

Environmental Protection Operations Directorate
Prairie & Northern Region
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ECCC File: 6200 000 001/011
NWB File: 3AM-IQA1626



July 17, 2020

via email at: licensing@nwb-oen.ca

Richard Dwyer
Manager Licensing
Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU X0B 1J0

Dear Richard Dwyer:

**RE: 3AM-IQA1626 – City of Iqaluit – City of Iqaluit Type A Water Licence Amendment
ECCC Technical Review Comments**

Environment and Climate Change Canada (ECCC) has reviewed the information submitted to the Nunavut Water Board (NWB) including the City of Iqaluit's (the Proponent) response to our May 6, 2020 Information request, regarding the above-mentioned water licence amendment.

ECCC's provides specialist advice based on our mandate pursuant to the *Canadian Environmental Protection Act* and the pollution prevention provisions of the *Fisheries Act*.

ECCC is providing the following technical comments:

1. Baseline Monitoring

Reference(s)

- Facility Monitoring Plan – Landfill and Waste Transfer Station (Dillon Consulting, January 2020)

Comment

Section 2.4 (Baseline Conditions) of the Facility Monitoring Plan provides details on a baseline conditions assessment of the Waste Transfer Station and the landfill conducted by Dillon Consulting for the City of Iqaluit in 2019. Although the Facility Monitoring Plan provides monitoring details and general results, it does not provide raw or summarized data. As well, the Facility Monitoring Plan does not state whether further baseline monitoring will be conducted.



ECCC Recommendation(s)

ECCC recommends that the proponent:

- Provide raw and summarized data (including field results, laboratory reports, a tabulated summary, and a comparison of monitored parameters to relevant guidelines) for the baseline conditions assessment of the Waste Transfer Station and landfill conducted by Dillon Consulting in 2019; and
- Clarify whether additional baseline monitoring is planned.

2. Un-bailed Waste

Reference(s)

- Method Statement of Construction – Landfill, Waste Transfer Station (WTS) and Road (Dillon Consulting; January 2020)

Comment

Section 5.0 (Landfill) of the Method Statement of Construction document describes that the landfill will accept municipal solid waste (MSW) and construction and demolition (C&D) debris within the same landfill and cell. Typically, the MSW is baled and wrapped in plastic. However, the design of the landfill will allow for the placement of unbaled MSW if there are operational issues at the Waste Transfer Station (WTS). Construction and demolition (C&D) debris, potentially shredded, will be placed in the landfill to “fill in” areas as the bales are placed. Section 5.2.7.1 (Daily and Intermediate Cover) of the same document states: “*The plastic wrapping of the bales functions as an alternative cover, eliminating the requirement for a soil-based daily or intermediate cover. As such, borrow material stockpile areas are not required*”.

ECCC notes that plastic is subject to degradation over time, and will not necessarily provide a long-term alternative cover.

In addition, the Method Statement of Construction does not discuss measures to ensure containment of unbaled C&D debris and any unbaled MSW within the landfill cell.

ECCC Recommendation(s)

ECCC recommends that:

- the proponent identify measures to ensure the containment of unbaled C&D debris and any unbaled MSW within the landfill cell.
- Contingency measures, such as potential cover sources, should be available to ensure containment of unbaled waste in the event of any extended or recurring operational issues at the Waste Transfer Station.

ECCC recommends that the proponent conduct an evaluation of the durability of the baled wastes’ plastic cover, which should include a discussion of alternative cover methods.

3. Acid Rock Drainage/Metal Leaching

Reference(s)

- Method Statement of Construction – Landfill, Waste Transfer Station and Road (Dillon Consulting; January 2020)
- Operations and Maintenance Manual (Revised Final) – Landfill and Waste Transfer Station, Version 3.0 (Dillon Consulting, January 2020)

Comment

Per Section 6.0 (Landfill Access Road) of the Method Statement of Construction document, a two-lane, gravel-surfaced road connecting the existing Qaqqamiut Road to the landfill site is to be constructed as a component of the landfill and WTS project. The road will also provide access to the Northwest Aggregate Deposit, situated to the west of the landfill property.

