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-IQA1626

November 26, 2020

Our file - Notre référence
CIDM#1291246

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 Review of the City of Iqaluit's Pre-Hearing Conference Commitments regarding the Amendment Application for Water Licence #3AM-IQA1626 for New Solid Waste Disposal Facilities

Dear Mr. Dwyer,

Thank you for the October 19, 2020 invitation for interveners to comment on the Pre-Hearing Conference Commitments provided by the City of Iqaluit as part of the above referenced application. The Water Resources Division of Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) examined the submissions 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 Bridget Campbell at bridget.campbell@canada.ca.

Sincerely,

Bridget Campbell
Water Management Coordinator

Canada

Crown-Indigenous Relations and Northern Affairs Canada | Relations Couronne-Autochtones et Affaires du Nord Canada

Technical Review Memorandum

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

From: Bridget Campbell, Water Resources Coordinator, Water Resources Division, CIRNAC

Date: November 26, 2020

Re: Crown-Indigenous Relations and Northern Affairs Canada's Review of the City of Iqaluit's Pre-Hearing Conference Commitments regarding the Amendment Application for Water Licence #3AM-IQA1626 for New Solid Waste Disposal Facilities

Region: ☐ Kitikmeot ☐ Kivalliq ☒ Qikiqtani

A. BACKGROUND

The City of Iqaluit (the City) holds Type "A" Nunavut Water Board (NWB) Water Licence 3AM-IQA1626, which allows for water withdrawal, wastewater release, and solid waste disposal for municipal purposes. The licence permits the City to extract water from Lake Geraldine and Apex (Niaqunngut) River and covers the operation of the water treatment plant, the wastewater treatment plant, and the West 40 landfill. Iqaluit is located in southern Baffin Island on Frobisher Bay.

The West 40 landfill is nearing capacity and the City requires another landfill to meet its solid waste disposal needs. The amendment application under review is to construct and operate a new solid waste treatment facility (landfill) approximately 6km northwest of the city and a waste transfer station (WTS) within the City's industrial area.

Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) submitted information requests on May 6, 2020 as part of the completeness check. The City of Iqaluit (City) responded on June 2, 2020. Based on those responses, CIRNAC determined that it was ready to move to the Technical Review stage of the application process and submitted Technical Review Comments on July 17, 2020.

CIRNAC presented its concerns and recommendations, and the City provided responses and commitments to resolve the concerns, at the Technical Meeting and Pre-Hearing Conference (TM-PHC) held on September 17 and 23, 2020, respectively. These are recorded in the TM-PHC List of Issues (NWB, September 23, 2020) and List of Commitments (NWB, September 23, 2020). The City provided three submissions to respond to the List of Issues on October 2 and October 9, 2020. A list of documents submitted and reviewed is provided in Section B. Full comment details are provided in Section C. Further references are in Section D.

B. DOCUMENTS REVIEWED

Table 1: Documents Reviewed as part of the Original Application

Attachment	Document Title	Author, File No., Rev., Date
Main Document	Type "A" Water Licence Amendment Application Form	Blue Star Gold Corps., 07-04-2020
Block 5	Topographic Map	Blue Star Gold Corps., 13-03-2020
Block 7	Nunavut Planning Commission Determinations	Nunavut Planning Commission, 03-12-2018
Block 8	Notice of Release of Screening Decision Report	Nunavut Impact Review Board, 13-09-2019
Block 8	Nunavut Impact Review Board Screening Decision Reports	Nunavut Impact Review Board, 13-09-2019
Block 9	Iqaluit Closure and Decommissioning Plan	Dillon Consulting, 01-2020
Block 9	Landfill Engineering Drawings	Dillon Consulting, 24-01-2020
Block 9	Waste Transfer Station Engineering Drawings	Dillon Consulting, 10-2019
Block 9	Method Statement of Construction Report	Dillon Consulting, 01-2020
Block 9	Waste Transfer Station and Landfill Facility Monitoring Program	Dillon Consulting, 01-2020
Block 9	Waste Transfer Station and Landfill O&M Manual	Dillon Consulting, 01-2020
Block 17	Environmental Management Plan	Dillon Consulting, 01-2020
Block 17	Environmental Protection Plan - Operations, Closure and Post-Closure Phases	Dillon Consulting, 01-2020
Block 17	Environmental Protection Plan - Construction Phase	Dillon Consulting, 01-2020
Block 17	Erosion and Sediment Control Plan	Dillon Consulting, 01-2020
Block 20	Solid Waste Management Project Public Consultation Report	City of Iqaluit, 12-2018
Block 23	Preliminary Geotechnical Investigation Report	EXP Services Inc., Rev. 1, 28-01-2020
Block 23	Physical and Biological Assessment	EXP Services Inc., 10-2018
Block 23	Compliance Assessment and Status Report	City of Iqaluit, 09-04-2020
	Executive Summary	City of Iqaluit, 09-04-2020
	Supporting Submission For Application to Amend Type A Water Licence 3AM-IQA1626	City of Iqaluit, 04-2020
	Emergency Response Plan	Dillon Consulting, 24-01-2020
	ICIP - Climate Lens – Greenhouse Gas Mitigation Assessment	Dillon Consulting, 10-2019
	ICIP - Climate Lens – Resiliency Assessment Report	Dillon Consulting, 10-2019

