



November 13, 2015

Phyllis Beaulieu
Manager of Licensing
Nunavut Water Board

**Re: City of Iqaluit's Response to Stakeholders Submission 150710 3AM-IQA0612 AANDC
TECHNICAL COMMENTS-ILAE**

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ᐅᐅᐅᐅᐅᐅᐅ (867) 979-5600

ᐅᐅᐅᐅᐅᐅ (867) 979-5922

City of Iqaluit

Box 460

Iqaluit, Nunavut

X0A 0H0

Phone (867) 979-5600

Fax (867) 979-5922

Ville d'Iqaluit

C.P. 460

Iqaluit, Nunavut

X0A 0H0

Tél. (867) 979-5600

Télécop. (867) 979-5922

admin@city.iqaluit.nu.ca

www.iqaluit.nu.ca

Dear Ms. Beaulieu:

In support of the City of Iqaluit's (City) water licence renewal application, please accept the following letter as the response to the submission from Aboriginal Affairs and Northern Development Canada reference 150710 3AM-IQA0612 AANDC TECHNICAL COMMENTS-ILAE, dated July 10th, 2015.

Requests for Information

1.2 Monitoring Program Requirements

(IR 1) AANDC requests that the Licensee provide motivation for changing the sampling frequency at stations IQA-04 and IQA-06 and presently does not support the change.

***Response:** The City requests the change in sampling frequency for operational costs and scheduling reasons. This request has been supported by AANDC in their letter dated December 5th, 2014.*

1.4 Outstanding Licence Requirements

(IR 2) AANDC request the Licensee to provide the construction record which shows that the construction was supervised and field-checked by an Engineer and recommends keeping the requirement for all plans and drawings to be stamped by a Professional Engineer registered with the Northwest Territories and Nunavut Association of Professional Engineers and Geoscientists (NAPEG) in the renewed licence.

***Response:** Record drawings for the original plant do not exist. The record drawings (not stamped) for the 2006 upgrade are being provided to the Nunavut Water Board as part of this response to submissions from stakeholders.*

2.1 Dam Safety Inspections for Lake Geraldine Reservoir

(IR 3) AANDC requests that the Licensee provide details on actions taken in the light of consultant recommendations for the mentioned items.

- In 2014, the Licensee's consultant recommended that repair to concrete spalling and joints on the upstream faces of the concrete structure is required by autumn 2016. However, the work should be completed sooner if concrete conditions deteriorate.
- The Licensee's 2013 Annual Report and states that, 'the Permanent Record File, Logbook and Operation and Surveillance manual requires updating for the year 2014.
- All of the inspection reports above mention an Emergency Preparedness Plan. Prior to 2012, the reports recommend its creation and after this they recommend including it in the documentation and Permanent Record File

Response: The City is currently in the process of addressing the spalling concrete issue and the work is currently under design. As per the terms of the Water Licence the design will be submitted for review prior to the work proceeding.

The Permanent Record File will be updated by the end of 2015.

The Emergency Preparedness Plan will be completed in 2016.

(IR 4) Additionally, the Licensee should provide the 2014 Lake Geraldine Dam Safety Inspection Report signed by a Professional Engineer.

Response: The 2014 Lake Geraldine Dam Safety Inspection Report has been submitted with the 2014 Annual Report.

2.2 Lake Geraldine Water Balance

(IR 5) If the reservoir supply is exhausted at the end of winter, can spring melt provide the required daily water quantities on the fourth day after 3 consecutive days with air temperatures above 0.5°C?

Response: The Lake Geraldine water balance was designed to estimate water levels within Lake Geraldine under predicted future conditions and inform the City of implications of different combinations of water supply stressors (i.e., historic combinations of precipitation, air temperature, winter durations and predicted climate change, coupled with future consumption rates). Within the tool itself, which is intended to be a water management planning tool, predicted and observed water levels (and therefore volumes) may differ from one another for a variety of climatic and operational reasons including;

- winter lasting longer than predicted (and, thus, resulting in a delay in recharge of Lake Geraldine);
- increases in water takings (both because of changes in consumption, but even because of damage to water taking equipment, burst pipes, etc.);
- lower precipitation than that predicted (thus reducing the recharge to Lake Geraldine); and
- greater ice formation than normal (therefore reducing the available water for consumption through the winter).

