ENVIRONMENT ACT PROPOSAL
R.M. OF MACDONALD - COMMUNITY OF LA SALLE
WASTEWATER STABILIZATION POND EXPANSION

Prepared for:

R.M. of Macdonald
161 Mandan Drive
Sanford, Manitoba
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Project No: 131-21138-00

January 2014

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0.0 EXECUTIVE SUMMARY

Leading up to this Environment Act Proposal (EAP), WSP (formerly GENIVAR) completed several expansion assessments for the R.M. of Macdonald regarding the wastewater treatment facility in the Community of La Salle dating back to 2011. Upon selection of a plan for expansion, the R.M. of Macdonald desired to move forward without delay to the preparation and submission of this EAP report.

The existing wastewater stabilization pond, "lagoon", is located east and south of the Community of La Salle and consists of two primary (treatment) cells and two secondary (storage) cells, receiving wastewater from sewer systems within the Community. Considering the existing capacities of the lagoon and the anticipated growth within La Salle, expansion of the existing wastewater facility is required.

The expansion was not designed on the basis of a 20 year projection, but rather on utilizing the available land to provide the maximum serviceable population. It is recommended to expand and combine the existing primary cells and construct one new secondary cell north and east of the existing lagoon and convert the existing two primary cells into secondary cells. The proposed new secondary cell will be constructed with a combination of a 3.0 m wide clay core and a 1.0 m surface clay liner. The proposed expanded primary cell will be constructed by continuing with a 1.0 m surface clay liner. This design was based on the information presented in the Geotechnical Report. All secondary cells will discharge to a constructed ditch with an established growth of cattails and eventually the La Salle River. Major design appurtenances include a perimeter fence, valves, piping, rip rap and lagoon signage.

Upon approval from Manitoba Conservation and the issuance of an Environment licence, it is anticipated that the tender and construction will begin in 2014.

1.0 DEVELOPMENT INFORMATION

R.M. of Macdonald – Community of La Salle – Wastewater Stabilization Pond
Name of development

R.M. of Macdonald
Legal name of the proponent of the development

27-8-2 EPM
Location of development

Contact Person for Proponent:

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Contact Person for Environmental Assessment:

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Winnipeg, Manitoba R3T 6B8

Proposal Contents:

Section of Environmental Act Proposal Form		Section Number in Report
DESCRIPTION OF DEVELOPMENT:		
(i)	Legal description and map of development	2.1
(ii)	Mineral rights	2.2
(iii)	Existing land use	2.3
(iv)	Land use designation	2.3
(v)	Previous studies	2.4
(vi)	Proposed development	5.0
(vii)	Storage of gasoline or associated products	6.3.1
(viii)	Potential impacts	6.0
(ix)	Proposed environmental management	7.0
SCHEDULE:		8.0
FUNDING:		8.0

1.1 CANADIAN ENVIRONMENTAL ASSESSMENT INFORMATION

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Screening Report Outline		**Section Number in Report**
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2.0 DESCRIPTION OF DEVELOPMENT

2.1 LEGAL DESCRIPTION AND OWNERSHIP

The existing lagoon proper is located on portions of the south half of Section 27-8-22 EPM. The R.M. of Macdonald is the registered owner of the existing lagoon land, as identified in Certificate of Title No. 2004398/1. Specifically, these areas ownership are Public Works Plan 16400 WLTO, Lot 1 Plan 29214 WLTO and Lot 1 Plan 42537 WLTO.

The new development is to be located to the north and east of the existing lagoon facility on portions of NW, NE and SE 27-8-2 EPM, as shown in Figure 2.1. According to Certificate of Title No. 2365922/1, the R.M. of Macdonald is the registered owner of the land proposed for development in SE 27-8-2 EPM. Ownership purchase and transfer to the R.M. of Macdonald for the other pieces of land is well underway, but was not legally finalized at the time of writing. Certificate of Title Nos. 2365925/1 and 2241305/1 show the current ownership of the remaining land proposed for development. All aforementioned Certificates of Title are included in Appendix A.

