



P&R 8.122 JRCC

M-575.01

RM of Montcalm
Environment Act Proposal
for
St. Jean Baptiste
Facultative Lagoon and Forcemain

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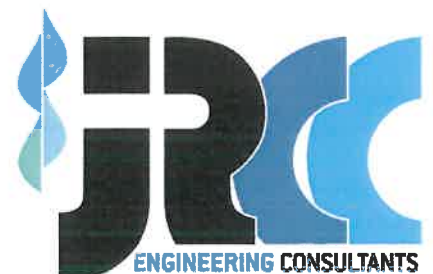


TABLE OF CONTENTS

Section	Page
ENVIRONMENT ACT PROPOSAL FORM	i
1.0 DEVELOPMENT INFORMATION	1
1.1 Contact Information	1
2.0 DESCRIPTION OF THE DEVELOPMENT	1
2.1 Land Title	1
2.1.1 Facultative Lagoon	1
2.1.2 Forcemain	2
2.1.3 Discharge Route	2
2.2 Minerals	2
2.3 Land Description	2
2.3.1 Facultative Lagoon	2
2.3.2 Forcemain	2
2.3.3 Discharge Route	3
2.4 Land Use Designation/Zoning Designation	3
2.4.1 Lagoon	3
2.4.2 Forcemain	3
2.4.3 Discharge Route	3
2.5 Description of Previous Studies	3
2.6 Description of Development	4
2.6.1 Background	4
2.6.2 Wastewater Treatment Process	5
2.6.3 Basis for Proposed Lagoon Site Selection	5
2.6.4 Lagoon Drainage Route	6
2.6.4.1 Flow in the Red River	6
2.6.4.2 Fish Species Information	6
2.6.4.3 Water Quality Information	6
2.6.5 Forcemain	7
2.6.6 Access Road	7
2.6.7 Topography and Geotechnical Review	7
2.6.7.1 Topography	7
2.6.7.2 Geotechnical Review	7
2.6.8 Population Contributing Wastewater and Corresponding Loading to Lagoon	9
2.6.8.1 Contributing Population	10
2.6.8.2 Organic Loading	10
2.6.8.3 Hydraulic Loading	10
2.6.9 Lagoon Regulatory Requirements	10
2.6.9.1 Province of Manitoba Design Objectives	10
2.6.9.2 Nutrient Management Plan	11
2.6.10 Summary of Selected Design Criteria to Year 20	14
2.6.11 Lagoon Layout	15
2.6.12 Lagoon Construction Detail	15
2.6.12.1 General	15

Section	Page
2.6.12.2 Conceptual Liner Design	16
2.6.12.3 Construction Techniques	16
2.6.12.4 Construction Details	17
2.6.13 Access Road Construction Detail	18
2.6.13.1 General	18
2.6.14 Piping Installation Detail	18
2.6.14.1 General	18
3.0 POTENTIAL ENVIRONMENTAL IMPACTS	18
3.1 Releases to Air, Water, Land	19
3.1.1 Air	19
3.1.2 Water	19
3.1.3 Land	19
3.2 Wildlife	20
3.3 Fisheries	20
3.4 Surface Water and Groundwater	20
3.5 Forestry	20
3.6 Vegetation	20
3.7 Heritage Resources	21
3.8 Socio-Economic Implications	21
3.9 Public Involvement	21
4.0 MANAGEMENT PRACTICE	21
4.1 Mitigation of Impacts to Air	21
4.2 Mitigation of Impacts to Land	22
4.3 Mitigation of Impacts to Water	22
5.0 RESIDUAL AND CUMULATIVE EFFECTS	23
6.0 MONITORING AND FOLLOW-UP	24
7.0 SCHEDULE	24
7.1 Commencement Dates	24
7.2 Environmental Approval Date	24
8.0 FUNDING	24

Appendix A

Certificates of Titles

Crown Lands & Property Agency - Lands Branch, October 23, 2009 Email Correspondence

Land use Designation - RM of Montcalm, October 29, 2009 - Email Correspondence

Appendix B

Plan 1: Proposed Facultative Lagoon Site Location

Plan 2: Test Hole Locations at Proposed Facultative Lagoon Site

Plan 3: Proposed Forcemain Layout and Discharge Route

Plan 4: Red River Selected Water Quality and Flow Monitoring Stations

Appendix C

Test Hole Logs

The National Testing Laboratories Ltd. Soil Analysis Results

Appendix D

Table 1: Community of St. Jean Baptiste - Population, Hydraulic, and Organic Loading Projections

Table 2: Water Quality of the Red River at Emerson (Stations MB050CS001 & MB050CS007) and at St. Jean (Station MB050CS031)

Tables: The 7Q10 Flow Data for the Red River at Emerson and Ste. Agathe Stations

Appendix E

Plan L1: Proposed Facultative Lagoon with Setbacks

Plan L2: Proposed Facultative Lagoon Layout

Plan L3: Proposed Facultative Lagoon Dike Details

Plan L4: Spillway, Truck Turnaround, Fence, Gate, Bollard, Site Marker, and Access Road Cross Section Details

Plan L5: Valve, Valve Marker, Rip Rap, Ditch, Silt Fence and Miscellaneous Details

Appendix F

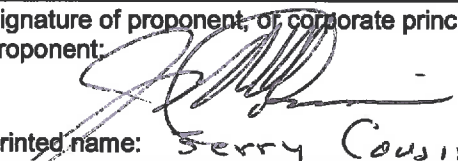
Fisheries Branch, Manitoba Water Stewardship, October 15, 2009 - E-mail Correspondence

Manitoba Conservation Wildlife & Ecosystem Protection Branch, October 20, 2009 - Email Correspondence

Manitoba Culture, Heritage, Tourism and Sport - Historic Resources Branch, November 9, 2009 - Memorandum

Environment Act Proposal Form



Name of the development: RM of Montcalm, St. Jean Wastewater Treatment Lagoon and Forcemain	
Type of development per Classes of Development Regulation (Manitoba Regulation 164/88): Class 2 Development	
Legal name of the applicant: RM of Montcalm	
Mailing address of the applicant: P.O. Box 300	
Contact Person: Ms. Michelle Robert	
City: Letellier	Province: Manitoba Postal Code: R0G 1C0
Phone Number: (204) 737-2271	Fax: (204) 737-2326 email:
Location of the development: St. Jean, Manitoba	
Contact Person: Ms. Michelle Robert	
Street Address:	
Legal Description: River Lots 225 and 227	
City/Town: St. Jean	Province: Manitoba Postal Code: R0G 1C0
Phone Number: (204) 737-2271	Fax: (204) 737-2326 email:
Name of proponent contact person for purposes of the environmental assessment: Mr. Jerry Cousin, P.Eng., JR Cousin Consultants Ltd.	
Phone: (204) 489-0474 Fax: (204) 489-0487	Mailing address: 91A Scurfield Blvd Winnipeg, Manitoba R3Y 1G4
Email address: jcousin@jrcc.ca	
Webpage address: jrcc.ca	
Date: March 31, 2014	Signature of proponent, or corporate principal of corporate proponent:  Printed name: Jerry Cousin

1.0 DEVELOPMENT INFORMATION

The development described herein is for a Facultative Wastewater Treatment Lagoon Construction and related piping (forcemain and discharge pipe) installation to service the community of St. Jean Baptiste, in the RM of Montcalm.

1.1 Contact Information

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R3Y 1G4
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Ms. Michelle Robert, C.A.O
RM of Montcalm
46 - First Street East
P.O. Box 300
Letellier, Manitoba
R0G 1C0
Phone (204) 737-2271 Fax (204) 737-2326

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

Certificate of Title showing the legal description of the development; 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. Name of the owner(s) of the land upon which the development would be constructed.

2.1.1 Facultative Lagoon

The proposed facultative lagoon site would be located on a portion of River Lots 225 and 227 located east of the Municipal shop as shown on Plan 1 attached in Appendix B. The lagoon construction is proposed to occur on approximately 15 ha of land that includes a buffer zone surrounding the lagoon site. The land is currently owned by Mr. Roger Vermette, Mr. Guy Vermette, Mr. Richard Vermette, and Mr. Louis Vermette. The RM has discussed with the owners to purchase the land for construction of the lagoon. Copies of the Certificate of Titles are attached in Appendix A.

2.1.2 Forcemain

Approximately 2,000 m of 150 mm forcemain would be installed extending from an existing lift station to the proposed facultative lagoon. The proposed forcemain route is shown on Plan 3, attached in Appendix B. The forcemain will be placed within portions of the right of ways of Railway Street, a railway, Municipal road 17 NE, and through small portions (property edges) of agricultural lands within River Lots 229, 231, 233, 235, and 237. Permission for easements from the agricultural land owners would be obtained by the RM of Montcalm for locations where the forcemain falls within private lands.

