous applications that address item g with the same consistent messaging that CIRNAC does not support those changes.

At no time will a CIRNAC inspection report be considered an adequate replacement for the annual inspection by a Engineer.

CIRNAC's Response: CIRNAC recommends that the Applicant, NWB and CIRNAC Water Resources plan a discussion on this topics outside of this amendment process.

2. Term of Licence

Recommendation: (R-02) CIRNAC supports a 10 year term of licence with the consideration that additional monitoring stations, sampling and analyses may be required by an Inspector and or the Board to achieve legislative objectives.

Applicant's Response: N/A

3. Signage

Recommendation:(R-03) CIRNAC recommends that the condition reads *"The Licence shall post signs to identify the Water Intake/ Water Treatment Facilities, Sewage and Waste Disposal Facilities. All signage postings shall be in the Official Languages of Nunavut, and shall be located and maintained to the satisfaction of the Inspector.*

An additional condition to be included is *"The Licensee shall post the necessary signs to identify the stations of the Monitoring Program. The signs shall be located and maintained to the satisfaction of an Inspector.".*

Applicant's Response: The Licensee agrees.

4. Effluent Quality Limits and the Monitoring Program

Recommendation: (R-04) CIRNAC recommends that regular collections of samples under the current monitoring program be completed prior to any changes to the criteria. These results and analysis should then be provided to the Board for future consideration if evidence is presented that a change is necessary. Part H, condition 14 of the Water Licence allows for modifications to the monitoring program upon request to the Board.

Applicant's Response: GN-CGS will continue to support communities in collecting regular samples under the summer monitoring program. Sampling was unable to occur during summer 2022 due to a bottle supply shortage at ALS laboratories, which is the laboratory that supplies water and wastewater sampling bottles to the Kivalliq region. Sampling from the current wastewater system will have no bearing on the performance of the proposed facility. Previous monitoring will not inform the performance of the new facility, as they are different facilities.

The new lagoon will improve the quality of effluent being released to the environment, particularly with the ability to hold wastewater throughout the year and decant in a controlled manner. The current discharge point and wetlands area effluent results would meet the NWB limits, but that was due to the large amount of dilution taking place. Controlled decant will allow for the spring melt/freshet to pass and the wetland vegetation to develop, in addition to not overloading the wetland through rapid discharge, which will allow for further biological treatment to take place in the wetlands area.

The 100/120mg/L cBOD/TSS effluent quality limits are based on NU specific research that CGS completed in partnership with Dalhousie University from 2010-2016, along with an additional field study completed by Dalhouise of the Naujaat wetlands in 2017. These effluent quality limits are technology based (ie. what a lagoon and wetland system is capable of realistically achieving), along with confirming that effluent of this quality would not have a negative impact on the receiving environment.

CIRNAC's Response: CIRNAC stands by the original recommendation.

5. Replacement of Effluent Parameters

Recommendation: (R-05) CIRNAC recommends that the GN-CGS clarify why the parameters $CBOD_5$ should replace BOD_5.

Applicant's Response: The basis for using CBOD in this amendment process is that the effluent parameter recommendations from the Nunavut specific research is CBOD not BOD5 and there is generally a 20% difference between these test results based on

significant research in this area in North America, BOD5 being higher. Setting the limit at 100 mg/L BOD5 is more stringent than 100 mg/L CBOD. Additionally, CBOD is known to be a more stable and reliable result. There is precedent for using CBOD by NWB on the 3AM-RUT2035, 3AM-ARV2232, 3BMWHA-2126, and 3BM-TAL1926 licences.

BOD is an obsolete parameter, as is evident by its' replacement in the Federal Wastewater System Effluent Regulations. ECCC has expressed support for the amendment of BOD5 to CBOD.

CIRNAC's Response: CIRNAC supports the Applicant's requested to replace the parameter BOD_5 with CBOD and that the Board consider this request in light of previous precedent.

6. Plan Submissions

Recommendation: (R-06) CIRNAC recommends that the submitted plans be reviewed in a separate process by interested parties before they are approved by the Board and implemented by the Licensee.

Applicant's Response: The Licensee agrees.

7. Pre- Design Report

Recommendation: (R-07) CIRNAC recommends that GC-CGS clarify which design option has been selected and provide the constructions drawings and plans as may be required, for review by intervenors prior to any construction.

Applicant's Response: GN-CGS has selected a single cell sewage lagoon with 12-month storage capacity. 99% drawings for this selection were provided for distribution and review on January 18, 2023. Details of these drawings were discussed with CIRNAC on January 24, 2023.

CIRNAC's Response: Additional information was submitted by the Applicant and received by CIRNAC on January 19, 2023. No further comment.

8. Secondary Cell- Capacity

Recommendation: (R-08) CIRNAC recommends that the applicant provide information on the working capacity of the secondary cell and the total working capacity of the WTA, prior to the last point of control, with the addition of the proposed amendments.