Because the model is simply an abstraction of the real world and predictions are confined to historic ranges in weather, predicted future climatic changes, and anticipated water consumption rates, the model should be used as a planning tool to 'guide' decision making while considering the possibility of variation outside the predicted extremes. Therefore, a cautious rather than optimistic approach regarding water supply outcomes should be employed in all cases as indicated in Section 7.0 of the report.

(IR 6) How was the reservoir geometry extrapolation done? Was this extrapolated data used to develop the stage-storage relationship presented in Table 3 of Section 4.2? The reservoir volume between 109.3 and 111.3 m asl accounts for 32% of the available water supply. Given the sensitivity of reservoir volume to the topography/bathymetry, are the results accurate enough to have confidence in building a multi-year water management plan with them?

Response: The bathymetry provided to Golders by the City was limited to a water level elevation of 109.6 m asl. In order to account for additional storage between this water level and the reservoir spillway, the stage-storage relationship was extrapolated to 111.3 m asl by assuming that the ratio between stage and storage would remain identical to that reported (Canada Centre for Remote Sensing, Natural Resources Canada) between 108.6 to 109.6 m asl. This probably results in a

conservative estimation of storage volumes above 109.6 m asl.

As noted above and discussed in the Golders report (Sections 5.4, 6.0, 7.0) there are a number of reasons why the model should be employed only as a water management planning tool rather than assumed to provide exact or precise outcomes months or even years down the line. In most cases, it likely provides a fairly reasonable estimation of water supply outcomes for the input variables selected by the user, but unpredictable changes in weather and consumptive use may result in a difference between simulated and observed results

(IR 7) If the reservoir is filled to near capacity in early summer, what measures would be taken to prevent the dam from being overtopped during an extreme rain event? Would the Emergency Preparedness Plan referred to in comment 2.1 address this concern?

Response: The Lake Geraldine dam is designed with a spillway elevation at 111.3 m. The spillway is designed to allow any excess water to be released to the stream below

2.5 Location Selection for Additional Water Withdrawal Location on Apex River

(IR 8) AANDC would like the Licensee to provide the referenced report (City of Iqaluit Raw Water Supply and Storage Review, Trow Associates Inc., OTC00016888A, April 2004). We would like to know if a Topography and Bathymetry Survey as well as Sedimentation and Erosional Analysis have been considered.

Response: The City concurs with recommendation R12 and is removing the supplemental water source project from the licence renewal as it will require NIRB Review. The Supplement Water Source if and when the City plans to implement will be dealt with as a water licence amendment, therefore this comment will be addressed at that time.

(IR 9) AANDC requests that the Licensee demonstrate that the proposed water intake location A2 is suitable in all years and flow conditions in a report signed by a Professional Engineer registered with NAPEG.

Response: The City concurs with recommendation R12 and is removing the supplemental water source project from the licence renewal as it will require NIRB Review. The Supplement Water Source if and when the City plans to implement will be dealt with as a water licence amendment, therefore this comment will be addressed at that time.

2.6 Minimum Flow Requirements for Apex River

(IR 10) AANDC requests the Licensee provide a discussion of the potential impacts of leaving no flow in the river and what mitigation measures proposed. Specific detail should be provided regarding the impact on stopping the river flow on the fishing occurring at the mouth of the river.

Response: The City concurs with recommendation R12 and is removing the supplemental water source project from the licence renewal as it will require NIRB Review. The Supplemental Water Source, if and when the City plans to implement, will be dealt with as a water licence amendment, therefore this comment will be addressed at that time.

(IR 11) Additionally, AANDC requests information on any public consultation that has taken place regarding potential water withdrawals on the Apex River.

Response: The City concurs with recommendation R12 and is removing the supplemental water source project from the licence renewal as it will require NIRB Review. The Supplemental Water Source, if and when the City plans to implement, will be dealt with as a water licence amendment, therefore this comment will be addressed at that time.

2.7 Water Withdrawal Quality

(IR 12) AANDC requests that the Licensee provide the maximum quantity of water it proposes to withdraw from the Apex River.

Response: The City concurs with recommendation R12 and is removing the supplemental water source project from the licence renewal as it will require NIRB Review. The Supplemental Water Source, if and when the City plans to implement, will be dealt with as a water licence amendment, therefore this comment will be addressed at that time.

