



Stantec Consulting Ltd.
500-311 Portage Avenue, Winnipeg MB R3B 2B9

April 19, 2021
File: 111217470

Attention: Shannon Kohler, Director
Environmental Approvals Branch
Conservation and Climate
1007 Century Street
Winnipeg, MB R3H 0W4

Dear Shannon,

Reference: Application for an Environmental Licence for an Aerated Lagoon with Post Lagoon Nitrification Wastewater Treatment System for the Community of Boissevain

On behalf of the Municipality of Boissevain-Morton, we are submitting two (2) paper copies and (1) USB of the Application for a New Environmental Act Licence for an Aerated Lagoon with Post Lagoon Nitrification Wastewater Treatment System for the Community of Boissevain.

The \$7,500 Licence Application Fee is enclosed and is being sent by Stantec on behalf of the Municipality of Boissevain-Morton.

Regards,

Stantec Consulting Ltd.



Tim Stratton P.Eng.
Senior Project Manager
Phone: 204-478-8997
Fax: 204-453-9012
tim.stratton@stantec.com

Attachment: Two (2) paper copies and one (1) USB of the Application for a new Environmental Act Licence

- c. Leo Poulin, CAO – Municipality of Boissevain-Morton
Ernie Epp – Way To Go Consulting Inc.
Tyler Foxtan – Manitoba Water Services Board

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Environment Act Proposal Form



Name of the development: An Aerated Lagoon with Post Lagoon Nitrification Wastewater Treatment System	
Type of development per Classes of Development Regulation (Manitoba Regulation 164/88): Class 2 Development - Waste Treatment & Storage	
Legal name of the applicant: Municipality of Boissevain-Morton	
Mailing address of the applicant: 420 South Railway Street, P.O. Box 490	
Contact Person: Leo Poulin, CAO	
City: Boissevain	Province: MB Postal Code: R0K 0E0
Phone Number: (204) 534-2433 Fax: (204) 534-3710 email: lpoulin@boissevain.ca	
Location of the development: RM of Boissevain-Morton	
Contact Person: Leo Poulin, CAO	
Street Address: 420 South Railway Street, P.O. Box 490	
Legal Description: Section SE 11, TWP 4, RGE 20 WPM	
City/Town: Boissevain	Province: MB Postal Code: R0K 0E0
Phone Number: (204) 534-2433 Fax: (204) 534-3710 email: lpoulin@boissevain.ca	
Name of proponent contact person for purposes of the environmental assessment: Robert De Koninck, P.Eng., Stantec Consulting Ltd.	
Phone: (204) 928-8690	Mailing address: 500-311 Portage Avenue Winnipeg, Manitoba R3B 2B9
Fax: (204) 453-9012	
Email address: rob.dekoninck@stantec.com	
Webpage address: www.stantec.com	
Date: 2021-04-19	Signature of proponent, or corporate principal of corporate proponent:
	Printed name: Cameron Dyck, P.Eng., Stantec Consulting Ltd,

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 Conservation and Water Stewardship
Suite 160, 123 Main Street
Winnipeg, Manitoba R3C 1A5

For more information:

Phone: (204) 945-8321

Fax: (204) 945-5229

<http://www.gov.mb.ca/sd/eal>



**Application for an
Environmental Act Licence for an
Aerated Lagoon with Post Lagoon
Nitrification Wastewater
Treatment System for the
Community of Boissevain**

April 19, 2021

Prepared for:

Manitoba Conservation and Climate
Environmental Approvals Branch
Conservation and Climate
1007 Century Street
Winnipeg, MB R3H 0W4

Proponent:

Municipality of Boissevain-Morton
420 South Railway Street
PO Box 490
Boissevain, MB R0K 0E0

Prepared by:


Stantec Consulting Ltd.
500-311 Portage Avenue
Winnipeg, MB R3B 2B9

Project No. 111217470

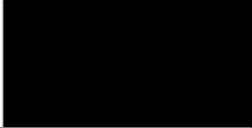


APPLICATION FOR AN ENVIRONMENTAL ACT LICENCE FOR AN AERATED LAGOON WITH POST LAGOON NITRIFICATION WASTEWATER TREATMENT SYSTEM FOR THE COMMUNITY OF BOISSEVAIN


This document entitled Application for an Environmental Act Licence for an Aerated Lagoon with Post Lagoon Nitrification Wastewater Treatment System for the Community of Boissevain was prepared by Stantec Consulting Ltd. ("Stantec") for the account of the Municipality of Boissevain-Morton (the "Client"). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

Prepared by 
_____ (signature)

Tim Stratton, P.Eng.

Reviewed by 
_____ (signature)

Saibal Basu, Ph.D, P.Eng.

Approved by 
_____ (signature)

Cameron Dyck, P.Eng.



**APPLICATION FOR AN ENVIRONMENTAL ACT LICENCE FOR AN AERATED LAGOON WITH
POST LAGOON NITRIFICATION WASTEWATER TREATMENT SYSTEM FOR THE COMMUNITY OF
BOISSEVAIN**

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APPLICATION FOR AN ENVIRONMENTAL ACT LICENCE FOR AN AERATED LAGOON WITH POST LAGOON NITRIFICATION WASTEWATER TREATMENT SYSTEM FOR THE COMMUNITY OF BOISSEVAIN

Development Information and Background
April 19, 2021

1.0 DEVELOPMENT INFORMATION AND BACKGROUND

Boissevain is an unincorporated urban community located within the Municipality of Boissevain – Morton (Municipality) approximately 75 kms south of Brandon. Boissevain currently operates a two-cell wastewater lagoon estimated to have been constructed approximately 60 years ago. The primary cell is aerated, and the secondary cell provides some additional treatment prior to discharge. The existing lagoon is located in SE 23-3-20 W with continuous controlled discharge to Cherry Creek. The land where the current lagoon is located is zoned “A-Agricultural”

The existing wastewater lagoon is operated under the Clean Environment Commission (CEC) Order No. 1166 pursuant to the provision of The Clean Environment Act that was issued to the then Town of Boissevain in 1988. The Order permits BOD₅ effluent limits up to 70 mg/L from November 1 to May 15 and 30 mg/L during the remaining discharge period. Also, fecal and total coliforms were not to exceed 200 and 1500 MPN/100 mL respectively, at any time. On July 21, 2016, Environmental and Enforcement Branch advised that Boissevain was not meeting treatment parameters as lagoon effluent showed both fecal and total coliform > 11,000 MPN/100 mL and requested a feasibility report be developed.

Stantec was retained by the Municipality and the Manitoba Water Services Board (MWSB) in November 2017 to undertake a feasibility study for the Wastewater Lagoon Upgrade and develop alternate treatment options at the existing lagoon site. It was determined that the existing lagoon aeration system was undersized, and the lagoon cell dikes were non-compliant as they contain significant quantities of sand, gravel and organics, resulting in seepage through the dikes. Therefore, a clay or synthetic liner would have been required if the cells were to be used as part of the upgraded wastewater treatment system. Historically treated effluent testing results also showed very high levels of coliforms and phosphorus. In March 2017, Manitoba Sustainable Development required that the community complete an Environment Act Proposal for a new or upgraded wastewater treatment facility that would meet current standards.

Stantec developed preliminary concepts for three (3) alternative wastewater treatment facilities as follows:

- Option 1: Conventional facultative lagoon with 230 days storage
- Option 2: Aerated Lagoon with post lagoon nitrification using a Submerged Attached Growth Reactor (SAGR®) and UV disinfection. The aerated lagoon system would have continuous discharge to Cherry Creek.
- Option 3: Mechanical wastewater treatment plant using extended aeration (EA) process followed by UV disinfection and continuous discharge to Cherry Creek.



APPLICATION FOR AN ENVIRONMENTAL ACT LICENCE FOR AN AERATED LAGOON WITH POST LAGOON NITRIFICATION WASTEWATER TREATMENT SYSTEM FOR THE COMMUNITY OF BOISSEVAIN

Development Information and Background
April 19, 2021

Based on the technical and cost analysis, Stantec recommended an aerated lagoon followed by post nitrification using a Submerged Attached Growth Reactor (SAGR®) and UV disinfection. As stated earlier, the feasibility study was based on reusing the upgraded existing lagoon cells. However, upon further discussions with the Municipality, it was subsequently decided to relocate the proposed aerated lagoon to a new site outside of Boissevain. Since the Municipality could not find an appropriate clay site, it was decided to locate the proposed wastewater lagoon facility on SE 11-4-20 W, a site adjacent to the Municipality owned waste disposal grounds. Aerated lagoon cells would require 60 mil HDPE linings. This EAP addresses the requirements of Manitoba Conservation and Climate for a new Environment Act Licence. The project is awaiting funding confirmation from the Investing in Canada Infrastructure Program (ICIP).



APPLICATION FOR AN ENVIRONMENTAL ACT LICENCE FOR AN AERATED LAGOON WITH POST LAGOON NITRIFICATION WASTEWATER TREATMENT SYSTEM FOR THE COMMUNITY OF BOISSEVAIN

Description of Development
April 19, 2021

2.0 DESCRIPTION OF DEVELOPMENT

2.1 CERTIFICATE OF THE TITLE AND LEGAL DESCRIPTION

The proposed wastewater treatment system is located on SE 11-4-20WPM. The land is owned by the RM of Boissevain-Morton. Title #2439670/2 is attached in **Appendix 2**.

2.2 OWNER

The registered owner is the Municipality of Boissevain-Morton.

2.3 EXISTING LAND USE

The existing site is an open field, directly north of the RM waste disposal ground.

2.4 LAND USE DESIGNATION

The land is zoned "AG – Agricultural General". Wastewater lagoons are a conditional use in this zoning under the Boissevain-Morton Zoning By-law.

2.5 PUBLIC MEETINGS OR HEARINGS

A public meeting was held on March 25, 2020 to discuss the borrowing by-law. The meeting was also live streamed. There were no objections to borrowing for the proposed new wastewater treatment system.

2.6 AGRICULTURAL OR INDUSTRIAL WASTE

No agricultural or industrial wastes, including petroleum products, will be put into the proposed wastewater treatment system.

2.7 DOMESTIC WATER SUPPLY

The Boissevain water supply is 85% surface water from the Boissevain Reservoir approximately 2 km southeast of Boissevain and 15% from 5 wells located 2 km south of the reservoir. The water treatment process is lime softening to remove hardness and iron. There are 4 rapid gravity filters as well as 2 granular activated carbon filters. The water is disinfected with chlorine.



APPLICATION FOR AN ENVIRONMENTAL ACT LICENCE FOR AN AERATED LAGOON WITH POST LAGOON NITRIFICATION WASTEWATER TREATMENT SYSTEM FOR THE COMMUNITY OF BOISSEVAIN

Description of Development
April 19, 2021

2.8 SCHEDULE AND FUNDING

Design is scheduled to be completed in 2021 and construction is scheduled for a start date of May 1, 2022 with Substantial Completion by December 31, 2022.

The Municipality is expecting a grant from (ICIP) to fund the project.



APPLICATION FOR AN ENVIRONMENTAL ACT LICENCE FOR AN AERATED LAGOON WITH POST LAGOON NITRIFICATION WASTEWATER TREATMENT SYSTEM FOR THE COMMUNITY OF BOISSEVAIN

Environmental Impact and Management Practices
April 19, 2021

3.0 ENVIRONMENTAL IMPACT AND MANAGEMENT PRACTICES

Environmental impact and management practices are contained in Section 8.0, Environmental Screening, of the Pre-Design Report in **Appendix 1**.



APPLICATION FOR AN ENVIRONMENTAL ACT LICENCE FOR AN AERATED LAGOON WITH POST LAGOON NITRIFICATION WASTEWATER TREATMENT SYSTEM FOR THE COMMUNITY OF BOISSEVAIN

Accidents, Malfunctions, and Operations
April 19, 2021

4.0 ACCIDENTS, MALFUNCTIONS, AND OPERATIONS

4.1 GENERAL

The effects of accidents and malfunctions for the development are primarily related to the potential for equipment failure, fire/explosion, fuel or other chemical spills, and transportation accidents. The following sections outline the potential effects from accidents and malfunctions and the measures proposed to prevent accidents and malfunctions.

The Community will be required to develop an Emergency Response Plan for the proposed wastewater treatment system operation and account for new equipment installed within the upgraded/expanded facility. The critical infrastructure associated with the treatment system will have both duty and stand-by equipment. All practices conducted at the site will be performed in accordance with *The Workplace Safety and Health Act*, which will serve to reduce potential effects on health and safety. Personal protective equipment and safety equipment will be provided for employees working in the facility where required.

4.2 FIRE/EXPLOSION

During construction and operation, there exists potential for fires at the site involving mechanical equipment and fuels. Effects related to fire include; harm to on-site personnel, damage to equipment and property, and the potential release of contaminants and hazardous materials. The plant will include a back-up generator that would be fueled by a diesel fuel source. Reasonable precautions and mitigative actions will continue to be taken to prevent fire hazards at the site.

4.3 SPILLS

During construction and operation, there is potential for environmental effects due to fuel and chemical spills and/or leaks of lubricants from equipment and activities at the site. Accidents could result in the release of hazardous materials and/or equipment fluids or fuels from equipment or vehicles, chemical spills from improper storage and handling procedures and wastewater from equipment failure. As a result of spills, effects on air quality, soil degradation, surface water, and human health and safety are possible.

Adherence to standard environmental protection practices will minimize the risks associated with accidental spills and adverse effects. Provincial regulations related to chemical storage, spill containment, and requirements respecting the storage, handling and transport of dangerous goods and hazardous wastes will also be adhered to. Emergency response plans, procedures and equipment will also address the potential for accidental release of fuel, chemicals or other hazardous materials and will serve to reduce the effects. MSDS information will be available for aluminum sulphate which is the only chemical anticipated to be used in the wastewater treatment system.



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Accidents, Malfunctions, and Operations
April 19, 2021

4.4 CONSTRUCTION

Potential effects resulting from spills occurring during the construction phase is anticipated to be irregular and short-term in duration. A spill, if it were to occur, would predominantly be contained within the site; the magnitude of a spill effect could range from negligible to moderate and would depend on the size of the spill.

Potential effects on soil are considered low given the small amount of equipment and quantity of fuel, lubricants and materials that would be present at the project site. An emergency spill kit to remediate small accidental spills, leaks or releases will be maintained on the project site during construction. Surface water and near-surface groundwater has the potential to be affected by the accidental release of contaminants and improper storage and disposal of construction wastes generated on-site and via runoff from the site.

Storage and handling of potential contaminants or hazardous materials will be in accordance with established guidelines, regulations, standards and protocols. Petroleum leaks or spills will be mitigated by use of properly maintained equipment, use of spill clean-up equipment and materials, and use of appropriate fueling equipment. The General Contractor will be responsible for maintaining an emergency response plan that can be implemented immediately in the event of a major spill. In the event of a reportable spill, Manitoba Sustainable Development (MSD) will be notified through the emergency response line and appropriate measures will be taken according to MSD requirements. A 100 m setback to watercourses will be maintained for all fueling and servicing activities.

4.5 OPERATION

The delivery, storage and use of chemicals (i.e., liquid alum) for the chemical feed system has the potential to affect surface water if an accidental spill were to happen. The design of the above ground bulk tank (double wall) and chemical room for the provision of liquid alum will be in accordance with applicable regulations and guidelines.

Improper storage or spills, leaks or accidental releases can adversely affect the soil at the project site. The existing lagoon cells will be lined and so the potential for the release of raw or partially treated sewage that could affect soil quality is very low.

During the operations phase, the regular inspection and maintenance of vehicles and plant equipment would serve to reduce the risk of spills occurring at the site.

4.6 EQUIPMENT FAILURE

Equipment malfunctions related to forcemain, pump and pipe failures could occur resulting in the release of chemicals or sewage to the environment. All new piping, pumps and emergency overflow piping for the upgraded/expanded wastewater treatment system will be tested prior to operation to assess for potential



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Accidents, Malfunctions, and Operations
April 19, 2021

issues or leaks. Regular inspection of accessible piping and pumps will be conducted by Municipality personnel. It is expected that adherence to proper engineering design of processes meeting applicable codes of practice and equipment standards will mitigate the potential for these effects. The new system will have a backup generator.

4.7 TRANSPORTATION ACCIDENTS

Transportation accidents can result in the release of vehicle fluids to the environment (i.e., diesel, gasoline, oils, etc.) and the materials the vehicles were transporting (i.e., alum, sewage, sludge). Effects related to such releases can include air, soil, water and groundwater quality effects with potential for subsequent effects on the environment and human health.

During the construction phase, there will be an increase in the number of vehicles travelling to and from the project site with construction equipment and associated materials. To minimize impact on residential neighborhoods, access to the lagoon site will be provided by an alternative route utilizing an existing gravel road.

Operational traffic at the construction site (i.e., deliveries and hauling) operates at slow speeds to minimize the potential for on-site transportation accidents. The Contractor will be mandated to utilize qualified drivers and qualified companies to transport materials and waste products to and from the site to further minimize the potential for transportation risks.

4.8 PREVENTION MEASURES

Measures to prevent adverse effects associated with fire/explosion, spills, equipment failure, and transportation accidents are as follows:

- Flammable waste and combustible materials (i.e., greasy/oily rags) will be removed on a regular basis and disposed of at an appropriate licensed disposal facility.
- Appropriate fire extinguishers are available on-site during operations and are maintained to manufacturer's standards.
- Potentially hazardous materials and chemicals are stored and handled at dedicated areas and labelled in accordance with applicable regulatory requirements.
- Hazardous materials are transported in accordance with the *Dangerous Goods Handling and Transportation Act* and used according to product-use instructions.
- Regular waste materials will be deposited and stored in appropriate containers and removed from the site on a regular basis for disposal at an appropriate licenced facility.
- Refueling of vehicles and equipment will adhere to proper procedures and will use designated refueling areas or will be refueled off-site.