2.1.3 Discharge Route

From the lagoon, the discharge route will consist of several metres of the existing ditch along the Municipal Road 17 NE subsequently to an existing natural ditch that leads to the Red River as shown on Plan 3 attached in Appendix B.

2.2 Minerals

Name of the owner of Mineral Rights beneath the Land if this is not the same as the surface owner:

The Crown Lands & Property Agency was contacted regarding the proposed development location. According to the Crown Lands & Property Agency, the mines & minerals and sand and gravel in the proposed development location are privately owned with the surface (see October 23, 2009 e-mail correspondence with the Crown Lands & Property Agency - Lands Branch, attached in Appendix A).

2.3 Land Description

Description of the existing land use on the site and adjoining it as well as changes that would be made thereto for the purposes of the development:

2.3.1 Facultative Lagoon

The land is currently being used for agricultural purposes. As shown on Plan 1 in Appendix B, the proposed facultative lagoon site is bordered by Municipal Road 17 NE to the north, the Municipal shop to the west, and agricultural land to the south and east. Based upon the 0.3 m contour topographical information obtained from Manitoba Land Initiative Web Site, the general elevation of the native ground surface at the site ranges from 236.75 m to 237.50 m ASL (average 237.00 m). The land would be changed due to excavation of the site for construction of the lagoon cells, perimeter ditches, and dikes.

2.3.2 Forcemain

The right of ways of Railway Street, Municipal Road 17 NE and the railway as well as some private lands will be disturbed by trenching for the installation of the forcemain. The disturbed lands will be limited to the trench area and will be returned to their original state or roached to allow for settling and grass seeded once construction is complete.

2.3.3 Discharge Route

From the lagoon, the discharge route will consist of several metres of the existing ditch along the Municipal Road 17 NE subsequently to an existing natural ditch that leads to the Red River as shown on Plan 3 attached in Appendix B. The ditch may have to be improved to provide consistent positive drainage. If the drainage on the river bank is altered, an erosion control blanket and rip rap would be installed in disturbed areas along the Red River bank.

2.4 Land Use Designation/Zoning Designation

Land use designation for the site and adjoining land as identified in a development plan adopted pursuant to the Planning Act or the City of Winnipeg Act and the zoning designation as identified in a Zoning By-Law, if applicable:

2.4.1 Lagoon

From e-mail correspondence with the RM of Montcalm (Appendix A), the land use designation for the land upon which the lagoon is to be developed is zoned "AG" (Agricultural General).

2.4.2 Forcemain

Per the e-mail correspondence with the RM of Montcalm (Appendix A) the portion of land outside of town for the proposed forcemain route is also zoned "AG" (Agricultural General).

2.4.3 Discharge Route

The land where the discharge route is to be constructed is a Municipal Road allowance.

2.5 Description of Previous Studies

Description of previous studies and activities relating to feasibility, exploration, or project siting and prior authorization received from other government agencies:

RM of Montcalm – Community of St. Jean Geotechnical Investigation for Wastewater Treatment Lagoon Report, April 2009 by JR Cousin Consultants Ltd.

JR Cousin Consultants Ltd. completed a Geotechnical Investigation of the existing lagoon site and the two potential sites described below (Sites 2 and 4). The geotechnical investigation report identified the subsurface conditions of the existing lagoon site and the two potential sites, to determine the possibility of upgrading the existing lagoon to an aerated lagoon or alternatively constructing a new lagoon at one of the two potential sites using a clay liner. According to the geotechnical report, clay soils suitable for a lagoon clay liner are available at the existing lagoon site and the two potential lagoon sites. Due to high silt content encountered at the existing lagoon site, a slope stability study of the lagoon and flood dikes was suggested to determine feasibility of upgrading the lagoon into an aerated lagoon. The suitable clay soils are found deeper at Site 4 than at Site 2. Therefore, construction of a new lagoon at Site 4 is likely to require the vertical cutoff walls extended to a deeper level than at Site 2.

RM of Montcalm - Community of St. Jean Baptiste Wastewater Lagoon Study, May 2009, by JR Cousin Consultants Ltd.

The RM of Montcalm had requested assistance in finding a solution to upgrade the sewage treatment capacity of the St. Jean Baptiste (St. Jean) lagoon. JR Cousin Consultants Ltd. completed the wastewater lagoon study to outline the possible solutions for upgrading the existing wastewater treatment lagoon to accommodate the 20 year projected growth of the community. As part of the existing lagoon study, four potential sites (Site 1 located in the south east corner of SE 9-4-1, Site 2 on portions of River Lots 225 and 227, Site 3 on a portion of River Lot 207, and Site 4 in the north west corner of SW 26-3-1) for new lagoon were reviewed. Per discussion with the RM of Montcalm Sites 1 and 3 were not feasible, whereas Sites 2 and 4 were chosen for a more detailed study to assess their suitability for new lagoon. In the study, potential upgrades to the current lagoon that would allow conversion of the lagoon to an aerated lagoon were considered. The detailed study of the two chosen sites (Site 2 and Site 4) was undertaken with consideration of relocating the existing lagoon and installing a new forcemain. The study concluded that conversion of the existing lagoon into an aerated lagoon or construction of a new facultative lagoon at Site 2 are viable options.

RM of Montcalm – St. Jean Baptiste Wastewater Lagoon Letter Report on Aerated Lagoon Site 2, August 2009, by JR Cousin Consultants Ltd.

Based upon the May 2009 lagoon study report, the RM of Montcalm chose Site 2, for a new facultative lagoon. However, the RM requested JRCC to investigate the possibilities for an aerated lagoon at Site 2, prior to proceeding with a facultative lagoon at the site. The August 2009 letter report by JRCC outlined findings of the assessment for an aerated lagoon at Site 2. The letter report included a conceptual layout of the aerated lagoon based upon discussion with the RM, the site geotechnical information, regulatory requirements, site specific equipment requirements, and capital cost requirements.

2.6 Description of Development

Description of the proposed development and the method of operation including hours of operation:

2.6.1 Background

The community of St. Jean is located in the Rural Municipality of Montcalm, approximately 80 kilometres south of Winnipeg. Initially an EAP was submitted to Manitoba Conservation for an aerated lagoon project. Manitoba Conservation had a meeting with the RM to discuss facultative lagoons versus aerated lagoons. As a result of the meeting the Rural Municipality of Montcalm requested that JR Cousin Consultants Ltd. re-submit the EAP for a facultative lagoon project.

The proposed facultative lagoon site (Site 2) is located approximately 500 m to the southeast of the town of St. Jean, immediately to the east of the Municipal shop and south of Municipal road 17 NE. Refer to Plan1 attached in Appendix B showing the proposed facultative lagoon site location.

The community of St. Jean is serviced by a gravity sewer collection system. A lift station discharges the effluent through a forcemain to the existing two cell wastewater treatment lagoon that was constructed in the 1960s.

The proposed development is the construction of a new facultative wastewater treatment lagoon and installation of a forcemain between the existing lift station and the new facultative lagoon. The proposed lagoon construction would occur immediately south of the Municipal Road 17 NE and east of the Municipal shop. Upon completion of the facultative lagoon, the wastewater that is being piped and trucked to the existing lagoon would be re-directed to the new facultative lagoon and the existing lagoon would be decommissioned.

2.6.2 Wastewater Treatment Process

The treatment system is composed of two facultative lagoon cells. Wastewater from the forcemain and sewage from trucks would be discharged into the primary cell. Effluent will be transferred from the primary cell to the storage cell by gravity, through a valved intercell pipe. The proposed layout with dimensions of the facultative lagoon is shown on Plan L2, attached in Appendix E.

After June 15 the treated effluent would be tested and subsequently discharged by gravity into the Red River via the proposed discharge route.

2.6.3 Basis for Proposed Lagoon Site Selection

Five sites (including the existing lagoon site) were originally considered for the location of an upgraded or a new wastewater treatment lagoon. Following the geotechnical investigation, the two studies summarized above, and discussion with the RM of Montcalm, the proposed lagoon site was selected based upon the following conditions:

1. Distance From Nearest Community – approximately 500 m southeast of the community of St. Jean, which is the nearest community. Manitoba Conservation requires a distance of 460 m from facultative lagoons to the nearest community.
2. Distance From Nearest Resident – approximately 369 m southeast of the nearest resident. Manitoba Conservation requires a distance of 300 m from facultative lagoons to the nearest resident.
3. Land Availability – The land is available for purchase
4. Soil Type – the geotechnical investigation indicated that there are clay soils at the proposed site suitable for the construction of a lagoon liner in accordance with Manitoba Conservation guidelines
5. Discharge – the lagoon could be discharged into the Red River, which is the receiving water body of the existing lagoon
6. Accessibility – the site can be accessed from Municipal road 17 NE, located immediately to the north of the site, running east/west
7. Adjacent Land Use – the adjacent land is agricultural
8. Air Pollution – air pollution is of minimal concern as the lagoon would be located at least 369 m from the nearest resident.

