



GWICH'IN LAND AND WATER BOARD

P.O. Box 2018, Inuvik, NT X0E 0T0

☎ 867-777-4954

📠 867-777-2304

🌐 glwb.com

REASON FOR DECISION

Issued Pursuant to Section 54 of the *Waters Act*.

File Number:	G17L3-001 (Renewal of G06L3-001)	Type:	"A" Water Licence
Applicant:	Town of Inuvik		
Activity:	Water Use and Deposit of Waste for Municipal Purposes at the Town of Inuvik, NT		
Board Meeting:	Tuesday, May 23, 2016		

With respect to this application, notice was given in accordance with sections 63 and 64 of the *Mackenzie Valley Resource Management Act (MVRMA)*, and section 43(1) of the *Waters Act*.

BACKGROUND

The Town of Inuvik, with an estimated population of 3265 in 2015, is located on the East Channel of the Mackenzie Delta, approximately 100 km from the Arctic Ocean and 200 km north of the Arctic Circle. The Town was first issued Type "A" Municipal Water Licence by the Northwest Territories Water Board (NWTWB) under the *Northwest Territories Waters Act* in 1983. This Licence was renewed in 1993 and 1996 by the NWTWB, and again by the Gwich'in Land and Water Board (GLWB) in 2006. A one year renewal was issued in 2016, to allow for the completion of upgrades to the Town's water intake and treatment facilities, which were completed in early 2017.

On February 6, 2017, the Town submitted an updated water licence renewal application to the GLWB. This application was given a new file number G17L3-001. The application was distributed for public review on February 8, 2017. A Public Hearing was scheduled to be held on April 27, 2016, in the Town of Inuvik. Notice of the Public Hearing was provided in accordance with paragraph 41(2)(a) of the *Waters Act*. The Public Hearing was cancelled in accordance with paragraph 41(3)(a) of the *Waters Act* because the GLWB did not receive any written interventions or notifications that any person or body intended to appear and make representations to it.

Written submissions were received from GNWT Environment and Natural Resources (ENR) and the Gwich'in Renewable Resources Board (GRRB); both stated that a formal public hearing was not required, however, the GRRB requested that a follow up meeting with the town be held to further discuss the concerns brought forward during the review period. A technical session was held on April 27, 2017. A total of 21 attendees were present for all or part of the day. Following the technical session, GLWB staff

prepared a draft Water Licence, which was circulated for review on March 4, 2017. The update draft was presented for consideration at the GLWB Board meeting on May 23rd 2017.

DECISION

After reviewing the submission of the Applicant and the written comments and submissions received by the Board, and having due regard to the facts and circumstances, the merits of the submissions made to it, and to the purpose, scope, and intent of the MVRMA and the Waters Act and Regulations made thereunder, the Board has determined that Water Licence G17L3-001 be issued, subject to the terms and conditions contained therein. The Board's reasons for this decision are set out below.

General Principles

The scope, definitions, and conditions set forth in the Water Licence have been developed in order to address the Board's statutory responsibilities and the concerns that arose during the regulatory process.

Requirements of Section 26 and 27 of the *Waters Act*

Existing Licensees

After reviewing the submissions made during the regulatory process and filed on the GLWB Public Registry, the Board is satisfied that, with respect to paragraph 26(5)(a) of the *Waters Act*, the granting of this Licence to the Town of Inuvik will not adversely affect, in a significant way, any existing Licensee, provided the conditions of the Licence are adhered to. There are no other applicants with precedence.

Existing Water Users

Paragraph 26(5)(b) of the *Waters Act* prohibits the issuance of a Licence unless the Board is satisfied that appropriate compensation has been or will be paid by the Applicant to people who were, at the time when the Applicant filed its application with the Board, members of the classes of water users, depositors, owners, occupiers, or holders listed under paragraph 26(5)(b), who would be adversely affected by the use of waters, or deposit of waste proposed by the Applicant.

The Board received no claims for compensation either during the prescribed period or afterwards. Provided that compliance with the Water Licence conditions is achieved, the Board does not believe that any users or persons listed in paragraph 26(5)(b) of the *Waters Act* will be adversely affected by the use of Waters or the deposit of Waste proposed by the Applicant.

