

MVLWB / GNWT

Operation and Maintenance Plan Templates for Municipal Water Licences: Wastewater (Sewage) Treatment System

November 10, 2015



**Operation & Maintenance Plan Template – Wastewater (Sewage) Treatment System (WWTS)
General Questions – All System Types**

If you have any questions about this document, please contact your regional Manager of Community Infrastructure Planning.

1. Site Description

Definitions:

- **Mechanical Plant:** a constructed system with mechanical parts such as tanks, pumps, blowers, screens, and grinders.
- **Natural Lake Lagoon:** a natural lake being used as a lagoon, including lakes with minor modifications or added control structures.
- **Engineered Lagoon:** any type of constructed or artificial lagoon that is decanted at a specific point or flows continuously through a weir or other discharge structure, including all lined lagoons.
- **Exfiltration System:** a pit, trench, or lagoon that is designed to allow effluent to seep continuously through gravel, sand, or another material.

Identify the type of treatment system. Note that each type of system requires a separate additional document to be completed. Schedules A through D have questions specific to each system type.

- Mechanical Plant - complete and attach Schedule A.
- Natural Lake Lagoon - complete and attach Schedule B.
- Engineered Lagoon - complete and attach Schedule C.
- Exfiltration System - complete and attach Schedule D.

Where is the wastewater treatment system (WWTS) located?

Community:	Sambaa K'e
Latitude:	60°25'09.49"N
Longitude:	121°13'53.90"W

Which coordinate system was used for these coordinates?

- Decimal Degrees
- Degrees, Decimal Minutes
- Universal Transverse Mercator (UTM)

Location map attached.

Map to include scale, north arrow, roads/access, and location of groundwater monitoring wells.

Date of Commissioning of WWTS: yyyy/mm/dd (if date is unknown, estimate year)

What are the ground conditions relating to permafrost in and around the community in which the WWTS is located?

Definitions:

- **Permafrost** – Ground that stays frozen through the summer. There is a surface layer that thaws, but underneath the ground stays frozen. (There are other definitions, but for the following question, use this one.)
- **Continuous permafrost** – There is permafrost everywhere in the area.
- **Discontinuous permafrost** – (a) There is permafrost but some areas thaw in the summer, or (b) there are some patches of permafrost, but most of the ground thaws in the summer.

Continuous permafrost

Discontinuous permafrost

No permafrost in area.

2. WWTS Staff

Provide the name, contact information, and role for each staff member.

Name	Phone	Email
<input type="text" value="Jessica Jumbo"/>	<input type="text" value="(867) 206-2800"/>	<input type="text" value="environment@sambaakefn.com"/>

Role/Responsibilities

Name	Phone	Email
<input type="text" value="Fred Punch"/>	<input type="text" value="(867) 206-2800"/>	<input type="text"/>

Role/Responsibilities

Name	Phone	Email
<input type="text" value="Brian Kotchea"/>	<input type="text" value="(867) 206-2848"/>	<input type="text"/>

Role/Responsibilities

3. Security and Control

How is public access to the system controlled? (Check all that apply.)

- No control
- Front gate locked when facility is closed
- Perimeter chain-link fence around entire facility
- Locked man-door
- Other:

Is the following signage posted at the WWTS? (Check all that apply.)

- Name of facility
- Notification of restriction of public access
- Warning signage regarding chemicals used in the treatment process
- Sign at each Surveillance Network Program (SNP) monitoring site

4. Wastewater Generation and Conveyance

Is wastewater collection done with trucks, or a sanitary sewer system (either underground pipes or utilidor)?

- Trucked Sanitary Sewer Combination of sanitary sewer and trucked
- Other:

If both a sanitary sewer and trucks are used, please answer both sets of questions below.

For **sanitary sewer systems**, attach a map indicating locations of lift stations and force mains including design flow rates and control points (valves).

- Map attached

Annual volume of wastewater collected in piped system: m³/year

For **trucked systems**, provide the following information:

Describe the group responsible for the collection and transport of wastewater to the WWTS (e.g., community staff, private contractor) and scope of service (e.g., vehicles, equipment, fuel etc.):

Sambaa K'e Works Department staff are responsible for the collection and transport of wastewater to the WWTS. The Works Department owns and is responsible for the maintenance of the wastewater truck.

