



Mackenzie Valley Land and Water Board
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Staff Report

Applicant: Hamlet of Fort Liard	
Location: Fort Liard, NT	Application: MV2009L3-0025
Date Prepared: June 26, 2017	Meeting Date: July 6, 2017
Subject: Sewage Lagoon Desludging Plan	

1. Purpose/Report Summary

The purpose of this Report is to present to the Mackenzie Valley Land and Water Board (MVLWB/the Board) for approval, a Sewage Lagoon Desludging Plan (Plan) submitted by the Hamlet of Fort Liard (Hamlet), in accordance with Part I, item 5 of their municipal Water Licence (Licence) MV2009L3-0025.

2. Background

- March 1, 2010 – Issuance;
- May 5, 2017 – Sewage Lagoon Desludging Plan received;
- May 10, 2017 – Sewage Lagoon Desludging Plan distributed for review;
- June 7, 2017 – Reviewer comments and recommendations due and received;
- June 14, 2017 – Hamlet response deadline;
- June 15, 2017 – Hamlet responses received;
- **July 6, 2017 – Sewage Lagoon Desludging Plan presented to the Board for approval;** and
- February 29, 2020 – Expiration.

3. Discussion

Licence Requirements

Part I, item 5 of the Licence states:

The Licensee shall submit a sludge management plan to the Board for approval 90 days prior to desludging the Sewage Disposal Facility. The plan shall include, but not be limited to, the following:

- a. Maintenance procedures (periodic removal and disposal of Sewage sludge);*
- b. Quantities of sludge likely to be produced;*
- c. Identification of the required frequency of extraction from the lagoons; and*
- d. operational procedures developed for environmentally sound removal and disposal.*

Submission Description

The Hamlet has submitted a plan to desludge Cell 3 of their Sewage Disposal Facilities (Lagoon), which has been identified as the priority for improving lagoon function by removal of sludge.

4. Comments

This Plan addresses the immediate desludging of a particular lagoon cell, whereas the Licence conditions imply the requirement for a more generic sludge removal plan for the Sewage Disposal Facility. As below, Board staff suggest that when sludge is to be removed from the Sewage Disposal Facilities again, the Plan should be updated to reflect any changes to sludge management practices.

The Hamlet has not included a concordance table in the Plan to demonstrate where each Licence condition has been addressed in the Plan; however, the introductory paragraph lists each component of Part I, item 5. Table 1 below lists the components of the Plan required in the Licence and details on the adequacy of the submission.

Table 1: Plan Completeness

	Components of the Plan as required in Part I, item 5 of the Licence	Board staff analysis of the adequacy of the Plan in addressing the component
a)	Maintenance procedures (periodic removal and disposal of Sewage sludge);	<p>Adequate (Sludge Removal Method, Sludge Disposal Method, and Maintenance sections).</p> <p>As per Comment ID MVLWB 1 and 2, the Hamlet should include the step-by-step process for sampling, submitting results, and seeking approval prior to removing sludge from the Geotubes in the Plan.</p> <p>As per Comment ID MVLWB 4, the Hamlet should include details regarding the addition of flocculent to the Geotubes.</p> <p>As per Comment ID MVLWB 7, the Plan should be revised to include discussion of future desludging events; when sludge is to be removed from the Sewage Disposal Facilities again, the Plan should be updated to reflect any changes to sludge management practices.</p>
b)	Quantities of sludge likely to be produced;	Adequate (Characterization of Sludge section).
c)	Identification of the required frequency of extraction from the lagoons;	Some details are provided in the Characterization of Sludge section, including reference to annual sludge measurements to track sludge accumulation in each cell (pg 1).

		As noted above, when sludge is to be removed from the Sewage Disposal Facilities again, the Plan should be updated to reflect any changes to sludge management practices.
d)	Operational procedures developed for environmentally sound removal and disposal.	<p>As per Comment ID GNWT-ENR 3, the Hamlet should specify where laboratory data will be kept, once sludge testing has been conducted.</p> <p>As per Comment ID MVLWB 5, the Hamlet should include the site selection criteria for the Geotube pad.</p> <p>As per Comment ID MVLWB 6 and Part H, item 1 of MV2009L3-0025, design details of the Geotubes should be submitted to the Board prior to construction.</p>

5. Reviewer Comments

By June 7, 2017, comments and recommendations on the Plan were received from Environment and Climate Change Canada (ECCC), the Government of the Northwest Territories Department of Environment and Natural Resources (GNWT-ENR), and Board staff.