APPLICATION FOR AN ENVIRONMENTAL ACT LICENCE FOR AN AERATED LAGOON WITH POST LAGOON NITRIFICATION WASTEWATER TREATMENT SYSTEM FOR THE COMMUNITY OF BOISSEVAIN

Accidents, Malfunctions, and Operations
April 19, 2021

- Emergency spill kits will be maintained on-site and staff will be trained to properly deploy spill kit materials and clean-up spills.
- Vehicles and equipment will be maintained to minimize leaks. Regular inspections of hydraulic and fuel systems on equipment and machinery will be undertaken on a routine basis. Leaks detected will be repaired immediately by trained personnel.
- Chemical (i.e., alum) transfers from tanker to storage tanks will be monitored at all times.
- All pump equipment, pipelines and accessible forcemains will be regularly inspected by qualified RM operations personnel.
- Existing traffic control measures (i.e., speed limits, signage) will be adhered to.
- The Community as a part of their Health and Safety Program will include policies related to emergency preparedness and response plan, workplace hazardous materials information system (WHMIS) and spill response procedures.

4.9 SUMMARY

To prevent accidents and malfunctions, the operation of the proposed new wastewater treatment system will be conducted in accordance with regulatory requirements. The implementation of and adherence to measures outlined in an Emergency Response Plan to mitigate potential effects related to accidents and malfunctions will serve to reduce the likelihood of these events occurring.



APPLICATION FOR AN ENVIRONMENTAL ACT LICENCE FOR AN AERATED LAGOON WITH POST LAGOON NITRIFICATION WASTEWATER TREATMENT SYSTEM FOR THE COMMUNITY OF BOISSEVAIN

Operations and Maintenance Procedures
April 19, 2021

5.0 OPERATIONS AND MAINTENANCE PROCEDURES

5.1 OPERATION PROCEDURES

The lagoon operates on a continuous discharge basis. Effluent from the aerated lagoon is discharged by gravity into the Submerged Attached Growth Reactor (SAGR™) cells for nitrification (ammonia removal, cBOD₅, and TSS polishing following the lagoon system and to meet the target effluent criteria. Phosphorus removal is achieved through chemical precipitation using Alum (Aluminum Sulphate). The following procedures would be followed with respect to operating the wastewater treatment lagoon system:

- Regular sampling of treated effluent in accordance with the Operating Licence;
- Adjustment of Alum feed chemical dose rate based on observed influent loads and effluent quality;
- Perform a SAGR™ step-feed once per year in the fall. The procedure is as follows:
 - Open the step-feed gate valve at the inlet of each SAGR cell
 - Allow effluent to feed into each SAGR cell through the normal inlet and step-feed inlet for a period of 4 weeks
 - After 4 weeks, close the step-feed gate valves and return to normal flow through the SAGR cells.

5.2 MAINTENANCE PROCEDURES

General Maintenance

The majority of maintenance is carried out in the spring, summer and fall of each year as weather permits. Typical maintenance tasks include:

- Grass on the dykes of the lagoon should be cut on a regular basis. The grass should not exceed 0.3 meters in length. Deep rooted weeds should be removed to prevent deterioration of the dykes and liner system.
- Inspect fence and gate for damage and repair as required.
- If encountered, animals burrowing on the dykes of the lagoon should be removed and the holes filled. If assistance in animal control is required, contact Manitoba Conservation.
- Check for erosion on the dykes. If erosion is present, erosion repairs should be undertaken. This may include re-grading, grass planting or stone rip rap.



APPLICATION FOR AN ENVIRONMENTAL ACT LICENCE FOR AN AERATED LAGOON WITH POST LAGOON NITRIFICATION WASTEWATER TREATMENT SYSTEM FOR THE COMMUNITY OF BOISSEVAIN

Operations and Maintenance Procedures
April 19, 2021

- Regular road and turn around maintenance should be undertaken to ensure access to the site at all times. Culverts should be cleared of blockage.
- Inspect and maintain drainage.
- All gate valves on the lagoon and along each forcemain should be operated/cycled a minimum of once per year to ensure they are in proper working order.
- Monitor treated effluent discharge outfall for blockages.

Aerated Lagoon, SAGR and UV Disinfection Maintenance

Typically, the in-water components in the Aerated Lagoon Wastewater Treatment System, including Partial Mix Cells and SAGR, do not require operator intervention. Typical maintenance tasks include:

- Monitor sewage dumping;
- Check and adjust lagoon cell aeration system floating lateral tension weights as required;
- Purge condensate from lagoon and SAGR aeration system laterals on a monthly basis;
- Inspect and periodically clean the Alum slipstream injection system including the carrier water inlet filter, dosing pumps and injection quill;
- Periodically inspect the aeration diffuser membranes. Replace as needed;
- Perform regular blower maintenance per manufacturers recommendations including oil changes, belt replacement and filter changes;
- Perform regular maintenance of the ultraviolet disinfection system following the manufacturers recommendations.



APPENDIX 1
PRE-DESIGN REPORT



**Municipality of Boissevain-Morton
Proposed Aerated Lagoon with Post
Lagoon Nitrification
Pre-Design Report**

March 24, 2021

Prepared for:

The Manitoba Water Services Board
Unit 1A - 2010 Currie Boulevard
Brandon, MB R7B 4E7

and

The Municipality of Boissevain-Morton
420 South Railway Street, PO Box 490
Boissevain, MB, R0K 0E0

Prepared by:

Stantec Consulting Ltd.
500-311 Portage Avenue
Winnipeg, MB, R3H 2B9

Project No. 111217470

 **ENGINEERS
GEOSCIENTISTS
MANITOBA**

Certificate of Authorization
Stantec Consulting Ltd.

No. 1301



**MUNICIPALITY OF BOISSEVAIN – MORTON
PROPOSED AERATED LAGOON WITH POST LAGOON NITRIFICATION – PRE-DESIGN REPORT**

This document entitled the Municipality of Boissevain – Morton Proposed Aerated Lagoon with Post Lagoon Nitrification Pre-Design Report was prepared by Stantec Consulting Ltd. (“Stantec”) for the accounts of the Manitoba Water Services Board and the Municipality of Boissevain - Morton (the “Clients”). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec’s professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

Prepared by _____
(signature)

Rob De Koninck, P.Eng.

Reviewed by _____
(signature)

Saibal Basu, Ph.D., P.Eng.

Approved by _____
(signature)

Tim Stratton, P.Eng., FEC



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**MUNICIPALITY OF BOISSEVAIN – MORTON
 PROPOSED AERATED LAGOON WITH POST LAGOON NITRIFICATION – PRE-DESIGN REPORT**

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Abbreviations

RPM	Rotation Per Minute
SBR	Sequencing Batch Reactor
SCADA	Supervisory Control and Data Acquisition
SMBS	Sodium Metabisulphite
SRT	Sludge Retention Time
SVI	Sludge Volume Index
TAC	Technical Advisory Committee
TKN	Total Kjeldahl Nitrogen
TP	Total Phosphorus
TSS	Total Suspended Solids
USEPA	United States Environmental Protection Agency
UV	Ultraviolet
VFD	Variable Frequency Drive
VSS	Volatile Suspended Solids
WAS	Waste Activated Sludge
WWTP	Wastewater Treatment Plant



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Introduction
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1.0 INTRODUCTION

1.1 BACKGROUND

Boissevain is an unincorporated urban community located within the Municipality of Boissevain – Morton (Municipality) approximately 75 kms south of Brandon. Boissevain currently operates a two-cell wastewater lagoon estimated to have been constructed approximately 60 years ago. The primary cell is aerated, and the secondary cell provides some additional treatment prior to discharge. The existing lagoon is located in SE 23-3-20 W with continuous controlled discharge to Cherry Creek. The land where the current lagoon is located is zoned “A-Agricultural”

The existing wastewater lagoon is operated under the Clean Environment Commission (CEC) Order No. 1166 pursuant to the provision of The Clean Environment Act that was issued to the then Town of Boissevain in 1988. The Order permits BOD₅ effluent limits up to 70 mg/L from November 1 to May 15 and 30 mg/L during the remaining discharge period. Also, fecal and total coliforms were not to exceed 200 and 1500 MPN/100 mL respectively, at any time. On July 21, 2016, Environmental and Enforcement Branch advised that Boissevain was not meeting treatment parameters as lagoon effluent showed both fecal and total coliform > 11,000 MPN/100 mL and requested a feasibility report be developed.

Stantec was retained by the Municipality and the Manitoba Water Services Board (MWSB) in November 2017 to undertake a feasibility study for the Wastewater Lagoon Upgrade and develop alternate treatment options at the existing lagoon site. It was determined that the existing lagoon aeration system was undersized, and the lagoon cell dikes were non-compliant as they contain significant quantities of sand, gravel and organics, resulting in seepage through the dikes. Therefore, a clay or synthetic liner would have been required if the cells were to be used as part of the upgraded wastewater treatment system. Historically treated effluent testing results also showed very high levels of coliforms and phosphorus. In March 2017, Manitoba Sustainable Development required that the community complete an Environment Act Proposal for a new or upgraded wastewater treatment facility that would meet current standards.

Stantec developed preliminary concepts for three (3) alternative wastewater treatment facilities as follows:

- Option 1: Conventional facultative lagoon with 230 days storage
- Option 2: Aerated Lagoon with post nitrification using Submerged Attached Growth Reactor (SAGR®) and UV disinfection. The lagoon will have continuous discharge to Cherry Creek.
- Option 3: Mechanical wastewater treatment plant using extended aeration (EA) process followed by UV disinfection and continuous discharge to Cherry Creek.



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Based on the technical and cost analysis, Stantec recommended an aerated lagoon followed by post nitrification using Submerged Attached Growth Reactor (SAGR®) and UV disinfection. As stated earlier, the feasibility study was based on reusing the upgraded existing lagoon cells. However, upon further discussions with the Municipality, it was subsequently decided to relocate the proposed aerated lagoon to a new site outside of Boissevain. Since the Municipality could not find an appropriate clay site, it was decided to locate the proposed wastewater lagoon facility on SE 11-4-20 W - the site of the Municipality owned waste disposal grounds. This present Pre-Design Report (PDR) and subsequent EAP, will address the requirements of Manitoba Conservation and Climate for a new Environment Act Licence. The project is awaiting funding confirmation from the Investing in Canada Infrastructure Program (ICIP).

1.2 PURPOSE AND SCOPE OF PROJECT

The overall scope of this work is to develop a Preliminary Design of the facility at this new site and submit an Environment Act Proposal (EAP) to obtain an Environment Act Licence for the proposed wastewater lagoon facility. Stantec has assumed that the treated effluent will be allowed to discharge continuously into Cherry Creek as per current practice. The existing Boissevain wastewater treatment system will be decommissioned once the new system is in operation.



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Proposed Lagoon Site
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2.0 PROPOSED LAGOON SITE

The RM had searched for suitable clay sites in close proximity to the Town. Since the Municipality could not find an appropriate site, it was decided to locate the proposed wastewater lagoon facility on SE 11-4-20 W - the site of the Municipality owned waste disposal grounds, approximately 5 km north of Boissevain.

The site appears to be suitable for a lagoon with a 60 mil HDPE liner and capable of receiving truck haul sewage. Treated effluent will be pumped by force main to Cherry Creek in a continuous discharge system.

The proposed site meets most of the requirements including high flat ground, low water table, adjacent drainage, adjacent gravel road, and adjacent power. However, clay is not available for a clay lined lagoon. The closest lagoon cell would be approximately 1.25 km from the nearest house.



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Test Hole Drilling, Laboratory Testing and Geotechnical Conditions
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3.0 TEST HOLE DRILLING, LABORATORY TESTING AND GEOTECHNICAL CONDITIONS

Twelve (12) test holes were drilled by Paddock Drilling on November 20, 2020 on the proposed aerated lagoon site on SE 11-04-20W.

The soils are a consistent mix of sand, silt and clay with some gravel. Till was encountered in two holes at a depth of approximately 2.7 m. All holes were dry although some moist soil was encountered. There was no evidence of a high ground water table at the time of drilling.

Soil samples were obtained on site and two particle size analysis tests were done at the Stantec Laboratory as well as one hydraulic conductivity test. The hydraulic conductivity test result was 3.1×10^{-7} cm/sec which fails the Manitoba Conservation and Climate maximum hydraulic conductivity of 1×10^{-7} cm/sec for a clay lined wastewater lagoon. This result corresponds with another failed hydraulic conductivity test done some years ago at the site. Therefore, a 60 mil HDPE synthetic liner will be required in the two aerated lagoon cells.

The site will be suitable for structures; but, further geotechnical analysis will be required at the time of design to determine foundation requirements.

Test hole logs and laboratory test results are attached in **Appendix A**. A test hole location plan is also provided in **Appendix A**.



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Site Topographic Survey
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4.0 SITE TOPOGRAPHIC SURVEY

Stantec completed a GPS topographic survey on November 20, 2020. There is an overall elevation differential of approximately 0.4 m across the site which is suitable for a lagoon. The lagoon exterior drainage would be drained to the municipal drainage ditch located to the east of the proposed site. There is a fall of approximately 1.2 m from the lagoon site to the drainage ditch. The topographic survey data is shown on **Figure 6.4 (Appendix B)** the Lagoon Site Plan.



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Design Criteria
March 24, 2021

5.0 DESIGN CRITERIA

5.1 GENERAL

This section summarizes the design criteria which forms the basis of the preliminary design of the proposed for the Boissevain Wastewater Treatment System. The key elements of the design criteria comprising of population projections, wastewater flows, influent loadings and anticipated effluent criteria was originally presented to the Town and MWSB as a part of Technical Memorandum No.1 (TM NO.1) during the preparation of the Feasibility Study. Since issuing the Feasibility Study, the Town advised that the lagoon shall be designed to accommodate septage and domestic sewage from a limited number of septic tanks and holding tanks within the municipality. This information has been incorporated in the current design and presented in the following sections.

5.2 POPULATION

The existing population for the Town is 1,572 people based on the RM's records. The RM provided a 20-year design population of 1,600 people based on their own analysis of the projected growth.

5.3 WASTEWATER FLOWS

5.3.1 Gravity System

All wastewater collected by the Towns collection system flows by gravity to a lift station (LS) located at the existing lagoon site. The Town currently does not have a flow monitoring device at the lagoon lift station to measure the volume of raw wastewater entering the lagoon. As noted in the previous Feasibility Study, the per capita flows for the gravity system were based as follows:

Domestic wastewater:	315 lpcpd
Infiltration (75%)	<u>235</u> lpcpd
Total	550 lpcpd

- Therefore, the average day flow = 550 lpcpd x 1600 people = 880,000 L/d or 880 m³/d
- The estimated design flow based on max month conditions (assuming a max month factor of 1.2) can be estimated as follows: [(1.2 x 315 lpcpd) + (235 lpcpd)] x 1600 people = 980,800 L/d or 981 m³/d



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5.3.2 Estimation of Peak Hourly Flows

5.3.2.1 Raw Wastewater Lift Station

As stated earlier, the Town does not record flows entering the existing lagoon. Since the existing wastewater collection system from the Town flows by gravity to the existing lagoon, a new lift station will be provided at the existing lagoon site to pump wastewater to the new lagoon located on SE 11-4-20 W. The proposed lift station will be sized to accommodate average day and peak flow conditions. The Town currently operates a portable pump during periods of high flow (wet weather events) to supplement the existing lagoon lift station submersible pumps. The capacity of the portable pump was assumed to be 15 L/s.

The size of the raw wastewater lift station will be based on meeting the domestic peak hour flows generated in the wastewater collection system plus peak wet weather flows. For the domestic peak hour factor (PHF), Stantec compared the PHF generated by the treated water distribution system of 3.75 to the Harmon Peaking Factor. The formula for Harmon Peaking Factor is as follows:

Harmon's Peaking Factor = $1 + [14 / \{4 + \{(P/1000)^{0.5}\}}]$, where $P = \text{Population}$

Based on the above formula, a peak hourly factor of 3.66 was calculated. The more conservative value of 3.75 is recommended for the new raw wastewater lift station.

- Average Day Flow = $880 \text{ m}^3/\text{day} / 24 \text{ hrs/day} / 3600 \text{ s/hr} = 10.2 \text{ L/s}$
- Peak Hour Flow = Average Domestic Flow x PHF + Infiltration & Inflow = $1600 \times (315 \text{ lpcpd} \times 3.75 + 215 \text{ lpcpd}) / 24 \text{ hrs/day} / 3600 \text{ s/hr} + 15 \text{ L/s} = 25.9 \text{ L/s} + 15 \text{ L/s} = 40.9 \text{ L/s}$, say 45 L/s (rounded)

5.3.2.2 Treated Effluent Pump Station

The aerated lagoon acts as a reservoir that buffers the incoming flows. As a result, the peak treated effluent flows would be less than the peak raw wastewater flow rate. The peak treated effluent flowrate was calculated as follows:

- Average Day Flow = $880 \text{ m}^3/\text{day} / 24 \text{ hrs/day} / 3600 \text{ s/hr} = 10.2 \text{ L/s}$
- Peak Hour Flow = Average Day Flow + Inflow = $10.2 \text{ L/s} + 15 \text{ L/s} = 25.2 \text{ L/s}$

5.3.3 Summary of Design Flows

Based on projected population, per capita wastewater flows and peak factors developed in the previous sections, the design flows are summarized below.



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Table 5.1 – Summary of Design Loads

Description/Parameter	Source			Total Flow ¹
	Gravity Sewer	Holding Tanks	Septage	
Average Day Flow	880 m ³ /d	2.2 m ³ /d	20 m ³ /d	902 m ³ /d
Design Flow (Max Month/Max Hauling Condition)	981 m ³ /d	4.8 m ³ /d	50 m ³ /d	1036 m ³ /d
Lift Station Average Hourly Flow	10.2 L/s			10.2 L/s
Lift Station Peak Hour Flow	45 L/s			45 L/s
Treated Effluent Peak Flow	25.2 L/s			25.2 L/s

¹Total Flows (rounded)

5.4 INFLUENT WASTEWATER LOADING

5.4.1 Projected Loadings

5.4.1.1 Population Served by Sewer Type

Due to lack of historical data, the projected sewage loadings for various sewage constituents are based on the following assumptions:

- For piped sewage from the Town of Boissevain, equivalent service population was based on 315 lpcpd and the following per capita loadings were applied (adopted from Qasim, 1999 and Metcalf and Eddy, 2014).