How many days per week is wastewater collection done?	3	days per week
Number of wastewater trucks available:	1	Truck(s)
Wastewater truck volume:	4160	Litres
Number of truckloads delivered to lagoon per week:	12.5	trips per week
Annual volume collected by all trucks (if known):	2705	m ³ /year

Are honeybags accepted at the WWTS?

Yes No

If yes,

Estimated annual volume of honeybags: m³/year

Where are honeybags stored/disposed of?

How are hazardous wastes and other unacceptable substances kept out of the WWTS?

Waste is only deposited into WWTS by trained Work Department employees

5. Influent Wastewater Quality

Influent wastewater quality refers to the composition of the raw wastewater to be treated at the WWTS.

Are water quality results available for influent (raw) wastewater quality?

Yes No

If **no**, skip this section.

If **yes**, attach the results of the sampling program.

Results attached

6. System Capacity and Design Data

Indicate the **Design Flows** for which the system was designed. If this is an existing system and **design information** (such as an engineering report) is not available, skip this question.

Monthly **design** flow: m³
 Annual (yearly) **design** flow: m³

Indicate the Effluent Quality Criteria for which the **system was designed**. Add any additional criteria listed in the water license for the system. Skip any that don't apply. If this is an existing system and **design information** (such as an engineering report) is not available, skip this question.

pH:	<input type="text"/>
Biochemical Oxygen Demand (BOD5):	<input type="text"/> mg/L
Carbonaceous Biochemical Oxygen Demand (CBOD):	<input type="text"/> mg/L
Total Suspended Solids (TSS):	<input type="text"/> mg/L
Oil and Grease:	<input type="text"/> mg/L
Fecal Coliforms:	<input type="text"/> CFU/100 ml
Ammonia-N (NH ₃ -N):	<input type="text"/> mg/L
Phosphorus:	<input type="text"/> mg/L
Acute Toxicity - Rainbow Trout	<input type="text"/> % survival
Acute Toxicity - Daphnia magna	<input type="text"/> % survival

Additional criteria from water license:

7. Effluent Discharge

Is treated wastewater discharged/decanted at specific times (seasonal), or does it flow all the time except when frozen (continuous)?

Seasonal Continuous

If Seasonal, indicate the duration of discharge (or decant):

3-5 days Days OR Weeks

What time of year is seasonal discharge typically done?

spring, fall

Indicate the average discharge flow rate: m³/day

Indicate which of the following activities are done. Your water licence will specify which requirements apply to your system. Check all that apply.

- The Land and Water Board is advised at least ten days prior to discharge of treated sewage.
- The Water Resource Officer is advised at least ten days prior to discharge of treated sewage.
- Land and Water Board approval is obtained prior to discharge of treated sewage
- Water Resource Officer approval is obtained prior to discharge of treated sewage
- Discharged effluent is sampled at the SNP station prior to and/or during discharge.

Where is the treated wastewater discharged?

- Surface Waterbody Natural Wetland

If discharged to surface water, provide the following information:

Name of waterbody:

Average annual flow rate of waterbody (if known): m³/sec

Attach water quality data for the waterbody upstream of the discharge point, if available.

Data attached

If discharged to a natural wetland, provide as much of the following information as possible. If this is an existing system and design information (such as an engineering report) is not available, skip any that are unknown.

Average annual discharge flow rate out of the wetland system: m³/sec

Wetland Area: hectares

Wetland Length: m

Wetland Operating Depth: m

List the types of plants in the wetland:

Black spruce, red willow, diamond willow, poplar, Labrador tea, alder

Estimated Hydraulic Loading Rate: cm/day

Estimated Hydraulic Retention Time: days

8. Sludge Management

Has sludge from the treatment system ever been removed for disposal?

Yes No

How frequently is the sludge level checked?

Annually Other:

How often is sludge removal done?

Every years.

Estimated annual sludge production: m³

Briefly explain how sludge removal is done.

How is the sludge disposed of?

On-site Land Application

Off-site Land Application

Landfill

Other:

Identify/name and describe the location or facility where the sludge is disposed of.

9. Surface Water Management

Are there perimeter ditches surrounding the site to manage run-on?

Yes No

Is the site constructed with positive site drainage (minimum 1%) to minimize ponding?

Yes No

What is the distance to the nearest fish-bearing water body (lake, river, etc.)? m

10. Record-Keeping

The following are record keeping requirements related to O&M of the Wastewater Treatment System and should be filed as an annual report with the MVLWB no later than the date stipulated in the water license for the previous year. The annual report should include the following:

- Monthly and annual quantities of all wastewater discharged to wastewater treatment system, reported in cubic metres.