Applicant's Response: The existing natural depression is currently identified as the secondary treatment cell. There are no modifications or amendments proposed to this body of water. There are attenuation berms proposed for the WTA downstream of the natural depression (i.e., Berm 1). To clarify, the natural depression shouldn't be considered a secondary lagoon cell and should be considered a wetland cell.
In reference to Drawing 110 of the 99% design package, the WTA is split up into 7 wetland cells by the attenuation berms. The natural depression would be considered wetland cell 1. Each cell will have a depth ranging from 0.3 m, up to 1.0 m. The water depth of the WTA will vary with flow throughout the treatment season. To clarify, we are recommending a decant rate from the primary lagoon cell of 1,950 m3/day under a 60 day decant period. The wetland cells have a working volume as shown in the table below:

Wetland Cell	Area	Working Volume at 0.3 m depth	Working Volume at 1.0 m depth
1 (Natural Depression)	32,345 m2	9,704 m3	32,345 m3
2	9,856 m2	2,957 m3	9,856 m3
3	6,088 m2	1,826 m3	6,088 m3
4	34,848 m2	10,454 m3	34,848 m3
5	13,402 m2	4,021 m3	13,402 m3
6	13,395 m2	4,019 m3	13,395 m3
7	1,022 m2	307 m3	1022 m3
Total	110,956 m2	33,287 m3	110,956 m3

CIRNAC's Response: CIRNAC accepts the response.

9. Secondary Cell- Hold Time and Flowrate

Recommendation:(R-09) CIRNAC recommends that the applicant provide more information on flowrates and holding times to the Board prior to approval of this amendment.

Applicant's Response: As stated above the existing natural depression is currently identified as the secondary treatment cell. There are no modifications or amendments proposed to this body of water. No survey data is available on the natural depression. The 2017 *Wetland Treatment Area Study in Naujaat, Nunavut* as prepared by the Centre for Water Resources Studies (CWS) at Dalhousie University sampled at the natural depression and observed concentration reductions when comparing raw wastewater to the WTA influent (effluent from the natural depression). Dillon used these sampling results to calibrate a kinetic model to conservatively estimate the concentration reductions across new lagoon cell and the existing natural depression. Based on a 60 day decant from the primary lagoon cell and a flow rate (decant rate) of 1,950 m3/d, a holding time approaching 16.5 days is estimated through the natural depression.

CIRNAC's Response: CIRNAC accepts the response.

10. Wastewater Treatment Facility (WWTF) Operation and Maintenance Plans

Recommendation: (R-10) CIRNAC recommends that the Operation and Maintenance plan be provided 60 days prior to the commissioning of the new WWTF and include specification on flowrate and measures to maintain the structures in the WTA to ensure the facility will function as designed.

Applicant's Response: The Operation and Maintenance plan will be provided prior to the commissioning of the WWTF and will include the recommended information.

CIRNAC's Response: CIRNAC accepts the response.

11. Monitoring Program- Effluent Volumes

Recommendation: (R-11) CIRNAC recommends that the Monitoring Program includes daily recorded decant volumes from the new lagoon to the WTA to ensure the WWTF is operating as designed.

Applicant's Response: The licensee agrees.

12. Cut-off Berm and Perimeter Ditches

Recommendation: (R-12) CIRNAC recommends that the applicant provide the outstanding drawings to the Nunavut Water Board or a rational as to why this component is no longer considered part of the necessary design before approval of this amendment is considered.

Applicant's Response: The 99% drawing package shows flow diversion ditching around the lagoon (Drawing 101, 102, 105, 106). Drawing 106 shows culverts to direct water under the access road from upstream of the lagoon. There is also drainage piping shown under the lagoon to direct water from under the liner if anything is captured.
Drainage in the vicinity of the lagoon is characterized by overland flow from small upstream catchments that collect in depressions and then spill down the valleys. Northwest of the lagoon area is relatively flat with depressions that collect water. The Geotechnical Investigation concluded that infiltration into the soils is anticipated to be moderate to substantial during the spring freshet and shallow subsurface flow is expected to travel along the bottom of the active layer of bedrock. Bedrock depths range from 0.0 to 4.3 m below ground.

Soils in the area are generally sandy to clayey sand and shallow groundwater flow is anticipated to mimic surface water flow directions. Culverts will be placed at three (3) locations where overland flow paths are intercepted by the access road. Around the

lagoon, it is anticipated that surface water will be directed to ditches that route flows around and away from the lagoon.

CIRNAC's Response: CIRNAC accepts the response.

If there are any questions or concerns, please contact me at (867) 975-4282 or Christine.Wilson3@rcaanc-cirnac.gc.ca.

Regards,

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Water Resource Division