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November 14, 2018

File: W2017L3-0002

Ms. Lisa Nitsiza
Senior Administrative Officer
Community Government of Whatì
P.O. Box 71
Whatì, NT X0E 1P0

Email: sao@whati.ca

Dear Ms. Nitsiza,

Re: Lagoon Summer Cell Expansion - Design

The Wek'èezhii Land and Water Board (WLWB) met on October 24, 2018 to consider the Community Government of Whatì's (CGW) request for the approval of design drawings (the Design) for a proposed expansion to the lagoon summer cell at the Sewage Disposal Facilities (SDF). The Board has approved the Design, and requires CGW to address items 1-3 in the Reasons for Decision. The Board's Reasons for Decision are attached.

Sincerely,

A handwritten signature in blue ink, appearing to read "Joe Mackenzie".

Joe Mackenzie
Chair, Wek'èezhii Land and Water Board

Copied: Wek'èezhii West Distribution List



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Reasons for Decision

Reference/File Number:	W2017L3-0002
Licensee:	Community Government of Whatì
Subject:	Lagoon Summer Cell Expansion

Decision from the Wek'èezhì Land and Water Board Meeting of October 24, 2018

1.0 Decision

On October 24, 2018, the Wek'èezhì Land and Water Board (the Board) met to consider a request by the Community Government of Whatì for the approval of design drawings¹ (the Design) for a proposed expansion to the Community Government of Whatì's (CGW) lagoon summer cell at the Sewage Disposal Facilities (SDF), as per Part E, Condition 1 of Water Licence W2017L3-0002 (the Licence).² The Board approved the Design, and requires CGW to complete the following:

1. Investigate the type and source of EQC exceedances, and to provide an update in their next Annual Report;
2. Submit Version 3.0 of the SDF Operations & Management (O&M) Plan to the Board for approval, describing the expanded lagoon cell and associated operation and maintenance changes, 90 days prior to discharging wastewater into the expanded lagoon cell; and
3. Describe plans for sludge management in Version 3.0 of the SDF O&M Plan.

2.0 Background

On September 14, 2018, the CGW submitted the Design proposing to expand the lagoon summer cell. As per Part E, Condition 1 of the Licence, CGW are required to submit design drawings stamped by a

¹ See WLWB Registry for [W2017L3-0002 – Whatì – Lagoon Summer Cell Expansion – Design Drawings – Sept 1 18](#)

² See WLWB Registry for [W2017L3-0002 – Whatì – Type B Water Licence Renewal – Water Licence and SNP – Sep 22 17](#)

Professional Engineer, prior to the construction “of any dams, dykes or structures intended to contain, withhold, divert or retain water or Wastes”.³

The capacity of the sewage facility has been proposed to be increased to accommodate the temporary increase in population due to the estimated 300 workers required to build the Tłıchq All-Season Road (TASR) which is a two-lane gravel all-season highway proposed to extend from Highway 3 near Behchokq to Whatı.⁴

As detailed in the CGW’s Operations and Maintenance (O&M) Plan⁵ for the SDF, sewage is collected and transported by truck to a wetlands treatment facility. Wastewater is discharged into either the winter or summer lagoon, depending on the season. The larger winter cell is designed to hold half of Whatı’s total annual sewage generation (approximately 11,400m³). From each lagoon, sewage flows through three ponded areas, each with a spring detention time of five days. The treated sewage is discharged to the surrounding land area, eventually reaching Lac La Martre River. In winter, the sewage freezes and forms an ice pack in the lagoon area, with little to no discharge into the wetlands system. In the spring, the six-month accumulation melts and enters the system over several weeks, by natural exfiltration through the berms. The smaller summer lagoon has been out of service since 2015, due to a leak. This cell is planned to be rebuilt and put back into service to meet the additional demand that the TASR will bring, with upgrades including a new liner, berm and culverts. CGW is aiming to proceed with construction this fall, as their available funding expires March 31, 2019.⁶

The Design was distributed for review on September 18, 2018. Comments were received by the Government of the Northwest Territories – Department of Environment and Natural Resources (ENR), and WLWB Staff. Proponent responses were received on October 16, 2018, five days after the deadline of October 11, 2018. The Review Summary Table, including reviewer comments and proponent responses, is available on the WLWB Online Registry (see Review Summary and Attachments).⁷

3.0 Reasons for Decision

3.1 Approval of the Expansion Plan

The Board believes that the Design for the CGW’s lagoon summer cell expansion satisfies the requirements of CGW’s Licence:⁸

- As per Part D, Condition 6, the Design indicates a Freeboard limit of 1.0 metre; and
- As per Part E, Condition 1, the Design is stamped by a Professional Engineer.

