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P&R 8.355 JRCC

E-730.01

Rural Municipality of Ellice-Archie

Environment Act Proposal
for the
St. Lazare Wastewater Treatment Facility

APEGM
Certificate of Authorization
J. R. Cousin Consultants Ltd.
No. 234 Date: JUL 2 6 2019

PROVINCE OF MANITOBA
JUL 2 6 2019
J. G. DYCK
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July 2019

JRCC ENGINEERING CONSULTANTS

ACKNOWLEDGMENTS

To prepare this report various sources of information were investigated and researched. JR Cousin Consultants Ltd. (JRCC) wishes to thank the RM of Ellice-Archie who contributed to the data and content of this study. In addition, we wish to commend the RM of Ellice-Archie and the Manitoba Water Services Board for their fortitude in addressing the need for a long-term solution to wastewater treatment for the Village of St. Lazare and the surrounding RM.

REMARKS

JR Cousin Consultants Ltd. has conducted this environment act proposal in accordance with generally accepted professional engineering principles and practices for the purpose of identifying conditions that may have an environmental impact on the site. The findings and recommendations reached in this report are based on information made available to JRCC during the investigation and conditions at the time of the site investigation. Conclusions derived in this report are intended to reduce, but not wholly eliminate the uncertainty regarding potential environmental concerns on the site, and recognizes reasonable limitations with regards to time, accuracy, work scope and cost. It is possible that environmental conditions may change from the date of this report. If conditions appear different from those encountered and expressed in this report, JRCC should be informed so that mitigation recommendations can be reviewed and adjusted as required. Historical data and information obtained from personal communication used in this report, are assumed to be correct, however JRCC has not conducted further investigations into the accuracy of this data. JRCC has produced this report for the use of the client, and takes no responsibility for any third party decisions or actions based on information contained in this report.

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Environment Act Proposal Form

Manitoba
Sustainable Development

Name of the development:
St Lazare - Wastewater Treatment Facility

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

Legal name of the applicant:
Rural Municipality of Ellice-Archie

Mailing address of the applicant: 318 Railway Ave

Contact Person: Ms. Trish Huberdeau

City: McAuley Province: Manitoba Postal Code: R0M 1H0

Phone Number: (204) 722-2053 Fax: (204) 722-2027 email: rmarchie@mts.net

Location of the development: St Lazare

Contact Person: Ms. Trish Huberdeau

Street Address:

Legal Description: SW 17-17-28 WPM

City/Town: St Lazare Province: Manitoba Postal Code: R0M 1H0

Phone Number: (204) 722-2053 Fax: (204) 722-2027 email: rmarchie@mts.net

Name of proponent contact person for purposes of the environmental assessment:
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Date: JUL 2 6 2019

Signature of proponent, or corporate principal of corporate proponent:

Printed name: Jeff Dyck, P.Eng.

PRINT RESET

EXECUTIVE SUMMARY

General

The Rural Municipality of Ellice-Archie is proposing to construct and operate a new wastewater treatment facility (WWTF) to replace the existing oxbow wastewater lagoon, currently servicing the community of St. Lazare. An Environment Act Licence will be required from Manitoba Sustainable Development for the construction and operation of the WWTF. JR Cousin Consultants Ltd. (JRCC) was retained for the engineering services.

Description

The existing wastewater lagoon servicing the community of St. Lazare is an oxbow of the Assiniboine River, located just west of the community, within the provincial residential setback requirement (i.e. 400 m). This oxbow lagoon was not suitably designed or constructed and is not operating under a provincial licence. The proposed development will include replacing the existing lagoon cells with a Moving Bed Biofilm Reactor (MBBR) mechanical wastewater treatment plant, located adjacent to the existing oxbow lagoon, west of the community of St. Lazare. The MBBR plant will continuously discharge treated effluent into the adjacent Assiniboine River. The MBBR plant will require a heated building for tanks and treatment equipment, with a genset and an access approach. This WWTF will be sized to handle peak organic and hydraulic flows to Design Year 20.

Population Contributing Effluent

The projected Year 20 population used for sizing the WWTF consisted of: the residential population in St. Lazare (328 people), the school population (50 people), and surrounding rural residents.

Organic and Hydraulic Loading

The total projected year 20 organic loading from the service population would be approximately 30.4 kg BOD_5/day, which considers peak daily loading. The total projected hydraulic loading from the service population would be approximately 193 m^3/day. Peak day and hour factors would be considered in the design of the MBBR plant.

Site Investigation

The area proposed for the development of the WWTF was an open grass field, adjacent to the existing lagoon and surrounded by baseball fields and agricultural land to the north, a flood protection dike and the Assiniboine River to the west, the existing lagoon and residential community to the east, and a low lying marsh area and access road to the south. The Assiniboine River is located approximately 230 m to the west of the development site and the topography at the proposed site is gently sloped to the south. The soil profile consisted of surficial topsoil, followed by a layer of medium plastic clay and silt to a depth of 0.7 m, followed by layers of saturated high plastic clay and sand down to depths of 4.5 m to 6.0 m below the surface. Groundwater was recorded at depths of 0.3 m to 1.4 m below the surface.

MBBR Treatment System

An MBBR is being proposed and will provide enhanced wastewater treatment through the use of aeration and free flowing plastic media for bacterial growth. Components of the MBBR system would generally include:

- an intake screening system
- an equalization tank
- a primary clarifier tank
- an MBBR treatment tank
- a solids separation tank
- an aerated sludge holding tank
- a UV disinfection system
- a digital control system
- a heated building to house equipment and tanks.

The MBBR plant would have sufficient organic and hydraulic capacity to Design Year 20, based on the projected population in the service area. The biological treatment and ammonia reduction would generally occur in the MBBR treatment tank and the phosphorus reduction would occur in the clarifier and solids separation tanks with the addition of chemical coagulant. Disinfection would occur with the use of a UV system. Sludge generated at the facility would be hauled regularly to a nearby lagoon in the RM for disposal. The treatment system will have the capability for remote monitoring and access.

Effluent Discharge

The WWTF would operate with continuous discharge of treated effluent into the Assiniboine River. From a review of historical flows in the river, the continuous discharge flow of effluent would make up less than 1% of the river flow during the 7Q10 flow period. It is not expected that flows in the river will be impacted significantly by the St. Lazare WWTF.

Existing Lagoon Cells

The existing oxbow lagoon cells will be decommissioned by disconnecting and capping the gravity main pipe and discharged when effluent requirements are met. The sludge will be allowed to naturally dewater and a sludge disposal plan will be prepared to address removal and disposal of sludge. The cells will then be abandoned in place as a wildlife habitat area.

Additional Design Considerations

Additional design considerations of the proposed WWTF will include:

- electrical and communication lines extended to the building
- a compacted granular access approach and parking lot area
- re-routing gravity main to new WWTF
- installing discharge piping into the Assiniboine River
- a perimeter fence with locking gate
- a sign at the entrance to the facility
- proper site grading away from the building and a perimeter ditch.

Potential Concerns and Mitigation Measures

The potential concerns identified with the WWTF construction and operation, and associated mitigation measures include:

Potential Concern	Mitigation Measure
Emissions from construction equipment and genset	The heavy equipment will be maintained during construction and the genset unit will be designed to meet provincial and local emission standards
Dust generation	Dust suppression methods (i.e. wetting) will be utilized if dry and windy conditions are a nuisance to nearby residents
Odours from WWTF operation	The treatment system will be aerated and wastewater will be contained in tanks and in the treatment plant building, therefore odour nuisances to nearby residents are not expected
Contamination of surface and groundwater from discharge and seepage	Wastewater effluent will be contained in the treatment system tanks, which will be tested for leaks prior to commissioning. Effluent will be treated to the requirements of the Environment Act Licence during operation, prior to discharging into the Assiniboine River
Soil erosion after construction works	Areas with bare soil outside of the WWTF and disturbed areas will be seeded with grass to reduce erosion
Spills or leaks during construction	Contractor to have emergency spill kit on site. Hazardous materials and fuel to be handled in accordance with all federal and provincial regulations
Leaks from the piping	The gravity main and discharge pipe will be inspected and tested after installation to ensure there are no leaks prior to commissioning
Impacts to historic or heritage resources	A heritage resources impact assessment will be completed prior to conducting the construction works. If any historic resources are uncovered during the excavation, works will temporarily cease while municipal, provincial and federal authorities (as needed) conduct site investigations.
Noise impacts from construction and operation	Construction works will be limited to daylight hours only. Mechanical components will be contained within the treatment plant building and the genset will be located in an enclosure.
Public health and safety	Construction workers will be required to adhere to the safety program which will include utilizing personal protective equipment while on site. Access to the construction site will be limited to authorized personnel. Warning signs will be utilized at the entrance to the site to prevent unauthorized entry. The treatment plant building should be locked at all times.

Schedule and Approvals

The WWTF owner would like to begin the construction works in the spring of 2020, after receipt of an Environment Act Licence and funding is obtained. Decommissioning of the existing lagoon cells will occur after the WWTF is commissioned. No additional approvals, licences or permits are expected for the works, beyond the Environment Act Licence from Manitoba Sustainable Development.

1.0 INTRODUCTION AND BACKGROUND

The development described herein is for the construction and operation of a new wastewater treatment facility, located near the community of St. Lazare, Manitoba, for the Rural Municipality of Ellice-Archie.

1.1 Introduction

The RM of Ellice-Archie has prepared this Environment Act Proposal (EAP) to satisfy the requirements of Manitoba Sustainable Development, for the construction and operation of a new wastewater treatment facility (WWTF) in the community of St. Lazare. An Environment Act Licence is required from Manitoba Sustainable Development for the proposed works. JR Cousin Consultants Ltd. (JRCC) was retained for the related engineering services.

1.2 Contact Information

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1.3 Background Information

The community of St. Lazare is located approximately 330 km northwest of Winnipeg, in the RM of Ellice-Archie, and is accessed by PTH 41. St. Lazare currently utilizes an oxbow of the Assiniboine River for wastewater treatment and storage, located at SW 17-17-28 WPM. The service population utilizing the St. Lazare oxbow lagoon includes residential populations within the community and surrounding rural residents. The residents within the community are currently serviced with a gravity sewer collection system that flows by gravity to the lagoon.

The RM does not have a current operating licence for the existing oxbow lagoon. The oxbow lagoon is located west of the community and approximately 175 m from the Assiniboine River. The oxbow lagoon discharges treated effluent into the Assiniboine River. Issues related the oxbow lagoon include:

- a setback distance of less than the minimum 300 m from a residence
- insufficient organic and hydraulic storage capacity for the service population
- seepage into the surrounding groundwater, as this facility was never constructed with a liner for containment

- no fencing surrounds the cells for public safety.

The oxbow lagoon is currently surrounded by the community residences to the east, baseball fields to the north, cleared grassland to the west and Fouillard Avenue to the south. The cleared grassland area to the west is the desired location for a new wastewater treatment system and is within an existing flood protection dike that surrounds the community.

1.4 Description of Previous Studies

The reports entitled *Feasibility Study for the Village of St. Lazare Proposed Sewage Treatment System*, by JRCC (August 1990) and *Environmental Impact Assessment of the Village of St. Lazare Existing Lagoon*, by JRCC (May 1991) were reviewed to obtain background information on the existing St. Lazare oxbow lagoon. The Feasibility Study discussed various options for an alternate sewage treatment system to replace the oxbow lagoon and included a soil investigation of two separate sites near St. Lazare. One site was located on the river flats northeast of the village and had soils consisting of silty clays and sandy clays, while the other site was located in the hillside and had soils mainly consisting of suitable clay. The environmental impact assessment discussed the environmental and health concerns of continued lagoon operation, along with the mitigation measures required to reduce potential impacts.

A letter report entitled *Path Forward regarding St. Lazare Treatment System Regulatory Non-Compliance*, by Stantec (July 2015) was reviewed to obtain background information on the existing St. Lazare oxbow lagoon. The letter report indicated that the existing oxbow lagoon system did not meet the requirements of the Environmental Approvals Board due to existing lagoon soils being unacceptable for containment and no liner being present, being too close to habitation, not meeting the hydraulic storage requirements, and the system relying on the downstream wetland for treatment. Options for new lagoon construction were reviewed.

The *RM of Ellice-Archie Pre-Design Report for St. Lazare Wastewater Treatment*, by JRCC (April 2019) was reviewed for background information on soil conditions and recommendations for development of a new wastewater treatment system. The soils generally consisted of saturated high plastic clay and sand, followed by a high plastic grey clay, but there is insufficient area for a new lagoon. It was recommended that an MBBR treatment plant be developed to the west of the existing oxbow lagoon.

1.5 Project Description

The RM of Ellice-Archie is proposing to construct a new mechanical wastewater treatment facility to replace the existing oxbow lagoon in the community of St. Lazare, and is in need of an Environment Act Licence for the construction and operation of the new facility. The WWTF will be located in SW 17-17-28 WPM, on a cleared parcel of land, approximately 150 m to the west of the community, adjacent to the existing lagoon primary cell. Additional works will include an access road from Fouillard Avenue, a discharge pipe to the Assiniboine River, perimeter ditching and perimeter fencing. The existing oxbow lagoon will be decommissioned, which includes disconnecting and abandoning the intake pipe and removing sludge.

2.0 DESCRIPTION OF THE DEVELOPMENT

For each heading there is an information request from the Environment Act Proposal Form. These requests are repeated herein in italics followed by the pertaining response.

2.1 Land Title/Location

Certificate of Title showing the owner(s) and legal description of the land upon which the development will be constructed; or, in the case of highways, rail lines, electrical transmission lines, or pipelines, a map or maps at a scale no less than 1:50,000 showing the location of the proposed development:

The location for the proposed WWTF is on SW 17-17-28 WPM, adjacent to the existing lagoon primary cell, west of the community of St. Lazare. Location of the proposed facility layout is included on Plan 1 of Appendix D. The land parcel to be utilized for the new WWTF is cleared grassland currently owned by the RM. The land is surrounded to the north and east by the existing oxbow lagoon, to the west by an existing flood protection dike and south by a low lying wetland area. Fouillard Avenue borders the land parcel to the south with an existing dirt access road running north to the proposed development area. A copy of the current Status of Title (No. 2020792/5) for this land parcel is attached in Appendix A.

2.2 Owner of Land and Mineral Rights

Owner of land upon which the development is intended to be constructed, and of mineral rights beneath the land, if different from surface owner:

Based upon the status of title for the proposed WWTF development area, all mines and minerals are excluded from the surface land title as set forth in transfer #51805 NLTO.

2.3 Existing Land Use

Existing land use on the site and on land adjoining it, as well as changes that will be made in such land use for the purposes of the development:

The land parcel for the proposed WWTF is currently an open grassed field, adjacent to the existing oxbow lagoon. The land to the north consists of recreational baseball fields and agricultural land; to the west is the Assiniboine River; to the east is the community; and to the south is a low lying wetland area. The entire community and lagoon area are located in a valley that rises significantly to the east and west. The community is accessed from PTH 41. The Assiniboine River is located approximately 230 m west of the proposed development site.