The Hamlet responded on June 15, 2017. The Review Summary and Attachments (attached) presents the concerns identified through the review of the Plan. Table 1 above addresses some of the topics raised.

In response to Comment ID GNWT-ENR 1, Board staff note that MV2009L3-0025 contains Effluent Quality Criteria (EQC) for station 1478-9 (site of compliance to monitor final effluent quality before discharge to the receiving environment) that the Hamlet must meet. The Hamlet could be reminded to continue to sample this station as per Licence requirements.

GNWT-ENR identified (Comment ID GNWT-ENR 4) that ‘Current EQCs in Part D of the Hamlet’s Water Licence were selected for sewage wastes,’ and recommended that ‘the Board consider whether additional non-sewage parameters should be included at SNP 1478-9 to identify if significant discharges of non-sewage waste to the SDF are occurring.’ Board staff note that the Sludge Management Plan contains criteria for the management of sludge, and that the criteria include non-sewage waste parameters. Board staff further note that based on the definition of “Sewage” and “Sewage Disposal Facilities” in MV2009L3-0025, only toilet and greywater wastes should be disposed to the lagoon system. The types of wastes entering the Sewage Disposal Facilities should be addressed and well-defined in the Hamlet’s outstanding Sewage Disposal Facilities O&M Plan.

A number of reviewer comments were related to annual reporting under MV2009L3-0025. Board staff note that the Hamlet could be reminded to include the following in their annual reporting:

- Quantities of sludge removed for the sewage disposal facility (Comment ID GNWT-ENR 2); and
- Analytical results from sludge testing (Comment ID GNWT-ENR 3 and MVLWB 9);

Board staff note that some items identified for revision during this review are best applied to the forthcoming Wastewater Treatment Facility Operation and Maintenance Plan, which the Hamlet plans to submit in the near future using the MVLWB templates. These include:

- Sampling and frequency parameters for sludge analysis (Comment ID ECCC 1); and
- Procedures for sludge testing (Comment ID GNWT-ENR 3 and MVLWB 9) and desludging (Comment ID MVLWB 7 and 8).

6. Security

N/A

7. Conclusion

Board staff conclude that further information was provided by the Hamlet in their responses to reviewer comments; Board staff suggest this submission is in conformity with the requirements of MV2009L3-0025; however, the Plan could be improved with additional information prior to final approval.

8. Recommendation

Board staff recommend the Board approve the Plan as an interim plan and requires the Hamlet to submit a revised Plan (Version 1.1) by July 14, 2017. The revised Plan will be considered to be approved upon written confirmation of conformity by Board staff.

A draft interim approval letter is attached, with the following options for the Board's consideration. One or more of these options could be chosen to include in the Board's interim approval letter, to address the revisions that have been suggested:

1. include the step-by-step process for sampling, submitting results, and seeking approval prior to removing sludge from the Geotubes in the Plan;
2. include details regarding the addition of flocculent to the Geotubes;
3. include discussion of future desludging events;
4. specify where laboratory data will be kept, once sludge testing has been conducted; and
5. include the site selection criteria for the Geotube pad.

Board staff recommend that the Board remind the Hamlet to continue sampling all SNP stations as per Licence SNP requirements, and to report on the quantities of sludge removed from the Sewage Disposal Facilities, and the analytical results from sludge testing, in their annual reporting (due March 31 each year).

Board staff recommend that the Board request that as per Part H, item 1 of MV2009L3-0025, the Hamlet should submit design details of the Geotubes to the Board prior to construction.

Board staff recommend including the following text in the decision letter:

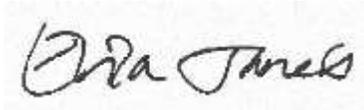
- The Board notes that some items identified for revision during the review of this Plan are best applied to the forthcoming Wastewater Treatment Facility Operation and Maintenance Plan, which the Hamlet plans to submit in the near future, using the MVLWB templates. These include:
 - Sampling and frequency parameters for sludge analysis; and
 - Procedures for sludge testing and desludging.

