Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

Associated Engineering (Sask.) Ltd.
203 – Five Donald Street
Winnipeg, Manitoba, Canada, R3L 2T4

TEL: 204.942.6391
FAX: 204.942.6399
www.ae.ca

February 1, 2019
File: 2015-4557.000.E.400

Ms. Tracey Braun, M. Sc.
Director, Environmental Approvals
Sustainable Development
123 Main Street, Suite 160
Winnipeg Manitoba, R3C 1A5

Re: ENVIRONMENT ACT PROPOSAL - TOWN OF MINNEDOSA
WASTEWATER TREATMENT FACILITY UPGRADES

Dear Ms. Braun:

On behalf of the Town of Minnedosa, please find enclosed four (4) hardcopies and one (1) electronic PDF of our Environmental Act Submission for the above-mentioned project. The enclosed is also accompanied by a $7,500 cheque for the application fee.

Currently there is no available funding for the project, thus the construction timeline is unknown. It is not anticipated that the project would start construction until 2022 at least, or until funding is made available.

We trust that the enclosed application contains sufficient information for your staff to provide the necessary approvals. Should the reviewer require any additional information or require any clarifications, please do not hesitate to contact myself.

We thank you for your consideration of this application.

Yours truly,

Ken Anderson
Manager, Water

KA

Environment Act Proposal Form

Manitoba Sustainable Development

Name of the development:

Town of Minnedosa Wastewater Treatment Facility

Type of development per Classes of Development Regulation (Manitoba Regulation 164/88):

Class 2

Legal name of the applicant:

Town of Minnedosa

Mailing address of the applicant: 103 Main Street

Contact Person: Kevin Marcino

City: Minnedosa Province: MB Postal Code: R0J 1E0

Phone Number: 204-867-2727 Fax: email: minpwork@mymts.net

Location of the development: Town of Minnedosa

Contact Person: Kevin Marcino

Street Address: 103 Main Street

Legal Description: NE & SE 1/4 3-15-18W

City/Town: Minnedosa Province: MB Postal Code: R0J 1E0

Phone Number 204-867-2727 Fax: email: minpwork@mymts.net

Name of proponent contact person for purposes of the environmental assessment:

Ken Anderson, P. Eng.

Phone: 204-942-6391 Fax:	Mailing address: Associated Engineering 203 - 5 Donald St. WPG MB R3L 2T4

Email address: andersonk@ae.ca

Webpage address:

Date: Feb. 01, 2019	Signature of proponent, or corporate principal of corporate proponent: K Anderson. Printed name:

PRINT RESET

A complete **Environment Act Proposal (EAP)** consists of the following components:

- ☐ **Cover letter**
- ☐ **Environment Act Proposal Form**
- ☐ **Reports/plans supporting the EAP** (see "Information Bulletin - Environment Act Proposal Report Guidelines" for required information and number of copies)
- ☐ **Application fee** (Cheque, payable to Minister of Finance, for the appropriate fee)

Per Environment Act Fees Regulation (Manitoba Regulation 168/96):

Class 1 Developments	$1,000
Class 2 Developments	$7,500
Class 3 Developments:	
Transportation and Transmission Lines	$10,000
Water Developments	$60,000
Energy and Mining	$120,000

Submit the complete EAP to:

Director
Environmental Approvals Branch
Manitoba Sustainable Development
1007 Century Street
Winnipeg, Manitoba R3H 0W4

For more information:
Phone: (204) 945-8321
Fax: (204) 945-5229
http://www.gov.mb.ca/sd/eal

Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

ENVIRONMENT ACT PROPOSAL

Town of Minnedosa

Town of Minnedosa
Wastewater Treatment Facility Upgrades

February 2018

AE#:2016-4757

CANADA'S BEST MANAGED COMPANIES Platinum member

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1 Introduction

Associated Engineering (AE) was retained by the Manitoba Water Services Board and the Town of Minnedosa to undertake an infrastructure assessment study on the Town's wastewater treatment system.

As part of our scope, AE completed a Feasibility Study for potential lagoon upgrades in 2018. Our scope of services also included this Environmental Act Proposal submission but is did not include any detail design of the facility upgrades. Design and construction will occur at a much later date when the Town is able to secure funding and can also afford the new facility; this is expected to be in 2022 or 2023.

The proposed upgrades are a designed to improve treatment performance at the facility in order to meet the newer Provincial and Federal Regulations effluent standards for phosphorus and ammonia.

This Application documents the conceptual design for upgrading the Town of Minnedosa's two cell aerated Wastewater Treatment System with an ammonia and phosphorus treatment processes.

1.1 BACKGROUND INFORMATION

In 2018, Associated Engineering completed a "Town of Minnedosa Wastewater Treatment Feasibility Study" that included an assessment of the lagoon capacity for current and future population requirements, as well as its ability to meet current and future effluent quality parameters. The Study concluded that the existing aerated lagoon is sufficient for BOD and TSS reduction for the current and future population demands. However, it was recommended to add an MBBR process followed by settling ponds and UV disinfection to improve treatment performance for ammonia and phosphorus.

The Town of Minnedosa (Town) is located approximately 52 km north of Brandon and 216 km west of Winnipeg. In 2011, the population of the Town was 2,587 people (Statistics Canada). In 2016, the contributing population to the wastewater system was estimated by the Town to be approximately 2,449 people.

1.2 EXISTING FACILITIES AND ISSUES

The Town is served by a sanitary sewer collection system which conveys flows to the Main Sewage Lift Station (LS). Wastewater is pumped by the SLS via a forcemain to the Wastewater Treatment Facility (WWTF). At the WWTF, treatment is provided by a two-cell aerated lagoon system using chlorine gas for effluent disinfection. Effluent is continuously discharged to the adjacent Little Saskatchewan River.

The Town's treatment lagoon was originally constructed in 1982 and was last upgraded with a new aeration system in 2017. The existing facility is a continuously discharging aerated lagoon with chlorine disinfection. Although the facility is operating within their Licence for BOD, TSS and disinfection, it is not able to meet the more recent nutrient limits for these types of facilities. The facility is not meeting the Provincial limits on

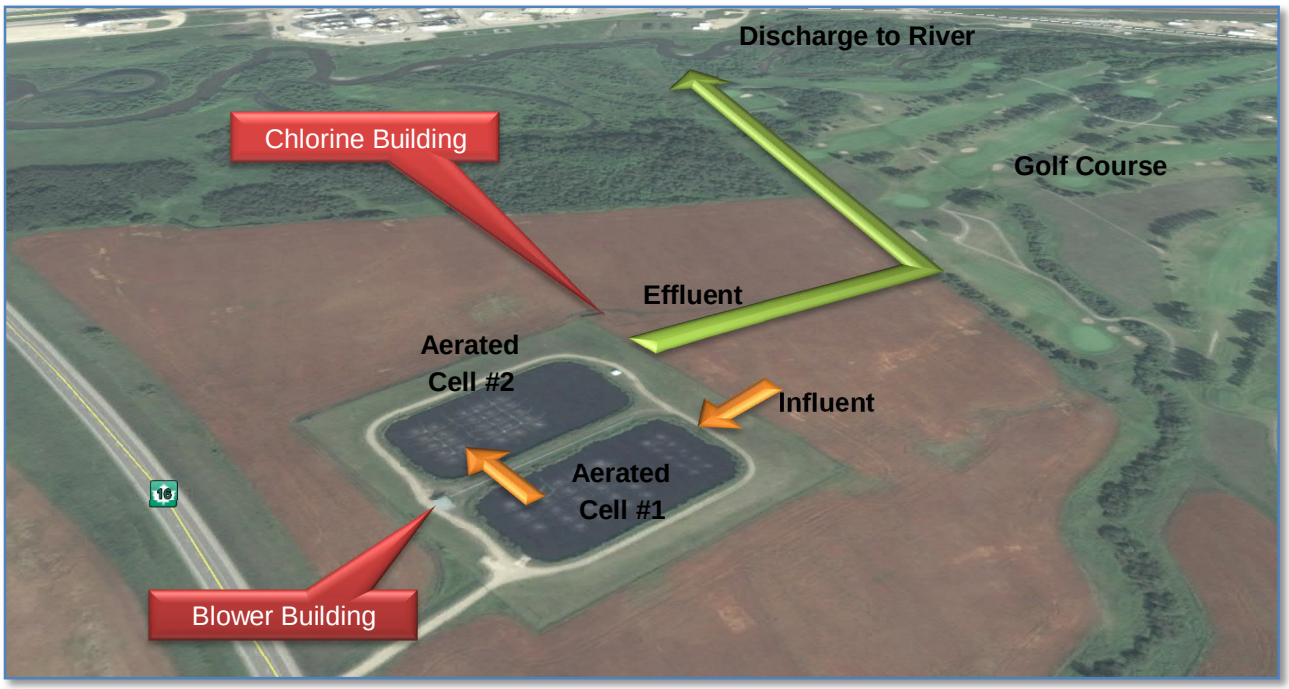
Phosphorus (<1.0 mg/L) and is challenged to meet the Provincial and Federal ammonia toxicity limits (<0.04 mg/L un-ionized in-stream).

Table 1-1 – Existing Lagoon Capacity Assessment

Cell #	Water Depth (m)	Nominal Volume (m^3)	Retention Time (d) at 1,715 m^3/d	Retention Time (d) at 1,845 m^3/d
1 – Fully mixed	5.19	30,600	17.5	16.5
2 – Partially mixed	5.19	30,600	17.5	16.5
Total		**61,200**	**35**	**33**

In 2017, the Town replaced their old blowers and aeration equipment with all new equipment. The new equipment was designed for the 2038 population demands.
The following Figure shows the current Layout of the existing lagoon facility.

Figure 1-1. Existing Lagoon Site



1.3 POPULATION AND LAGOON LOADING

The Town estimates that the current population in 2018 was approximately 2,500 people. Through discussions with the Town it was agreed to adopt a conservative approach to population growth for the conceptual design, based on the potential residential development of 110 lots over 20 years and with an average of three residents per lot.

The above estimate for residential development would provide an average growth rate of 0.62% per year over the 20-year study period, similar to the average growth reported through the census data. The historical population, average annual growth rate, and projected growth are outlined in **Table 1-2** below.

Table 1-2 – Minnedosa Population Projections

Year	Data Source	Population
2011	Statistics Canada	2,587
2016	Statistics Canada	**2,449**
2018		2,500
2023	Projections calculated @ 0.7% growth per year	2,589
2028		2,681
2033		2,776
2038		**2,874**

The Town's sanitary sewer system collects wastewater flow from residents, local commercial and retail sources, and from the Husky Energy Ethanol Plant. Infiltration and Inflow (I&I) can contribute significant flows within the sewer system. Ongoing efforts towards source control of I&I is recommended but it is unlikely to be able to significantly reduce the forecast storm flows in the short term. Below is a summary of anticipated wastewater flow over the 20-year design horizon:

Table 1-3. Wastewater Flows

Source	2018 Current Flows	2038 Projected Flows
Residential (350 L per capita per day)	875 m^3 per day	1,005 m^3 per day
Husky Energy, Ethanol Plant	400 m^3 per day	400 m^3 per day
Infiltration and Inflow*	440 m^3 per day	440 m^3 per day
Total Contribution to Wastewater Flow	**1,715 m^3 per day**	**1,845 m^3 per day**

**estimated at ~2,200 L/ha/day @ 200 ha*

Table 1-4 projects the anticipated dry weather (November-April) and wet weather (May-October) flows to 2038. The future flow projections assume minimal infiltration allowance in new development areas with tighter collection systems; and that the Town will also be renewing infrastructure and addressing infiltration in the older areas.

Table 1-4 – Projected Wastewater Generation

Year	Population	Average Daily Population Contribution	Average Daily DRY Weather Flows	Average Daily WET Weather Flows
2018	2,500	875 m3/day	1,275 m^3/day	1,715 m^3/day
2038	**2,874**	**1,005 m3/day**	**1,405 m^3/day**	**1,845 m^3/day**

For the purpose of design, the average wastewater loading rates will be based on a per capita generation rate. **Table 1-5** summarizes the estimated wastewater loading for the Town at the project 2038 population of 2,874 residents. The loadings include the RM residents who have their wastewater hauled to the lagoon.

Table 1-5 – Estimated Wastewater Loadings (kg/day) by Population

Parameter	Estimated Loading per Person Town / RM (g/cap/day)	Year 2038 Average Day Load (kg/day)	TOTAL Average Day Load for 2036 (kg/day)
Biochemical Oxygen Demand (BOD_5)	Town: 77 / TH*: 42	Town: 221 / TH: 20	**241 kg/d**
Carbonaceous BOD	110 / 62	316 / 20	**335 kg/d**
Total Suspended Solids (TSS)	60 / 75	172 / 20	**192 kg/d**
Total phosphorus	2.7 / 2.7	8 / 1	**9 kg/d**
NH_3-N (Ammonia - N)	5 / 1	14 / 1	**15 kg/d**
TKN	9 / 1	26 / 1	**27 kg/d**

** TH = Truck Haul*

1.4 REGULATORY FRAMEWORK

The current facility is operating under an older 1991 Licence with limited wastewater effluent criteria. It is understood that the new upgrades are considered a Major Alteration and a full EAP is required for the works. A new Environment Act Licence will then be issued for the upgrades.