Soil would be excavated on the proposed development site for construction of the WWTF building foundation and buried tanks, along with drainage ditching, buried piping and an access road. The existing approach off of Fouillard Avenue will be upgraded for use by maintenance vehicles and septic hauling trucks.

2.4 Land Use Designation/Zoning Designation

Land use designation for the site and adjoining land as identified in a development plan adopted under The Planning Act or The City of Winnipeg Act, and the zoning designation as identified in a zoning by-law, if applicable:

The proposed WWTF site is zoned as OR (Open Space/Recreation Zone), based on zoning designations in the RM of Ellice-Archie.

2.5 Description of Development

Description of proposed development and schedule for stages of the development, including proposed dates for planning, design, construction, commissioning, operation, and decommissioning and/or termination of operation (if known), identifying major components and activities of the development as applicable (e.g. access road, airstrip, processing facility, waste disposal area, etc.).

2.5.1 Project Schedule

The WWTF is proposed to be constructed in 2020, upon receipt of the Environment Act Licence and availability of funding. Commissioning and operation of the WWTF would begin upon completion of construction and after approval for use is obtained from Manitoba Sustainable Development. The proposed WWTF would be designed for a 20 year lifespan. Sludge in the existing lagoon cells will be dewatered and hauled off the site after the WWTF is in operation.

2.5.2 Basis for Proposed WWTF Site Selection

The location of the proposed WWTF was determined based on distance to wastewater infrastructure and land availability. The site selected is adjacent to the existing lagoon primary cell, approximately 250 m from the nearest residence and approximately 230 m from the Assiniboine River.

2.5.3 Access Approach

There is an existing approach off of Fouillard Avenue that was constructed from soil. This approach would be upgraded with compacted granular material to allow for regular maintenance vehicle and septic truck access.

2.5.4 Continuous Discharge Route

It is proposed that the WWTF would discharge treated effluent into the Assiniboine River. A limiting factor for winter discharge to a receiving body of water can be winter icing, however, due to the size of the river and flows (see Section 2.5.5 below), the river does not freeze to the bottom during the winter months and effluent discharge is not expected to have an impact on river flows.

2.6 Population Contributing Effluent

Population data was obtained from Statistics Canada and discussions with the RM of Ellice-Archie. The service population utilizing the St. Lazare wastewater treatment lagoon will include residents within the Village of St. Lazare, the St. Lazare School and the surrounding rural residents in the RM of Ellice-Archie.

2.6.1 Community of St. Lazare

St. Lazare consists of residential, commercial, and institutional populations. Statistics Canada (2011) reported a residential population for the community of St. Lazare of 254 people, which is the most current census data. The only other historical census data available for St. Lazare was from 2006, where the village had a population of 265 people. Therefore the population has declined between 2006 and 2011. From discussions with the RM of Ellice-Archie, the population has been relatively stable since 2011, therefore a current population of 254 people has been utilized. The RM also indicated that future growth in the village would consist of a 20 lot development with an estimated seventy additional people, in Design Year 20, which would be a linear growth of 3.5 people/year. Therefore, the year 20 design population is projected to be 328 people.

2.6.2 St. Lazare School

The St. Lazare School (École Saint-Lazare) services students in St. Lazare and surrounding rural residences. Based on communication with the Division Scolaire Franco-Manitobaine, the school has fifty students bussed in from outside of St. Lazare. The population of bussed in students has an assumed occupancy of one-third the population, based on the amount of time spent at school, and would therefore represent an equivalent population of seventy people (50/3).

2.6.3 Septic Tanks

The RM of Ellice-Archie has advised that in addition to the piped loading from St. Lazare, there are approximately ten loads from septic tanks hauled to the lagoon on a yearly basis. For sizing purposes, ten loads per year will be used.

2.6.4 Population Summary Table

The current and projected populations for the service area have been included in the summary table below and in the attached Table 1 in Appendix A.

Contributing Population	Current Population	Year 20 Population
Community of St. Lazare	258	328
École Saint-Lazare	50 (equivalent to 17)	50 (equivalent to 17)
Septic Tank Loadings	10 loads/ year	10 loads / year

2.7 Wastewater Production

The proposed St. Lazare wastewater treatment facility will service the projected populations as described above. The facility will service the residential and bussed-in student populations from the community via wastewater collection piping systems and will service rural populations via truck hauled dumping. The facility sizing will be based on the projected 20 year populations and the projected organic and hydraulic loadings.

2.7.1 Organic Loading

The organic loading calculation is based upon the organics in typical residential wastewater and septage. A typical residential value of 0.076 kg BOD_5/person/day was utilized to estimate the organic loading from the residents utilizing the piped collection system within St. Lazare. Based on the projected year 20 population of 345 people (including École Saint-Lazare) utilizing the piped collection systems, an organic load of 26.2 kg BOD_5/day will be generated.

Septic tank wastewater typically has higher concentrations of Biochemical Oxygen Demand (BOD_5), as piped wastewater has a higher dilution factor and septic tanks have a greater accumulation of solids. The septage from these tanks typically impacts the peak daily BOD_5 loading. The following assumptions were made to determine organic loading from the rural septic tanks:

- the rural housing population density of 2.5 people/household, as determined from Statistics Canada
- average daily wastewater production of 430.9 L/person/day, as per the water treatment plant records in St. Lazare
- each septic tank would have a typical volume of 4,500 L
    - based upon the infrequent truck dumping (i.e. 10 loads/year), it is assumed that each truck load is from one tank only
- each septic tank is pumped out annually
- an average generation rate of 200 L/person/year of septage solids at 0.007 kg BOD_5/L
- a calculated average BOD_5 concentration of 0.000176 kg BOD_5/L of non-solid septage effluent.

Therefore, based on the above criteria, each septic tank pump out would generate approximately 4.2 kg BOD_5, based on the following:

$$(200 \times 2.5 \times 0.007) + ((4{,}500-(200 \times 2.5)) \times 0.000176) = 4.2 \text{ kg } BOD_5.$$

Due to the estimated volume of septic tank pumping from the rural residents, it is assumed that a maximum of one tank load would be hauled to the facility per day.

The total daily organic loading from piped sources and truck hauled septage is projected to be approximately 30.4 kg BOD_5/day in Design Year 20. The current and projected organic loadings

to the wastewater treatment facility are provided in the summary table below and in the attached Table 1 (Appendix A).

Contributing Organic Loading	Year 20 Total Daily BOD Production
Community of St. Lazare (piped)	26.2 kg BOD_5/day
RM Rural Population (truck haul)	4.2 kg BOD_5/day
Total	**30.4 kg BOD_5/day**

2.7.2 Hydraulic Loading

The hydraulic loading to the wastewater treatment facility is comprised of three wastewater streams: water usage, water treatment plant backwash water and infiltration. Based upon a review of recent water plant records, the average daily water usage, and an equivalent population of 275 (community and school), the per capita wastewater generation rate is 430.9 L/person/day.

In discussion with the RM, the water treatment plant backwash water directed to the wastewater collection system is accounted for in the water use records provided, therefore no additional volume was considered.

The final source of hydraulic loading is from infiltration. In the case of St. Lazare, there is no lift station, thus the total flow to the lagoon cannot be calculated from lift station flows. Based upon information from the Municipality, approximately 50-55% of the houses in the community have sump pumps connected to the wastewater system, which is likely a significant source of infiltration. Based upon this pumping, the estimated infiltration rate would be 30% of the base hydraulic loading. No new housing development is permitted to have sump pumps connected to the wastewater collection system, therefore future increases in infiltration from this source were not considered.

Based on the per capita wastewater production rate and additional infiltration, the current hydraulic loading is approximately 153.8 m^3/day. The projected hydraulic loading to a lagoon/facility in Design Year 20 would be approximately 193.0 m^3/day. Table 1 attached in Appendix A, shows the current and projected year 20 hydraulic loadings to the facility.

2.7.3 Wastewater Production Summary Table

The current and projected organic and hydraulic loadings for the service area have been included in the summary table below and in the attached Table 1 (Appendix A).

Contributing Wastewater Load	Current Daily Load	Year 20 Daily Load
Organic Loading (kg BOD_5/day)	25.1	30.4
Hydraulic Loading (m^3/day)	153.8	193.0

2.7.4 Peak Factors

Peak Day

The maximum day hydraulic loading peak factor was determined from the water use records. The maximum wastewater production was 195.5 m^3/day. This corresponds to a maximum day peak factor of 1.68 times average day demand.

Peak Hour

Due to a lack of hourly meter reading data from the community, the Harmon Peaking Factor, which is a population based factor, was used to determine the peak hour factor. Based on the projected year 20 population, the peak hour factor is 4.07 times average day demand.

2.8 WWTF Sizing Requirements

In sizing a mechanical treatment plant with continuous discharge, peak day and peak hour loadings are considered for design criteria by the WWTF supplier, to ensure the system is large enough to adequately treat effluent during times of high flows.

2.9 Site Investigation

An onsite investigation and topographic survey was completed on May 2, 2017, to determine the suitability of the site and soils for a new WWTF.

2.9.1 Site Conditions and Topography

The proposed WWTF development site is an open grassed field adjacent to the existing oxbow lagoon and the flood protection dike. The surface is gently sloped towards a low lying wet area to the south. The area has a maximum elevation difference of approximately 1.8 m from the north to the south. A marsh area was located on the south side of Fouillard Avenue. The flood protection dike located along the western border of the site had an elevation approximately 3.5 m higher than the development area.

2.9.2 Geotechnical Investigation

A geotechnical investigation was completed at the proposed development site using a tracked drill rig to conduct test hole drilling. The soil profile consisted of surficial silty topsoil, followed by a layer of medium plastic clay and silt down to a depth 0.7 m below the surface. Below this were layers of saturated high plastic clay and sand down to depths of 4.5 m to 6.0 m below the surface, followed by a layer of high plastic grey clay to the bottom of the test holes. Groundwater was recorded at depths ranging from 0.3 m to 1.4 m below the surface. Details of the test hole locations, test hole logs and laboratory reporting are attached in Appendix C.

2.9.3 Discharge Route

The WWTF would include a piped discharge directly into the Assiniboine River, approximately 230 m to the west (see Plan 1 in Appendix D). The Assiniboine River (6th Order Provincial Drain at

the discharge point) flows south and east from the proposed discharge point. The proposed discharge pipe would consist of a 150 mm diameter HDPE buried below the flood protection dike and emerging into the river above the river bed.

2.9.3.1 Flow in the Assiniboine River

Flow information for the Assiniboine River, at the nearest station to St. Lazare (Russell Station 05ME001), is provided in Table A below. The low flow and mean monthly flow data for the Assiniboine River was obtained from provincial flow records from 1969 to 2014 (see memorandum from Manitoba Conservation and Water Stewardship, May 17, 2019).

Table A: Mean Flow Data for Station 05ME001 on the Assiniboine River, Manitoba between 1969 and 2014

Month	Median Flow (m^3/s)	1-Q_{10} Flow (m^3/s)	7-Q_{10} Flow (m^3/s)	30-Q_{10} Flow (m^3/s)
January	9.89	3.62	3.11	4.16
February	10.40	2.89	2.20	3.12
March	12.10	1.20	0.83	1.72
April	13.95	0.78	0.54	1.13
May	17.10	0.76	0.43	1.12
June	15.60	1.01	0.56	1.21
July	14.80	1.02	0.57	1.28
August	7.81	1.03	0.61	1.57
September	5.33	1.62	1.29	2.05
October	6.05	1.76	1.37	2.57
November	8.97	2.28	1.78	3.69
December	9.44	3.37	2.76	4.16

2.9.3.2 Assiniboine River Fish Species

Manitoba Sustainable Development, Fisheries Science Section provided the following list of fish species know to inhabit the Assiniboine River:

- Yellow Perch
- Logperch
- Bigmouth Buffalo
- Fathead Minnow
- Brook Stickleback
- Golden Redhorse
- Bigmouth Shiner
- Walleye
- Longnose Dace
- White Sucker
- Pearl Dace
- River Darter
- Northern Pike
- Carp
- Common Shiner
- Emerald Shiner
- Burbot
- Quillback
- Silver Chub
- Blacknose Shiner
- Blacknose Dace
- Johnny Darter
- Black Bullhead
- Black Crappie

- Blackchin Shiner
- Blacksided darter
- Brown Bullhead
- Central Mudminnow
- Chestnut Lamprey
- Creek Chub
- Finescale Dace
- Flathead Chub
- Freshwater Drum
- Golden Shiner
- Goldeye
- Iowa Darter
- Lake Sturgeon
- Mimic Shiner
- Mooneye
- Ninespine Stickleback
- River Shiner
- Rock Bass
- Sand Shiner
- Sauger
- Shorthead Redhorse
- Silver Redhorse
- Spotfin Shiner
- Spottail Shiner
- Stonecat
- Tadpole Madtom
- Channel Catfish.

According to the Restricted Activity Timing Windows for the Protection of Fish and Fish Habitat in Manitoba, produced by Fisheries and Oceans Canada (DFO), the following are the common spring summer and fall spawning fish with the spawning period in southern Manitoba:

Spring Spawning Fish (April 1 – June 15)	Summer Spawning Fish (May 1 – June 30)	Fall Spawning Fish (September 15 – May 15)
Northern Pike, Walleye, Sauger, Yellow Perch, Suckers, Smallmouth Bass, Arctic Grayling	Channel Catfish, Lake Sturgeon, Goldeye, Mooneye, White Bass, Freshwater Drum, Carmine Shiner*	Brook Trout, Lake Trout, Arctic Char, Lake Whitefish

Of the species listed in the Table above, the Assiniboine River contains several spring and summer spawning fish and thus early life stages can be expected from April 1 to June 30. The Assiniboine River provides year round habitat for a number of fish species and mussel beds.

2.9.3.3 Assiniboine River Water Quality

Information on the water quality of the Assiniboine River was provided by Manitoba Sustainable Development – Water Quality Management Section on May 23, 2019.

The information provided included measurements from station MB05MES049 along the Assiniboine River, downstream of the Qu'Apple River. Data recorded at this station from 2001 to 2003 was reviewed for various water quality parameters. The following table summarizes the key historical water quality parameters of the Assiniboine River.

Table B: Assiniboine River Water Quality Parameters

Parameter	pH	Phosphorus Total (mg/L)	TKN (mg/L)	Ammonia (NH3) (mg/L)	Total Suspended Solids (mg/L)
Minimum	7.4	0.05	0.2	0.01	2.0
Maximum	8.6	0.29	2.9	0.22	150
Average	8.2	0.14	1.0	0.08	50.5

2.9.4 Continuous Discharge

It is proposed that the WWTF would discharge treated effluent into the Assiniboine River. A limiting factor for winter discharge to a receiving body of water can be winter icing, however, due to the size of the river and flows, the river does not freeze to the bottom during the winter months.

The 7Q10 flows for the Assiniboine River (as shown in Table A above), are the minimum average flows for seven consecutive days over a ten year period. For continuous discharge of treated effluent, the expected monthly discharge flow (0.002 m^3/s) was compared to the historical median flows and 7Q10 flows in the river, to determine the potential impacts of adding a continuous discharging system to the watershed. The following table shows the percentage of total flow that would be effluent in the Assiniboine River from a continuously discharged WWTF at St. Lazare.