- BOD₅: 0.090 kg/person/d
- TSS: 0.095 kg/person/d
- TKN: 0.018 kg/person/d
- NH₃-N: 0.014 kg/person/d
- TP: 0.003 kg/person/d

- Septage loading was based on septage characteristics as defined by WEF Septage Manual, MOP No, 24 as follows:

- BOD₅: 7,000 mg/L
- TSS: 15,000 mg/L
- TKN: 700 mg/L
- NH₃-N: 150 mg/L
- TP: 250 mg/L



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3. For holding tanks, high strength sewage as defined by Metcalf and Eddy (2014) was assumed as follows:

- BOD₅: 300 mg/L
- TSS: 350 mg/L
- TKN: 50 mg/L
- NH₃-N: 40 mg/L
- TP: 8 mg/L

The design population of 1,600 people along with the per capita loadings shown in **Table 5.2** for the respective sewer type will be used to calculate the lagoon loadings. Also, as discussed in Section 2.3.2, we have assumed a max. daily septage discharge rate of 4.8 m³/d and holding tank discharge of 50 m³/day. These flows along with the septage characteristics noted above were used to establish the sewage loading to the lagoon. A summary of these calculations is provided in **Table 5.2**.

Table 5.2 – Summary of Design Loads

Wastewater Source	Design Flow (m ³ /d)	BOD ₅ Load (kg/d)	TSS Load (kg/d)	TKN Load (kg/d)	Ammonia-N Load (kg/d)	TP Load (kg/d)
Gravity Sewer	981	144	152	28.8	22.4	4.8
Septage	4.8	33.6	72	3.36	0.72	1.2
Holding Tank	50	15	17.5	2.5	2	0.4
TOTAL	1,036	193	242	35	25	6.4

5.5 EFFLUENT CRITERIA

5.5.1 General

Based on our understanding of the requirements for this project the following effluent limits are proposed. The confirmation of these limits is necessary through the Environment Act Licencing process prior to the completion of detailed design.

Table 5.3 – Treated Effluent Limits

Effluent Parameter	Value	Notes
cBOD ₅	≤ 25 mg/L	daily never-to-exceed basis.
TSS	≤ 25 mg/L	daily never-to-exceed basis.
Ammonia Nitrogen ¹	≤ 3.0 mg/L (May to September) ≤ 5.0 mg/L (October to April)	daily never-to-exceed basis



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Effluent Parameter	Value	Notes
Total Phosphorus	≤ 1.0 mg/L	30-day rolling average
Total Residual Chlorine ²	≤ 0.02 mg/L	Monthly average basis
Escherichia coli ³	200 MPN / 100 mL	Monthly geometric mean of a minimum 12 samples

¹ Manitoba Conservation and Water Stewardship may choose to derive site-specific limits based on Manitoba Surface Water Quality Objectives.

² Current CEC Order requires 0.01 mg/L

³ Current CEC Order requires 100 MPN/100 mL



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Wastewater Lagoon Upgrade – Key System Components
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6.0 WASTEWATER LAGOON UPGRADE – KEY SYSTEM COMPONENTS

6.1 GENERAL

As a part of the proposed new lagoon works, it is anticipated that the following key components and unit process will be required to meet the operational requirements of the Town, meet the target effluent quality and anticipated Licence requirements:

- New lift station at the existing lagoon site
- Forcemain from Town to new lagoon site
- Truck dump structure
- Two-cell aerated lagoon
- Submerged Attached-Growth Reactor cells
- Operations Building (for blowers, chem feed, electrical, UV)
- Chemical storage and feed system for phosphorus removal
- Disinfection
- Effluent flow monitoring
- Treated effluent pump station, forcemain and disposal to Cherry Creek

6.2 RAW WASTEWATER LIFT STATION & FORCEMAIN

A triplex pump lift station with submersible sewage pumps will be installed adjacent to the existing lagoon lift station. The lift station will consist of three 10 HP submersible pumps operating in lead / lag / standby fashion to transfer raw wastewater to the new lagoon. Each pump will include a built-in VFD allowing for operation at various flowrates based on meeting the average day and peak flows. Each pump will be rated to operate between 10.2 L/s to 32 L/s with a single pump operating and 45 L/s with two pumps operating together.

- Pre-cast concrete single chamber wet well, 3.0m diameter and approximately 5.0m deep.
- Level controls
- Submersible solids handling style effluent pumps
- Lead / lag /stand-by pumps each rated at max flow of 32 L/s.
- Pump motor size: 10.0 HP w/ VFD
- 300 mm HDPE forcemain



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The top of the lift station will be at grade with the surrounding area. The lift station will be controlled via a remote panel located adjacent to the wet well. The lift station will be connected to the existing gravity sewer once the new works are commissioned and ready for service.

Raw wastewater will be pumped to the new lagoon through a 300 mm diameter high density polyethylene forcemain. The forcemain will be installed via a combination of trenchless and open cut excavation at a minimum bury of 2.4 m cover, eliminating any need for insulation. The proposed forcemain alignment and location of the lift station are illustrated in **Figure 6.1 (Appendix B)**.

6.3 WASTEWATER TREATMENT LAGOON SYSTEM COMPONENTS

As per the recommendation of the feasibility study, a two-cell aerated lagoon (See **Figure 6.2**) followed by a post lagoon nitrification process utilizing a Submerged Attached Growth Reactor (SAGR®) system will be constructed. The process technology is briefly described as follows:

Lagoon based treatment systems provide some ammonia removal (nitrification) capability during the summer months but are generally incapable of meeting the target effluent limits during prolonged periods of low water temperatures experienced in Manitoba. The problem with nitrification in cold climate lagoons is two-fold:

- Ammonia oxidizing bacteria (AOB) or nitrifiers are generally not able to compete with heterotrophic bacteria (responsible for BOD₅ removal) in presence of high BOD₅ normally present in wastewater at the front end of the lagoon. Hence, nitrification is better accomplished near the back end of a lagoon system once BOD₅ has been reduced to a level below 30 mg/L.
- Secondly, as the liquid temperature drops starting late fall and continues to drop through the winter months, the temperature of the lagoon can drop down to < 1°C. At temperatures below 6°C, the AOB bacteria become inhibited causing nitrification to stop completely and results in negligible ammonia removal from the incoming wastewater stream.

In the proposed aerated lagoon system, the organics in the wastewater (measured as BOD₅) is reduced to carbon dioxide, water, and inert ash by natural bacteria. The bacteria receive their oxygen supply from air provided through the aeration diffusers. For Boissevain, fine bubble membrane diffusers are proposed. Other types of aerators such as surface aerators



**Figure 6.2: Aerated Lagoon System
(Source: NEXOM)**



Figure 6.3: Tubular Membrane Diffusers



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are less efficient and would require a larger lagoon footprint to achieve sufficient surface area to provide the same level of aeration as the fine bubble membrane diffusers. The proposed diffusers consist of an HDPE air distribution body with individual tubular membranes extending outwards in a horizontal plane (see **Figure 6.3**). The design prevents bubbles from coalescing and results in an efficient oxygen transfer rate with minimum headloss. The diffusers are suspended with a marine grade rope directly under the lateral, at a uniform depth. The rope is attached to the floating header for the ease of diffuser retrieval. Each diffuser is attached to a small concrete weight, encased in a HDPE pipe. Diffuser assemblies can be retrieved from a boat with no special equipment. The proposed lagoon and SAGR® system site plan is illustrated in **Figure 6.4** found in **Appendix B**. For the proposed lagoon, both cells will be outfitted with a fine bubble aeration system.

A summary of the lagoon design is provided in **Table 6.1** below.

Table 6.1 – Proposed Aerated Lagoon Design

Cell	Reactor Type	Water Depth (m)	Water Volume (m ³)	Hydraulic Retention Time (days)
1	Partial Mix	3.0	22,499	24.1
2	Partial Mix and Settling	3.0	22,499	24.1
TOTAL			44,998	48.2

6.3.1 Lagoon Cell Construction

A two (2) cell aerated lagoon will be constructed on the northern end of the selected site. In-situ material from the lagoon site will be used to construct the cell dykes and floor. The material will be placed and compacted in layers to achieve the minimum compaction requirements. The lagoon cells will be lined with a 60 mil HDPE liner to meet the hydraulic requirements. A 300mm layer of sand above and below the HDPE liner provides protection for the liner. Due to the overall size of each cell, rip rap will be provided along the inside slopes of each cell to abate erosion from wave activity. **Figure 6.7** found in **Appendix B** demonstrates typical sections and details of the lagoon cell construction.

A concrete truck dump structure will be installed at the inlet of Cell No.1. The truck dump structure will follow Manitoba Water Service Board (MWSB) standard details.

6.3.2 Submerged Activated Growth Reactors (SAGR®)

Following settling in Cell 2, the effluent from the lagoon will be directed by gravity to the Submerged Attached Growth Reactor (SAGR®). As noted earlier, SAGR® is a patented attached growth treatment process for nitrification. The system consists of a gravel bed where the influent is distributed evenly across the width of the cell. A horizontal collection chamber is provided at the back end of the system to collect the final nitrified effluent. The bed is aerated to maintain aerobic condition that is necessary for



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Wastewater Lagoon Upgrade – Key System Components
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nitrification. The gravel bed is covered by a layer of peat or mulch for insulation to prevent ice formation in the bed, allowing the system to treat wastewater that is near freezing (<0.5°C). For Boissevain, a dual cell SAGR® is proposed. The piping system will be set-up to allow isolation and bypass of any cells for maintenance. A SAGR® system is illustrated in **Figure 6.5**.

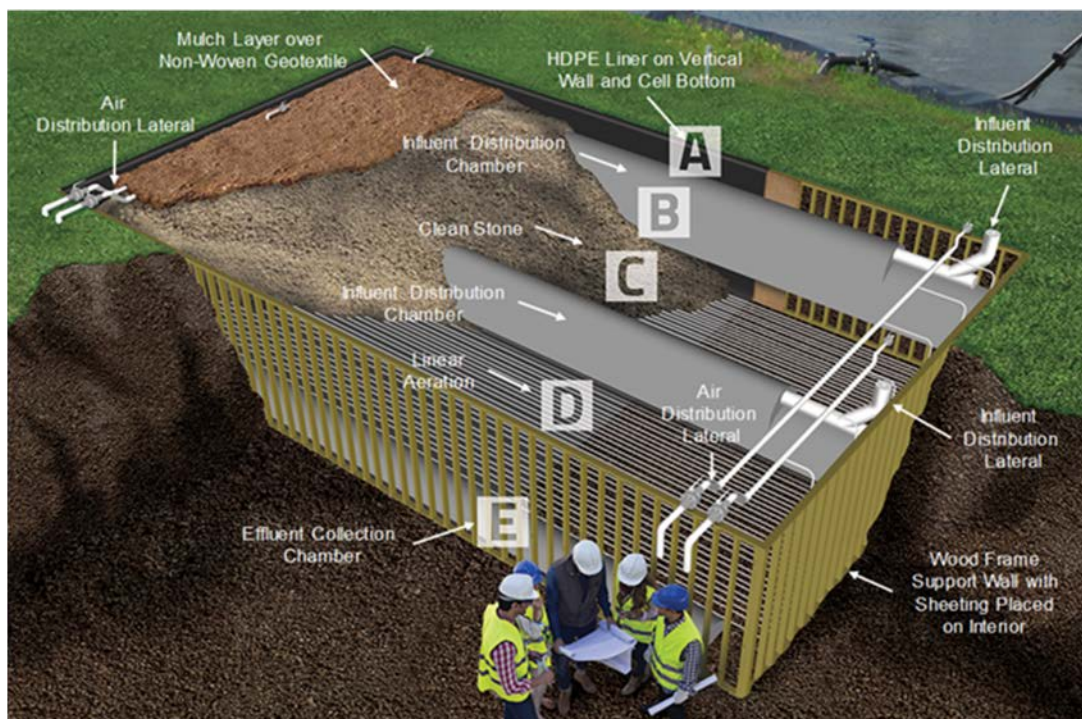


Figure 6.5: SAGR® System (Source: NEXOM)

6.3.3 Aeration System

To meet the aeration requirements of both the lagoon aeration system and the SAGR® process, positive displacement blowers are proposed. The blowers will be equipped with sound attenuating enclosures and housed in the Operations Building, immediately South of the proposed Cell No.2 (refer to **Figure 6.4**) and near the entrance to the lagoon site. A summary of the blower design is provided as follows:

Table 6.2 – Proposed Blower Design

Item	Lagoon Aeration	SAGR® Aeration
Total number of blowers	1	2
Number of duty blowers	1	1
Number of blowers on stand-by	0 ^a	1 ^a



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Item	Lagoon Aeration	SAGR® Aeration
Motor HP	30	40
Design airflow per blower (scfm)	456	457
Maximum discharge pressure (psig)	7.4	9.5

^aStand-by provided by lagoon aeration blowers

6.3.4 Chemical Storage and Handling Systems

Phosphorus removal by chemical precipitation is proposed. A side stream of wastewater flow coming from the primary cell will be pumped into the operations building, where it will be dosed (inline) with Alum solution ($Al_2(SO_4)_3 \cdot 14H_2O$) prior to being discharged into the intercell manhole between cells 1 and 2. Rapid mixing would be provided by an inline static mixer, while slow mixing for flocculation would take place in cell 2. The ensuing precipitate ($AlPO_4$) will settle out in Cell 2 resulting in phosphorus removal via chemical precipitation. Alum sludge will accumulate primarily in Cell 2 while organic solids would primarily settle out in Cell 1. Chemical feed systems will include skid mounted peristaltic type pumps (duty-stand-by) and two (2) double walled bulk storage tanks for alum storage (estimated capacity of 7,600 L each).

The two (2) chemical dosing storage tanks will provide storage based on design flows and assumed dosing rate. The tanks will come complete with fill port, access hatch, venting, etc. Containment would be provided through double-wall tank construction. Since potable water is not available on site, a clean water holding tank (approx. 1,100 L capacity) will also be provided within the building for periodic flushing of the dosing pumps, manifold, and feed piping.

A duplex chemical dosing skid will provide dosing into the side stream system using a variable speed peristaltic (positive displacement) pump. Pump speed can be manually set or regulated by overall system as measured by a magnetic flow meter installed on the interconnection line between cells 1 & 2. The dosing pumps will be designed for the 20-year system flow and have the ability for turn-down during initial operation. Bench-scale testing with actual effluent is recommended to determine dosing rates, optimize chemical usage, and maximize removal efficiency.

6.3.5 UV Disinfection

Disinfection is considered to be the primary mechanism for the inactivation/destruction of pathogenic organisms to prevent the spread of waterborne diseases to downstream users and the environment (US EPA). It is critical that wastewater be treated adequately prior to the disinfection process in order for any disinfectant to be effective.



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UV disinfection involves the use of ultraviolet light to inactivate pathogens in the wastewater. UV light is a physical and not a chemical disinfectant. UV light between the wavelength of 235 and 270 nanometers (nm) has been found to be effective to inactivate the target pathogenic organisms found in wastewater effluents. An UV disinfection system transfers electromagnetic energy from a mercury arc lamp to an organisms genetic material (DNA and RNA). When exposed to UV light, UV light penetrates the cell wall of the microorganisms which are inactivated within seconds through a physical reaction with the organisms' DNA.



The effectiveness of any UV disinfection system depends on the quality of the effluent being treated, the intensity of the UV radiation, the contact time the microorganisms are allowed to be exposed to the radiation and the hydraulic regime of the contact tank or channel. Typically, the success of the UV disinfection is directly related to the level of colloidal and suspended particles present in the water. This is often measured as transmissivity or transmittance. The main component of the UV disinfection system consists of UV lamps, UV channel, lamp ballasts and control panel. The source of UV radiation is either the low-pressure or medium-pressure mercury lamps. Also, the UV lamps can be configured in a horizontal or vertical configuration.

Table 6.3 – Advantages and Disadvantages of UV Disinfection System

Advantages	Disadvantages
No toxic residual in effluent	Higher energy use compared to chlorination/dechlorination
Comparable costs with chlorination/dechlorination	Disinfection can be compromised by poor effluent quality leading to lamp fouling
No chemical handling required which improves operator safety over chlorination/dechlorination	An appropriate automated lamp cleaning system is necessary to maintaining performance
Fully automated operation	
Requires less space than chlorination due to shorter reaction times	

For this project, a low-pressure high output UV (LPHO) system is proposed. A summary of the conceptual design is as follows:

- Maximum Design Flow to achieve disinfection: 2,180 m³/d or 25.2 L/s
- Hydraulic Capacity: 2,180 m³/d or 25.2 L/s
- UV Transmissivity: 55 % (minimum)
- Suspended Solids: 25 mg/L (monthly avg.)



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• Number of Channels:	1
• Total Number of Banks:	1
• Number of Modules per Bank:	3
• Number of Lamps per Module:	4
• Total Number of Lamps:	12
• Number of Power Distribution Centers (PDC):	1
• Number of System Control Centers:	1
• Number of Level Controllers:	1
• Type of Level Controller:	Finger Weir
• Lamp Cleaning System:	Automatic (both Mech. &Chem.)

6.3.6 Effluent Flow Monitoring

Most Environmental Act Licences issued by Manitoba Conservation and Water Stewardship requires monitoring of the final effluent flow prior to discharge. Depending on the final configuration of the UV disinfection system, an appropriate flow meter will be selected. For the purpose of this report and considering that effluent will be pumped to the UV system, a magnetic flow meter is assumed for costing purpose.

6.4 TREATED EFFLUENT PUMP STATION, FORCEMAIN AND OUTFALL

A new treated effluent lift station and a 250 mm effluent forcemain will transfer treated effluent to Cherry Creek. Since the lagoon acts as a large reservoir to balance the peak incoming flows, the treated effluent pump station will be sized to meet the average day flow and peak effluent flow of the lagoon using a single pump. The LS will consist of two 10 HP submersible pumps operating in duty / standby fashion. Each pump will include a built-in VFD allowing for operation at various flowrates based on meeting the average day and peak flows. Each pump will be rated to operate between 10.2 L/s to 25.2 L/s. A duplex pump control will be installed in the Operations Building. The effluent pump station will include the following key components:

- Pre-cast concrete single chamber wet well, 2.4 m diameter and approximately 4.0 m deep.
- Level controls
- Submersible solids handling style effluent pumps
- Duty/stand-by pumps each rated at max flow of 25.2 L/s.
- Pump motor size: 10.0 HP w/ VFD
- 250 mm HDPE forcemain

Since the lagoon acts as a large reservoir to balance the peak incoming flows, the treated effluent pump station will be sized to meet the average day flow and peak effluent flow of the lagoon using a single pump. A duplex pump control will be installed in the Operations Building.