Table 2: Documents Reviewed as part of the Pre-Hearing Conference Commitments

Attachment	Document Title	Author, File No., Rev., Date
Main Document	MEMO to the City of Iqaluit Re: July 2020 Regulator (ECCC/CIRNAC) Comments - Responses	Keith Barnes, P.Eng., Dillon Consulting, File No. 19-9543, October 2, 2020
Addendum A	Regulator Commitments Status, 2 October 2020	
Appendix B	Regulator Commitments Response Package, 2 October 2020	
Main Document	West 40 Closure Memo to Alan Rustom MClArb, BEng,MSc, Med, Colliers Project Leaders Re: Water License Amendment	Jim Clare, RET, AECOM Canada Ltd., File No. 60609125 (470), September 30, 2020
Main Document	MEMO to the City of Iqaluit Re: July 2020 Regulator (ECCC/CIRNAC) Comments – Responses October 9	Keith Barnes, P.Eng., Dillon Consulting, File No. 19-9543, October 9, 2020
Addendum A	Regulator Commitments Status, 9 October 2020.	
Addendum B	Regulator Commitments Response Package, 9 October 2020.	

C. RESULTS OF REVIEW

On behalf of CIRNAC Water Resources, the following comments and recommendations were provided for the Nunavut Water Board's consideration. A list of the comment topics and resolution status of recommendations is compiled in Table 3 below. Many of the comments integrate material developed by Tetratech Canada Inc., whom CIRNAC hired as consultants for this review.

Table 3: Recommendation Topics and Resolution Status

Recommendation	Topic	Resolution
1	Reclamation of West 40 Landfill	Resolved
2	Runoff from Baled Waste at Transfer Station	Partially Resolved
3	Landfill Leachate Treatment	Unresolved
4.1	Landfill Leachate Collection	Partially Resolved
4.2		Unresolved
4.3		Resolved
4.4		Partially Resolved
5.1	Surface Water Management at Landfill	Partially Resolved
5.2		Resolved
5.3		Partially Resolved
6	Fencing	Partially Resolved
7.1	Permafrost Considerations	Unresolved
7.2		Partially Resolved
7.3		Partially Resolved
7.4		Unresolved
8	Waste Transfer Station Geotechnical Report	Unresolved
9	Landfill Design Drawings	Partially Resolved
10.1	Operations	Partially Resolved
10.2		Partially Resolved
10.3		Partially Resolved
10.4		Resolved

1. Reclamation of West 40 Landfill

Resolved:
The water licence amendment application included the submission of a reclamation plan for the future landfill and waste transfer station. CIRNAC did not find further information on reclamation plans for the current West 40 landfill and noted that an update timely would be, as the most recent iteration of the plan provided in 2014 lacks some details typically present in a final closure plan. CIRNAC recommended that the City provide an update on plans for reclaiming the West 40 landfill including an estimated schedule for reclamation work and details on site drainage.

The City responded that landfill is currently filling to a proposed final design elevation that has been established to provide the City with disposal capacity until the new facilities are fully operational. The City also stated that surveys have been recently conducted and confirm that the landfill will have capacity until 2022/2023, at which time the City expects that the final closure report and design for the West 40 landfill will be developed, and the facility closed and decommissioned. CIRNAC finds that this timeline is acceptable to resolve the indicated concern.

Recommendation:
CIRNAC recommends that an amended licence include a condition for the applicant to provide the final closure design report, including details pertaining to site drainage, within one year of closure of the West 40 landfill and more than a year prior to undertaking reclamation work.