Water Quality Standards

Insofar as subparagraph 26(5)(c)(i) of the *Waters Act* is concerned, the Board is of the view that compliance with the Licence conditions will ensure that waste produced by the Town of Inuvik

will be treated and deposited in a manner that will maintain water quality consistent with applicable standards and the Board's *Water and Effluent Quality Management Policy*¹.

Effluent Quality Standards

Consistent with subparagraph 26(5)(c)(ii) of the *Waters Act*, the Board is satisfied that the effluent standards it has set out in the Licence as conditions are consistent with the Board's *Water and Effluent Quality Management Policy* and will protect the receiving waters and environment. These are further discussed below.

Requirements of Subsection 27(2) of the Waters Act

It is the opinion of the Board that adherence to the conditions of the Licence will ensure that any potential adverse impacts on other water users, which might arise as a result of the issuance of the Licence, will be minimized.

Requirements of Subsection 61 of the MVRMA

Pursuant to subsection 61(2) of the MVRMA, the Board may not issue a licence or permit except in accordance with any applicable land use plan. The Board acknowledges the Gwich'in Land Use Plan, but notes that the lands included in the scope of Licence G17L3-001 are within the boundaries of the Town of Inuvik; therefore, the Board is satisfied that the requirements of this subsection have been met.

Water Licence G17L3-001 Term and Conditions

Water Licence Term

The Town of Inuvik requested a ten (10) year renewal of their existing water licence. The Board recommends a ten year term water licence be issued.

Part A: Scope and Definitions

Scope

The scope of the Licence authorizes the Licensee to use water and dispose of Waste for municipal undertakings.

Definitions

The Board has updated several definitions in the Licence in order to ensure a common understanding of Licence conditions and avoid future differences in interpretation. The definitions use wording similar to that found in other water licences issued by the Board.

Part B: General Conditions

The General Conditions section stipulates matters regarding compliance and conformity with the MVRMA and the *Waters Act*, and an assortment of conditions that support the other Parts of the

¹ Water and Effluent Quality Management Policy, Standard Procedure and Consistency Working Groups (WG), March 2011.

Licence. This includes conditions that pertain to the Surveillance Network Program (SNP), measuring devices, signage, and annual reporting. These are standard conditions found in the Town's current Licence and in other water licences issued by the Board, and are appropriate for the Town of Inuvik.

Part C: Conditions Applying to Water Use

The conditions in Part C of the Licence address the sources and maximum amounts of freshwater that can be used for the municipal undertaking, and stipulate other restrictions related to water withdrawals. The conditions in this Licence are consistent with the previous licence and standard conditions found in other water licences issued by the Board.

Part D: Conditions Applying to Waste Disposal

The conditions in Part D of the Licence address waste disposal requirements. The conditions in this Licence are generally consistent with standard conditions found in other water licences issued by the Board. Any exceptions are discussed in further detail below.

Effluent Quality Criteria for Sewage Disposal Facilities

Part D, item 5 includes the Effluent Quality Criteria (EQC) for effluent from the Sewage Disposal Facilities.

The Board's approach to managing the deposit of waste to the receiving environment through water licence terms and conditions is described in the MVLWB's *Water and Effluent Quality Management Policy*. Effective March 31, 2011, this Policy is being applied to all new and renewal water license Applications throughout the Mackenzie Valley.

In 2014, the *Wastewater Effluent System Regulations*² (WSERs) were legislated in all Canadian provinces and include performance standards of CBOD (carbonaceous biological oxygen demand) ≤ 25 mg/L, TSS (total suspended solids) ≤ 25 mg/L, TRC (Total Residual Chlorine) ≤ 0.02 mg/L; and un-ionized ammonia ≤ 1.25 mg/L. However, the WSERs do not yet apply to wastewater treatment systems in Canada's north. It is unknown if or when the WSERs will be legislated in the Northwest Territories because of the unique challenges presented by the northern environment (the remoteness of municipalities, the limited resources to operate and maintain sewage treatment systems and the logical use of natural (lagoon/wetland) systems rather than sophisticated mechanical treatment plants). Accordingly, these standards were not directly considered in the discussions regarding reassessment of effluent quality criteria for this Licence. Instead, the Board's approach was to evaluate the appropriateness of the existing EQC for sewage considering the qualities of the receiving environment (the East Channel of the Mackenzie River).