2.6.4 Lagoon Drainage Route

The treated effluent from the facultative lagoon would be discharged to a ditch along Municipal road 17 NE, leading into the Red River, eventually reaching Lake Winnipeg. The discharge route is shown on Plan 3 in Appendix B. The Municipality recognizes the growing concern with the treated effluent discharge that eventually reaches Lake Winnipeg.

2.6.4.1 Flow in the Red River

Manitoba Water Stewardship (MWS) was contacted regarding the flow conditions in the Red River. Data was obtained from MWS that includes monthly flows and the seven day 10 year low flows in the Red River at the Emerson (Station - MB050CS001) and Ste. Agathe (Station - MB050CS012) stations. The approximate locations of stations are shown on Plan 4 attached in Appendix B. The monthly average flow in cubic metres per second as summarized from the data obtained is provided in the table below.

Station Location	Monthly Average Flow (m ³ /sec)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Emerson	27	26	76	429	280	176	145	67	54	50	52	34
Ste. Agathe	37	35	105	600	431	260	226	103	79	75	80	49

The 7 day 10 year low flows (7Q10) for the Red River at the Emerson and Ste. Agathe stations were obtained from Manitoba Water Stewardship (MWS). Based upon the data provided by MWS, the lowest monthly 7Q10 is 4.1 m³/sec at Emerson and 6.0 m³/sec at Ste. Agathe. The 7Q10 flow data obtained from MWS is attached in Appendix D.

As indicated in Section 2.6.8.3, the daily wastewater flow to the lagoon is expected to be 321 m³/day in year 20. Trickle discharge is proposed and is discussed in Section 2.6.9.2.

2.6.4.2 Fish Species Information

The Fisheries Branch of Manitoba Water Stewardship was contacted regarding the type of fish that may exist in the Red River. A list of the fish species in the Red River as obtained from the Fisheries Branch, per an e-mail correspondence dated October 15, 2009, is attached in Appendix F.

2.6.4.3 Water Quality Information

Water quality data for the Red River at three stations (MB050CS001, MB050CS007 and MB050CS031) upstream and downstream of the proposed location of the lagoon discharge into the Red River are provided in Table 2 attached in Appendix D. Plan 4 attached in Appendix B shows the locations of the above three stations. The summary of the water quality information presented in the table and the plan

showing the station locations were prepared from data provided by the Water Quality Management Section 2009, Manitoba Water Stewardship. As shown on the plan, stations MB050CS001 and MB050CS007 are located approximately 49 km south (upstream) of the proposed lagoon discharge location into the Red River, whereas station MB050CS031 is situated approximately 2 km northwest (downstream) of the proposed lagoon discharge location.

2.6.5 Forcemain

The 150 mm forcemain will be installed within the right of ways of Railway Street, CP railway, Municipal road 17 NE, and through small portions (property edges) of agricultural lands within River Lots 229, 231, 233, 235, and 237. Permission from land owners of the agricultural lands would be obtained by the RM of Montcalm for locations where the forcemain falls on private lands. The layout for the forcemain is shown in Plan 3 attached in Appendix B.

2.6.6 Access Road

The proposed facultative lagoon site would be accessed from an existing all-weather access road to the Municipal shop that branches off the Municipal road 17 NE.

2.6.7 Topography and Geotechnical Review

An on-site geotechnical investigation of the proposed lagoon site was completed on December 17, 2008 to determine the suitability of the site for construction of a wastewater treatment lagoon. Based upon the investigation, the site is suitable for the proposed facultative lagoon construction.

2.6.7.1 Topography

The 0.3 m contour topographical information obtained from the Manitoba Land Initiative Web Site was reviewed to assess topography of the site. Based upon the review, the general surface elevation of the site ranges from 236.75 m to 237.50 m ASL with the average surface elevation being 237.00 m. The land around St. Jean is subject to flooding by both the Red River and the Plum River. The 100 year flood elevation requirement in the area is 239.70 m. Dikes of the proposed facultative lagoon would be constructed to 2.70 m above the average existing ground site elevation of 237.00 m to meet the 100 year flood elevation requirement of 239.70 m.

2.6.7.2 Geotechnical Review

Test Holes

On December 17 and 18, 2008 geotechnical site investigations were conducted at the existing lagoon site and two potential sites for a wastewater treatment lagoon near the community of St. Jean. After additional study and discussions with the RM of Montcalm, one of the two potential sites was selected for the proposed lagoon. The geotechnical information included in this proposal pertains to the selected lagoon

site, and does not include information relating to the existing lagoon site and the alternate potential lagoon site.

The December 17, 2008 geotechnical investigation of the proposed facultative lagoon site undertaken by JR Cousin Consultants Ltd. (JRCC) included drilling of five test holes (TH5 – TH9) utilizing a tracked drill rig (test hole locations shown on Plan 2 attached in Appendix B). Soil samples were collected at selected intervals within the test holes when soil layers differed. In general the surficial layer of the soil profile consists of an average of approximately 0.5 m thick topsoil underlain by layers of approximately 0.5 m thick organic clay, 1.15 m thick medium plastic silty clay, and 3.85 m thick high plastic clay soils to a depth of 6.0 m. Details of the soil profile observed in each of the 5 test holes at the proposed lagoon site have been documented and are provided in the Soil Logs attached in Appendix C. More detailed information on the soils at the site can be found in the St. Jean Geotechnical Investigation for Wastewater Treatment Lagoon Report prepared by JRCC, in April 2009.

Based on the above, the in-situ clay soils at the site exhibit the properties necessary to be utilized for the construction of a facultative wastewater treatment lagoon liner.

Laboratory Analysis

To confirm our preliminary assessment, selected representative soil samples from the site were subsequently submitted to the National Testing Laboratories Ltd. (NTL) for visual soil classification, moisture content determination, particle size, liquid limit, plastic limit, and plasticity index analyses. The laboratory analysis results indicate that there are high plastic clay (CH-Fat clay) soils at the proposed facultative lagoon site suitable for a lagoon liner. The plasticity index of the soil samples obtained from the proposed facultative lagoon site (Site 2) and submitted to the laboratory reportedly ranged from 21 - 62. Based on their analysis results and visual examination, NTL expressed their opinion that the clay soil samples except TH7 1.2 - 2.0 m could be used for a lagoon liner in their undisturbed or re-compacted condition. The above NTL assessment is based on assumed conditions that the soil is homogeneous and no preferential flow paths would be encountered. Based on previous experiences, homogeneous soil samples with a plasticity index greater than 25 and a silt content less than 50% will typically have a hydraulic conductivity 1.0×10^{-7} cm/sec or less. Based upon the above, the laboratory analysis results confirmed the existence of soils at the lagoon site suitable for construction of a clay lined wastewater treatment lagoon to provincial guidelines. The National Testing Laboratories soil analysis results are attached in Appendix C.

Discussion

Manitoba Conservation guidelines require a standard wastewater treatment lagoon clay liner be 1 m in thickness and have a hydraulic conductivity (i.e. the potential rate

of fluid movement through the soil) of 1×10^{-7} cm/sec or less. This low rate is to protect the underlying groundwater from lagoon seepage.

Based on the results of the onsite investigations and laboratory analysis results, the clay soils at the proposed facultative lagoon site could be used in-situ as a lagoon liner. Clay soils from the excavation and/or borrow area must be used to construct the dike vertical cut-off walls extending into the in-situ clay to form a continuous clay liner of the lagoon. Given the soil conditions at the proposed lagoon site, the site would be suitable for the construction of a facultative wastewater treatment lagoon with an in-situ clay liner.

2.6.8 Population Contributing Wastewater and Corresponding Loading to Lagoon

The population contributing wastewater to the lagoon was determined based upon a review of information obtained from the RM of Montcalm and incorporated in the *Rural Municipality of Montcalm - Community of St. Jean Baptiste Wastewater Lagoon Study*, completed by JRCC in 2009. Accordingly, the population contributing wastewater to the lagoon consists of: the population from the Town of St. Jean, future residential development in town, bussed-in students, and the population from rural areas in the RM of Montcalm. A growth rate of 0.1% was used for the community of St. Jean and bussed-in students, an increase of 4 persons/year was used for the future residential development in the town, and a 1.0% growth rate was used for the population in the rural areas to calculate population projections to year 20. The present and projected year 20 population expected to be contributing wastewater to the lagoon from all areas is provided in Table 1, attached in Appendix D.