Table C: Wastewater Discharge Compared to Flow Data from the Assiniboine River

Month	Average Effluent Discharge(m^3/s)	% of Median flow (m^3/s)	% of 7Q10 flow (m^3/s)
January	0.002	0.02%	0.06%
February	0.002	0.02%	0.09%
March	0.002	0.02%	0.24%
April	0.002	0.01%	0.37%
May	0.002	0.01%	0.46%
June	0.002	0.01%	0.36%
July	0.002	0.01%	0.35%
August	0.002	0.03%	0.33%
September	0.002	0.04%	0.16%
October	0.002	0.03%	0.15%
November	0.002	0.02%	0.11%
December	0.002	0.02%	0.07%

Based on the historical flow data provided by Manitoba Conservation and Water Stewardship and the estimated Year 20 discharge flows from the WWTF, it is expected that the continuous discharge flows will be less than 1% of the river flow, even during the lowest 7Q10 flow period.

Therefore, the effluent discharge flows are not expected to have a significant impact on the Assiniboine River flows.

2.10 Effluent Quality Requirements

Any new or expanding wastewater treatment facilities are required to meet the Manitoba *Water Quality Standards, Objectives and Guidelines - Tier 1 Water Quality Standards* at a minimum, along with the Federal *Wastewater Systems Effluent Regulations*, for discharged effluent. The effluent requirements for the WWTF, at a minimum, would include:

- E. coli of 200/100 ml or less
- CBOD of 25 mg/L or less
- TSS of 25 mg/L or less
- Total residual chlorine of 0.02 mg/L or less
- Un-ionized ammonia (as N) of 1.25 mg/L or less, at 15ºC
- 1 mg/L Total Phosphorus or demonstrated nutrient reduction strategy.

Sampling periods under the Federal WSER would be monthly based on an average daily effluent discharge of less than 2,500 m^3/day. Acute Lethality testing at the final discharge point would also be required quarterly. The sampling frequency would become once per year if all four quarterly samples taken in the previous year were determined not to be acutely lethal.

2.11 MBBR Treatment System

A Moving Bed Biofilm Reactor (MBBR) wastewater treatment plant provides enhanced treatment through the use of treatment tanks filled with free flowing plastic media, on which bacteria can grow. Oxygen is provided in the tanks for bacteria growth and mixing. Disinfection would be achieved through the use of a UV treatment system prior to discharge.

The MBBR system would generally consist of the following components:

- an intake screening system
- an equalization tank
- a primary clarifier tank
- an MBBR treatment tank
- a solids separation tank
- an aerated sludge holding tank
- UV disinfection system
- digital control system
- building to house equipment and tanks.

The exact configuration of the system would be determined in the design phase of the project. The biological treatment and ammonia reduction would generally occur in the MBBR treatment tank and the phosphorus reduction would occur in the clarifier and solids separation tanks, with the addition of chemical coagulant. Disinfection would occur with the use of a UV system. The treatment system will have the capability for remote monitoring and access.

2.12 Summary of Design Considerations

The MBBR treatment system will be designed based on the following design criteria:

- A 20 year design period
- A total service population of 345 people from the community of St. Lazare
- A peak day septic tank loading of one tank/day
- A peak daily organic loading rate of 30.4 kg BOD_5/day
- An average daily hydraulic loading rate of 193.0 m^3/day.

Additional features of the mechanical treatment plant would include:

- electrical and communication lines extended to the building
- a compacted granular access approach and parking area
- the gravity main re-routed to the MBBR building
- a discharge pipe from the MBBR building to the Assiniboine River
- a perimeter fence with a locking gate
- a sign at the entrance to the site
- a ditch around the perimeter of the MBBR building.

2.13 Construction Details

The building foundation will be a concrete slab on grade. Any buried tanks will be backfilled with sand or granular material to the specifications of the tank supplier. The above ground equipment will be housed in a heated building, which will be constructed on a concrete slab foundation. A genset unit in an enclosure will also be provided on a concrete pad adjacent to the building for standby power in the event of a power failure. The existing gravity main pipe will be extended to a balance tank at the WWTF. The treated effluent will be continuously discharged to the river via a buried discharge pipe that will extend below the flood protection dike. The pipe installation trenching will require suitable backfill which does not contain large or sharp stones to prevent damage to the pipe. The piping will be installed with a minimum soil cover of 2.5 m below the surface for frost protection. The pipe will be directionally drilled below the flood protection dike and into the river to avoid disturbance of the dike and river bank.

A 1.6 m high fixed knot fence would be installed around the outside of the building and buried tanks, with a locked gate to discourage unauthorized entry. A sludge access port will be required for regular pump outs with a septic hauling truck. An access approach and parking lot area would be constructed with compacted granular material composed of compacted subgrade, geotextile and A base material. The access approach works would include upgrading the existing approach off of Fouillard Avenue.

2.14 WWTF Operation and Maintenance

The operation and maintenance of the proposed WWTF will be conducted by an operator trained by the treatment equipment supplier. In general, the maintenance tasks for a WWTF will include:

- inspecting pumps and equipment
- monitoring flows and effluent parameters
- conducting regular effluent sampling when required
- contacting septic haulers to remove sludge when required
- inspecting chemical levels and ordering more when required
- replacing equipment when required
- reporting any concerns to the equipment supplier
- providing sampling results to Manitoba Sustainable Development and to Environment Canada
- maintaining building and property.

2.15 Lagoon Decommissioning

The existing oxbow lagoon will be decommissioned by disconnecting and capping the gravity main into the primary cell. The lagoon will be discharged into the Assiniboine River if the effluent quality meets the provincial guidelines. As the cell was not engineered or constructed with a liner system it is unknown if the lagoon is hydraulically connected to the river, however a flood protection dike separates the lagoon from the river to prevent overland flooding. After discharging the cell the accumulated sludge will be allowed to naturally dewater in the cell over summer months. After dewatering the RM will propose a sludge disposal plan to Manitoba Sustainable Development, which may include depositing in another lagoon, land application or landfill disposal. After the sludge is removed, the oxbow will be abandoned in place as a wildlife habitat area.

2.16 Sludge Production and Disposal

The operation of the proposed WWTF will produce a regular supply of sludge solids which will need to be removed from the site by a septage hauler. The sludge solids would be hauled to the nearby McAuley wastewater treatment lagoon approximately once every two weeks (depending on the size of the sludge storage tank) as part of the regular maintenance. The McAuley lagoon is also being proposed for expansion and this expansion will take into consideration the proposed loading from the St. Lazare WWTF.

3.0 POTENTIAL ENVIRONMENTAL IMPACTS

The biophysical and socioeconomic environment as related to the development, and potential impacts of the development on the environment.

3.1 Releases to Air, Water, Land

3.1.1 Air

In general, nuisance odours are not a concern in properly operating mechanical treatment plants, as odours typically result from anaerobic conditions. As the treatment system relies on aeration, the potential for odour impacts is expected to be low, and as the effluent is contained in an enclosed building and tanks this also reduces the likelihood for odour nuisances.

There is a potential for greenhouse gas emissions during construction works from heavy equipment and transport vehicles, and from the genset unit during emergency power failures. There is also a potential for impacts from dust generation if conditions are dry and windy during excavation works.

3.1.2 Water

Pollutants that may be released into surface and ground water during the operation of a WWTF include: coliforms, organic wastes, suspended solids, nutrients and other materials that are typically disposed of into the sewer collection system in a residential community. Pollutants in the wastewater produced by the service population are expected to be residential in nature.

Pollutants that have a potential to be released into the surface or ground water during the WWTF construction activities include petroleum hydrocarbons (PHCs) from heavy equipment and sediments from soil erosion.

As the genset unit will operate with diesel fuel, there is the potential for PHCs to be released from an accidental spill or leak from the unit during operation.

Surface Water

Surface water may be impacted if the wastewater is not sufficiently treated and is subsequently released from the WWTF into the Assiniboine River. There is also potential to impact surface waters via sedimentation or equipment leaks/spills during construction works, which reach the low lying marsh area adjacent to the development site.

The effluent discharge from the WWTF should not cause or contribute to flooding in the immediate area of release. There is no potential to impact the navigation of surface waters as a result of the development, as the Assiniboine River near the discharge point is not a navigable body of water.

Positive effects to the environment are expected from a properly sized wastewater treatment system that will produce better quality effluent than the current facultative oxbow lagoon can produce.

Groundwater

There is a potential for groundwater impacts if wastewater leaks/seeps through the tanks or piping and into the groundwater below, however the site would be improved from the existing leakage from the oxbow lagoon. There is also a potential for groundwater impacts from construction equipment or genset leaks or fuel spills onto the ground surface.

3.1.3 Land

The landscape would be altered by construction of the WWTF building, perimeter fencing and perimeter ditching. The building foundation would be slightly higher than the surrounding land to prevent overland flooding from impacting the building. Disturbed land areas can be impacted through soil erosion if not covered or re-vegetated.

Pollutants that may be released to the land during construction activities are typically petroleum hydrocarbons (PHCs) from equipment leaks, or re-fuelling incidences.

3.2 Wildlife

The proposed WWTF development site is located in the "Aspen Parkland" Ecoregion of Canada. Characteristic wildlife includes: white-tailed deer, snowshoe hare, coyote, rabbit, cotton tail, red fox, northern pocket gopher, ground squirrel and waterfowl. No wildlife was observed at development site during the site investigation.

The typical concern on any construction project is that wildlife species would be displaced through the construction works. However from observations made during the site investigation, it is unlikely that the construction works will have any significant impact on wildlife in the area, since the site is currently cut grass land. In addition, the Manitoba Sustainable Development Wildlife and Fisheries Branch was contacted regarding the proposed WWTF development project and they indicated that there were no known occurrences of a species at risk at the proposed development site in the provincial database. There were two bird species identified within 2 km of the site. Refer to the May 8, 2019 email correspondence, attached in Appendix B.

3.3 Fisheries

The typical concerns for impacts to fish and fish habitat are from sediments released during construction and from untreated wastewater effluent discharges into a body of surface water utilized by fish species. These impacts could include the reduction of water quality or physical disturbances that would create an unfavourable environment for fish or fish eggs.

3.4 Forestry

There would be no potential impacts to forestry as the area of the construction works has been previously cleared.

3.5 Vegetation

Characteristic vegetation in the "Aspen Parkland" Ecoregion is a mixture of trembling aspen, oak groves, mixed tall shrubs and intermittent fescue grasslands. During the site investigation the land was a maintained grass field with no designated land use.

The only vegetation expected to be removed from the site will be grasses. There is a minimal concern for the removal of rare or threatened vegetative species through the construction works, since the development area is actively maintained by the RM. The Manitoba Sustainable Development Wildlife and Fisheries Branch was contacted regarding the proposed WWTF development project and they indicated that there were no known occurrences of a species at risk at the proposed development site in the provincial database. There were several vascular plant species identified within 2 km of the site. Refer to the May 8, 2019 email correspondence, attached in Appendix B.

3.6 Noise Impacts

There is a potential for noise impacts in the immediate area of development due to the heavy equipment utilized during construction. Maintenance vehicles and septic hauling trucks will be frequenting the site during the operation of the facility, which may generate some traffic noise. Mechanical components in the facility (i.e. pumps, aerators, generator) have the potential to make noise during the operation.

3.7 Health and Safety

As the wastewater effluent will be monitored in accordance to the provincial Environment Act Licence, there are not expected to be any impacts to human health and safety from effluent discharge.

There is a potential for impacts to the health and safety of workers and the public during the construction works, as heavy equipment will be utilized on site.

3.8 Heritage Resources

The Municipality was not aware of any historic or heritage resources located at the proposed development site or along the discharge piping route. The Manitoba Historic Resources Branch was contacted regarding the proposed site, however they did not provide information regarding concerns from any potential historic sites or heritage resources.

3.9 Socio-Economic Implications

The heavy equipment traffic in the area of the construction would increase temporarily during the construction works. There would be greater traffic to the WWTF during operation from the operator and septic haulers. The construction related economic activity should have a positive economic impact on the nearby community of St Lazare during the construction works. In addition, the increased wastewater treatment capacity should encourage growth in the service area.

3.10 Aesthetics

The development is not expected to have adverse impacts on the general aesthetics of the area, as the building exterior would be approved by the RM and would appear similar to other new buildings in the community. The land surrounding the building will be properly graded, and landscaped after construction is complete.

4.0 MANAGEMENT PRACTICE

Proposed environmental management practices to be employed to prevent or mitigate adverse implications from the impacts identified above.

4.1 Mitigation of Impacts to Air

To reduce the potential for odour nuisance to nearby residents an aeration system will be utilized in the treatment, and wastewater effluent will be enclosed in the building structure. The system will be sized for the projected year 20 peak organic loadings.

Emissions from construction equipment and transport vehicles will be controlled through regular maintenance by the construction contractor, and will meet all provincial and local standards. Emissions requirements for the genset will be met by the genset supplier. Dust suppression methods (i.e. water spraying) will be utilized at the construction site if dry conditions create excessive dust through construction activities and transport, which becomes a nuisance to nearby residents.

4.2 Mitigation of Impacts to Water

Surface Water

Impacts to surface waters from discharge of treated effluent are not expected, as the effluent would be treated to the Provincial and Federal Standards and in accordance with the Environment Act Licence during operation and would be tested regularly due to the continuous discharge system.

Siltation in surrounding water bodies from erosion of any excess material stockpiles would be prevented by either covering any bare soil stockpiles or seeding with grass. Sten logs would be installed in the perimeter ditching and roadside ditching, and should remain in place until grass growth is established on disturbed areas of the site. Perimeter ditch slopes would be seeded with grass to help control erosion and sediment entry into the roadside ditching. Disturbance of the soils adjacent to the perimeter ditches would be minimized during construction.

To minimize impacts from construction equipment on surface waters, the construction specifications should outline to the contractor the requirements for handling and storage of fuels and hazardous materials during construction, as per federal and provincial regulations. The specification should state wording similar to the following:

- Diesel or gasoline should be stored in double walled tanks or have containment dikes around fuel containers for volumes greater than 68.2 L (15 gallons) or in compliance with provincial regulations
- Clean up material should be available at the site, consisting of a minimum of 25 kg of suitable commercial sorbent, 30 m^2 of 6 mil PVC, and an empty fuel barrel for spill collection and disposal
- Fuel storage and hazardous material areas established for project construction should be located a minimum of 100 m from a water body, and comply with provincial regulations

- Waste hazardous materials from construction activities and equipment must be properly collected and disposed of in compliance with provincial regulations
- Hazardous material handling and storage are to follow all provincial and federal regulations including WHMIS and spill containment requirements
- In the event of spills or leaks of fuels and hazardous materials in excess of 100 L, the contractor or operator should notify the project engineer and provincial authorities.

The specifications should state that when working near water with construction equipment:

- Construction equipment is to be properly maintained to prevent leaks and spills of fuels, lubricants, hydraulic fluids or coolants
- There can be no re-fueling or servicing of construction equipment within 100 m of a water body.