1.5 PREVIOUS STUDIES

Town of Minnedosa & MWSB – Wastewater Treatment Facility Feasibility Study, February 2018, by Associated Engineering.

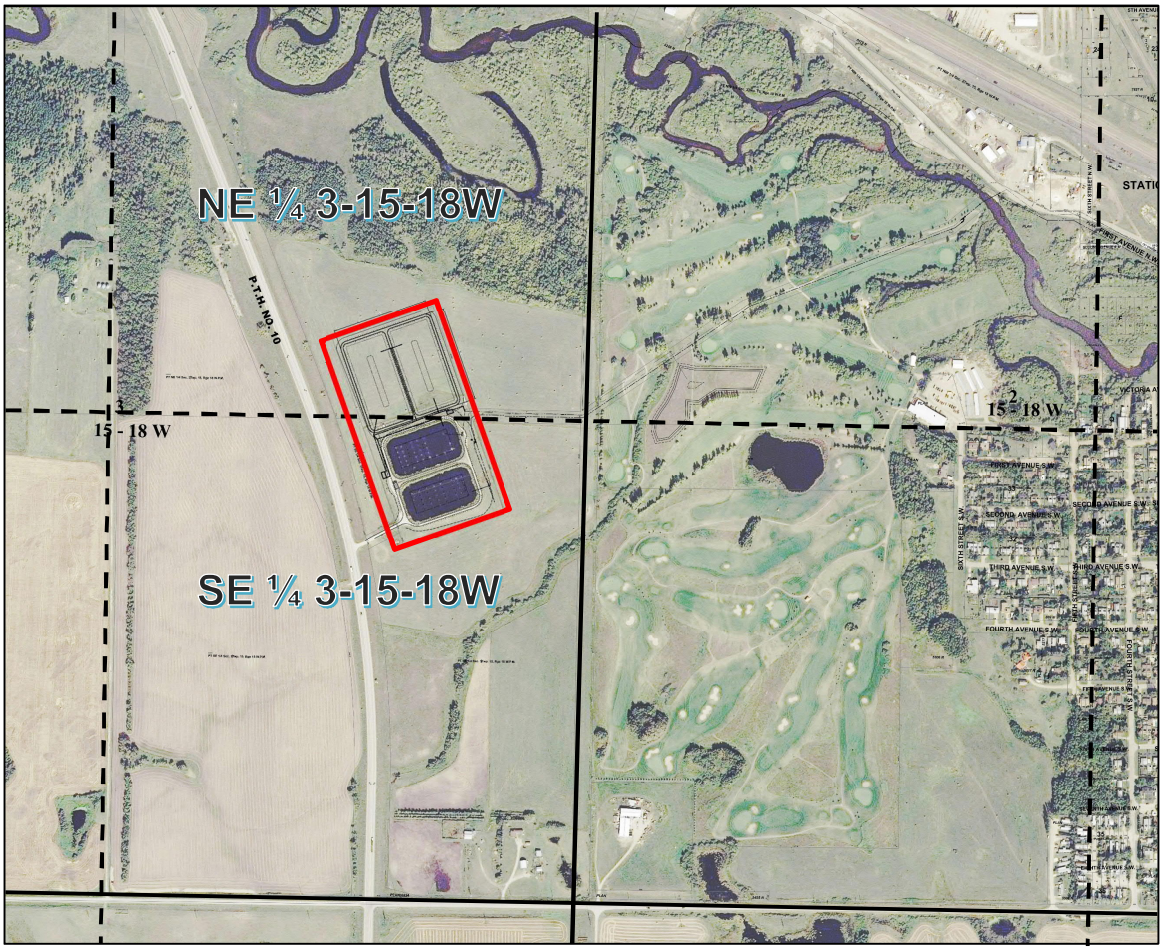
Pilot Study Report: LagoonGuardTM for Post Lagoon Ammonia removal at Low Temperatures, 2017, by Veolia Water Technologies Canada Inc. (for Town of Neepawa and MWSB – Confidential).No previous studies are available.

2 Description of Proposed Development

2.1 PROJECT LOCATION AND OWNERSHIP

The existing wastewater treatment lagoon is located in the SE and NE quarter of Section 03, Twp 15, Rge 18W. See **Figure 2-1**.

Figure 2-1 – Project Location Map



The land is owned by the Town of Minnedosa under Plans 98006 and 37707 NLTO. Copies of the Status of Tile are included in the Appendices.

2.2 EXISTING AND ADJACENT LAND USE

During the Conceptual Design it was assumed that all proposed treatment options need to fit within the confines of the existing property boundary. There is possibility for the Town to expand through the acquisition of adjacent properties if required.

All the land comprising wastewater treatment lagoon has been categorized as an Open Space Zone. The main purpose of this land use category is to accommodate open areas, controlling development to create undeveloped areas of land or water within a community.

2.3 PROJECT DESCRIPTION

Based on the 2017 Feasibility Study and consultation with the Town during the review process, the preferred new treatment technologies are MBBR for nitrification and settling ponds for phosphorus reduction, and UV for final disinfection.

Figure 2-2 shows the proposed treatment schematic for the upgrades wastewater treatment facility. The objective will be to try and have enough hydraulic grade line though the system so that it all flows by gravity without the need for re-pumping through the system. As such, hydraulic restrictions (i.e. site piping) should be minimized.

Figure 2-2 – Aeration Lagoon Schematic with MBBR Treatment Process

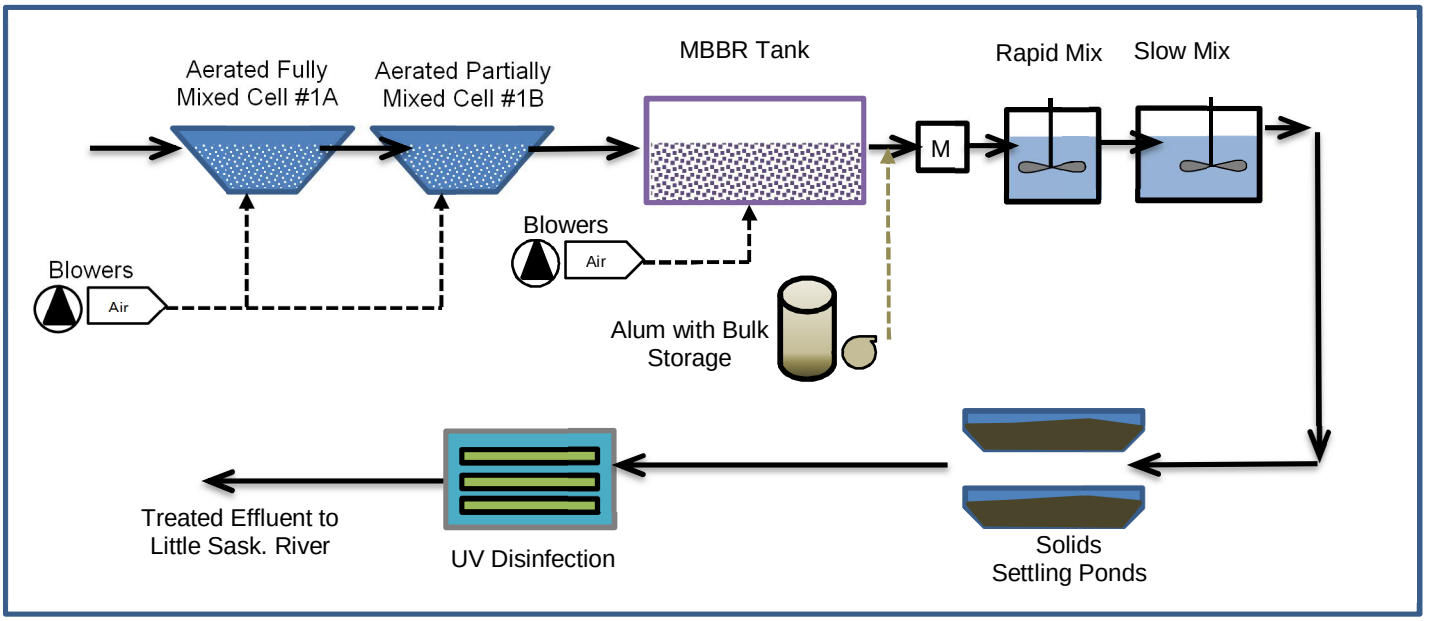
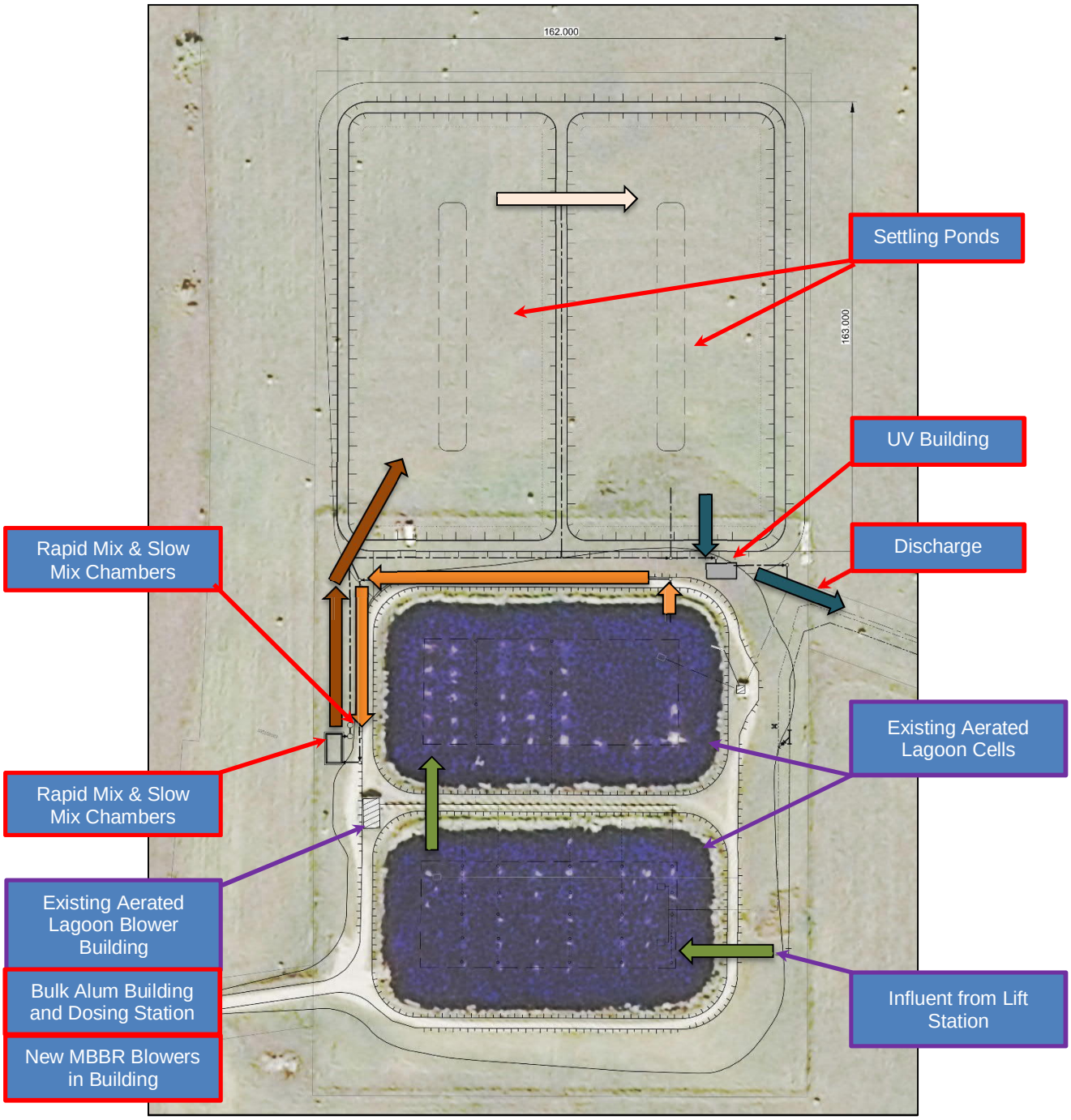


Figure 2-3 shows the proposed site layout of the existing aerated cells, the MBBR and the settling cells.