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Effluent from the lagoon system will be discharged into Cherry Creek. The effluent will be dispersed in the creek via a new outfall structure to prevent erosion. The outfall structure will be pre-cast concrete construction with peripheral openings to allow dispersion of the effluent into the creek.

6.5 OPERATIONS BUILDING

The blowers, chemical feed system and UV disinfection system will be housed in a pre-engineered steel building that will serve as the Operations Building for the Sewage Lagoon System. The building will be approximately 10.0 x 16.5 m and will use prefabricated double-skin insulated panels. Refer to **Figure 6.6 (Appendix B)** for the proposed Operations Building Floor Plan.

The panels used for both wall and roof construction have the following characteristics.

- 75 mm thick urethane injected wall panels (R-23 insulation rating) and 125 mm thick urethane injected roof panels (R-40 insulation rating)
- Pre-finished painted exterior metal finish
- 22 ga. galvanized steel skin

The building will come complete with all electrical, including blower panels, all wiring within building, and heating, lighting, and ventilation systems. The building will include a washroom for the Operations Staff.

While the new building foundation will likely be shallow footings with piers and grade beams, it is dependent on geotechnical recommendations. From our preliminary review of the geotechnical results, the site conditions appear suitable to this style of foundation. The foundation would be constructed on a concrete mud slab.

6.5.1 Electrical

A new Manitoba Hydro electrical service will be provided to serve the new building, lift station and lagoon system. A new 400A, 347/600V, 3 phase, 4 wire electrical service will be installed. Manitoba Hydro will provide overhead lines to bring power close to the building, pole mounted transformers, and an overhead drop to the building. The Contractor will provide a metered CSTE to receive power and to connect the Utility metering to. The CSTE will be on the building exterior, with the Utility meter adjacent.

New service and distribution equipment will be located inside the building, consisting of an MCC with main breaker, surge protection, motor controllers, circuit breakers, and an auto transfer switch. A small 120/208V, 3 phase, 4 wire transformer and panelboard will power smaller loads, LED lighting, and receptacles. Wiring in the new building will be Teck90 in cable tray, or run in rigid PVC conduit and junction boxes, both in the wet areas and in the ordinary dry areas. Branch circuit wiring will be copper with a minimum size of 12 AWG. Feeders and major power circuits will be aluminum-sheathed PVC-jacketed copper cables, or equivalent conductors in conduit.



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Receptacles and switches will be specification grade, installed in PVC boxes and covers, and weatherproof rated as required. Outdoor parking receptacles will be provided for staff.

Motors shall be TEFC or submersible rated, of the latest energy efficiency design. All motors powered by VFDs will be inverter-duty rated.

HOA selector switches, pilot lights, and run time meters will be provided for larger motor loads. Disconnecting means will be provided to code requirements. Motors on VFDs will be provided with individual Human Machine Interfaces (HMIs) for manual speed control.

6.5.2 Backup Generator

An outdoor winterized standby generator will be provided to power three blowers, lagoon pumping, and building loads during Utility power outages. The generator shall have a subbase fuel tank mounted at the bottom of the generator unit itself. The generator will be rated 100kW, 347/600V, 3 phase, 4 wire.

6.5.3 Controls and Instrumentation

A control system will be provided for overall control of the process systems as well as the building systems at the lagoon site blower building. The lagoon aeration system, chemical feed system and UV disinfection packages will have integral control systems, and the main plant system will interlock those systems as well as monitor them for faults and alarms. The control system will have dial out capability to transmit alarms to operators should there be a high priority alarm condition (such as pump failures, building low temperature, or building intrusion) or a low priority alarm condition (such as a single blower fault or a single chemical feed pump fault).

6.5.4 Heating, Ventilation, and Air Conditioning (HVAC)

The heating ventilation and air conditioning (HVAC) systems for the building will be based on providing and maintaining a minimum ambient temperature of 18°C for most spaces. Ventilation air exchange ranges, noted in **Table 6.4**, will be provided via new air handlers, air conditioning, heat recovery ventilators, unit heaters or baseboard heaters (note: not all systems will be used in all spaces).

Table 6.4 – Ventilation Air Exchange Rates

Room	Min. Air Changes/hr	Max. Air Changes/hr
Blower Room / Electrical Room	6	6
Washroom	6	6
Chemical Room	6	6
UV Room	6	8



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It should be noted that air from other spaces with higher air classifications can be transferred to these spaces for ventilation.

No mechanical DX cooling is intended to be provided for process spaces. Dehumidification can be provided for the UV Room to lower the humidity levels during the summer months. This can be achieved via a portable industrial dehumidifier.

Heating will be provided by a duct-mounted electric heater with ceiling hung unit heaters in the different spaces.

The air treatment and renovation in the UV Room and Chemical Room should be done separately and with moisture and corrosion resistant equipment.

Outside air will meet the minimum ASHRAE 62.1 requirements but will be dictated by exhaust air requirements of the zone (washroom exhausts and as required).



Decommissioning of Existing Lagoon
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7.0 DECOMMISSIONING OF EXISTING LAGOON

7.1 GENERAL

The community currently operates a two-cell wastewater lagoon estimated to have been constructed approximately 60 years ago. The primary cell is aerated and both cells are clay lined.

Raw wastewater is pumped to the existing lagoon via a duplex lift station located on the westside of the primary cell. The lift station design consists of a 2.6 m internal diameter wetwell with two submersible pumps. A non-insulated wood frame building is constructed over the LS. The LS control panel and the lagoon's aeration blower are housed in the building.

The existing lagoon and lift station will be decommissioned following construction and commissioning of the new lagoon and associated infrastructure. Key aspects associated with decommissioning of these facilities are discussed in the following sections.

7.1.1 Lift Station

The key components that will require decommissioning will include the submersible pumps, control panel, aeration blower and associated LS piping & wiring.

The existing wet well will be emptied of any sewage or sludge prior to demolition. The walls and bottom of the wet well will then be hosed and disinfected. Sewage and liquid wastes will be hauled to the new truck haul dump station at the new lagoon. The wet well will be abandoned in place and filled with granular material and capped with concrete. The Town may choose to retain the existing building for future use; however, it is anticipated that the building will be demolished in which case the wet well would be removed and disposed of.

7.1.2 Existing Lagoon Cells

A significant volume of sludge has accumulated in the lagoon which will need to be removed and disposed of. Stantec undertook a sludge depth survey of both existing lagoon cells on October 10, 2018. A small boat using an attached GPS sounding unit was used, as well as a GPS connected sounding rod as a check. The sounding rod tended to sink into the top layer of sludge and this was taken in to consideration in estimating the distance from the top of dike to the top of sludge. The sludge calculations are based on the as-built drawings which show a depth of 4.0 m for the small aerated cell, and 2.5 m for the large secondary cell, from the top of dike to the lagoon floor.



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The estimated sludge accumulations (to the nearest 100 m³) are:

Ext. Small Aerated Primary Cell _____

$$= 1.7 \text{ m of sludge} \times 3,276 \text{ m}^2 = 5,600 \text{ m}^3$$

Ext. Large Secondary Cell _____

$$= 0.4 \text{ m of sludge} \times 21,500 \text{ m}^2 = 8,600 \text{ m}^3$$

$$\text{Total Sludge Accumulation} = 14,200 \text{ m}^3$$

Following sludge removal, the lagoon dykes will be levelled, and the site graded for drainage. The details of the existing lagoon are as follows:

- 0.27 hectare aerated primary cell, 4 m deep.
- 2.29 hectare non-aerated secondary cell, 4 m deep.



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8.0 ENVIRONMENTAL SCREENING

8.1 DESCRIPTION OF DEVELOPMENT

8.1.1 Introduction and Background

The existing Boissevain lagoon wastewater treatment system is undersized with substandard dikes that contain substantial quantities of sand, gravel and organics (resulting in excess seepage). Decommissioning of the existing lagoon system and replacement with a new system is proposed to address seepage issues as well as existing effluent treatment deficiencies.

The proposed Project consists of two new treatment cells (approximately 40 m x 120 m each) and two new submerged attached growth reactor (SAGR) cells (approximately 18 m x 44 m each) located adjacent to an existing waste disposal site five km north of the community of Boissevain. Raw wastewater from the existing wastewater lagoon location will be conveyed via a new lift station and underground forcemain 1.1 km west and 8 km north to the new system for treatment. Raw wastewater will enter a new cell (Cell #1) via the influent forcemain for partial mixing followed by additional partial mixing and settling in a second new cell (Cell #2). From Cell #2, the effluent will then be transferred to two new SAGR cells (Cells #3 and #4). A small blower/ chemical feed building will supply the two SAGR cells (see Drawing NE01). Phosphorus removal will be achieved by alum dosage and chemical precipitation. Wastewater will be dosed with alum solution prior to being discharged into a manhole between Cells #1 and #2. The chemical feed building will include a chemical feed system consisting of skid mounted pumps (duty and stand-by) and two double walled bulk storage tanks for alum storage (7,600 L each). Two double-walled chemical dosing storage tanks will also be provided. As potable water is not available at the new treatment site, a clean water holding tank (approx. 1,100 litre) will be provided for periodic flushing of the associated equipment).

Once treated, the effluent will be transferred via an effluent lift station, through the return underground forcemain to discharge on a continual basis (as is the practice with the current system), via a new concrete discharge structure with peripheral openings to disperse the treated effluent into Cherry Creek (approx. 8.0 km southwest). A perimeter ditch will be constructed around the new system (i.e., two cells and two SAGR cells), to manage surface water drainage and direct surface water to the ditch along the municipal road on the east side of the site.

The raw wastewater (supply) and treated effluent (return) forcemains may be installed side by side in a common open trench or by directional drilling, along road allowances, fields and trails, under existing road right-of-way crossings, including Provincial Road (PR) 448 (Figure 1.0). A larger open cut area will be required at Cherry Creek to install the forcemain pipe on/into the new discharge structure. Open cuts will also be required at the new lift station at the new lagoon site and a proposed new lift station at the existing lagoon in Boissevain.



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The existing lagoon and lift station will be decommissioned following construction and commissioning of the new treatment lagoon and associated infrastructure. The existing outfall to Cherry Creek will also be removed as part of decommissioning of the existing lagoon. Approximately 14,200 m³ of sludge will be removed and disposed of in a biosolids land management program. Following sludge removal, the existing lagoon dikes will be levelled, and the existing site graded for drainage. Construction is planned to start in May 2022 with substantial completion by end of December 2022.

8.1.2 Legal Description

The proposed new wastewater lagoon site is located north of the community of Boissevain in the southeast quarter of Section 11, Township 4, Range 20W, in the Province of Manitoba. The land parcels for the new lagoon site (CT #2439670) and for the new lift station at the existing lagoon site (CT #1696272 and CT #1710726) are owned by the Municipality of Boissevain-Morton. The majority of the forcemain from the new lagoon site to Cherry Creek will follow within existing municipal road allowance rights-of-way. A short portion of the forcemain route through southeast Section 23, Township 3, Range 20W and southwest Section 23, Township 3, Range 20W is privately-owned (i.e., west of the existing lagoon site) under CT #2375184. This short section of forcemain will require an easement agreement between the Municipality and the landowner.

8.2 DESCRIPTION OF THE ENVIRONMENT

8.2.1 Terrestrial Vegetation and Wetlands

The Project is in the Aspen Parkland Ecoregion, Killarney Ecodistrict (Smith et al. 1998). Surficial materials are characterized as a dissected, level to very gently rolling morainal plain lying north of Turtle Mountain. Included in this region are intermittent creeks carrying runoff to Whitewater Lake and the Pembina River, part of the Killarney division of the Red River watershed. The soils in the region are predominantly well-drained Black Chernozems developed on very strongly calcareous loam to clay loam glacial till. Vegetation in the region includes trees on sheltered sites such as slopes of deep ravines. Aspen groves are present in the eastern and northeastern part of the ecodistrict (Smith et al. 1998). Based on project test hole drilling, the soils at the aerated lagoon site are a consistent mix of sand, silt and clay with some gravel. Till was encountered in two boreholes to a depth of approximately 2.7 m (**see Section 3.0**).

The expansion site consists predominantly of open, grassed vegetation with a few small depressions, a small waterbody and dugout. The forcemain route passes through open agricultural field and pasture/hay land. A request submitted to Manitoba Conservation Data Centre (MBCDC) for existing records of rare and protected vegetation species at the new lagoon site or within the forcemain route right-of-way to Cherry Creek indicated no previously recorded occurrences.



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The MBCDC reported three vascular species occurrences in Section 23-3-20W (although of high locational uncertainty) for the short section of forcemain east to the existing lagoon site and new lift station, including:

- Hairy prairie-clover (*Dalea villosa var. villosa*) ranked by the Manitoba Conservation Data Centre (MBCDC) as S2S3 – meaning imperiled/vulnerable and listed as Endangered under *The Endangered Species and Ecosystems Act* (MBESEA) and Special Concern under the federal *Species at Risk Act* (SARA) and Committee on the Status of Endangered Wildlife in Canada (COSEWIC) (MBCDC 2021).
- Seaside heliotrope (*Heliotropium curassavicum var. obovatum*), ranked S1 (critically imperiled), not listed under the MBESEA, SARA, or COSEWIC
- Gumbo-lily (*Mentzelia decapetala*), ranked as SH (possibly extirpated), not listed under the MBESEA, SARA, or COSEWIC.

8.2.2 Wildlife Species

Wildlife habitat in the region has been affected by historic agricultural development. White-tailed deer, coyote and fox are widespread throughout the area, as are smaller mammals such as ground squirrel, cottontail rabbit, hare, striped skunk, redback vole and deer mice. Many bird species are found throughout the ecoregion, including various raptors (ferruginous hawk, sparrow hawk, red-tailed hawk), and other birds such as mourning dove, black-billed magpie, red-winged blackbird, killdeer and meadowlark. Various species of waterfowl are found within the wetlands. Red-sided and western plains garter snakes and various frogs are also common (Smith et al. 1998).

A review of the MBCDC species database for existing records of rare and protected wildlife species in the Aspen Parkland Ecoregion indicated the potential for numerous species, including: western tiger salamander (*Ambystoma mavortium*), grasshopper sparrow (*Ammodramus savannarum*), bobolink (*Dolichonyx oryzivorus*), and bank swallow (*Riparia riparia*). The western tiger salamander is designated as Special Concern and the bobolink and bank swallow are designated as Threatened under COSEWIC.

A request submitted to MBCDC for existing records of rare and protected wildlife species in the Project area indicated one record of occurrence for the expansion site in SE11-4-20W (MBCDC 2021); a grasshopper sparrow. The grasshopper sparrow is ranked as S2S3B by MBCDC, meaning imperiled/vulnerable breeding population status. However, this species is not designated under MBESEA, SARA, or by COSEWIC. No rare or endangered species occurrences were noted along the forcemain road allowance right-of-way route between the new lagoon site and Cherry Creek.

There is a record of one species occurrence within Section 23-3-20W for the forcemain route east of the road allowance to the existing lagoon and the proposed new lift station at the existing lagoon site: the yellow-banded bumble bee (*Bobmus terricola*). The yellow-banded bumble bee, an invertebrate species, is ranked by the MBCDC as S4S5 – meaning apparently secure/secure and is listed as Special Concern



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under SARA and COSEWIC (MBCDC 2021). However, the occurrence is noted as being of high locational uncertainty.

A search of the Manitoba Herp Atlas (MHA) database did not identify any records of amphibian species near the Project site. The closest sighting to the Project site was for western tiger salamander, observed at Whitewater Lake, several kilometres southwest of the Project site (iNaturalist 2021).

Cherry Creek flows to the west into Whitewater Lake, located approximately 7.8 km west of Boissevain, in a combination of a defined and undefined channels. Whitewater Lake is designated as a provincial Wildlife Management Area and an Important Bird Area of Canada, as a major staging area for waterfowl, shorebirds, and Tundra Swans.

8.2.3 Water Resources

The groundwater supply in the Morton-Boissevain Planning District, in which the project is located, varies greatly in quantity and quality. Shallow aquifers occur in the district that may be susceptible to pollution (Manitoba Local Government 2004). Raw water for the community is drawn from the Boissevain Reservoir that is sourced from five wells located 3.4 km (approx.) south of the existing lagoon site in Boissevain (Municipality of Boissevain-Morton 2016).

Cherry Creek is located within the Whitewater Lake Sub-watershed of the East Souris River Watershed drainage area (Turtle Mountain Conservation District 2005). Surface water drainage channels exist to the west and south of the Project site in SE11-4-20W.

8.2.4 Fish Species

The Community of Boissevain is encompassed by the Souris River and Red River watersheds. These two watersheds support sport and recreational fishing with fish species including northern pike, bullhead, walleye, shorthead redhorse sucker, white sucker, fathead minnow, and brook stickleback (Turtle Mountain Conservation District 2006; 2011). According to Milani (2013), Cherry Creek is considered Type C habitat, meaning it provides direct complex habitat for forage fish species (i.e., non-sport/ commercial/ domestic and non-SARA fish species). While no fish species were sampled by Milani within the portion of Cherry Creek near the Project, fish species sampled within an unnamed tributary to Cherry Creek, south of the effluent discharge point, consisted of brook stickleback, fathead minnow, and pearl dace (Milani 2013).

8.2.5 Land Use

Land use in the Municipality of Boissevain-Morton is governed by the Morton-Boissevain Planning District Development Plan By-law No. 2009-01. The proposed new lagoon expansion site is designated as “Agricultural Area” under planning district development plan and zoned “AG – Agricultural General” Zone under Zoning By-law No. 2019-03. Utilities Policies under the Development Plan note that essential



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government and public and private utilities are permitted in any land use designation, subject to the requirements of the applicable zoning by-law. Sewage lagoons are a conditional use in the “AG – Agricultural General” Zone under the Boissevain-Morton Zoning By-law.

Land uses adjacent to the new treatment site include the existing waste disposal site to the south of the new cells, and agricultural land use to the north, east and west. The closest residence to the proposed new treatment site is approximately 1.0 km to the south. The community of Boissevain is approximately 5.5 km south of the new treatment site. A municipal airport/landing strip is located approximately 4.0 km south of the new treatment site (Mussio Ventures Ltd. 2018). The closest First Nation to the Project is Swan Lake First Nation, with reserve lands located approximately 80 km to the northeast near Spruce Woods Provincial Park.