2. Runoff from Baled Waste at Transfer Station

Partially Resolved:
The Waste Transfer Station and Landfill Operation and Maintenance (O&M) Manual outlines how waste will be baled and covered in plastic at the waste transfer station. Additionally, the 0.25% grades, presented in the Waste transfer station Design Drawings – 90% submission drawing LF-C01, appear to be insufficient to ensure overland flow, which might lead to ponding. Leachate and surface water in contact with the bales could potentially be contaminated and CIRNAC was unable to find any reference to what would be done to contain and manage this water.

CIRNAC recommended the applicant provide rationale for not controlling leachate and contact water from the bale storage area at the waste transfer station, and how they will ensure proper drainage. The City responded that drawings would be revised in the 100% submission to include asphalt pad, asphalt curbing to control runon and runoff, and the sump. The drainage plan for the transfer station site is described in Section 12.1 of the Operations and Maintenance (O&M) Manual (Dillon Consulting, Rev. 4, October, 2020, pg. 240). This partially resolves the indicated concern concerning drainage.

The concern regarding the control of leachate and contact water from the bale storage area at the waste transfer station is not resolved as drawing C04 does not show the sump as described.

The O&M Manual (Dillon Consulting, Rev. 4, October, 2020, pg. 240) suggests that unbaled waste may be placed in a pocket constructed within the balefill. This raises another concern as it appears that this may occur over baled waste, resulting in baled and unbaled wastes being mixed in the same cells with equipment operating directly on baled waste. If this is the case, it is not clear how the integrity of the bale wrap will be maintained.

Recommendations:

i. CIRNAC recommends that the City clarify whether the sump is shown in other drawings, and if so, direct CIRNAC to the relevant drawing(s).
ii. CIRNAC recommends that the NWB include a condition in amended water licence to require that all water collected from the transfer station floor, produced by baling operations or by waste storage, be treated as leachate rather than being discharged to offsite drainage systems.
iii. CIRNAC recommends that the City clarify whether there is a strategy for separating baled and unbaled waste, and if not, how the integrity of the bale wrap will be maintained.
iv. CIRNAC recommends that the NWB include a condition in an amended water licence to require that the City review the O&M Manual on an annual basis, and make revisions to the O&M Manual based on any changes to operational practices that vary from the current iteration or version of the manual, derived from operational experience gained with the balefill.

3. Landfill Leachate Treatment

Unresolved:

Given the novelty of a landfill using plastic wrapped bales in an arctic environment, CIRNAC acknowledges the quantity and quality of leachate that will be generated is uncertain and it is therefore difficult to design an effective and efficient way of treating the leachate. Several options were discussed in the application documents submitted by the City and it was not clear where the current position was. CIRNAC recommended that the applicant clarify what the current position is for treating landfill leachate and the factors that led their decision.

The City responded that they plan to hold leachate in new engineered lagoons for up to two years, samples will be taken to monitor its quality, and if leachate is found to exceed discharge limits set by the NWB, then additional treatment will be designed and installed, such as aeration to the lagoons, metal precipitation and filtration. It was still unclear whether treated leachate would be discharged to the environment, and CIRNAC recommended that the City monitor and report on the leachate before the ponds become full, and implement any treatment methodologies within one year of a decision of a need for treatment. The City's October 2020 response indicated that over the first

two years of landfill operation leachate quality may be such that direct discharge to the environment may be possible and practiced, or that leachate could be trucked to the WWTP.

The management/treatment process developed based on the first two years of operation may not be adequate for leachate generated in ten or twenty-years' time Leachate produced during the first two years of operation may have low concentrations of measurable parameters compared to leachate that would be generated once more waste is in place, as the waste to runoff ratio will likely increase over time due to factors such as increasing waste mass, deterioration of the balefill wrap and changes in waste materials. As such, monitoring of leachate quality and planning for an adequate management strategy would be more effective if implemented as an ongoing adaptive process rather than a process that is completed after a two-year period of observation.

In a worst case scenario in which the leachate cannot be discharged to either the environment or the WWTP, a two year holding period may pose a problem as this would require construction of a treatment plant in Year 2. Although this scenario is assumed to be low risk, it is not clear what the proposed leachate management strategy will be if the leachate lagoons reach capacity, a plant is not ready in time to treat the stored leachates, and discharge to environment and WWTP are not possible.