The organic loading calculation from the community of St. Jean is based on a typical daily per capita BOD₅ of 0.076 kg/day, whereas that from the rural areas is based on 7.0 kg BOD₅/m³ of septage to be hauled from septic tanks. A daily per capita wastewater production of approximately 500 L/person/day (including infiltration) is used to estimate the hydraulic loading to the lagoon from the community of St. Jean. The rate of 500 L/person/day wastewater production used herein is a wastewater production rate based upon the RM committing to reduction in infiltration. It was assumed that the bussed-in students would contribute loadings to the lagoon during 1/3rd of the day only. Therefore, the daily per capita BOD₅ of 0.076 kg/day and wastewater production of 500 L/person/day were each reduced by a factor of 3 to estimate the organic and hydraulic loading contributions from the bussed-in students.

The current total wastewater production of 1,970 L/day from the rural population is utilized to determine the hydraulic loading to the lagoon from rural areas during the non-winter storage period of 135 days, with an increase of 1.0% per year. There is no anticipated future commercial or industrial wastewater producer being considered to impact the lagoon loading. The total organic and hydraulic loadings from the current and projected contributing population are provided in Table 1, attached in Appendix D.

Based on the above, the population contributing wastewater to the lagoon and the resulting organic and hydraulic loadings to the lagoon from the current and projected year 20 populations are as follows:

2.6.8.1 Contributing Population

The current population contributing wastewater to the lagoon is 520 persons from the community of St. Jean, and 81 bussed-in students. The actual population of the rural residents is not included, however hauled septage from rural residents was included in the wastewater loading calculations. The projected year 20 total population contributing wastewater to the lagoon would be approximately 530 people from the community of St. Jean, 83 bussed-in students, 80 people from the new residential development, plus septage hauled from rural areas.

2.6.8.2 Organic Loading

The daily organic loading to the lagoon from all the contributing population is approximately 55.22 kg BOD₅/day (current) and 65.15 kg BOD₅/day (projected year 20).

2.6.8.3 Hydraulic Loading

The daily hydraulic loading to the lagoon from all the contributing population is approximately 276 m³ (current) and 321 m³ (projected year 20). The current Manitoba Regulations require a lagoon to have sufficient storage for a 230 day period over the winter months. The total hydraulic capacity of the lagoon would need to be 73,375 m³ over the required 230 day storage period. Table 1 in Appendix D shows the current and projected year 20 hydraulic loadings to the lagoon.

2.6.9 Lagoon Regulatory Requirements

2.6.9.1 Province of Manitoba Design Objectives

The Province of Manitoba Design Objectives for Standard Sewage Lagoons is used as a guideline in the layout and design of the lagoon.

Organic Loading

Although a facultative lagoon operates at various organic efficiencies throughout the year, an average organic treatment capacity of 56 kg BOD₅/ha/day at a depth of 0.75 m in the primary cell has been utilized for design purposes.

Hydraulic Loading

According to current guidelines a facultative lagoon cannot be discharged between November 1 and June 15 (230 day winter storage period). Therefore, the lagoon must have the storage capacity for this time period based upon half the volume of the primary cell and the secondary cell volume from the invert of the discharge pipe to the maximum liquid level.

Lagoon Liner

Sewage lagoons with a clay liner are to be designed and constructed such that the interior surface of the proposed lagoon is underlain by at least one metre of soil having a hydraulic conductivity of 1×10^{-7} cm/sec or less. In the absence of soils with a hydraulic conductivity of 1×10^{-7} cm/sec or less, a flexible synthetic liner may be recommended.

Effluent Quality Requirements

Any new or expanding wastewater treatment lagoons 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 standards specific to the St. Jean lagoon would be:

- 200 fecal coliforms/100 ml or 200 E. coli/100 ml
- 25 mg/L BOD
- 25 mg/L CBOD
- 25 mg/L TSS
- 0.02 mg/L Total residual chlorine
- 1.25 mg/L Unionized Ammonia at 15°C
- 1 mg/L Total Phosphorus or demonstrated nutrient reduction strategy.

Recently Manitoba Conservation has included an additional effluent standard for ammonia which is:

- Nitrogen reduction to 15 mg/L is required on a site-specific basis depending on the receiving environment for new and expanding wastewater treatment facilities serving more than 10,000 equivalent people. The St Jean lagoon would not be required to adhere to a nitrogen limit of 15 mg/L, based on the service population. A limit of 1.25 mg/L of un-ionized ammonia applies to all lagoons, however the un-ionized portion of ammonia is pH and temperature dependent, and will increase with higher temperatures and pH. Typically this ammonia limit can be met by regular lagoon operations such as discharging effluent in the spring and fall and not during the warmest period of the summer. Algae blooms in a lagoon can trigger an increase in pH and un-ionized ammonia, however these algae blooms also typically occur during the warmest period of the summer, and so the most simple solution would be to wait until the water temperatures drop in the fall before discharging.

2.6.9.2 Nutrient Management Plan

The Manitoba Water Quality Standards, Objectives, and Guidelines, 2011, outline the nutrient reduction requirements for effluent in all new, expanding or modified

wastewater treatment facilities. Based upon the above guideline, the following options were considered to address nutrient management, with particular emphasis on phosphorus reduction:

- expand the existing facultative lagoon
- provide a new facultative lagoon at an alternate location
- convert the existing facultative lagoon into an aerated lagoon system, with filtration and UV disinfection
- construct an aerated lagoon at an alternate location.

Initially an EAP was submitted to Manitoba Conservation for an aerated lagoon project. Manitoba Conservation had a meeting with the RM to discuss facultative lagoons versus aerated lagoons. As a result of the meeting the Rural Municipality of Montcalm requested JR Cousin Consultants Ltd. re-submit the EAP for a facultative lagoon project.

Nutrient reduction guidelines were released in the *Manitoba Water Quality Standards, Objectives, and Guidelines, November 28, 2011*. As outlined, the regulations include province wide standards for phosphorus reduction. Under the nutrient standards, a 1.0 mg/L phosphorus limit applies for all new, expanding or modified wastewater treatment facilities. The exception being small wastewater treatment facilities that serve a population of less than 2,000 equivalent people, which have the option of implementing a nutrient reduction strategy instead of the 1.0 mg/L phosphorus limit. Nutrient reduction strategies include, but are not limited to, effluent irrigation, trickle discharge or constructed wetlands.

The *Lake Winnipeg Stewardship Board - Report to the Minister of Water Stewardship, December 2006* recommended several strategies for nutrient management with particular emphasis on phosphorus reduction. Based upon these strategies, the following options were considered for nutrient management for the facultative wastewater treatment lagoon.

Phosphorus Reduction by Filtration

Sewage treatment plant technology, such as chemical addition and filtration systems could be utilized to reduce the phosphorus concentration in the lagoon. The effluent could be pumped through a filtration system prior to discharge. A chemical flocculent such as alum would have to be added to the wastewater prior to filtration. Backwash containing the phosphorus would be sent back to the primary cell where it settles out into sludge. The sludge will accumulate in the lagoon for approximately 20 - 25 years before requiring removal.

This level of treatment is costly as equipment and housing is required as well as annual operating costs and chemical costs. An electrical power source is also required, such as a hydro line to the lagoon. It was therefore not considered a feasible

option for the facultative lagoon due to the higher capital cost and operating and maintenance costs.

Phosphorus Reduction by Surface Chemical Treatment

This option involves application of chemicals such as alum to wastewater in the secondary cell to reduce the level of phosphorus in the treated effluent, if prior to discharge the phosphorus concentration in the wastewater is found to be greater than 1.0 mg/L. The alum is broadcast onto the surface of the storage cells utilizing a gas driven pump and spray system from the top of the dike, or from a boat on the surface of the cells. The alum produces a chemical reaction with the phosphorus causing a pin floc. The pin floc of phosphorus and the turbidity settle to the bottom. The effluent can then be discharged from the secondary cell with a reduced level of phosphorus. This option requires higher operation and maintenance costs and was not the preferred option.

Constructed Wetlands

Constructed wetlands are used to polish treated effluent from a lagoon, and have the potential to provide nutrient reduction. However, they can require large land areas for construction, have increased odour potential, can favour mosquito breeding (due to vegetation type, very shallow effluent and minimal wind action) and add cost to the project. In addition, the use of constructed/engineered wetlands requires further investigation regarding their effectiveness under climatic conditions in Manitoba. Due to the uncertain effectiveness of the system and the increased cost, the use of constructed/engineered wetlands for the lagoon was not considered feasible.

Trickle Discharge

Slower discharge is expected to increase opportunity for nutrients to be taken up by growing plants along the discharge route, which is a means of reducing phosphorus concentration in the treated effluent. The total length of the drainage route is approximately 450 m prior to reaching the Red River. The maximum discharge volume from the lagoon will be approximately 63,960 m³ (the total available volume in the storage cell). If the entire volume was discharged over a 6 week period, the discharge rate would be approximately 18 L/sec. Based on the trickle discharge rate from the lagoon and the length of drainage route, it is expected that natural uptake of nutrients by the plants and soils will occur.