Section 8.3.2 (Waste Covering) of the Landfill Operations and Maintenance Manual, states that the placement of locally sourced aggregate cover over the waste bales is required only as a precursor to final landfill capping, and potentially as cover for non-typical waste material. Cover material required to support the landfill's operations, including bale/waste covering and final grading, is planned to be acquired from the Northwest Aggregate Deposit (Section 8.3.3 Cover Borrow Areas).

ECCC notes that project borrow sources should be tested for acid rock drainage/ metal leaching (ARD/ML) potential.

ECCC Recommendation(s)

ECCC recommends that:

- the proponent sample project borrow source locations in order to identify any ARD/ML potential that could affect water quality. Testing should be completed using static and kinetic methods to characterize representative units.
- The proponent should avoid quarry/units that are determined to have ARD/ML potential.

4. Leachate Treatment - Landfill

Reference(s)

- Method Statement of Construction – Landfill, Waste Transfer Station and Road (Dillon Consulting; January 2020)
- Leachate Treatment System Evaluation memo (Dillon Consulting; August 30, 2019)

Comment

Section 5.2.12 (Leachate Treatment System) of the Method Statement of Construction report states:

“Leachate will be collected via the landfill’s liner system and then pumped to the leachate collection facility.

On August 30, 2019, Dillon submitted a leachate treatment options evaluation memo to the City presenting several options for leachate treatment at the new landfill. At time of writing the City has elected to move forward with collection, containment, and characterization of the leachate during initial operation of the landfill. Preferable treatment methodologies will be based upon the volume of leachate generated and chemical characteristics of the leachate under regular operating conditions.”

ECCC notes that the options presented are limited to re-using some or all of the treatment system used to treat leachate resulting from the landfill fire (which may or may not still be functional), or to invest in a new system, for which the technology or treatment process has not been identified.

ECCC Recommendation(s)

ECCC recommends that:

- the proponent identify treatment options beyond the existing system, and determine the lead-time needed to install and commission the treatment system.

5. Leachate Retention Ponds

Reference(s)

- Physical and Biological Assessment – Proposed New Landfill Site, Iqaluit, NU (EXP Services Inc., October 2018)
- Operations and Maintenance Manual (Revised Final) – Landfill and Waste Transfer Station, Version 3.0 (Dillon Consulting, January 2020)

Comment

Section 4 (Conclusions and Recommendations) of the Physical and Biological Assessment states:

“Future climate trends for Baffin Island show a steady increase in temperature and precipitation... The median projection for precipitation in the 2010-2039 period is an annual increase of 6 percent over baseline climate (with a lower and upper range of 0 to 9 percent).... “

Section 4.2.5 (Leachate Management System) of the Operation and Maintenance (O&M) manual notes that the volume of the landfill retention ponds was established based on the objective of providing a minimum of two years of effluent and precipitation storage capacity. However, it is unclear whether the two years of storage capacity accounts for the upper range of the projected increase in precipitation.

ECCC Recommendation(s)

ECCC recommends that:

- the proponent clarify whether the leachate retention ponds would provide at least two years of effluent and precipitation storage capacity under the upper range precipitation projection scenario (i.e., annual increase of 9 percent over baseline climate).

6. Groundwater

Reference(s)

- Environmental Protection Plan (Revised Final) – Construction Phase – Landfill and Waste Transfer Station, Version 3.0 (Dillon Consulting, January 2020)
- Environmental Protection Plan – Operations, Closure and Post-Closure Phases (Revised Final) – Landfill and Waste Transfer Station, Version 3.0 (Dillon Consulting, January 2020)

Comment

Section 3.0 (Environmental Considerations) of both Environmental Protection Plans (EPPs) briefly describes the environmental considerations for this project, including wetlands and watercourses. The proponent did not identify groundwater as an environmental consideration for either of the EPPs. As landfill leachate has the potential to affect shallow groundwater quality, the project's interactions with and effects on groundwater should be considered.

ECCC Recommendation(s)

ECCC recommends that:

- the proponent revise the Environmental Protection Plans to include groundwater as an environmental consideration for this project.