8.2.6 Heritage Resources

Heritage resources, and their associated artifacts and cultural data, are protected under *The Heritage Resources Act* and archaeological sites have been recorded along Cherry Creek. A request for a heritage screening review was submitted to the Heritage Resources Branch (HRB) to determine the potential for heritage resources at the new lagoon site and forcemain route and the need for a heritage resource impact assessment (HRIA). The HRB screening response indicated that the proposed footprint of the development cuts through many high potential landforms, including larger landforms with known archaeological sites on them. As such, an HRIA will be required for the new lagoon site.

8.3 ENVIRONMENTAL SCREENING EFFECTS

The following sections address the environmental screening for the proposed development.

a) Soil and Terrain Effects

There is potential for disturbance of soils and terrain through construction work at the lagoon and lift station sites and along the forcemain route. The new sewage lagoon cells will be excavated to an average depth of 1.3 m below existing grade. The bottoms of the SAGR cells will be 2.8 m below grade. The finished dike will be approximately 2.7 m above the existing ground surface. The sites for the new lift stations will be excavated in open cut areas. Similarly, the site for the concrete discharge structure at Cherry Creek will be open cut (approx. <1.0 m deep) to install the forcemain on/into the structure. The entire length of the forcemain route between the new lagoon site and the existing lagoon site may be open trenched to a depth of approximately 2.4 m, while crossing of road rights-of-way will be directionally drilled. Excavations along the route will be used to facilitate the operation of the directional drill equipment, pipe fusing, making connections, and assembling air release valves, etc. Topsoil will be stripped and stockpiled for use in ground restoration along the forcemain route. Any soils compacted by construction equipment will undergo repair and restoration. Horizontal directional drilling will be used to install the forcemains at road allowance crossings (i.e., PR 448).



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Potential adverse residual effects on soil and terrain at the new treatment site, lift stations and forcemain route are anticipated to be negligible to low.

The existing lagoon cells will be decommissioned following construction of the new treatment system. Approximately 14,200 m³ of sludge will be removed from the existing lagoon cells and land applied to agricultural fields under the terms of a separate approval from MCC. Land application of biosolids will add nutrient and organic content to receiving soils and increase soil quality, benefiting agricultural capability of the receiving fields. Following sludge removal, the existing lagoon dikes will be levelled, and the existing site regraded for proper drainage ahead of revegetation. The potential residual effects on soils at the existing lagoon site are considered negligible.

b) Vegetation Effects

There is potential for removal of vegetation species through construction work at the new treatment site, lift stations, along the forcemain route, and at the discharge structure. The proposed site for the new cells is predominantly an existing open, grassed area that includes small wet areas and depressions. A request submitted to MBCDC for existing records of rare and protected vegetation species at the new treatment site or within the forcemain route right-of-way indicated no previously recorded occurrences. However, three vascular species occurrences were identified in Section 23-3-20W for the short section of forcemain east to the existing lagoon site and the new lift station, including the hairy prairie-clover, seaside heliotrope and gumbo-lily (occurrences were noted to be of high locational uncertainty). Mitigation measures include limiting construction equipment and vehicle movements to designated roads and pathways and within and around work areas. Reducing the disturbed/exposed areas and rehabilitating/revegetation with native seed mixes as soon as practical is also recommended. Similar revegetation work will be conducted at the existing lagoon site upon decommissioning completion. The potential effects on vegetation at the new treatment site, lift stations, forcemain route, and the existing lagoon site are expected to be negligible to low in magnitude.

c) Effects on Wildlife

There is potential for disturbing or displacing wildlife species present in the general Project area via clearing, excavation, and construction activities and noise generation from equipment and vehicles.

A request submitted to MBCDC for existing records of rare and protected wildlife species in the Project area (a 2 km radius including the new treatment site, forcemain route, and existing lagoon) indicated one record of occurrence for the new treatment site in SE11-4-20W (MBCDC 2021), the grasshopper sparrow. The restricted activity period for construction for this bird species is from May 16 to August 21 (MBCDC 2015). The recommended setback distance from a nest site for this species for a medium disturbance category (i.e., pipeline construction diameter < 1 foot) is 250 m (MBCDC 2015). The grasshopper sparrow, however, is not designated under *The Endangered Species and*



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Ecosystems Act (MBESEA), the federal Species at Risk Act (SARA), or by COSEWIC. No other historical species occurrences were noted for other areas of the project.

Project-related disturbance activities to wildlife and habitat can be reduced by avoiding the applicable sensitive breeding window for migratory bird wildlife species – mid-April to end of August (Environment and Climate Change Canada 2018). Efforts should be made during construction to limit vegetation removal where practical to reduce the risk of incidental take of birds or their nests. If additional ground disturbance/clearing must be undertaken during the sensitive nesting period, it is recommended that a pre-construction nest survey be conducted by a qualified biologist to establish appropriate mitigation methods to the extent possible.

A search of the MHA database did not reveal the presence of amphibians or reptile species in the immediate area for the expansion lagoon site or along the forcemain route; however, the absence of data from the database does not confirm the absence of listed species. Due to the presence of water bodies in the vicinity and open grassed areas, there is potential for amphibian and reptile species to occur in the general Project area. Species such as western tiger salamander are known to breed in April/May in permanent or semi-permanent standing water and overwinter in small mammal burrows and forested areas near aquatic habitats (COSEWIC 2012). Should ground disturbance be conducted in April/May, a pre-construction inspection of the area is recommended to identify additional measures to mitigate potential for harm to protected amphibian species if necessary. Construction workers should be aware of the potential for amphibian species to be present in the Project area; they may need to take additional measures to avoid harming these species.

d) Effects on Fish and Fish Habitat and Surface Water

Potential effects on fish and fish habitat are related to the release of deleterious substances such as oil or gasoline leaks from equipment, or erosion and release of sediments from construction activities associated with lagoon excavation (i.e., blown dust, exposed surface run-off), the open cut for the new construction and existing demolition of discharge structures at Cherry Creek, and from lagoon effluent discharges into surface water bodies utilized by fish.

Project-related disturbance activities to fish and fish habitat can be addressed by avoiding the applicable no in-water work timing window for fish species in southern Manitoba – April 1 to June 15 (spring and summer spawners) and September 15 to April 30 (fall spawners) (Fisheries and Oceans Canada 2013). Measures will be implemented to mitigate working in water related to the protection of fish and fish habitat as identified through the DFO Request for Review process. Additional mitigation measures will be implemented to mitigate effects on fish and fish habitat from working in water related to the erosion and sediment control measures and management of deleterious substances as per DFO's Measures to Protect Fish and Fish Habitat (i.e., isolating flows and placement of a silt curtain).

The nearest natural water body to the Project is Cherry Creek approximately 8.0 km to the southwest of the treatment site. The new treatment system will discharge treated effluent via two lift stations, an



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underground forcemain, and a new concrete discharge structure to Cherry Creek (considered Type C habitat [Milani 2013]) on a continuous basis where spring spawners may potentially be present. The potential for summer and fall spawners in Cherry Creek is unknown. Cherry Creek ultimately flows westward to Whitewater Lake in a combination of defined and undefined channels.

The new treatment system will reduce the treatment deficiencies of the existing lagoon system with improved wastewater treatment prior to discharge to Cherry Creek. Work in Cherry Creek for the construction/installation of the discharge structure and decommissioning/removal of existing infrastructure along the bank or below the highwater mark will require implementation of mitigation measures as will be outlined in a Request for Review to be approved by DFO. Erosion/deposition during construction activities at drainage locations and at Cherry Creek will be mitigated by the installation of silt curtain/fencing. Excavation work and the open cuts at Cherry Creek for the new outfall structure construction and existing outfall decommissioning will also involve the temporary installation of a silt curtain and coffer dam to isolate flows in the creek from in-stream work. The resulting residual adverse effects on surface water quality and fish and fish habitat are expected to be low.

e) Effects on Groundwater

The new treatment cells will be lined with a 60 mil HDPE liner in order to meet Provincial hydraulic conductivity requirements and provide groundwater protection at the site. The SAGR cells will include an HDPE liner with a gravel bed covered by a layer of peat or mulch. Based on geotechnical investigations conducted at the new site there was no evidence of a high groundwater table at the time of drilling. The storage and handling of hazardous materials (i.e., chemicals) at the new treatment site will be subject to proper engineering design and in accordance with established guidelines, regulations, standards, and protocols. Any spills of chemicals or hazardous materials will be mitigated by use of properly maintained equipment and use of spill clean-up equipment and materials. The residual effects on groundwater from the Project are anticipated to be negligible.

f) Air Quality

There is potential for emissions, including greenhouse gases (GHGs) and fugitive dust generation, from construction equipment and vehicle movements during construction works at the sites and along the forcemain route. Fuel may be transported to the site to fuel equipment. Localized increased volatile organic compound (VOC) levels could result from fuels used during construction.

Nuisance odours can occur for a short time in spring during the thawing period from lagoons that are not sized properly or are organically overloaded. The proposed new treatment system will be sized with capacity to address current deficiencies with the existing lagoon system. Prevailing winds at Brandon in southwestern Manitoba, the closest weather station with wind data to the Project site, are principally from the west (Environment and Climate Change Canada 2018). Potential odours could be carried by variable winds and cause a nuisance to nearby residents. The closest residence to the new



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lagoon system is located approximately 1.0 km to the south of the expansion site, which is beyond the 300 m setback zone established for wastewater treatment systems. There is some potential for construction and equipment emissions for forcemain construction, but the effect is expected to be temporary and negligible and limited to the immediate area.

g) Noise Effects

There is some potential for noise effects in the immediate area during construction from the operation of construction equipment and vehicles. Most of the equipment work will occur at the new lagoon site where the new cells are to be constructed. Equipment used along the forcemain route will include equipment to dig trenches or directionally drill to place the pipe. Noise effects could cause temporary disturbance to people and wildlife in the area. The magnitude of effect would be low for the new lagoon site and lift stations and negligible along the majority of the forcemain route. The nearest residence is located approximately 1 km to the south of the new treatment site beyond a vegetation buffer. Residual noise effects of Project construction are anticipated to be negligible in comparison to existing noise (traffic) in the region along most of the forcemain route. The setback from the treatment site will provide sufficient mitigation for noise effects on residents; mitigation measures identified for wildlife (birds and amphibians) will be implemented as necessary.

h) Socio-economic

The land for the proposed new treatment site, forcemain, and lift stations is appropriately zoned for its' intended and current use under the Municipality of Boissevain-Morton Zoning By-law No. 2019-03. The treatment system site is municipal property. The forcemain route is a mixture of municipal owned road allowance right-of-way, municipal property, and private ownership. The short section across private property will require an easement agreement with the landowner for the Project. The proposed Project will create temporary construction employment and contribute to the local economy in the surrounding area through the purchase of goods and services during construction.

The forcemain route will be directionally drilled underneath PR 448. A permit will be required from Manitoba Infrastructure for the provincial road crossing.

i) Heritage Resources

Archaeological sites have been recorded along Cherry Creek. A request for a heritage screening review was submitted to the HRB to determine the potential for heritage resources at the new lagoon site and forcemain route and the need for a HRIA. The HRB responded that the proposed Project is in a sand dune area with interdunal wetlands near known archaeological sites. As such, planned development within the area has the potential to impact heritage resources.

Based on concerns identified, the HRB requires an HRIA for the proposed treatment site and new lift station sites consisting of a pedestrian survey and development implementation of a heritage resource protection plan. There are no heritage concerns with the planned forcemain route within



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existing rights-of-way. However, an HRIA is required for those portions of the forcemain outside the existing rights-of-way (i.e., easement portion through southeast Section 23, Township 3, Range 20W and southwest Section 23, Township 3, Range 20W).

If the forcemain route is revised or if any staging areas, storage areas, turn-arounds, etc. will be used for the Project, the HRB will need to review the alignment again and the HRIA may need to be revised to encompass those project areas as well. A qualified archaeologist must conduct the HRIA to identify and assess any heritage resources that may be negatively impacted by the Project. A permit must be obtained by a qualified archaeologist to conduct the HRIA prior to the commencement of construction.

8.4 SUMMARY

Based on the current understanding of the Project potentially required permits and approvals have been identified. The proposed new treatment system seeks to improve effluent quality and address the facility condition issues of the existing municipal lagoon by constructing a new facility with a forecasted 20-year design-life. The potential for adverse environmental effects related to the proposed new treatment site, lift stations and forcemain route for most environmental components were found to be negligible to low in magnitude for construction and operation. Once operational, the Project will result in an improved effluent discharge and reduced water quality effects.

If ground disturbance/clearing must be undertaken for the Project during the sensitive nesting period (May 16 to August 21), a pre-construction nest survey is recommended to be conducted by a qualified biologist to establish appropriate mitigation methods for birds. Similarly, a pre-construction inspection of the area is recommended to identify required additional mitigation measures to protect amphibian species, should ground disturbance be conducted in April/May.

In addition to the Environment Act Licence for the Project and the recommended mitigation measures generally described above, additional environmental approvals required for the Project include:

- DFO approval of a Request for Review for work in Cherry Creek for the construction/installation of the discharge structure and decommissioning/removal of existing infrastructure along the bank or below the highwater mark, including the existing outfall at Cherry Creek.
- An Environment Act Licence for the land application of sludge from the existing lagoon.
- A permit from Manitoba Infrastructure for the forcemain crossing of PR 448.
- Completion of an HRIA and report and implementation of identified mitigation measures for heritage resources by a qualified archaeologist.



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Opinion of Probable Costs of Options
March 24, 2021

9.0 OPINION OF PROBABLE COSTS OF OPTIONS

9.1 CAPITAL COSTS

This section outlines the opinion of probable construction costs for the proposed new system. These costs were developed based on recent projects of similar size and complexity. The costs are based on 2021 dollars excluding GST, MWSB Administrative Costs and forcemain easement costs (to nearest \$5,000).

Table 9.1 – Opinion of Probable Capital Costs (to nearest \$5000)

Item	Unit	Quantity	Unit Price	Amount
Clearing & Grubbing	L.S.	1	\$10,000	\$10,000
Topsoil Stripping, Stockpiling and Replacement	C.M.	16,000	\$8	\$130,000
Common Excavation or Borrow	C.M.	50,000	\$6	\$300,000
60 mil HDPE Liner (2 Cells)	S.M.	30,000	\$10	\$300,000
Sand Bedding/Cover	C.M.	18,000	\$30	\$540,000
Rip Rap	Tonnes	2,500	\$60	\$150,000
Inlet/Outlet Structure	Each	2	\$30,000	\$60,000
Interconnecting Pipe Systems	Each	1	\$30,000	\$30,000
Gas Release Piping & Vents	L.S.	1	\$30,000	\$30,000
Truck Dump Structure	L.S.	1	\$40,000	\$40,000
Culverts	L.S.	1	\$10,000	\$10,000
Ditching	L.S.	1	\$20,000	\$20,000
Seeding	L.S.	1	\$25,000	\$25,000
Raw WW Lift Station	L.S.	1	\$800,000	\$800,000
Treated Effluent Pump Station	L.S.	1	\$500,000	\$500,000
Power to Site	L.S.	1	\$75,000	\$75,000
Decommissioning Existing System – Sludge Removal, Fill Cells, Remove Structures	L.S.	1	\$650,000	\$650,000



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Opinion of Probable Costs of Options
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Item	Unit	Quantity	Unit Price	Amount
Supply of Aeration, SAGR & Associated Works	L.S.	1	\$1,000,000	\$1,000,000
SAGR Civil Works/HDPE Liner	L.S.	1	\$650,000	\$650,000
Flow Metering Manhole	L.S.	1	\$50,000	\$50,000
UV System	L.S.	1	\$150,000	\$150,000
Raw Wastewater Forcemain	L.M.	9,300	\$75	\$700,000
Treated Effluent Forcemain	L.M.	8,200	\$60	\$490,000
Creek Outfall Structure	L.S.	1	\$75,000	\$75,000
Operations Building for UV/Chem Feed/Blowers	L.S.	1	\$1,000,000	\$1,000,000
Backup Generator	L.S.	1	\$150,000	\$150,000
Fence and Gates	L.S.	1	\$60,000	\$60,000
Sub-Total Construction Cost				\$7,995,000
Engineering and Construction Cost Contingency Allowance (25%)				\$2,000,000
TOTAL ESTIMATED OPINION OF CAPITAL COST				\$9,995,000

9.2 ANNUAL O & M COSTS

The estimated annual Operation and Maintenance costs are based on an annual average flow of 880 m³/d and are summarized as follows:

Table 9.2 – Opinion of Probable Annual Operation and Maintenance Costs

Item	Annual O&M Cost
Power	\$ 50,000
Building Heating	\$ 25,000
Chemicals	\$ 60,000
Manpower	\$ 40,000
Miscellaneous Equipment/Testing	\$ 35,000
Total	\$ 205,000

Assumptions for developing O&M costs are:

- Power costs were based on 8.0 ¢ /kwh for the aeration systems, Raw WW LS, Treated Effluent Pump Station and Operation Building power consumption.



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Opinion of Probable Costs of Options
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- Building heat based on electric heating.
- Chemical costs based on Alum for chemical P removal.
- Manpower costs include salaries for one (1) part-time operator (minimum Level II) along with part-time support from electrical and mechanical journeyman.
- Miscellaneous costs include annual UV lamp replacement, laboratory testing, plant consumables and replacement at 1% of capital costs (mechanical/electrical/site services) and the use of domestic water.



**MUNICIPALITY OF BOISSEVAIN – MORTON
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References
March 24, 2021

10.0 REFERENCES

10.1 PRE-DESIGN REPORT REFERENCES

- a) Town of Boissevain - Clean Environment Commission Order No. 1166
- b) Manitoba Water Quality Standards, Objectives and Guidelines (MWQSOG) Regulation
- c) Water Environment Federation (WEF), Septage Handling Manual of Practice No. 24, 1997.
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- e) Metcalf and Eddy - Wastewater Engineering Treatment and Reuse, 5th Edition (2014).
- f) Boissevain Wastewater Lagoon Study, Draft Final Report dated February 2019, Stantec Project No. 111217470.200.