Recommendation:

i. CIRNAC recommends that that the NWB include a condition in an amended water licence to require the City conduct ongoing monitoring of quality and leachate levels, that discharge events are recorded if and when they occur (volume, leachate quality), and that results be reported as part of the Annual Report.

ii. CIRNAC recommends that the City provide a status update on whether current leachate management is expected to be adequate for the future based on leachate quality trends to date as part of each Annual Report.

4. Landfill Leachate Collection

A robust leachate collection system is critical with regard to environmental protection and reducing future liability as it ensures continued leachate removal from the landfill into the post closure period, reducing head on the liner system and thus potential for uncontrolled discharges into the environment underneath the landfill. The design drawings submitted for the landfill in the 90% submission and the Method of Construction Statement Report were missing several elements which should be incorporated in final documents. CIRNAC recommended the applicant provide more detail on the leachate collection system, including: 4.1) leachate collection pipes; 4.2) leachate sump and manhole; 4.3) liner installation; and 4.4) cell 10 leachate collection.

4.1 – Partially Resolved:
CIRNAC noted during the Technical Meeting that the responses provided by the City seemed to indicate leachate will still flow to sumps from cells far away from those sumps, and it was unclear how this would work once the landfill is closed. The City responded by providing updated Drawings LF-C14 and LF-C15 to offer more details on the leachate collection pipes. CIRNAC also reviewed Drawing LF-C11, submitted as response to CIRNAC 4.2 (leachate sump and manhole).

Drawing LF-C11 shows a 4m wide strip for Cell 1 only on the east and north side. The gravel layer under the waste and the waste mass itself are assumed to freeze up during winter months and will likely remain frozen once sufficient waste has been placed. Any leachate therefore has to flow along the surface or through the waste, particularly in the long-term.

Based on the responses and drawings provided, CIRNAC has the following concerns:

a. Leachate Overflow: The space between the berm and waste do not appear to be large enough to prevent overtopping of leachate during freshet or a larger precipitation event. It is not clear what happens to the leachate when this area is being filled in.
b. Leachate Ponding: Leachate is expected to be removed from two locations only in the long-term. For leachate to flow to these locations, during the summer months and initial operation of a cell, the gravel drainage layer may be available and could possibly freeze up. Leachate may accumulate if it cannot drain via the gravel layer. It is not clear how the City plans to remove accumulated leachate prior to landfill closure, nor is it clear how it intends to maintain the gravel layer so it remains unfrozen, as biodegradation of baled waste, and therefore heat generation, is likely to be limited.
c. Leachate Removal: It is possible that sumps will fill up with water (ice) and potentially litter, which could pose challenges to leachate removal. The pipe system has a risk of freezing up if not drained properly and it is most needed during spring; it would be very difficult to remove any blockage at that time of year.

The leachate collection system presented appears to be complex; with complexity comes an increase in potential points of failure. Whatever system is in place will need to be robust and resilient to function reliably, particularly during freshet when environmental risk is highest.

Recommendation:

i. CIRNAC recommends that the City consider leachate collection system designs that focus on robustness and resiliency, so it can work during freshet when environmental risk is highest.
ii. CIRNAC recommends that the O&M Manual provide guidance on how leachate may flow and which areas should not be obstructed.

4.2 – Unresolved:
CIRNAC expressed that the key concern is a low point in which leachate can accumulate remaining after sump or manhole removal and specifically requested that the City clarify how the sump will be removed. The City responded by providing updated Drawings LF-C11 and LF-C16 to offer more details on the leachate sump and manhole.

The updated drawings now show a note that the sump will need to be removed. It is still not clear how the sump would be removed to ensure leachate flow to the sump in Cell 4, nor is it clear what led to the choice of placing a manhole in Cell 1. Based on the responses provided in recommendation 4.1, little flow is expected within the leachate collection drainage layer and most of the flow would be at surface once waste has been placed.

Recommendation:
CIRNAC recommends that the City clarify the rationale for placing a manhole in Cell 1, and how the sump will be removed to ensure leachate flow to the sump in Cell 4.

4.3 – Resolved:
In its response, the City proposed typical types of geotextile for landfill and road construction applications (Type A: 6 oz, Type B: 12 oz, and Type C: 28 oz). Based on the drawing set dated May 2019, and on selected drawings provided in the October submission, the type of geotextile to be used is not definitive in all details. The type of geotextile chosen should be of an appropriate thickness/weight to offer adequate protection of the geomembrane. CIRNAC is concerned that Type A geotextile may not be robust enough to provide adequate protection.