7. Environmental Protection Plan Section 4.0 Mitigation Measures Tables

Reference(s)

- Environmental Protection Plan (Revised Final) – Construction Phase – Landfill and Waste Transfer Station, Version 3.0 (Dillon Consulting, January 2020)
- Environmental Protection Plan – Operations, Closure and Post-Closure Phases (Revised Final) – Landfill and Waste Transfer Station, Version 3.0 (Dillon Consulting, January 2020)

Comment

The erosion and sediment control mitigation measures specified in the Section 4.0 mitigation measures tables of both Environmental Protection Plans (EPPs) are not comprehensive. As the Erosion and Sediment Control Plan (ESC) will contain a greater level of detail than the mitigation tables, the ESC plan should be incorporated into the mitigation measures tables as a new measure.

ECCC Recommendation(s)

ECCC recommends that:

- the mitigation measures tables located in Section 4.0 of both Environmental Protection Plans (EPPs) each include a measure specifying that erosion and sediment control activities be conducted in accordance with the Erosion and Sediment Control Plan.

8. Environmental Protection Plan Section 5.0 Monitoring and Inspection

Reference(s)

- Environmental Protection Plan (Revised Final) – Construction Phase – Landfill and Waste Transfer Station, Version 3.0 (Dillon Consulting, January 2020)
- Environmental Protection Plan – Operations, Closure and Post-Closure Phases (Revised Final) – Landfill and Waste Transfer Station, Version 3.0 (Dillon Consulting, January 2020)
- Proponent Response to NWB – Comment sheet (June 2, 2020)

Comment

The Environmental Protection Plans (EPPs) do not describe any monitoring or inspection activities for this project. Section 5.0 (Monitoring and Inspection) of the EPPs appear to be a place-holder at this time. ECCC has previously recommended the proponent update Section 5.0 (Monitoring and Inspection) of both Environmental Protection Plans to specify the monitoring and inspection activities that will be conducted. The proponent has stated that reports will be updated for the 100% final submission of the EPP's, presumably prior to construction.

ECCC Recommendation(s)

ECCC recommends that:

- the proponent submit the monitoring and inspection sections of the Environmental Protection Plans prior to commencement of construction.

9. Total Suspended Solids/Turbidity Monitoring

Reference(s)

- Erosion and Sediment Control Plan – Landfill and Waste Transfer Station, Version 3.0 (Dillon Consulting, January 2020)

Comment

The Erosion and Sediment Control Plan provides no information regarding in-stream monitoring. If this project will involve in-stream construction, then the Erosion and Sediment Control Plan should provide applicable guidance, including appropriate mitigations and monitoring. The proponent should conduct total suspended solids (TSS)/turbidity monitoring during any in-stream works.

ECCC Recommendation(s)

ECCC recommends that the proponent:

- Conduct sediment monitoring in relation to any project disturbances in or near water (e.g., in-stream construction); and
- Conduct TSS/turbidity monitoring routinely during in-stream works, and identify thresholds and accompanying management actions in advance of such in-stream works.

10. Visual Monitoring

Reference(s)

- Facility Monitoring Plan – Landfill and Waste Transfer Station (Dillon Consulting, January 2020)

Comment

Section 3.1.1 (Visual Monitoring Plan) describes the visual inspections to be conducted during the operation and maintenance stage of the landfill. ECCC notes that the proponent should increase the visual monitoring frequency during periods of high runoff, given the increased potential for erosion and the increased volume of leachate to manage at such times.

ECCC Recommendation(s)

ECCC recommends that:

- the proponent increase the frequency of visual monitoring during and following freshet and major rainfall events, particularly with respect to monitoring for signs of erosion and monitoring the capacity of the leachate holding ponds.

11. Landfill Surface Water Monitoring

Reference(s)

- Facility Monitoring Plan – Landfill and Waste Transfer Station (Dillon Consulting, January 2020)

Comment

Section 3.5.1 (Surface Water Monitoring Plan) of the Facility Monitoring Plan discusses the surface water sampling parameters. ECCC notes that the proponent should add TSS and phenols to the parameter list.

ECCC Recommendation(s)

ECCC recommends that:

- the proponent add TSS and phenols to the surface water monitoring parameters listed in Section 3.5.1 (Surface Water Monitoring Plan) of the Facility Monitoring Plan.

12. Groundwater Monitoring

Reference(s)

- Facility Monitoring Plan – Landfill and Waste Transfer Station (Dillon Consulting, January 2020)

Comment

Section 3.7 (Active Layer Groundwater Monitoring) of the Facility Monitoring Plan identifies the groundwater monitoring parameters. ECCC notes that dissolved metals should be added to the parameter list. As well, this section should describe how the proponent will assess the groundwater monitoring results, for instance in comparison to guidelines or other metrics.