How and where is this recorded?

Where are these records kept?

- A summary of volumes of effluent discharge to the environment.

How and where is this recorded?

Where are these records kept?

- A summary of volume of sludge removed from the system.

How and where is this recorded?

Where are these records kept?

- A summary of modifications and/or major maintenance work carried out on the wastewater treatment system, including all associated structures. Check your water licence for specific requirements regarding modifications.

How and where is this recorded?

Where are these records kept?

- A list of spills and unauthorized discharges.

How and where is this recorded?

Where are these records kept?

- A summary of any closure and reclamation work completed during the year and outline of any work anticipated for the next year.

How and where is this recorded?

Data recorded by Environment Coordinator

Where are these records kept?

In SKFN Band Office - Environmental Coordinator

- A summary of any studies requested by the MVLWB that relate to waste disposal or reclamation, and a brief description of any future studies planned.

How and where is this recorded?

Data recorded by Environment Coordinator

Where are these records kept?

In SKFN Band Office - Environmental Coordinator

- An outline of any spill training and communication exercises carried out.

How and where is this recorded?

Data recorded by Environment Coordinator

Where are these records kept?

In SKFN Band Office - Environmental Coordinator

Are records of repairs kept?

Yes No

Are records of upgrades kept?

Yes No

11. Water Quality Monitoring

The “**final discharge point**” is the point where the treated wastewater leaves the treatment system and enters the environment. What type of final discharge point does the WWTS have? (Choose one.) *Note this is at the end of the treatment system, which may be different from the lagoon decant point.*

- Exfiltration through berm or substrate
- Natural channel outflow (i.e. discrete stream from natural lake lagoon)
- End of wetlands (natural or engineered)
- Engineered berm - water pumped or siphoned over berm
- Engineered berm - outfall structure built into berm (gate with stop logs/pipe/spillway/notch)
- Pipe outflow
- Other (specify):

What are the coordinates of the final discharge point?

Latitude:

Longitude:

Which coordinate system was used for these coordinates?

- Decimal Degrees
- Degrees, Decimal Minutes
- Universal Transverse Mercator (UTM)

The “**receiving environment**” is the environment or area where the treated wastewater ends up after passing through the entire treatment system. What is the receiving environment located after the final discharge point? (Choose one.)

- River/stream**
- Lake/pond**
- Ocean** (i.e. water goes directly from the treatment system to the ocean, with nothing else in between)
- Wetland** (that is not part of the treatment system)
- Land - subsurface (exfiltration)**
- Land - surface (overland)** (e.g. a field)
- Other (specify):**

Name of waterbody or area, if applicable:

If the receiving environment is water (river/stream/lake/pond/ocean or similar), estimate the size of the waterbody:

What types of plants or trees are in the receiving environment? (Choose all that apply.)

- Wildflowers (e.g. Butterwort, Cloudberry, Common Plantain, Common Yarrow, Fireweed, Indian Paintbrush, Mountain Avens, Prickly Saxifrage, Red Baneberry, Silverweed, Twinflower, Wild Mint, Yellow Lady's Slipper)
- Aquatic plants (e.g. Cat-tail, Duckweed, Rat Root, Water-arum, Yellow Pond-lily)
- Horsetails (e.g. Common Horsetail)
- Sedges (e.g. Cotton-grass)
- Shrubs (e.g. Black Currant, Bog Rosemary, Crowberry, Ground Juniper, Labrador Tea, Mountain Cranberry and Kinnikinnick, Prickly Wild Rose, Silverberry, Soapberry, Willow)
- Trees (e.g. Black Spruce and White Spruce, Jack Pine, Paper Birch and Dwarf Birch, Tamarack, Trembling Aspen and Balsam Poplar)
- Other (specify):

Has a study or sampling program been done to determine **background water quality** at the final discharge point (i.e. a study of the water in the environment before the WWTS started discharging there, or at a distance from the discharge point)?

Yes No

If **yes**, provide the following information on the study.

Title of document:

Name of company or person who did the study:

Date study was completed (yyyy/mm/dd):

Attach the results of the study if available.

Background water quality results attached

Has a study or sampling program been done to assess **effluent quality** at the final discharge point (i.e. a study or sampling of the water coming out the end of the treatment system)?