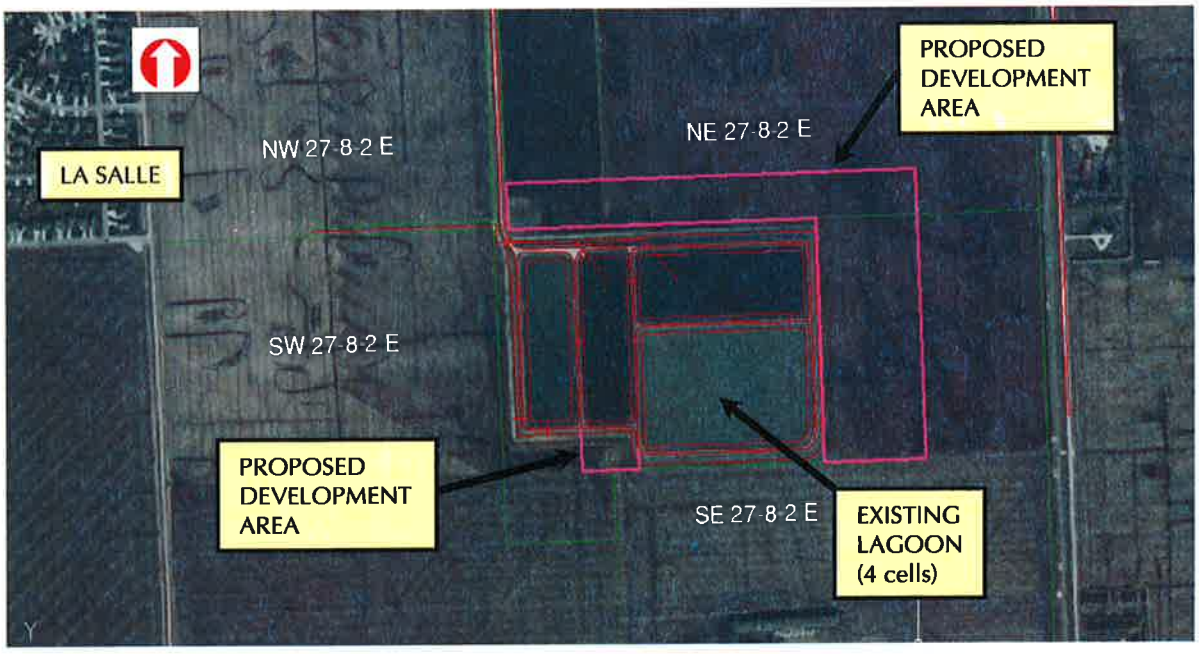


Figure 2.1: Location map of the existing and proposed development

2.2 MINERAL RIGHTS

The Crown Lands and Property Agency – Lands Branch was contacted to provide information on the Mines & Minerals and Sand & Gravel ownership of the applicable lands discussed in the previous section. According to the Certificates of Title, ownership of the Mines & Minerals and Sand & Gravel remain with the surface titles. Correspondence is included in Appendix E.

2.3 DESCRIPTION OF EXISTING LAND USE

Through information provided by the R.M. of Macdonald, the existing lagoon land and the land intended for lagoon development are designated as "EV", Environmental Policy Area and zoned "AR", Agriculture Restricted. A Macdonald-Ritchot Planning District map illustrating the land designations for La Salle is included in Appendix E. The land surrounding the lagoon is used for agricultural purposes, which includes the land intended for development.

2.4 PREVIOUS STUDIES

2013 *Geotechnical Report: "Proposed R.M. of Macdonald – Community of La Salle WWSP Expansion"* prepared by GENIVAR for the *R.M. of Macdonald*

This report provides a detailed geotechnical investigation of the proposed development site conducted by GENIVAR on November 19, 2013. The investigation included testhole drilling, sample collection and laboratory testing. The report concluded that based on soil conditions, the proposed expansion should be constructed with a 1.0 m surface clay liner.

2011 *"R.M. of Macdonald – Community of La Salle" Lagoon Upgrading Assessment Report prepared* by GENIVAR for the *R.M. of Macdonald*

This report identifies the existing capacity of the lagoon and details five expansion options to accommodate at least 500 new homes beyond the existing capacity. The study concludes with an opinion of probable costs for each expansion option.

3.0 EXISTING WASTEWATER STABILIZATION POND

3.1 DESCRIPTION

The existing licence directing lagoon operation is Environment Act Licence No. 2674, dated January 25, 2005. The lagoon was last expanded at this time. The licence is attached in Appendix B.

The existing wastewater stabilization pond is located east and south of the Community of La Salle and consists of two primary cells and two secondary cells. It receives wastewater from both a gravity sewer system and a low pressure sewer system in the Community of La Salle via four lift stations and multiple forcemains. The residents connected by low pressure sewer also have septic tanks. Generally, the older areas of the Community are serviced by low pressure sewers and the newer subdivisions are serviced by gravity sewers. The Oak Bluff lagoon is the designated municipal lagoon to receive outside truck hauled wastewater and septage.

According to Statistics Canada, the R.M. of Macdonald population for the 2011 Census was 6,280. There are no individual community population breakdowns provided by Statistics Canada within the municipality. However, based on the *Private dwellings occupied by usual residents*, the municipality's *persons per dwelling* statistic is approximately 3.06, which we will round to 3.1.

The R.M. of Macdonald provided data showing the number of residential water connections in the Community of La Salle. As of December 12, 2013, there were 780 residential water connections. We will assume that the number of residential water connections is equivalent to the *Private dwellings occupied by usual residents*. Therefore, with an average of 3.1 *persons per dwelling*, the current population within La Salle is 2,418. In addition, the lagoon serves 21 bussed-in students. In calculating wastewater flow for these students, we use a ratio of 3:1 (3 bussed-in students are equivalent to 1 person in a dwelling), which totals 7 equivalent people. **The total equivalent population currently serviced by the La Salle lagoon is 2,425.**

3.2 EXISTING CAPACITY

The existing La Salle lagoon has two primary cells and two secondary cells that collectively function in the treatment and storage of the wastewater. Information regarding the actual dimensions and elevations of the existing lagoon was based on a combination of the 2006 Record Drawings and data from a 2013 WSP (formerly GENIVAR) topographical survey.

Table 3.1 lists the surface areas and volumes of the existing cells, which were calculated using 4:1 side slopes and maximum operating depths of 1.5 metres. Since Manitoba Conservation stipulates that only half of the total volume for primary cells contributes to the hydraulic storage of the lagoon, these storage volumes are simply half of the total volumes. Calculating the storage volumes for secondary cells was done under the assumption that the bottom 0.3 m of liquid depth in the cells is considered "dead" storage.