Calculating water-quality-based EQC in place of applying set discharge limits requires sufficient data on the quality and flow of water in the receiving water body, as well as the establishment of water quality objectives (WQOs) for the site. At this time, the Board does not have adequate evidence to make a determination on appropriate WQOs for this site, and limited data is available for the receiving water body. Additionally, the achievability of any calculated EQC would need to be evaluated, and the Board does not have sufficient data on the quality of effluent from the

² [Wastewater System Effluent Regulations](#), SOR/2012-139, Minister of Justice, Canada.

sewage treatment system to conduct such an evaluation. As such, the Board has not considered water-quality based EQC in this case, but has chosen to evaluate the current EQC which have proven achievable by the Town's current technology (sewage lagoon) for treating sewage.

Part D, item 4 of the existing Licence G06L3-001 stipulates that sewage discharged from SNP station 0036-3 meet the following effluent criteria: (Maximum Average Concentration) Faecal Coliforms = 1×10^6 CFU/100 ml; BOD₅ = 150 mg/L; Suspended Solids = 70 mg/L; Oil and Grease Non-Visible; and the waste discharged shall have a pH above 6.

During the review of this Application, the GLWB solicited recommendations for the EQC to be met at SNP station 0036-3. No comments regarding EQC were submitted during the review of the water licence application; however, at the Water Licence Renewal Technical Session held on April 27, 2017, ENR suggested that the EQC for BOD could be dropped to 100 mg/L, based on the recent SNP data for 0036-3. AECOM (for the Town of Inuvik) were concerned with lowering the criterium, citing that the Mackenzie River was able to dilute the effluent quickly and sufficiently. The Town also noted that changing the EQC for the BOD parameter would not change lagoon performance and that the advantage of the lagoon system is that it is easy to maintain. Instead of lowering EQC, effort could be made to maintain proper freeboard and remove sludge/solids from the lagoon to optimize performance³.

Given the discussion surrounding the Board's option to lower or not lower EQC at 0036-3, Board staff chose to explore the assimilative capacity of the East Channel of the Mackenzie River. Using the *Alberta Water Quality Based Effluent Limits Procedures Manual*⁴, Board staff completed basic calculations with limited available data for the background concentration of Total Suspended Solids (TSS) in East Channel to estimate any changes to background water quality using the proposed technology-based EQC.

The resultant concentration for TSS in the Mackenzie River was conservatively calculated using the following formula:

$$C = (Q_e C_e + ff Q_s C_s) / (Q_e + ff Q_s)$$

Where:

Q_e = volume of effluent discharge

Q_s = volume of receiving stream available for mixing

C_e = concentration of a substance in the effluent

C_s = upstream concentration of substance

ff = fraction of streamflow available for mixing

C = resultant instream concentration of substance after mixing

The following conservative values were used:

Q_e = 1,486 m³/day (average rate of discharge from Sewage Disposal Facilities, determined by average water use by Town of Inuvik 2012-2016⁵).

Q_s = 10% of 5.61 m³/s (5.61 m³/s was calculated as the 7Q10 value – the lowest 7-day average

³ [Town of Inuvik Technical Session – Meeting Notes – May 10 2017](#), found on the GLWB Public Registry under New Application for Water Licence G17L3-001.

⁴ Alberta Environmental Protection, [Water Quality Based Effluent Limits Procedures Manual](#), 1995.

⁵ See Town of Inuvik Annual Water Licence (G06L3-001) Reports 2012-2016, available on the GLWB Public Registry.

flow that occurs on average once every 10 years using flow recorded between 1960-2013 at station number 10LC002 (East Channel) by Water Survey Canada between 1972-2015^{6,7}). $C_e = 70$ mg/L (the existing EQC for TSS in G06L3-001).

$C_s = 65$ mg/L (average TSS measured in East Channel/Mackenzie River by Community Based Monitoring Program ENR, GNWT in 2012-2015).

$ff =$ A 10% fraction of total streamflow was used to conservatively assume that only 10% of the flow of East Channel was available for mixing with the discharged effluent.