2.8 Water Conservation Measures

(IR 13) AANDC would like to know what measures if any the Licensee is taking or planning to take for the promotion of responsible water use because they would reduce the water necessary and thereby the efforts to procure and treat it.

Response: The City current does not have any programs to promote responsible water use. However, the City plans to identify potential sources of water losses in the City's water system in 2016 and develop a plan to address these over the next 3 to 5 years.

3.2 Sewage Lagoon Operation and Maintenance

(IR 14) AANDC would like the Licensee to provide an Operation and Maintenance Plan for the Sewage Lagoon and an update on the sewage lagoon capacity.

Response: As part of the proposed upgrades to the Wastewater Treatment Plant an O&M Manual will be developed which will incorporate in the O&M Manual for the sewage lagoon. The City will complete a capacity analysis of the sewage lagoon along with the upgrades to the Wastewater Treatment Plant.

2 SOLID WASTE MANAGEMENT

(IR 15) AANDC would like the Licensee to provide information regarding the permafrost regime below the landfill and any information they have on the groundwater.

Response: Prior to responding to this request for information the City requests clarification of the purpose of this request for information.

(IR 16) AANDC requests the Licensee provide the units for maximum allowable concentrations in Table 3 of the Review.

Response: The City has revised the table to include the units as requested and is provided to the Nunavut Water Board as part of this response to submissions from stakeholders.

(IR 17) AANDC requests that the Licensee provide details on treatment technologies for landfill runoff water. We would specifically like to understand why the Geotube method proposed by AECOM seems to result in only physical treatment instead of both physical and chemical treatment, as well as what solutions will be implemented for effective removal of all the contaminants of concern.

Response: A report entitled "Water Run-off Treatment and Discharge at the City of Iqaluit Solid Waste Facility" by Qikiqtaaluk Environmental dated October 26, 2015 has been provided to the Nunavut Water Board as part of this response to submissions from stakeholders.

4.3 West 40 Landfill Decommissioning

(IR 18) We seek confirmation that the solutions for these problems found for operation of the landfill will be continued after its decommissioning

Response: *The City confirms that it will continue to manage the facility post decommissioning*

(IR 19) Are the site conditions before it became a landfill known? If there were materials on site prior to its use as a landfill, were they properly disposed of?

Response: *The site conditions prior to the site of the West 40 Landfill prior to the construction of the facility are unknown.*

(IR 20) Will the composting site be decommissioned in the same time as the landfill? If so, what are the plans? If not, how will the drainage for this portion of the landfill be altered by the decommissioning and how will runoff be contained?

Response: *It is unknown at this time if the new solid waste facility will incorporate a sludge composting area, as part of the development of the new solid waste facility the relocation of the sludge composting site will be considered.*

Recommendations

1.1 Licence Term

(R 1) Aboriginal Affairs and Northern Development Canada (AANDC) recommends that the license should be renewed for five years but we are not opposed to a term up to ten years, should the Board consider it suitable.

Response: *The City believes that a long term licence is in the best interest of both the City and the NWB, and that any changes to the operations regulated under the water licence during the licence term could be dealt with through the amendment process. The City would support a 10 year term.*

1.2 Monitoring Program Requirements

(R 2) AANDC believes the possibility of chlorinated alkane concentrations in water exists and recommends keeping this testing requirement in the licence until the Licensee has sample results over three years to demonstrate that it is not a concern.

Response: *The comment that "The higher volatility of certain short-chain compounds suggests that their presence resulted from long-range atmospheric transportation" implies that the chlorinated paraffins are not a result of the City's water use. Therefore testing for their presence should not be part of the water licence. Any study of long range transportation of chlorinated paraffins is outside the scope of a water licence.*

(R 3) AANDC agrees with the statement regarding influent toxicity and recommends removal of the LC50 Bioassay requirement IQA-03 and IQA-05 from the licence. AANDC also recommends suspending the testing requirement for station IQA-04 until after 2018, when the wastewater treatment plant will provide secondary treatment. Finally, AANDC recommends keeping the testing requirement for station IQA-02, the final discharge point from the sewage lagoon.