- The Board further notes that when sludge is to be removed from the Sewage Disposal Facilities again, the Plan should be updated as necessary to reflect any changes to sludge management practices, and resubmitted to the Board for approval.
- The Board thanks the Hamlet for their continued work toward achieving compliance with their Water Licence.
- The Hamlet shall adhere to the commitments made in their responses to reviewer comments dated June 15, 2017.

9. Attachments

- [Sewage Lagoon Desludging Plan](#)
- Review Comment Summary Table
- Draft Reasons for Decision
- Decision Letter from the Board

Respectfully submitted,



Erica Janes
Regulatory Specialist



Heather Scott
Technical Advisor

Review Comment Table

Board:	MVLWB
Review Item:	Hamlet of Fort Liard Sewage Lagoon Desludging Plan (MV2009L3-0025)
File(s):	MV2009L3-0025
Proponent:	Hamlet of Fort Liard
Document(s):	MV2009L3-0025 - Ft Liard - Desludging Plan August 2017 - May5-17 (2.3MB)
Item For Review Distributed On:	May 10 at 13:27 Distribution List
Reviewer Comments Due By:	June 7, 2017
Proponent Responses Due By:	June 14, 2017
Item Description:	<p>The Hamlet of Fort Liard has submitted a Desludging Plan for Cell 3 of their Sewage Disposal Facility (Lagoon), in accordance with Part I, item 5 of their municipal Water Licence MV2009L3-0025. This Plan is for Board approval.</p> <p>Part I, item 5 of MV2009L3-0025 states:</p> <p style="padding-left: 40px;"><i>The Licensee shall submit a sludge management plan to the Board for approval 90 days prior to desludging the Sewage Disposal Facility. The plan shall include, but not be limited to, the following:</i></p> <ul style="list-style-type: none"> <i>a. Maintenance procedures (periodic removal and disposal of Sewage sludge);</i> <i>b. Quantities of sludge likely to be produced;</i> <i>c. Identification of the required frequency of extraction from the lagoons; and</i> <i>d. Operational procedures developed for environmentally sound removal and disposal.</i> <p>Reviewers are invited to submit questions, comments and recommendations on the Hamlet’s Desludging Plan by June 7, 2017.</p> <p>If you have questions or comments regarding this review or the Online Review System, please contact Erica Janes at (867) 766-7466 or ejanes@mvlwb.com.</p>

General Reviewer Information:	<p>In addition to the email distribution list, the following organizations received review material by fax:</p> <ul style="list-style-type: none"> • Fort Liard Metis Local #67 - Ernie McLeod, President: (867)770-4573; • Fort Simpson Métis Local #52 - Marie Lafferty, President: (867)695-2040; • Hay River Metis Council - Trevor Beck, President: (867)874-4472; and • Northwest Territory Métis Nation - Tim Heron, NWTMN IMA Coordinator: (867)872-3586.
Contact Information:	<p>Erica Janes 867-766-7466 Heather Scott 867-766-7463 Jen Potten 867-766-7468</p>

Comment Summary

Environment and Climate Change Canada: Emily Nichol				
ID	Topic	Reviewer Comment/Recommendation	Proponent Response	Board Staff Analysis
3	General File	Comment (doc) ECCC Comment Letter Recommendation		Noted.
1	Sludge monitoring	<p>Comment The desludging plan provides the following recommendation, "as the Hamlet operates a multi-cell facility, every year the sludge levels in each of the sewage cells should be measured and sampled to keep an annual report on the sludge characteristics and to determine when the next desludge event should take place" (page 6, Sewage Lagoon Desludging Plan).</p> <p>Recommendation ECCC supports the consultant's recommendation to measure the sludge levels in each of the sewage lagoon cells annually. Chemical characterization should be done</p>	<p>June 15: The Hamlet will be submitting a WWF O&M Plan in the near future using the MVLWB templates. Additional information regarding sludge level measurements and chemical characterization information can be attached or the template amended as required by the Board.</p>	Noted. The Hamlet should include sampling frequency and parameters for sludge analysis in the forthcoming Wastewater Treatment Facility Operation and Maintenance Plan.