According to the Manitoba Conservation guideline, a primary treatment cell requires one hectare of liquid surface area per 56 kg-BOD_5 daily loading. The existing primary cells have a combined surface area of approximately 6.15 hectares at a liquid level of 1.5 m and on this basis can service a daily organic loading of **344.4 kg-BOD_5**.

The total storage capacity provided by the existing cells is **137,457 m^3**.

TABLE 3.1: EXISTING WASTEWATER STABILIZATION POND CELL CAPACITIES

Type	Surface Area [ha]	Total Volume [m^3]	Storage Volume [m^3]
Primary Cell 1	2.62	34,910	17,455
Primary Cell 2	3.53	49,225	24,612
Secondary Cell 1	2.34	31,900	26,000
Secondary Cell 2	6.02	85,880	69,390
Total	**14.51**	**201,915**	**137,457**

3.3 EFFLUENT QUALITY AND DISCHARGE ROUTE

To meet the requirements of the *Water Quality Standards, Objectives and Guidelines Regulation* under *The Water Protection Act (2011)*, the R.M. of Macdonald (for the La Salle lagoon) will implement a nutrient reduction strategy consisting of trickle discharge. We

propose to utilize the existing discharge route which consists of approximately 1,375 metres of constructed ditching up to Provincial Road (PR) 247 and then 310 metres of more natural swale down to the La Salle River for a total of 1,685 metres. This existing ditch has well-established cattail growth and the R.M. owns approximately 1,210 metres of the ditch before it reaches PR 247.

The lagoon secondary cells would be trickle discharged during the spring (after June 15) and the fall (before October 31) periods. A sampling and monitoring program would be implemented with a duration of 5 years to accumulate data on phosphorus reduction at selected points along the discharge route. At the conclusion of the 5 year period, an assessment will be made to determine if the phosphorus levels are consistently meeting 1.0 mg/L.

If the results are promising, but further reduction is necessary, the R.M. has land available to the south of the existing lagoon that could be developed into a constructed wetland area and the testing would resume for another 5 years.

Alternatively, if the results are not encouraging or the R.M. elects not to proceed with a constructed wetland, the lagoon secondary cells would then be chemically treated with aluminum sulfate (alum) to reduce the phosphorus to 1.0 mg/L. For this reason, the R.M. also requests the option of discharging the lagoon east into a field drain ditch that discharges into a newly constructed drain running north into the La Salle River. This alternative route would see the effluent traverse a total distance of 2,135 metres to reach the La Salle River. Both discharge routes are illustrated in Figure 3.1.

The existing and proposed lagoon facility is in the Lower La Salle Watershed (No. 22).