Yes No

If **yes**, provide the following information on the study.

Title of document:

Trout Lake Bacteriological Sampling

Name of company or person who did the study:

GNWT-PWS (Olivia Lee)

Date study was completed (yyyy/mm/dd):

2005/08/02

Attach the results of the study if available.

Effluent quality results attached

12. Additional Information Required

For **Mechanical Plants**, complete and attach Schedule A.
For **Natural Lake Lagoons**, complete and attach Schedule B.
For **Engineered Lagoons**, complete and attach Schedule C.
For **Exfiltration Systems**, complete and attach Schedule D.



***Schedule A - Mechanical Wastewater
Treatment Plant***



**Operation & Maintenance Plan Template – Wastewater Treatment System (WWTS)
Schedule A – Mechanical Wastewater Treatment Plant**

Complete this document for Mechanical Wastewater Treatment Plants only.

If you have any questions about this document, please contact your regional Manager of Community Infrastructure Planning.

1. Site Description

Community:

Sambaa K'e

2. System Design

Attach Piping and Instrumentation Diagram (P&ID) final as-built drawings, if available, or stamped design drawings by a Professional Engineer or Geoscientist registered with NAPEG.

Indicate what type of drawings are attached:

As-built drawings Design drawings Other:

3. Treatment System

Indicate any **pre-treatment** technologies used at the plant:
(Check all that apply.)

- Screening (bar screen/mechanically raked)
- Grit removal (settling basin/mechanical or aerated)
- Flow equalization
- pH/temperature adjustment
- Pre-aeration
- Grease/oil separation (gravity, mechanical, dissolved air flotation (DAF))
- Pre-chlorination

Indicate any **primary treatment** technologies used at the plant:
(Check all that apply.)

- Sedimentation/clarification
- Combined sedimentation digestion (e.g., septic tank, Imhoff tank)
- Other:

Indicate any **secondary treatment** technologies used at the plant:
(Check all that apply.)

- Rotating biological contactor
- Trickling filter
- Conventional activated sludge
- Sequencing batch reactor
- Membrane bioreactor
- Stabilization ponds without aeration
- Aerated lagoon
- Other:

Indicate any **advanced wastewater treatment** technologies used at the plant:
(Check all that apply.)

- Polishing pond/constructed wetland
- Biological nutrient removal
- Ion exchange
- Reverse osmosis (RO), electro-dialysis
- Air stripping

Indicate any **disinfection** technologies used at the plant:
(Check all that apply.)

- Chlorination Solid Liquid Gas
- Dechlorination Liquid Gas
- Ozonation
- Ultraviolet Radiation (UV)

4. Wastewater Treatment System O&M

Does the municipality have an O&M Manual for the Wastewater Treatment System?

Yes No

If yes, please provide the following information for the plan:

Prepared by (name of company or person that wrote the plan):

Title of document:

Completion date: yyyy/mm/dd

Location of document (where is the plan kept, or where can a copy be obtained?):



Schedule B - Natural Lake Lagoons



**Operation & Maintenance Plan Template – Wastewater Treatment System (WWTS)
Schedule B – Natural Lake Lagoons**

Complete this document for Natural Lake Lagoons only.

If you have any questions about this document, please contact your regional Manager of Community Infrastructure Planning.

1. Site Description

Community:

2. System Design

Attach one of the following drawing options with the documents you are submitting. As-built drawings are preferred, if available. All drawings are required to have scales and north arrows (for plan views).

Indicate what type of drawings are attached:

- As-built drawings of the facility prepared by a Professional Engineer or Geoscientist registered with NAPEG.
- Design drawings stamped by a Professional Engineer or Geoscientist registered with NAPEG.
- Scaled site plan with an air photo.

3. Treatment System

Attach simple schematics showing the individual units/cells/ponds and flow sequence (e.g., process flow diagram, hydraulic profile of the lagoons or exfiltration system). If engineered drawings are not available, provide a sketch or label the components on an air photo. Show which direction the wastewater flows.

Schematic attached

Provide the following data **from the engineering design** of the treatment system. If this is an existing system and design information (such as an engineering report) is not available, provide the lagoon dimensions and any other information you have, and skip the rest.