		periodically and prior to desludging. This will allow tracking of sludge depth and characteristics in order to inform sludge management.		
2	Performance of geotube units under Northern conditions; Alternate treatment/management options	Comment The Hamlet intends to install Layfield Geotube containers for the interim storage, de-watering and treatment of the lagoon sludge (page 3, Sewage Lagoon Desludging Plan). The de-watering and treatment process is expected to take 2-3 years. Once treated and de-watered, the Hamlet intends to use the dried sludge as landfill cover material. The dried sludge will be sampled and sent to a lab for analysis in order to confirm that it meets the quality guidelines for landfill application. If the results of analyses are within guidelines and with approval from the Mackenzie Valley Land and Water Board, the sludge will be used as landfill cover. However, if the sludge analyses exceed guidelines, further treatment of the sludge will be required (page 5, Sewage Lagoon Desludging Plan). The Sewage Lagoon Desludging Plan does not mention whether there is a track record for the successful use of geotubes in the North or if this technology has been demonstrated to achieve the intended treatment levels under Northern conditions. There is no information provided regarding what additional treatment measure(s) would be	June 15: Similar technology has been applied at mine sites in the NT, in the Yukon, Alaska, Northern Alberta and Northern BC. It should be noted that Geotubes provide the same type of drying/freezing treatment process as would a sludge bed, landfarm or 'dedicated cell'. Sludge dewatering occurs as a result of drying/freezing cycles, and sludge stabilization (treatment) occurs as a function of aerobic and anaerobic decomposition over time. Geotubes simply provide a physical barrier intended to retain the sludge in an effort to reduce the footprint of affected/contaminated land. If the treated sludge does not meet the criteria for land application at the time of sampling (est. 2-3 years), more time may be needed for stabilization. Providing alternate treatment/management options may therefore be redundant, as the concept is in line with established guidelines for sludge disposal in the NWT (Heike 1996).	Acceptable response.

		<p>implemented, should the proposed treatment not achieve the quality guidelines/criteria for the intended landfill application. Alternate treatment options should be discussed in the plan.</p> <p>Recommendation ECCC recommends the Sewage Lagoon Desludging Plan be revised to include a discussion of whether the proposed geotube treatment technology has been demonstrated to achieve the intended treatment levels under Northern conditions. The plan should also incorporate alternate treatment/management options (such as disposal in a dedicated cell), in the event that treated sludge does not meet guideline levels.</p>		
GNWT - ENR: Central Email GNWT				
ID	Topic	Reviewer Comment/Recommendation	Proponent Response	Board Staff Analysis
5	General File	<p>Comment (doc) ENR Letter with Comments and Recommendations</p> <p>Recommendation</p>		Noted.
1	Topic 1: Sludge Thickness and Treatment Performance	<p>Comment The "Characterization of Sludge" section specifies that information in past Annual Reports and discussions with the Hamlet of Fort Liard (the Hamlet) tend to indicate that no sludge removal has occurred since this multi-cell Sewage Lagoon Facility was constructed in the early 1990's. Past recommendations from the Sewage Lagoon Capacity Study, as well as from</p>	<p>June 15: If required by the Board, the Hamlet will monitor the sample results at SNP 1478-9, sampled as part of the Water Licence requirements, and will compare these water quality values to annual sludge thickness measurements in order to determine whether a correlation exists between sludge depth and effluent quality over time.</p>	<p>The Hamlet should continue to sample SNP station 1478-9 as per Licence requirements; Board staff note that MV2009L3-0025 contains EQC for SNP station 1478-9 (Part D, item 2 of MV2009L3-0025) that the Hamlet must meet.</p>