Groundwater

Seepage of effluent from the WWTF is unlikely as the containment tanks will be tested prior to commissioning to ensure there are no leaks. The piping installed will also be inspected and pressure tested to ensure there are no leaks. Any leaks from the piping would be detected by effluent pooling on the ground surface, at which point the pipe would be exposed and repaired.

Mitigation of potential impacts to groundwater during the construction and operation activities from fuel handling, equipment leaks or fuel spills, would follow the same procedures as described above for surface waters.

4.3 Mitigation of Impacts to Land

To minimize the potential for the release of PHCs into the soil, the mitigation measures described in Section 4.2 above outlining fuel handling procedures should be followed.

To minimize the potential for soil erosion, disturbed areas of exposed soil would be seeded with grass.

4.4 Mitigation of Impacts to Wildlife

The contractor will conduct an inspection of the proposed development site to ensure that no wildlife species are located within the boundaries of the site or will be impacted by the proposed construction works. If a wildlife species or wildlife habitat is encountered Manitoba Sustainable Development will be contacted for guidance.

4.5 Mitigation of Impacts to Fisheries

The WWTF will treat wastewater to reduce the total ammonia and un-ionized ammonia levels to below provincial and federal requirements. The discharge into the Assiniboine River will be the same as what is currently occurring from the lagoon cells, however the treated effluent will be a higher quality when the development is complete.

4.6 Mitigation of Noise Impacts

To minimize the potential for noise impacts, construction equipment and transport vehicles should have mufflers working properly, and construction activities should be limited to daylight hours only.

The mechanical equipment (pumps, aerators, etc.) will be located inside of the treatment building, and the genset unit will be in a weather resistant enclosure, which should limit noise impacts to the environment and nearby residences. The nearest residence is 240 m away, therefore noise impacts are not expected to be a nuisance.

4.7 Mitigation of Impacts to Health and Safety

To minimize impacts to health and safety of workers and the public, the construction contractor is to have a safety program in place, in accordance with all federal and provincial health and safety regulations. During construction, site access will be limited to the construction crew only and warning signs will be posted at the entrance to the construction site and any open excavation areas left unattended will be clearly marked and fenced. Personal protective equipment should be worn by anyone on the construction site, in accordance with the contractor's safety program.

4.8 Mitigation of Impacts to Heritage Resources

If any significant historic or heritage resources are discovered in the course of excavation or construction, the works are to temporarily cease and an investigation of the site is to be conducted by the Municipality, Manitoba Historic Resources Branch and any other provincial and federal authority, as may be required.

5.0 RESIDUAL AND CUMULATIVE EFFECTS

Residual environmental effects remaining after the application of mitigation measures, to the extent possible expressed in quantitative terms relative to baseline conditions

No negative residual effects are anticipated through the construction and operation of the WWTF, due to the mitigation measures described above. Positive residual effects to the environment are expected from a properly sized wastewater treatment system that will produce better quality effluent than the current facultative lagoon can produce.

No negative cumulative effects are anticipated from other construction works in the area, as the RM is not planning any significant construction works at the same time.

6.0 MONITORING AND FOLLOW-UP

Proposed follow-up activities that will be required at any stage of development (eg. Monitoring, inspection, surveillance, audit, etc.)

Monitoring of the WWTF operation is to be conducted by an operator trained directly by the treatment system supplier. The operation is to ensure the WWTF is operated under the requirements of the Environment Act licence. Duties of the operator include:

- inspecting equipment daily
- monitoring flows and effluent parameters
- conducting regular sampling of effluent
- ensuring water quality parameters as described in the Environment Act licence are met
- submitting report of sampling results to Provincial and Federal departments as required.

If there are any concerns with the operation of the WWTF, the operator will discuss the concerns with the treatment system supplier. If the effluent quality does not meet the Environment Act Licence, the owner is to contact the local environment officer to discuss mitigation options. The construction contractor is to ensure that grass growth occurs on slopes and disturbed areas, after the construction activities are completed.

7.0 FUNDING AND APPROVALS

Name and address of any Government Agency or program (federal, provincial or otherwise) from which a grant or loan of capital funds have been requested (where applicable). Other federal, provincial or municipal approvals, licences, permits, authorizations, etc. known to be required for the proposed development, and the status of the project's application or approval.

The project will be funded by the RM of Ellice-Archie, with potential funding through a provincial grant. No additional approvals, licences or permits are required for the WWTF construction and operation. The owner will also be responsible for registering the WWTF with Environment Canada and providing annually monitoring reports to Environment Canada under the *Federal Wastewater Systems Effluent Regulations*.

8.0 PUBLIC CONSULTATION

Results of any public consultations undertaken or to be undertaken in conjunction with project planning.

Public comments will be received by Manitoba Sustainable Development through the public registry during the Environmental Act Proposal review period.

9.0 CONCLUSION

Based on the design of the project and the implementation of the mitigation measures, identified in Section 4.0 above, no significant negative environmental impacts are anticipated. Positive effects to the environment are expected from a properly sized wastewater treatment system that will produce better quality effluent than the current facultative lagoon can produce.

The proponent would like to complete the requirements of the Environment Act Proposal as soon as possible so that the design works can begin when funding becomes available.

JR Cousin Consultants Ltd. requests that a draft copy of the Environment Act Licence be forwarded for review prior to the issue of the final licence.

APPENDIX

Appendix A

Status of Title

Table 1: St Lazare - Population and Wastewater Loading Projections

Appendix B

Wildlife and Fisheries Branch Email Correspondence, Manitoba Sustainable Development, May 8, 2019

Manitoba Conservation and Water Stewardship – Memorandum, May 17, 2019

Appendix C

Test Hole Location Plan

Test Hole Logs

Soils Analysis Report, AMEC Foster Wheeler, June 28, 2017

Driller Well Log Reports

Sludge Assessment Report, Assiniboine Injections Ltd., August, 2016

Appendix D

Title Page

Plan 1: Proposed WWTF Layout Plan

Plan 2: Access Approach, Fence, Gate, Lock and Sign Details

Plan 3: Sten Log, Pipe Trench and Ditch Details

Appendix A

Status of Title

Table 1: St Lazare - Population and Wastewater Loading Projections

Status of Title

STATUS OF TITLE

Title Number **2020792/5**
Title Status **Accepted**
Client File

The Property Registry
A Service Provider for the Province of Manitoba

1. REGISTERED OWNERS, TENANCY AND LAND DESCRIPTION

VILLAGE OF ST. LAZARE

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

AT ST. LAZARE AND BEING:
LOT 2 BLOCK 1 SP 7433 NLTO
EXC FIRSTLY: WATER CONTROL WORKS PLAN 42807 NLTO
EXC SECONDLY: ALL MINES AND MINERALS IN TRANSFER 51805 NLTO
IN S 1/2 17-17-28 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

Instrument Type:	**Caveat**
Registration Number:	**1024999/5**
Instrument Status:	**Accepted**
Registration Date:	2002-08-12
From/By:	MTS COMMUNICATIONS INC.
To:	
Amount:	
Notes:	No notes
Description:	EASEMENT AGREEMENT

3. ADDRESSES FOR SERVICE

VILLAGE OF ST. LAZARE
BOX 100
ST. LAZARE MB
R0M 1Y0

4. TITLE NOTES

No title notes

5. LAND TITLES DISTRICT

Neepawa

6. DUPLICATE TITLE INFORMATION

Duplicate Produced for: HOLD FOR PROD OF DUPL CT NO(S) 237695

7. FROM TITLE NUMBERS

1676496/5 Balance

8. REAL PROPERTY APPLICATION / CROWN GRANT NUMBERS

No real property application or grant information

9. ORIGINATING INSTRUMENTS

Instrument Type: **Request To Issue Title - Internal**
Registration Number: **1038644/5**

Registration Date: 2004-06-08
From/By: VILLAGE OF ST. LAZARE
To:
Amount:

10. LAND INDEX

Lot 2 Block 1 Plan 7433
IN S 1/2 17-17-28W EX WCW PLAN 42807 EX M&M

CERTIFIED TRUE EXTRACT PRODUCED FROM THE LAND TITLES DATA STORAGE SYSTEM OF TITLE NUMBER 2020792/5

Table 1: St Lazare - Population and Wastewater Loading Projections

TABLE 1

ST LAZARE - POPULATION AND WASTEWATER LOADING PROJECTIONS

Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	Col 8	Col 9	Col 10	Col 11	Col 12	Col 13	Col 14	Col 15
Calendar Year	Project Year	Population				Organic Loading					Hydraulic Loading			
		Community Population (linear growth)*	Bussed-in Students (No growth rate applied) # Students	Bussed-in Students (No growth rate applied) Equivalent population	Total Population on Piped System	Daily Per Capita BOD_5 Loading (Piped Collection System) (kg/person/day)	Daily BOD_5 Loading (Piped System) (kg/day)	Maximum Daily BOD_5 Loading (Truck Haul) (kg/day)	Maximum Total Daily BOD_5 Loading (All Sources) (kg/day)	Primary Cell Surface Area @ 0.75 m Depth (m^2)	Daily Per Capita Hydraulic Loading (L/person/day)	Infiltration Allowance (30%) (L/person/day)	Daily Hydraulic Loading (m^3/day)	Total Lagoon Storage Volume Required (230 Days) (m^3)
2018	0	254	50	17	271	0.076	20.6	4.2	24.8	4,428	430.9	129.3	151.8	34,917
2019	0	258	50	17	275	0.076	20.9	4.2	25.1	4,475	430.9	129.3	153.8	35,368
2020	1	261	50	17	278	0.076	21.1	4.2	25.3	4,523	430.9	129.3	155.7	35,819
2021	2	265	50	17	282	0.076	21.4	4.2	25.6	4,570	430.9	129.3	157.7	36,270
2022	3	268	50	17	285	0.076	21.7	4.2	25.9	4,618	430.9	129.3	159.7	36,721
2023	4	272	50	17	289	0.076	21.9	4.2	26.1	4,665	430.9	129.3	161.6	37,172
2024	5	275	50	17	292	0.076	22.2	4.2	26.4	4,713	430.9	129.3	163.6	37,623
2025	6	279	50	17	296	0.076	22.5	4.2	26.7	4,760	430.9	129.3	165.5	38,074
2026	7	282	50	17	299	0.076	22.7	4.2	26.9	4,808	430.9	129.3	167.5	38,525
2027	8	286	50	17	303	0.076	23.0	4.2	27.2	4,855	430.9	129.3	169.5	38,976
2028	9	289	50	17	306	0.076	23.3	4.2	27.5	4,903	430.9	129.3	171.4	39,427
2029	10	293	50	17	310	0.076	23.5	4.2	27.7	4,950	430.9	129.3	173.4	39,878
2030	11	296	50	17	313	0.076	23.8	4.2	28.0	4,998	430.9	129.3	175.3	40,329
2031	12	300	50	17	317	0.076	24.1	4.2	28.3	5,045	430.9	129.3	177.3	40,780
2032	13	303	50	17	320	0.076	24.3	4.2	28.5	5,093	430.9	129.3	179.3	41,231
2033	14	307	50	17	324	0.076	24.6	4.2	28.8	5,140	430.9	129.3	181.2	41,682
2034	15	310	50	17	327	0.076	24.9	4.2	29.1	5,188	430.9	129.3	183.2	42,133
2035	16	314	50	17	331	0.076	25.1	4.2	29.3	5,235	430.9	129.3	185.1	42,584
2036	17	317	50	17	334	0.076	25.4	4.2	29.6	5,283	430.9	129.3	187.1	43,035
2037	18	321	50	17	338	0.076	25.7	4.2	29.9	5,330	430.9	129.3	189.1	43,486
2038	19	324	50	17	341	0.076	25.9	4.2	30.1	5,378	430.9	129.3	191.0	43,936
2039	**20**	**328**	50	17	**345**	0.076	26.2	4.2	**30.4**	**5,425**	430.9	129.3	**193.0**	**44,387**

*Future growth is based upon addition of a 20-lot subdivision, at 3.5 people/lot, over the 20-year projection period.

Appendix B

Wildlife and Fisheries Branch - Email Correspondence, Manitoba Sustainable Development, May 8, 2019

Manitoba Conservation and Water Stewardship – Memorandum, May 17, 2019

Wildlife and Fisheries Branch - Email Correspondence, Manitoba Sustainable Development, May 8, 2019

Oswald Wohlgemut

From: Murray, Colin (SD) [Colin.Murray@gov.mb.ca]
Sent: Wednesday, May 08, 2019 5:09 PM
To: 'Oswald Wohlgemut'
Subject: Data request O Wohlgemut JR Cousin Consult 20190426 St lazare wastewater treatment project

Hi Oswald
Thank you for your information request. I completed a search of the Manitoba Conservation Data Centre's (CDC) rare species database for your area of interest. This includes the primary location:
SW-17-017-28W1; and a two kilometer radius buffer from the edge of the location boundary.

The search resulted in the following occurrences:

Within the footprint or primary location(s):
SW-17-017-28W1: No listed or tracked species occurrences at this time.

Within 2km of the footprint boundary:

TAXGROUP	SCINAME	COMNAME	SRANK	ESEA	SARA
Vascular Plant	Cyperus schweinitzii	(Schweinitz's Flatsedge)	S2	NA	NA
Vertebrate Animal	Chordeiles minor	(Common Nighthawk)	S3B	Threatened	Threaten
Vertebrate Animal	Dolichonyx oryzivorus	(Bobolink)	S4B	NA	Threaten
Vascular Plant	Townsendia exscapa	(Silky Townsend-daisy)	S2	NA	NA
Vascular Plant	Achnatherum hymenoides	(Indian Rice Grass)	S2	NA	NA

General area records low locational accuracy:

TAXGROUP	SCINAME	COMNAME	SRANK	ESEA	SARA
Vascular Plant	Erigeron caespitosus	(Tufted Fleabane)	S1	NA	NA
Vascular Plant	Penstemon nitidus	(Smooth Blue Beard-tongue)	S2	NA	NA
Vascular Plant	Euphorbia geyeri	(Geyer's Spurge)	S2	NA	NA
Vascular Plant	Dichanthelium wilcoxianum	(Sand Millet)	S2?	NA	NA
Vascular Plant	Corispermum americanum var. americanum	(American Bugseed)	S3	NA	NA
Vascular Plant	Corispermum villosum	(Hairy Bugseed)	S1S2	NA	NA

Found in broader area and similar habitat:
NA

Further information on this ranking system can be found on our website at: http://www.natureserve.org/conservation-tools/conservation-status-assessment.
These designations can be found at:
http://web2.gov.mb.ca/laws/statutes/ccsm/e111e.php,
https://www.canada.ca/en/environment-climate-change/services/committee-status-endangered-wildlife.html and
http://www.sararegistry.gc.ca/default.asp?lang=En&n=24F7211B-1.

Manitoba's recommended setback distances can be found at: https://www.gov.mb.ca/sd/pubs/conservation-data-centre/mbcdc_bird_setbacks.pdf.