Lake Lagoon Dimensions:

Length:

 m

Width:

 m

Maximum Depth:

 m (if known)

Note: If you have measurements in feet, multiply by 0.305 to get meters.
e.g. 20 ft x 0.305 = 6.1 m

Lake Lagoon Area: hectares

Liquid Operating Depth: m (total depth minus freeboard and sludge allowance)

Freeboard Depth for structures: m (if applicable; normally applies to berms, dykes, and other control structures)

Design Sludge Depth Allowance: m

Lake Lagoon Active Volume: m³

Peak flow rate out of lake: L/sec (the fastest flow rate of the year, measured at the point where water leaves the lake lagoon)

Hydraulic Retention Time: days (amount of time that wastewater will stay in the lagoon, based on the lagoon volume and the flow rate)

Note: If you know the volume in cubic feet, multiply by 0.028 to get cubic meters.
e.g. 4500 ft³ x 0.028 = 126 m³

Are flow control structures used in the lagoon system?

Yes No

If yes, identify type, quantity and purpose of control structure (inlet, interconnection of cells, cell drain/discharge etc.) (Check all that apply.)

Stop logs

Quantity:

Purpose of structure:

Valves

Quantity:

Purpose of structure:

Other control structures:

Specify control structure:

Quantity:

Purpose of structure:

4. Wastewater Treatment System O&M

The following provides a list of typical operation, maintenance and monitoring activities applicable to a water license. Refer to the Additional Plans document to outline SNP monitoring.

Indicate the frequency of each of the following activities at the facility.

	Never	Daily	Weekly	Monthly	Annually	Other (specify)
Monitoring of the colour of the liquid in the lagoon as an indication of performance.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Variable
Monitoring of water levels to ensure the minimum freeboard limit of 1 m on constructed berms, dykes, and dams (or as approved by the Board) is maintained.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Removal of floating debris, algae and plant growth.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Inspection of dams, dykes, berms and liners for damage by animals, vegetation growth or erosion.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Measurement of sludge levels.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> 2x/yr with decants
Removal and disposal of accumulated sludge.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Inspection of inlet, interconnecting valves, outlet and truck discharge structures for damage, blockage, settlement or erosion.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> 2x/yr with decants

Monitoring for damage to fencing/signage and gate.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> no fencing/gate
Monitoring damage to monitoring wells.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> with decants
Monitoring damage to traffic barriers.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> <input type="text"/>
Inspection, grading and reshaping of access road and truck pad.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> 3x/year
Monitoring and clearing of drainage ditches and culverts (if applicable).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> <input type="text"/>
Other monitoring activities:						
<input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> <input type="text"/>
<input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> <input type="text"/>
<input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> <input type="text"/>
<input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> <input type="text"/>

5. Closure and Reclamation Plan and Post-Closure Monitoring Plan

If not already submitted, a Closure and Reclamation (C&R) Plan shall be submitted when required by the MVLWB (typically required at least six months prior to closure).

The C&R Plan shall include, but not be limited to, the following details:

- An implementation schedule;
- Contaminated site remediation;
- Hazardous waste management;
- Leachate prevention;
- Maps delineating all disturbed areas, borrow material locations, and site facilities;
- Consideration of altered drainage patterns;
- Type and source of cover materials; and
- Future area use.

Additional considerations shall include:

- Any and all structures to be reused if possible, otherwise proper disposal shall be ensured;
- Equipment that is not required during the C&R phase shall be removed from site; and
- Signage shall be placed at the entrance that indicates that closure and reclamation are in progress and the facility is no longer accepting waste. Alternative locations for waste disposal shall be provided.

Post-Closure Monitoring will take place until one or more of the following conditions apply:

- It can be demonstrated that the site is no longer releasing contaminants; or
- It can be demonstrated that the site has reached an equilibrium state in which contaminant release poses no unacceptable risk to the environment.

Post-Closure Monitoring shall include, but not be limited, to:

Monthly	Seasonally	Annually
<ul style="list-style-type: none"> • Site Inspection 	<ul style="list-style-type: none"> • Sludge sampling and analysis • Monitor vegetation and reseed as necessary 	<ul style="list-style-type: none"> • SNP sampling and analysis • Monitor settling and fill in low areas • Monitor and repair drainage pathways • Submit inspection reports to MVLWB regarding matters of concern



Schedule C - Engineered Lagoons



**Operation & Maintenance Plan Template – Wastewater Treatment System (WTS)
Schedule C – Engineered Lagoons**

Complete this document for Engineered Lagoons only.