		<p>ENR, have identified that routine de-sludging should be made a priority because of difficulties for the sewage lagoon treatment system to meet Water Licence Effluent Quality Criteria (EQC) at compliance point (SNP 1478-9). De-sludging of the lagoon cell will assist in improving treatment efficiency and reduce TSS in effluent outflow, as described in the introductory part of the Sewage Lagoon De-sludging Plan (the plan). The plan also specifies that the sewage cells were designed to allow for an annual cycle of discharges, intra-cell transfers and decanting - to optimize the effectiveness of the hydraulic capacity and sewage treatment occurring at the facility. ENR agrees that sludge levels should be measured and sampled every year - in order to help determine when the next de-sludging event should occur (Maintenance section of the plan). However, the plan suggests that de-sludging is typically required once the sludge blanket of a lagoon reaches a thickness of approximately 0.5 m (p. 3 of 11). While this may apply to other systems, it may not be accurate for Fort Liard as current/past BOD5 & TSS elevated results are/were encountered even though the average sludge thickness measured at each of the cell was well below the 0.5 m mark (i.e. 0.038 m at Cell #1, 0.177 m at Cell #2 and</p>		
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		<p>0.145 m at Cell #3 - see Table 1 (2015 measurements)).</p> <p>Recommendation 1) ENR recommends that the Hamlet should consider water quality at SNP 1478-9 when determining when de-sludging should occur. The Hamlet may need to develop their own sludge thickness trigger value (i.e less than 0.5m), if a correlation between sludge depth and effluent quality is identified for this facility.</p>		
2	None	<p>Comment None</p> <p>Recommendation 2) ENR recommends the plan specify that monthly and annual quantities of sewage solids (sludge) removed from the Sewage Disposal Facilities will be included within the Hamlet Annual Water Licence Report, as per Part B, Item 1 k) of the current Water Licence.</p>	<p>June 15: The quantity of sludge removed from the sewage disposal facility will be included in the Annual Water Licence Report.</p>	Acceptable response.
3	None	<p>Comment None</p> <p>Recommendation 3) ENR further recommends the plan specify where laboratory data will be kept once sludge testing analyses have been conducted, as specified in the Sludge Disposal Method Section (p. 6 of 11). The Hamlet may wish to submit these results as part of the Annual Water Licence Report and specify these procedures in the plan.</p>	<p>June 15: The Hamlet will be submitting a WWF O&M Plan in the near future using the MVLWB templates. Additional information about laboratory data storage can be attached or the template amended as required by the Board.</p>	Board staff note that the Wastewater Treatment System O&M Plan template does not include laboratory results in Section 10: Record Keeping. However, Section 8: Sludge Management does require the Hamlet to provide procedures for sludge testing. The Hamlet should submit laboratory results of sludge testing

				with their annual reports, as per Part B, item 1.i.
4	Topic 2: Non-sewage Sludge Discharges to Sewage Lagoon	<p>Comment The "Characterization of the Sludge" Section (p. 2) identifies that contaminants such as heavy metals, solvents and petroleum products may be present in the lagoon due to municipal activities. ENR is concerned that these parameters may build up in the lagoons cells to a level that may cause issues for sludge disposal, and that elevated concentrations of metals or hydrocarbons in influent could interfere with the biological treatment processes occurring in the sewage lagoon cells and the Sewage Disposal Facilities. Neither the definitions in Water Licence nor the Board STF templates consider the discharge of non-sewage wastes to the SDF.</p> <p>Recommendation 1) Current EQCs in Part D of the Hamlet's Water Licence were selected for sewage wastes. ENR recommends the Board consider whether additional non-sewage parameters should be included at SNP 1478-9 to identify if significant discharges of non-sewage waste to the SDF are occurring.</p>	<p>June 15: It should be noted that this is a systemic issue that affects ALL lagoons and sewage waste disposal sites. If the Board deems it necessary to change the parameters included in the current WL, the Hamlet will comply with the new conditions.</p>	<p>Board staff note that the Sludge Management Plan has criteria in place for the management of the sludge, and that the criteria include non-sewage waste parameters. Board staff further note that based on the definition of "Sewage" and "Sewage Disposal Facilities" in MV2009L3-0025, only toilet and greywater wastes should be disposed to the lagoon system. The types of wastes entering the Sewage Disposal Facilities should be addressed and well-defined in the Hamlet's outstanding Sewage Disposal Facilities O&M Plan.</p>