Figure 2-3 – Proposed Facility Upgrades



2.3.1 Project Timeline

It is uncertain when the proposed facility upgrades will take place. The Town will need to not only secure Federal and Provincial Funding, but they must also be able to afford their own portion of the contribution. Currently, the anticipated timeline is that the works would take place in 5 to 7 years from 2017 (2022-2024). It is expected that a functional design report will be developed prior to detail design to re-establish design conditions and re-evaluation of the available technologies for treatment.

2.3.2 Environment Act Proposal

In order to meet any future Funding requirements and avoid unnecessary construction delays, the Town is submitting this EAP to have a Licence in place waiting for construction. It is requested that that the new Licence include the necessary clauses to delay any implementation of the new effluent requirements until the new facility is constructed.

In a new Licence will likely be a Clause requiring the works to works to be completed within a three-year period. If the works are not started in this time frame, the Town will apply for an extension of the Licence.

2.4 DESIGN CRITERIA

2.4.1 Wastewater Characteristics and Loadings

Table 2-1 presents the key design values used for the upgraded wastewater treatment system. The final values should be re-confirmed at the Functional Design stage.

Table 2-1. Key Design Values for the Upgraded Wastewater Treatment System

Parameter	2038 Design Value	Comments
Design Population	**2,874 residents**	+ some Truck Haul
Design Average Dry Weather Flow	**1,445 m^3/d**	
Design Average Wet Weather Flow	**1,845 m^3/d**	
Temperature	**0.5 – 20 ^oC**	
BOD_5 Load, average	**241 kg/d**	
$cBOD_5$ Load, average	**335 kg/d**	
TSS Load, average	**192 kg/d**	
Total Phosphorus Load, average	**9 kg/d**	Based on effluent data
NH_3 – N Load, average	**15 kg/d**	Based on effluent data
TKN Load, average	**27 kg/d**	

2.4.2 Proposed Effluent Quality Criteria

Manitoba Sustainable development regulates the discharge of treated effluent in Manitoba, as legislated in the *Public Health Act* (P210). Based on current Provincial and Federal regulations, **Table 2-2** summarizes the anticipated effluent requirements to the Little Saskatchewan River.

Table 2-2 – Anticipated Wastewater Effluent Requirements

Parameter	Effluent Limit	Comments
$cBOD_5$, (mg/L)	**≤ 25 mg/L**	Grab samples prior to discharge
TSS, (mg/L)	**≤ 25 mg/L**	Grab samples prior to discharge
Total Phosphorus, TP, (mg/L)	**< 1.0 mg/L**	Grab samples prior to discharge
Fecal coliform, (MPN/100 mL*)*	**< 200**	Grab samples prior to discharge
Unionized Ammonia (mg/L)	**< 1.25 mg/L**	Env. Canada (WSER) Expressed as N, sample at T=15ºC +/- 1ºC
Total Residual Chlorine (mg/L)	**<0.02**	Env. Canada (WSER) If chlorine is used in the process.
Acute Lethality	**< 50% rainbow trout mortality after 96 hr.**	Env. Canada (WSER) Fish submerged in 100 percent effluent.

2.5 TREATMENT PROCESSES

2.5.1 Aerated Lagoon Cells

The existing facility implements aerated lagoon cells for the primary treatment of BOD and TSS. The cells are constructed with a 1.0 m thick clay liner, and have an operating depth of 5.0 m. These cells will be maintained as part of the treatment process, no upgrades are required at this time to meet the future demand projections.

Sizing of the aerated cells is based on the BOD reduction objective and cold weather temperature kinetics. **Table 2-3** shows that the existing cells should be suitably sized. The effluent data also demonstrates excellent BOD reduction through the current cells.

Table 2-3 – Existing Aerated Cell Sizing Parameters

Parameter	Value
Influent BOD (C_0)	**241 mg/L**
Effluent BOD (C_n)	**20 mg/L**
k_T	**0.138**
Number of cells (operated in series)	**2 cells**
Operating Depth	**5.0 m**
Freeboard	**1.0 m**
Interior side slopes	**5:1**
Outside side slopes	**4:1**
Required Retention	**~33 days**
ADWWF	**1,445 m^3/day**
Design Total Cell volume	**51,400 m^3**
Existing Cell Volume	***61,000 m^3***

As previously noted, the aeration equipment was completely replaced in 2017 with new blowers, piping and diffusers by Nexom.

2.6 MBBR TECHNOLOGY

To achieve the required amount of nitrification throughout the year, the Veolia LagoonGuard™ Moving Bed Biofilm Reactor (MBBR) was selected through a proposal process. The MBBR was selected over the more common Submerged Attached Growth Reactor (SAGR), due to it's much smaller footprint size and lifecycle costs.

Effluent for the aerated lagoons will flow by gravity to a single MBBR tank. The anticipated effluent from the lagoon cells into the MBBR will be low in BOD_5 (≤25 mg/L) and TSS (≤25 mg/l), but high in total ammonia nitrogen (TAN) (15 – 40 mg N /L). Therefore, the biofilm will be adapted for nitrification for effective ammonia reduction.

2.6.1 Pilot Testing

A pilot study was conducted on site at the Neepawa lagoon to demonstrate MBBR performance on this specific wastewater quality and in the cold weather environment. The pilot project ran from December 2016 through to May 2017 under harsh cold weather conditions.

During the pilot, the average influent ammonia concentration was measured to be 36 mg NH_4-N/L. The hydraulic retention time was optimized at 5.9 hours and corresponded to an effluent ammonia concentration of 0.5 mg NH_4-N/L. On the coldest days, the water temperature ranged from 0.5^0C to 0.7^0C while effluent ammonia concentrations ranged from 0.5 to 0.7 mg NH_4-N/L. Two influent samples were taken to analyze for acute lethality, and both samples showed 100% lethality, whereas the two effluent samples demonstrated 0% lethality and 0% stressing.

Table 2-4 summarizes the design parameters used to size the MBBR basin.

Table 2-4 – MBBR Sizing Parameters

Parameter	Value
Influent BOD_5	**<20 mg/L**
Influent TSS	**<20 mg/L**
Influent total ammonia nitrogen	**2 - 40 mg N /L**
Influent pH	**7 – 8**
Influent Alkalinity (as $CaCO_3$)	**300 mg/L**
Max Wastewater Temperature	**25^0 C**
Min. Wastewater Temperature	**0.5^0 C**

Parameter	Value
Winter daily flow (for highest TAN concentration)	**1,445 m^3/day**
Average day flow	**1,845 m^3/day**
Hydraulic capacity	**5,000 m^3/day**
Number of Basins	**1**

Table 2-5 summarizes the MBBR effluent quality objectives.

Table 2-5 – MBBR Effluent Parameters

Parameter	Influent to MBBR	Effluent from MBBR
Influent BOD_5	<20 mg/L	**<20 mg/L**
Influent TSS	<20 mg/L	**<25 mg/L**
Influent total ammonia nitrogen (TAN)	2-40 mg N /L	**< 3.0 in summer <5.0 in winter**
Unionized ammonia	-	**Not acutely lethal per Section 15 of WSER**
pH	~7.5	~7.5
Alkalinity (as $CaCO_3$)	300 mg/L	--
Max Wastewater Temperature	25^0 C	25^0 C
Min. Wastewater Temperature	0.5^0 C	0.5^0 C

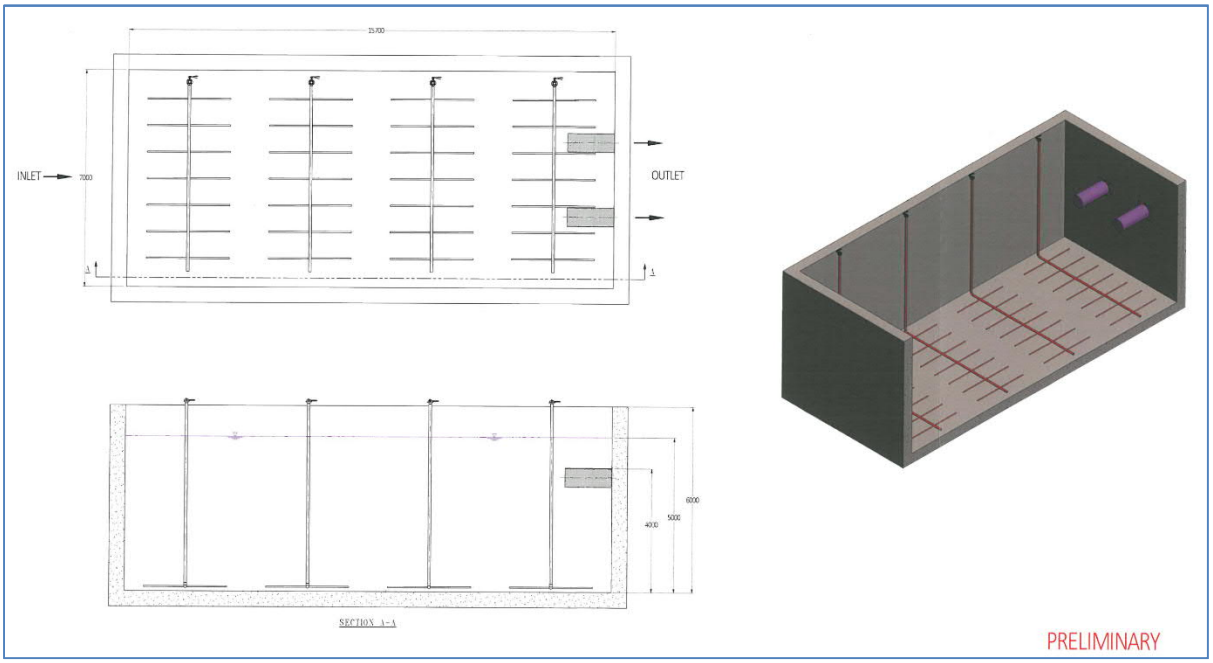
Any potential sloughing of biological matter that could increase TSS (~1-5 mg/L) in the effluent should be addressed by the settling ponds downstream.

Table 2-6 summarizes the MBBR tank sizing parameters and aeration equipment. The Blowers for the MBBR aeration system would be located inside the existing Blower Building.

Table 2-6 – MBBR Sizing Summary

Parameter	Value
MBBR Volume	435 m^3
Operating water depth	6.0 m
Tank Length	7 m
Tank width	10 m
Number of Blowers	2 (duty/standby)
Target DO concentration	7.0 mg/L

Figure 2-4 – Proposed MBBR Tank Layout



2.7 SETTLING PONDS FOR PHOSPHORUS REMOVAL

2.7.1 Rapid and slow mixing tanks

Prior to the MBBR treatment process, wastewater will flow by gravity to a rapid mix tank then sent to a slow mix tank. The purpose of the rapid mix tank is to force colloids to floc together then in the slow mix tank, allow them to settle and remove phosphorus (P) to less than 1.0 mg/L, but is also expected to remove some TSS and BOD with the solids.

Table 2-7 summarizes the sizing parameters for mix tanks.

Table 2-7 – Mixing Tank Sizing Parameters

Parameter	Value
Max Daily Flow	**1,845 m^3/day**
Max Daily Flow	**21 L/sec**
Rapid mix objective	**2.0 minutes**
Rapid Tank Volume	**2.5 m^3**
Slow Mix Floc Objective	**15 min**
Slow Mix Floc Tank Volume	**20 m^3**
Influent P	**~6.0 mg/L**
Effluent P	**<1.0 mg/L**

The mix tanks will be located adjacent to the MBBR tankage as cast in place concrete tankage. The influent flow from the cells will be metered to pace coagulant dosage with flow. Coagulant will be added just prior to the rapid mix tank. The coagulant will be stored in double wall bulk containment tanks in the existing blower building. The floc will then flow by gravity to the settling ponds.

2.7.2 Settling Ponds

The settling ponds are proposed to be 4.0 m deep to allow ~1.5 m of sludge accumulation. The anticipated cells should require de-sludging every 5-10 years depending on chemical usage and flow rates. A preliminary indication of when the cells are at capacity is expected to be an increasing amount of carry over and an inability to maintain a <1.0 mg/L P objective.

Once the cells are actually nearing capacity, an NOA/EAP would be conducted to describe the feasible disposal method.

Table 2-8 – Settling Pond Parameters

Parameter	Value
Annual Sludge Production Estimate (P & TSS reduction)	**350-500 m^3/year @ 20% solids**
Number of cells	**2**
Operating Depth	**4.0 m**
Freeboard	**1.5 m**
Interior Side Slopes	**5:1**
Total Volume both cells	**24,000 m^3**
Total Volume both cells with 1.2m of ice cover	**15,000 m^3**
Sludge Storage volume at 1.5 m depth	**5,000 m^3**

2.8 FINAL DISINFECTION

The use of an ultraviolet (UV) disinfection will be the final treatment step before discharging to the environment. Final disinfection is typically required with continuous discharging facilities. With the strict federal regulations on chlorine residuals (<0.02 mg/L), UV can become more feasible than chlorination followed de-chlorination.