The information provided in this letter is based on existing data known to the Manitoba CDC of the Wildlife and Fisheries Branch at the time of the request. These data are dependent on the research and observations of CDC staff and others who have shared their data, and reflect our current state of knowledge. **An absence of data does not confirm the absence of any rare or endangered species.** Many areas of the province have never been thoroughly surveyed, however, and the absence of data in any particular geographic area does not necessarily mean that species or ecological communities of concern are not present. The information should, therefore, not be regarded as a final statement on the occurrence of any species of concern nor should it substitute for on-site surveys for species or environmental assessments. Also, because our Biotics database is continually updated and because information requests are evaluated by type of action, any given response is only appropriate for its respective request.

Please contact the Manitoba CDC for an update on this natural heritage information if more than six months passes before it is utilised.

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

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

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

If you have any questions or require further information contact me directly at (204) 945-7760.

Colin

Reference screen clip:

Colin Murray
Information Manager
Manitoba Conservation Data Centre
Wildlife and Fisheries Branch
Department of Sustainable Development

200 Saulteaux Crescent
Winnipeg, Manitoba, R3J3W3
204-945-7760
colin.Murray@gov.mb.ca
http://www.gov.mb.ca/sd/cdc/index.html

From: Oswald Wohlgemut <owohlgemut@jrcc.ca>
Sent: April-26-19 2:43 PM

Manitoba Conservation and Water Stewardship – Memorandum, May 17, 2019

Manitoba
Conservation and Water Stewardship

Memorandum

DATE: May 17, 2019

TO: Oswald Wohlgemut
Environmental Scientist
J.R. Cousin Consultants Ltd.

FROM: Sung Joon Kim, Ph.D., P. Eng.
Hydrologic Applications and Research Engineer
Surface Water Management Section
Water Science and Management Branch
Manitoba Sustainable Development

PHONE NO.: 204-619-2110
FAX NO.: 204-948-2357

SUBJECT: Low Flows for Assiniboine River near St. Lazare

This memo responds to the low flow information request for the location of SW 17-17-28 WPM near the Assiniboine River near St. Lazare. The Assibinoine River near St. Lazare (05ME802) hydrometric station records only water level information. The area of interest is located before the confluence of the Assiniboine River and the Qu'Appelle River. There are two hydrometric station with flow records upstream of St. Lazare: the Assiniboine River near Russell (05ME001) and the Assiniboine River at Shellmouth Bridge (05MD801). The Assiniboine River near Russell station has flow records from 1913 to 2017 but the records include noticeable missing data for 1930s, 1940s, and the years from 2013 to 2017. As the Assiniboine River at Shellmouth Bridge station records are available for the period of 1969 – 2014 to fill in the missing data for the Assiniboine River near Russell and the Shellmouth Dam was built in late 1960s, the low flow analysis was conducted for the period of 1969 – 2014 at the Assiniboine River near Russell station as shown in Table 1.

Table 1: Statistics of Low Flows and Monthly Averages for Assiniboine River near Russell [unit: m^3/s]

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Open Water	Winter	Water Year
$1Q_{10}$	3.62	2.89	1.20	0.78	0.76	1.01	1.02	1.03	1.62	1.76	2.28	3.37	0.63	1.09	0.56
$7Q_{10}$	3.11	2.20	0.83	0.54	0.43	0.56	0.57	0.61	1.29	1.37	1.78	2.76	0.44	0.82	0.40
$30Q_{10}$	4.16	3.12	1.72	1.13	1.12	1.21	1.28	1.57	2.05	2.57	3.69	4.16	0.96	1.76	0.90
Minimum	0.62	0.76	0.92	1.19	0.65	0.69	0.61	0.74	0.88	1.24	2.65	3.04			
Median	9.89	10.40	12.10	13.95	17.10	15.60	14.80	7.81	5.33	6.05	8.97	9.44			
Lower Quartile	7.12	6.23	5.29	4.74	2.33	2.65	3.32	4.09	3.72	4.54	6.38	6.43			

Original Signed By

Sung Joon Kim, Ph.D., P. Eng.

Cc: Mark Lee, Tara Wiess

Appendix C

Test Hole Location Plan

Test Hole Logs

Soils Analysis Report, AMEC Foster Wheeler, June 28, 2017

Driller Well Log Reports

Sludge Assessment Report, Assiniboine Injections Ltd., August, 2016

Test Hole Location Plan

SCALE BAR
(IN METRES)

40 0 20 40 80 120 160 200

1:2000

No.	REVISIONS	DATE	INITIALS

B.M. EL.

LOCATIONS OF UNDERGROUND STRUCTURES/UTILITIES AS SHOWN ARE BASED ON AVAILABLE INFORMATION BUT NO GUARANTEE IS GIVEN OR IMPLIED THAT ALL EXISTING UNDERGROUND STRUCTURES/UTILITIES ARE SHOWN OR THAT THE GIVEN LOCATIONS ARE EXACT. CONFIRMATION OF EXISTENCE AND EXACT LOCATION OF ALL UNDERGROUND STRUCTURES/UTILITIES MUST BE OBTAINED FROM THE APPROPRIATE AUTHORITY/OWNER, BY THE CONTRACTOR, BEFORE PROCEEDING WITH CONSTRUCTION.

ENGINEER'S SEAL

PRELIMINARY

JR Cousin Consultants Ltd.
91A Scurfield Blvd. Winnipeg MB R3Y 1G4
p. (204) 489-0474
f. (204) 489-0487
www.jrcc.ca
ENGINEERING CONSULTANTS
ENGINEERING EXCELLENCE SINCE 1981

CODE:	E-730.01
DESIGNED BY:	OW
DRAWN BY:	RH
REVIEWED BY:	

PROJECT:
RM OF ELLICE-ARCHIE
ST LAZARE LAGOON PREDESIGN STUDY

TITLE:
PROPOSED DEVELOPMENT AREA AND TESTHOLE LOCATION PLAN

SCALE:	DATE:	PLAN:	SHEET:
1:2000	17/09/14	1	1 of 5

Sep 28, 2017 - 8:28am P:\700\730 Elkhorn-Kettle Hills\730.01 St Lazare Lagoon Study and EA\04 Drawing\Dwg\Pre Design Study\Plan 1 Testhole Location Plan.dwg

Test Hole Logs

J. R. Cousin Consultants Ltd.

TEST HOLE LOGS

SYMBOL INDEX


GW. : Well graded gravels and gravel sand mixtures, little or no fines


GP. : Poorly graded gravels, gravel - sand mixtures, little or no fines


GM. : Silty gravels, gravel-sand-silt mixtures


GC. : Clayey gravels, gravel-sand-clay mixtures


SW. : Well graded sands, gravelly sands, little or no fines


SP. : Poorly graded sands, or gravelly sands, little or no fines


SM. : Silty sands, sand-silt mixtures


SC. : Clayey sands, sand-clay mixtures


ML. : Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity


CL. : Inorganic clays of low plasticity, gravelly clays, sandy or silty clays, lean clays


OL. : Organic silts and organic silty clays of low plasticity


CI. : Inorganic clays of medium or intermediate plasticity


MH. : Inorganic silts, fine sandy or silty soils


CH. : Inorganic clays of high plasticity, fat clays


OH. : Organic clays of medium to high plasticity, organic silts


Pt. : Peat, humus, swamp soils with high organic contents


TOPSOIL

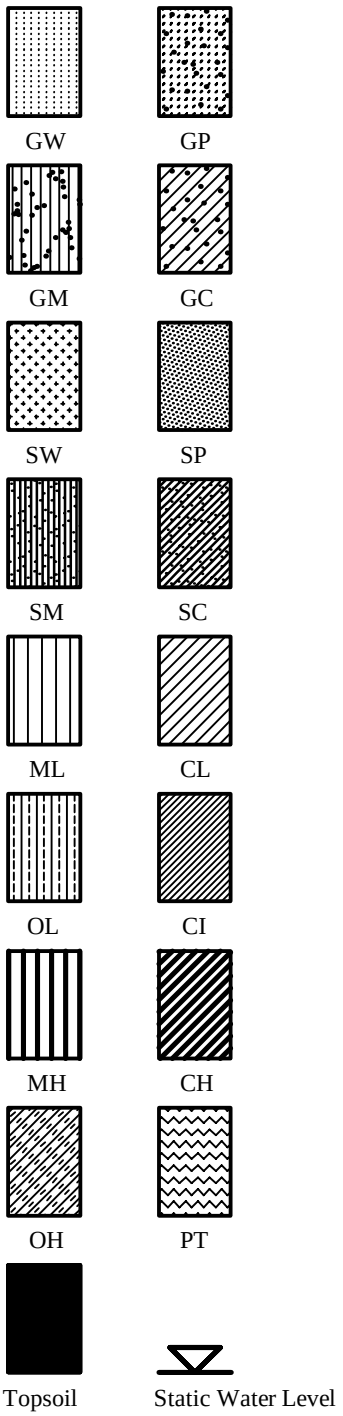
The soil logs are based upon objective data available to us at the time of forming our opinions. The soil logs indicate site specific soil characteristics and must not be generalized over larger areas due to the limited number of test holes as compared to that of an unlimited number of test holes. Every effort is made to evaluate the information by methods generally recognized. The soil logs represent our opinions. J.R. Cousin Consultants Ltd. cannot be responsible for actual site conditions proved to be materially at variance from our analysis or from the data generalization over untested areas.

J. R. Cousin Consultants Ltd.

TEST HOLE LOG SHEET

LOCATION : West of St. Lazare Lagoon
CODE : E-730.01
DATE : May 2, 2017
COORDINATES: 5591267 N, 335782 E
ELEVATION : 388.97m
PROJECT : St. Lazare Lagoon Study
METHOD OF SAMPLING : Drill Rig
TEST HOLE # 1

DEPTH OF SAMPLE	FIELD CLASSIFICATION
0m / 0	TOPSOIL - Black, silty, clayey, moist
	SILT - Brown, medium plastic, clayey, wet, soft
2'	
1m	SILTY SAND - Brown, low plastic, saturated, very soft
4'	
6'	
2m	CLAY - Brown, high plastic, silty, saturated, very soft
8'	
3m / 10'	SAND - Brown, coarse grain, stones, saturated, very soft
12'	
4m	
14'	
16'	SAND - Grey, coarse grain, stones, saturated, very soft
5m	
18'	
6m / 20'	- Standing water at 1.4m



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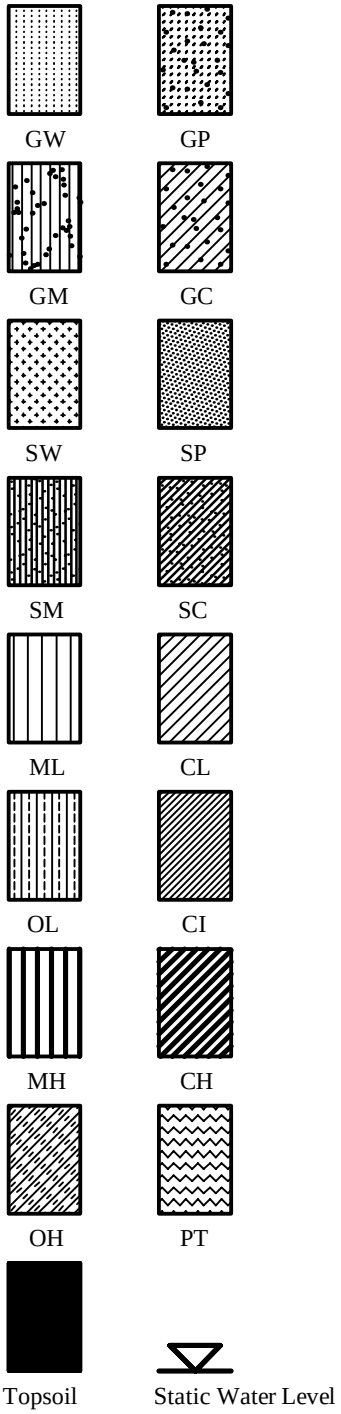
J. R. Cousin Consultants Ltd.

TEST HOLE LOG SHEET

LOCATION : West of St. Lazare Lagoon
CODE : E-730.01
DATE : May 2, 2017
COORDINATES: 5591219 N, 335770 E
ELEVATION : 388.79m
PROJECT : St. Lazare Lagoon Study
METHOD OF SAMPLING : Drill Rig
TEST HOLE # 2

DEPTH OF SAMPLE		FIELD CLASSIFICATION
0m	0	TOPSOIL - Black, silty, clayey, moist
	2'	SILT - Brown, medium plastic, clayey, wet, soft
1m	4'	
	6'	CLAY - Brown, high plastic, silty, saturated, very soft
2m	8'	
3m	10'	SAND - Brown, coarse grain, stones, saturated, very soft
	12'	
4m	14'	
	16'	SAND - Grey, coarse grain, stones, saturated, very soft
5m	18'	
6m	20'	- Standing water at 1.4m



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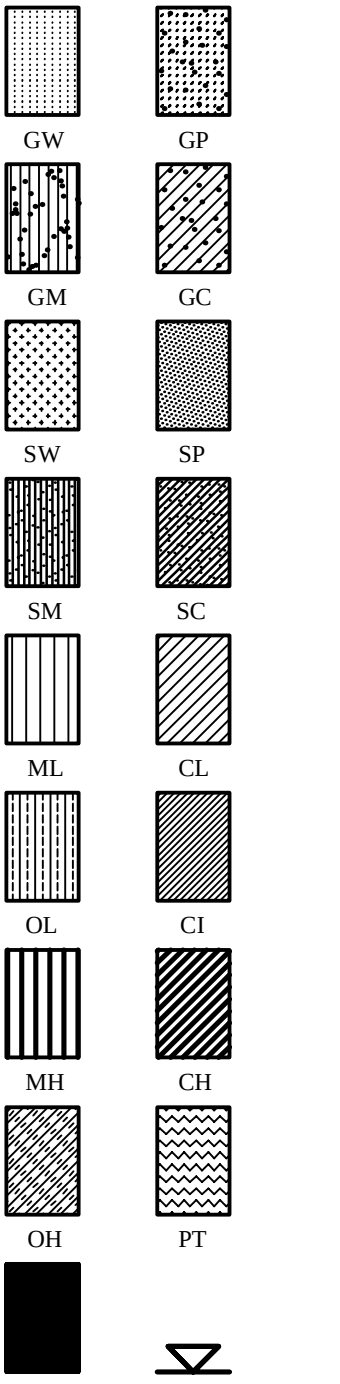
J. R. Cousin Consultants Ltd.