Recommendation:
CIRNAC recommends that the City ensure that the type of geotextile used be of an appropriate thickness/weight to offer adequate protection of the geomembrane.

4.4 – Partially Resolved:
The City provided updated drawings LF-C17 and LF-C19 as part of the October 9 submission, which show leachate collection in Cell 10. Based on Drawing LF-C16, which was provided in response to CIRNAC recommendation 4.2 (leachate sump and manhole), the low point in cell 10 to the north of the sump is still in place. Two elevations have been annotated on Drawing LF-C16 and it is unclear what they show.

Recommendation:
CIRNAC recommends that the City clarify the significance of the elevations which are annotated in Drawing LF-C16, and clarify whether the low point in cell 10 to the north of the sump is still in place.

5. Surface Water Management at Landfill

Surface water management at landfills is important to prevent run-on to landfill cells and operating areas by conveying clean off-site runoff around the site and to manage site run-off such that it does not cause damage at the point of release. It is also important to avoid erosion of built up berms to prevent structural damage to landfill cells or roads. Several elements were missing or unclear from the 90% submission design drawings for the landfill, submitted as part of the original application package, including: 5.1) surface water ponding; 5.2) stormwater berm in cell 1; and 5.3) erosion control features.

5.1 – Partially Resolved:
CIRNAC recommended that the City provide details on surface water ditching on north side of Cell 1 to convey drainage. The City responded by providing Drawing C-04, which does not show north side of cell. Other drawings appear to indicate routing of flow, but there is no clear indication that a ditch or swale would be constructed. CIRNAC would find it more helpful if the City provided the entire drawing set as a single document for review purposes.

Recommendation:
CIRNAC recommends that the City provided the entire drawing set as a single document.

5.2 – Resolved:
CIRNAC recommended that the City provide information on the stormwater berm in Cell 1. Specifically, if the berm is temporary, information on the design intent for removal of the berm, and if the berm is permanent, how filling of bales should occur at the berm location. The City responded by adding a note to the relevant drawings indicating the berm is temporary and to be removed by the Owner prior to waste being placed in that location. This resolves the indicated concern.

5.3 – Partially Resolved:
CIRNAC recommended that the City provide rationale for why erosion control features were not deemed necessary in the sediment traps along the west side of west access road, nor along the south side of south access road. The City responded that the flow would be captured by the northern most sediment trap on the east side, resolving this portion of the concern.

CIRNAC also requested rationale for why erosion control features were not deemed necessary in the fibre rolls and silt fence on both sides of Leachate lagoon road. The City responded by providing an updated surface water management drawing (LF-C03) as part of the October 9 submission. Based on CIRNAC's review of Drawing LF-C03, it is still unclear why erosion control features were not deemed necessary on both sides of the leachate lagoon access road. It appears that this area drains off-site; CIRNAC is

concerned that silt and/or sediment leaving the site in this location could clog up drainage pathways off site.

In addition, CIRNAC notes that it is unclear how surface water north of the west perimeter is managed. Sediment traps were added on the south side of the south access road as well as on the west side of the west access road. Runoff collected on either side of the west access road appears to be conveyed around the landfill cell in a ditch that is indicated on LF-C03. It is not clear how erosion and sediment control is implemented in the area immediately to the north of where the west access road ends, as sediment traps are shown to the north of where this ditch commences, and the ditch appears to end without any erosion and sediment control. Runoff exiting this ditch appears to flow overland to the north ditch of the south access road and into the sediment basin from there.

Recommendation:
CIRNAC recommends that the City provide rationale for why erosion control features were not deemed necessary on both sides of the leachate lagoon access road, and clarify how the runoff north of the end of the west access road is captured and conveyed.

6. Fencing

Partially Resolved:
The landfill design drawings provided as part of the original submission did not provide an indication of which areas of the landfill will be fenced. CIRNAC recommended that the City provide clarification on where fencing and gates are to be installed and procedures for gate closures. If no fencing is planned, CIRNAC recommended that the City provide details on how wildlife and general public will be restricted from access and any response procedures if the public or wildlife access the site.

The City responded by providing an updated Operation and Maintenance Manual. Section 2.1.2 describes site security; details include fence locations and end of the day gate closure at the landfill and the Transfer Station. This information resolves part of the indicated concern.