Effluent from the settling ponds will flow by gravity through a UV channel located in new UV building. Final effluent from the UV will then be directed to a discharge pipe, then drainage ditch to the Little Saskatchewan River, in same area as the current discharge location.

The UV basis for design is the Trojan 3000 Plus. **Table 2-9** summarizes the design criteria for the proposed UV system.

Table 2-9 – UV Disinfection Design Criteria

Parameter	Value
Peak Disinfection flow	**1,845 m^3/day**
Peak Hydraulic flow capacity	**5,000 m^3/day**
Minimum UVT	**55%**
TSS	**<25 mg/L**
Dosage	**40.7 mJ/cm^2 never to exceed**
Disinfection Limit	**200 fecal coliform/100 ml Never to exceed**
Number of channels/banks	**1**
Width of channel	**310 mm**
Number of Lamps	**18**
Lamp Arrangement	**6 lamps per module, 3 modules**

2.8.1 UV Performance Requirements:

- The ultraviolet disinfection system will produce an effluent conforming to the following discharge permit: **never to exceed 200 fecal coliform/100 mL**.
- The UV system will be designed to deliver a minimum UV reduction equivalent dose of 30,000 µWs/cm^2 at peak flow, with reference to the MS2 surrogate organism in effluent with a UV Transmission of 60% at end of lamp life and with clean lamp sleeves for either mechanical/chemical or mechanical only cleaning systems.

- The rated life of the lamp shall be a minimum of 12,000 hours. After 12,000 hours the lamp UV intensity output shall not be less than 80% of its initial UV intensity.
- The quartz sleeves shall be rated for a minimum of 89% UV transmission and shall not be subject to solarization over the length of their life.
- The system will be designed for complete indoor installation.
- Year-round disinfection is required.

2.9 OTHER DESIGN PARAMETERS

2.9.1 Influent Alkalinity

Other factors that were noted that may impact treatment strategies was the influent alkalinity and pH of the wastewater. The typical alkalinity of the Towns treated water is ~300 mg/L, and the pH in the wastewater sampling data is between 8.0 and 8.5. The elevated alkalinity is conducive to nitrification processes, but the elevated pH can increase ammonia toxicity.

2.9.2 Truck Haul Facilities

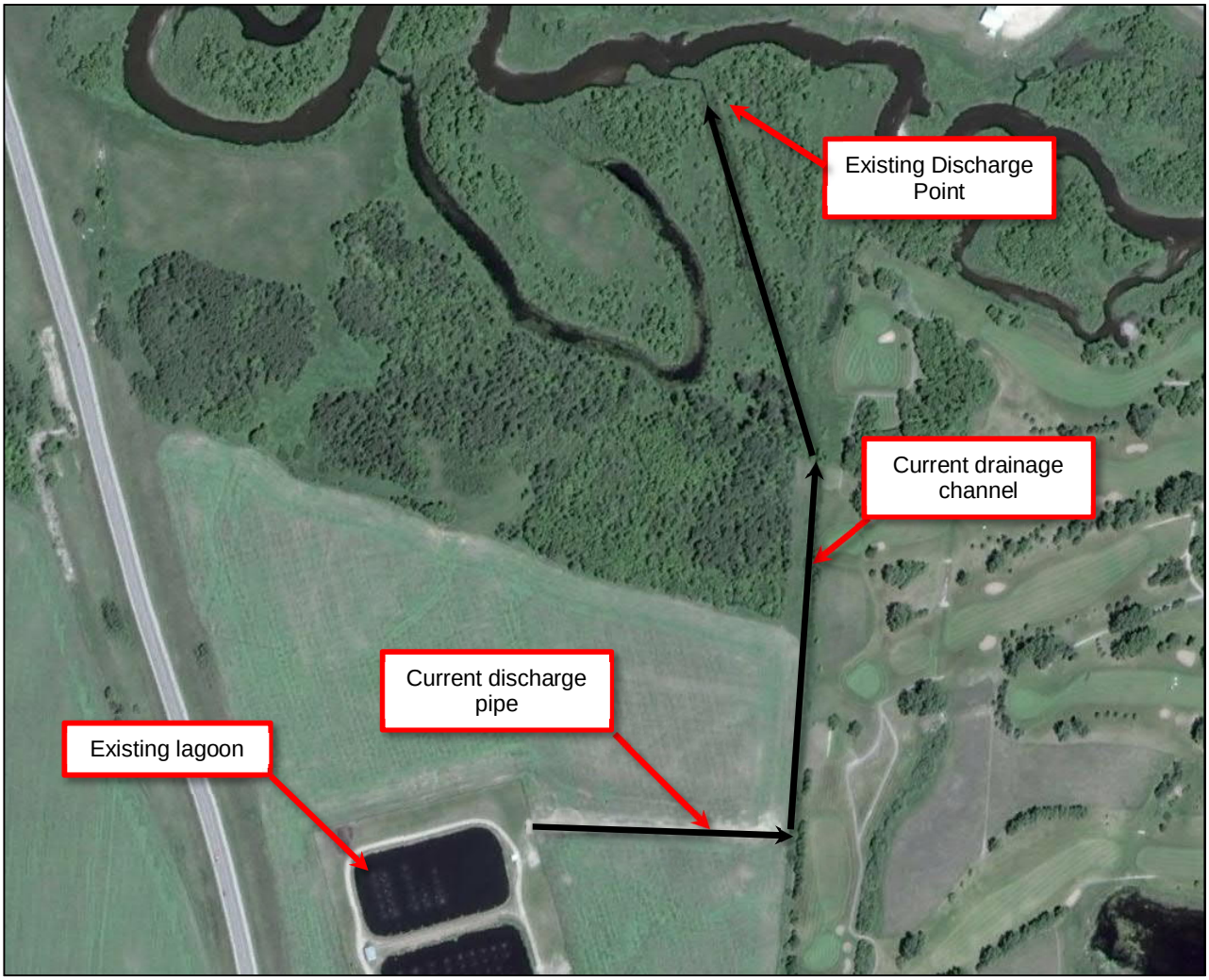
The existing truck haul facilities will be maintained.

2.9.3 Discharge Route

The discharge will remain as is, from the northeastern corner of the secondary cell and flow along a drainage channel to the Little Saskatchewan River 400 m north of the cells.

See **Figure 2-5** below.

Figure 2-5 – Discharge Route



2.10 OPERATIONS AND MAINTENANCE

The Town of Minnedosa will be responsible for operation and maintenance of the WTP. The Town will utilize their water treatment plant operations staff to also operate the new wastewater facilities. The operators will obtain any required training to increase their certification for the new facility. The upgraded facility will also be operated in accordance with the new Environment Act Licence requirements, sampling will also be in accordance with the Licence.

2.10.1 Facility Operations

The proposed new facility will be a continuously discharging process, wastewater will always be flowing through the process.

For the aerated lagoons, there will always be one blower in operation to maintain dissolved oxygen (DO) levels and mixing.

For the MBBR, a DO probe in the basin will control the aeration blower speed to maintain a desired DO range (~7.0 mg/L). There are no further operational controls for the MBBR.

For the Mix tanks, the influent flow will pass through a flow meter into the tankage to pace coagulant and polymer dosage into flow. The wastewater will then be rapidly mixed for two minutes for floc formation. Flow will then decant into the slow mix tank for 15 minutes tank. The effluent will then flow by gravity to the settling ponds.

Effluent from the settling ponds will then flow by gravity to the proposed UV building where it will be disinfected.

The MBBR will have a PLC to monitor the DO and ammonia probes and trend the data. However, final effluent sampling is expected to be accomplished through grab samples sent to a certified Lab for analysis. There will be no in-house lab water quality analysis, other than pH and temperature.

2.10.2 Facility Maintenance

During construction and commissioning, Operating and Maintenance Manuals will be developed for the plant and the specific equipment. These will form the basis for general plant operations and maintenance procedures.

2.10.3 Interim Operations

It is anticipated that the exiting facility can remain in full operation during the upgrades with minimal interruptions in treatment during construction and commissioning.

2.11 DECOMMISSIONING

The intent is to re-utilize the existing facilities and no decommissioning is anticipated.

2.12 BIOSOLIDS DISPOSAL

There is minimal biosolids accumulation in the exiting cells, therefore, there is no immediate need for disposal during construction of the upgrades.

However, once in operation, the settling ponds will gradually fill with settled solids that will require periodic disposal. The proposed procedure will be to isolate one of the settling cells in fall and dewater the supernatant liquid to the other settling pond. The exposed sludge would then be allowed to freeze dry over the winter thus reducing the water content for a spring handling. The dewatered sludge is then expected to be removed and land applied to agricultural lands as a solid (manure spreader machinery).

When the Town is ready for de-sludging these settling ponds, an EAP will be prepared to describe the removal process and identify the lands that will receive the biosolids for beneficial re-use. Based on sludge sampling and selected lands, the proposed application rates can then be determined.

2.13 PROJECT FUNDING

There is no identified funding yet for these upgrades, and the Town is not planning to apply for any funding until they are able to afford their portion of the project. The Town is currently close to their borrowing capacity and need to eliminate existing debentures before taking a new one on for the lagoon upgrades.

2.14 PROJECT SCHEDULE

Once the Town is able to make a new borrowing by-law for the proposed upgrades, they will then contact the MWSB to request funding for detail design of the facility upgrades. With a detail design and a new Licence in place for the upgrades, the Town can put forth a shovel ready project for funding applications.

The proposed upgrades are likely too costly for the MWSB to fund directly, thus, other Federal and/or Provincial funding programs need to be accessed.

2.15 PUBLIC CONSULTATION

No Public Consultation is proposed for these upgrades at this time. The borrowing by-law procedure will likely be the next opportunity for the Town to present the project to the public.

3 Existing Physical Environment

3.1 PHYSIOGRAPHIC SETTING AND CLIMATE

Minnedosa is located in south-western Manitoba within the Prairie Ecozone in the Aspen Parkland Ecoregion (Smith et al., 1998). The area is comprised of an undulating to hummocky and kettled glacial till plain. These broad plains are underlain by Cretaceous shale with significant areas of level lacustrine and hummocky to ridged fluvioglacial deposits. Significant areas of level to gently undulating glaciolacustrine sands occur in the eastern (Assiniboine Delta) and southwestern portions of the Ecoregion.

The Minnedosa area generally ranges from nearly level to gently rolling (Smith et al., 1998). Slopes are generally less than 5 percent, of medium length and usually between 50 to 150 m long while the mean elevation is approximately 518 metres above sea level (masl). Surface drainage is part of the Little Saskatchewan watershed, which is also part of the larger Assiniboine River drainage system.

The surficial geology within the Minnedosa area consists largely of fine to coarse sand deposited by glacial meltwaters and some till, clay and silt with minor fine-grained sand (Rutulis 1979). Bedrock surface elevation in the Minnedosa area is approximately 330 masl (Province of Manitoba 1988).

The climate in this region lies between the drier areas to the southwest and more humid areas to the east and northeast and is characterized by short warm summers and long cold winters (Smith et al., 1998). **Table 3-1** provides climatic data that was taking from an Environment Canada Weather Station (2014) (i.e. Minnedosa Water) located in Minnedosa, MB from 1981 to 2010.

Table 3-1 – Climatic Averages for the Region (1981-2010)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Year
TEMPERATURE (°C)													
Daily Average	-17.3	-13.2	-6.6	2.3	9.8	15.1	17.3	16.8	10.5	3.2	-7.1	-15.0	1.3
Daily Max	-11.3	-7.3	-1.0	8.8	17	21.7	24	24	17.1	9	-2.3	-9.6	7.5
Daily Min	-23.1	-19.1	-12.3	-4.2	2.7	8.5	10.6	9.5	3.7	-2.7	-11.8	-20.2	-4.9
PRECIPITATION (mm)													
Monthly Average	23.2	16.7	27	29.5	59	76.7	81.5	69.6	47.8	34.3	18.6	21	504.8

*Environment Canada (http://climate.weather.gc.ca/climate_normals/results_1981_2010_e.html?stnID=3509&autofwd=1)

3.2 HYDROGEOLOGY

An examination of groundwater in the Little Saskatchewan watershed has identified that groundwater is the principal source of water in the area (MWS, 2008). The aquifers have variable depths from a few meters to one hundred meters below the surface, and generally consisting of gravel, sand. Thin sand aquifers are present in the Minnedosa area with thin minor lenses in clay and silt deposits (MWS, 2008). Water yields in this area are low to moderate (i.e. 0.1 L/s to 1.0 L/s) and water quality has been noted to be good to poor.