TEST HOLE LOG SHEET

LOCATION : West of St. Lazare Lagoon
CODE : E-730.01
DATE : May 2, 2017
COORDINATES: 5591227 N, 335747 E
ELEVATION : 389.85m
PROJECT : St. Lazare Lagoon Study
METHOD OF SAMPLING : Drill Rig
TEST HOLE # 3

DEPTH OF SAMPLE	FIELD CLASSIFICATION
0m / 0	GRAVEL FILL - Brown, sandy, clayey, moist
2'	CLAY - Brown, medium plastic, sandy, damp, hard
1m / 4'	
	SILT - Brown, low plastic, sandy, moist, stiff
6'	
2m / 8'	
	SAND - Brown, medium grain, saturated, very soft
3m / 10'	
	- Standing water at 1.8m
12'	
4m / 14'	
16'	
5m / 18'	
6m / 20'	



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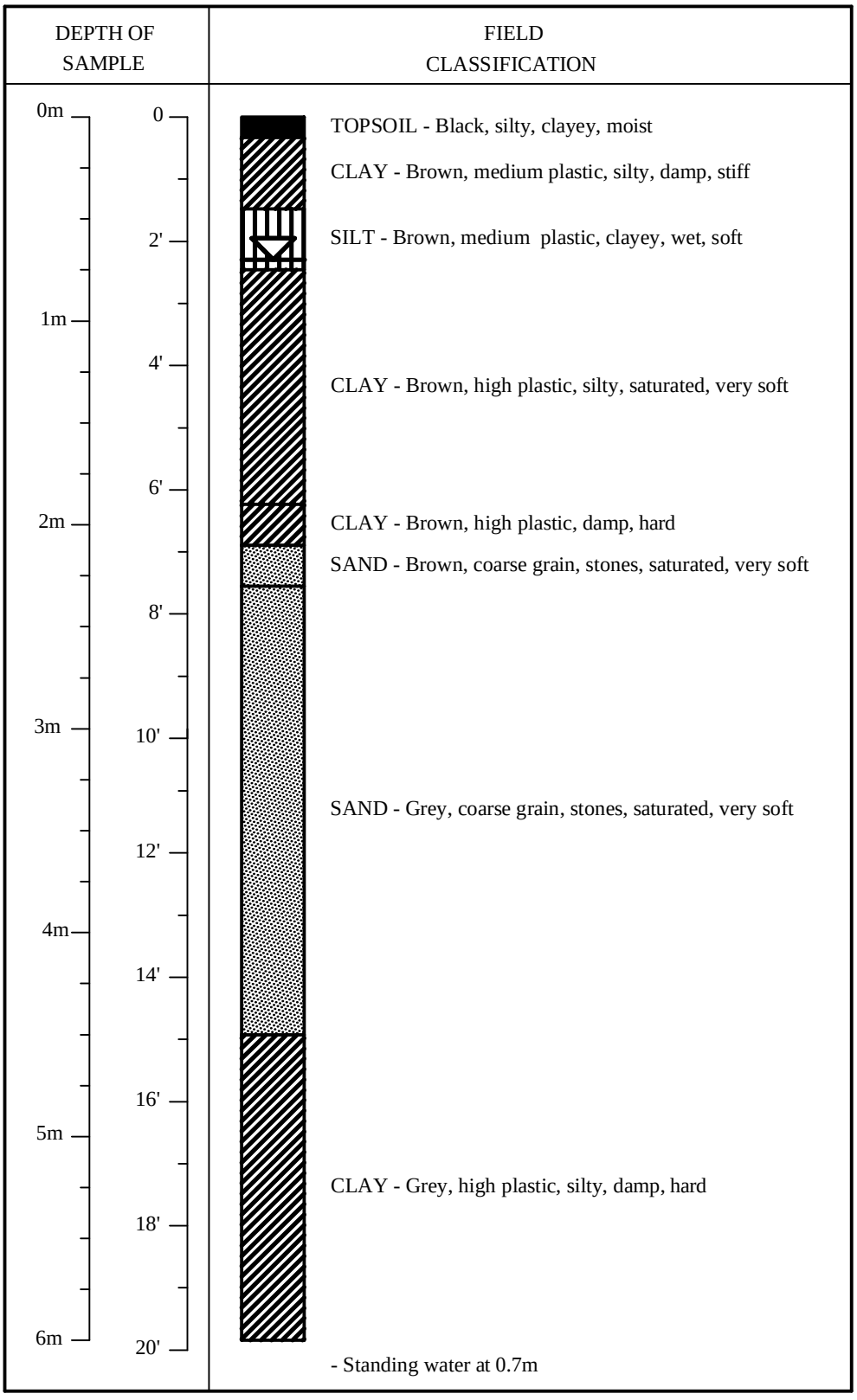
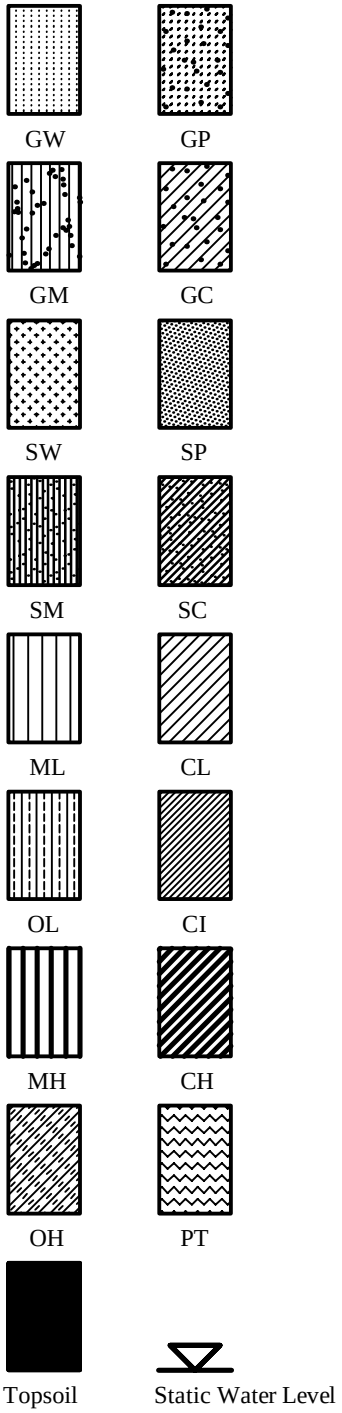
TEST HOLE LOG SHEET

LOCATION : West of St. Lazare Lagoon
CODE : E-730.01
DATE : May 2, 2017
COORDINATES: 5591254 N, 335845 E
ELEVATION : 388.12m
PROJECT : St. Lazare Lagoon Study
METHOD OF SAMPLING : Drill Rig
TEST HOLE # 4





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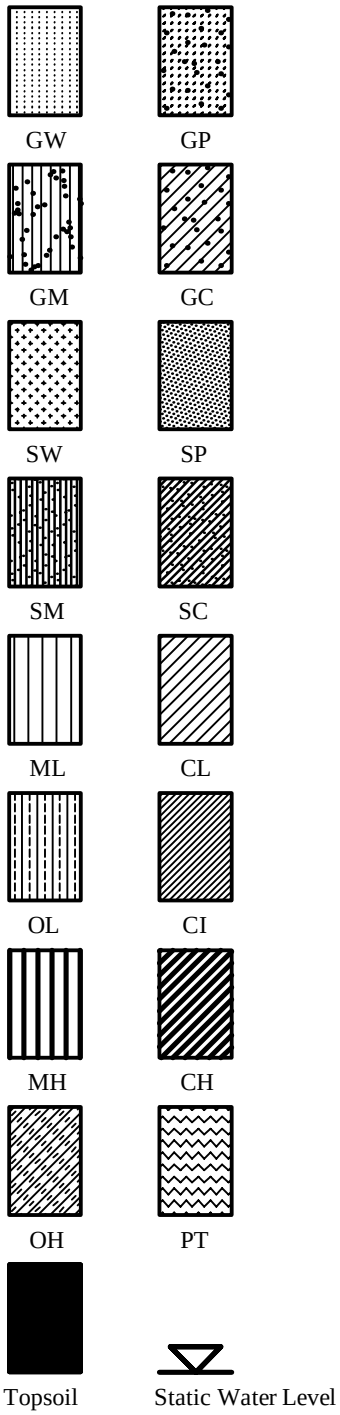
J. R. Cousin Consultants Ltd.

TEST HOLE LOG SHEET

LOCATION : West of St. Lazare Lagoon
CODE : E-730.01
DATE : May 2, 2017
COORDINATES: 5591193 N, 335824 E
ELEVATION : 388.03m
PROJECT : St. Lazare Lagoon Study
METHOD OF SAMPLING : Drill Rig
TEST HOLE # 5

DEPTH OF SAMPLE	FIELD CLASSIFICATION
0m / 0	TOPSOIL - Black, silty, clayey, moist
	CLAY - Brown, medium plastic, silty, damp, firm
2'	
1m	
4'	
	CLAY - Brown, high plastic, silty, saturated, very soft
6'	
2m	
8'	
3m / 10'	
	SAND - Grey, coarse grain, stones, saturated, very soft
12'	
4m	
14'	
16'	
5m	
	CLAY - Grey, high plastic, silty, damp, firm to hard
18'	
6m / 20'	
	- Standing water at 0.9m



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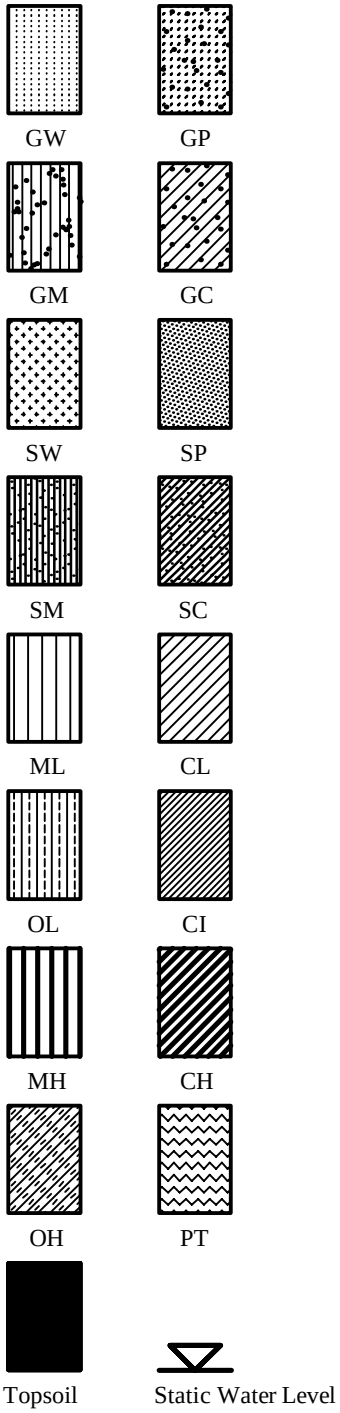
J. R. Cousin Consultants Ltd.

TEST HOLE LOG SHEET

LOCATION : West of St. Lazare Lagoon
CODE : E-730.01
DATE : May 2, 2017
COORDINATES: 5591126 N, 335897 E
ELEVATION : 387.76m
PROJECT : St. Lazare Lagoon Study
METHOD OF SAMPLING : Drill Rig
TEST HOLE # 6

DEPTH OF SAMPLE	FIELD CLASSIFICATION
0m / 0	TOPSOIL - Black, silty, clayey, moist
	CLAY - Brown, medium plastic, silty, damp, firm
2'	
1m	
4'	CLAY - Brown, high plastic, silty, saturated, very soft
6'	
2m	
8'	SAND - Grey, medium grain, saturated, very soft
3m / 10'	
12'	SAND - Grey, coarse grain, stones, saturated, very soft
4m / 14'	
16'	
5m	CLAY - Grey, high plastic, silty, damp, firm to hard
18'	
6m / 20'	- Standing water at 0.3m



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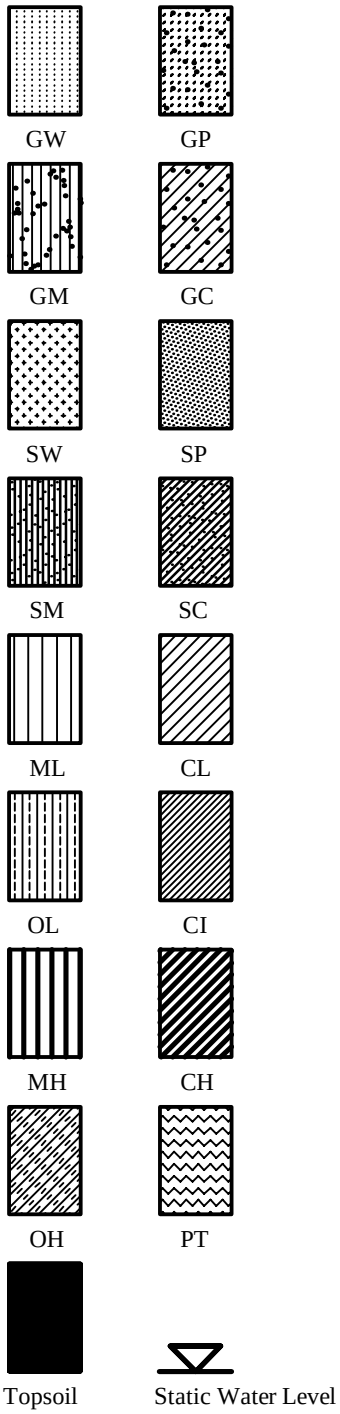
J. R. Cousin Consultants Ltd.

TEST HOLE LOG SHEET

LOCATION : West of St. Lazare Lagoon
CODE : E-730.01
DATE : May 2, 2017
COORDINATES: 5591126 N, 335793 E
ELEVATION : 388.23m
PROJECT : St. Lazare Lagoon Study
METHOD OF SAMPLING : Drill Rig
TEST HOLE # 7

DEPTH OF SAMPLE	FIELD CLASSIFICATION
0m / 0	TOPSOIL - Black, silty, clayey, moist
	CLAY - Brown, medium plastic, silty, damp, firm
2'	
1m / 4'	CLAY - Brown, high plastic, silty, saturated, very soft
6'	
2m / 8'	CLAY - Grey, high plastic, damp, hard
	SAND - Brown, coarse grain, stones, saturated, very soft
3m / 10'	
12'	
4m / 14'	SAND - Grey, coarse grain, stones, saturated, very soft
16'	
5m / 18'	CLAY - Grey, high plastic, silty, damp, firm to hard
6m / 20'	
	- Standing water at 0.8m



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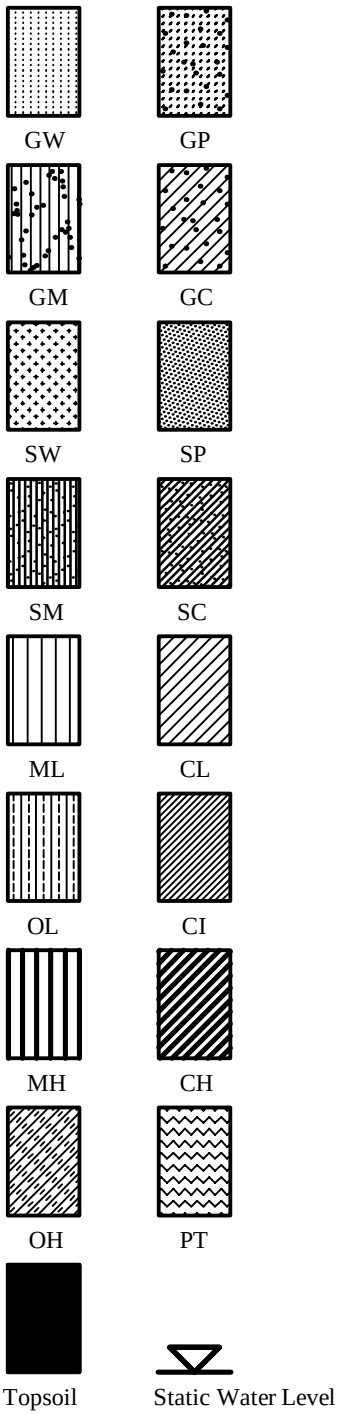
J. R. Cousin Consultants Ltd.