Response: The City requests the requirement for LC50 Bioassay testing be tied to the commissioning of the secondary wastewater treatment facility as oppose to a specific date to allow for changes in the schedule of the wastewater treatment plant project.

The logic of suspending the LC50 Bioassay until after the wastewater plant is upgraded which AANDC supports is based on the understanding that the effluent would not pass the test prior to the upgrading of the facility. As it is understood that the sewage lagoon effluent would not pass the LC50 Bioassay requirements, the same logic should apply to the testing at station IQA-02 and the requirement should be not be included in the water licence.

(R 4) AANDC recommends keeping station IQA-01 in the renewed licence, but perhaps measures can be taken to streamline the process to allow presentation of sampling results taken for the City or the Government of Nunavut, Environment and Health.

Response: Testing for water quality as it pertains to raw water being taken for use as potable water should not be part of the water licence process. This is a water quality issue and testing is required under the Public Water Supply Regulations. The City requests that the monitoring requirement be removed and replaced with the requirement that the City provides test results as per the Public Water Supply Regulations.

(R 5) AANDC recommends keeping stations IQA-03 and IQA-05 in the renewed licence, but perhaps measures can be taken to streamline the process to allow presentation of sampling results taken for the City. Station IQA-03 should be moved to a location that allows access.

Response: Collection of information required for design is not part of the NWB's mandate. It should be part of the design of the expansion to the plant but as per the AANDC letter should not be a condition of the licence.

IQA-03 is the inlet to the lagoon and as there is typically no flow to the lagoon it is not possible to schedule an annual sampling protocol. Furthermore, the location of IQA-03 is located approximately 200 m upstream of IQA-05. There are no additional sources of wastewater between IQA-03 and IQA-05 therefore for all intents and purposes they are the same sampling point and the quality of effluent should be the same. Requiring sampling at both locations provides no additional information.

1.3 Annual Reports

(R 6) AANDC recommends requiring the Licensee to provide water quality monitoring data in a tabular format that identifies the station sampled and any criteria exceedance.

Response: The City agrees with this recommendation.

1.5 Inspector's Annual Reports

(R 7) AANDC recommends rewording Part A, Item 3 of the licence so that the Inspector can address points 1 to 5 in their Inspection Reports rather than being required to produce a separate annual report.

Response: The City has no comment.

(R 8) AANDC requests the opportunity to review these documents when available and recommends that if the Water treatment plant decommissioning is included in the renewed licence, it be conditional on approval of a decommissioning plan.

Response: There are no plans to decommission the Water Treatment Plant, therefore development of a closure plan for this facility would be premature. The City suggests the following clause be added to allow the water licence to manage the potential closure of any facility.

The Licensee shall submit to the Board for approval an Abandonment and Restoration Plan at least six (6) months prior to abandoning any facilities or upon submission of the final design drawings for the construction of new facilities to replace existing ones. Where applicable, the Plan shall include information on the following:

- a. water intake facilities;*
- b. the water treatment and waste disposal sites and facilities;*
- c. leachate prevention;*
- d. an implementation schedule;*
- e. maps delineating site facilities;*
- f. consideration of altered drainage patterns;*
- g. a proposal identifying measures by which restoration costs will be financed by the Licensee upon abandonment related to water use, waste deposit to water, or appurtenant undertakings related to water use and/or deposit of waste to water, subject to the act and regulations.*

2.1 Dam Safety Inspections for Lake Geraldine Reservoir

(R 9) AANDC recommends that the wording of Part D, Item 5 of the Licence be modified so that the Licensee is required to follow the current Canadian Dam Safety Guidelines, and submit inspections and reviews following the schedule in these guidelines. This would allow the inclusion of yearly inspections as necessary, as well as reviews as deemed necessary

Response: The City agrees with the requirement for following the Canadian Dam Safety Guidelines

2.3 Monitoring Lake Geraldine Reservoir Levels

(R 10) AANDC recommends including the requirement for a real-time water level monitor to measure the reservoir level in Lake Geraldine in the renewed Licence.

Response: The City requests that this recommendation not be adopted as part of the water licence as a monitoring program exists and the requirement for a redundant system is an operational issue for the City and therefore should not be a condition of the water licence.

