Environment Act Proposal Form

Manitoba

Name of the development:
Norwood Colony Farms Ltd. - Domestic Wastewater Lagoon

Type of development per Classes of Development Regulation (Manitoba Regulation 164/88):
Class 2 - Wastewater Treatment Lagoon

Legal name of the applicant:
Norwood Colony Farms Ltd.

Mailing address of the applicant: Box 10

Contact Person: Ivan Hofer

City: Grosse Isle Province: Manitoba Postal Code: R0C 1G0

Phone Number: (204) 322-5279 Fax: email: ivan@bruderbuilt.com

Location of the development: SW 20-16-04 EPM

Contact Person: Ivan Hofer

Street Address: N/A

Legal Description: SW 20-16-04 EPM

City/Town: RM of St. Andrews Province: Manitoba Postal Code: R0C 1G0

Phone Number: (204) 322-5279 Fax: email: ivan@bruderbuilt.com

Name of proponent contact person for purposes of the environmental assessment:
Ashley Haigh, P.Eng.

Phone: (204) 728-7364
Fax: (204) 728-4418

Mailing address: 903 Rosser Avenue, Brandon, MB R7A 0L3

Email address: a.haigh@bmce.ca

Webpage address: N/A

Date: 2025-05-16

Signature of proponent, or corporate principal of corporate proponent:
[redacted]

Printed name: Ashley Haigh, P.Eng.

PRINT RESET

BURNS MAENDEL
CONSULTING ENGINEERS LTD.

903 Rosser Ave.
Brandon, MB R7A 0L3
Tel: 204.728.7364
Fax: 204.728.4418
www.bmce.ca

May 16, 2025

Environmental Approvals Branch
Manitoba Environment, Climate and Parks
Box 35 - 14 Fultz Boulevard
Winnipeg, MB R3Y 0L6

Reference: Environmental Act Proposal
Norwood Colony Farms Ltd. - Domestic Wastewater lagoon
SW ¼ 20-16-04 EPM, Rural Municipality of St. Andrews

Dear Director,

Burns Maendel Consulting Engineers Ltd. is pleased to submit an Environment Act Proposal for the proposed domestic wastewater lagoon located on SW 20-16-04 EPM in the Rural Municipality of St. Andrews on behalf of Norwood Colony Farms Ltd. This domestic wastewater lagoon will be designed to treat wastewater for the expected population of 250 people, a small abattoir, and backwash from the water treatment plant.

All the information relating to the Environmental Act Proposal has been compiled in the attached document. If you have any questions or comments, please feel free to contact the undersigned.

Regards,

[redacted]

[redacted]

Ashley Haigh, P.Eng.
Civil Engineer

Environmental Approvals Branch
Manitoba Environment, Climate and Parks
Box 35 - 14 Fultz Boulevard
Winnipeg, MB R3Y 0L6

Environmental Act Proposal

Norwood Colony New Development

SW 20-16-4 EPM

Submitted by:

Burns Maendel Consulting Engineers Ltd.
903 Rosser Ave.
Brandon, MB R7A 0L3
Tel: 204.728.7364
Fax: 204.728.4418

On behalf of:

Norwood Colony Farms Ltd.
P.O. Box 10
Grosse Isle, MB R0C 1G0
Tel: 204.322.5279

May 16, 2025

Executive Summary

Norwood Colony Farms Ltd. has proposed a new colony development in the RM of St. Andrews, located on SW 20-16-4 EPM. The proposed site is currently undeveloped land consisting of cultivated farmland. The proposed colony will contain residences, communal buildings including kitchen facilities, a school, and a church, and several industrial shops. The colony also operates an abattoir and light manufacturing facilities.

As part of the development, a wastewater treatment facility is required. BMCE has been retained for the design of the water treatment lagoon as well as the corresponding Environment Act Proposal. Due to the isolated nature of the site and its adjacency to a natural drainage path, a facultative wastewater lagoon was selected as the method of treatment.

The lagoon will consist of two cells: a primary cell with a capacity of 10,760 m^3, and a secondary cell with a capacity of 23,511 m^3 for a total active storage volume of 26,277 m^3. The lagoon cells are proposed to be constructed using cut and fill methods to establish a remolded clay liner.

The lagoon effluent will discharge and flow south, then east for approximately 1.4 km before it enters the Fisher Drain where it flows southeast for an additional 9.7 km to Netley Lake. Fisher Drain as it flows past the project site is classified as a Class D fish habitat by Fisheries and Oceans Canada, then becomes a Class B habitat as it begins to flow southeast toward Netley Lake. This indicates that the drain is a simple habitat with non-indicator species that later becomes a simple habitat with indicator species approximately 5.2 km from site. During operation, wastewater effluent will be tested prior to release, in accordance with Manitoba Environment and Climate Change. As such, any possible or anticipated risks are minimized.

No registered Points of Use (> 25 000 L/d) were identified downstream the discharge path. The distance, as well as lagoon liner requirements prohibiting infiltration, reduce the likelihood of any impact on this user or any users further downstream.

The development of a domestic lagoon on SW 20-16-4 EPM in the RM of St. Andrews will meet the need of wastewater storage and treatment for the colony development. All applicable regulatory requirements, guidelines, and industry standards will be adhered to for the construction, operation, and maintenance of the lagoon. Through appropriate mitigation measures, any potential negative effects associated with the lagoon can be reasonably prevented, minimized, or mitigated.

Standard Limitations

This report was prepared by Burns Maendel Consulting Engineers Ltd. (BMCE) for the account of Norwood Colony Farms Ltd. (the Client). The disclosure of any information contained in this report is the sole responsibility of the Client. The material in this report reflects BMCE's best judgment in light of the information available to it at the time of preparation. Should this report be used by a third party, any reliance or decisions made based on this report are the responsibility of such third party. BMCE accepts no responsibility for damages, if any, suffered by a third party as a result of decisions made or actions based on this report. BMCE makes no representation concerning the legal significance of the findings or the information contained within this report.

Table of Contents

List of Tables

List of Figures

List of Appendices

1. Introduction and Background

Norwood Colony Farms Ltd. (the colony) has proposed a new colony development in the Rural Municipality of St. Andrews (the RM). The proposed development is located on SE 19-16-4E and part of SW 19-16-4E, approximately 4.6 km northwest of Netley, Manitoba.

The proposed colony will contain residences, communal buildings including kitchen facilities, a school, and a church, and several industrial shops. The colony also operates an abattoir and light manufacturing facilities.

To aid in the development process, the colony has retained Burns Maendel Consulting Engineers Ltd. (BMCE) to provide engineering design and technical support. This Environment Act Proposal (EAP) has been prepared by BMCE on behalf of the colony to obtain a license for the proposed domestic lagoon. The proposed lagoon location is on the adjacent quarter, on SW 20-16-4 EPM.