If you have any questions about this document, please contact your regional Manager of Community Infrastructure Planning.

1. Site Description

Community:

2. System Design

Attach one of the following drawing options with the documents you are submitting. As-built drawings are preferred, if available. All drawings are required to have scales and north arrows (for plan views).

Indicate what type of drawings are attached:

- As-built drawings of the facility prepared by a Professional Engineer or Geoscientist registered with NAPEG.
- Design drawings stamped by a Professional Engineer or Geoscientist registered with NAPEG.
- Scaled site plan with an air photo.

3. Treatment System

Attach simple schematics showing the individual units and flow sequence (e.g., process flow diagram, hydraulic profile of the lagoons or exfiltration system).

Schematic attached

Number of cells in engineered lagoon system:

Provide construction details for each cell.

	Units	Cell 1	Cell 2	Cell 3	Cell 4
Lagoon length (at top of berm)	m	<input type="text" value="25"/>	<input type="text" value="30"/>	<input type="text" value="25"/>	<input type="text"/>
Lagoon width (at top of berm)	m	<input type="text" value="30"/>	<input type="text" value="21"/>	<input type="text" value="10"/>	<input type="text"/>

Lagoon length (at base of lagoon)	m	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Lagoon width (at base of lagoon)	m	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Lagoon area (length multiplied by width at top of berm)	hectares	0.075	0.063	0.025	0
Liquid operating depth	m	3	3	3	<input type="text"/>
Sludge depth allowance	m	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Active volume	m ³	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Hydraulic retention time	days	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Freeboard depth	m	1	1	1	<input type="text"/>
Berm height	m	1.5	1.5	1.5	<input type="text"/>
Berm top width	m	1	1	1	<input type="text"/>
Interior berm side slope (horizontal : vertical, e.g. 3:1)	slope	4:1	4:1	4:1	<input type="text"/>
Exterior berm side slope (horizontal : vertical, e.g. 3:1)	slope	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

What type of liner does the lagoon have?

- None
 HDPE
 LDPE
 Clay Composite
 Sodium Bentonite

Other:

What type of liner do the berms have?

- None
 HDPE
 LDPE
 Clay Composite
 Sodium Bentonite

Other:

Are flow control structures used in the lagoon system?

Yes No

If yes, identify type, quantity and purpose of control structure (inlet, interconnection of cells, cell drain/discharge etc.) (Check all that apply.)

Stop logs
 Quantity:
 Purpose of structure:

Valves
 Quantity:
 Purpose of structure:

Other control structures:
 Specify control structure:
 Quantity:
 Purpose of structure:

4. Wastewater Treatment System O&M

The following provides a list of typical operation, maintenance and monitoring activities applicable to a water license.

Indicate the frequency of each of the following activities at the facility.

	Never	Daily	Weekly	Monthly	Annually	Other (specify)
Monitoring of the colour of the liquid in the lagoon as an indication of performance.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/> Variable <input type="text"/>
Monitoring of water levels to ensure the minimum freeboard limit of 1 m (or as approved by the Board) is maintained.	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> <input type="text"/>
Removal of floating debris, algae and plant growth.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/> <input type="text"/>

Inspection of dams, dykes, berms and liners for damage by animals, vegetation growth or erosion.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
Measurement of sludge levels.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	2x/yr with decants
Removal and disposal of accumulated sludge.	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
Inspection of inlet, interconnecting valves, outlet and truck discharge structures for damage, blockage, settlement or erosion.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	2x/yr with decants
Monitoring for damage to fencing/signage and gate.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	no fencing/gate
Monitoring damage to monitoring wells.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	with decants
Monitoring damage to traffic barriers.	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
Inspection, grading and reshaping of access road and truck pad.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	3x/year
Monitoring and clearing of drainage ditches and culverts (if applicable).	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
Other monitoring activities:							
<input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
<input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
<input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
<input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>

5. Closure and Reclamation Plan and Post-Closure Monitoring Plan

If not already submitted, a Closure and Reclamation (C&R) Plan shall be submitted when required by the MVLWB (typically required at least six months prior to closure).

The C&R Plan shall include, but not be limited to, the following details:

- An implementation schedule;
- Contaminated site remediation;
- Hazardous waste management;
- Leachate prevention;
- Maps delineating all disturbed areas, borrow material locations, and site facilities;
- Consideration of altered drainage patterns;
- Type and source of cover materials; and
- Future area use.