ECCC Recommendation(s)

ECCC recommends that the proponent:

- Include the monitoring of dissolved metals, in addition to total metals, for groundwater samples; and
- Incorporate a description of how the groundwater monitoring results will be assessed (for example, compare results to baseline sample concentrations, applicable license requirements and recognized groundwater guidelines) into Section 3.7 (Active Layer Groundwater Monitoring) of the Facility Monitoring Plan.

13. Effluent Discharge

Reference(s)

- Facility Monitoring Plan – Landfill and Waste Transfer Station (Dillon Consulting, January 2020)

Comment

Per Section 3.9 (Effluent Discharge Limits) of the Facility Monitoring Plan:

“No discharge of effluent is anticipated to occur with site activities. Should seepage be identified or discharge events occur, the sample results will be compared against water quality criteria as defined under the Licence. Should it be determined that storage volumes within the ponds are nearing design capacity, the City, in consultation with the Nunavut Water Board, will access contingency actions including transporting quantities of effluent via pumper truck from the site to either the West 40 landfill (e.g., controlled discharge through the existing waste mass) or the City’s WWTP. As secondary contingency (to be implemented only with the approval of NWB), a valved discharge manhole at the second storage pond will allow for the controlled release of effluent to a gravel bed diffuser. The implementation of the secondary contingency measure will necessitate additional surface water monitoring requirements at the Landfill site”.

ECCC Recommendation(s)

ECCC recommends that:

- the proponent characterize the effluent to determine compatibility with the wastewater treatment process prior to transporting effluent to the City’s Waste Water Treatment Plant (WWTP). The proponent may need to implement alternative small-scale treatment if effluent quality would render the options discussed unacceptable.

14. Leachate Management Landfill

Reference(s)

- Operations and Maintenance Manual (Revised Final) – Landfill and Waste Transfer Station, Version 3.0 (Dillon Consulting, January 2020)

Comment

Per Section 4.2.5 (Leachate Management System) of the O&M manual:

“The Landfill’s leachate management system includes a leachate collection layer/piping within the cell liner, a collection sump with extraction manhole, a portable pump complete with discharge hosing/discharge piping, a retention pond and future bioreactor pond. Acknowledging significant uncertainties regarding the quality and quantity of leachate that will be generated by the landfill (e.g., the unique situation of having plastic wrapped waste bales in an arctic setting), the initial leachate management system will consist of collection and storage infrastructure only. The volume of the ponds has been

established based (conservatively) with the objective of providing a minimum of two years of effluent and precipitation storage capacity. By assessing generation rates and effluent characteristics during the initial operational period of the landfill, it is believed that a treatment system appropriate to the unique conditions of the City of Iqaluit site can be designed and subsequently installed as part of a future initiative.”

According to Section 12.2 (Landfill) of the O&M manual,

“the two ponds have been designed to provide approximately two years of [leachate] storage.... Should it be determined that storage volumes within the ponds are nearing design capacity, the City, in consultation with the NWB, will access contingency actions including transporting quantities of effluent via pumper truck from the site to either the West 40 landfill (e.g., controlled discharge through the existing waste mass) or the City’s WWTP. As a secondary contingency (to be implemented only with the approval of NWB), a valved discharge manhole at the second storage pond will allow for the controlled release of effluent to a gravel bed diffuser. It is acknowledged that it is anticipated that implementation of the secondary contingency measure will necessitate additional environmental effects (e.g., surface water) monitoring requirements at the Landfill site”.

ECCC Recommendation(s)

ECCC recommends that the proponent:

- Provide details for assessing landfill leachate/effluent characteristics; and
- Include a summary in the annual report of the landfill leachate management system, including leachate generation rates, leachate/effluent characteristics, holding pond capacity, and an update on leachate management/treatment.