There are 82 wells within a three-kilometer area around the lagoon ranging from 4.88 near the lagoon to 91.5 feet, east of Minnedosa (GIN, 2017). Most wells in the watershed are relatively shallow with (MWS, 2008). Most wells are drilled with less than 15 percent with diameters over 30 centimeters. These wide diameter wells are mostly used in areas where the aquifers are shallow. The average yield has been reported at 1.6 L/s with half having yields greater than 1 L/s. Average depth of sand and gravel aquifers are 53 meters. In general, wells completed into bedrock, in the region, tend to be deeper than wells completed in overburden aquifers (MWS, 2008).

Groundwater quality can be difficult to generalize in the region due to the complex hydrogeology. Overburden aquifers have variable groundwater quality ranging from total dissolved solids (TDS) values less than 360 mg/L in the northern portions of the watershed to over 3,000 mg/L in the southern portion. The groundwater in the high TDS areas are of the Na-Ca-Mg-SO_4-HCO_3 type while the lower TDS areas consist of the Ca-Mg-HCO_3 type (MWS, 2008). This more mineralized water also thought to have higher SO_4 concentrations.

Few complete chemistry tests were completed but of the ones taken, Aluminum, antimony, barium, boron, cadmium, chromium, copper, lead, uranium, and zinc were measured below the guideline. Selenium and arsenic was above the guideline in one sample. Nitrate as 10 mg/L as N exceeded the guideline in 12 percent of samples (MWS, 2008).
Total coliform is commonly found in private wells, resulting from multiple factors and pathways for contamination. Of the 37 samples taken, 24 percent of the samples had detectible traces of the bacteria and eight percent of the samples had measurable levels of the bacteria (MWS, 2008).

3.3 HYDROLOGY

The nearest watercourse is the Little Saskatchewan River which travels close by (i.e. 410-430 m) the north east side of the existing lagoon. This river is the receiving watercourse for the treated effluent once the treatment is complete. An existing discharge pipe is located on the west side of the second lagoon cell, which then travels approximately 600 m through a drainage channel before emptying into the Little Saskatchewan River. The Little Saskatchewan River empties into the Assiniboine River which flows into Lake Winnipeg. Other watercourses and tributaries (i.e. Arrow Oak Watershed, Rolling River, Broughtons Creek, and West Springs Creek) provide flow into the Little Saskatchewan River Watershed.

The Little Saskatchewan River has a total drainage basin area of approximately 3600 km^2 (AAFC-PFRA, 2004) and is partially regulated by the Minnedosa Lake, just upstream of the Town of Minnedosa. Rolling River becomes the Little Saskatchewan River at the RM of Harrison and Minto-Odanah boundary.

Similar to other temperate prairie rivers, the Little Saskatchewan River undergoes wide seasonal fluctuations in discharge associated with frozen conditions in the winter and the annual spring melt.

Based on data extracted from Environment Canada (2016) average monthly flows in the Little Saskatchewan River near the Town of Minnedosa over the past 100 years are approximately 9.8 m^3/s

(846,000 m^3/day), 14.4 m^3/s (1,244,160 m^3/day), and 9.1 m^3/s (786,240 m^3/day) in April, May and June, respectively, declining to > 3 m^3/s for the remainder of the year . A review of the historical dataset (1914-2015), has indicated that late-summer flows were generally below 6 m^3/s (518,400 m^3/day).

Downstream of the Town of Minnedosa, inflows to the Little Saskatchewan River occur throughout its run during periods of surface runoff. Lakes, ponds, and sloughs are also present throughout the region and occupy shallow depressions.

Table 3-2 – Historical River Water Quality Assessment

Parameter	Upstream sampling location	Downstream sampling location	Limits[1]
Total Kjeldahl Nitrogen (TKN)	0.9 to 2.69 mg/L	0.8 to 2.4 mg/L	
Dissolved Nitrogen (NO_3 and NO_2)	0.02 to 7.62 mg/L	0.01 to 2.34 mg/L	
Total Phosphorus	0.04 to 0.66 mg/L	0.04 to 0.63 mg/L	0.05 mg/L
Biochemical Oxygen Demand (BOD)	1.1 to 5.6 mg/L	1.0 to 6.9 mg/L	n/a
Bacteriological (E.coli)	10 to 120 CFU/100 mL	10 to 240 CFU/100 mL	200 CFU/100 mL
Total Suspended Sediments (TSS)	1 to 180 mg/L	3 to 238 mg/L	25 mg/L induced change from background – 1 day

1: Manitoba Water Quality Standards, Objectives, and Guidelines, 2011

Portions of the Little Saskatchewan River are a part of a nutrient management zone which has been designated to protect water quality by encouraging responsible nutrient planning. Setback distances from the shoreline of the receiving water body have been set by MB Sustainable Development to regulate the application of materials containing nutrients. A nutrient buffer zone surrounding the watercourse has a setback of 3 m, as the site is covered with permanent vegetation and the Little Saskatchewan River is not considered vulnerable in the Nutrient Management Regulation.

3.4 FISH AND FISH HABITAT

Manitoba Conservation has noted a diverse set of fish species inhabit the Little Saskatchewan River. Notable fish species known to occur in the river include northern pike, white sucker, walleye, yellow perch, burbot, chestnut lamprey (Bruno Bruederlin, Personal communication). A list of fish thought to inhabit the Little Saskatchewan River is provided in **Table 3-3**.

As previously mentioned, the Little Saskatchewan River discharges into the Assiniboine River then into Lake Winnipeg, approximately 190 km downstream of the Project site. Lake Winnipeg fish populations are unlikely to use habitats, as far upstream as the Town of Minnedosa, due to barriers to upstream fish passage along the river (AECOM, 2010).

Table 3-3 – Fish Species that Inhabit the Little Saskatchewan River (Earth Tech 2008)

Scientific Name	Common Name
Ameiuris melas	Black bullhead
Catostomus commersoni	White sucker
Culaea inconstans	Brook stickleback
Esox lucius	Northern pike
Percina shumardi	River darter
Etheostoma nigrum	Johnny darter
Ichthyoinyzon castaneus	Chestnut lamprey
Lota lota	Burbot
Luxilus cornutus	Common shiner
Moxostoma anisurum	Silver redhorse
Moxostoma macrolepidotum	Shorthead redhorse
Notropis atherinoides	Emerald shiner
Notropis dorsalis	Bigmouth shiner
Notropis hudsonius	Spottail shiner
Notropis stramineus	Sand shiner
Noturus flavus	Stonecat
Perca flavescens	Yellow perch
Percina maculata	Blackside darter
Percopsis otniscomaycus	Trout-perch
Pimephales promelas	Fathead minnow
Pungitius puitgitius	Ninespine stickleback
Rhinichthys cataractae	Longnose dace
Seinotilus atromaculatus	Creek chub
Sanders vitreus	Walleye
Hiodon tergisus	Mooneye
Ambloplites rupestris	Rock bass
Rhinichthys obtusus	Western blacknose dace

Scientific Name	Common Name
Carpiodes cyprinus	Quillback
Rhinicthys cataractae	Longnose dace
Cyprinus carpio	Common carp
Notropis blennius	River shiner

3.5 VEGETATION AND WILDLIFE

The propose development is located in the Hamiota Ecodistrict which is part of the Aspen Parkland Ecoregion and the Prairies Ecozone (Smith et al, 1998). Vegetation in the Aspen Parkland Ecoregion is considered to be a transition between the boreal forests in the north and the grasslands to the south. The natural vegetation varies, with most loamy areas typically having trembling aspen groves in moister locations to various types of grasslands on drier landscapes. Rapidly drained and well drained sites are generally dominated by grassland with hazel, common and creeping juniper, white spruce, trembling aspen and sometimes scrub bur oak (Smith et al, 1998). The natural grasslands typically consist of mixed-grass prairie including species such as spear grass, wheat grass and blue grama grass. Alkali grass, wild foxtail barley, red samphire and sea blite are found in more saline areas. North facing slopes generally have a larger forest cover with less grass and no juniper. Trembling aspen and balsam poplar, and dense alder and red-osier dogwood are common on imperfectly drained sites. Poorly drained sites have willow, alder and red-osier dog-wood with a grass or sedge groundcover. Maple and ash trees can be found along larger waterways.

Much of the native vegetation in this Ecozone has been altered by agriculture (i.e. crop and rangelands) (Smith et al, 1998).

White-tailed deer are widespread and can be found in areas that provide both grazing and cover habitat, in the Aspen Parkland Ecoregion (Smith et al, 1998). Other species that may be found in the ecoregion include elk (wapiti), coyote, badger, white-tailed jack rabbit, Richardson's ground, squirrel and northern pocket gopher.

Characteristic bird species of the Ecozone include ferruginous hawk, sage grouse, American avocet and burrowing owl, but their numbers are often severely reduced through habitat loss (Smith et al, 1998). Other representative birds include great blue heron, black-billed magpie, Baltimore oriole, veery and brown thrasher. This Ecozone provides major breeding, staging and nesting habitat for ducks, geese, other waterfowl and shore birds, even though a significant reduction in wetlands (to both extent and frequency) has occurred.

3.6 PROTECTED SPECIES AND SENSITIVE HABITATS

Upon completion of a search of the MB Sustainable Development's Data Centre's rare species database, no occurrences of rare species were found for the area of interest, at this time (Chris Friesen, Personal

communication). Given the surrounding land use is disturbed by agricultural and recreational activities, the likelihood of occurrence for other unknown rare species is little to none. No further investigation for rare species is recommended at this time.

The Little Saskatchewan River Conservation District contains most of the Little Saskatchewan River and aims to conserve ground and surface water quality and quantity along with preserving natural areas (Manitoba Conservation, 2017).

3.7 SOCIOECONOMIC

The proposed expansion is located within the limits of the Town of Minnedosa, which has a current population at 2,500 residents. The Town anticipates their population to grow to 2,590 residents by the year 2021, and to nearly 2,874 by 2038. The economy in the Town of Minnedosa and the area is dependent on agriculture (Town of Minnedosa, 2016). The area supports many types of crops and livestock operations and Minnedosa is a major agriculture service centre for many of the producers in the area.

As previously mentioned, the area surrounding the existing lagoon is used for agriculture (hay and croplands), a cemetery and a golf course. A school, hospital and a park can also be found within a 1.5 km radius of the western edge of the existing lagoon (i.e. upstream of the effluent discharge point) whereas no strip malls, day cares, nursery schools, senior care facilities, or churches are found within a 1 km radius of the Project Site (Google Inc., 2017).

The nearest Indigenous community (Rolling River First Nation) is located 29 km northwest of the proposed Project (Google, 2017). Following a document review, there were seven surface water licences issues in the little Saskatchewan Watershed (Water Licencing Branch).

3.7.1 Heritage Resources

The Heritage Resources Branch of Manitoba Sport, Culture, and Heritage was contacted to identify whether any heritage resources are located within in the proposed lagoon expansion area. According to the branch records, the potential to impact heritage resources was low, and the Heritage Resources Branch had no concerns with the project.

If any last-minute discoveries, and possible destruction, of heritage resources and human remains are found at the site during construction, the Town will work with Heritage Resources Branch to mitigate any concerns as required.

4 Potential Environmental Effects

4.1 ENVIRONMENTAL EFFECTS DURING CONSTRUCTION

4.1.1 Air Quality Impacts

Construction activities will create dust and emissions from construction machinery. Dust suppression using water sprays or mists will be used to alleviate potential dust from being raised. Air quality effects from any dust generation during construction would be localized and temporary and is considered to have a low or negligible environmental effect. Emissions from construction equipment will be temporary and minimized by having machinery operating within normal limits and outfitted with mufflers (where application) to reduce air emissions. Contributions from construction activities and operations to greenhouse gas emissions are not expected to be significantly above background levels and are unlikely to contribute significantly to overall greenhouse gas inventories from the area.

4.1.2 Soils Impacts

A risk exists, during the construction of the facility, for a spill to occur from construction machinery and vehicle equipment. To reduce this risk storage of fuel, other petroleum products and lubricants will not be permitted within the area of the water supply. Therefore, the risk of occurrence is small based and additionally standard construction best practices for managing clean-up and removal of any impacted soils will be used to prevent any impacts.

4.1.3 Surface Water and Fish Habitat

Potential environmental impacts to surface water and fish habitat are expected to be minor and short term during construction. The majority of the work will take place at least 400m from the Little Saskatchewan River. Standard construction best management practices for sedimentation and erosion control will be implemented during construction to reduce potential effects to aquatic life.

4.1.4 Climate Change Adaptation

As previously mentioned, contributions from construction activities and operations to greenhouse gas emissions are not expected to be significantly above background levels and are unlikely to contribute significantly to overall greenhouse gas inventories from the area.