1.1. Wastewater Production

Typical colony developments in Manitoba account for a population of approximately 125, however, modern trends for growth and industrialization have resulted in larger settlement sizes.

1.1.1. Population

The new colony has been designed to permanently accommodate a maximum population of 200 persons at full construction. Per traditional colony development, as the colony near capacity it will then divide and establish another subsequent colony. As the establishment of the subsequent colony proceeds, it is reasonable to understand that the colony population will continue to naturally increase in the interim. Therefore, BMCE has assumed a domestic population of 250 to accommodate a larger than standard population during the construction of the subsequent colony.

1.1.2. Domestic Wastewater Production Rate

Domestic wastewater production rates were calculated using a loading rate of 0.077 kg BOD_5/cap/day for organic loading and a value of 300 L/cap/day was used to determine hydraulic loading. This organic loading rate is typical for wastewater projects within Manitoba. The rate for hydraulic loading is in accordance with literature values as well as historical design wastewater loading rates from other colonies.

Table 1 – Domestic Organic and Hydraulic Loading Rates

Population	Organic Loading Rate (kg BOD_5/c/d)	Organic Loading (kgBOD5/d)	Hydraulic Loading Rate (m^3/c/d)	Hydraulic Loading (m^3/d)
250	0.077	19.25	0.3	75.0

1.1.3. Truck Wash Production Rate

Once fully constructed and operational, the colony plans to include a truck wash for personal use in their agricultural operations. The runoff from the truck wash will be collected in the wastewater lagoon at an assumed rate of 3.89 m^3/day. This loading rate is based upon an assumed usage of 4 hours/day, 6 days/week of a 5 gpm pressure washer, based on discussions with Norwood Colony Farms Ltd.

1.1.4. Abattoir Production Rate

The proposed development includes plans for an abattoir for colony use, with no commercial processing in the facility. It is anticipated that the colony will process 25 beef cattle, 500 hogs, 1500 broiler chickens, and 800 broiler ducks/turkeys annuals, at full occupancy and operations.

Typical wastewater requirements and loading rates for the slaughter of cattle, hogs, and poultry were obtained from *The Characterization of Provincial Inspected Slaughterhouse Wastewater in Ontario, 2011.* Utilizing these values, BMCE calculated the average daily organic and hydraulic loading for the proposed abattoir. As summarized in Table 2, the abattoir at full operation is expected to contribute 1212 L/day and 6.52 kg BOD_5/day.

Table 2 - Abattoir Organic and Hydraulic Loading Rates

Parameter		**Result**	
Livestock Type	Quantity (head)	Washwater Loading (L/head)	Daily Loading (L/day)
Chicken	1500	11	45
Ducks/Turkeys	800	12	26
Hogs	500	757	1037
Cattle	25	1,514	104
Chicken – Washwater BOD_5 Concentration (mg/L)		1,648	
Ducks/Turkeys - Washwater BOD_5 Concentration (mg/L)		1,999	
Hogs – Washwater BOD_5 Concentration (mg/L)		4,711	
Cattle – Washwater BOD_5 Concentration (mg/L)		14,545	
Chicken – Washwater BOD_5 Loading (kg BOD_5/d)		0.07	
Ducks/Turkeys – Washwater BOD_5 Loading (kg BOD_5/d)		0.05	
Hogs – Washwater BOD_5 Loading (kg BOD_5/d)		4.89	
Cattle – Washwater BOD_5 Loading (kg BOD_5/d)		1.51	

Blood does not enter the wastewater collection system or the lagoon. During the slaughter process, blood is allowed to coagulate and, once in a semi-solid form, will be mixed with offal byproducts and composted or sent to a rendering facility.

1.1.5. Additional Hydraulic Loading

Backwash flow rates from the future water treatment plant were obtained via records of similar colony water treatment plants and their observed usage, and other colony domestic lagoons on the public registry. These values were then improved upon based on the anticipated treatment system and published literature regarding the frequency and volumes of reverse osmosis and filter backwash as a percentage of domestic water consumption.

An infiltration and inflow value of 15% of total flow was utilized.

Organic and hydraulic loading is summarized below, demonstrating the contributions of population, abattoir, and backwash.

Table 3 - Organic and Hydraulic Loading Rate Summary

Contributor	Organic Loading (kg BOD_5/d)	Hydraulic Loading (m^3/d)
Population	19.25	75.00
Abattoir	6.52	1.21
Truck Wash	N/A	3.89
Backwash	N/A	10.75
Infiltration	N/A	13.63
TOTAL	**25.1**	**104.5**

1.2. Topographical Survey

BMCE conducted a topographical survey utilizing GPS survey technology and a review of LiDAR data for the area to gain an understanding of the drainage patterns of the project site. The objective of the survey was to determine existing elevations across the site. This data indicated the direction of existing runoff flow as well as any areas of ponding.

The majority of the surface water in the proposed lagoon location drains east. The existing topographical features have been optimized and improved upon during BMCE's detailed design of the wastewater lagoon.

1.3. Geotechnical Review

Accurate geotechnical investigations play a pivotal role in domestic lagoon design. Proper soil analysis determines whether a clay liner can be used, compacted or otherwise, or if a synthetic liner is needed. Additionally, determining the location of the water table is necessary to determine possible interference with the present groundwater system.

BMCE retained Trek Geotechnical to conduct a geotechnical investigation of the project site.

1.3.1. Geotechnical Investigations

The geotechnical investigation, completed January 20th-24th, 2025, included a sub-surface investigation, laboratory testing, and provisions of geotechnical recommendations. A total of twenty-six (26) test holes were drilled or excavated across the project site, with test holes #22-26 located under the proposed lagoon footprint. Detailed test hole summary logs are included in the Geotechnical Report in Appendix A.

The soil stratigraphy was visually classified at the time of drilling using the modified Unified Soil Classification System (USCS). Soil samples were collected off the auger flights, via Shelby Tubes, and split spoons. All samples were retained for testing at Trek's Winnipeg laboratory.

1.3.1.1. Laboratory Program

Laboratory testing consisted of moisture content determination on all samples, grain size analysis via hydrometer, Atterberg limits, permeability, undrained shear strength testing via pocket penetrometer, torvane and unconfined compression, and Standard Proctor testing on select samples.

1.3.1.2. Soil Stratigraphy

Detailed soil stratigraphy is provided in the test hole logs located in Appendix A. Generally, the proposed lagoon site includes a covering of organic clay or silt topsoil, overlaying layers of silt and clay, which are underlain by silt till.

1.3.2. Groundwater

Seepage and groundwater were observed between 2.4 to 5.5 m below surface grade immediately after drilling. Additional information regarding existing groundwater conditions is discussed in Section 3.5.