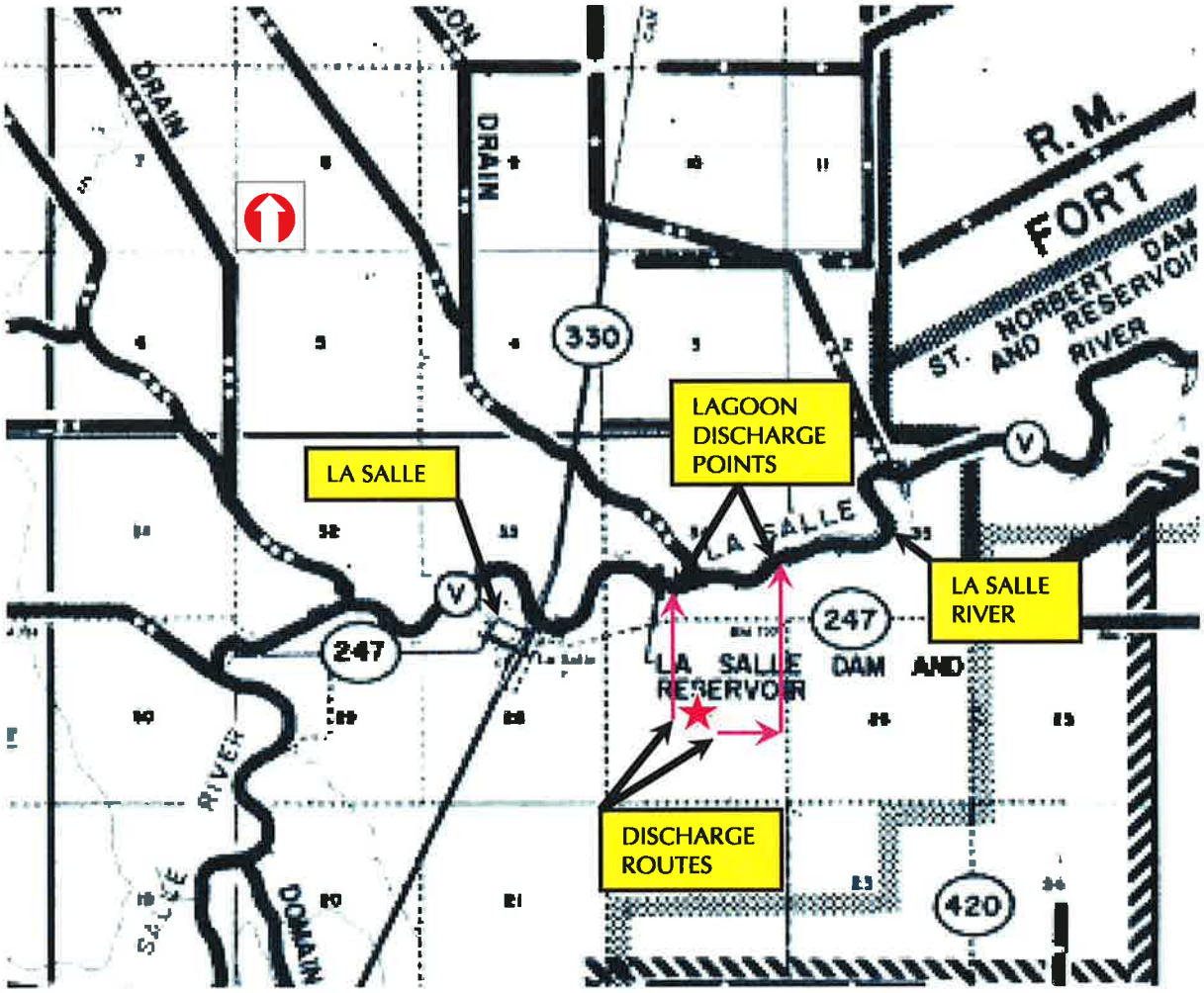


Figure 3.1: Effluent discharge routes from the La Salle lagoon

4.0 POPULATION SERVICED AND DESIGN LOADING

4.1 SOURCES OF WASTEWATER

The existing La Salle lagoon services the current population of the Community of La Salle of approximately 2,418 people. In addition to the serviced residents, the Community sewer system serves 21 bussed-in students. In calculating wastewater flow we use a ratio of 3:1 (3 bussed-in students are equivalent to 1 person in a dwelling), which totals 7 equivalent people. Therefore, the **total equivalent population is currently 2,425.**

Approximately 50% of the Community is connected via gravity sewer, while the remaining 50% of the Community is connected via low pressure sewer. The residents connected by low pressure sewer also have septic tanks. The Municipality empties each septic tank once a year, between June 15 and November 1.

There are no other significant industrial or high strength contributors. There is no outside wastewater and septage hauled to the La Salle lagoon. The Oak Bluff lagoon is the designated municipal lagoon to receive truck hauled wastewater and septage.

4.2 ORGANIC LOADING

Organic loading refers to the quantity of organic material present in the incoming wastewater and is measured as the five day Biochemical Oxygen Demand (BOD_5). The organic loading becomes the total mass of BOD_5 in kg/d in the wastewater discharged to the lagoon. The wastewater from the piped serviced areas are consistent on a year-round basis and do not have a seasonal variation.

In the area serviced by the combination of low pressure sewer and septic tanks, the solids portion and liquid portion of the waste are separated. The solids portion of the wastewater is collected by each septic tank while the liquid portion of the wastewater flows through the low pressure sewer system, which is connected to the lagoon year-round. The wastewater from each septic tank is emptied once a year by the municipality. The emptying and discharging of all the tanks is spread out from June 15 to November 1 and is not concentrated over a short period of time. As a result, the organic loading of the wastewater from the area serviced by low pressure sewer and septic tanks is considered to be similar to

the wastewater from the gravity sewer serviced area since the wastewater in its entirety eventually ends up in the lagoon.

On the basis of accepted practice, the daily BOD_5 production for domestic wastewater collected via a piped system is 0.077 kg per person. This value is assumed for the area serviced by the low pressure sewer and septic tank combination as well. With a current equivalent population of 2,425 (including bussed-in students), the organic loading to the existing La Salle lagoon is **186.7 kg-BOD_5/d**.

Outside septic and/or holding tank loading need not be considered for this lagoon, as previously stated in section 4.1.

As stated in Section 3.2, the existing primary cells of the lagoon provide an organic loading capacity of 344.4 kg-BOD_5/d. **Therefore, the existing primary cells have adequate treatment capacity for the present and future loadings, up to a population of 4,473 people**.

4.3 HYDRAULIC LOADING

Hydraulic loading refers to the volume of sewage flow to the lagoon. Wastewater facilities are presently designed for a 227-day storage period beginning November 1st and ending June 15th of the following year. Hydraulic loading over the 227-day storage period is used to calculate the volume of storage required in the lagoon facility.

WSP (formerly GENIVAR) previously completed a lagoon upgrading assessment for the R.M. of Macdonald regarding the La Salle lagoon. At this time, lift station data was reviewed to determine the per capita wastewater generation within the Community. Based on the reviewed information, the wastewater generation for the Community over the lagoon storage period (227 days) was calculated at 186 litres per capita per day (L/c/d), which included infiltration.

Even though this wastewater generation appears low, it can be justified when considering that La Salle is a satellite community to the City of Winnipeg. Most people work in Winnipeg and the Community is mainly residential in nature. It is understood that the design guidelines

for the R.M. of Macdonald specify designing for 325 L/c/d, which in this case would amount to a 75% increase in wastewater generation. However, for the purposes of this report, a prudent approach would suggest designing for **250 L/c/d**, which is a typical wastewater generation design value that also happens to be close to the average of the above numbers.

With a current equivalent population of 2,425 (including bussed-in students), the hydraulic loading to the existing La Salle lagoon is (2,425 c x 250 L/c/d x 227 d =) **137,619 m^3**.