After reviewing the submission of the CGW, the written comments and submissions received by the Board, the Board do not believe that there were issues raised during the public review that are significant enough to prevent the Board from approving the Design. Relevant issues are discussed in further detail below.

Decision 1: The Board approves the Design of the lagoon summer cell expansion.

³ See WLWB Registry for [W2017L3-0002 – Whatı – Type B Water Licence Renewal – Water Licence and SNP – Sep 22 17](#)

⁴ See WLWB Registry for [W2017L3-0002 – Whatı – Lagoon Summer Cell Expansion – Submission Correspondence – Sept 14 18](#)

⁵ See WLWB Registry for [W2017L3-0002 – Whatı – Operation and Maintenance Plan – Sewage Treatment – Version 2.0 – Aug 17 17](#)

⁶ See WLWB Registry for [W2017L3-0002 – Whatı – Lagoon Summer Cell Expansion – Submission Correspondence – Sept 14 18](#)

⁷ See WLWB Registry for [W2017L3-0002 – Whatı – Lagoon Summer Cell Expansion – Review Summary and Attachments – Oct 16 18](#)

⁸ See WLWB Registry for [W2017L3-0002 – Whatı – Type B Water Licence Renewal – Water Licence and SNP – Sep 22 17](#)

3.2 Whati's effluent quality criteria

Both ENR and Board staff commented on Whati's effluent quality criteria (EQC). ENR (ENR comment 2) noted that EQCs have been exceeded, for Biochemical Oxygen Demand (BOD) at SNP 002-1, and for Total Suspended Solids (TSS) at both Surveillance Network Program (SNP) stations (SNP 002-1 and SNP 002-3). ENR suggested "that the cell expansion project planning for the cell expansion may not have considered current wastewater treatment performance challenges", and recommended that the CGW "ensure that the current cell expansion is planned with consideration of wastewater treatment objectives and Water Licence EQCs compliance limits" are considered in the planning of the expansion". The CGW responded stating that the "design of the expansion to the current summer cell was prepared with a review and a consideration of the water licence EQC compliance limits as specified in the water licence". The Board further notes that the EQC for Oil and Grease has also been exceeded several times in the past two years.

Board staff (WLWB comment 4) asked whether CGW expected any changes to the treatment efficacy, and whether the EQC required reconsideration. The CGW responded stating that the new summer cell "was designed with the same criteria applied for the current summer cell, applying the best practices of sewage detention in a series of detention ponds, followed by supplemental wetland treatment". The CGW further stated that "based upon these design criteria, it is anticipated that the current treatment efficacy will be maintained."

Board staff (WLWB comment 3) also asked whether the SNP stations (SNP 002-1 and SNP 002-3) will still be in the ideal locations following the expansion. The CGW responded the "existing SNP locations downstream of the treatment facility still appear to be the most appropriate locations".

Table 1 summarizes Whati's EQCs (as per the Licence), and their SNP results from 2017 -2018.

Table 1: Whati's Licence EQCs and SNP results 2017-2018^{9 10 11}

TABLE KEY:	Sample below EQC.	Sample exceeds EQC.	Sample was received past hold time; analysis not possible.			
SNP Station 002-2						
Parameter	Maximum Average Concentration	Aug 2018	June 2018	Sept 2017	Aug 2017	July 2017
Suspended Solids	240 mg/L	6860 mg/L	1800 mg/L	< 3 mg/L	134 mg/L	220 mg/L
Oil and Grease	5 mg/L	79.1 mg/L	15.5 mg/L	<2 mg/L	49.5 mg/L	95.8 mg/L
BOD	260 mg/L	576 mg/L	438 mg/L	N/A	N/A	463 mg/L (inconclusive result)
Faecal Coliforms	1 x 10 ⁶ CFU/100ml (1,000,000)	4,100,000 CFU/100ml	N/A	N/A	N/A	10,200,000 CFU/100ml
SNP Station 002-3						
Parameter	Maximum Average Concentration	Aug 2018	June 2018	Sept 2017	Aug 2017	July 2017
Suspended Solids	25 mg/L	124 mg/L	10 mg/L	184 mg/L	27 mg/L	62 mg/L
Oil and Grease	5 mg/L	< 2.0 mg/L	< 2.0 mg/L	80.4 mg/L	< 2.0 mg/L	< 2.0 mg/L
BOD	25 mg/L	19 mg/L	24 mg/L	N/A	N/A	6 mg/L
Faecal Coliforms	1 x 10 ⁶ CFU/100ml (1000000)	130 CFU/100ml	1 CFU/100ml	N/A	N/A	15 CFU/100ml

⁹ See WLWB Registry for [W2017L3-0002 – Whati – 2017 Annual Water Licence Report – May 7 18](#)