1.3.3. Liner Recommendations

The province of Manitoba requires that soil liners have a minimum hydraulic conductivity of $1x10^{-7}$ cm/s. To assess the in-situ permeability of a soil liner, flexible wall permeability, Atterberg limits, and grain size analysis testing was conducted on a bulk sample of native silty clay obtained from test holes (TH25-22, 23, and 25) within the extents of the proposed lagoon compacted to 96.5% of the SPMDD.

The compacted silty clay sample exceeded the provincial hydraulic conductivity requirements for use as a soil liner with a measured hydraulic conductivity of $8.23x10^{-9}$ cm/s indicating that this material will be suitable for use in a compacted liner. BMCE recommended that the colony proceed with the design and installation of a compacted clay liner for their domestic lagoon.

2. Description of Proposed Development

2.1. Certificate of title

The legal land description where the proposed wastewater lagoon will be situated is SW 20-16-04 EPM. The legal landowner of the quarter section is Norwood Colony Farms Ltd. under Title No. 3267806. Refer to Appendix B for a copy of the Certificate of Title.

2.2. Sealed Engineering Drawings

BMCE has prepared a detailed drawing set for the lagoon siting plan, site layout, lagoon plan view, section views, and details. Sealed engineering drawings detailing the proposed wastewater lagoon have been included in Appendix C.

2.3. Site Selection

In selecting the location of the new Norwood Colony, BMCE was retained to provide a technical opinion on the suitability of the proposed site. The following sections detail the reviews and research used to determine the location of the lagoon and its placements within SW 20-16-04 EPM.

2.3.1. Land Use Planning Review

BMCE completed a comprehensive policy review, considering regulations, planning documents, and regional goals.

Per the St. Andrews Consolidated Zoning Map, Zoning By-law 4066 (updated July 22, 2021), the project site is zoned as A80 Agricultural General. Per this by-law, domestic wastewater lagoons are classified as conditional uses under the waste disposal facility categorization. As such, a conditional use order is required. A conditional use order for the development was approved at the public hearing on November 12, 2024.

The Environmental Act requires that wastewater treatment lagoons not be located closer than 300m from an individual residence and the toe of the lagoon embankment shall be no less than 30m from any property line. These requirements have been exceeded for the proposed facility.

As per the Nutrient Management Regulations, part of *The Water Protection Act*, no lagoon shall be located in the nutrient buffer zone adjacent to waterways.

A review of the Red River Planning District Development Plan By-Law No. 272/19 and East Interlake Watershed District Integrated Watershed Management Plan showed that the project site is not located in a source water protection zone.

2.3.2. Flood Protection

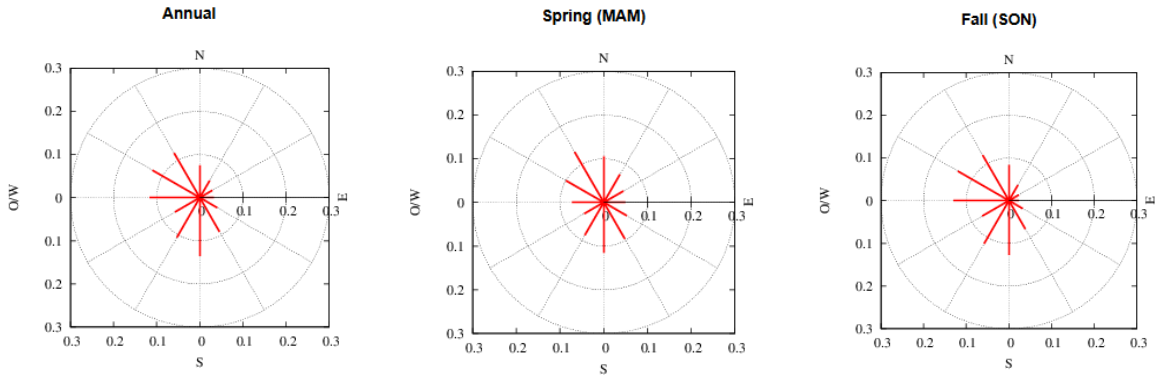
The project site is located more than 7.0 km west of Lake Winnipeg/Netley Lake and is approximately 14.0 m higher in elevation than the high-water boundary (217.9 m based on the *Lake Winnipeg Regulation* provided on the province's website). Based on this information, flooding from Lake Winnipeg/Netley Lake is not a concern.

The St. Andrews Zoning By-Law No. 4066 (updated July 22, 2021) requires a flood protection level of 220.12 m. The proposed lagoon has been designed with berm elevations of 231.8 m and exceeds the required flood protection levels.

2.3.3. Siting and Location

The province of *Manitoba's Information Bulletin – Design Objectives for Wastewater Treatment Lagoons, 2022,* states that a lagoon site should be as far as practical from habitation or any area which may be built up within a reasonable future period. Lagoons should not be located closer than 460 m from any center of population with individual residences not being any closer than 300 m with both distances being measured from the outer toe of the nearest dyke.

Additionally, the design objectives state that the preference should be given to sites which will permit an unobstructed wind sweep across the cells of the lagoon. Consideration should be given to the lagoon location such that prevailing winds will be in the direction of uninhabited areas.



Wind roses obtained from windatlas.ca.

Figure 1: Seasonal Wind Roses

Prevailing winds are northwest and south annually. Odour nuisance is only expected to be a factor during spring and fall turnover, as this is the time when noxious gases are released. Prevailing winds are northwest in the spring and northwest in the fall. The nearest residences are 0.9 km to the southeast, 1.1 km to the southwest, and 1.3 km to the northwest. These residences are more than 3 times the minimum distance from the proposed lagoon and should be minimally affected by odour.

Lagoons should also be located such that sufficient distance is available between the lagoon and property line or the lagoon and the fence line for access of maintenance equipment. It is required that a minimum distance of 30 m be maintained between the outside toe of the embankment and the fence line or property.

The proposed location of the lagoon is in the northeast corner of SW 20-16-04 EPM. As per the zoning by-law, the lagoon meets or exceeds all setback requirements as it will be located more than 300 m from the nearest residential residence and more than 460 m from any center of population. Additionally, the lagoon footprint is not near any nutrient zones and as stated in Section 2.3.1, the project site SW 20-16-04 EPM is not considered to be in a source water protection zone. Proposed lagoon configuration and associated setbacks are provided in the Drawings in Appendix C.

2.4. Lagoon Design

The following sections provide information on the design considerations, assumptions, and methods used in the lagoon design.