The resultant $C = 65.1$ mg/L illustrates that even under conservative, worst-case conditions, the EQC of 70 mg/L of TSS appears to have no significant effect on the background TSS concentration in the Mackenzie River, and the Board concludes that this technology-based EQC for TSS is appropriate for this site. Although there are no WQOs that have been set to be met in East Channel after receiving the discharge from the Sewage Disposal Facilities, the Board notes that the resultant instream TSS concentration calculated above ($C = 65.1$ mg/L) meets the Canadian Water Quality Guidelines for the Protection of Aquatic Life for Total Particulate Matter⁸. It is also important to note that the lagoon effluent receives further treatment post discharge, as it flows through the wetlands between the Sewage Treatment Facilities and the East Channel of the Mackenzie River.

No BOD or CBOD data was available for the East Channel of the Mackenzie River, so the above calculation could not be performed for the EQC for BOD or CBOD. The resultant TSS concentration above illustrate that using very conservative flow data and worst-case conditions for dilution, the dilution of the Sewage Treatment Facilities effluent in the Mackenzie River is very high. Given these conditions, the Board concludes that the existing EQC for BOD is appropriate. This approach to using technology-based EQCs when effluent is discharged to a large river with a dilution factor is similar to the Town of Fort Smith's Water Licence, MV2011L3-0001.⁹ However, since CBOD and BOD are closely related parameters that are both used to monitor the oxygen-consuming capability of sewage discharges, and because the Wastewater System Effluent Regulations¹⁰ use CBOD instead of BOD, it is recommended that CBOD be monitored and used as the EQC for sewage discharge in this Licence, rather than BOD. In order to derive an appropriate EQC for CBOD, Board staff looked to the BOD/CBOD Trend Analysis¹¹ submitted by the City of Yellowknife (as per municipal Licence, MV2009L3-0007), and Trend Analysis submitted by the Town of Fort Smith¹² (as per municipal Licence MV2011L3-0001). These reports illustrate that over a three-year average, CBOD values were approximately 90% of BOD values for wastewater effluent in each community. Therefore, Board staff recommend an EQC of 135 mg/L CBOD, which is 90% of the EQC for BOD (150 mg/L) in the existing Licence.

⁶ See ENR WRD – Mackenzie River East Channel at Inuvik Mean and 7Q10 Flow May 17 2017, available on the GLWB Public Registry, under Renew Application, Water Licence G17L3-001.

⁷ See Environment Canada, Water Office Database (www.wateroffice.ec.gc.ca), Monthly Discharge Data for Mackenzie River at East Channel (Station 10LC002).

⁸ Canadian Water Quality Guidelines for the Protection of Aquatic Life, Total Particulate Matter, Factsheet. <http://cegg-rcqe.ccme.ca/download/en/217>

⁹ See the MVLWB (www.mvlwb.com) Online Registry for Reasons for Decision, [MV2001L3-0001 Type A WL Approval – Nov 23-11](#), Town of Fort Smith.

¹⁰ [Wastewater System Effluent Regulations](#), SOR/2012-139, Minister of Justice, Canada.

¹¹ See the MVLWB (www.mvlwb.com) Online Registry for the City of Yellowknife, MV2009L3-0007, [MV2009L3-0007 - City of Yellowknife - BOD and CBOD Study and SNP Proposal](#), May 2016.

¹² See the MVLWB (www.mvlwb.com) Online Registry for the City of Yellowknife, MV2011L3-0001, [MV2011L3-0007 - Town of Fort Smith - BOD and CBOD Trend Analysis](#), July 2016.

Both the pH and oil and grease criteria in Part D, item 5 are typical of EQC for municipal sewage discharge in water licenses issued by the Board.

The EQC in the existing Licence G06L3-001 for fecal coliforms will remain: $1 \times 10^6/100\text{mL}$. No specific recommendations for a change in the fecal coliform EQC were raised during the review period.

Fencing at the Solid Waste Disposal Facilities

Part D, Item 15 requires the submission of a Solid Waste Disposal Facilities Fencing Plan within two years of Licence issuance. This requirement was included in response to recommendations pertaining to the management of landfill-habituated bears and windblown garbage concerns.