2.4 Apex River as Supplementary Water Source

(R 11) AANDC recommends that the Licensee be required to submit its proposed project of an additional water source to the NIRB for screening prior to including it in a water licence amendment.

Response: The City concurs with recommendation R12 and is removing the supplemental water source project from the licence renewal as it will require NIRB Review. The Supplemental Water Source if and when the City plans to implement will be dealt with as a water licence amendment, therefore this comment will be addressed at that time.

2.5 Location Selection for Additional Water Withdrawal Location on Apex River

(R 12) AANDC recommends withholding the inclusion of an additional water withdrawal location until it has been determined to be adequate.

Response: The City concurs with recommendation R12 and is removing the supplemental water source project from the licence renewal as it will require NIRB Review. The Supplemental Water Source if and when the City plans to implement will be dealt with as a water licence amendment, therefore this comment will be addressed at that time.

2.6 Minimum Flow Requirements for Apex River

(R 13) If public consultation regarding using the Apex River as a water source and minimum flow requirements has not been undertaken, AANDC recommends it be included in the planning process.

Response: The City concurs with recommendation R12 and is removing the supplemental water source project from the licence renewal as it will require NIRB Review. The Supplemental Water Source if and when the City plans to implement will be dealt with as a water licence amendment, therefore this comment will be addressed at that time.

(R 14) AANDC recommends that any water withdrawal quantity authorized on the Apex River be limited to a fraction of the flow.

Response: The City concurs with recommendation R12 and is removing the supplemental water source project from the licence renewal as it will require NIRB Review. The Supplemental Water Source if and when the City plans to implement will be dealt with as a water licence amendment, therefore this comment will be addressed at that time.

2.7 Water Withdrawal Quality

(R 15) AANDC recommends adjusting the water withdrawal quantity with the term of the licence whilst considering the reservoir's capacity. AANDC also recommends including a water withdrawal quantity for the additional water withdrawal location that is respectful of ecological flow requirements.

Response: Actual water consumption in 2014 was approximately 990,000 m³. The City recognizes the limitations on the existing water supply and the requirement for supplemental water supply for the long term. The City recommends that the maximum quantity of water remain at 1,100,000 m³ until demand dictates that it be increased and at that time it can be dealt with as an amendment.

The City concurs with recommendation R12 and is removing the supplemental water source project from the licence renewal as it will require NIRB Review. The Supplemental Water Source if and when the City plans to implement will be dealt with as a water licence amendment, therefore this comment will be addressed at that time.

3 Wastewater Management

(R 16) AANDC requests the opportunity to review these documents when available and recommends that if the Water treatment plant upgrade and decommissioning are included in the renewed licence, it be conditional on approval of appropriate plans.

Response: Appendix C-9 – Iqaluit WWTP Technical Overview of 2005 Secondary Sewage Treatment Plant Design was provided as part of the water licence renewal submission. The City has completed the Feasibility Study for the Upgrade/Expansion of the Wastewater Treatment Plant and is provided to the Nunavut Water Board as part of this response to submissions from stakeholders.

The current Water Licence includes the following clause that would ensure that any upgrade to the wastewater treatment facility be reviewed by the NWB. The City supports inclusion of this clause in the new licence.

PART G: CONDITIONS APPLYING TO MODIFICATIONS

- 1. The Licensee may, without written consent from the Board, carry out Modifications to the Water Supply Facilities and Waste Disposal Facilities provided that such Modifications are consistent with the terms of this Licence and the following requirements are met:
 - a. the Licensee has notified the Board in writing of such proposed Modifications at least 60 days prior to beginning the Modifications;*
 - b. such Modifications do not place the Licensee in contravention of the Licence or the Act;*
 - c. the Board has not, during the 60 days following notification of the proposed Modifications, informed the Licensee that review of the proposal will require more than 60 days; and*
 - d. The Board has not rejected the proposed Modifications.**
- 2. Modifications for which all of the conditions referred to in Part G, Item 1 have not been met can be carried out only with written approval from the Board.*
- 3. The Licensee shall provide as-built plans and drawings of the Modifications referred to in this Licence within 90 days of completion of the Modifications. These plans and drawings shall be stamped by an Engineer.*

There are no plans to decommission either the Wastewater Treatment Plant or the lagoon, therefore development of a closure plan for these facilities would be premature. The City recommends that the following clause be added to allow the water licence to manage the potential closure of any facility.