2.4.1. Design Parameters

BMCE utilized the following rationale to establish design parameters for the proposed lagoon:

- The detention time was set at **230 days**. 227-230 days are standard detention times, based on the operational requirement that the wastewater effluent be discharged between June 15 and November 1 of a given year.
- The design organic loading rate per person is set at **0.077 kg BOD/person/day**. This is a value used commonly in wastewater treatment design in Manitoba.
- The maximum organic loading rate is set at **56 kg BOD5/ha/day**. This value is commonly used in wastewater lagoon design across Manitoba per *Manitoba's Information Bulletin – Design Objectives for Wastewater Treatment Lagoons.*
- Per common practice and design standards for wastewater lagoon design, the available storage will be **1.50 m**, and active storage will be **1.20 m**.
- Per common practice and design standards for wastewater lagoon design, the available freeboard will be **1.00 m**.
- The area below the interconnecting pipe inverts is considered dead storage and is not part of the design storage volume or freeboard. The dead storage height is **0.30 m**, as per common design practice and MECP standards.
- The interior slope of the primary and secondary cells will be **4:1** in accordance with the province of Manitoba's *Information Bulletin – Design Objectives for Wastewater Treatment Lagoons*.

Details of the lagoon design parameters utilized during design of the wastewater lagoon are summarized in Table 4. These parameters are in conformance with the province of Manitoba's *Information Bulletin – Design Objectives for Wastewater Treatment Lagoons.*

Table 4 – Lagoon Design Parameters

Parameter	Result
Winter Storage Period	Nov. 1 to Jun. 15
Detention Time (days)	230
Trickle Discharge (days)	40
Organic Loading Rate (kg BOD_5 / cap / d)	0.077
Organic Treatment Rate (kg BOD_5 / ha/ d)	56.0
Active Storage Depth (m)	1.20
Freeboard (m)	1.00
Dead Space (m)	0.30
Total Depth (m)	2.50
Cell Interior Side Slope	4:1

2.4.2. Primary Cell Design (Organic Loading)

The area outlined in Table 5 was determined at the active storage depth in the lagoon using the 56 kg BOD_5/ha/d as outline in Section 2.4.1. This represents a depth of 0.6 m from the high-water level or 0.9 m from the bottom of cell which will represent the average water depth in the lagoon throughout the year.

Table 5 – Primary Cell Design Summary

Parameter	Result
Top of Berm Dimensions – L x W (m)	125.0 x 93.0
Floor Dimensions – L x W (m)	104.0 x 73.0
Area at Average Active Storage Depth (m^2)	8,902
Organic Treatment Capacity Provided (kg BOD_5 / d)	49.8
Organic Loading Rate (kg BOD_5 / d)	25.8
Trickle Discharge (40-day contribution; m^3)	4,179
10% Factor of Safety (m^3)	971
Volume Required (m^3)	10,682
Volume Provided (m^3)	10,760

2.4.3. Secondary Cell Design (Hydraulic Loading)

The total active storage volume provided for the secondary cells was calculated using the volume of the secondary cell plus half of the volume of the primary cell (excluding the trickle discharge volume and the safety factor), per *Manitoba Sustainable Development's Design Objectives for Wastewater Treatment Lagoons, 2022*. The subsequent hydraulic capacity provided is then calculated by dividing the total active storage volume provided by the detention time to get an average inflow rate over this period of time that the lagoon can accommodate. This hydraulic capacity can then be compared to the hydraulic loading

calculated in Section **Error! Reference source not found.** (loading for population, abattoir, and extra considerations).

Table 6 – Secondary Cell Design Summary

Parameter	Result
Top of Berm Dimensions – L x W (m)	257.0 x 93.0
Floor Dimensions – L x W (m)	237.0 x 73.0
Secondary Cell Volume Provided (m^3)	23,511
½ Active Primary Cell Volume Provided (m^3)	2,766
Total Active Storage Provided (m^3)	26,277
10% Factor of Safety (m^3)	2,127
Hydraulic Loading (m^3/d)	104.5
Hydraulic Capacity Provided (m^3/d)	114.2

2.5. Lagoon Liner

The lagoon containment will consist of a minimum of 1.0 m thick remolded clay liner at the surface of the berms surrounding and throughout the cells. BMCE anticipates that there will be adequate quantity of clay materials on site for liner construction which will meet or exceed the hydraulic conductivity requirement of 1 x 10^{-7} cm/s when remolded and compacted.

A geotechnical investigation was completed by TREK Geotechnical January 20th-24th, 2025, see Section 1.3. The Geotechnical Investigation Report has been included in Appendix A. The report contains the test hole and test pit logs throughout the site and details the soil stratigraphy and laboratory testing results. In order to meet the MECC requirements for cut and fill soil liners, the report recommends the following:

- Proper construction techniques be followed,
- Provide scarification and compaction of the silty clay to address potential impact of trace sand and trace silt inclusions, and
- Berms should be constructed of silty clay in lifts of 150 mm compacted to 95% of the SPMDD and wet of optimum.

2.6. Effluent Discharge

The proposed lagoon with be located in the northwest corner of SW 20-16-04 EPM. The cell outlet will release from the secondary cell through a release pipe sloped at 0.5% to the outfall with an invert elevation of 228.50 m. This outfall will be armoured with a 3.0 x 3.0 m, grouted, riprap splash pad.

Effluent discharge will flow south and then east for approximately 1.4 km before it enters the Fisher Drain where it flows southeast for an additional 9.7 km to Netley Lake as shown in Figure 2.