TEST HOLE LOG SHEET

LOCATION : West of St. Lazare Lagoon
CODE : E-730.01
DATE : May 2, 2017
COORDINATES: 5591155 N, 335755 E
ELEVATION : 390.25m
PROJECT : St. Lazare Lagoon Study
METHOD OF SAMPLING : Drill Rig
TEST HOLE # 8

DEPTH OF SAMPLE	FIELD CLASSIFICATION
0m / 0	TOPSOIL - Black, silty, clayey, moist
	CLAY - Grey, high plastic, damp, stiff
2'	
1m	
4'	CLAY - Brown, medium plastic, sandy, moist, stiff
6'	
2m	
8'	SAND - Brown, fine grain, silty, saturated, very soft
3m / 10'	- Standing water at 2.9m
12'	
4m	
14'	
16'	
5m	
18'	
6m / 20'	



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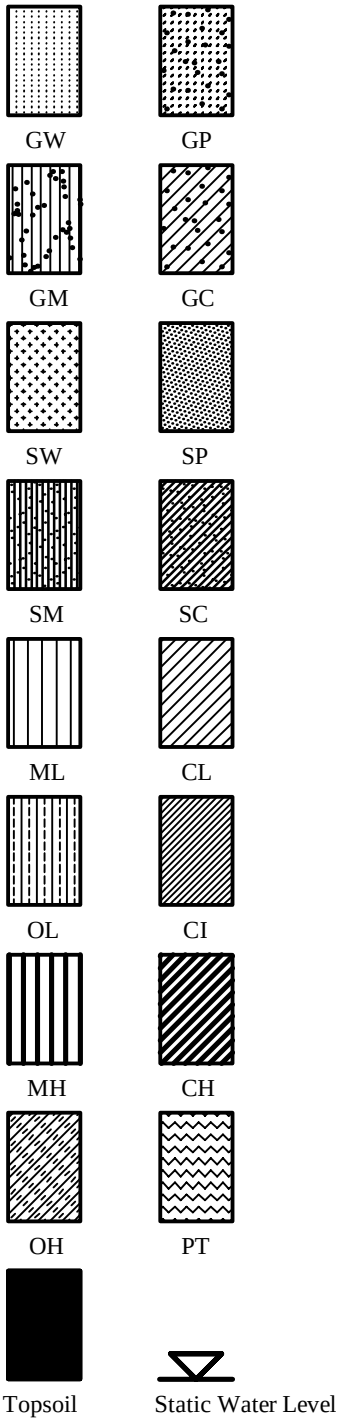
J. R. Cousin Consultants Ltd.

TEST HOLE LOG SHEET

LOCATION : West of St. Lazare Lagoon
CODE : E-730.01
DATE : May 2, 2017
COORDINATES: 5591072 N, 335743 E
ELEVATION : 389.94m
PROJECT : St. Lazare Lagoon Study
METHOD OF SAMPLING : Drill Rig
TEST HOLE # 9

DEPTH OF SAMPLE	FIELD CLASSIFICATION
0m / 0	TOPSOIL - Black, silty, clayey, moist
2'	CLAY - Brown, medium plastic, sandy, moist, stiff
1m / 4'	
6'	SILT - Brown, low plastic, sandy, wet, firm
2m / 8'	SAND - Brown, medium grain, saturated, very soft
3m / 10'	- Standing water at 2.9m
12'	
4m / 14'	
16'	
5m / 18'	
6m / 20'	



The soil logs are based upon objective data available to us at the time of forming our opinions. The soil logs indicate site specific soil characteristics and must not be generalized over larger areas due to the limited number of test holes as compared to that of an unlimited number of test holes. Every effort is made to evaluate the information by methods generally recognized. The soil logs represent our opinions. J.R. Cousin Consultants Ltd. cannot be responsible for actual site conditions proved to be materially at variance from our analysis or from the data generalization over untested areas.

Soils Analysis Report, AMEC Foster Wheeler, June 28, 2017

28 June 2017

Project No. WX11334-2600

J.R. Cousin Consultants Ltd.
91 Scurfield Boulevard
Winnipeg, Manitoba
R3Y 1G4

Attention: **Mr. Oswald Wohlgemut**

Re: Soils Analysis
St. Lazare Lagoon Studies

1.0 INTRODUCTION

As authorized by Mr. Oswald Wohlgemut of J.R. Cousin Consultants Ltd. (JRCC), Amec Foster Wheeler Environment and Infrastructure, a division of Amec Foster Wheeler Americas Ltd. (Amec Foster Wheeler), has completed an evaluation of 4 soil samples (grab samples) that were submitted to our office by JRCC. Visual classification, moisture content, Atterberg limits and particle size testing were requested as well as comments relating to suitability of the soils to be used as a lagoon cell liner.

2.0 LABORATORY TESTING

On receipt, the grab samples were classified in accordance with the Modified Unified Soil Classification System and were tested for moisture content, particle size (hydrometer method) and Atterberg limits. The visual classification and laboratory testing results are summarized in Table 1 with the laboratory data summary also appended to this report.

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Winnipeg, Manitoba R3Y 1N4
Tel +1 (204) 488-2997
amecfw.com

Amec Foster Wheeler Environment & Infrastructure
Registered office: 2020 Winston Park Drive, Suite 700, Oakville, Ontario L6H 6X7
Registered in Canada No. 773289-9; GST: 899879050 RT0008; DUNS: 25-362-6642
PBN: 899879050PG0015

Table 1: Lab Results

Sample Number	Depth (m)	Water Content (%)	Atterberg Limits			Particle Size Analysis			
			Liquid Limit (%)	Plastic Limit (%)	Plasticity Index	% Gravel	% Sand	% Silt	% Clay
TH8	0.3 – 2.3	30.4	44	16	28	0.0	49.4	28.1	22.5
		Classification: Clay (CI) – and sand, silty, medium plastic, moist							
TH5	0.1 – 0.4	31.3	31	14	17	0.0	12.7	52.2	35.1
		Classification: Clay (CI) – and silt, some sand, medium plastic, moist							
TH5	0.4 – 2.7	42.2	73	18	55	0.0	4.2	38.2	57.6
		Classification: Clay (CH) – and silt, trace sand, high plastic, moist							
TH5	4.8 – 6.0	34.6	73	17	56	0	4.7	38.7	56.6
		Classification: Clay (CH) – sand silt, trace, sand, high plastic, moist							

Note: Sample information provided by JRCC

3.0 DISCUSSION

Amec Foster Wheeler was requested to comment on the suitability of the tested soils for use as a liner in a re-compacted or in-situ condition, based on the visual assessment and the test results summarized in Section 2.0 above.

Feasibility for the utilization of the various materials as an impermeable liner for the proposed lagoon will largely depend on the quality and amount of the clay available. Typical engineering practice is to specify materials that comply with the following minimum parameters:

- Liquid Limit of 30% or greater ;
- Plastic Index of 10% or greater;
- 30% or more passing a number 200 mesh sieve; and
- 20% or more of clay particles (2-µm particle size)

In general, materials meeting the combination of characteristics noted above would typically provide a re-compacted liner having a hydraulic conductivity not exceeding the maximum allowable value of $1x10^{-7}$ cm/sec required by Manitoba Conservation for construction of lagoon liners in Manitoba. Where the characteristics of materials tested exceed one or more of these criteria, the required hydraulic conductivity may not be achieved.

Based on the laboratory test data obtained on the grab samples, the submitted samples meet the above criteria, and in this regard are expected to meet the maximum conductivity value specified by Manitoba Conservation with or without re-working. \It is recommended, however, that confirmatory hydraulic conductivity testing be completed on test hole TH8, as while meeting the requirements noted above, the sample contains relatively amounts of sand and as such could potentially fall below the conductivity value specified by Manitoba Conservation as a result.

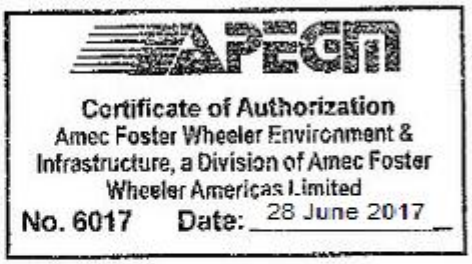
Standard Proctor Moisture Dry Density Testing is recommended on all samples to evaluate workability and optimum moisture content conditions should they be selected for use in lagoon construction.

4.0 CLOSURE

Amec Foster Wheeler trusts that the forgoing is sufficient for your present requirements. Should you require additional information, please contact the undersigned at this office.

Sincerely,
Amec Foster Wheeler Environment & Infrastructure
A Division of Amec Foster Wheeler Americas Limited

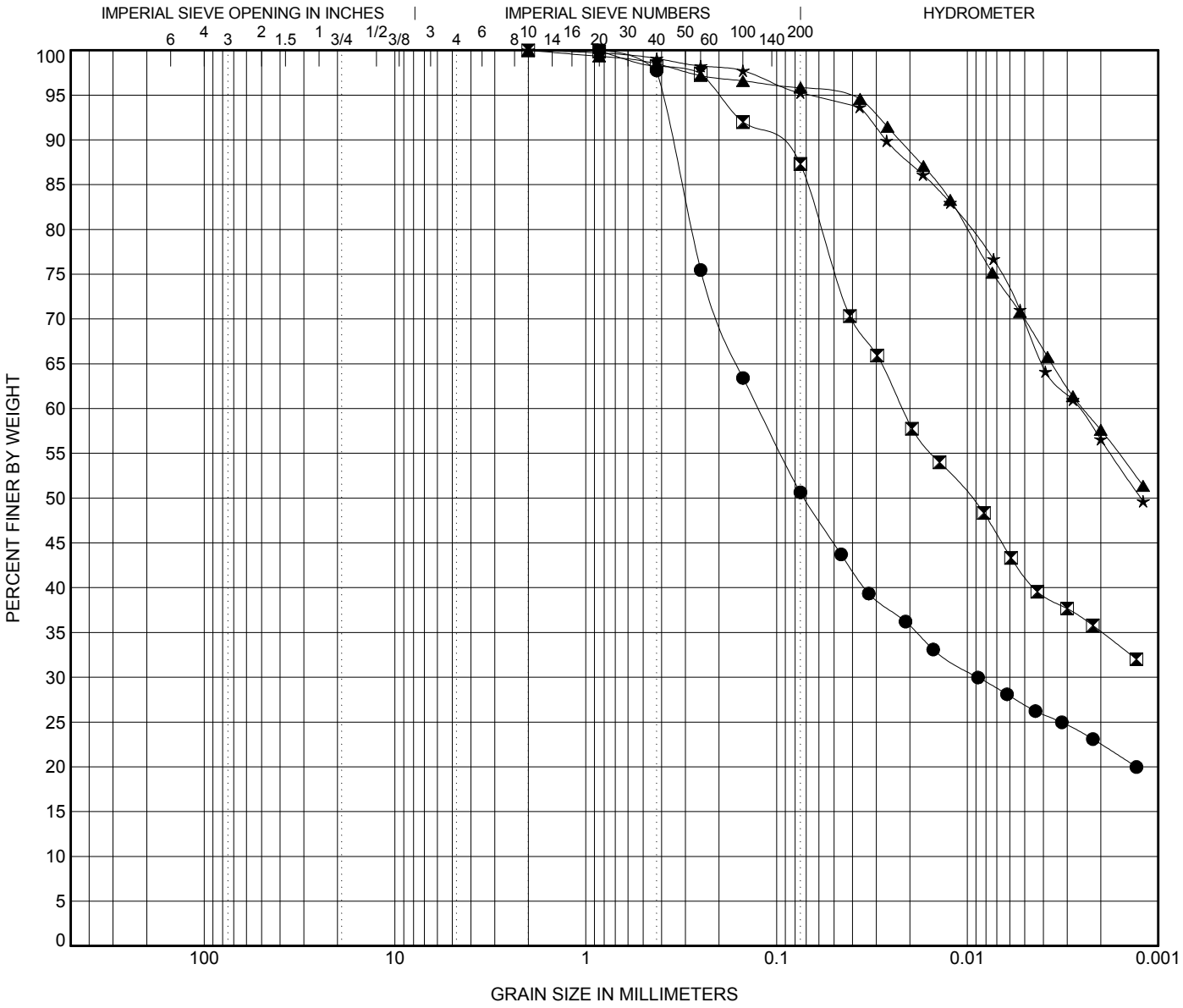
28 June 2017



Jorden Wiwcharyk, P. Eng.
Geotechnical Engineer

Reviewed by:
Trevor Gluck, P.Eng.
Associate Geotechnical Engineer

Attachments: Lab Summary (1)



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Sample ID	Depth	MC	LL	PL	PI	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**TH05**	**0.1 m**	**30.4**	**44**	**16**	**28**	**0.85**	**0.125**	**0.009**		**0.0**	**49.4**	**28.1**	**22.5**
⧓	**TH05**	**0.4 m**	**31.3**	**31**	**14**	**17**	**2**	**0.022**			**0.0**	**12.7**	**52.2**	**35.1**
▲	**TH05**	**4.8 m**	**42.2**	**73**	**18**	**55**	**2**	**0.002**			**0.0**	**4.2**	**38.2**	**57.6**
★	**TH08**	**0.3 m**	**34.6**	**73**	**17**	**56**	**2**	**0.003**			**0.0**	**4.7**	**38.7**	**56.6**

AMEC Foster Wheeler Environment and Infrastructure
Winnipeg, Manitoba

PARTICLE SIZE DISTRIBUTION

Driller Well Log Reports

Location: SW 17-17-28W

Well_PID: 69520

Owner: WALTER LECLERC

Driller: Paddock Drilling Ltd.

Well Name:

Well Use: PRODUCTION

Water Use: Domestic

UTMX: 335604

UTMY: 5591251

Accuracy XY: 1 EXACT [<5M] [GPS]

UTMZ:

Accuracy Z:

Date Completed: 1990 May 04

WELL LOG

From (ft.)	To (ft.)	Log
0	7.5	FINE BROWN SAND, SILTY
7.5	8.5	LIGHT BROWN MEDIUM SAND SOME SILT
8.5	12.0	SANDY SILT
12.0	16.0	REDDISH BROWN MEDIUM SAND
16.0	19.5	MEDIUM COARSE GREY SAND SHELLS
19.5	20.0	GREY CLAY

WELL CONSTRUCTION

From (ft.)	To (ft.)	Casing Type	Inside Dia.(in)	Outside Dia.(in)	Slot Size(in)	Type	Material
0	10.0	casing	30.00				CORRUGATED FIBERGLASS
10.0	19.0	perforations	30.00		0.040	SAW CUT	FIBERGLASS
0	19.0	gravel pack					WASHED S.