10.2 ENVIRONMENTAL SCREENING REFERENCES

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March 24, 2021

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March 24, 2021

Personal Communications

- s) Impact Assessment Archaeologist, Historic Resources Branch, Manitoba Sport, Culture and Heritage. Email correspondence with Senior Environmental Planner, Stantec Consulting Ltd., March 12, 2021.
- t) Information Coordinator, Manitoba Conservation Data Centre, Manitoba Sustainable Development. Email correspondence with Senior Environmental Planner, Stantec Consulting Ltd., March 4, 2021
- u) Information Coordinator, Manitoba Conservation Data Centre, Manitoba Sustainable Development. Email correspondence with Senior Environmental Planner, Stantec Consulting Ltd., March 3, 2021.
- v) Community Planner, Community and Regional Planning Branch, Manitoba Municipal Relations. Email correspondence with Senior Environmental Planner, Stantec Consulting Ltd., February 13, 2019.
- w) Heritage Resources Registrar, Historical Assessment Services, Historic Resources Branch. Email correspondence with Senior Archaeologist, Stantec Consulting Ltd., March 27, 2018.



APPENDIX A
DRILLED TEST HOLE LOGS AND
LABORATORY TEST REPORTS

Test Hole Logs from November 20, 2020

Test Hole Locations Shown on Test Hole Plan

TH 15	0 – .25 m .25 – 3.0 m dry hole	topsoil sand, silt & clay
TH 16	0 – .25 m .25 – 1.5 m 1.5 – 3.0 m dry hole	topsoil dry sand, silt & clay moist sand, silt & clay
TH 17	0 – .25 m .25 – 2.745 m 2.74 – 3.0 m dry hole	topsoil moist sand, silt & clay till
TH 18	0 – .25 m .25 – 2.74 m 2.74 – 3.0 m dry hole	topsoil sand, silt & clay till
TH 19	0 – .25 m .25 – 1.5 m 1.5 – 3.0 m dry hole	topsoil sand, silt & clay sand, silt & clay with gravel
TH 20	0 – .7 m .7 – 1.5 m 1.5 – 3.0 m dry hole	topsoil sand, silt & clay sand, silt & clay with gravel
TH 21	0 – .25 m .25 – 1.5 m 1.5 – 3.0 m dry hole	topsoil sand, silt & clay sand, silt & clay with gravel
TH 22	0 – .25 m .25 – 3.0 m dry hole	topsoil sand, silt & clay with gravel
TH 23	0 – .25 m .25 – 3.0 m dry hole	topsoil sand, silt & clay with gravel
TH 24	0 – .25 m .25 – 1.5 m 1.5 – 3.0 m dry hole	topsoil silt with sand & clay sand, silt & clay with gravel

Test Hole Logs from November 20, 2020

Test Hole Locations Shown on Test Hole Plan

TH 25	0 - .25 .25 – 3.0 dry hole	topsoil sand, silt & clay
TH 26	0 - .25 .25 – 3.0 dry hole	topsoil sand, silt & clay



Stantec Consulting Ltd.
 199 Henlow Bay, Winnipeg, MB R3Y 1G4
 Tel: (204) 488-6999

ASTM D5084 - MEASUREMENT OF HYDRAULIC CONDUCTIVITY OF SATURATED POROUS MATERIALS USING A FLEXIBLE WALL PERMEAMETER

TO Stantec Consulting Ltd.
 500-311 Portage Ave.
 Winnipeg, MB
 R3B 2B9

PROJECT Boissevain Wastewater Lagoon Study

PROJECT NO. 111217470

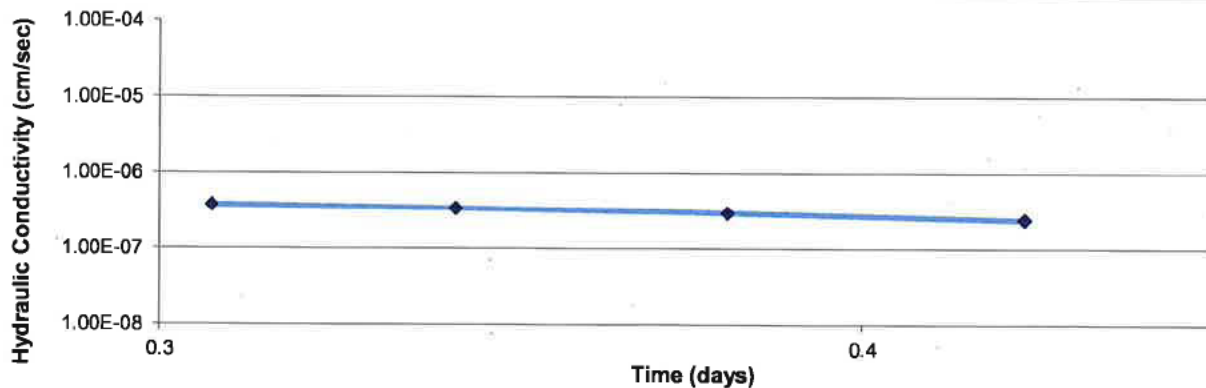
ATTN: Tim Stratton

REPORT NO. 1

SAMPLE ID: Composite of TH15 (9'), TH16 (4' & 9'), TH17 (4'), TH18 (4'), TH20 (9'), TH25 (4') & TH26 (8')
 SOIL DESCRIPTION: Sandy silt till, tan, compact, moist, medium plasticity, clayey, some sand, trace fine gravel

DATE TESTED: December 18 to December 23, 2020
 CONFINING PRESSURE (kPa): 155.1
 EFFECTIVE SATURATION STRESS (kPa): 51.7
 ASSUMED SPECIFIC GRAVITY: 2.65
 HYDRAULIC GRADIENT: 10.0
 TYPE OF PERMEANT LIQUID: De-aired Water
 HYDRAULIC CONDUCTIVITY, "k" (cm/s): 3.6E-07
 HYDRAULIC CONDUCTIVITY, "k₂₀" (cm/s): 3.1E-07

	Height (mm)	Diameter (mm)	Wet Mass (g)	Dry Density (g/cm ³)	Water Content by Mass (%)	Water Content by Volume (%)	Saturation (%)
Initial Reading	77.9	71.1	622.3	1.732	16.3	28.3	81.5
Final Reading	78.1	71.4	649.7	1.745	19.2	33.4	97.8



COMMENTS:
 Remoulded sample.

REPORT DATE: 2021.Jan.04

REVIEWED BY Guillaume Beauce, P.Eng.

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Stantec Consulting Ltd.
 199 Henlow Bay, Winnipeg, MB R3Y 1G4
 Tel: (204) 488-6999



AASHTO T88 (ASTM D422) - PARTICLE-SIZE ANALYSIS OF SOILS

TO Stantec Consulting Ltd.
 500-311 Portage Avenue
 Winnipeg, MB
 R3B 2B9

PROJECT Boissevain Wastewater
 Lagoon Study

ATTN: Tim Stratton

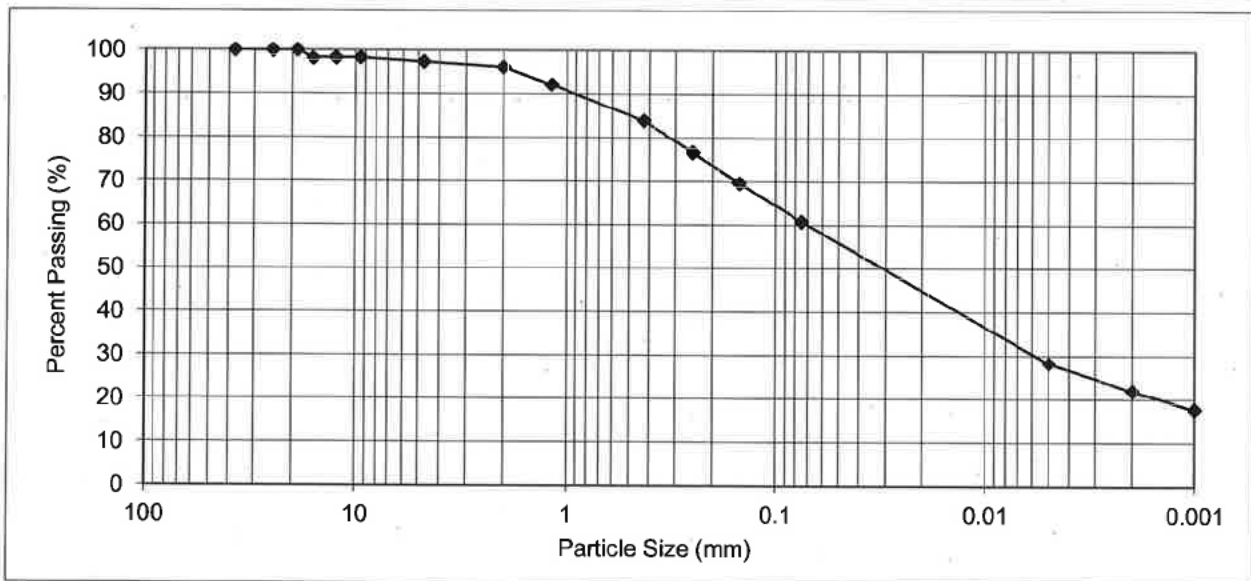
PROJECT NO. 111217470

REPORT NO. 1

DATE SAMPLED: Not Provided
 SAMPLED BY: Client

DATE RECEIVED: 2020.Dec.02
 SAMPLE ID: TH16 @ 9'

DATE TESTED: 2020.Dec.04
 TESTED BY: Donald Eliazar



PARTICLE SIZE		PERCENT PASSING
37.50	mm	100.0
25.00	mm	100.0
19.00	mm	100.0
16.00	mm	98.3
12.50	mm	98.3
9.50	mm	98.3
4.75	mm	97.4
2.00	mm	96.2

PARTICLE SIZE		PERCENT PASSING
1.18	mm	92.2
0.425	mm	83.9
0.250	mm	76.7
0.150	mm	69.7
0.075	mm	60.8
0.005	mm	28.2
0.002	mm	22.0
0.001	mm	17.7

Gravel, % 75 to 4.75 mm	Sand, %			Silt, % <0.075 to 0.002 mm	Clay, % <0.002 mm	Colloids, % < 0.001 mm
	Coarse <4.75 to 2.0 mm	Medium <2.0 to 0.425 mm	Fine <0.425 to 0.075 mm			
2.6	1.2	12.3	23.1	38.8	22.0	17.7

REPORT DATE: 2020.Dec.07

REVIEWED BY: [REDACTED] Guillaume Beauce, P.Eng.

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Design with community in mind



Stantec Consulting Ltd.
 199 Henlow Bay, Winnipeg, MB R3Y 1G4
 Tel: (204) 488-6999



AASHTO T88 (ASTM D422) - PARTICLE-SIZE ANALYSIS OF SOILS

TO Stantec Consulting Ltd.
 500-311 Portage Avenue
 Winnipeg, MB
 R3B 2B9

PROJECT Boissevain Wastewater
 Lagoon Study

PROJECT NO. 111217470

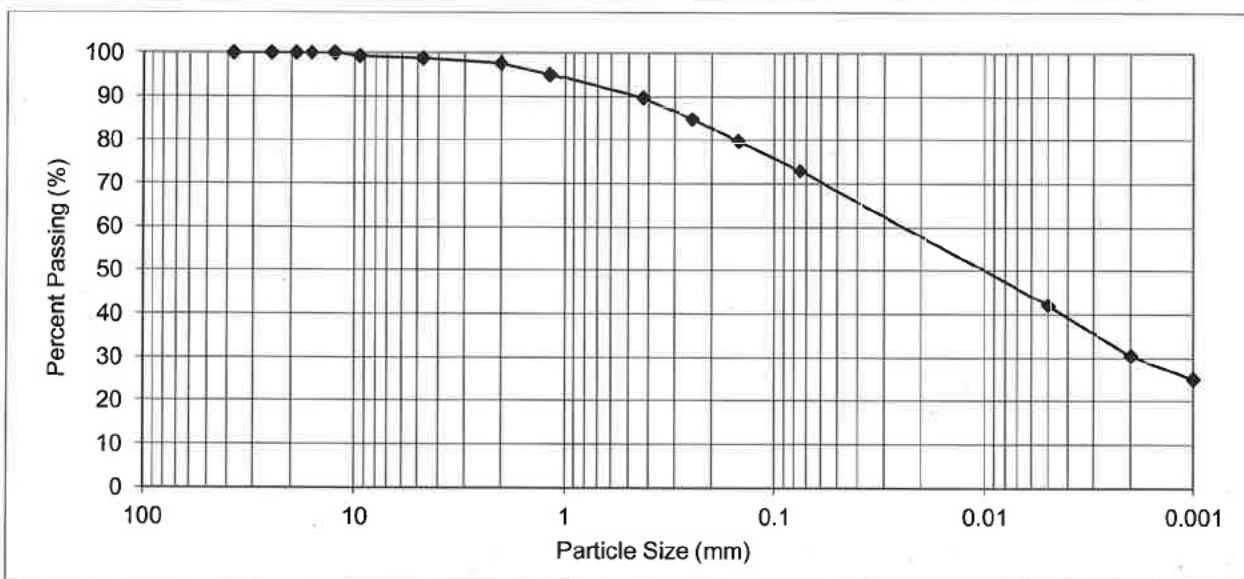
ATTN: Tim Stratton

REPORT NO. 2

DATE SAMPLED: Not Provided
 SAMPLED BY: Client

DATE RECEIVED: 2020.Dec.02
 SAMPLE ID: TH18 @ 4'

DATE TESTED: 2020.Dec.04
 TESTED BY: Donald Eliazar



PARTICLE SIZE		PERCENT PASSING
37.50	mm	100.0
25.00	mm	100.0
19.00	mm	100.0
16.00	mm	100.0
12.50	mm	100.0
9.50	mm	99.3
4.75	mm	98.8
2.00	mm	97.7

PARTICLE SIZE		PERCENT PASSING
1.18	mm	95.2
0.425	mm	89.8
0.250	mm	85.0
0.150	mm	79.9
0.075	mm	73.0
0.005	mm	42.1
0.002	mm	30.5
0.001	mm	25.2

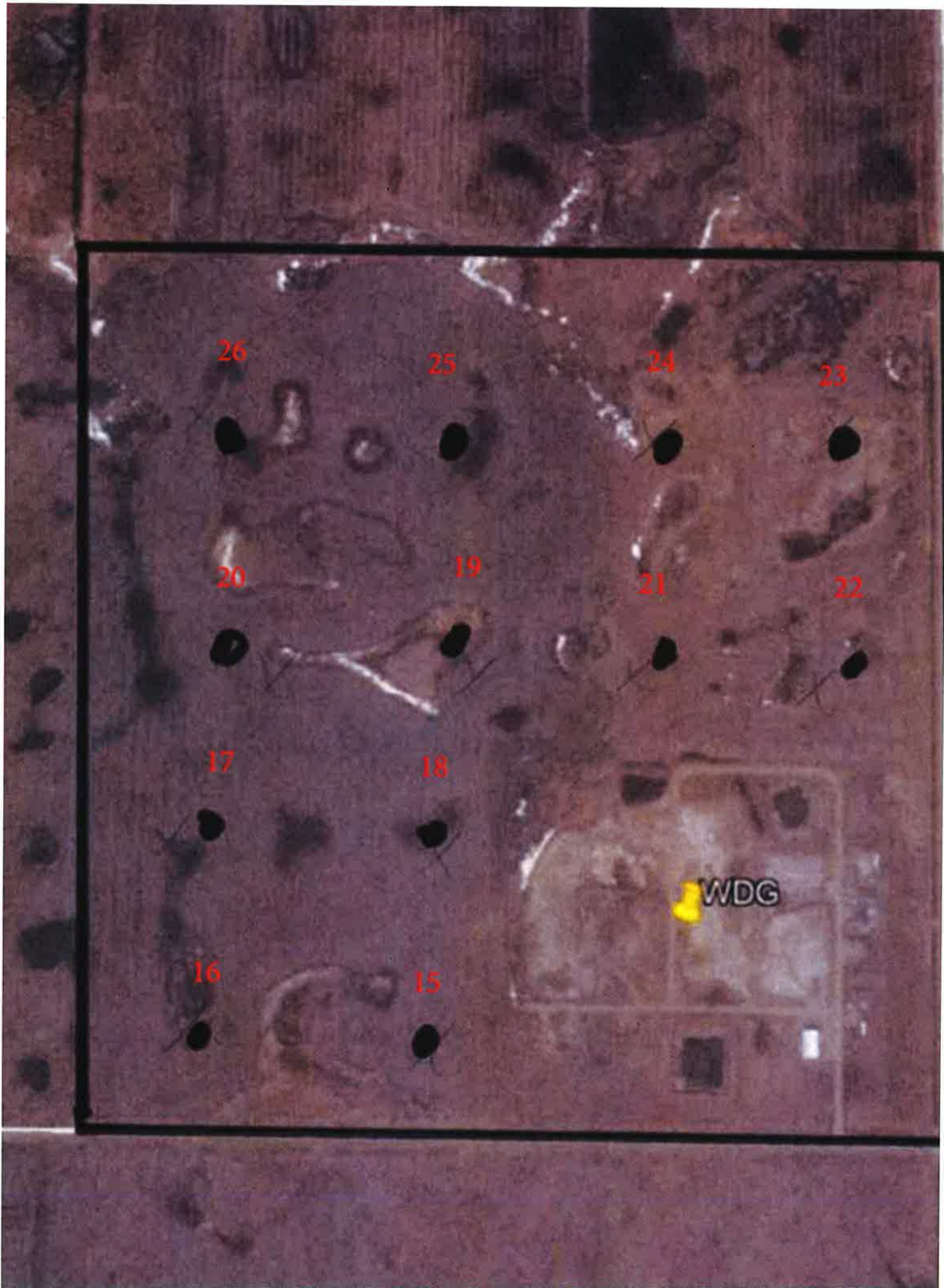
Gravel, % 75 to 4.75 mm	Sand, %			Silt, % <0.075 to 0.002 mm	Clay, % <0.002 mm	Colloids, % < 0.001 mm
	Coarse <4.75 to 2.0 mm	Medium <2.0 to 0.425 mm	Fine <0.425 to 0.075 mm			
1.2	1.1	7.9	16.8	42.5	30.5	25.2

REPORT DATE: 2020.Dec.07

REVIEWED BY:  Guillaume Beauce, P.Eng.

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of the test results is provided only on written request. The data presented above is for the sole use of the client stipulated above. Stantec is not responsible, nor can be held liable, for the use of this report by any other party, with or without the knowledge of Stantec.