¹⁰ See WLWB Registry for [W2017L3-0002 – Whati – SNP Results – August 14 2018 – Sep 1 18](#)

¹¹ See WLWB Registry for [W2017L3-0002 – Whati – SNP Results – June 8 2017 – Jul 4 17](#)

The Board notes that during the public review of CGW's Water Licence Renewal in September 2017, Environment and Climate Change Canada (ECCC) raised concerns on the effluent quality of SNP 002-2 because of exceedances in 2016.¹² The CGW responded stating that reopening the summer retention pond may assist in the improvement of effluent quality. In their Reasons for Decision, the Board noted that alternatively the exceedances may be due to the SNP samples being collected at the incorrect location.¹³ The Board noted that the SNP Station 002-2 sample was meant to be collected at the end of the lagoon ponds, after sewage had spent time in several ponded and bermed areas. Instead, SNP Station 002-2 had been sampled adjacent to the winter ice pack storage berm, thus samples were potentially capturing direct sewage.¹⁴

The CGW have stated that reopening and expanding the summer cell lagoon may improve effluent quality. The Board considers that further investigation would identify the type and source of the exceedances that have been recorded from the SNP stations. The Board is of the opinion that investigating the source of these exceedances would enable the CGW (or the Board if required) to better understand what further steps could be undertaken to ensure that an acceptable level of water quality is maintained.

Decision 2: The Board directs the CGW to investigate the type and source of EQC exceedances, in coordination with the Inspector, and provide an update in their next Annual Report.

3.3 Updating the Operations and Maintenance (O&M) Plan

ENR (ENR comment 1) asked that "further information on the summer cell and associated SDF be provided as part of the current expansion application" and recommended that "the current changes of operations and/or technology" be included in the CGW's next O&M Plan. The CGW responded stating they "acknowledge this recommendation and intend to address operation and maintenance clarifications where applicable in the next annual report submission."

ENR (ENR comment 3) recommended that the CGW "evaluate potential sources of the elevated TSS at the outlet of the treatment lagoon". ENR further recommended that the CGW "outline which management action(s) will be planned in the future, to maintain Suspended Solids (SS) within compliance limits" and asked that these are outlined in the next SDF O&M Plan. The CGW responded stating that a "future study to ascertain the potential sources of the elevated TSS at SNP002 will be considered if the TSS exceed the current requirements after the new cell becomes operational. The CGW further stated that the new summer cell should "maintain an estimated minimum retention time of 22 days, including a 1 day with the holding cell and 21 combined days within the 3 downstream 3 detention cells".

Board staff (WLWB comment 2) asked whether the CGW would be submitting an updated O&M Plan to the Board for approval to reflect the lagoon expansion, and if so when. The CGW responded that they "intend to address operation and maintenance clarifications, where applicable, in the next annual submission".

As per Part H, Condition 1 of the Licence, the CGW must annually review O&M Plans, and submit updates to the Board for approval, "when necessary to reflect changes in operation or technology".¹⁵ The approved SDF O&M Plan states that the CGW "will be completing upgrades to the summer retention pond in 2018".¹⁶

¹² See WLWB Registry for [W2017L3-0002 – Whati – Type B Renewal Application – Review Summary and Attachments – Sep 5 17](#)

¹³ See WLWB Registry for [W2007L3-0002 – Whati – Water Licence – Conditions for SNP – Sep 28 07](#)

¹⁴ See WLWB Registry for [W2017L3-002 – Whati – Reasons for Decision – Sep 27 17](#)

¹⁵ See WLWB Registry for [W2017L3-0002 – Whati – Type B Water Licence Renewal – Water Licence and SNP – Sep 22 17](#)

¹⁶ See WLWB Registry for [W2017L3-0002 – Whati – Operation and Maintenance Plan – Sewage Treatment – Version 2.0 – Aug 17 17](#)

The Board believe that an updated SDF O&M Plan is required to address the expansion in operations. Additional issues relevant to operation and maintenance are discussed below.

Decision 3: The Board directs the CGW to submit Version 3.0 of the SDF O&M Plan to the Board for Approval, describing the expanded lagoon cell and associated operation and maintenance changes, 90 days prior to discharging wastewater into the expanded lagoon summer cell.

3.3.1 Best Practice for Wastewater Treatment Storage

ENR (ENR comment 4) provided information on research that suggested a lagoon storage time of 10 months is best practice for wastewater treatment performance. ENR noted that the Design specifies “a 5-day spring retention time at the existing wetland detention areas no. 1, 2 and 3, corresponding also to 5 days spring detention periods” specified for the winter cell in the SDF O&M Plan. ENR further stated that the “application specifies a working volume to be 1,760 m³”, as well as “an estimated holding cell discharge cycle of 7 days”. ENR recommended that the CGW specify “how best practices regarding storage time were and/or will be considered in the current SDF modification (summer cell expansion) towards optimum wastewater treatment”. The CGW responded stating that the “new expanded summer cell was designed with the same criteria applied for the current summer cell, applying the best practices of sewage detention in a series of detention ponds, followed by supplemental wetland treatment”.