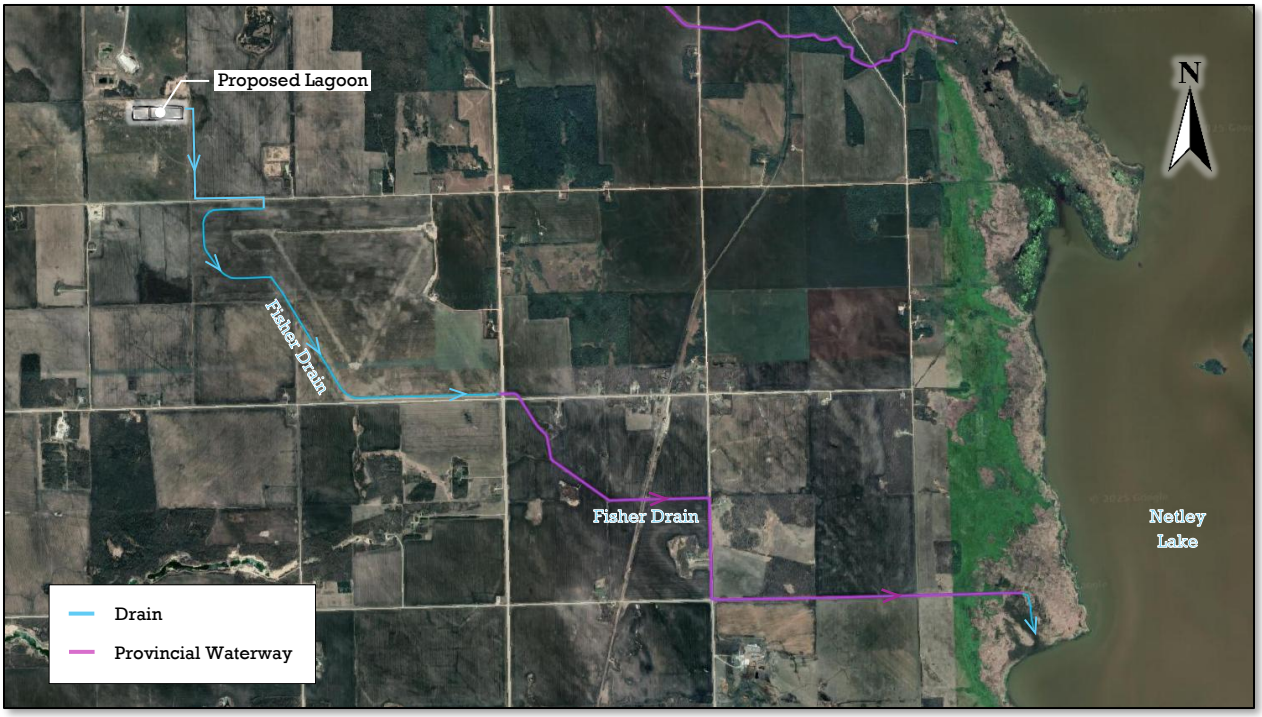


Figure 2: Drainage Path

Between the months of June and November, once the secondary cell has been tested and meets MECC effluent quality requirements, the effluent will be discharged into Fisher Drain. Wastewater will be tested prior to discharge to confirm the following effluent quality requirements outlined in MECC's *Design Objectives for Wastewater Treatment Lagoons, 2022* are met:

- ***Effluent Quality Requirements**: All wastewater treatment lagoons must meet the following requirements:*
    - *Five-day carbonaceous biochemical oxygen demand (CBOD5) – not to exceed 25 milligrams per litre;*
    - *Total suspended solids (TSS) – not to exceed 25 milligrams per litre unless caused by algae;*
    - *Fecal coliform content or Escherichia coli (E. Coli) content as indicted by the MPN index - not to exceed 200 per 100 millilitres;*
    - *Un-ionized ammonia content expressed as nitrogen (N), at 15°C ±1°C – not to exceed 1.25 milligrams per litre for intermittently discharging facilities; and*
    - *Total phosphorus – not to exceed one milligram per litre; or a demonstrated nutrient reduction strategy for facilities discharging less than 820 kg/year of total phosphorus (a population equivalent of under 2000 people.) For facilities proposing a nutrient reduction strategy, strategies will be evaluated on a site specific basis, and strategies which do not offer a reasonable likelihood of attaining a total phosphorus content of one milligram per litre at a significant downstream waterway will not be approved.*

A trickle discharge will be used to slowly release the effluent and prevent overflow and erosion. This will allow the vegetation along the channel to further dilute and polish the effluent.

Based on the project location and effluent testing protocols that will be implemented, no effect is anticipated to downstream users.

2.7. Wastewater Collection System

The colony will utilize a combination of gravity and low-pressure sewer systems to convey wastewater to a lift station. The lift station will then pump the water into the primary cell of the wastewater lagoon via a forcemain. The wastewater collection system will be submitted separately with an Application for a Certificate of Approval for a Wastewater Collection system to MECC.

2.8. Facility Operation

Wastewater effluent collected by the sewer network will be pumped to the lagoon where the wastewater will be stored and treated until it is released in the summer/fall.

The discharge operation is summarized in the following steps:

Two weeks prior to the time of sampling, the valve permitting flow between the primary and secondary cell will be closed. This will ensure a representative water sample can be collected from the secondary cell to be discharged.

Two weeks after the valve has been closed, a water sample from the secondary cell will be obtained, using sample bottles supplied from an accredited laboratory. Water sampling and submission procedures will be performed in accordance with MECC guidelines.

If the samples do not meet MECC requirements, testing will be repeated until the samples have passed the testing criteria. Additional time will allow for natural processes, including sunlight and settling, to remove unwanted constituents from the effluent. When water samples successfully meet MECC requirements, water from the secondary cell can be discharged. Discharge will only occur within the June 15 to November 1 period each year.

Once the effluent has been drained from the secondary cell, the discharge valve will be closed. At this time, the valve regulating flow between the primary and secondary cell will be reopened.

Once the water level between the primary and secondary cell has been equalized, the secondary cell effluent can be released a second time to provide adequate capacity for winter. In the event of a subsequent release is required, the isolation sampling and release process shall be repeated. At full capacity, two annual discharges will be necessary in a typical operating year.

2.9. Seasonal Maintenance

Regular observation of the lagoon will be undertaken by colony members to ensure that there is no damage to the lagoon structure. The following tasks will be performed to ensure that the integrity of the lagoon is maintained and is functioning properly:

- Visible sections of the liner will be inspected for damage and repaired immediately to maintain the integrity of the facility.
- The lagoon will be inspected for signs of wildlife. Any wildlife burrowing into the berm or otherwise causing damage will be removed.
- Valves and drainage areas will be checked and cleared of obstructions on a regular basis.
- Snow will be cleared on the access road so that the lagoon may be accessed at any time.
- Areas inside fencing will be mowed so berms are visible for inspection.

Records of all maintenance will be recorded and retained for a minimum of five (5) calendar years.

3. Description of Existing Environment in the Project Area

The project site is to be located on the northeast corner of SW 20-16-04 EPM. It is between PTH No. 17 - Clouston Road and Kreamer Road, accessible by the undeveloped right of way (Quarry Ridge Road) and an access road from the future colony development.

3.1. Land Use

The subject site is classified as A80 (Agricultural General) per the St. Andrews Zoning By-law and as RA (Resource and Agriculture) by the Red River Planning District Development Plan (By-law No 272/19), which provides for a full range of agricultural activities and other natural resource related industrial uses. The footprint of the proposed lagoon is presently undisturbed native farmland.

3.2. Topography

The area is clear of major tree cover and is adjacent to the Fisher Drain. Elevations within and adjacent to the footprint of the lagoon show gradual slopes flowing east toward Fisher Drain. These slopes will provide positive drainage from the lagoon to minimize the impact of stormwater on the facility during operations.