Design with community in mind



26

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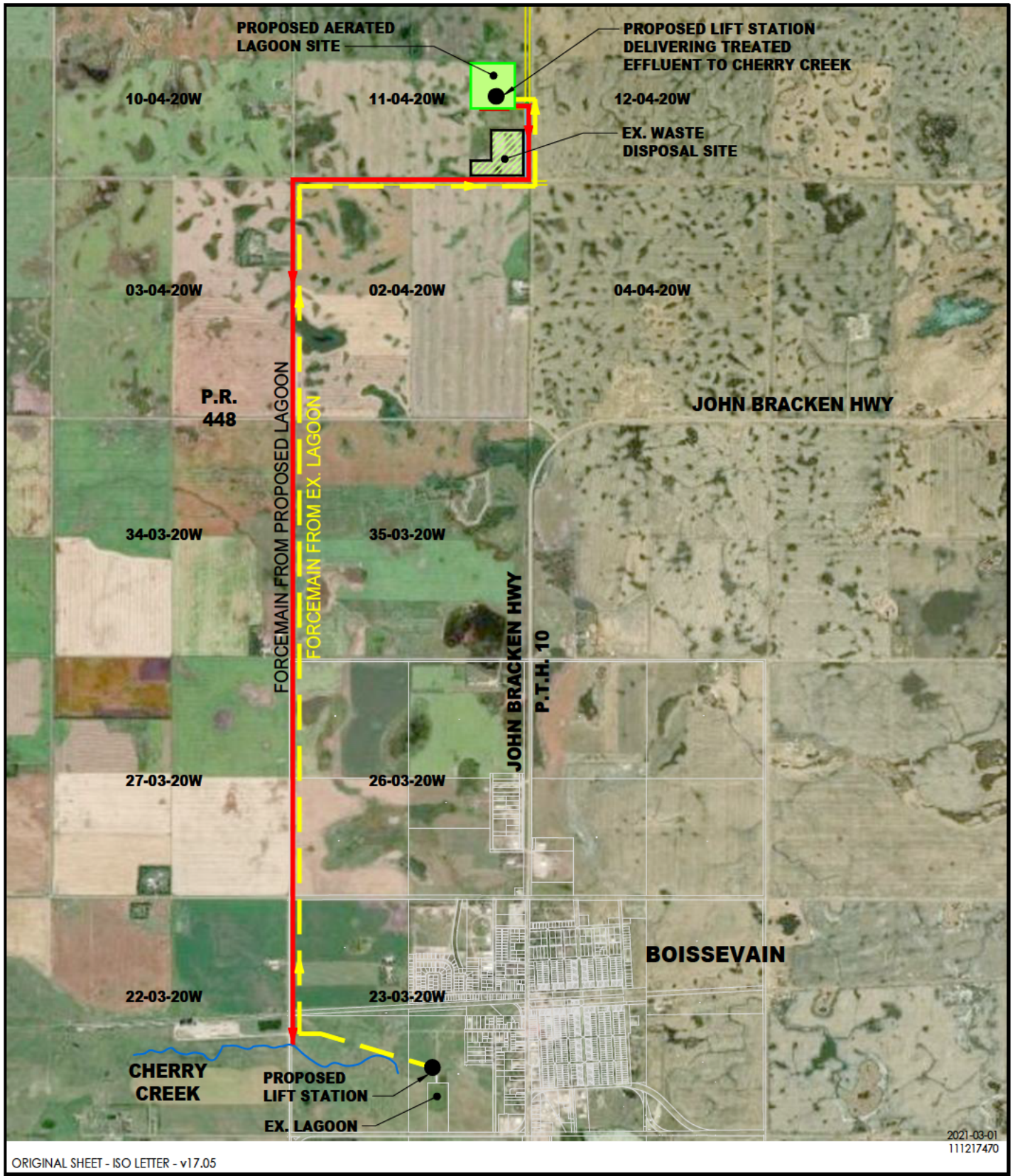
18

16

15

WDG

APPENDIX B
DRAWINGS AND FIGURES



V:\112\active\111217470\0300_drawing\0301_sketches\17470-fig 6.1.dwg site
 2021/03/01 5:39 PM By Ramnarace Kesh

2021-03-01
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 Suite 500, 311 Portage Avenue
 Winnipeg MB Canada R3B 2B9
 Tel. 204.489.5900 Fax. 204.453.9012
 www.stantec.com



Client/Project

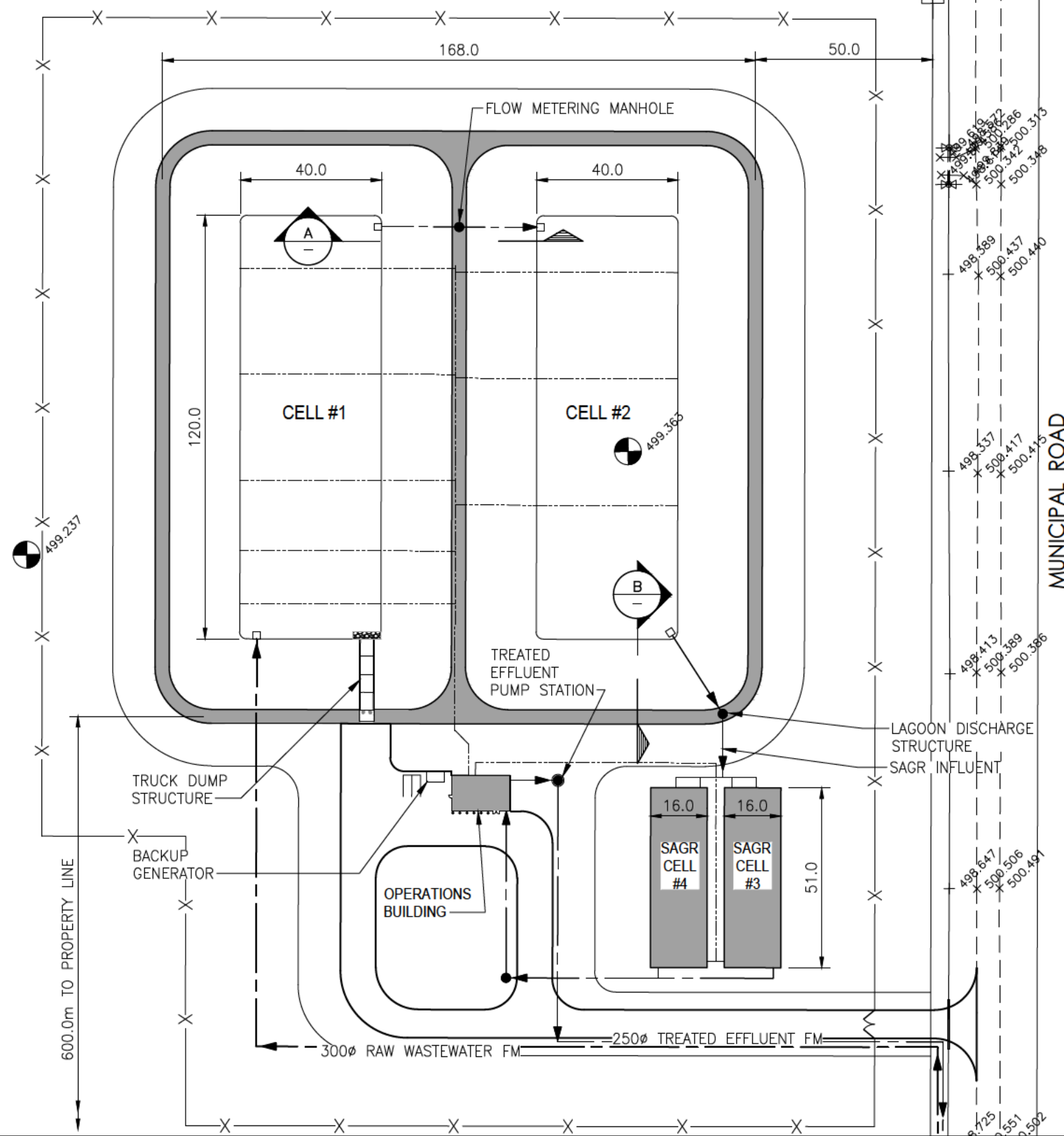
MWSB AND RM OF BOISSEVAIN - MORTON
 BOISSEVAIN WASTEWATER TREATMENT

Figure No

6.1

Title

OVERALL SITE PLAN



V:\1112\active\111217470\0300.drawing\0301_sketches\17470-fig6.4.dwg lag
 2021/03/02 9:54 AM by: Ramnarace Mesh

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2021-03-02
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Legend



Notes

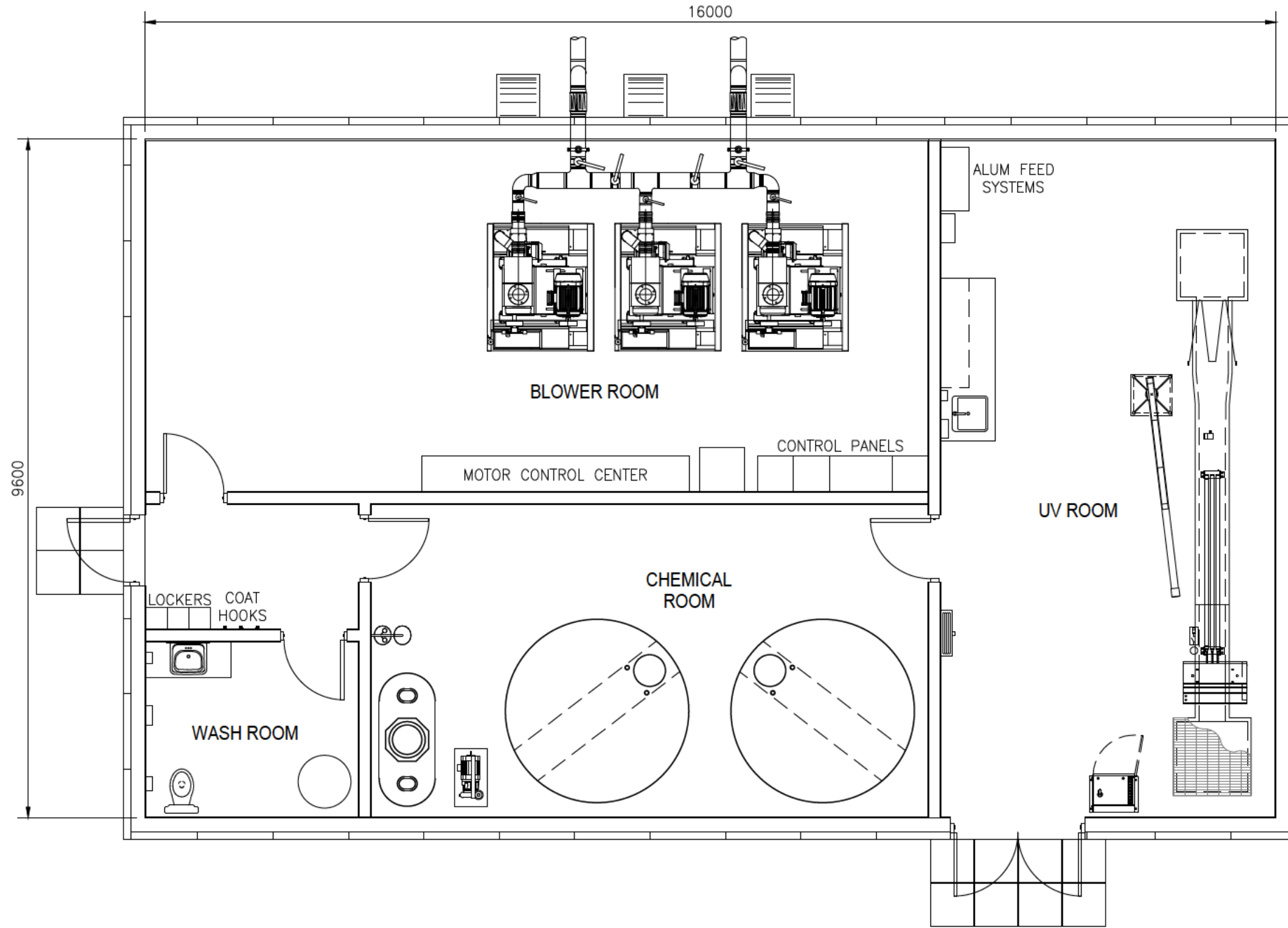
Client/Project
 MWSB AND RM OF BOISSEVAIN - MORTON
 BOISSEVAIN WASTEWATER TREATMENT

Figure No

6.4

Title

LAGOON SITE PLAN



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2021/03/01 11:54 AM By: Ramnarace Kesh

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Notes

Client/Project

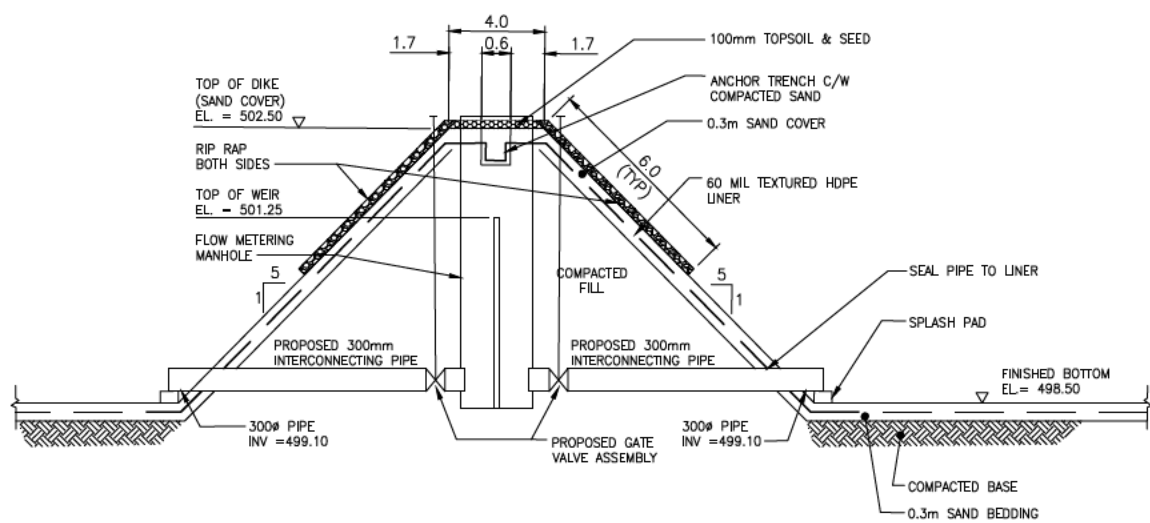
MWSB AND RM OF BOISSEVAIN - MORTON
BOISSEVAIN WASTEWATER TREATMENT

Figure No

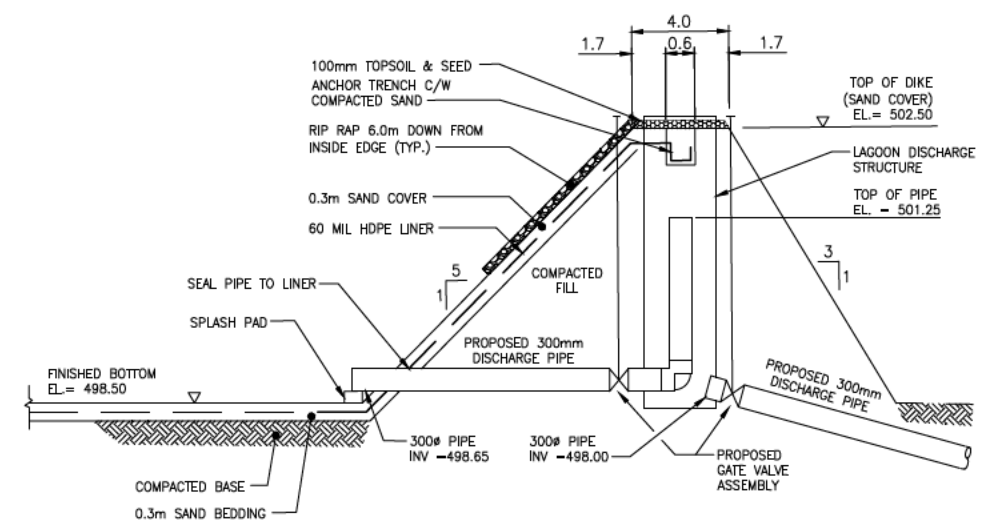
6.6

Title

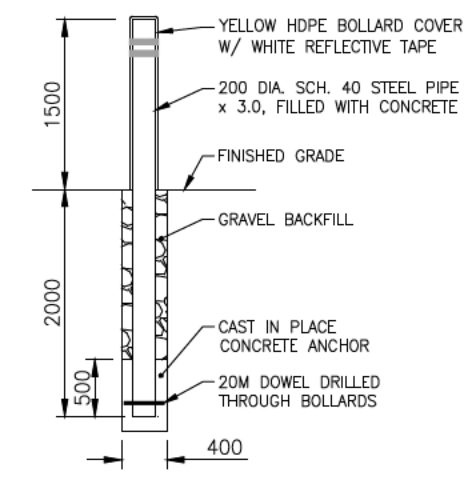
OPERATIONS BUILDING
FLOOR PLAN



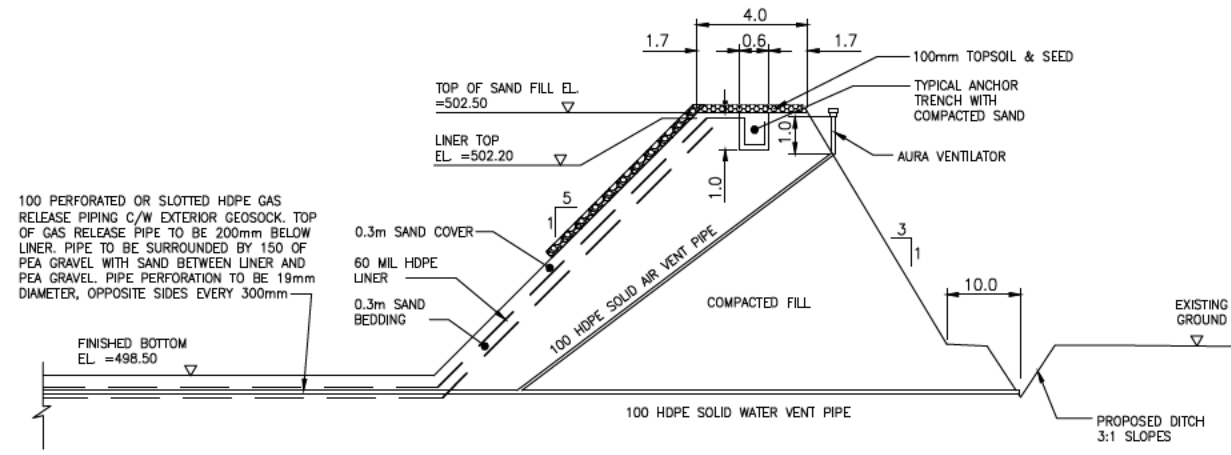
A
COMMON DIKE AND INTERCONNECTING PIPE SECTION
N.T.S.