Additional considerations shall include:

- Any and all structures to be reused if possible, otherwise proper disposal shall be ensured;
- Equipment that is not required during the C&R phase shall be removed from site; and
- Signage shall be placed at the entrance that indicates that closure and reclamation are in progress and the facility is no longer accepting waste. Alternative locations for waste disposal shall be provided.

Post-Closure Monitoring will take place until one or more of the following conditions apply:

- It can be demonstrated that the site is no longer releasing contaminants; or
- It can be demonstrated that the site has reached an equilibrium state in which contaminant release poses no unacceptable risk to the environment.

Post-Closure Monitoring shall include, but not be limited, to:

Monthly	Seasonally	Annually
<ul style="list-style-type: none"> • Site Inspection 	<ul style="list-style-type: none"> • Sludge sampling and analysis • Monitor vegetation and reseed as necessary 	<ul style="list-style-type: none"> • SNP sampling and analysis • Monitor settling and fill in low areas • Monitor and repair drainage pathways • Submit inspection reports to MVLWB regarding matters of concern



Schedule D - Exfiltration Systems



**Operation & Maintenance Plan Template – Wastewater Treatment System (WWTS)
Schedule D – Exfiltration Systems**

Complete this document for Exfiltration Systems only.

If you have any questions about this document, please contact your regional Manager of Community Infrastructure Planning.

1. Site Description

Community:

Sambaa K'e

2. System Design

Attach one of the following drawing options with the documents you are submitting. As-built drawings are preferred, if available. All drawings are required to have scales and north arrows (for plan views).

Indicate what type of drawings are attached:

- As-built drawings of the facility prepared by a Professional Engineer or Geoscientist registered with NAPEG.
- Design drawings stamped by a Professional Engineer or Geoscientist registered with NAPEG.
- Scaled site plan with an air photo.

3. Treatment System

Attach simple schematics showing the individual units and flow sequence (e.g., process flow diagram, hydraulic profile of the lagoons or exfiltration system).

Schematic attached

Indicate the type of exfiltration system:

- Exfiltration Pit Exfiltration Lagoon Exfiltration Trench

Other:

Exfiltration System Dimensions:

Length (at grade or top of berm): m
Width (at grade or top of berm): m
Length (at base): m
Width (at base): m

Infiltration Surface Area: m²
Base Material Controlling Exfiltration Rate (e.g., gravel):
Estimated Hydraulic Loading Rate: m/year
Maximum Operating Depth: m
Freeboard Depth: m

Berm Details and Dimensions (if applicable):

Berm Height: m
Berm Top Width: m
Interior Berm Side Slope: horizontal : vertical slope (e.g. 3:1)
Exterior Berm Side Slope: horizontal : vertical slope (e.g. 3:1)

Are flow control structures used in lagoon system?

Yes No

If yes, identify type, quantity and purpose of control structure (inlet, interconnection of cells, cell drain/discharge etc.) (Check all that apply.)

Stop logs

Quantity:
Purpose of structure:

Valves

Quantity:
Purpose of structure:

Other control structures:

Specify control structure:
Quantity:
Purpose of structure:

4. Wastewater Treatment System O&M

The following provides a list of typical operation, maintenance and monitoring activities applicable to a water license.

Indicate the frequency of each of the following activities at the facility.

	Never	Daily	Weekly	Monthly	Annually	Other (specify)
Monitor water level over time to trend the treatment capacity.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
Monitor and measure solids accumulation rate on exfiltration surface.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
Removal and disposal of solids.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
Removal of litter and bulky material from exfiltration surface.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
Replacement of exfiltration base layer.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
Monitoring for damage to fencing/signage and gate.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	no fencing/gate
Monitoring damage to monitoring wells.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
Monitoring damage to traffic barriers.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
Inspection, grading and reshaping of access road and truck pad.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	3x/year

Post-Closure Monitoring shall include, but not be limited, to:

Monthly	Seasonally	Annually
<ul style="list-style-type: none">• Site Inspection	<ul style="list-style-type: none">• Sludge sampling and analysis• Monitor vegetation and reseed as necessary	<ul style="list-style-type: none">• SNP sampling and analysis• Monitor settling and fill in low areas• Monitor and repair drainage pathways• Submit inspection reports to MVLWB regarding matters of concern

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