ENR (ENR comment 5) recommended that “further details be provided as to how the increased discharge volume from an anticipated population increase will not be influencing the subsequent wetland detention times of 5 days, pre and post expansion”. The CGW responded stating that the expanded summer cell “has been formulated to maintain an estimated average total retention time of 24 days. The estimated minimum retention time is 22 days, including a 1 day with the holding cell and 21 combined days within the 3 downstream detention cells”. The CGW further stated that the “condition of the downstream detention cells is unknown, therefore the detention time is estimated based upon the design drawings prepared in 2000”. The Board was satisfied with the CGW’s response, but note that the approved O&M Plan states that “sewage flows through a series of three ponded areas, each with a spring detention time of 5 days”.¹⁷

3.3.2 Sludge Management

ENR (ENR comment 6) commented that “the most recent Annual Report (2017) specifies that no sludge has been removed from the sewage lagoon(s), and that sludge measurements are to commence in the summer of 2018”. ENR asked “whether sludge build up overtime in the proposed summer cell expansion project was acknowledged in the current expansion planning, so that sufficient sewage/wastewater storage allowing for optimum treatment (and retention) is planned”. ENR recommended that “additional summer cell expansion details be provided which specify how sludge build up volumes have been, or will be, considered over time during overall SDF operations”. The CGW responded stating a “sludge study was not completed as part of the current scope of work for the new expanded summer cell – sludge storage volume will be accommodated in the bottom of the cell by placing the outlet discharge pipe a minimum of 0.5 metres above the base of the cell”.

As per Schedule 2, item 1(b) of the Licence, the CGW must include the “removal of floating materials and sludge from the Sewage Disposal Facilities” in their O&M Plan. Additionally, as per Schedule 1, item 1(a) of the Licence, the CGW must include “the annual quantities in cubic metres of sludge in the sewage lagoon” in the Annual Report.¹⁸ The Board notes that the 2017 Annual Report states that “sludge volumes will be

¹⁷ See WLWB Registry for [W2017L3-0002 – Whati – Operation and Maintenance Plan – Sewage Treatment – Version 2.0 – Aug 17 17](#)

¹⁸ See WLWB Registry for [W2017L3-0002 – Whati – Type B Water Licence Renewal – Water Licence and SNP – Sep 22 17](#)

submitted in the 2018 annual report”.¹⁹ The Board believes that once the Annual Report is submitted, the CGW needs to provide further information on how sludge will be managed in the community, as per the *MVLWB Operation and Maintenance Plan templates for Municipal Water Licences: Sewage Disposal Facilities*.²⁰

Decision 4: The Board directs the CGW to describe their plans for sludge management in Version 3.0 of the SDF O&M Plan.

3.3.3 Discharge Regime

ENR (ENR comment 7) commented that the SDF O&M Plan specifies that sewage in the winter cell freezes to form an ice pack during winter, during which “there is effectively zero discharge into the wetlands systems, which will gradually melt and enter the system by natural exfiltration of the berms.” ENR recommended that the CGW “specify the discharge regime” that will be used at the proposed expanded summer cell. The CGW responded stating that “the discharge regime for the expanded summer cell is a periodic discharge through a 400 mm pipe throughout the estimated 165 day annual operating period of the expanded summer cell. The expanded summer cell will be lined with an impermeable synthetic membrane”. The Board was satisfied with this response.

3.4 Materials Used for Construction

Board staff (WLWB comment 1) commented that the Licence requires that “any fill materials used in the construction of any facilities must be from an approved source and be clean and free of contaminants”. Board staff asked CGW to describe the material that may be used during construction, and to confirm that they are from an approved source and are clean and free of contaminants. The CGW responded stating that the “materials used during construction will be readily available granular material from the local Hamlet quarry – the material will be clean and free of containments”. The Board was satisfied with this response.

Signed the 14th November, 2018, on behalf of the Wek’èezhii Land and Water Board



Witness



Joe Mackenzie
Chair, Wek’èezhii Land and Water Board

¹⁹ See WLWB Registry for [W2017L3-0002 – Whati – 2017 Annual Water Licence Report – May 7 18](#)

²⁰ See WLWB Website for [MVLWB Operation and Maintenance Plan Templates for Municipal Water Licences: Sewage Disposal Facilities](#)