ID	Topic	Reviewer Comment/Recommendation	Proponent Response	Board Staff Analysis
1	Table 2: Lab analysis of sludge samples from Cells 1-3	<p>Comment The Plan does not include step-by-step procedures for the sampling, analysis and removal of sludge from the Geotubes. Board Staff note that it may be prudent for the Hamlet to update the Plan with step-by-step procedures for determining sludge quality and seeking approval. I.e.: The Hamlet will test treated sludge and compare against the CCME Compost Quality Guidelines and the GNWT Guidelines for Contaminated Site Remediation; should treated sludge meet appropriate guidelines, the Hamlet will send to the Inspector and Board; inclusion of the sampling results, the appropriate criteria, and the proposed final end-use of the material; and that sludge will only be removed once an Inspector has approved the removal and end-use of the sludge.</p> <p>Recommendation Please indicate the step-by-step process for sampling, submitting results, and seeking approval prior to removing sludge from the Geotubes.</p>	<p>June 15: Sampling will be conducted per the recommended procedures in the CCME Guideline for Compost Quality (the guideline references TMECC). Samples will be sent to an accredited laboratory (CARO - Edmonton). Results will be compared to CCME Guidelines for Compost Quality.</p>	<p>Noted. The Hamlet should include this information in the Plan.</p>
2	None	<p>Comment Sampling procedures are not outlined in the Plan. Board Staff note that the City of Yellowknife's Composting Facility Operations and Maintenance Plan refers to the Test Methods for the Examination of Composting and Compost</p>	<p>June 15: Sampling will be conducted per the recommended procedures in the CCME Guideline for Compost Quality (the guideline references TMECC). Samples will be sent to an accredited laboratory (CARO - Edmonton). Results will be</p>	<p>Noted. The Hamlet should include this information in the Plan.</p>

		and sends their samples to A&L Laboratories Inc. Recommendation What are the procedures that will be used for sampling treated sludge and determining if it meets guidelines?	compared to CCME Guidelines for Compost Quality.	
3	Characterization of Sludge	Comment At the top of page 3, this section states that the concentrations of beryllium, cobalt and vanadium remained relatively static across all three cells. Recommendation Does the Hamlet know why the concentrations of these three metals did not decrease through treatment? Is this a concern? Are any additional treatment methods proposed to lower these metal levels before or after sludge removal?	June 15: There are too many variables in the system to isolate the factors that contributed to the observed trends for beryllium, cobalt and vanadium across the three cells. It should be noted that the final concentrations of these elements will differ significantly after dewatering and stabilization. The observed concentrations do not currently appear to be of concern in the context of the CCME Guidelines for Compost Quality.	Noted.
4	Geotubes for sludge containment and dewatering	Comment This section states that 'should particles be too small to be retained by the geotextile, a flocculent will be added.' Recommendation How will it be determined that adding a flocculent will be necessary? Will there be periodic inspection? Will there be a trigger for adding flocculent?	June 15: The Geotube installation will be carried out by Layfield Geomembrane experts. Sludge sampling will be done (by Layfield experts) prior to installation in order to determine the optimal concentration of polymer required, if any. The addition of polymer may only be required during the initial pumping of sludge into the geotubes. Periodic inspections will be done as part of regular site maintenance, however it is not anticipated that addition of flocculent to the sludge (if necessary) will require specific monitoring. addition of	Noted. The Hamlet should include this information in the Plan.

			flocculent to the sludge (if necessary) will require specific monitoring.	
5	Site selection and preparation	<p>Comment This section states that the final location of the geotube pad will be confirmed upon site inspection, and an alternative site chosen if the proposed location proves to be unsuitable.</p> <p>Recommendation According to what criteria will the location of the geotube pad be evaluated?</p>	<p>June 15: The geotube pad location will be selected to maximize treatment efficiency, public safety and to minimize impact to the environment.</p>	Noted. The Hamlet should include this information in the Plan.
6	None	<p>Comment None</p> <p>Recommendation Please note that Part H, item 1 of MV2009L3-0025 states: Prior to construction of any dams, dykes, or structures intended to contain, withhold, divert, or retain water or Wastes other than as contemplated in the Contingency Plan, the Licensee shall submit to the Board for approval a design report stamped by a qualified Engineer.</p>	<p>June 15: Design reports including site plans and engineered drawings for the site as available were submitted to the MVLWB with the WL renewal application in 2010. If any new construction is needed, the Hamlet will provide engineered drawings for approval. The Hamlet will be submitting a WWF O&M Plan in the near future using the MVLWB templates, and plans will be included again as required.</p>	Noted. As per Part H, item 1 of MV2009L3-0025, design details of the Geotubes should be submitted to the Board prior to construction.
7	Sludge removal method	<p>Comment This section refers to removing sludge from Cell 3 only.</p> <p>Recommendation Please confirm whether the Hamlet is planning to remove sludge from cell 3 only in 2017. Has cell 3 been selected because it has the largest volume of sludge? When is it anticipated that the other cells will require desludging?</p>	<p>June 15: The Hamlet is planning to desludge only Cell 3 in 2017. As reported in the Sewage Lagoon Capacity Study (2015), Cell 3 has had difficulty meeting Water Licence Effluent Quality Criteria (EQC) at compliance point (SNP 1478-9). It is anticipated that de-sludging lagoon Cell 3 will assist in improving its treatment efficiency and will reduce TSS in effluent outflow. At the current rate of sludge production, Cell 1 and Cell 2 are not expected to require de-sludging for</p>	Noted. The Hamlet should include this information in the Plan. When sludge is to be removed from the Sewage Disposal Facilities again, the Plan should be updated to reflect any changes to sludge management practices.