3.3. Climate

All climate information has been obtained from the *Terrestrial Ecozones, Ecoregions, and Ecodistricts of Manitoba – An Ecological Stratification of Manitoba's Natural Landscapes, 2001*. The project is located in the Gimli Ecodistrict. This ecodistrict lies within the more humid and cooler subdivision of the Subhumid Low Boreal Ecoclimatic Region, which is characterized by short, warm summers and cold winters. The mean annual precipitation is about 520 mm, of which about one-quarter falls as snow. Precipitation varies greatly from year to year and is highest from late spring through summer. The average annual moisture deficit is nearly 100 mm. The ecodistrict has a humid, moderately cold, Cryoboreal to subhumid, cool, Boreal soil climate.

The climate data from the Gimli Station (#5031042) is relevant to the ecodistrict.

3.4. Soil Conditions

See Section 1.3 and Appendix A for a summary of the soil conditions for the project.

3.5. Groundwater

Regional hydrogeology indicates that aquifers can be found in all major geologic units across the Interlake region. The most extensive of these aquifers is known as the Carbonate Aquifer which is also the most widely developed groundwater source in Manitoba, within the Western Canadian Sedimentary Basin.

3.6. Surface Waterbodies

The project site drains northeast toward the Fisher Drain. Fisher Drain runs southeast for approximately 9.7 km before draining into Netley Lake. The project site is in the east section of the Netley-Grassmere Watershed.

3.7. Wildlife in Project Area

3.7.1. Existing Aquatic Environment

Fisher Drain as it flows past the project site is classified as a Class D fish habitat by Fisheries and Oceans Canada, then becomes a Class B habitat as it begins to flow southeast toward Netley Lake. This indicates that the drain is a simple habitat with non-indicator species that later becomes a simple habitat with indicator species approximately 5.2 km from site.

Site numbers X-05-186 and B-03-248 on the Fisher Drain within the Class B habitat report 'No Catch' and 'No Fishing Effort', respectively.

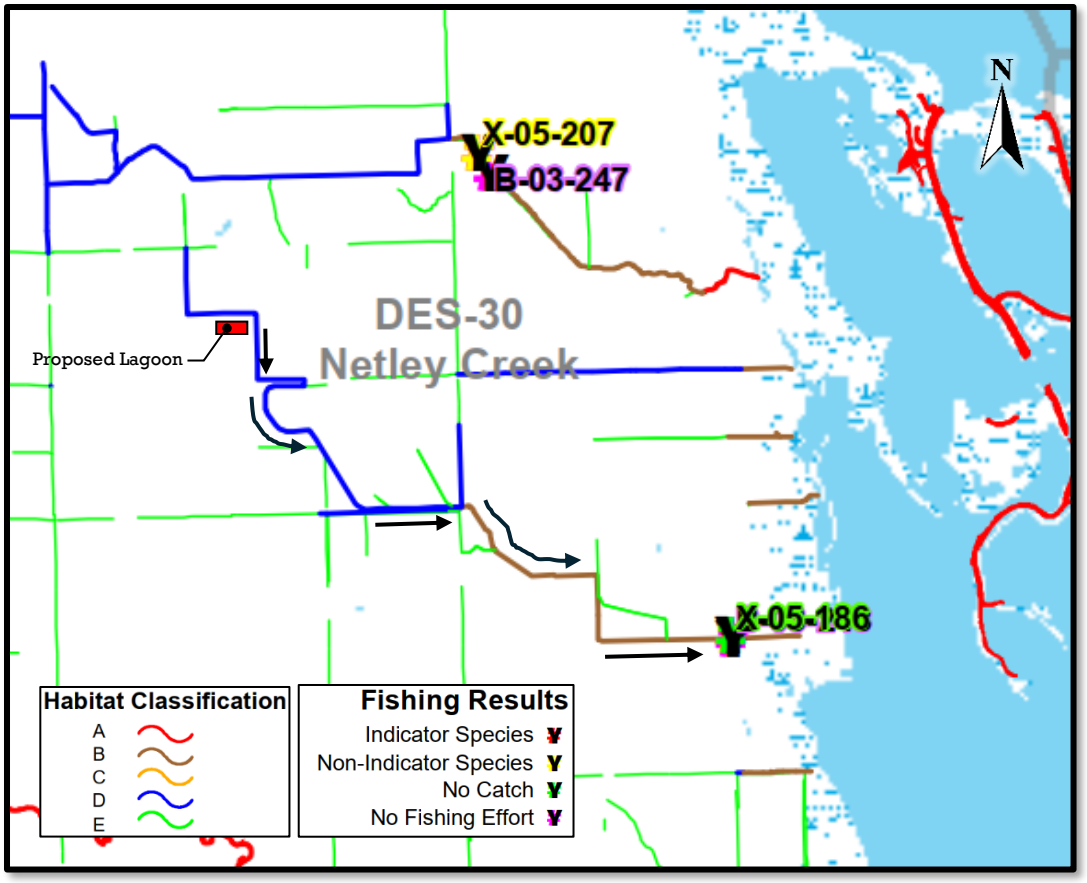


Figure 3: Fish Habitat Classification Map – 062I07

3.7.2. Existing Terrestrial Environment

The project site is part of the Interlake Plain Ecoregion, no permanent habitats are expected within the cultivated areas; however, this ecoregion usually provides shelter for several species of animal. Some of the terrestrial wildlife that may be present at or near the project site are:

- **Small Mammals**: Beaver, coyote, rabbits, foxes, racoons, squirrels, chipmunks, skunks
- **Large Mammals**: Bears, deer, moose
- **Reptiles and Amphibians**: Frogs, turtles, snakes
- **Birds**: Grouse, woodpeckers, hummingbirds, bluebirds, cardinals

3.7.3. Rare, Threatened, Protected or Endangered Species

BMCE contacted the Manitoba Conservation Data Centre (MBCDC) to request a search of the threatened species database for the project's area of interest. The review considers the primary location, as well as a two-kilometer radius buffer and a five-kilometer radius buffer from the footprint boundary. Per the Species at Risk Act (SARA), "threatened species" means a wildlife species that is likely to become an endangered species if nothing is done to reverse the factors leading to its extirpation or extinction.

During this review, no listed or tracked species occurrences were found within the review area. Several species were identified within a 5-km radius of the site boundary and have been summarized in Table 7 below.

Table 7: Conservation Data Centre Findings within 5km of Project Site

Species	S Rank	ESEA	SARA	COSEWIC
Eastern Wood-pewee	S3B		Special Concern	Special Concern
Red-headed Woodpecker	S3B	Threatened	Endangered	Endangered
Horned Grebe	S3B		Special Concern	Special Concern
Barred Owl	S3S4			

As the lagoon expansion is proposed to be constructed on lands that are currently utilized as cultivated agricultural land, it is unlikely there are nests, burrows, or dens in the project site. As there are no recorded observations of these species at the project site, there will be minimal impact to any threatened species, endangered species, or species of special concern.