4.2 ENVIRONMENTAL EFFECTS FROM OPERATING NEW FACILITY

4.2.1 Air Quality Odour Considerations

It is anticipated that during the operation of the WWTF there would not be any release of pollutants to the air.

It is not anticipated that the operation of the new facility will create any more odours than the current facility. The operation of the settling cells should also pose minimal odour concerns. The solids will generally be covered by water, and when it is exposed for drying, it is expected this will take place over winter for the optimal freeze-drying process.

4.2.2 Soils Impacts

The new aerated cells will be constructed with a liner to current standards. Potential adverse impacts to soil quality are assessed to be negligible. Disposal of biosolids to surrounding agricultural lands will be done through controlled and approved procedures.

4.2.3 Groundwater Impacts

The proposed activities associated with the upgrades are not expected to impact groundwater resources. Ponds will be lined with compacted clay liner and other treatment cells (i.e. MBBR) are to be constructed out of concrete. Due to the small footprint of the proposed upgrade and expansion, existing groundwater monitoring wells will continue to be used to monitor potential impacts to groundwater resources. The potential environmental effects to groundwater resources are therefore expected to be negligible during operations.

4.2.4 Wildlife Habitat

The potential effects to wildlife and habitat loss were assessed to be negligible as all activities are occurring in areas previously disturbed.

4.2.5 Surface Water and Fish Habitat

The proposed new facility is expected to result in improved wastewater effluent to the Little Saskatchewan River over the current facultative treatment process. The expected reduction in TSS, BOD, and nutrient loading in the effluent should have a positive effect on the receiving surface water quality.

The length of hydraulic retention in the ponds should also result in effluent temperatures that are close to the receiving body ambient temperature. This should minimize any temperature shock, or effects in the waterbody.

Of more concern to fish habitat is the impacts from ammonia levels in the effluent, specifically un-ionized ammonia. Although the regulations state a less than 1.25 mg/L of un-ionized ammonia in the effluent, data has shown that it needs to be much less than this to maintain a non-lethal effect in fish habitat. With the proposed MBBR treatment process specifically designed for ammonia reduction, the effluent quality is

expected to achieve this non-lethal objective. As demonstrated in the 2016-17 pilot testing in nearby Neepawa, the ammonia (TAN) levels in the effluent are expected to be 5 mg/L or less (depending on temperature); which results in an un-ionized fraction of 0.07 mg/L. At these levels, there was shown to be 0% mortality and 0% stressing of the sample trout.

The Little Saskatchewan River has the highest monthly flows in the Town of Minnedosa during the spring and then is drastically reduced for the remainder of the year. Therefore, with peak flows in spring during a critical cool water fish spawning season, there is expected to be more dilution occurring in the receiving body – further reducing any impacts from the effluent.

5 Environmental Mitigation Measures

Long-term residual effects are not anticipated, but short-term residual effects are considered local, minor in magnitude, short term in duration, and reversible over time after environmental protection and mitigation measures are applied.

Annual monitoring reports for the proposed lagoon upgrades and expansion will be provided to Manitoba's Sustainable Development Branch, along with reporting for the existing lagoon, according to the facility's licence to operate.

5.1 ENVIRONMENTAL MITIGATION DURING CONSTRUCTION

5.1.1 Air Quality

Well maintained vehicles and equipment and reduction of unnecessarily transportation and idling of vehicles will assist in mitigating air quality impacts.

The control of dust with water sprays or an approved dust suppressant will limit the impact of dust to the air quality. Prompt re-establishment of vegetation disturbed during construction and also limiting certain work to periods of low winds will also help mitigate air quality impacts.

5.1.2 Soils

Preparation of an emergency response plan to mitigate potential impacts to soil by contaminants from petroleum products as well as use and availability of on-site spill clean-up equipment and materials, using properly maintained equipment and fuelling procedures.

Minimal ground disturbance is anticipated during the construction phase. The reestablishment of vegetation and backfill of any short trenches or excavations will occur as soon as possible after any disturbance to reduce the loss of soil due to wind or water erosion.

5.1.3 Surface Water

Surface water issues may be mitigated during construction by redirecting surface run-off, pumping accumulated water to adjacent ditches and installing proper erosion control practices such as silt fences and erosion control blankets.

Properly maintained, operated and fueled equipment will assist with the mitigation of potential fuel or petroleum spills. Manitoba Sustainable Development will be notified through the emergency response line and appropriate measures will be taken according to Manitoba Sustainable Development requirements.

Washing, refueling and servicing machinery and storage of fuel and other materials for the machinery will occur in such a way to prevent any deleterious substances from entering the water. Vehicles will stay on

established roads and not unnecessarily disturb riparian zones. Any disturbed vegetation will be re-established as soon as possible.

5.1.4 Groundwater

The same mitigation efforts as described for surface water can be applied to as mitigation measures to reduce potential impact to any groundwater.

5.1.5 Vegetation and Wildlife

The establishment of vegetation will occur as soon as practically possible for disturbed areas. Minimizing laydown areas and construction activities will act as a measure to reduce disturbance to soils, and vegetation. Proper noise control and dust control as previously discussed will be implemented to mitigate potential impacts.

5.1.6 Fisheries

Fisheries impacts will be mitigated by controlling run-off and any construction related discharge to the watercourse to reduce potential harmful effects. The work area will be set back from riparian zones and a vegetated buffer will remain intact to minimize any sediment from entering the Little Saskatchewan River. Proper erosion and sedimentation control measures for working near water will be implemented. These measures will limit any short term temporary impact to fisheries during construction activities.

5.1.7 Noise and Vibration

Unnecessary operation of equipment, properly muffled vehicles and equipment on site and properly maintained equipment will be assist in mitigating noise and vibration issues.

5.2 ENVIRONMENTAL MITIGATION DURING OPERATION OF NEW FACILITY

5.2.1 Nutrient Loading

With the incorporation of the MBBR treatment process for nitrification, nutrient loading from ammonia to the receiving body will be reduced.

With the incorporation of mix tanks for phosphorus removal, nutrient loading from phosphorus to the receiving body will be noticeably reduced. However, with the implementation of this phosphorus removal technology, there will now be a solids stream to be managed more regularly.

The floc from the tanks will be directed to wards settling ponds for collection and storage. Once the solids have filled the ponds, they will need to be mechanically removed and disposed of. The preferred disposal means would be land application to nearby farmer's fields. Because the filtration process requires a coagulant and polymer, the biosolids may have higher than normal metal content. This could result in lower application rate if metals become the limiting factor (and not nutrient load), and more land area required.

6 References

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Appendix A – Certificate of Titles

STATUS OF TITLE

Title Number **2202800/5**
Title Status **Accepted**
Client File 2202800/2418617

The Property Registry
A Service Provider for the Province of Manitoba

1. REGISTERED OWNERS, TENANCY AND LAND DESCRIPTION

TOWN OF MINNEDOSA

IS REGISTERED OWNER SUBJECT TO SUCH ENTRIES RECORDED HEREON IN THE FOLLOWING DESCRIBED LAND:

ALL THAT PORTION OF SE 1/4 3-15-18 WPM
TAKEN FOR PUBLIC WORK PLAN 6985 NLTO
EXC: AN UNDIVIDED ONE-HALF INTEREST IN ALL MINES AND MINERALS IN TRANSFER 94912 NLTO

The land in this title is, unless the contrary is expressly declared, deemed to be subject to the reservations and restrictions set out in section 58 of *The Real Property Act.*

2. ACTIVE INSTRUMENTS

No active instruments

3. ADDRESSES FOR SERVICE

TOWN OF MINNEDOSA
BOX 426
MINNEDOSA MB
R0J 1E0

4. TITLE NOTES

No title notes

5. LAND TITLES DISTRICT

Neepawa

6. DUPLICATE TITLE INFORMATION

Duplicate Produced for: HOLD FOR PROD OF DUPL CT NO(S)
226164
SIMS & CO., MINNEDOSA
1992/08/27

7. FROM TITLE NUMBERS

226164/5 All

8.	**REAL PROPERTY APPLICATION / CROWN GRANT NUMBERS** No real property application or grant information
9.	**ORIGINATING INSTRUMENTS** Instrument Type: **Request Electronic Title Conversion** Registration Number: **1055542/5** Registration Date: 2007-01-11 From/By: NLTO - INTERNAL To: Amount:
10.	**LAND INDEX** Plan 6985 PUBLIC WORK PLAN IN SE 3-15-18W EX 1/2 M&M SE 3-15-18W PUBLIC WORK PLAN 6985 EX 1/2 M&M

CERTIFIED TRUE EXTRACT PRODUCED FROM THE LAND TITLES DATA STORAGE SYSTEM OF TITLE NUMBER 2202800/5

STATUS OF TITLE

Title Number **2418617/5**
Title Status **Accepted**
Client File 2202800/2418617

The Property Registry
A Service Provider for the Province of Manitoba

1. REGISTERED OWNERS, TENANCY AND LAND DESCRIPTION

TOWN OF MINNEDOSA

IS REGISTERED OWNER SUBJECT TO SUCH ENTRIES RECORDED HEREON IN THE FOLLOWING DESCRIBED LAND:

ALL THAT PORTION OF THE NE 1/4 OF SECTION 3-15-18 WPM TAKEN FOR PUBLIC WORK PLAN 6985 NLTO
EXC: AN UNDIVIDED ONE-HALF INTEREST IN ALL MINES AND MINERALS IN TRANSFER 94912 NLTO

The land in this title is, unless the contrary is expressly declared, deemed to be subject to the reservations and restrictions set out in section 58 of *The Real Property Act.*

2. ACTIVE INSTRUMENTS

No active instruments

3. ADDRESSES FOR SERVICE

TOWN OF MINNEDOSA
BOX 426
MINNEDOSA MB
R0J 1E0

4. TITLE NOTES

No title notes

5. LAND TITLES DISTRICT

Neepawa

6. DUPLICATE TITLE INFORMATION

Duplicate not produced

7. FROM TITLE NUMBERS

2211450/5 All

8. REAL PROPERTY APPLICATION / CROWN GRANT NUMBERS

No real property application or grant information

9.	ORIGINATING INSTRUMENTS	
	Instrument Type:	**Transfer Of Land**
	Registration Number:	**1076215/5**
	Registration Date:	2009-12-08
	From/By:	HMQ MANITOBA
	To:	TOWN OF MINNEDOSA
	Consideration:	$1.00

10. LAND INDEX

Plan 6985
PUBLIC WORK PLAN IN NE 3-15-18W EX 1/2 M&M

NE 3-15-18W
PUBLIC WORK PLAN 6985 EX 1/2 M&M

CERTIFIED TRUE EXTRACT PRODUCED FROM THE LAND TITLES DATA STORAGE SYSTEM OF TITLE NUMBER 2418617/5

Appendix B – Current Licence (1452)

Environment Act Licence

Manitoba Environment

Licence No. 1452

Issue Date FEBRUARY 11, 1991

In accordance with the Manitoba Environment Act (C.C.S.M. c. E125)

THIS LICENCE IS ISSUED TO:

TOWN OF MINNEDOSA; APPLICANT

The following limits, terms and conditions shall be complied with in connection with the operation of a wastewater collection system and operation of an aerated wastewater treatment lagoon located on the east half of Section 3, Township 15, Range 18 WPM in the Rural Municipality of Minto with discharge of treated effluent to the Little Saskatchewan River and/or to a golf course located on the west half of Section 2, Township 15, Range 18 WPM:

1. The Applicant shall ensure that all sewage generated within the Town of Minnedosa, excluding sewage directed to other approved sewage treatment facilities, shall be directed toward the aerated wastewater treatment lagoon.

2. The Applicant shall ensure that the said aerated wastewater treatment lagoon is maintained and operated in such a manner that:

   (a) the contamination of groundwater is prevented; and

   (b) the release of offensive odours is minimized.

3. The Applicant shall not permit the hydraulic conductivity of the interior of the aerated wastewater treatment lagoon to exceed 1×10^{-7} centimetres per second over the entire lagoon structure.

4. Subject to Clause 5 and Clause 6, the Applicant shall not discharge effluent from the wastewater treatment lagoon:

   (a) where the organic content of the effluent, as indicated by the five day biochemical oxygen demand, is in excess of 30 milligrams per litre;

   (b) where the suspended solids content of the effluent is in excess of 30 milligrams per litre; and

   (c) where the fecal coliform content of the effluent, as indicated by the MPN index, is in excess of 200 per l00 millilitres of sample.