			at least 5-10 years. The Hamlet will be submitting a WWF O&M Plan in the near future using the MVLWB templates, and de-sludging activities are covered in that plan.	
8	Sludge disposal method	<p>Comment This section states that if sludge analyses exceed guidelines, further treatment of sludge will be required.</p> <p>Recommendation What would further treatment of sludge entail? If metals are present or guidelines cannot be met with sludge treatment, what is the ultimate plan for disposal of the sludge? Please include a step-by-step plan should the sludge not meet guideline criteria.</p>	<p>June 15: Natural treatment of sludge in landfarms, sludge beds or geotubes is time dependent. Sludge treatment (stabilization) occurs as a function of aerobic and anaerobic decomposition over time. The end use of treated sludge is for use as landfill cover. CCME Guidelines for Compost Quality will be used to evaluate its acceptability for this use. It should be noted that these guidelines have a MAC limit for trace metals in compost. The Hamlet will be submitting a WWF O&M Plan in the near future using the MVLWB templates, and sludge management and disposal if the sludge cannot be used for cover are covered in that plan.</p>	Noted.
9	Maintenance	<p>Comment Page 6 refers to measuring and sampling sludge levels in each cell, every year.</p> <p>Recommendation The Hamlet is reminded to report on sludge volume measurements and any laboratory analyses of sludge conducted, in their annual reports.</p>	<p>June 15: The Hamlet acknowledges this and will report on sludge volumes and laboratory analyses in future Annual Reports.</p>	Noted. See Board staff analysis of Comment ID ENR 3.

10	Maintenance	<p>Comment This section states that the Hamlet anticipates Cell 3 to undergo a planned decant in fall 2017.</p> <p>Recommendation Please explain why a decant of cell 3 will still be necessary following a presumed increase in lagoon volume produced by desludging.</p>	<p>June 15: The lagoon is designed as an intermittent discharge system and operates according to an annual cycle of discharges, intra-cell transfers and decanting to optimize the effectiveness of the hydraulic capacity and sewage treatment. The planned decant in Fall is part of regular lagoon system operation.</p>	Noted.
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June 7, 2017

Erica Janes
Regulatory Officer
Mackenzie Valley Land and Water Board
7th Floor – 4910 50th Avenue
P.O. Box 2130
Yellowknife, NT
X1A 2P6

Dear Ms. Janes,

**Re: Hamlet of Fort Liard
Water Licence – MV2009L3-0025
Sewage Lagoon Desludging Plan
Request for Comments**

The Department of Environment and Natural Resources (ENR), Government of the Northwest Territories has reviewed the plan at reference based on its mandated responsibilities under the *Environmental Protection Act*, the *Forest Management Act*, the *Forest Protection Act*, the *Species at Risk (NWT) Act*, the *Waters Act* and the *Wildlife Act* and provides the following comments and recommendations for the consideration of the Board.

Topic 1: Sludge Thickness and Treatment Performance

Comment(s):

The “Characterization of Sludge” section specifies that information in past Annual Reports and discussions with the Hamlet of Fort Liard (the Hamlet) tend to indicate that no sludge removal has occurred since this multi-cell Sewage Lagoon Facility was constructed in the early 1990’s.

Past recommendations from the Sewage Lagoon Capacity Study, as well as from ENR, have identified that routine de-sludging should be made a priority because of difficulties for the sewage lagoon treatment system to meet Water Licence Effluent Quality Criteria (EQC) at compliance point (SNP 1478-9). De-sludging of the lagoon cell will assist in improving treatment efficiency and reduce TSS in effluent outflow,

as described in the introductory part of the Sewage Lagoon De-sludging Plan (the plan). The plan also specifies that the sewage cells were designed to allow for an annual cycle of discharges, intra-cell transfers and decanting – to optimize the effectiveness of the hydraulic capacity and sewage treatment occurring at the facility.