3.8. Socioeconomic Environment

The socioeconomic environment is not a large factor in the development of this wastewater lagoon. The project site is a moderately isolated location in an undeveloped area with approximately 8 non-associated residences within 2.0 kilometers. The proposed lagoon will be located approximately 960 m from the nearest residence not associated with the colony.

Due to the standards in place for effluent discharge from wastewater lagoons as well as the length of the effluent path, it is expected downstream users will be unaffected.

3.9. Heritage Resources

BMCE discussed the project with Manitoba's Historic Resources Branch (HRB) to identify any potential heritage resources, historical characteristics, sites, or structures at 19-16-04 EPM that would be of archaeological significance and thus impact the project development. Initial conversations indicated that a Heritage Resource Impact Assessment (HRIA) may be required as *"there are several known archaeological sites within five kilometers of the proposed development area. These factors, although not exclusive to the analysis, indicate a reason to believe that any future planned ground disturbance, activity, and/or development within the area has the potential to impact heritage resources."*

An HRIA will be commissioned prior to construction occurring on the main colony development site or within the lagoon footprint, however, concerns raised by the HRB were primarily in regards to the ridge running through SW 19-16-04 EPM and not the lagoon subject site. Construction operations will be directed by any findings from the HRIA, and at a minimum a Heritage Resource Protection Plan (HRPP) will be implemented to direct proceedings in the event that any heritage resources are encountered.

3.10. Indigenous Communities in Vicinity of Project

The proposed project is within Treaty 1 lands. The nearest indigenous community to the project is Brokenhead Ojibway Nation (No. 4), in the Rural Municipality of St. Clements, approximately 28 km east of the project site. Due to this distance, no detrimental effects or impacts are anticipated as a result of the proposed lagoon.

No direct consultations were conducted with the regional indigenous bodies.

4. Possible Effects & Planned Mitigation of Proposed Development

Wastewater lagoons that are designed constructed, operated, and maintained in accordance with MECC regulations pose negligible impacts to the environment nor to human health. Potential impacts that may be encountered during lagoon construction or operation, and the mitigation measures to remove or minimize these effects have been provided as follows:

4.1. Air Quality

During construction, emissions from construction equipment will be present. These emissions will be addressed and minimized by emphasizing the use of construction equipment in good operative condition and minimizing equipment idle time.

Odour nuisance is only expected to be a factor during spring and fall turnover, as this is the time when noxious gases are released. Odour will be mitigated by the fact that prevailing wind will direct the odours away from the populous regions. The period in which odours are released is short and therefore odour effects should not be a nuisance for residents in the immediate area.

Ongoing monitoring of the lagoon will be performed to ensure the proper functioning of the lagoon. Further attention will be paid to odour, and if excessive odour is noticeable the cause will be identified and dealt with accordingly. For a detailed review of the facility operation, please refer back to Section 2.8.

4.2. Soils

In situ soils will be disturbed during the construction of the new cell. While construction equipment is on-site, there is the risk of fuel spills from the operation of heavy equipment. This risk will be reduced by prohibiting the storage of fuels and other contaminants on-site during construction. Any small spills or leaks that may occur would be addressed with standard soil contamination protocol.

Ongoing monitoring of the lagoon will be performed to ensure the proper functioning of the lagoon. Regular inspection will ensure that there is no damage to the lagoon from erosion, liner failures, or other causes. The general condition of the lagoon will be observed on an ongoing basis during all seasons.

4.3. Groundwater

While construction equipment is on-site, there is the risk of fuel spills from the operation of heavy equipment. This risk will be reduced by prohibiting the storage of fuels and other contaminants on-site during construction. Any small spills or leaks that may occur would be addressed with standard soil contamination protocol, so it does not reach the ground water table.

Properly designed wastewater lagoons liners do not allow for any infiltration of wastewater into the surrounding environment except during wastewater discharge where it has been treated to an acceptable level by MECC standards. Additionally, regular inspections of the liner will occur to determine if the liner is functioning as designed. For these reasons no impact is expected to groundwater during the lagoon operation.

4.4. Forestry and Vegetation

As the lagoon is proposed to be constructed on lands that consist of cultivated fields with intermittent deciduous forest, small sections of treed areas will be cleared during the construction of the lagoon. When performing tree cutting and clearing the following responsible practices will be followed:

- Minimize cutting, only removing what is required,
- Avoid noise and dust nuisances by following good construction practices regarding operation time and dust mitigation measures,
- Responsibly grub by repurposing or recycling useable lumber, and
- Follow construction practices set by MBCDC.

During regular operation, vehicular access will be limited to the access road within the fenced enclosure. As such operational impacts to forestry and vegetation will be minimal.

4.5. Surface Water, Fish, and Fish Habitats

Minimal impacts on surface water and fish habitat are anticipated during project construction. While construction equipment is on-site, there is the risk of fuel spills from the operation of heavy equipment. This risk will be reduced by storing equipment and fuel a minimum of 100m away from waterbodies, as per Petroleum Products & Allied Products Regulation.

Additionally, during operation, impact to surface water bodies is expected to be minimal. All effluent is tested according to the MECC license requirements and discharged between June 16th and November 1st of any year. As per the Fisheries Act – Wastewater Systems Effluent Regulations SOR/2012-139-Part 1 Effluent Containing Deleterious Substances:

Authorization to deposit

- *6(1) For the purpose of paragraph 36(4)(b) of the Act, the owner or operator of a wastewater system may:*
  - *during a given calendar year, quarter or month, determine in accordance with subsection (2) – deposit or permit the deposit of effluent that contains any of the deleterious substances prescribed in Section 5 via the system's final discharge point in any water or place referred to in subsection 36(3) of the Act if the effluent is not acutely lethal as determined in accordance with section 15 and if*
  - *during the previous calendar year, previous quarter or previous month, determined in accordance with subsection (2) the effluent met the following conditions:*
    - *(a) The average carbonaceous biochemical oxygen demand due to the quantity of CBOD matter in the effluent did not exceed 25 mg/L;*
    - *(b) The average concentration of suspended solids in the effluent did not exceed 25 mg/L;*
    - *(c) The average concentration of total residual chlorine in the effluent did not exceed 0.02 mg/L, if chlorine, or one of its compounds, was used in the treatment of wastewater; and*
    - *(d) The maximum concentration of un-ionized ammonia in the effluent was less than 1.25 mg/L, expressed as nitrogen (N), at 15˚C ± 1˚C.*

A domestic wastewater lagoon is permitted to discharge to fish bearing water bodies, so long as the above effluent conditions are met. Should a license be issued for the lagoon, it is standard practice that the testing and effluent requirements as stated above are included as a condition of the license by MECC. BMCE has confirmed that a Request for Review does not need to be submitted to DFO.