Top of Casing: 1.000 ft. below ground

PUMPING TEST

Date: 1990 May 04

Pumping Rate: 29.987 Imp. gallons/minute

Water level before pumping: 8.0 ft. below ground

Pumping level at end of test: 17.0 ft. below ground

Test duration: 1 hours, minutes

Sludge Assessment Report, Assiniboine Injections Ltd., August 2016

Assiniboine Injections Ltd.

Box 160 177 Notre Dame Ave Notre Dame de Lourdes, MB R0G-1M0
PH: 204-248-2559 FAX: 204-248-2799 EMAIL: info@lagooncleaning.com

DATE: AUGUST 4, 2016
TOWN: ST. LAZARE

As requested, Assiniboine Injections Ltd completed our biosolids survey of primary Cell. This survey was completed on JULY 26, 2016

Methodology

The cells were surveyed using a grid pattern.
Measurements are obtained by going out on a boat and probing the bottom with a measuring pole. The depth is determined by top of sludge blanket to base of lagoon.

Please find maps of cells, grid locations, indicating depth to sludge and depth to bottom of cell.

Cell Sludge Volume

CELL	SLUDGE VOLUME
PRIMARY CELL	12000 M3

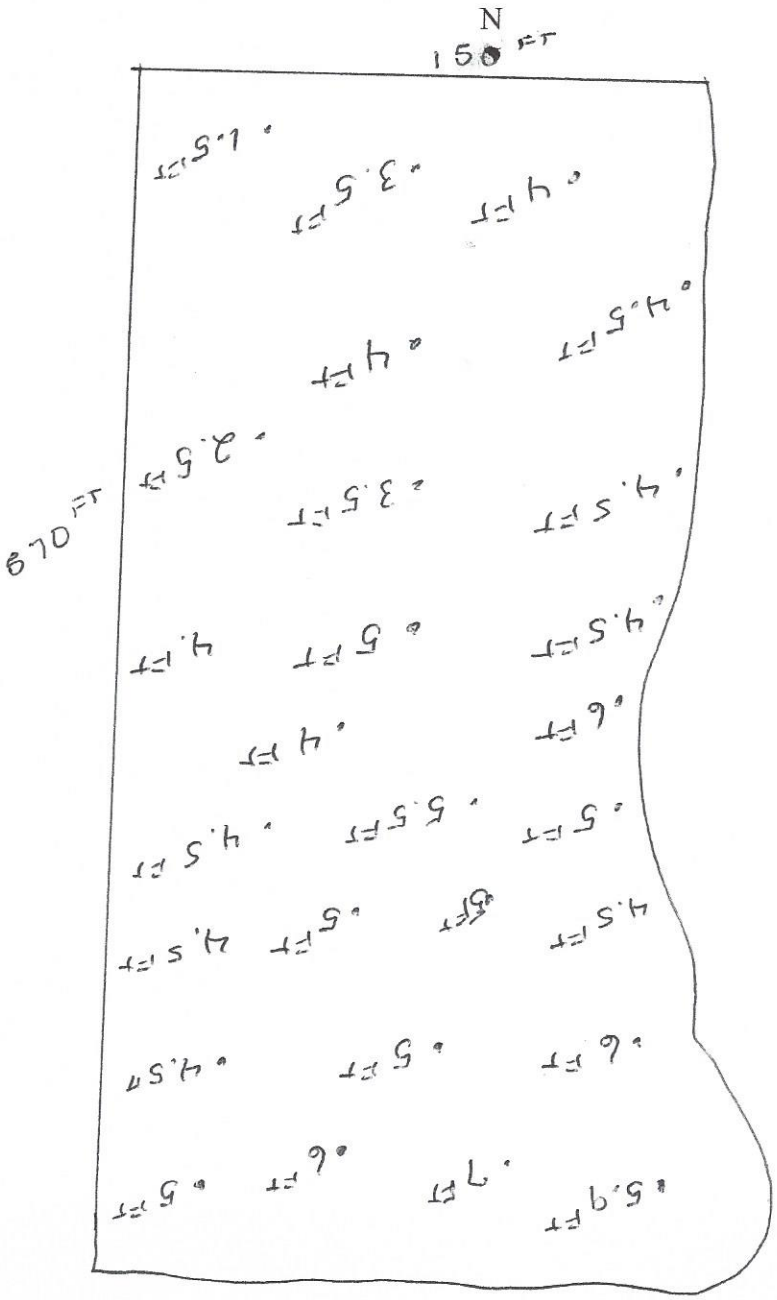
Thank you for allowing us to help you with this project. Please let me know if we can be of any more help with your biosolids management requirements. We look forward to working with you in the future.

Yours Truly,
Assiniboine Injections Ltd

Assiniboine Injections Ltd.

Box 160 177 Notre Dame Ave Notre Dame de Lourdes, MB R0G-1M0
PH: 204-248-2559 FAX: 204-248-2799 EMAIL: info@lagooncleaning.com

Project No. 1 Survey Date: JULY 26, 2016 Survey Crew: Jeff
Client: ST. LAZARE Lagoon Id: Primary Lagoon Dimensions: 570 FTX 150FT
Avg. Sludge Depth: 4.93 FT Samples Taken: NO



Appendix D

Title Page

Plan 1: Proposed WWTF Layout Plan

Plan 2: Access Approach, Fence, Gate, Lock and Sign Details

Plan 3: Sten Log, Pipe Trench and Ditch Details

RM OF ELLICE - ARCHIE

ST. LAZARE WASTEWATER TREATMENT FACILITY

ENVIRONMENT ACT PROPOSAL

PLAN INDEX

PRELIMINARY

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JR Cousin Consultants Ltd.

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f. (204) 489-0487

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ENGINEERING EXCELLENCE SINCE 1981

REDUCED DRAWING SET
DO NOT SCALE

PRELIMINARY
NOT FOR CONSTRUCTION

SCALE BAR
(IN METRES)
10 0 5 10 20 30 40 50
1:500

No.	REVISIONS	DATE	INITIALS
			B.M. EL.

LOCATIONS OF UNDERGROUND STRUCTURES/UTILITIES AS SHOWN ARE BASED ON AVAILABLE INFORMATION BUT NO GUARANTEE IS GIVEN OR IMPLIED THAT ALL EXISTING UNDERGROUND STRUCTURES/UTILITIES ARE SHOWN OR THAT THE GIVEN LOCATIONS ARE EXACT. CONFIRMATION OF EXISTENCE AND EXACT LOCATION OF ALL UNDERGROUND STRUCTURES/UTILITIES MUST BE OBTAINED FROM THE APPROPRIATE AUTHORITY/OWNER, BY THE CONTRACTOR, BEFORE PROCEEDING WITH CONSTRUCTION.

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PRELIMINARY

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f. (204) 489-0487
www.jrcc.ca
ENGINEERING CONSULTANTS
ENGINEERING EXCELLENCE SINCE 1981

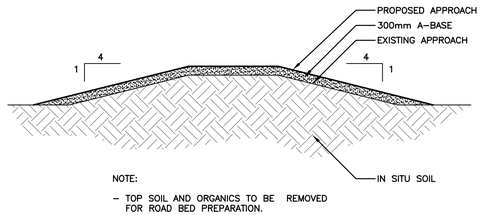
CODE:	E-730.01
DESIGNED BY:	OW
DRAWN BY:	RH
REVIEWED BY:	JD

PROJECT: RM OF ELLICE-ARCHIE
ST. LAZARE WASTEWATER TREATMENT FACILITY – ENVIRONMENT ACT PROPOSAL

TITLE: PROPOSED WASTEWATER TREATMENT FACILITY LAYOUT PLAN

SCALE:	DATE:	PLAN:	SHEET:
1:500	19/06/24	1	1 of 3

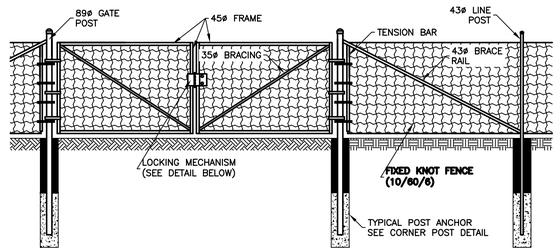
Jul 12, 2019 - 4:24pm P:\730\01\30 Ellice-Archie, RM\730.01 St Lazare Lagoon Study and EAP\04 Drawings\Dwg\EAP\EAP1 1.dwg



NOTE:

– TOP SOIL AND ORGANICS TO BE REMOVED FOR ROAD BED PREPARATION.

1/1|2 ACCESS APPROACH DETAIL
SCALE = 1:100



2/1|2 GATE DETAIL
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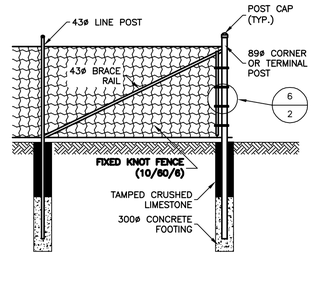

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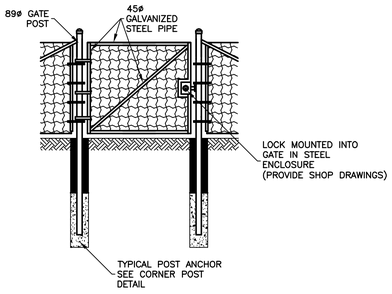

4/1|2 MAN GATE DETAIL
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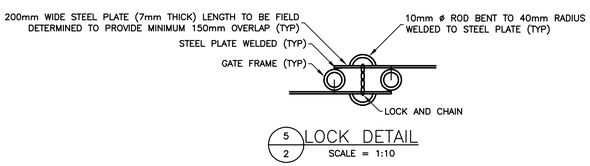

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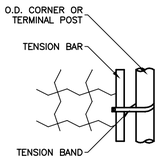

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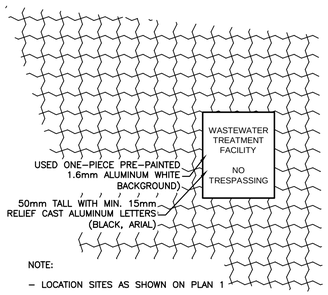

NOTE:

– LOCATION SITES AS SHOWN ON PLAN 1

7/1|2 WWTF FENCE SIGN DETAIL
SCALE = 1:25

PRELIMINARY
NOT FOR CONSTRUCTION

No.	REVISIONS	DATE	INITIALS
	B.M. EL.		

LOCATIONS OF UNDERGROUND STRUCTURES/UTILITIES AS SHOWN ARE BASED ON AVAILABLE INFORMATION BUT NO GUARANTEE IS GIVEN OR IMPLIED THAT ALL EXISTING UNDERGROUND STRUCTURES/UTILITIES ARE SHOWN OR THAT THE GIVEN LOCATIONS ARE EXACT. CONFIRMATION OF EXISTENCE AND EXACT LOCATION OF ALL UNDERGROUND STRUCTURES/UTILITIES MUST BE OBTAINED FROM THE APPROPRIATE AUTHORITY/OWNER, BY THE CONTRACTOR, BEFORE PROCEEDING WITH CONSTRUCTION.

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PRELIMINARY

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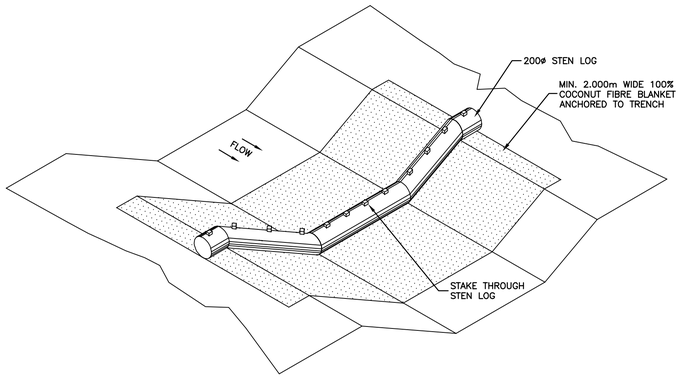
ENGINEERING CONSULTANTS
ENGINEERING EXCELLENCE SINCE 1981

CODE:	E–730.01
DESIGNED BY:	OW
DRAWN BY:	RH
REVIEWED BY:	JD
PROJECT:	RM OF ELLICE–ARCHIE ST. LAZARE WASTEWATER TREATMENT FACILITY – ENVIRONMENT ACT PROPOSAL
TITLE:	ACCESS APPROACH, FENCE, GATE, LOCK AND SIGN DETAILS
SCALE:	AS NOTED
DATE:	19/06/24
PLAN:	2
SHEET:	2 of 3



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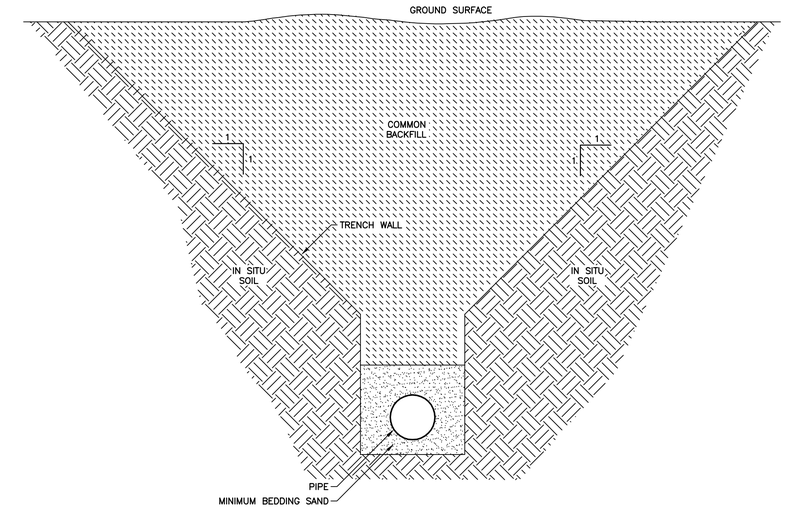

2/3 SINGLE TRENCH PIPING DETAIL
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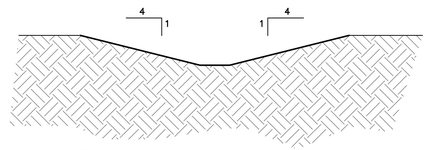

NOTE:

– TOP SOIL AND ORGANICS TO BE REMOVED FOR ROAD BED PREPARATION.

3/1 3 DITCH DETAIL
SCALE = 1:100

PRELIMINARY
NOT FOR CONSTRUCTION

No.	REVISIONS	DATE	INITIALS
			B.M. EL.

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CODE:	E–730.01
DESIGNED BY:	OW
DRAWN BY:	RH
REVIEWED BY:	JD
PROJECT:	RM OF ELLICE–ARCHIE ST. LAZARE WASTEWATER TREATMENT FACILITY – ENVIRONMENT ACT PROPOSAL
TITLE:	STEN LOG, PIPE TRENCH AND DITCH DETAILS
SCALE:	AS NOTED
DATE:	19/06/24
PLAN:	3
SHEET:	3 of 3