As stated in Section 3.2, the existing storage capacity of the lagoon is 137,457 m^3. **Therefore, the existing lagoon has reached its storage capacity and requires expansion for the continued growth within the Community of La Salle.**

5.0 PROPOSED DEVELOPMENT

Rather than sizing the expanded lagoon for a 20-year life, the proposed expansion involves utilizing the current land available to provide a balance of treatment and storage capacity realizing that the next step involves purchasing land elsewhere to build a new lagoon to service future subdivisions within La Salle. Even though the existing primary cells provide sufficient treatment capacity for a sizeable expansion, the proposed expansion involves the merging and expansion of the primary cells into one large primary cell and the construction of one new secondary cell. The dyke separating the existing primary cells will be removed and Primary Cell 1 will be extended 46.2 m to the south, creating one expanded primary cell. The New Secondary Cell will be constructed to the north and east of the existing site. The expanded primary and new secondary cells were sized to balance the treatment and storage capacities to provide for maximum growth within the Community of La Salle based on the available land. **The expanded lagoon will provide adequate treatment and storage for a population of 4,809 people, which includes bussed-in students.** Based on an average *person per dwelling* of 3.1 (See section 3.1), this equates to 1,551 homes.

5.1 SITE CONDITIONS

On November 19, 2013, GENIVAR conducted a geotechnical investigation at the proposed development area during which a drill rig was used to drill a total of 14 testholes (TH1 to TH14) between 4.6 m and 7.6 m depths below grade. The complete Geotechnical Report is included in Appendix C.

5.1.1 Local Topography

The proposed site is located on an area known as the Red River Plain sub-area. The Red River Plain sub-area is a clay basin, with local flood plains and river levees, which occupies the flat areas in the lower-lying part of the Lake Agassiz basin. The area consists of lacustrine clay and alluvial deposits which range from a few metres to 13 m or more in thickness. Limestone bedrock below thick clay and till layers (see the attached nearest well log of SW 26-8-2E) underlies much of the surficial deposits about 24 m below grade.

5.1.2 Soil Conditions

The general soil profile reveals a topsoil layer of about 100 mm to 150 mm followed by a thick clay layer, which extended to the bottom of the testholes at 7.6 m below grade.

Fractured high plasticity clay was observed down to 1 m. Beneath the fractured clay is a cohesive, high plasticity clay which extends down to 7.6 m depth. No seepage and caving conditions were observed from the testholes. A detailed description of the soil profile is presented in the attached logs, Appendix C (Geotechnical Report).

5.1.3 Groundwater

At present, there is a preliminary groundwater report prepared by the Planning Branch of the Water Resources Division on this area. Groundwater is readily available and fresh in the area east of the Red and Rat Rivers. The main aquifer in the area is the carbonate bedrock (limestone and dolostone) that underlies the whole area but bears freshwater only in the areas east of the Red and Rat Rivers. The depth to the carbonate bedrock ranges from 12 m to 40 m. Minor shallow sand aquifers were found along the La Salle River meander belt and along one of its tributaries near Starbuck. The well yields of the main aquifer are adequate for moderate industrial and municipal requirements and groundwater quality ranges from fair to excellent. A review of the Groundwater Pollution Hazard Map shows that the property is located outside a groundwater pollution hazard area.

Based on the drainage map of the area, groundwater flow at the site is immediately towards the north and eventually heading to the La Salle River.

5.1.4 Site Investigation

As classified during our field investigation, the clay layer encountered at the site is heavily fractured beneath the topsoil layer down to at least 1 m below grade. For this reason, hydraulic conductivity of the in-situ clay at approximately 1 m below grade was tested.

The clay material in the upper 1.5 m of the soil profile is a CH material based on visual classification. The estimated hydraulic conductivity of this material should range between 10^{-8} to 10^{-9} cm/sec. The hydraulic conductivity of the in-situ clay obtained at 1.5 m depth for TH4 was 5.6 $x10^{-9}$ cm/sec.

5.2 SUMMARY OF PROPOSED DEVELOPMENT

As identified previously, the existing La Salle lagoon is hydraulically undersized for continued growth within the Community. The proposed development consists of the merging and expansion of the existing primary cells into one primary cell and the construction of one new secondary cell, as illustrated in the design drawings (Appendix D). The expansion work is to be completed while the facility remains in operation.

5.2.1 Expanded Primary Cell

The Expanded Primary Cell will be constructed as illustrated in the design drawings (Appendix D). The expanded portion of the primary cell will be designed with a 1.0 m wide surface clay liner extending around the interior of the new dykes and bottom of the proposed expanded cell. The surface clay liner will tie into the existing surface clay liner, located along the interior of the existing dykes. The surface clay liner shall have a permeability of $1x10^{-7}$ cm/s or less. Based on providing a balance in the maximum population growth, the cell is designed to provide a surface area of 6.61 ha. This surface area equates to a treatment capacity of **370.3 kg-BOD_5/d**. The expansion of the cell will be constructed with 4:1 interior side slopes and 4:1 exterior side slopes and will have a normal operating depth of 1.5 metres with a minimum 1.0 metre freeboard. Table 5.2 provides the details for the preliminary design specifications for the Expanded Primary Cell.