Public Awareness

In conjunction with nutrient reduction methods through treatment, preventative measures can also be taken to reduce nutrients in the wastewater influent. As the majority of the influent to the lagoon would be residential in nature, the RM is encouraged to inform residents and schools in the community of nutrient reducing strategies, such as using non-phosphate based soap and cleaning products for

domestic use. This would reduce the amount of phosphorus being released into the lagoon and reduce the requirements for treatment.

Recommended Phosphorus Reduction Strategy

As the population being serviced by the St. Jean lagoon is less than 2,000 people, a nutrient reduction strategy would be recommended, as opposed to a phosphorus limit of 1.0 mg/L prior to discharge. Therefore, the recommendation for the lagoon operation would be to utilize a trickle discharge from the storage cell (as described above). This option would require the least amount of operation and would be the most cost effective. In addition, the RM of Montcalm will be encouraged to notify residents in the community about the importance of nutrient source reduction in their homes.

2.6.10 Summary of Selected Design Criteria to Year 20

The following selected criteria would be used for design purposes:

- A total equivalent design population of 693 people being serviced from the piped collection system in the community in design year 20
- People using septic tanks in the surrounding rural areas, contribution per Table 1
- A maximum of one truck load of septage per day
- Primary cell with a minimum surface area of 11,633 m² at 0.75 m from the cell floor, providing a minimum daily organic treatment capacity of 65.15 kg BOD₅/day
- A total hydraulic storage capacity in the lagoon of 73,375 m³ which is provided from the upper half the liquid depth in the Primary cell and the remainder from the Secondary cell from the discharge pipe invert to the maximum liquid level
- A storage period of 230 days
- A height of 2.5 m from the cell floor to the top of dike in the primary and secondary cells is for typical lagoon design but this lagoon has to be protected from flooding hence the dike has to be raised above the 100 year flood level of 239.7 m. Dikes of the proposed facultative lagoon would be constructed approximately 2.70 m above the existing ground to meet the 100 year flood elevation requirement of 239.7 m. Excavation typically occurs in the cell to build the dikes, etc. In this case the base of the lagoon dikes is not below ground surface grade as a result of the need for high dikes to protect against flood elevations
- Since considerable borrow soil is required, to build dikes from ground surface upward, it is intended to obtain most of the borrow soil from the proposed floor of the primary and secondary cells, resulting in dikes close to 4 metres in height and cells much deeper than typical. This concept of flood protecting and obtaining borrow soil was discussed with Manitoba Conservation on March 24, 2014 and through e-mail correspondence on March 24 and 26, 2014
- The proposed discharge pipe invert would be 0.2 m above the cell floor elevation in the storage cell

- The treated effluent from the facultative lagoon would be discharged to a ditch along Municipal road 17 NE, leading into the Red River, eventually reaching Lake Winnipeg
- A 3.0 m wide vertical cut-off wall constructed with re-worked clay soils will extend to and into the horizontal clay liner and extend to the top of dike elevation
- A minimum of 1.0 m thick in-situ clay liner below the cell floors will be used for the horizontal liner
- A 4:1 slope will be used for the inner and outside dikes of the cells
- A truck turnaround and a spillway for trucked effluent would be provided at the primary cell
- The 150 mm forcemain will be installed within the right of ways of Railway Street, the CP railway, Municipal road 17 NE, and through small portions (property edges) of agricultural lands within River Lots 229, 231, 233, 235, and 237
- A 1.2 m high barbed wire fence with lockable gate would be installed around the perimeter of the lagoon
- Rip rap will be installed around the ends of the intercell and discharge piping
- A perimeter ditch will be constructed around the lagoon
- Site markers, warning signs, and valve markers will be installed.

2.6.11 Lagoon Layout

The layout of the proposed lagoon is as shown on Plan L2 in Appendix E.

2.6.12 Lagoon Construction Detail

2.6.12.1 General

The enclosed plans (Plans L1 to L5, Appendix E) show details of the conceptual design of the proposed facultative lagoon construction. The lagoon construction requires approximately 15 hectares of land area, including buffer zone surrounding the south and east side of the lagoon. Prior to construction of the cells, the upper organic topsoil would be removed from the construction area and stockpiled. The cells would be excavated and the dikes constructed with cut-off walls composed of high plastic clay, extended into the in-situ clay soils. The cut-off wall would be approximately 2.2 m below the ground surface. If unsuitable soils are encountered at that depth, presence of suitable clays underlying the unsuitable soils will be verified or the unsuitable soils will be removed and replaced as discussed in Section 2.6.12.3 below.

The tops of the dikes of both cells would have a height of 2.7 m above the existing ground surface to be raised above the 100 year flood level of 239.7 m. The top of the dikes would be approximately 3.7 m from the cell floors once the borrow soils from the cell have been removed. The cross section of the lagoon dike is shown on Plan L3 Appendix E.

Intercell and discharge pipes would be installed as shown on Plan L2 in Appendix E. Rip rap would be installed at the intercell and discharge piping. Perimeter ditches would be constructed surrounding the lagoon and would be connected to the drainage ditch along the existing municipal road immediately north of the lagoon site. Upon completion of the construction, the topsoil that is stripped off the excavation area would be placed on the outside of the dikes and the area would be seeded.

A 1.2 m high barbed wire fence would be installed around the lagoon complete with a lockable gate. A truck turnaround with bollards and spillway would be constructed. Signage will be installed near the gate.

2.6.12.2 Conceptual Liner Design

Based on the geotechnical investigation of the lagoon site outlined above, the clay soils underlying the site are suitable to provide an in-situ clay liner in accordance with Manitoba Conservation guidelines. To form a continuous clay liner, the cut-off walls (that form the vertical liner inside and below the dikes) must be tied into the horizontal clay liner below the cell floors. The exact location of the bottom liner would be confirmed upon completion of construction.

2.6.12.3 Construction Techniques

The construction technique for the proposed lagoon would provide a clay liner located as follows:

- A vertical cut-off wall constructed from high plastic clay and located in the dikes would form the vertical liner and would be keyed into the underlying in-situ clay soil being the bottom liner
- There would be a one metre thick in-situ clay liner below the cells. This bottom liner would extend under the dikes to intercept the vertical cut-off walls in the dikes.
- The vertical liner in all the perimeter dikes and the bottom liner would be connected.

The construction specification document would state that the cut-off wall liner would consist of clay type soil. The cut-off wall liner would be scarified and compacted to achieve a minimum Standard Proctor Density of 95%. All material for the cut-off wall liner shall be of the best clay type material available and shall be approved by the Engineer. Each lift of clay would be a maximum of 150 mm thick following compaction with a sheepsfoot roller.

2.6.12.4 Construction Details

Organics in the upper 200 mm topsoil would be removed from the cell construction area including where the dikes would be constructed, from the outer to the inner slopes.

Construction of lagoon liner would be in accordance with the following specifications:

1. The horizontal liner of the cells shall be in-situ clay soil material.
2. The cut-off wall in the dikes shall be constructed of re-worked clay soil material.
3. The liner shall be at least one metre in thickness.
4. The liner shall have a hydraulic conductivity of 1×10^{-7} cm/sec or less at all locations;
5. The cut off wall liner shall be constructed to an elevation of 237.5 m.

Prior to placement of the embankment material and material to be compacted, the foundation would be scarified to a depth of 150 mm (6 in.) compacted with a minimum of eight passes of a sheepsfoot roller. Complete foundation preparation shall be approved by the Engineer before any embankment is placed. Embankment material, both common backfill and relatively impermeable soil, would be compacted with a minimum of eight passes of a sheepsfoot roller on a 150 mm (6 in.) compacted lift. The lagoon bottom will be graded to a tolerance of ± 50 mm (2 in.).

The lagoon construction specifications would indicate that the sheepsfoot roller shall have a minimum foot pressure of no less than 1,700 kPa (250 psi). The drum diameter of the sheepsfoot roller would not be less than 1,200 mm (4 ft.). Each roller would be equipped with cleaning fingers designed to prevent the accumulation of material between the tamping feet. The foot pressure would be calculated by taking the total mass of the roller and dividing it by the greater of: the area of the maximum number of tamping feet in one row parallel to the axis of the roller, or by 5 percent of the total foot area. The roller foot would be at least 200 mm (8 in.) long and would have a minimum foot area of at least 4,500 mm² (7 sq. in.).