Surveillance Network Program Sampling Requirements

The SNP is annexed to the Licence to detail sampling and monitoring requirements related to compliance with conditions and plans required under the Licence. Requirements for measuring flows, volumes, and meteorological data are based on standard water licence conditions as are the reporting requirements. The Board may consider changes to the timing, frequency, and location of samples if additional evidence becomes available.

The location at which EQC must be met (SNP 0036-3) has been carried over from the previous Water Licence. In response to recommendations received during the application review and subsequent technical session, an additional SNP station (0036-9) has been added to the Licence, for the purpose of monitoring water quality in Boot Creek upstream of Boot Lake. SNP 0036-2 has been discontinued from previous years Licences, as the new water intake facility will now be drawing water from the Mackenzie River year-round. The location of SNP 0036-1 has been adjusted to account for the location of the new water intake facility.

SNP parameters were carried over from the existing Water Licence G06L3-001, however during the draft Licence review AECOM recommended that unionized ammonia should replace ammonium at SNP, in order to parallel the WSERs. In addition, the monitoring of Total Petroleum Hydrocarbons (TPH) at SNP 0036-4, 0036-5, and 0036-9, as recommended by the GRRB during the April 27 technical session, was included in the renewal Licence. This also mirrors the requirements of other municipal water licences across the Mackenzie Valley.

Part E: Conditions Applying to Operation and Maintenance

Operation and Maintenance Plans for the Wastewater Treatment Facilities and Solid Waste Facility were submitted to the Board with the Water Licence application. Part E is related to the review of management plans for the operation and maintenance of the Solid Waste Disposal Facilities, Sewage Disposal Facilities and Water Supply Facilities. These conditions are consistent with other Licences issued by the Board.

Part F: Conditions Applying to Construction

Part F of the Licence addresses a variety of issues related to Construction, including designs, maintenance, record-keeping, as-built drawings, notifications, and Board approval requirements. The main purpose of this Part is to ensure that Construction is carried out to appropriate standards with proper oversight, in order to facilitate good performance, avoid failures, and ultimately, to protect the environment. The conditions in this part are consistent with other municipal water licences issued by the Board.

Part G: Conditions Applying to Modifications

Part G of the Licence contains conditions outlining when and how Modifications of the engineered structures may be authorized. The conditions ensure that the Board and the Inspector are kept informed and have the opportunity to request more information or reject a proposed Modification. This section is closely linked to the Construction section (Part F). Part F relies on the definition of Modification, which does not include expansions or alterations of the purpose or function of a structure. The conditions in this section are consistent with other Licences issued by the Board.

The purpose of Part G is to streamline the process for authorizing Modifications and ensure that any proposed changes that might be inconsistent with the scope or conditions of the Licence are brought to the Board's attention.

Part H: Conditions Applying to Spill Contingency Planning

The conditions under Part H of the Licence are standard conditions to ensure procedures are in place to respond to spills. The planning and reporting requirements in this part ensure that the Licensee has identified the lines of authority and responsibility for spill response, established reliable reporting and communication procedures, and has an action plan for spill response. The intent is to ensure that any spills are effectively controlled and cleaned up in order to prevent or minimize damage to the receiving environment.

Part I: Conditions Applying to Closure and Reclamation

Part I of the Licence pertains to closure and reclamation of the waste disposal facilities. The general condition is similar to those in other licences.

CONCLUSION

Subject to the term and conditions set out in the Licence, and for the reasons expressed herein, the GLWB is of the opinion that the licensed undertaking for water use and waste disposal associated with the Town of Inuvik can be completed by the Licensee while providing for the conservation, development, and

utilization of waters in a manner that will provide the optimum benefit for all Canadians, and in particular, for the residents of the Gwich'in Settlement Area.

Water Licence G17L3-001 contains provisions that the Board feels necessary to ensure and monitor compliance with the MVRMA and the *Waters Act* and the Regulations made thereunder and to provide appropriate safeguards in respect of the Applicant's use water and deposit of waste.

SIGNATURE



Elizabeth Wright
Acting Chair, Gwich'in Land and Water Board

May 23, 2017

Date