TABLE 5.2: PRELIMINARY DESIGN SPECIFICATIONS FOR THE EXPANDED PRIMARY CELL

Parameter	Expanded Primary Cell
Cell bottom	irregular
Liquid surface (at 1.5 m depth)	irregular
Top of dyke (inside to inside)	irregular
Operating depth	1.5 m
Freeboard height	1.0 m
Interior side slope	4:1
Exterior side slope	4:1
Total volume (at 1.5 m depth)	92,770 m^3
Storage volume	46,385 m^3
Surface area (at operating depth)	6.61 ha
Liner system	1.0 m surface clay liner

5.2.3 New Secondary Cell

The New Secondary Cell (3) will be constructed as illustrated in the design drawings (Appendix D). The cell will be designed with a 3.0 m wide clay core around the outside perimeter of the proposed new dykes and a 1.0 m wide surface clay liner along the existing dykes. The 1.0 m wide surface clay liner will extend from the top of the existing dykes to the bottom of the new secondary cell, extending at least 0.3 m into the unfractured, insitu clay. The clay core and the surface clay liner shall have a permeability of $1x10^{-7}$ cm/s or less. Based on providing a balance in the maximum population growth, the cell is designed to provide the balance of the storage. The cells will be constructed with 4:1 interior side slopes and 4:1 exterior side slopes and will have a normal operating depth of 1.5 metres with a minimum 1.0 metre freeboard. Table 5.3 provides the details for the preliminary design specifications for the New Secondary Cell (3).

5.2.4 Summary

After expansion the La Salle lagoon will be a four-cell lagoon. One primary cell will provide adequate treatment for a population of 4,809 people, while five secondary cells will provide storage (250 L/c/d, 227 days) for a population of 4,850 people. Table 5.4 summarizes the expanded lagoon capacities.

TABLE 5.3: PRELIMINARY DESIGN SPECIFICATIONS FOR THE NEW SECONDARY CELL

Parameter	New Secondary Cell
Cell bottom	irregular
Liquid surface (at 1.5 m depth)	irregular
Top of dyke (inside to inside)	irregular
Operating depth	1.5 m
Freeboard height	1.0 m
Interior side slope	4:1
Exterior side slope	4:1
Total volume (at 1.5 m depth)	164,900 m^3
Dead storage volume (at 0.3 m depth)	31,430 m^3
Storage volume	133,470 m^3
Liner system	3.0 m clay core & 1.0 m surface clay liner

TABLE 5.4: EXPANDED WASTEWATER STABILIZATION POND CELL CAPACITIES

Existing Type	Proposed Type	Surface Area [ha]	Total Volume [m^3]	Dead Storage Volume [m^3]	Storage Volume [m^3]
Primary Cell 1 & 2	Primary Cell 1	6.61	92,770	-	46,385
Secondary Cell 1	Secondary Cell 1	2.34	31,900	5,900	26,000
Secondary Cell 2	Secondary Cell 2	6.02	85,880	16,490	69,390
N/A	Secondary Cell 3	11.64	164,902	31,429	133,470
Total		**26.61**	**375,482**	**53,810**	**275,285**

5.2.5 Construction Details

According to the subsurface profiles in the 2013 Geotechnical Report, the depth of topsoil in the proposed area was approximately 100 mm - 150 mm. Organic soil from the lagoon area will be stockpiled and reapplied at the end of construction on the applicable disturbed areas and on the dykes as shown in the drawings.

For lagoon construction, Manitoba Conservation's Environmental guidelines require that the proposed dykes and bottom of the proposed cells be provided with a layer consisting of at least one metre of soil having a permeability of less than $1x10^{-7}$ cm/s. The proposed expansion location consists where such clay is present. The cohesive, high plasticity brown clay at a depth of 1.0 m was tested and achieved a hydraulic conductivity test result of less than $1.0x10^{-7}$ cm/s, thus meeting the guidelines.

The new cells will be constructed as detailed in the drawings. The interior and exterior side slopes of the constructed cell will be 4:1. The proposed secondary cell will have a 1.5 metre operating depth with a minimum 1.0 metre freeboard. The dykes will be constructed with in-situ material in 150 mm lifts compacted to 95% Standard Proctor density. The moisture content of the material should be minus two percent to plus 3 percent of optimum moisture as determined by the Standard Proctor test. Any unsuitable material such as course gravel and boulders should be removed. The top of the dykes will range from 3.0 m to 5.0 m wide. The 5.0 m wide dykes permit semi-trailer access to all secondary cells of the lagoon. The 3.0 m wide clay core of the new secondary cell and the expanded primary cell, and 1.0 m

surface clay liner of the new secondary cell will be tested and the results of the testing will be reported to Manitoba Conservation.

A perimeter drainage ditch will be constructed around the new cells, if required. Other ditching will be located as shown on the drawings. For disturbed areas where sediment or erosion control is deemed necessary, the contractor will be required to employ appropriate measures.

The interior dykes will be armoured with rip rap to prevent wave erosion. Rip rap is also proposed for the inlet and outlet areas of the inter-cell and discharge piping. All inter-cell and discharge piping and valves will be located as shown on the design drawings.

6.0 ENVIRONMENTAL IMPACTS

6.1 ODOUR CONSIDERATIONS

It is expected that the expanded facility will operate without causing any significant odour problems. The existing primary cell is designed for the flows with a 56 kg-BOD_5/ha/d loading. The only time of the year that some minor odours may be present is during the spring while the ice thaws. During the winter, ice cover largely prevents free oxygen from entering the water. This condition leads to the production of hydrogen sulphide gas (H_2S) during the winter by bacteria that do not require free oxygen. These accumulated gases dissipate quickly into the atmosphere when the ice breaks and the pond returns to a non-odorous condition.

The closest residence to the lagoon is located approximately 329 metres away (to the east), which meets the Manitoba Conservation minimum setback distance of 300 metres.

6.2 LAND IMPACT

Through information provided by the R.M. of Macdonald, the existing lagoon land and the land intended for lagoon development are designated as "EV", Environmental Policy Area" and zoned "AR", Agriculture Restricted. The land surrounding the lagoon is used for agricultural purposes, which includes the land intended for development. Therefore, the only pre-excavation work required is topsoil stripping and stockpiling.

