MUNICIPALITY OF GRISE FIORD

Operation & Maintenance Plan for Municipal Water Licence: Sewage Disposal Facilities

December 2025

Updated by:
Government of Nunavut
Transportation and Infrastructure Nunavut and Dillon Consulting Limited

Document Control

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October 2014	Operation and Maintenance Manual for the Existing Sewage Lagoon	Government of Nunavut-Community Government Services (GN-CGS)	Initial Document
December 2025	Municipality of Grise Fiord Operation & Maintenance Plan for Municipal Water Licence: Sewage Disposal Facilities	Government of Nunavut – Transportation and Infrastructure Nunavut Services (GN-TIN) and Dillon Consulting Limited	Consolidation of previous information into a standardized template

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1.0 Site Description

Date this plan was prepared: December 2025

1.1 Location of the Sewage Disposal Facility (SDF)

Municipality:	Grise Fiord
Latitude:	76º25’37” N
Longitude:	82º55’16” W
Proximity to Town:	800 m NW

The Municipality’s Sewage Disposal Facility location is shown in **Figure 1**.

Figure 1: Grise Fiord Sewage Disposal Facility (Google Earth, 2025)

1.2 SDF Site Summary

Year of commissioning the SDF: 1996

Design life of the SDF: 20 Years

1.2.1 Site History

The Municipality of Grise Fiord is located on the Southern tip of Ellesmere Island by the Baffin Bay. Located approximately 1,160 km North of the Arctic Circle, Grise Fiord has a population of 144 (Statistics Canada, 2021) and is in the Qikiqtaaluk Region of Nunavut.

Grise Fiord has a climate which consists of short cool summers and long cold winters. Annual snowfall and rainfall are approximately 118 cm and 15 cm, respectively. The typical temperature range for January is between a low of about -29°C and a high of about -23°C whereas in July, the temperatures range between a low of 3°C to a high of about 7°C. Usually, freeze up occurs during the month of November but it may happen as early as October or even September. In some years, early freeze up may thaw again before final freeze up occurs. Spring thaw typically takes place during the month of July, but the time frame can vary as much as freeze up. During spring runoff, the community experiences mild flooding.

The community uses trucked services for both water delivery and sewage collection. Wastewater is treated using a constructed retention Lagoon cell treatment system that is located approximately 800 m northwest from the center of the community.

1.2.2 Ground Conditions

Grise Fiord is cradled by the Arctic Cordillera Mountain range. Topography consists of areas of moss surrounded by rock outcrops, bedrock and steep cliffs. Grise Fiord lies within the continuous permafrost zone.

1.2.3 Treatment System

Wastewater in Grise Fiord is treated by a single cell sewage lagoon system. The lagoon is located 0.80 km from the community. This is a retention lagoon. A one-meter freeboard is maintained at all times in order to protect structural integrity. Ten days advance notice is provided to the Crown Indigenous Relations and Northern Affairs (CIRNAC) inspector prior to start decanting.

2.0 Staff

2.1 Senior Administrative Officer

Name: David General

Phone: 867-890-9959

Email: gfsao@qiniq.com

Responsibilities:

The SAO manages the municipal staff to ensure that:

- Proper operation of the SDF is carried out
- Sampling and inspections are completed
- Information under the water licence monitoring program is provided to the Government of Nunavut Department of Transportation and Infrastructure (GN-TIN) for Annual Report preparation
- Submission of the Annual Report for the Nunavut Water Board (NWB)

2.2 Foreman

Name: Chris Dederick

Phone: 867-980-9060

Email: gfforeman@qiniq.com

Responsibilities:

- Daily operations and maintenance of the SDF.
- The sampling program at the monitoring stations
- Maintaining signage at the SDF and monitoring stations
- Annual decanting of the lagoon effluent into the adjacent wetland treatment area

2.3 Sewage Truck Drivers

Name: Various

Phone: N/A

Email: N/A

Responsibilities: The sewage vacuum truck drivers collect sewage from holding tanks within the municipality. Sewage is transported to the lagoon where it is deposited.

3.0 Health and Safety

All personnel working within the SDF must follow the Nunavut Safety Act and be made aware of potential health hazards associated with working around sewage and wastewater. This is imperative so individuals make a conscious effort to perform all necessary safety procedures to protect themselves, their co-workers and family members at home. Safety precautions include:

- Ensure all equipment is kept as clean as possible;
- Assume anything touched by sewage is contaminated;
- Protective clothing such as coveralls, gloves, boots, and safety glasses are to be provided to personnel and always worn when working around sewage;
- Workers must always wear protective gloves
- Work clothing is not worn home
- Workers must wash their hands with soap and water on a regular basis, especially before delivering drinking water, eating and before going home;
- Workers are prohibited from eating or drinking in and around the sewage vacuum trunks; and
- Workers must keep their vaccinations up to date.