A limited range of moisture content would be permitted. The material shall not be so wet nor so dry that compaction equipment cannot compact the fill into a homogeneous mass. Material too wet shall be dried or wasted as directed by the Engineer and material too dry shall be wetted as directed by the Engineer. All constructed earthen lagoon components shall be graded to a tolerance of ± 50 mm (2 in.).

The specifications would state that the dikes and embankment are to be seeded with a grass such as brome, for erosion control.

The outer slope and perimeter drainage system would prevent surface drainage from entering into the lagoon and the ponding of surface drainage around the perimeter of the lagoon.

2.6.13 Access Road Construction Detail

2.6.13.1 General

Construction of the lagoon approach would include the removal of topsoil, excavation of ditches, preparation of a sub-base, and the addition of a granular material to support the traffic of septage hauling trucks. A culvert would be installed under the access road to the west of the truck turnaround, to allow drainage of the perimeter ditch to the north of the lagoon.

2.6.14 Piping Installation Detail

2.6.14.1 General

The works involved in the installation of the forcemain and discharge pipe include:

- Removal of vegetation and topsoil
- Excavation/directional drilling of piping trench
- Piping installation
- Connecting the hook-ups and the lagoon
- Filling the trench
- Return the topsoil
- Restoration of ditches, the cultivated field, and the river bank.

3.0 POTENTIAL ENVIRONMENTAL IMPACTS

A description of the potential impacts of the development on the environment, including, but not necessarily limited to:

- *type, quantity and concentration of pollutants to be released into the air, water or land*
- *impact on wildlife*
- *impact on fisheries*
- *impact on surface water and groundwater*
- *forestry related impacts*
- *impact on heritage resources*
- *socio-economic implications resulting from the environmental impacts.*

3.1 Releases to Air, Water, Land

3.1.1 Air

The proposed lagoon is to be situated approximately 369 metres southeast of the closest residence, therefore prevailing winds from the southeast are not expected to cause odours to drift toward the resident. The community of St. Jean is located approximately 500 m northwest of the lagoon and again, the prevailing winds are not expected to cause any odour problems to the community.

In general, nuisance odours occur in facultative lagoons that are improperly sized and organically overloaded. Odours are also generated under anaerobic conditions. During the summer the lagoon would be aerobic at the surface, facultative at the centre and anaerobic at the bottom. Minimal to no treatment would occur in the winter due to the ice cover on the surface; the treatment process would predominantly be anaerobic during winter. Therefore, the lagoon may generate some odours for a short time each spring during the thawing or turn-over period when water temperature inversion causes turbulence in the lagoon cells and gases produced from the anaerobic treatment process are brought to the surface. Prevailing winds in the area can carry odours if the area is exposed and wind breaks are not utilized around the lagoon cells.

There is also a potential for greenhouse gas emissions during construction works from heavy equipment and transport vehicles. Impacts from dust generation are not expected as the construction area will meet the minimal setback distances from residences.

3.1.2 Water

Seepage from the lagoon is not expected to impact surface water or groundwater, as it would be lined per Manitoba Conservation requirements. Effluent would be treated to the requirements set by Manitoba Conservation prior to discharge. No significant impact is expected from the installation of the forcemain, as no surface water bodies are in the vicinity of the forcemain route. Erosion control measures such as silt fencing will be employed to minimize impact from installation of the discharge pipe near the river bank.

3.1.3 Land

The land would be altered by the excavation of the cells and construction of the dikes and perimeter ditches. As the lagoon dikes would be constructed to Manitoba Conservation guidelines impact from seepage to the surrounding land is not expected. Directional boring and trenching of the land would be needed for installation of the forcemain however, any affected area due to the forcemain installation works will be restored with excavated material to conditions similar to prior to excavation.

3.2 Wildlife

Impacts to wildlife are not expected, as the lagoon construction and forcemain installation would occur in a previously disturbed area. Treated effluent discharged from the lagoon would be in accordance with Manitoba Conservation guidelines. Open water areas created as a result of lagoon construction would provide a habitat for waterfowl and nesting shorebirds.

3.3 Fisheries

Impacts to fish along the discharge route are unlikely as the lagoon effluent would be discharged after fish spawning has normally occurred and only when the treated effluent meets current Manitoba Conservation water quality guidelines for surface discharge.

3.4 Surface Water and Groundwater

Surface Water – Impacts to surface water due to discharge of the lagoon are not expected, as the treated effluent will meet Manitoba Conservation discharge criteria. The discharge from the lagoon should not cause or contribute to flooding in or along the drainage route. The lagoon would not be discharged during flood conditions. As discussed in Section 2.6.7.1 above, the land in the area is subject to flooding by both the Red River and the Plum River. The discharge route drains from the lagoon directly to the Red River via ditching as shown on Plan 3, of Appendix B. Due to the existing and proposed drainage slope in the discharge route, surface runoff into the neighbouring farmland from the lagoon discharge is not possible.

Groundwater – No impacts to groundwater are expected as the lagoon would be lined in accordance with Manitoba Conservation guidelines, and discharge effluent would meet water quality guidelines.

3.5 Forestry

There would be no impact to forestry as no trees would be removed for the lagoon construction or forcemain and discharge ditching.

3.6 Vegetation

Manitoba Conservation Wildlife and Ecosystem Protection Branch was contacted regarding occurrences of rare or endangered species in their database at the proposed lagoon site. The Branch identified no occurrences of any rare species at the site. Refer to Manitoba Conservation Wildlife and Ecosystem Protection Branch October 20, 2009 e-mail correspondence, attached in Appendix F.

The lagoon would be constructed on agricultural land, hence significant impact to natural or endangered vegetation is unlikely as the area has been previously disturbed. The forcemain would be installed mainly on road and railway right of ways, with some section of the forcemain passing through edges of agricultural fields to the southeast of the community that has also been previously disturbed. Therefore, installation of the piping is not expected to have a significant impact on natural or endangered vegetation.

3.7 Heritage Resources

The Manitoba Historic Resources Branch was contacted regarding the proposed lagoon site. The Historic Resources Branch indicated that the potential to impact significant resources is low, therefore the Branch has no concern regarding the project. Refer to the November 9, 2009 correspondence from the Historic Resources Branch of Manitoba Culture, Heritage, Tourism and Sport, attached in Appendix F. The Manitoba Historic Resources Branch would be notified if archaeological resources were encountered during excavation and trenching.

3.8 Socio-Economic Implications

The lagoon construction and piping installation are not expected to have adverse socio-economic impacts. In fact, construction related economic activity would have a positive economic impact. In addition, the community would have increased wastewater capacity upon completion of the project, which will encourage future growth in the community.

3.9 Public Involvement

The RM of Montcalm has been advised to keep the public informed of the project by means of newsletters and open house meetings, in order to address public concerns regarding the development. This environmental submission will be advertised by Manitoba Conservation to ensure the public is made aware of the project and has an opportunity to provide comments.

4.0 MANAGEMENT PRACTICE

A description of the proposed environmental management practices to be employed to prevent or mitigate adverse implications from the impacts identified in the potential impacts described above which will have regard to, where applicable: containment, handling, monitoring, storage, treatment and final disposal of pollutants; conservation and protection of natural or heritage resources; environmental restoration and rehabilitation of the site upon decommissioning; and protection of environmental health:

4.1 Mitigation of Impacts to Air

The proposed lagoon will also be located approximately 500 m southeast of the nearest residence and community of St. Jean Baptiste. The Manitoba Conservation guideline on setback requirements for facultative lagoons is: a minimum distance of 300 m to the nearest residence and 460 m to any centre of population. The buffer zones of 300 m from individual residence and 460 m from the nearest community centre to the lagoon are shown on Plan L1, in Appendix E.

To reduce the potential for odour nuisance in the community, the primary cell will be sized for the projected year 20 organic loadings, from the surrounding population. This takes into consideration the maximum allowable organic loading rate of 56 kg BOD₅/ha/day into the lagoon primary cell, which impacts the odours generated from a wastewater treatment lagoon peak day organic loading during septic truck dumping. Therefore, nuisance odours as a result of organic over-loading are not expected.

Although the lagoon would likely generate some odours for a short time each spring, during the thawing or turn-over period, prevailing (i.e. northwesterly) winds should not cause odours to drift toward the community that is northwest of the lagoon.

Emissions from construction equipment and transport vehicles will be controlled through regular maintenance, and will meet all provincial and local standards. 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. Due to the setback distance, it is unlikely that dust will have any impact on the community or to nearby residents.

4.2 Mitigation of Impacts to Land

To minimize the potential for slope erosion, the lagoon dike tops and outside slopes would be seeded with grass. The inlet and outlet piping locations of the lagoon would be surrounded by rip rap to prevent soil erosion at inlet and outlet locations.