6.3 SURFACE WATER

From the discharge point into the existing ditch, the treated effluent will flow through this ditching and then into a more natural swale down to the La Salle River. The distance of the route from the discharge point of the nearest secondary cell up to the La Salle River is approximately 1,685 metres. Perimeter ditching will be constructed to provide positive drainage for surface water around the lagoon, if required.

The Community of La Salle and the proposed lagoon facility are in the Lower La Salle Watershed (No. 22). Figure 3.1 illustrates this discharge route in the specified watershed.

The water licensing branch of Manitoba Water Stewardship was consulted to provide a list of water users along the drainage route. There are three licensed water users, one upstream and two downstream within the vicinity of the discharge point into the La Salle River (Appendix E).

6.3.1 Fuel Storage on Site

The proposed facility does not require the onsite storage of gasoline or diesel fuel. During construction and upgrading, the contractor will be required to ensure that all equipment is properly maintained to prevent leaks and spills of fuel and motor fluids. Refuelling of equipment will not be within 100 metres of a water body, stream or wetland.

6.4 GROUNDWATER

At present, there is a preliminary groundwater report prepared by the Planning Branch of the Water Resources Division on this area. Groundwater is readily available and fresh in the area east of the Red and Rat Rivers. The main aquifer in the area is the carbonate bedrock (limestone and dolostone) that underlies the whole area but bears freshwater only in the areas east of the Red and Rat Rivers. The depth to the carbonate bedrock ranges from 12 m to 40 m. Minor shallow sand aquifers were found along the La Salle River meander belt and along one of its tributaries near Starbuck. The well yields of the main aquifer are adequate for moderate industrial and municipal requirements and groundwater quality ranges from fair to excellent. A review of the Groundwater Pollution Hazard Map shows that the property is located outside a groundwater pollution hazard area.

Based on the drainage map of the area, groundwater flow at the site is immediately towards the north and eventually heading to the La Salle River.

The design of the new lagoon complies with Manitoba Conservation guidelines and will therefore sufficiently contain the influent wastewater. The treated effluent intended for discharge will comply with the parameters listed in the new Environment Act Licence.

6.5 SPECIES IMPACT

A file search with the Biodiversity Conservation Wildlife and Ecosystem Protection Branch of Manitoba Conservation resulted in no occurrences in the specified area of 27-8-2 EPM. Correspondence is included in Appendix E.

6.6 FISHERIES

According to the 2013 Milani Report with additional Fisheries and Oceans Canada (DFO) information provided in email correspondence, all ditching, including both the potential discharge routes, are considered type E habitat (indirect fish habitat), until reaching the type A habitat (complex habitat, indicators present) of the La Salle River. Correspondence is included in Appendix E.

In order to protect any potential fish in the critical springtime spawning season, when effluent un-ionized ammonia tends to be high, the lagoon has been designed to the 227-day storage period. The lagoon will discharge after June 15th and will allow for significant conversion of toxic un-ionized ammonia into relatively benign nitrates.

6.6.1 Fisheries Act Information

As noted from Fisheries and Oceans Canada (DFO), the deposit of deleterious substances into water frequented by fish is prohibited under the *Fisheries Act*. In addition, according to subsection 35(1) of the *Fisheries Act*, "no person shall carry on any work or undertaking that results in the harmful alteration, disruption or destruction of fish habitat."

6.7 FORESTRY

There is no forestry activity in the area. No treed areas should be affected by the construction of the two new lagoon cells.

6.8 HERITAGE RESOURCES

In an email dated December 24, 2013 from the Historic Resources Branch (Appendix E), it was stated that the potential to impact significant heritage resources is low, and therefore, the Historic Resources Branch has no concerns with the project.

6.9 SOCIO-ECONOMIC IMPACTS

The lagoon construction will result in a short-term boost to the construction industry in the area.

6.10 PUBLIC INVOLVEMENT

Comments from concerned members of the public will be solicited as part of Manitoba Conservation and Water Stewardship review prior to issuing a licence.

7.0 MANAGEMENT PRACTICE

The new wastewater treatment facility is specifically designed to provide wastewater treatment and storage capacity for the existing infrastructure and proposed developments up to a population of 4,809. The expanded La Salle lagoon is designed to treat wastewater up to an average loading of 370.3 kg-BOD_5/d and store the treated effluent for 227 days. The facility will normally discharge in spring soon after June 15th, and again in fall prior to October 31st. Treated effluent will be discharged from the isolated secondary cell(s). After the new development, the lagoon will consist of one primary and three secondary cells.

Manitoba Conservation and Water Stewardship generally requires treated effluent to have total suspended solids <25 mg/L, BOD_5 < 25 mg/L, fecal coliform MPN of <200 organisms/100 mL, total coliform MPN <1500 organisms/100 mL, and chlorine <0.02 mg/L and some nutrients removal requirements. The proposed facility will meet the new licence requirements.

7.1 DISCHARGE PROCEDURE

1) Manipulate the valve to isolate one, two or all of the secondary storage cells at least two weeks before collecting the BOD_5, bacteriological, and any other samples required in the new Environment Act Licence.

2) Sample the isolated secondary cell(s). Allow at least one week to analyze the sample(s), plus shipment time.