ENR agrees that sludge levels should be measured and sampled every year - in order to help determine when the next de-sludging event should occur (Maintenance section of the plan). However, the plan suggests that de-sludging is typically required once the sludge blanket of a lagoon reaches a thickness of approximately 0.5 m (p. 3 of 11). While this may apply to other systems, it may not be accurate for Fort Liard as current/past BOD5 & TSS elevated results are/were encountered even though the average sludge thickness measured at each of the cell was well below the 0.5 m mark (i.e. 0.038 m at Cell #1, 0.177 m at Cell #2 and 0.145 m at Cell #3 – see Table 1 (2015 measurements)).

Recommendation(s):

- 1) ENR recommends that the Hamlet should consider water quality at SNP 1478-9 when determining when de-sludging should occur. The Hamlet may need to develop their own sludge thickness trigger value (i.e less than 0.5m), if a correlation between sludge depth and effluent quality is identified for this facility.
- 2) ENR recommends the plan specify that monthly and annual quantities of sewage solids (sludge) removed from the Sewage Disposal Facilities will be included within the Hamlet Annual Water Licence Report, as per Part B, Item 1 k) of the current Water Licence.
- 3) ENR further recommends the plan specify where laboratory data will be kept once sludge testing analyses have been conducted, as specified in the “Sludge Disposal Method” Section (p. 6 of 11). The Hamlet may wish to submit these results as part of the Annual Water Licence Report and specify these procedures in the plan.

Topic 2: Non-sewage Sludge Discharges to Sewage Lagoon

Comment(s):

The “Characterization of the Sludge” Section (p. 2) identifies that contaminants such as heavy metals, solvents and petroleum products may be present in the lagoon due to municipal activities. ENR is concerned that these parameters may build up in the lagoons cells to a level that may cause issues for sludge disposal, and that elevated concentrations of metals or hydrocarbons in influent could interfere with the biological treatment processes occurring in the sewage lagoon cells and the Sewage

Disposal Facilities. Neither the definitions in Water Licence nor the Board STF templates consider the discharge of non-sewage wastes to the SDF.

Recommendation(s):

- 1) Current EQCs in Part D of the Hamlet's Water Licence were selected for sewage wastes. ENR recommends the Board consider whether additional non-sewage parameters should be included at SNP 1478-9 to identify if significant discharges of non-sewage waste to the SDF are occurring.

Comments and recommendations were provided by ENR technical experts in the Water Resources Division and the Dehcho Region and were coordinated and collated by the Environmental Assessment and Monitoring Section, Conservation, Assessment and Monitoring Division (CAM).

Should you have any questions or concerns, please do not hesitate to contact Patrick Clancy, Environmental Regulatory Analyst at (867) 767-9233 Ext: 53096 or email patrick.clancy@gov.nt.ca.

Sincerely,



Patrick Clancy
Environmental Regulatory Analyst
Environmental Assessment and Monitoring Section
Conservation, Assessment and Monitoring Division
Department of Environment and Natural Resources
Government of the Northwest Territories



Environment and
Climate Change Canada

Environnement et
Changement climatique Canada

Environmental Protection Operations Directorate (EPOD)
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June 1, 2017

ECCC File: 5200 000 026/001
MVLWB File: MV2009L3-0025

Erica Janes
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via online review system

RE: MV2009L3-0025 – Hamlet of Fort Liard – Sewage Lagoon Desludging Plan

Attention: Erica Janes

Environment and Climate Change Canada (ECCC) has reviewed the information submitted to the Mackenzie Valley Land and Water Board regarding the above-mentioned plan and is submitting comments via the online review system. ECCC's specialist advice is provided based on our mandate, in the context of the *Canadian Environmental Protection Act*, the pollution prevention provisions of the *Fisheries Act*, the *Migratory Birds Convention Act*, and the *Species at Risk Act*.

Should you require further information, please do not hesitate to contact me at (867)669-4732 or Emily.Nichol@canada.ca

Sincerely,

Emily Nichol
Environmental Assessment Coordinator

Attachment: ECCC comments Excel Sheet

cc: Bradley Summerfield, Senior Environmental Assessment Coordinator
Georgina Williston, Head, Environmental Assessment North (NT and NU),
PNR-EPOD