The disturbed land for the purpose of piping installation will be returned to its original state or roached to allow for settling and grass seeded after installation works are completed. The construction specifications would outline to the Contractor requirements for the minimization of soil loss, erosion, compaction and backfilling impacts. Illustrated mitigation measures to be undertaken during the installation of the piping are provided on Plans L5 attached in Appendix E.

Silt fence will be installed as shown on Plan L5 attached in Appendix E, to control sediments from the trenching area above the water line. Upon completion of construction, erosion control blankets, and rip rap will be placed along the disturbed areas from the water line up to the top of the embankment to return the disturbed riparian zone to its original state before construction. The silt fence will remain in place until vegetation is re-established. Rip rap will be installed at the outfall of the discharge pipe to protect the river bank from erosion.

4.3 Mitigation of Impacts to Water

The lagoon would be lined in accordance with Manitoba Conservation guidelines. There would be approximately a 30 m offset from the lagoon to the discharge ditch along Municipal road 17 NE located to the north of the lagoon. The specifications would state that the contractor is responsible for erosion control.

Any excess excavated material would be disposed of on land above the high water mark, to prevent re-entry of the material into any water course. Erosion from excess material stockpiles would be prevented by the use of silt fencing at drainage locations, or seeding the stockpiles with grass. Clean rock (free of fine materials) from an appropriate land-based source would be utilized as rip rap, to eliminate occurrence of erosion at the lagoon discharge outlet. Silt fence would be installed and perimeter ditch slopes would be seeded with grass to control erosion and sediment entry into the local drainage system. Disturbance of the soils adjacent to the perimeter ditches would be minimized.

The construction specifications would outline the contractor's requirements for the handling and storage of fuels and hazardous materials during construction as per federal and provincial regulations. The specification would state wording the same or 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 m² 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 waterbody, and comply with provincial regulations
- Waste hazardous materials from construction activity and equipment must be properly collected and disposed of in compliance with provincial regulation
- In the event of spills or leaks of fuels and hazardous materials, the contractor or operator should notify the project engineer and Provincial Authorities.

Hazardous material handling and storage would follow all provincial and federal regulations including WHMIS and spill containment requirements.

The specifications would 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.

The discharge from the lagoon will be drained to the Red River and would not cause or contribute to flooding in or along the drainage route.

Impacts to surface water from discharge of lagoon effluent are not expected, as the lagoon effluent would be treated to the Tier I Manitoba Water Quality Standards, Objectives and Guidelines, and the Federal Wastewater Systems Regulations, as described in Section 2.6.9.1 above.

Impacts to surface water due to discharge of the lagoon are not expected, as treatment will occur in the lagoon cells and measures such as a trickle discharge can be utilized to further reduce nutrient loading to surface waters.

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 wastewater treatment lagoon, due to the mitigation measures described above. Positive residual effects are expected from the properly sized wastewater treatment system that will allow for expansion of the service area in the future.

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 lagoon operation is to be conducted by a trained lagoon operator, who is to ensure the lagoon is operated under the requirements of the environmental licence. The operator is to ensure liquid levels in the lagoon cells are maintained within the required limits, conduct sampling of lagoon effluent prior to discharge, and is to ensure water quality guidelines as described in the environmental licence are met. The construction contractor is to ensure that grass growth occurs on slopes and disturbed areas, after the construction activities are completed.

7.0 SCHEDULE

7.1 Commencement Dates

The date of commencement of construction, commencement of operation including staging of the development and termination of operation, if known:

Lagoon construction is proposed to begin as soon as possible.

7.2 Environmental Approval Date

Latest date by which the proponent would like to complete the requirements of the Environment Act and seek approval for the development. Briefly state the reasons for the selection of this date:

The proponent would like to complete the requirements of the Environment Act Proposal by the spring of 2014. This date was selected so that the project could proceed as early as possible.

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

8.0 FUNDING

Name and address of the Government Agency (Federal, Provincial or otherwise) from which a grant or loan of capital funds have been requested, where applicable.

Funding is in the process of being solicited; actual sources have not been confirmed.

APPENDICES

Appendix A

Certificates of Titles

Crown Lands & Property Agency - Lands Branch, October 23, 2009 E-mail Correspondence

Land Use Designation - R.M. of Montcalm, October 29, 2009 - E-mail Correspondence

Appendix B

Plan 1: Proposed Facultative Lagoon Site Location

Plan 2: Test Hole Locations at Proposed Facultative Lagoon Site

Plan 3: Proposed Forcemain Layout and Discharge Route

Plan 4: Red River Selected Water Quality and Flow Monitoring Stations

Appendix C

Test Hole Logs

The National Testing Laboratories Ltd. Soil Analysis Results

Appendix D

Table 1: Community of St. Jean Baptiste - Population, Hydraulic, and Organic Loading Projections

Table 2: Water Quality of the Red River at Emerson (Stations MB050CS001 & MB050CS007) and at St. Jean (Station MB050CS031)

Tables: The 7Q10 Flow Data for the Red River at Emerson and Ste. Agathe Stations

Appendix E

Plan L1: Proposed Facultative Lagoon with Setbacks

Plan L2: Proposed Facultative Lagoon Layout

Plan L3: Proposed Facultative Lagoon Dike Details

Plan L4: Spillway, Truck Turnaround, Fence, Gate, Bollard, Site Marker, and Access Road Cross Section Details

Plan L5: Valve, Valve Marker, Rip Rap, Ditch, Silt Fence and Miscellaneous Details

Appendix F

Fisheries Branch, Manitoba Water Stewardship, October 15, 2009 - E-mail Correspondence

Manitoba Conservation Wildlife & Ecosystem Protection Branch, October 20, 2009 - Email Correspondence

Manitoba Culture, Heritage, Tourism and Sport - Historic Resources Branch, November 9, 2009 - Memorandum

Appendix A

Certificates of Titles

Crown Lands & Property Agency - Lands Branch, October 23, 2009 E-mail
Correspondence

Land Use Designation - R.M. of Montcalm, October 29, 2009 - E-mail Correspondence

Certificates of Titles

DATE: 1995/11/20
TIME: 07:34
PORT

MANITOBA
DUPLICATE TITLE

TITLE NO: 1413225
PAGE: 1

STATUS OF TITLE..... ACCEPTED
ORIGINATING OFFICE..... WINNIPEG
REGISTERING OFFICE..... WINNIPEG
REGISTRATION DATE..... 1995/11/06
COMPLETION DATE..... 1995/11/17
PRODUCED FOR: GREGORY, BRUCE D.
BY: D.MOONEY
LTO BOX NO: MAIL
CONSOLIDATION..... NO

LEGAL DESCRIPTION:

ROGER VERMETTE , GUY VERMETTE , RICHARD VERMETTE AND
LOUIS VERMETTE
ALL OF THE VILLAGE OF ST. JEAN BAPTISTE IN MANITOBA

ARE REGISTERED OWNERS SUBJECT TO SUCH ENTRIES
RECORDED HEREON IN THE FOLLOWING DESCRIBED LAND:

RL 225 AND 227 PARISH OF STE AGATHE
EXC OUT OF SAID LOT 227: PLAN 32874 WLTO AND
EXC OUT OF BOTH SAID LOTS
EXC FIRSTLY: MAIN HIGHWAY PLAN 3798 WLTO
SECONDLY: PUBLIC ROAD PLAN 5020 WLTO
THIRDLY: RAILWAY RIGHT-OF-WAY PLAN 5561 WLTO AND
FOURTHLY: PUBLIC WORK, ROAD NOS. 1 AND 2, AND
PUBLIC ROAD PLAN 29676 WLTO

CHARGES:

REGISTRATION NUMBER	EFFECT ON TITLE	AFFECTING INSTRUMENT	INSTRUMENT TYPE STATUS		NOTES
1745062 WPG 1901770 WPG	ACTIVE ACTIVE		CAV CAV	ACC ACC	LOT 227 WTN LT PL 32220

ADDRESS(ES) FOR SERVICE:

EFFECT	NAME AND ADDRESS	POSTAL CODE	FIRM NUMBER
ACTIVE	ROGER, GUY, RICHARD AND LOUIS VERMETTE GENERAL DELIVERY ST. JEAN BAPTISTE MB		

ORIGINATING INSTRUMENT(S):

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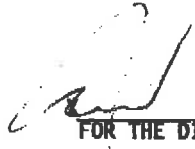
PRESENTED BY: GREGORY, BRUCE D.
FROM: ROGER VERMETTE, GUY VERMETTE, R. VERMETTE & L. VERMETTE
TO:

FROM TITLE NUMBER(S):

1310507 WPG BAL

DUPLICATE PRODUCED FOR..... GREGORY, BRUCE D. ON 1995/11/20
ADDRESS..... BOX 811
MORRIS MB
POSTAL CODE..... ROG 1K0

DUPLICATE TITLE NUMBER 1413225 PRODUCED FROM THE LAND TITLES DATA
STORAGE SYSTEM ON 1995/11/20


FOR THE DISTRICT REGISTRAR

DATE: 1995/11/20
TIME: 07:34
PORT

MANITOBA
DUPLICATE TITLE

TITLE NO: 1413225
PAGE: 2

STATUS OF TITLE..... ACCEPTED
ORIGINATING OFFICE..... WINNIPEG
REGISTERING OFFICE..... WINNIPEG
REGISTRATION DATE..... 1995/11/06
COMPLETION DATE..... 1995/11/17

PRODUCED FOR: GREGORY, BRUCE D.
BY: D.MOONEY
LTO BOX NO: MAIL
CONSOLIDATION..... NO

ACCEPTED THIS 6TH DAY OF NOVEMBER, 1995
BY D.MOONEY FOR THE DISTRICT REGISTRAR OF
THE LAND TITLES DISTRICT OF WINNIPEG.