The City also provided Drawing LF-C03 which shows a gate and fencing at the entrance of the landfill site. This gate and fencing at the entrance is more clearly shown on drawing LF-C04. Drawing LF-C11 shows fence and gate around Cell 1. The drawings do not include a fence reference or legend to show the fence locations around the entire site. No drawing provided demonstrates fencing around the leachate ponds. The landfill cell appears to be sufficiently fenced to prevent public access, and to prevent wildlife from entering the cells. The leachate ponds appear to remain unfenced and pose a risk to wildlife becoming trapped.

Recommendation:
CIRNAC recommends that the City implement a strategy to prevent wildlife from entering the leachate ponds.

7. Permafrost Considerations

It was unclear from the original submission how permafrost is being addressed in the design, construction, and operation of the facility.

7.1 – Unresolved:
CIRNAC recommended that the City clarify the construction methodologies that will be used to minimize impact on permafrost, and the design approach, recognizing the geotechnical and permafrost conditions that exist at the landfill site. The City responded that best practices can be found in the CSA PLUS 4011:19 Technical Guide. The City did not provide design reports, construction drawings, or construction specifications indicating how the design and construction will minimize impact on permafrost due to construction activities. CIRNAC finds this comment unresolved.

Recommendation:
CIRNAC recommends that the City provide design reports, construction drawings, or construction specifications that demonstrate how the design and construction will minimize impacts on permafrost.

7.2 – Partially Resolved:
CIRNAC recommended that the City describe permafrost conditions at the proposed leachate pond location and explain how permafrost conditions have been addressed in the design, construction and operation of the ponds. The City responded that “The construction of leachate ponds have been designed to avoid cuts into the active layer and placed over a thick gravel pad on a bedrock base, minimizing potential for impact to permafrost” (Response Package, October 9, 2020, pg 291).

Drawing LF-C06 shows a cross section through the leachate ponds and then a section of the existing grades along a different location. The section suggests that the leachate ponds will be excavated into the original ground.

Drawing LF-C13 provides a cross section which shows the lagoons constructed above grade. The cross section does not show an elevation profile for the existing ground surface and for the top of bedrock, nor is it clear whether the overburden will it be excavated or left in-place, or whether the leachate lagoons road will be constructed by excavating into the original ground as indicated in Drawing LF-C06.

Recommendation:
CIRNAC recommends that the City clarify whether the leachate ponds have been designed on fill only pads with no cuts into the original ground within the footprint of the lagoons.

7.3 – Partially Resolved:
CIRNAC recommended that the City describe the rationale for thermistor locations and how they will monitor ground temperature changes within and below the facilities. The City responded that the original thermistor locations were designed to provide a baseline assessment of the site without drilling conduit holes in locations where bales and drainage paths may be influenced. The City intends to place thermistors at the cells, the lagoons, and the Waste Transfer Station, to assess the permafrost conditions once the final arrangement is confirmed. The City does not intend to monitor temperatures below the access road. The City refers to updated drawings LF-C09 and LF-C13. The information provided resolves the indicated concern, and presents new concerns regarding the collection and use of long-term monitoring data.

Recommendation:
CIRNAC recommends that that the NWB include a condition in an amended water licence to require that the City provide its plan for long-term ground temperature monitoring for the facility, once the thermistor locations in the final design are decided. This plan should include the design locations of the thermistor string installations, the purpose of collecting round temperature data, and how the data will be used for operating the facility.

7.4 – Unresolved:
CIRNAC recommended that the City explain why it was not deemed necessary to consider heat generation from decomposing municipal waste in the thermal modelling of the landfill. The City responded that little is known regarding heat generation from decomposing municipal bale waste (high density) in a northern climate, and that the conditions require the presence of oxygen, which will be limited due to the wrapping of the waste bales with linear low-density polyethylene (LLDPE).

The City's mitigation plan for an event in which heat is generated from decomposing municipal bale waste has not been provided. It is not clear how the proponent intends to ensure that the wrapped waste bales will remain intact. Damaged bales have a risk of being exposed to oxygen over the long term before the bales are buried. Ultraviolet light, climatic conditions and wildlife, for example, pose risks to the integrity of the LLDPE wrapping material.