5. The Applicant shall, prior to using the effluent from the aerated wastewater treatment lagoon to irrigate the golf course ensure, that:

   (a) the effluent has been subjected to secondary treatment;

   (b) the effluent has been retained in an isolated storage pond for not less than 60 days;

   (c) either:

      (i) the fecal coliform content of the effluent, in terms of the MPN Index, is not in excess of 14 per 100 millilitres of sample; or

      (ii) the effluent contains a free chlorine residual of not less than 0.5 milligrams per litre after not less than 30 minutes of contact time;

   (d) the golf course is closed to the public during the irrigation operation;

   (e) only low angle spray nozzles are used in the irrigation system;

(f) permanent signs having letters not less than 5 centimetres high are installed and maintained at all access points to the golf course advising of the use of treated effluent for irrigation; and

(g) irrigation only takes place when weather conditions and irrigation spray locations are such that effluent will not be carried onto public roadways or onto neighbouring private property.

6. The Applicant shall ensure that, prior to using the effluent from the aerated wastewater treatment lagoon to fill water hazard impoundments on the golf course:

(a) the fecal coliform content of the effluent, in terms of the MPN Index, is not in excess of 200 per 100 millilitres of sample, and

(b) permanent signs, having letters not less than 5 centimetres high, are installed, maintained and spaced no further than 15 metres apart, around the perimeter of all water hazard impoundments, advising of the use of treated effluent in the water hazard impoundments.

7. The Applicant shall ensure that:

(a) effluent is transferred to the water hazard impoundments via a piped distribution system equipped with control valves at both inlet and outlet ends of the distribution system;

(b) effluent stored in the water hazard impoundments is not used for irrigation of the golf course; and

(c) no effluent is discharged from the water hazard impoundments unless it is discharged to the Little Saskatchewan River via a discharge pipeline.

8. The Applicant shall, in case of physical or mechanical breakdown of the wastewater collection and/or treatment system:

   (a) notify the Director immediately;

   (b) identify the repairs required to the wastewater collection and/or treatment system;

   (c) complete the repairs in accordance with written instructions of the Director; and

   (d) discontinue the use of the effluent for irrigation or storage in water hazard impoundments on the golf course.

9. The Applicant shall not dispose of sludge from the said aerated wastewater treatment lagoon except to a waste disposal ground operated in accordance with the regulations under the Environment Act.

10. The Applicant shall not permit the discharge of industrial wastes to the aerated wastewater treatment lagoon unless provisions are made to provide sufficient treatment to comply with the effluent quality limits prescribed in this Licence.

11. Environment Act Licence No. 1196 is hereby rescinded.

Larry Strachan, P. Eng.
Director
Environment Act

FILE : 3203.00
New File # 23.40

Appendix C – Facility Classification Form

Manitoba
Sustainable Development

Water & Wastewater Facility Operators Certification Program

Application for Wastewater Treatment Facility Classification

also available online at http://www.manitoba.ca/certification

Please print clearly or type and follow the instructions on the application form.
NOTE: If using Adobe Reader text can be inserted into form and tab between fields.

This application is pursuant to the Water and Wastewater Facility Operators Regulation issued under The Environment Act.

Name of Facility:	Town of Minnedosa Wastewater Treatment Facilicty
Name of Facility Owner: (Municipality/Commission/ Company/Individual/etc)	Town of Minnedosa
Civic Address of Facility:	
Mailing Address of Owner:	

Postal Code:	Telephone:
Contact Person: Kevin Marcino	Position: Utility Foreman

Cell or Pager:	Fax:	Email:

Is this a REAPPLICATION? (•) Yes ( ) No

Please complete the following. The information provided will be used to classify the wastewater treatment facility under the Water and Wastewater Facility Operators Regulation. In some cases actual numbers or answers must be supplied, but in most cases it will only be necessary to check the appropriate criteria.

Forward the completed form by email to:
wwopcert@gov.mb.ca

Or mail it to:
Director
Environmental Approvals Branch
Manitoba Sustainable Development
1007 Century Street
Winnipeg MB R3H 0W4

Please direct questions to:

Certification Program Specialist
Email: wwopcert@gov.mb.ca
Phone: (204) 945-7065

Application for Wastewater Treatment Facility Classification

SYSTEM *(choose all that apply)*			
1.	New or proposed Facility seeking classification	○	
	Proposed start of operations (month / year)		
	Existing Facility seeking classification (in operation prior to December 31, 2005)	◉	
	Facility has been in operation since (approximate month/year) 09/01/1982		
2.	The facility **WILL** employ mechanical treatment processes	◉	
	The facility **WILL NOT** employ mechanical treatment processes	○	

SIZE *(refer to Supplemental Information for point designation) (2 point minimum to 20 point maximum)*				
1.	Maximum population or part served, peak day	# 2574	1	1-10
2.	Design flow average day **Estimated** ○ or **Actual** ○ (Circle volume option & units) **OR** Peak month's flow average day **Estimated** ○ or **Actual** ○	1,845 ◉ m^3/day ○ gal/day —— ○ m^3/day ○ gal/day	1	1-10

VARIATION IN RAW WASTE[1] *(choose all that apply) (0 point minimum to 6 point maximum)*				
1.	Variations do not exceed those normally or typically expected	☐	0	
2.	Recurring deviations or excessive variations of 100-200% in strength	☐	2	2
	Recurring deviations or excessive variations of 100-200% in flow	☑		
	Recurring deviations or excessive variations of 100-200% in strength and flow	☐		
3.	Recurring deviations or excessive variations of more than 200% in strength	☐	4	
	Recurring deviations or excessive variations of more than 200% in flow	☐		
	Recurring deviations or excessive variations of more than 200% in strength and flow	☐		
4.	Raw wastes subject to toxic waste discharges	☐	6	
5.	Septage or truck-hauled waste discharge is accepted at the facility.	☑	0 - 4	2
	Estimated number of loads per day in peak haul times	2		

Application for Wastewater Treatment Facility Classification

PRELIMINARY TREATMENT *(choose all that apply)*				
1.	Facility pumping of main flow	☐	3	
2.	Screening or Comminution	☐	3	
3.	Grit removal	☐	3	
4.	Equalization	☐	1	

PRIMARY TREATMENT *(choose all that apply)*				
1.	Clarifiers	☐	5	
2.	Anaerobic treatment with biogas flare	☐	10	
3.	Anaerobic treatment with biogas utilization facility	☐	15	

SECONDARY TREATMENT *(choose all that apply)*				
1.	Fixed-film reactor	☐	10	
2.	Activated sludge	☐	15	
3.	Stabilization ponds without aeration(i.e. sewage lagoon)	☐	5	
4.	Stabilization ponds with aeration	✔	8	8

TERTIARY TREATMENT *(choose all that apply)*				
1.	Polishing ponds for advanced waste treatment	✔	2	2
2.	Chemical / physical advanced waste treatment without secondary treatment	☐	15	
3.	Chemical / physical advanced waste treatment following secondary treatment	☐	10	
4.	Biological or chemical / biological advanced waste treatment	☐	12	
5.	Nitrification by designed extended aeration only	✔	5	5
6.	Ion exchange for advanced waste treatment	☐	10	
7.	Reverse osmosis, electrodialysis and other membrane filtration techniques	☐	10	
8.	Advanced waste treatment chemical recovery, carbon regeneration	☐	4	

Application for Wastewater Treatment Facility Classification

9.	Media filtration	☐	5

ADDITIONAL TREATMENT PROCESSES *(choose all that apply)*				
1.	Chemical addition: *(Please list chemicals used, 2 pts per chemical to max. of 6)* Chemicals Alum	☑	0 - 6	2
2.	Dissolved air floatation (other than for sludge thickening)	☐	8	
3.	Intermittent sand filter	☐	2	
4.	Recirculating intermittent sand filter	☐	3	
5.	Microscreens	☐	5	
6.	Generation of oxygen	☐	5	

SOLIDS HANDLING *(choose all that apply)*				
1.	Storage (other than for stabilization)	☐	2	
2.	Stabilization by storage (including any storage afterwards)	☐	4	
3.	Gravity thickening	☐	2	
4.	Mechanical dewatering	☐	8	
5.	Anaerobic digestion of solids	☐	10	
6.	Utilization of digester gas for heating or cogeneration	☐	5	
7.	Aerobic digestion of solids	☐	6	
8.	Air-drying of sludge	☑	2	2
9.	Solids reduction (including incineration and wet oxidation)	☐	12	
10.	Disposal in landfill	☐	2	
11.	Solids composting	☐	10	
12.	Land application of biosolids by contractor	☑	2	2
13.	Land application of biosolids by facility personnel	☐	10	

Application for Wastewater Treatment Facility Classification

DISINFECTION *(choose all that apply) (0 point minimum to 10 point maximum)*				
1.	Chlorination	☐	5	
	Ultraviolet irradiation	☑		5
2.	Ozonization	☐	10	

EFFLUENT DISCHARGE *(choose all that apply) (0 point minimum to 10 point maximum)*				
1.	Discharge to surface water (ditch or lake or _____)	☑	0	0
2.	Mechanical post-aeration	☐	2	
3.	Direct recycling and reuse	☐	6	
4.	Land treatment and surface or subsurface disposal	☐	4	

INSTRUMENTATION *(choose one) (0 point minimum to 6 point maximum)*				
1.	SCADA or similar instrumentation systems are used to provide:			
	• Data with no process operation	○	0	
	• Data with limited process operation	◉	2	2
	• Data with moderate process operation	○	4	
	• Data with extensive or total process operation	○	6	

LABORATORY CONTROL[2] *(choose all that apply) (0 point minimum to 15 point maximum)*				
1.	Bacteriological / Biological *(0 point minimum to 5 point maximum)*			
	• Lab work done outside the facility	☐	0	
	• Membrane filter procedures	☐	3	
	• Use of fermentation tubes or any dilution method of fecal coliform determination	☐	5	
2.	Chemical / Physical *(0 point minimum to 10 point maximum)*			
	• Lab work done outside the facility	☑	0	

Application for Wastewater Treatment Facility Classification

	• Push button or visual methods for simple tests such as pH or settleable solids *(List tests)*	☐	3
	• Additional procedures such as DO, COD, BOD, gas analysis, titration, solids content or volatile content *(List tests)*	☐	5
	• More advanced determinations such as specific constituents, nutrients, total oils or phenols *(List tests)*	☐	7
	• Highly sophisticated instrumentation such as atomic absorption or gas chromatograph *(List tests)*	☐	10

APPLICANT VERIFICATION	
I HEREBY DECLARE THAT ALL INFORMATION IN THIS APPLICATION IS TRUE.	
Name of Applicant[3]: (Print)	
Title:	
Telephone:	Fax:
Email:	
Signature of Authorized Representative:	Date:

[1]The key concepts are frequency or intensity of deviation, or excessive variation from normal or typical fluctuations. The deviations in strength, toxicity, ratio of infiltration to inflow, or shock loads.

[2] The key concept is to credit laboratory analyses done on-site by facility personnel under the direction of an operator-in-charge with points from 0-15.

[3] Applicant must be an authorized representative of the owner/operating authority (i.e. manager, P. Eng., or overall responsible operator).

Print Application Form

Wastewater Treatment Form Supplemental Information

This is supplemental information for completing the Application for Wastewater Treatment Facility Classification Form only.

For exact definitions and text refer to Manitoba Regulation 77/2003, Water and Wastewater Facility Operators Regulation under The Environment Act (C.C.S.M. c E125).

A copy of the regulation is available by following the link for Manitoba Regulations at: http://www.gov.mb.ca/conservation/envapprovals/publs/index.html

Facilities are classified as follows:

Small system class
A wastewater treatment facility that otherwise meets the criteria of a class 1 wastewater treatment facility shall be classified in the small system class if

a) it treats wastewater from a population of no more than 500; and
b) no mechanical treatment processes are employed at the facility.

Classes 1 to 4
Wastewater treatment facilities shall be classified in classes 1 to 4 in accordance with the following table, on the basis of the number of classification points assessed under the classification point system set out in the Water and Wastewater Facility Operators Regulation.