- "The Licensee shall submit to the Board for approval an Abandonment and Restoration Plan at least six (6) months prior to abandoning any facilities or upon submission of the final design drawings for the construction of new facilities to replace existing ones. Where applicable, the Plan shall include information on the following:*
- a. water intake facilities;*
 - b. the water treatment and waste disposal sites and facilities;*
 - c. leachate prevention;*
 - d. an implementation schedule;*
 - e. maps delineating site facilities;*
 - f. consideration of altered drainage patterns;*
 - g. a proposal identifying measures by which restoration costs will be financed by the Licensee upon abandonment related to water use, waste deposit to water, or appurtenant undertakings related to water use and/or deposit of waste to water, subject to the act and regulations.*

3.1 West 40 Wastewater Treatment Plant Upgrade

(R 17) AANDC recommends adding criteria for more parameters for the wastewater treatment plant effluent discharge to be more in line with national standards

Response: *Prior to responding to this recommendation the City requests clarification as to what parameters are being considered to be added to the water licence to fully understand the potential ramifications of the recommendation.*

3.2 Sewage Lagoon Operation and Maintenance

(R 18) As in section 2.1, AANDC recommends that the wording of Part E, Item 8 of the License be modified so that the Licensee is required to follow the current Canadian Dam Safety Guidelines, and submit inspections and reviews following the schedule in these guidelines.

Response: The City agrees with the proposed wording.

4 SOLID WASTE MANAGEMENT

(R 19) AANDC requests the opportunity to review these documents when available and recommends that if the new solid waste management facility is included in the renewed licence, it be conditional on approval of appropriate plans

Response: The City agrees with the recommendation.

(R 20) AANDC recommends that the renewed licence include thermal monitoring at the landfill through the installation of thermistor strings with thermistor beads at selected intervals to provide ground temperature profiles at various locations in the landfill.

Response: The City requests clarification as to the purpose for this condition prior the City providing a response.

(R 21) AANDC also recommends that the renewed licence include effluent discharge criteria that, at minimum, meet CCME freshwater quality guidelines for the protection of aquatic life for the parameters in Table 3 of the Drainage Management Review since the discharges are occurring in a freshwater environment. Additional parameters typically found in leachate or that may be produced at the sludge processing and composting facility that uses the same drainage system should have criteria as well, including chloride, nitrate, ammonia, phosphorous and Faecal Coliform

Response: A report entitled "Water Run-off Treatment and Discharge at the City of Iqaluit Solid Waste Facility" by Qikiqtaaluk Environmental dated October 26, 2015 has been provided to the Nunavut Water Board as part of this response to submissions from stakeholders. Section 3 of the report contains a Discharge Criteria developed through consultation with Environment Canada.

4.2 Actions Required after 2014 West 40 Landfill Fire

(R 22) AANDC recommends that the effluent discharge criteria for landfill runoff apply to the collected contact water discharge. Additionally, AANDC recommends that a timeline for the draft pond dismantling be included in the renewed licence.

Response: The actions of the City with respect to the fire at the West 40 Landfill are considered emergency measures and the City is obligated to take direction from the AANDC Inspector. As this is an emergency measure and not part of the City normal operation it does not fall within the requirements of the Water Licence.

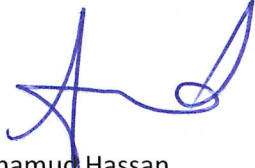
4.4 Use of Sewage Sludge Compost

(R 23) AANDC recommends that the renewed licence include quality criteria for composted sludge before it is used as a landfill cover or elsewhere. At a minimum it should meet the CCME compost quality guideline for Faecal Coliform concentrations. Additional criteria would be appropriate for trace metals that are pollutants of concern. Metals which appear in the US EPA and both CCME lists are: arsenic, cadmium, lead, mercury, nickel, selenium and zinc.

Response: The City has no comment on this recommendation.

If you have any questions or require further information or clarification, please contact Matthew Hamp, Director of Public Works and Engineering at 867-979-5653.

Sincerely,

A handwritten signature in blue ink, appearing to be 'Muhamud Hassan', with a stylized, flowing script.

Muhamud Hassan
Chief Administrative Officer
City of Iqaluit