4.0 Security and Control

Access Control of to the facility:

- Signage
- 450 m restricted land use development setback surrounding the SDF

5.0 Wastewater Conveyance

Wastewater transportation: Sewage Vacuum Truck
Annual volume of sewage collected: Reported in Annual Report
Number of days per week sewage is collected: 5

5.1 Operations

- Sewage is collected Monday through Friday from holding tanks in residences and other buildings in the community. Sewage is collected using sewage vacuum trucks.
- The vacuum trucks pump out sewage from the building holding tanks and transport it to the detention cell.
- Sewage is deposited into the lagoon from the vacuum trucks using the offload chute at the truck pad. The sewage truck backs up to the offload chute and the release valve of the truck is opened. Bollards with railings have been placed in front of each offload chute for safety precautions.
- The volume of sewage discharged into the lagoon is estimated from the municipal water delivery records

Influent volume estimates from 2015 to 2023 have been provided in **Table 1**.

5.2 Influent Volume

Table 1: Wastewater Generation Estimates

Year	Estimated Wastewater Volume (m^3)	Difference (%)
2015	5354.6	0
2016	5387.4	0.61
2017	5420.3	0.61
2018	5453.1	0.60
2019	5486.0	0.60
2020	5518.8	0.60
2021	5551.7	0.59
2022	5617.4	1.17
2023	5617.4	0

6.0 SDF Design

Lagoon Capacity:	19,360 m^3
Lagoon Dimensions:	97 m x 55 m
Wetland Treatment Area:	Undefined
Wetland Hydraulic Retention Time:	Unknown
Effluent Path Length:	250 m
Discharge Method:	Decant
Final Receiving Body:	Baffin Bay
Type of Receiving Environment:	Marine

An overview of the wastewater treatment process:

Sewage is discharged into the detention cell year-round. The detention cell provides primary treatment of sewage as effluent is held in the impervious cell for a period of time. In August the lagoon is decanted. Sewage trucks will continue discharging to the lagoon throughout the decanting process. The seasonal effluent flow through the wetland treatment area is shown in **Figure 2**.

Figure 2: Seasonal Effluent Flow Through the Wetland Treatment Area

Description of the Final Receiving Environment:

Baffin Bay is an arm of the Atlantic Ocean bounded by the Baffin Island in the west, Greenland in the east, and Ellesmere Island in the north. It connects to the Atlantic through the Davis Strait, and to the Arctic through several narrow channels of Nares Strait. It is a northwestern extension of the North Atlantic and Labrador Sea. It can also be viewed as a long strait separating Baffin Island and Greenland.

7.0 Effluent Discharge

Discharge Method:	Decant
Time of Decant:	August
Duration of Decant:	3 weeks
Average Discharge Flowrate:	Unknown

Description of Effluent Sampling Procedures:

Per water license 3BM-GRI2025, the Municipality is required to measure and record, in cubic metres, the monthly and annual quantities of raw sewage offloaded from trucks and the number of days of use for the Sewage Disposal Facilities. The Municipality is also required to measure and record, in cubic metres, the monthly and annual quantities of effluent pumped from Monitoring Program Station GRI-4. The results must be reported within the Annual Report. All sampling, sample preservation, and analyses must be conducted in accordance with methods prescribed in the current edition of Standard Methods for the Examination of Water and Wastewater, or by such other methods approved by the Board in writing. All analyses must be performed by a laboratory accredited according to ISO/IEC Standard 17025. The accreditation should be current and in good standing.

Description of Operations:

Municipal wastewater is collected from holding tanks at each residence and commercial building by sewage (vacuum) trucks. Sewage (vacuum) trucks pump the wastewater out of the holding tanks and transport it to the sewage treatment area.

Throughout the year, the wastewater is discharged into the lagoon through the offload chute located at the truck pad. The sewage truck backs up to the lagoon (bollards are placed for safety purposes) and the valve is opened. Wastewater is discharged into the lagoon, over the splash pad.

The retention period is minimum to satisfy the effluent quality to the water licence requirement. Decanting occurs for roughly three weeks during open water season, which is normally in August each year.

