May 12, 2022

Richard Dwyer

Manager of Licensing

Nunavut Water Board

VIA EMAIL

Subject: Response to CIRNAC comments on Water Licence (8BC-EUR2131) Amendment Application for Eureka High Arctic Weather Station

Dear: Richard Dwyer

On behalf of Environment and Climate Change Canada (ECCC), please find enclosed our responses to Crown- Indigenous Relations and Northern Affairs Canada (CIRNAC)'s comments pertaining to ECCC's Water Licence (8BC-EUR2131) Amendment Application for the Eureka High Arctic Weather Station (HAWS).

CIRNAC #1: Capacity of the proposed exfiltration trench

On page two (2) of Attachment F, it was stated that "(I)t is proposed to install one exfiltration trench 60 m long, 1.5 m wide and 0.6 m deep as shown in Figure 2. The total storage capacity of the trenches would be approximately 45 m^3, which would be adequate for a temporary storage of a 9-day grey water discharge volume to accommodate high flows or wet conditions. Unsaturated exfiltration capacity of the proposed exfiltration trench was estimated at 32.5 litres/m^3/day (0.8 US Gal/ft^2/day)."

It is not clear how the total storage capacity (i.e., 45 m^3) and the unsaturated exfiltration capacity (i.e., 32.5 litres/m^3/day) of the proposed exfiltration trench are defined and calculated, and if the proposed exfiltration trench has the sufficient capacity to handle the estimated 5 m^3 of grey water produced daily by the Nuna Camp for a 3-month period in the summer between 2022 and 2025.

Recommendation:

(R-01) CIRNAC recommends that the licensee explain how the capacities of the proposed exfiltration trench are defined and obtained, as well as address if the proposed exfiltration trench has the sufficient capacity to handle the estimated grey water produced daily by the Nuna Camp during the summer.

ECCC #1: Response

The exfiltration trench infiltrative surface was calculated as the bottom and wall surface area of the 60 m long trench. This works out to be 162 m^2. By applying an exfiltration/seepage rate of 32.5 litres/m^2/day, we get infiltration of 5226 litres per day (162 x 32.5). Normally we would not include both side walls in a

permanent application, but this is temporary and water will seep away without creating much of an impermeable layer on the trench excavated area. The 32.5 litres/m^2/day was a long term application rate for fine sand/ sandy loam as for use in a septic field (USEPA). We believe the number is safe to use, as the soil clogging ability of septic waste is much higher than the grey water being disposed of at the camp.

The volume of storage (45 m^3) was part of the original calculations and was not used as a key design parameter. It was not calculated correctly. Rather, it was a check to see how much buffer capacity the grey water field had. The number should have been 1.5 m width x 60 m length x 0.6 m depth = 54 m^3 of grey water granular. Assuming 30% voids there was (0.3 x 54 m^3) = 16.2 m^3 of storage capacity rather than 45 m^3 of storage. If there was a peak flow day, or a rain storm, or if surface water was accidentally routed to the field, there would be 15.2 m^3/ 5 m^3 = 3.2 days of storage volume. The storage volume helps equalize the flow and keeps the liquid in the trench.

CIRNAC #2: Alternative to the proposed exfiltration trench

The proposed exfiltration trench is to treat an estimated 5 m^3 of grey water produced daily by the Nuna Camp for a 3-month period in the summer (i.e., a total volume of about 450 m^3/year) between 2022 and 2025, or until the proposed water and sewage treatment facility upgrades are completed. The proposed exfiltration trench will then need to be decommissioned based on a revised Abandonment and Restoration Plan.

CIRNAC notes that greywater and sewage generated at the Eureka High Arctic Weather Station (approximately 35 m^3/day) is currently discharged to the sewage lagoon, which will continuously be used to handle greywater and sewage until the completion of the proposed water and sewage treatment facility upgrades. CIRNAC also notes that the existing sewage lagoon is only a few kilometers from the Nuna Camp and that the estimated 5 m^3/day (or collected in a holding tank before discharging to the proposed exfiltration trench.

Given the above observations, it is reasonable to suggest that the alternative of discharging grey water produced at the Nuna Camp to the existing sewage lagoon at the Eureka High Arctic Weather Station should be considered.

Recommendation:

(R-02) CIRNAC recommends that the licensee consider and discuss other alternatives for treating the grey water produced at the Nuna Camp, for example using the existing sewage lagoon at the Eureka High Arctic Weather Station.

ECCC #2: Response.

Due to increasing population pressures at the HAWS, the current sewage lagoon's effluent quality exceeded the limits set in the Water Licence. Alternatives were evaluated to reduce the lagoon's load, improve its function, and to temporarily reduce the potential for further exceedances while the new wastewater facility is built. Considering the remote nature of the site and limited transportation options, a grey water exfiltration trench was the best alternative as it can be installed relatively quickly with basic construction equipment and material.

CIRNAC #3: Sludge generated from the proposed wastewater treatment plant

Comment:

CIRNAC assumes that the proposed packaged wastewater treatment plant would generate sludge or solid waste and would like to note the lack of an adequate discussion on the quantity and quality of the sludge, as well as how the sludge will be managed in the amendment application.

Recommendation:

(R-03) CIRNAC recommends that the licensee clarify if sludge or solid waste will be generated from the proposed wastewater treatment plant, as well as how the sludge will be managed and if the response is positive, provide information on the quantity and quality of the sludge, as well as management plan for the sludge.