3) If the total coliform MPN index does not exceed 1500 organisms per 100 mL, the faecal coliform MPN index does not exceed 200 per 100 mL of sample, and the BOD_5 does not exceed 25 mg/L, then the bacteriological and BOD_5 component of the testing is satisfied. Further discharge parameters may be instituted in the new Environment Act Licence that should be satisfied prior to discharge.

4) While discharging, the valve(s) between the primary cell and the secondary cell(s) remain closed to prevent the primary cell from simultaneously discharging effluent into the discharging secondary cell(s).

5) Once the secondary cell(s) are discharged, close the discharge valve(s), and reopen the valve(s) between the primary cell and the secondary cell(s). This will allow the

water levels in the cells to equalize. In many cases a sufficient amount of treated effluent is discharged from the secondary cell(s) using this procedure to permit operation until the next scheduled discharge period. However, it may be necessary to discharge additional treated effluent to have enough storage for the wastewater flows in the following operational season.

6) If further discharging is necessary, repeat the isolation, testing and discharge process.

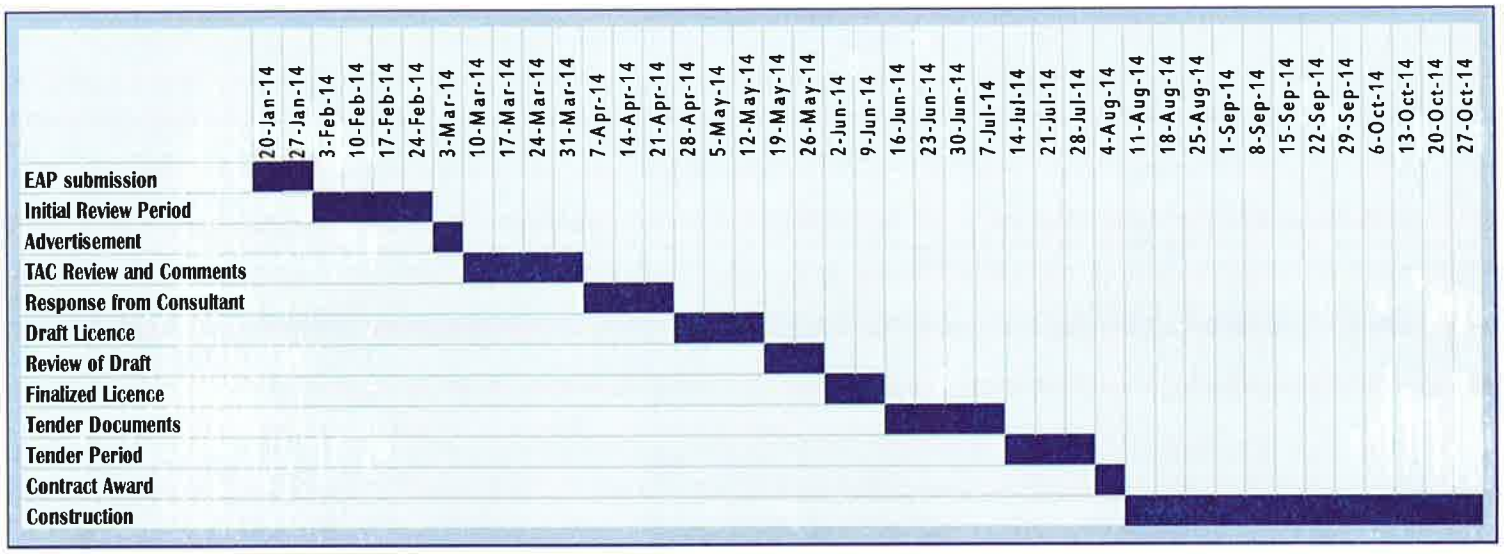
7.2 RECORD KEEPING AND INSPECTION ROUTINE

A record book, organized in five sections, should be maintained:

1) Daily Records – Water consumption and lift station pumping records should be collected and retained for future estimation of flows to the wastewater treatment facility. Septic hauling records (dates and volumes) from the individual haulers trucking to the lagoon should also be collected and retained, if applicable.
2) Weekly Records - The weekly summer inspection would consist of recording the following: the water level, presence of odours and their source, and presence of floating objects (removal). The summer maintenance should also include grass cutting on the dykes, if necessary, elimination of emergent vegetation, extermination of burrowing animals, repair of the dykes and rip rap if damaged by wind erosion and wave action, repair of the fence and gate.
3) Periodic Winter Inspection is confined to inspecting for frozen piping, checking if the water level in the cells is as it should be.
4) Discharge Records - The records should contain all treated effluent quality analyses, dates of discharge, discharge procedure followed, water levels and other pertinent data.
5) Monitoring Program – If acceptable, a sampling and monitoring program would be implemented with a maximum duration of 10 years. During the program the treated lagoon effluent would be sampled and analyzed during the discharges to track and assess the phosphorus reduction in the constructed ditch.

8.0 SCHEDULE AND FUNDING

It is anticipated that the Environment Act Licence process will be finalized by the summer of 2014 and construction will begin in the late summer of 2014. The project is funded by developer contributions and the funding is time sensitive. Due to the nature of construction in this particular project, it is imperative that construction be completed in the year it is begun and that sufficient time is given in 2014 to complete construction.



9.0 REFERENCES

Milani, D.W. 2013. Fish community and fish habitat inventory of streams and constructed drains throughout agricultural areas of Manitoba (2002-2006). Can. Data Rep. Fish. Aquat. Sci. 1247: xvi + 6,153 p.

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