8.0 Maintenance

Overview of Maintenance Activities:

- Annual inspections will be undertaken by Crown Indigenous Relations and Northern Affairs Canada (CIRNAC) accompanied by a licensee from the Municipality of Grise Fiord and/or a licensee representative from GN-TIN. The inspection report and recommendations will be reviewed by a GN-TIN municipal engineer and submitted in the Annual Report submitted to the Nunavut Water Board (NWB).

- Regular visual inspections by municipal staff of the:
  - Offload chutes
  - Lagoon berms
  - Signage

Any issues identified by municipal staff must be reported to the regional municipal engineer. Follow-up actions will be undertaken by the municipality with support from the GN-TIN.

Sludge Management:

The sludge blanket will be monitored as part of the annual discharge procedure. A study may be undertaken to determine the need and frequency for sludge removal and disposal over the lifetime of the lagoon. If the lab test results from the lagoon discharge quality, specifically BOD and TSS analyses, become noncompliant, then a sludge removal study can be conducted.

Sludge in the sewage lagoon should be sampled more often if required. The purpose of the sampling is to ensure that the sludge remains of a quality suitable for land disposal. Sampling shall consist of a sample collected from the center point of a grid no less than 10 m by 10 m. Sufficient samples shall be taken to describe the entire sewage lagoon. Results from the sludge analysis are to be reported upon completion of the test and in the annual report.

Evaluating the analytical results obtained by sludge sampling, the Government of Nunavut defaults to criteria established by the Canadian Council of Ministers of the Environment (CCME). For soil, the CCME Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health (updated September 2007) is used to compare the metals and VOC analytical results. The CCME has also established the Canada-Wide Standards (CWS) for Petroleum Hydrocarbons (PHC) in Soil (April 2001), which is the federal remedial standard for petroleum impacted soils. The CCME and CWS criteria are based on four land use categories: i) agricultural; ii) residential/parkland; iii) commercial; and iv) industrial. As the sludge is to be

disposed of at the landfill site, the industrial land use category is utilized for assessing the sludge management.

Surface Water Management:

Runoff from the Sewage Disposal Facility is monitored on an annual basis so that grading directs surface water away from the lagoon berms.

At some point, for a variety of reasons, impacted surface water may accumulate SDF. The water may or may not be impacted contaminants from sewage. In the event this occurs, the following procedures will be followed:

1. Collect samples from the water licence monitoring program at stations as outlined in the Environmental Monitoring Program and QA/QC Plan. It is recognized that it may take some time for results to be received from the accredited laboratory.
2. Analyze samples for parameters of concern and compare the results to the relevant Canadian Water Quality Guidelines.
3. Water should be inspected for odours, stain, or signs of visible impact (sheens, floating scum).
4. Consult with the GN-TIN municipal engineer and CIRNAC on discharge options.

9.0 Monitoring

Regulatory Inspection: The annual CIRNAC inspection will take place accompanied by the licensee from the Municipality and/or with a licensee representative from GN-TIN. The inspection report will be reviewed by a GN-TIN municipal engineer and submitted with the annual report.

Reporting requirements per the Water License have been provided in **Table 2.** Monitoring Program station information related to the SDF are provided in **Table 3.**

Table 2: License Requirements Related to O&M of the SDF

Requirements	Reported
Monthly and annual quantities of wastewater disposal	Annual report submitted to NWB
Notice of commencement of monitoring program and observed flow	Notice given to the CIRNAC inspector
A summary of modifications and/or major maintenance work carried out on the SDF	Proposal submitted to NWB 60 days prior
A list of spills and unauthorized discharges.	Annual report submitted to NWB
A summary of any studies requested for the SDF and future planned studies planned	Annual report submitted to NWB
Monitoring Program Station GRI-4 shall not exceed the effluent quality limits: 120 mg/L BOD_5 180 mg/L TSS $1x10^6$ CFU/dl Fecal Coliform No visible sheen of Oil and grease 6-9 pH	Annual report submitted to NWB
A freeboard of 1.0 m in the lagoon must be maintained	Annual report submitted to NWB

Table 3: Monitoring Program Station Location and Description

Station	Description	Latitude	Longitude
GRI-4	Effluent discharge from the Final Discharge Point at the Sewage Disposal Facility	76°25'33"	82°55'42"

10.0 Modifications and Upgrades

Planned modifications or upgrades:

There are no planned modifications or upgrades at this time.

11.0 Previous Reports

- Operation and Maintenance Manual for the Existing Sewage Lagoon, Unknown Author, 2014

Note: As the sewage lagoon was constructed in 1996, there are no facility drawings available