ECCC #3: Response.

Sludge generated by the packaged wastewater treatment plant will go through a separate process for Aerobic Digestion. The sludge will be aerated for approximately 30 days to help stabilize the sludge, thereby reducing pathogenic micro-organisms and the organic concentration within the sludge. At this point, polymer will be added and the sludge will be wasted approximately weekly to dewatering bags. This dewatered sludge is estimated to be between 15 and 25 percent solids and will be disposed of in the landfill. The volume of sludge will vary depending on the population and amount of time used for drying, but it is anticipated that the dewatered sludge volume will be between 1 and 2 m^3 per year.

Solids generated by the exfiltration trench will be collected in the settling side of the septic tank, upstream of the grey water field. These solids will be thickened through decanting and freeze thaw dewatering. The final solids will be removed from site for disposal in an approved facility or added to incineration toilets for disposal.

CIRNAC #4: Distances of facilities or activities from the ordinary High Water Mark of any adjacent water body

Part D item 1, Part E items 7 and 15, and Part G item 2 of Water Licence 8BC-EUR2131 stipulate, respectively, that waste disposal, land-based activity, quarry sites, and locations of all sumps and fuel caches be at lease thirty-one (31) metres from the ordinary High Water Mark of any adjacent water body.

The locations of the waste disposal facilities, land-based activity, quarry sites, and locations of temporary contaminated soil storage cells, sumps and fuel caches are marked in the three (3) topographical maps in Attachment D and a number of for-construction drawings in Attachment E.

CIRNAC notes that it is rather difficult to verify, from the topographical maps and for-construction drawings, if all waste disposal facilities, land-based activity, quarry sites, and locations of temporary contaminated soil storage cells, sumps and fuel caches are at least thirty-one (31) metres from the ordinary High Water Mark of any adjacent water body, as is required by Water Licence 8BC-EUR2131.

Recommendation:

(R-04) CIRNAC recommends that the topographical maps and for-construction drawings be revised to include information on the distances of waste disposal, land-based activity, quarry sites, and locations of all sumps and fuel caches from the ordinary High Water Mark of any adjacent water body.

ECCC #4: Response

The current sewage lagoon was constructed in 1974 under a different regulatory landscape and is located within thirty-one (31) metres of the ordinary high-water mark. As part of the wastewater treatment upgrades, the sewage lagoon will be converted to a retention pond for treated wastewater and will no longer be considered a component of the wastewater treatment process. ECCC confirms that all other disposal facilities, land-based activities, quarry sites, and locations of temporary contaminated soil storage cells, sumps and fuel caches are at least thirty-one (31) metres from the ordinary high-water mark.

CIRNAC #5: Additional types of waste generated

In Section 14 of Application for Water Licence Amendment, the two boxes marked for "Sludges" and "Contaminated soil and/or water", respectively, are not checked. The licensee also indicated that the proposed amendment does not change the types of waste to be generated or disposed.

CIRNAC notes that this licence amendment seeks to install a new packaged wastewater treatment plant, which, as noted in Comment #3 above, might generate sludge. CIRNAC also notes that contaminated soils have been identified at the site.

Recommendation:

(R-05) CIRNAC recommends that the licensee clarify if sludge from wastewater treatment plant and contaminated soils are or will be generated at the project site.

ECCC #5: Response

Hydrocarbon contaminated soils will not be generated as part of the undertaking. The hydrocarbon contaminated soils identified at the site are not waste; the intent is to remediate the soils in a landfarm.

Sludges will be produced as part of the undertaking (See ECCC #3 Response). There was an error in not selecting this box.

CIRNAC #6: *Proposed schedule for constructions*

This water licence amendment application proposes to "(1) upgrade of existing water storage and treatment systems including development of raw water storage reservoir and installation of new packaged wastewater treatment plant with peak flow capacity of 28 m^3/day and (2) development of grey water exfiltration trench to treat approximately 5 m^3/day of grey water."

The amendment application does not, however, include a clear schedule for the constructions of the raw water storage reservoir, the wastewater treatment plant, and the grey water exfiltration trench.

Recommendation:

(R-06) CIRNAC recommends that the licensee provide a schedule for the constructions of the proposed facilities.

ECCC #6: Response

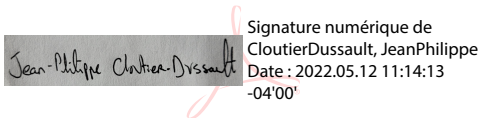
A schedule for construction of the water and sewage treatment facility and exfiltration trench is included in Attachment E of the Water Licence Amendment Application. In Summary:

- Raw Water Storage Reservoir

    - July 2 to September 9, 2022 – prepare granular berms for reservoir
    - July 1 to August 30, 2023 – Install piping in reservoir and install double wall HDPE liner
    - June 15 to August 30, 2024 – Fill the reservoir and install pump stations
- Grey Water Exfiltration Trench
    - July 2 to July 9, 2022
- Install Wastewater Treatment Plant
    - August 30, 2022 – Sealift wastewater plant to site
    - July 2023 – Install wastewater treatment plant
    - July to October 2023 – Startup and commissioning of wastewater plant

With the exception of personal information, all comments will become part of the public record.

Best Regards,



Jean-Philippe Cloutier-Dussault