Range of Classification Points	Classification	
0 to 30	Class 1	
31 to 55	Class 2	34 pnts
56 to 75	Class 3	
76 or more	Class 4	

Size

Points for size: (2 point minimum to 20 point maximum)

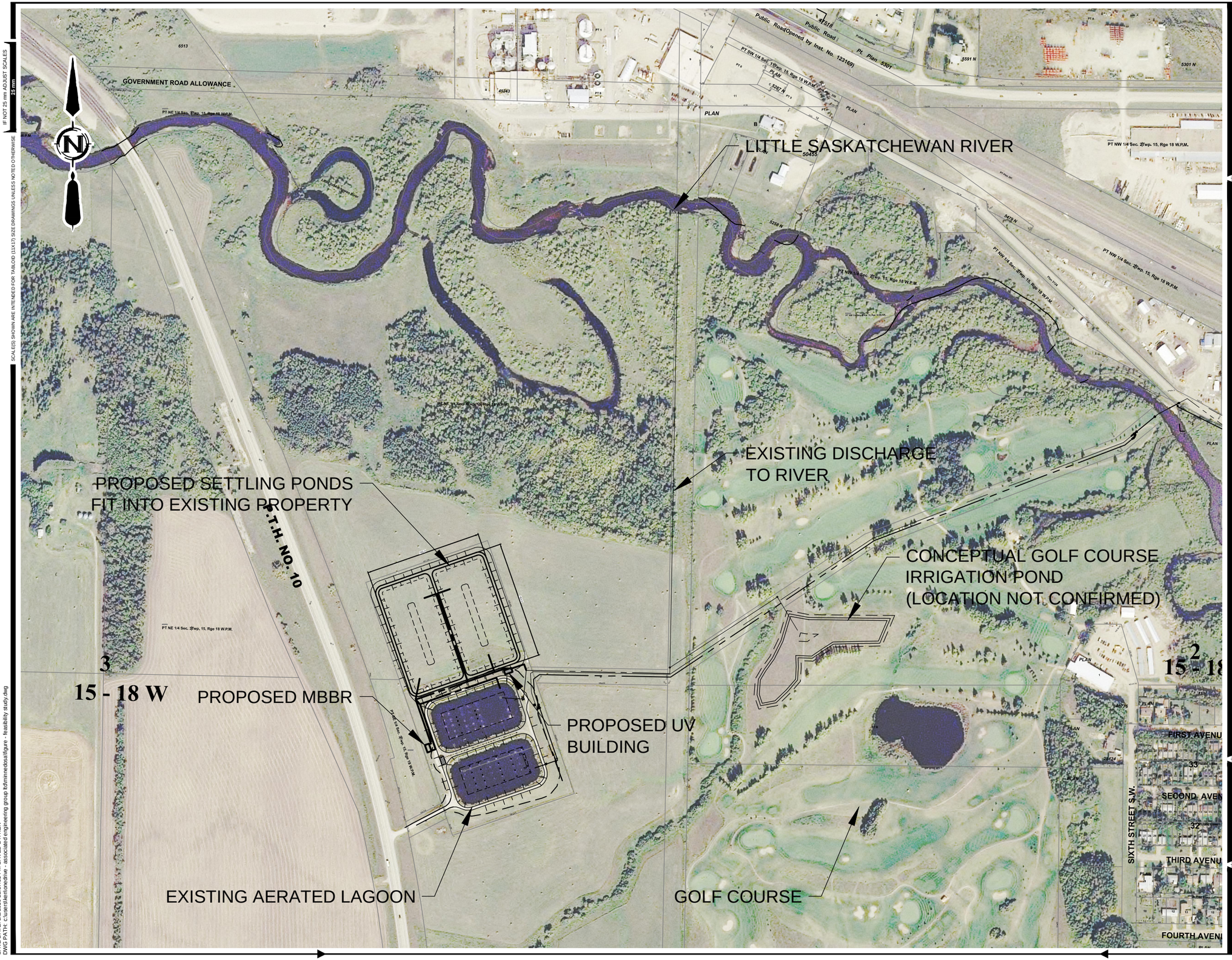
Maximum population or part served, peak day (1 point minimum to 10 point maximum). Points are assigned at 1 point per 10,000 population or part.

Design flow average day or peak month's flow average day, whichever is larger (1 point minimum to 10 point maximum). Points are assigned at 1 point per 4.5 megalitres per day or part.

Authorized Representative

Signatures for the Applicant Verification section must be an individual recognized by the Owner of the facility as able to sign official documentation (i.e. P.Eng., Manager, CAO, etc).

Appendix D – Drawings



Associated Engineering
203 - Five Donald Street, Winnipeg, Manitoba, R3L 2T4
Ph: 204 942 6391 Fax: 204 942 6399
www.ae.ca

FIGURE 1.0

Town of Minnedosa

CIVIL
SITE PLAN
OVERALL AREA PLAN

AE PROJECT No.	2016-4757
SCALE	1:5000
APPROVED	K.ANDERSON
DATE	2018-03-21
REV	0
DESCRIPTION	ISSUED FOR STUDY

Associated Engineering
203 - Five Donald Street, Winnipeg, Manitoba, R3L 2T4
Ph: 204 942 6391 Fax: 204 942 6399
www.ae.ca

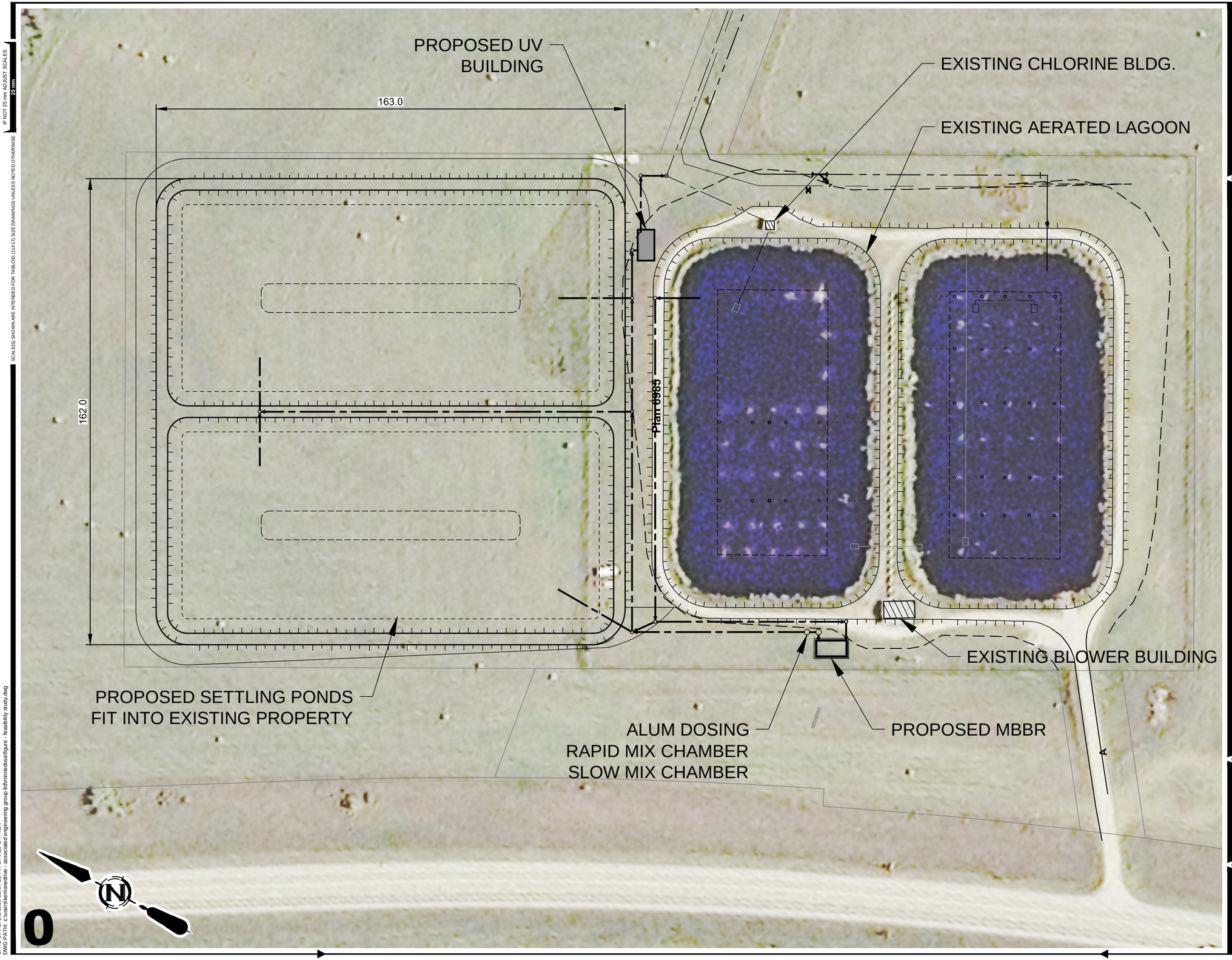


FIGURE 2.0

Town of Minnedosa

CIVIL
SITE PLAN
LAGOON PLAN

AE PROJECT No.	2016-4757
SCALE	1:5000
APPROVED	K.ANDERSON
DATE	2018-03-21
REV	0
DESCRIPTION	ISSUED FOR STUDY

Appendix E – Miscellaneous

Manitoba
Sport, Culture and Heritage

Memorandum

DATE: 2016-07-29

TO: **Wade SUMNERS**
Senior Biologist
Associated Environmental Consultants
1-2225 Northridge Drive
Saskatoon, Saskatchewan
S7L 6X6

CC: **Christina NESBITT**
Impact Assessment Archaeologist
Historic Resources Branch

FROM: **Suyoko TSUKAMOTO**
Impact Assessment Archaeologist
Historic Resources Branch
Main Floor – 213 Notre Dame Avenue
Winnipeg, Manitoba
R3B 1N3

PHONE NO: (204) 945-8145
FAX: (204) 948-2384
E-MAIL: Suyoko.Tsukamoto@gov.mb.ca

SUBJECT: **Heritage Review – Minnedosa Lagoon Expansion**
HRB File #: AAS-16-10696

No concerns at this time.

Further to your general inquiry regarding the above noted lagoon expansion, the Historic Resources Branch has examined the location in conjunction with Branch records for areas of potential concern. The potential to impact significant heritage resources has been deemed low in this area, therefore, the Historic Resources Branch has no immediate concerns with the project.

If at any time, however, heritage resources are encountered in association with these lands during testing and development, the Historic Resources Branch must be immediately contacted if an archaeological site is encountered during development. The Historic Resources Branch may require that an acceptable heritage resource management strategy be implemented by the developer to mitigate the effects of development on the heritage resources.

Although heritage resources have been deemed low in the immediate vicinity of the development, EAPs pertaining to this proposal must have a provision concerning the possibility of encountering heritage sites, the plan should contain an outline of the appropriate measures to mitigate those impacts upon such an encounter.

If you have any questions or comments, please feel free to contact me as above.

Suyoko Tsukamoto

From: Friesen, Chris (CWS) <Chris.Friesen@gov.mb.ca>
Sent: Tuesday, May 17, 2016 10:09 AM
To: Wade Sumners
Subject: Minnedosa Lagoon Expansion

Wade

Thank you for your information request. I completed a search of the Manitoba Conservation Data Centre's rare species database and found no occurrences at this time for your area of interest.

The information provided in this letter is based on existing data known to the Manitoba Conservation Data Centre at the time of the request. These data are dependent on the research and observations of CDC staff and others who have shared their data, and reflect our current state of knowledge. An absence of data in any particular geographic area does not necessarily mean that species or ecological communities of concern are not present; in many areas, comprehensive surveys have never been completed. Therefore, this information should be regarded neither as a final statement on the occurrence of any species of concern, nor as a substitute for on-site surveys for species as part of environmental assessments.

Because the Manitoba CDC's Biotics database is continually updated and because information requests are evaluated by type of action, any given response is only appropriate for its respective request. Please contact the Manitoba CDC for an update on this natural heritage information if more than six months pass before it is utilized.

Third party requests for products wholly or partially derived from Biotics must be approved by the Manitoba CDC before information is released. Once approved, the primary user will identify the Manitoba CDC as data contributors on any map or publication using Biotics data, as follows as: Data developed by the Manitoba Conservation Data Centre; Wildlife & Fisheries Branch, Manitoba Conservation and Water Stewardship.

This letter is for information purposes only - it does not constitute consent or approval of the proposed project or activity, nor does it negate the need for any permits or approvals required by the Province of Manitoba.

We would be interested in receiving a copy of the results of any field surveys that you may undertake, to update our database with the most current knowledge of the area.

If you have any questions or require further information please contact me directly at (204) 945-7747.

Chris Friesen
Coordinator
Manitoba Conservation Data Centre
204-945-7747
chris.friesen@gov.mb.ca
http://www.gov.mb.ca/conservation/cdc/

-----Original Message-----
From:
Sent: April-29-16 1:26 PM
To: Friesen, Chris (CWS)
Subject: WWW Form Submission

Below is the result of your feedback form. It was submitted by WWW Information Request () on Friday, April 29, 2016 at 13:25:47

DocumentID: Manitoba_Conservation

Project Title: Minnedosa Lagoon Expansion

Date Needed: 2016/05/13

Name: Wade Sumners

Company/Organization: Associated Environmental (Sask.)

Address: 1-2225 Northridge Drive

City: Saskatoon

Province/State: Sask

Phone: 306-850-2976

Email: sumnersw@ae.ca

Project Description: a lagoon expansion is being planned for the community of Minnedosa, MB and the info will be included in an EAP submission for the planned project

Information Requested: rare and protected species that have occurrences in the area

Format Requested: word doc and any associated map

Location: the facility is located in E half of 03-15-18 W1

action: Submit