Additionally, Netley Lake is 11 km downstream from the discharge location, this allows for additional natural filtering of nutrients before reaching the lake.

Because no effluent will be discharged from the lagoon until it meets MECC license requirements, no risk to fish is anticipated during operation, as potential risks of pollution can be properly monitored and mitigated.

4.6. Wildlife

As discussed in Section 3.7, as the lagoon expansion is proposed to be constructed on lands that are currently utilized as cultivated agricultural land, it is unlikely there are nests, burrows, or dens in the project site that will be disturbed during construction.

During operation any burrowing or nesting animals will be relocated so no damage to the lagoon will occur. This monitoring practice will also mitigate any impacts on said animals due to contaminated water consumption or equipment usage within the fenced area of the lagoon.

4.7. Rare/Threatened Species

Manitoba Conservation Data Centre (MBCDC) identified four species of threatened bird within the five-kilometer radius of the project site: the eastern wood-pewee, the red-headed woodpecker, the horned grebe, and the barred owl. During construction, the land clearing, excavation, and general operation of large machinery may cause disturbances to these species.

The MBCDC provides recommendations for construction practices in areas where sensitive species may be present in or near the project area. Following these recommendations for construction of the proposed development, if indicators of the noted species are identified the following practices will be adhered to:

- Disturbances will occur outside of breeding season,
- Minimal clearing/disturbance techniques will be utilized during and outside breeding season,
- Suitable habitat that is unavoidably disturbed will be reclaimed, and
- Where exact nesting sites cannot be identified, setback distances will be applied.

With the application of these recommendations, disturbance to these threatened species during construction will be minimized.

There is minimal expected impact on these species during the operation of the lagoon. Operation and maintenance will be carried out by minimal staff and equipment, where reeds and other vegetation will be removed making it undesirable as a nesting area. The clearing of vegetation will also deter the birds from entering the site and potentially consuming untreated effluent.

4.8. Climate Change

Impacts due to equipment usage and emissions will be mitigated by minimizing idle times and using responsible construction practices.

As this lagoon is taking advantage of natural treatment processes, no significant climate change impacts are expected during operation.

4.9. Human Health

The site location is located in the northern portion of SW 20-16-04 EPM, separated from the proposed colony, with a max population of 250, by a shelterbelt and a setback distance of over 750 m from the nearest colony residence. MECC guidelines require new lagoons to be constructed with a minimum setback of 300 m from any individual residence. The nearest residence not associated with the colony is setback a distance of 960 m. There are no communities within the vicinity of the proposed lagoon.

Increased dust, noise, and vehicle traffic is expected during construction. Noise pollution may be a nuisance to nearby residents, while dust and vehicles could pose a more dangerous threat with reduced visibility, and minor health issues. Dust and noise will be mitigated by

using proper construction methods including specific working hours and dust reduction materials and practices. Proper signage and vehicles in good working order will minimize risks due to traffic.

As outlined in Section 4.1, odour will only be a problem for short periods of time during the spring and fall. Nuisance odours can cause several minor health effects such as headaches, eye irritation, and respiratory problems. However, due to the proposed tree line and distance of separation from the nearest residences, no adverse effects on nearby residents are anticipated.

Safety features will include a 1.8 m tall, 150 x 150 field wire fence topped with barbed wire, and descriptive signs to discourage unauthorized access to the lagoon, and to make known the potential danger. In the event that an unauthorized person accesses the lagoon facility area and falls into the cells, the 4:1 interior side slope and access ramps will provide a sufficient surface to assist the person in exiting.

The effluent discharge path was examined to determine if there were any downstream users within sufficient range to be affected. A review of MECC's *Water Rights Licensing Public Map Viewer* showed there are no registered Points of Use (> 25 000 L/d) downstream of the proposed lagoon. As a properly designed wastewater lagoon will not allow infiltration of untreated water, no impact on this user, or any additional downstream users, is expected.

4.10. Socioeconomic

The proposed lagoon site is located in a reasonably isolated area, with less than 8 residences in a 2.0 km radius. As such, construction of the lagoon is not expected to impact the socioeconomic structure of area.

Once the lagoon is constructed and the colony is fully built, it will provide major consumer and supplier goods as well as a significant source of tax revenue for the Municipality of St. Andrews.

4.11. Heritage Resources

An Heritage Resource Impact Assessment (HRIA) will be commissioned for 19-16-04 EPM and SW 20-16-4 E. Based on the findings, appropriate mitigative measures will be implemented. A Heritage Resource Protection Plan (HRPP) will be included in the construction specifications to ensure the project team and contractors are aware of the proper contacts and procedures, should heritage resources accidentally be encountered during site development.

4.12. Indigenous Communities

As the nearest indigenous community is approximately 28 km east of the project site and not immediately downstream, no impact is expected on indigenous communities during construction or operation of the wastewater lagoon.

5. Follow-Up Plans

To ensure follow-up, plans including the monitoring and reporting tasks listed herein will be performed. These are to be conducted in addition to any monitoring and reporting requirements under the Environmental Act License (EAL).

5.1. Monitoring

On-going monitoring of the lagoon will be performed to ensure the proper functioning of the lagoon. Regular inspection will ensure that there is no damage to the lagoon from erosion, failures, wildlife, or other causes. Further attention will be paid to odour, and if excessive odour is detected the cause will be identified and dealt with accordingly. The general condition of the lagoon will be observed on an ongoing basis during all seasons.

Prior to all discharges of the lagoon, all wastewater samples will be collected in accordance with Standard Methods for the Examination of Water and Wastewater, and have all analyses completed by an accredited laboratory before release.

5.2. Reporting

The following will be monitored, recorded, and retained for a minimum of five calendar years, as per similar lagoon environmental act licenses:

- Reports of visual inspections conducted a minimum of once per month,
- Wastewater sample dates,
- Original copies of laboratory analytical results of the sampled wastewater,
- A summary and discussion of laboratory analytical results,
- Cell isolation dates (i.e., valve operation records),
- Effluent discharge dates,
- Estimated effluent discharge volumes,
- Maintenance and repairs,
- Expansions to the collection system with associated capacity assessment,
- Updated organization charts identifying all certified operators, including backup operators, and
- A summary of any wastewater collection system overflows.

6. Summary

The development of a domestic lagoon at SW 20-16-04 EPM in the RM of St. Andrews will meet the need of wastewater storage and treatment for the proposed colony development. All applicable regulatory requirements, guidelines, and industry standards will be adhered to for the construction, operation, and maintenance of the lagoon. Through appropriate mitigation measures, any potential negative effects associated with the lagoon can be reasonably prevented, minimized, or mitigated.