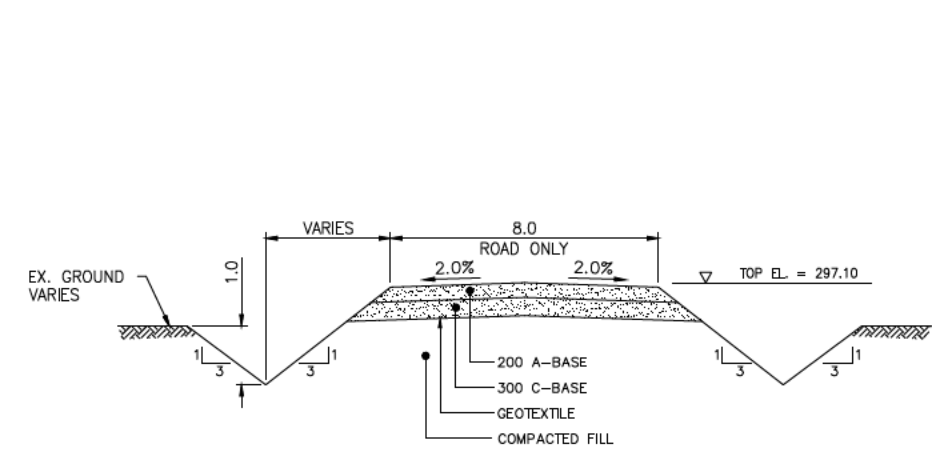
B
TYPICAL OUTSIDE DIKE AND DISCHARGE SECTION
N.T.S.



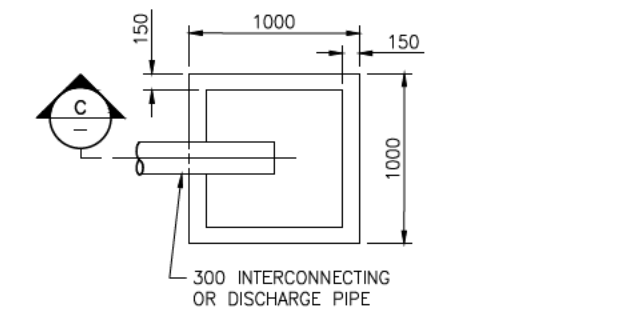
TYPICAL BOLLARD DETAIL
N.T.S.



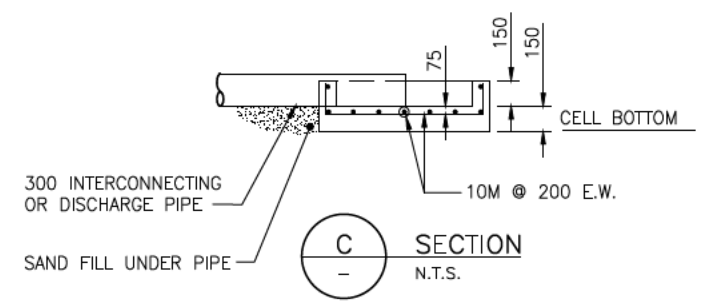
TYPICAL GAS RELEASE PIPING SYSTEM SECTION
N.T.S.



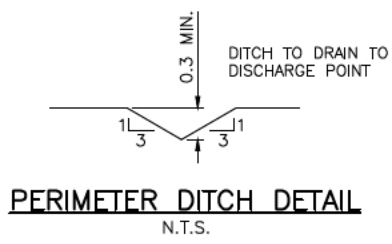
TYPICAL ACCESS ROAD / PAD SECTION
N.T.S.



PLAN



TYPICAL SPLASH PAD DETAIL
N.T.S.



PERIMETER DITCH DETAIL
N.T.S.

NOTE: CONCRETE TO BE SULPHATE RESISTANT, 30 MPa

2021-03-02
111217470

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Notes

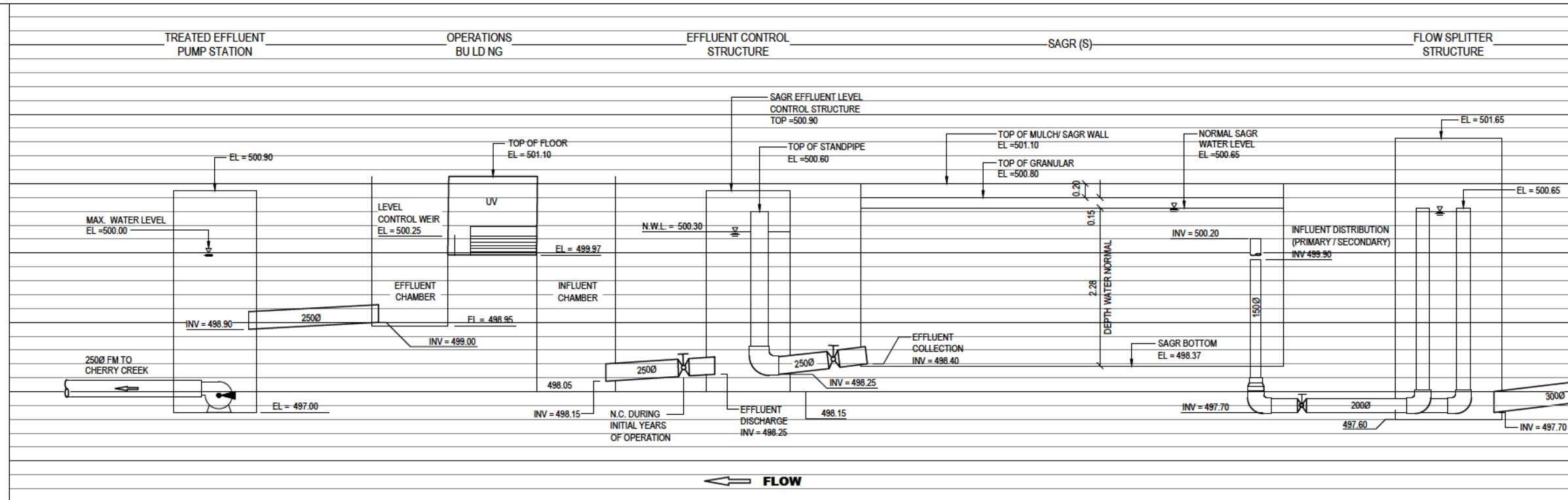
Client/Project
MWSB AND RM OF BOISSEVAIN - MORTON
BOISSEVAIN WASTEWATER TREATMENT

Figure No

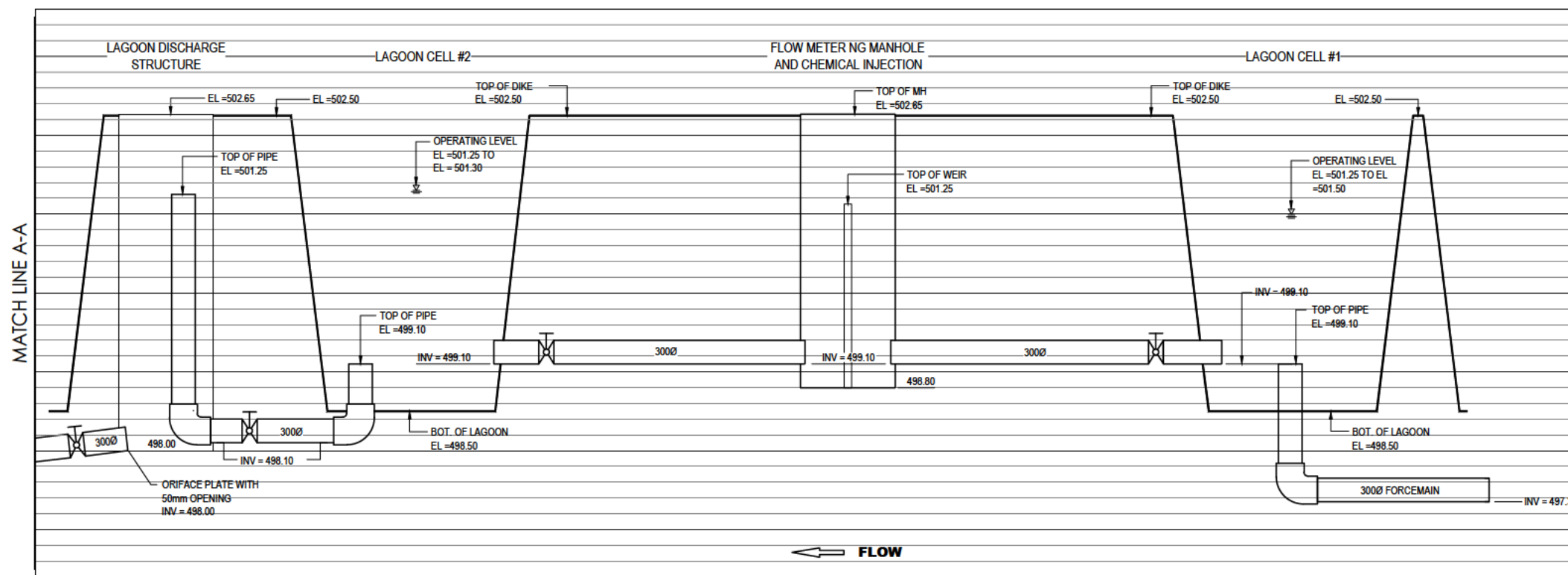
6.7

Title

LAGOON DETAILS
SECTIONS AND DETAILS



MATCH LINE A-A



MATCH LINE A-A

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ORIGINAL SHEET - ISO 11x17 - v17.05

2021-03-02
11217470



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Legend

NO SCALE

Notes

Client/Project
MWSB AND RM OF BOISSEVAIN - MORTON
BOISSEVAIN WASTEWATER TREATMENT

Figure No
6.8

Title
PROCESS FLOW DIAGRAM
HYDRAULIC PROFILE

APPENDIX 2
CERTIFICATES OF TITLE

STATUS OF TITLE

Title Number **2439670/2**
Title Status **Accepted**
Client File **Lagoon Research Project**



1. REGISTERED OWNERS, TENANCY AND LAND DESCRIPTION

TOWN OF BOISSEVAIN AND RURAL MUNICIPALITY OF MORTON

ARE EACH REGISTERED OWNERS OF AN UNDIVIDED 1/2 INTEREST SUBJECT TO SUCH ENTRIES RECORDED HEREON IN THE FOLLOWING DESCRIBED LAND

THE SE 1/4 OF SECTION 11-4-20 WPM
EXC ALL MINES AND MINERALS AND OTHER MATTERS
AS RESERVED IN THE GRANT FROM THE CROWN

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

Instrument Type: **Caveat**
Registration Number: **70799BO/2**
Instrument Status: **Accepted**

Registration Date: 1972-03-16
From/By: **MAN TELEPHONE SYSTEM**
To:

Amount:

Notes: **ELY 16.5'**
Description: **ELY 16.5 FEET**

3. ADDRESSES FOR SERVICE

TOWN OF BOISSEVAIN
BOX 490
BOISSEVAIN MB
R0K 0E0

RURAL MUNICIPALITY OF MORTON
BOX 490
BOISSEVAIN MB
R0K 0E0

4. TITLE NOTES

No title notes

5. LAND TITLES DISTRICT

Brandon

6. DUPLICATE TITLE INFORMATION

Duplicate not produced

7. FROM TITLE NUMBERS

2256773/2 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:	1261234/2
Registration Date:	2010-03-17
From/By:	RICHARD ROBERT WRIGHT
To:	TOWN OF BOISSEVAIN AND RURAL MUNICIPALITY OF MORTON
Consideration:	\$160,000.00

10. LAND INDEX

SE 11-4-20W
EX ALL M&M

**CERTIFIED TRUE EXTRACT PRODUCED FROM THE LAND TITLES DATA STORAGE
SYSTEM OF TITLE NUMBER 2439670/2**

STATUS OF TITLE

Title Number **2801235/2**
Title Status **Accepted**
Client File **Lagoon Research Project**



1. REGISTERED OWNERS, TENANCY AND LAND DESCRIPTION

HER MAJESTY THE QUEEN IN RIGHT OF THE PROVINCE OF MANITOBA

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

ALL MINES AND MINERALS IN THE FOLLOWING DESCRIBED LANDS, AS RESERVED
IN THE GRANTS FROM THE CROWN:

THE SE 1/4 OF SECTION 2-4-20 WPM;
THE SW 1/4 OF SECTION 4-4-20 WPM;
THE SE 1/4 OF SECTION 6-4-20 WPM;
THE SE 1/4 OF SECTION 10-4-20 WPM;
SECTION 11-4-20 WPM;
THE SE 1/4 OF SECTION 16-4-20 WPM;
THE SW 1/4 OF SECTION 20-4-20 WPM;
THE NW 1/4 OF SECTION 24-4-20 WPM; AND
THE SW 1/4 OF SECTION 28-4-20 WPM

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

DEPT. OF JUSTICE (WINNIPEG MB)
730 - 405 BROADWAY
WINNIPEG, MB.
R3C 3L6

CROWN LANDS & PROPERTY AGENCY
308 - 25 TUPPER STREET N
PORTAGE LA PRAIRIE, MB.
R1N 3K1

4. TITLE NOTES

No title notes

5. LAND TITLES DISTRICT

Brandon

6. DUPLICATE TITLE INFORMATION

Duplicate not produced

7. FROM TITLE NUMBERS

191992/2 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: **1386323/2**

Registration Date: **2015-09-16**

From/By: **BLTO**

To:

Amount:

10. LAND INDEX

SE 2-4-20W

ALL M&M

SW 4-4-20W

ALL M&M

SE 6-4-20W

ALL M&M

SE 10-4-20W

ALL M&M

NE 11-4-20W

ALL M&M

NW 11-4-20W

ALL M&M

SE 11-4-20W

ALL M&M

SW 11-4-20W

ALL M&M

SE 16-4-20W
ALL M&M

SW 20-4-20W
ALL M&M

NW 24-4-20W
ALL M&M

SW 28-4-20W
ALL M&M

**CERTIFIED TRUE EXTRACT PRODUCED FROM THE LAND TITLES DATA STORAGE
SYSTEM OF TITLE NUMBER 2801235/2**

STATUS OF INSTRUMENT

Instrument Number **70799BO/2** **CAV**
Instrument Status **Accepted**
Client File **Lagoon Research Project**



1. INSTRUMENT SUMMARY

Instrument Type: **Caveat**
Registration Number: **70799BO/2**
Instrument Status: **Accepted**

Registration Date: 1972-03-16
Completion Date: 1999-01-20

From/By: **MAN TELEPHONE SYSTEM**
To:

Amount:
Description: **ELY 16.5 FEET**

2. TITLES AFFECTED

<u>Title Number</u>	<u>Title Status</u>	<u>Effect</u>	<u>Notes</u>
1618562/2	Cancelled	Active	ELY 16.5'
	Land Index:	SE 11-4-20W EX ALL M&M	
2256773/2	Cancelled	Active	ELY 16.5'
	Land Index:	SE 11-4-20W EX ALL M&M	
2439670/2	Accepted	Active	ELY 16.5'
	Land Index:	SE 11-4-20W EX ALL M&M	

3. TITLES CREATED

No titles created

4. AFFECTS THE FOLLOWING INSTRUMENTS

No affected instruments

5. AFFECTED BY THE FOLLOWING INSTRUMENTS

No affecting instruments

6. ADDRESSES FOR SERVICE

No address for service

7. LAND TITLES DISTRICT

Brandon

8. DEFICIENCY INFORMATION

This instrument is not deficient

9. SERIES DETAILS

First Instrument Number in Series: 70799BO/2
Number of Instruments in Series: 1
Presented By: N/A

<u>Instrument Type</u>	<u>Registration Number</u>	<u>Instrument Status</u>	<u>Deficient</u>
Caveat	70799BO/2	Accepted	No

**CERTIFIED TRUE EXTRACT PRODUCED FROM THE LAND TITLES DATA
STORAGE SYSTEM OF INSTRUMENT NUMBER 70799BO/2**

APPENDIX 3

RESOLUTION # 2019-032 AND RESOLUTION # 2021-044 FROM THE MUNICIPALITY OF BOISSEVAIN-MORTON

Municipality of Boissevain-Morton
420 South Railway Street Box 490, Manitoba , R0K 0E0
Tel: 204-534-2433
<http://www.boissevain.ca/>

7 February, 2019

RESOLUTION

Resolution # 2019-032

Moved by: Doug Troke

Seconded by: Rhonda Coupland

WHEREAS Stantec has completed the draft Boissevain-Morton lagoon study;

AND WHEREAS the Municipality is required to finalize the study completed by Stantec;

AND WHEREAS the Municipality is required to select a construction option that is most feasible for the Municipality, to move forward with an Environment Act Proposal (EAP);

AND WHEREAS the Municipality has the ability to change the construction option to facultative lagoon at a later point in time, if deemed necessary;

THEREFORE BE IT RESVOLED THAT Council has decided to select an aerated lagoon system;

AND FURTHERMORE to approve the Boissevain-Morton lagoon study as prepared by Stantec.

Carried

I, Leo Poulin, CMMA and CAO of the Municipality of Boissevain-Morton hereby certify the above Resolution is a true and correct copy of a Resolution passed by Council in session assembled the 7th of February, 2019.



Leo Poulin, CAO

Municipality of Boissevain-Morton
420 South Railway Street Box 490, Manitoba , R0K 0E0
Tel: 204-534-2433
<http://www.boissevain.ca/>

25 March, 2021

RESOLUTION

Resolution # 2021-044

Moved by: David Stead

Seconded by: George Heide

BE IT RESOLVED THAT Council proceed with a new aerated lagoon system at SE 11-4-20W.

Carried

I, Leo Poulin, CMMA and CAO of the Municipality of Boissevain-Morton hereby certify the above Resolution is a true and correct copy of a Resolution passed by Council in session assembled the 25th of March, 2021.



Leo Poulin, CAO