15. Leachate Management – Waste Transfer Station

Reference(s)

- Operations and Maintenance Manual (Revised Final) – Landfill and Waste Transfer Station, Version 3.0 (Dillon Consulting, January 2020)

Comment

Section 12.1 (Waste Transfer Station) of the O&M manual states:

“Leachate within the WTS is generated during the waste baling process, as liquid is squeezed out of the waste mass. This liquid is collected via a shallow trench in the slab around the perimeter of the baling unit, with the effluent subsequently being pumped to a holding tank on the WTS floor. As required, this liquid is collected and transported to the City’s WWTP for treatment.”

ECCC Recommendation(s)

ECCC recommends that the proponent:

- Provide secondary containment for the leachate holding tank;

- Characterise the WTS leachate to determine compatibility with the wastewater treatment process prior to transporting leachate to the City's WWTP;
- Track the WTS leachate generation rates/volumes and treatment/disposal details; and
- Report the WTS leachate generation rates/volumes, treatment/disposal details, and characterization results in the annual report.

16. Liner Instillation Timing and Planning

Reference(s)

- Operations and Maintenance Manual (Revised Final) – Landfill and Waste Transfer Station, Version 3.0 (Dillon Consulting, January 2020)

Comment

Section 7.2 (Liner Installation Sequence) of the O&M manual states:

“The overall defined landfill footprint to accommodate 75 years of operation is approximately 22 ha in size. Within that footprint, a total of 12 disposal areas or cells (to be confirmed during the course of site development) have been identified. The first designated [lined] cell in the overall sequence, Cells 1, is scheduled for installation during the 2021 and 2022 constructions seasons.

Timing the installation requirement for the next lined area in the sequence is critical. Installation can only be practically completed during the non-winter months and adequate time must be allotted for the development of design documents, tendering and delivery of construction materials. The calculation to determine this timing is linked to defined bale placement requirements.”

Section 7.2 describes the installation timing calculation used to determine when the design and installation of the next lined disposal area in the sequence should be initiated. If it is determined that inadequate space is available to serve operations until late the following summer (i.e., August), then the proponent needs to initiate actions towards the design and installation of the next lined disposal area in the sequence.

ECCC Recommendation(s)

ECCC recommends that the proponent provide in the annual report:

- An update on the capacity of the landfill cell currently in use, including the installation timing calculation (inputs and result); and
- Discuss the required actions/schedule for the design and installation of the next lined disposal area in the sequence (i.e., development of design documents, tendering and delivery of construction materials, installation).

17. New Technology /Lessons Learned

Reference(s)

- Executive Summary document (April 2020)
- Method Statement of Construction – Landfill, Waste Transfer Station and Road (Dillon Consulting; January 2020)
- ECCC communication with City of Yellowknife (July 15, 2020)

Comment

This project involves the stage 1 construction (cell 1 and ancillary components to meet requirements for the first 5 years of operation) and the operation of an engineered balefill/ landfill and waste transfer station that are designed to serve the City of Iqaluit's near and long-term (75 years) municipal solid waste disposal needs.

ECCC notes that landfilling of baled waste is not a proven technology for Canada's arctic environment. Further, ECCC has recently become aware of ongoing challenges with the baling facility located in Yellowknife, including generation of substantial quantities of poor quality leachate, management and disposal of leachate, and challenges with operation of the machinery including down time for repairs and maintenance. Due to these issues, the City of Yellowknife has recently changed their baling facility into a recyclables-only operation and is now compacting waste in the landfill cells as a better alternative.

In the same context, Iqaluit will likely experience very similar in challenges with operating a baling facility. It is important to incorporate lessons-learned from Yellowknife's experience and identify management options to address potential issues.

ECCC Recommendation(s)

ECCC recommends that the proponent:

- Identify and describe measures to prevent/mitigate the challenges described above(i.e., substantial volumes of poor quality leachate, down time during mechanical breakdowns and for maintenance), and discuss their anticipated effectiveness;
- Describe how the effectiveness of these prevention/mitigation measures will be monitored; and
- Document lessons-learned to inform subsequent stages of construction and operation.

If you need more information, please contact Eva Walker at (867) 669-4744 or Eva.Walker@Canada.ca.

Sincerely,

A handwritten signature in black ink, appearing to read "Margaret", with a long horizontal flourish extending to the right.

Margaret Fairbairn, Regional Director
Environmental Protection and Operation Directorate Prairie and Northern Region

cc: Jody Small, Acting Head, Environmental Assessment North (NT and NU)