Recommendation:
CIRNAC recommends that the City provide a mitigation plan for an event in which heat is generated from decomposing municipal bale waste, as part of the long-term ground temperature monitoring plan recommended in comment 7.3.

8. Waste Transfer Station Geotechnical Report

Unresolved:
CIRNAC was unable to locate the report titled “City of Iqaluit Geotechnical Investigation Proposed Waste Transfer Station Lots 3586 228/17/18/20 and 3480 220 1 Iqaluit, Nunavut, October 2018” referred to in the Method Statement of Construction Report, and recommended that the City identify where this report can be found. The City has yet to provide the Waste Transfer Station geotechnical report. This Commitment remains outstanding.

9. Landfill Design Drawings

Partially Resolved:
The design drawings for the landfill, as presented in the 90% submission, did not include information pertaining to cuts in rock and overburden, or to ditches. CIRNAC recommended that the City clarify the construction methodology for cuts and ditches at the landfill. The City responded in the Response Package from October 9, 2020 (pg. 291) that “Cuts will be minimized and insulation utilized where possible to prevent heat transfer to permafrost. Future design may be adjusted based on knowledge gained during temperature monitoring from thermistors placed within the active cell.”

It is not clear from this response what the approach will be for protecting the permafrost during excavation (cutting and digging). The Design Engineer is obliged to provide specific construction drawings and specifications (construction direction) to the Contractor for what will be constructed. This includes required construction practices, and what will not be permitted specific to mitigating permafrost degradation and environmental impacts. CIRNAC (suggests) that this information be provided for review prior to cutting and digging activities.

Recommendation:
CIRNAC recommends that the City commit to providing provide for review, at least 60 days prior to work being undertaken, the proposed cut methodology for mitigating permafrost degradation.

10. Operations

There are certain elements of operations which had insufficient detail in the O&M Manual, which was submitted as part of the original application.

10.1 – Partially Resolved:
CIRNAC recommended that the City describe if non-baled waste in the landfill will be compacted, and how solid waste will be handled at the landfill in event of a mechanical breakdown of the baling or shredding equipment. The City responded by providing an

updated O&M Manual which clarifies the proposed operations, resolving the identified concern and raising a new concern.

As outlined in comment 2, the O&M Manual (Dillon Consulting, Rev. 4, October, 2020, pg. 240) suggests that unbaled waste may be placed in a pocket constructed within the balefill, which appears to occur over baled waste, resulting in baled and unbaled wastes being mixed in the same cells with equipment operating directly on baled waste. If this is the case, it is not clear how the integrity of the bale wrap will be maintained. CIRNAC has provided its recommendation under comment 2 for a review of the O&M Manual on an annual basis.

10.2 – Partially Resolved:
CIRNAC recommended that the City clarify what household hazardous wastes (HHW) will be accepted and if the hazardous waste storage area includes secondary containment. The City responded by providing a list of HHW which will be accepted under Section 4.1.5 of the updated O&M Manual. The list appears to not be specific to Iqaluit, as it includes lawn care products and does not include fluorescent light ballasts.

Recommendation:
CIRNAC recommends that the City develop procedures for packaging, storage, and shipment of HHW, and include the procedures in the the O&M Manual as part of its annual review.

10.3 – Partially Resolved:
CIRNAC recommended that the City provide additional details on leachate pumping including: objective criteria for when pumping is required (e.g. maximum allowable leachate head); method to be used to measure the leachate head and the level in the sump; and requirements for monitoring of pond levels and hoses for leaks during pumping operations. The City responded by providing an updated O&M Manual. Details regarding leachate pumping and monitoring of leachate head is addressed in Section 12 of the text. It is now stated that pumps and a generator will be placed and removed daily between June and September and the manual refers to daily measurements of leachate (head) levels (pg. 187, 242). It is unclear if the float system has been eliminated.

Recommendation:
CIRNAC recommends that an amended water licence include leachate head monitoring frequency.

10.4 – Resolved:
CIRNAC recommended that an amended water licence include a condition requiring additional cover, if nuisances occur. The City as agreed to the inclusion of this requirement in an amended licence and this concern is resolved.

D. REFERENCES

Nunavut Water Board. List of Commitments, Technical Meeting (TM) September 17, 2020, Held in Relation to An Application to Amend Water Licence No. 3AM-IQA1626. September 23, 2020.

Nunavut Water Board. List of Issues, Technical Meeting and Pre-Hearing Conference 3AM-IQA1626. September 23, 2020.