DUPLICATE TITLE NUMBER 1413225 PRODUCED FROM THE LAND TITLES DATA
STORAGE SYSTEM ON 1995/11/20



FOR THE DISTRICT REGISTRAR

***** END OF DUPLICATE TITLE FOR TITLE 1413225 WPG *****

DATE: 1996/01/26
TIME: 10:15
PORT

MANITOBA
DUPLICATE TITLE

TITLE NO: 1419222
PAGE: 1

STATUS OF TITLE.....	ACCEPTED	PRODUCED FOR: GREGORY, BRUCE D.
ORIGINATING OFFICE.....	WINNIPEG	BY: R.CRIERIE
REGISTERING OFFICE.....	WINNIPEG	LTO BOX NO:
REGISTRATION DATE.....	1996/01/11	CONSOLIDATION..... NO
COMPLETION DATE.....	1996/01/17	

LEGAL DESCRIPTION:

ROGER VERMETTE , GUY VERMETTE , RICHARD VERMETTE AND
LOUIS VERMETTE
ALL OF ST. JEAN BAPTISTE IN MANITOBA

ARE REGISTERED OWNERS SUBJECT TO SUCH ENTRIES RECORDED HEREON,
IN THE FOLLOWING DESCRIBED LAND:

PARCELS A AND B PLAN 29676 WLTO
EXC OUT OF SAID PARCEL B: LOT 1 PLAN 32874 WLTO
IN RL 225 AND 227 PARISH OF STE AGATHE

CHARGES:

NO CHARGES EXIST ON THIS TITLE

ADDRESS(ES) FOR SERVICE:

EFFECT	NAME AND ADDRESS	POSTAL CODE	FIRM NUMBER
ACTIVE	ROGER VERMETTE ST. JEAN BAPTISTE, MB	ROG 2B0	
ACTIVE	GUY VERMETTE ST. JEAN BAPTISTE, MB	ROG 2B0	
ACTIVE	RICHARD VERMETTE ST. JEAN BAPTISTE, MB	ROG 2B0	
ACTIVE	LOUIS VERMETTE ST. JEAN BAPTISTE, MB	ROG 2B0	

ORIGINATING INSTRUMENT(S):

REGISTRATION NUMBER	TYPE	REG. DATE	CONSIDERATION	SWORN VALUE
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PRESENTED BY: GREGORY, BRUCE D.
FROM: RURAL MUNICIPALITY OF MONTCALM
TO: ROGER VERMETTE, GUY VERMETTE, RICHARD VERMETTE, ETAL

FROM TITLE NUMBER(S):

1413214 WPG ALL

DUPLICATE TITLE NUMBER 1419222 PRODUCED FROM THE LAND TITLES DATA
STORAGE SYSTEM ON 1996/01/26

R. S. Bilquist
x
FOR THE DISTRICT REGISTRAR

DATE: 1996/01/26
TIME: 10:15
PORT

MANITOBA
DUPLICATE TITLE

TITLE NO: 1419222
PAGE: 2

STATUS OF TITLE..... ACCEPTED
ORIGINATING OFFICE..... WINNIPEG
REGISTERING OFFICE..... WINNIPEG
REGISTRATION DATE..... 1996/01/11
COMPLETION DATE..... 1996/01/17

PRODUCED FOR: GREGORY, BRUCE D.
BY: R.CRIERIE
LTO BOX NO:
CONSOLIDATION..... NO

DUPLICATE PRODUCED FOR..... GREGORY, BRUCE D.
ADDRESS..... BOX 811
MORRIS MB
POSTAL CODE..... ROG 1K0

ON 1996/01/26

ACCEPTED THIS 11TH DAY OF JANUARY, 1996
BY R.CRIERIE FOR THE DISTRICT REGISTRAR OF
THE LAND TITLES DISTRICT OF WINNIPEG.

DUPLICATE TITLE NUMBER 1419222 PRODUCED FROM THE LAND TITLES DATA
STORAGE SYSTEM ON 1996/01/26

X
FOR THE DISTRICT REGISTRAR

***** END OF DUPLICATE TITLE FOR TITLE 1419222 WPG *****

Crown Lands & Property Agency - Lands Branch, October 23, 2009
E-mail Correspondence

Bereket Assefa

From: Little, Karen (CLP) [Karen.Little@gov.mb.ca]
Sent: Friday, October 23, 2009 8:20 AM
To: Bereket Assefa
Subject: RE: St. Jean Proposed Aerated Lagoon Site - Mineral Rights

Good Morning Bereket,

According to our records this date, mines & minerals and sand & gravel in RL's 225 & 227 Parish of Ste Agathe were granted with the surface in 1882 and 1888. The Crown has no interests.

Based on Certificate of Title's 1413225 and 1419222 it appears ownership of the mines & minerals and sand & gravel are with the surface.

Have a great weekend. <Karen>

Karen Little
Supervisor of Registry
Crown Lands & Property Agency - Lands Branch
Rm 308 - 25 Tupper ST N
Portage la Prairie MB R1N 3K1
Phone: (204) 239-3805
Fax: (204) 239-3560
KAREN.LITTLE@GOV.MB.CA

From: Bereket Assefa [mailto:bassefa@jrcc.ca]
Sent: Thursday, October 22, 2009 8:57 AM
To: Little, Karen (CLP)
Subject: St. Jean Proposed Aerated Lagoon Site - Mineral Rights

Good morning Karen,

On behalf of the R.M. of Montcalm J.R. Cousin Consultants Ltd. is preparing an Environment Act Proposal (EAP) for a proposed aerated wastewater treatment lagoon construction in St Jean. The proposed aerated lagoon site is located south east of St. Jean on portions of River Lots 225 and 227 as shown on the attached Plan 1. The land is currently owned by Mr. Roger Vermette, Mr. Guy Vermette, Mr. Richard Vermette, and Mr. Louis Vermette as shown in the attached PDF copies of Certificates of Titles (No. 1413225 and No. 1419222). The R.M. of Montcalm is considering to purchase the land from the owners.

Please provide information regarding who owns the Mineral Rights underneath the proposed aerated lagoon site.

Thank you,

Bereket Assefa, Ph.D., P.Eng.
Environmental Engineer

J.R. Cousin Consultants Ltd.
Phone: (204) 489-0474
Fax: (204) 489-0487
www.jrcc.ca

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Land Use Designation - R.M. of Montcalm, October 29, 2009 - E-mail Correspondence

Bereket Assefa

From: RM of Montcalm [montcalm@mts.net]
Sent: Thursday, October 29, 2009 9:12 AM
To: Bereket Assefa
Subject: Re: St. Jean Aerated Lagoon

Hi Bereket,

Please see my answers below. Any other questions, don't hesitate.

Mitch

----- Original Message -----

From: Bereket Assefa
To: Mitch Duval
Sent: Wednesday, October 28, 2009 3:50 PM
Subject: St. Jean Aerated Lagoon

Hi Mitch,

I have a few questions related to the St. Jean Aerated lagoon project:

- What is the land use designation (zoning) for the land upon which the aerated lagoon is to be constructed?
The land use for the proposed site is currently zoned as "AG" Agricultural General.
- Per current conceptual design the forcemain route would be located within the right of ways of portions of the road to the west of the lift station and the rail way, in the property edges of River Lots 229, 231, 233, 235, and 237, and within the right of way of the road north of the proposed aerated lagoon site.
 - What are the land use designations of each portions of the above described forcemain route?
The land use for the proposed site of the forcemain is also zoned as "AG" Agricultural General.
 - What is the name of the road to the west of the lift station?
The lift station is located at the NE corner of Railway Street and River Avenue. Railway runs North/South,
River run
East/West
 - What is the name of the road to the north of the proposed aerated lagoon site?
The road north of the site that runs East/West is called Road 17 NE.

Please provide the above information as we need to use it in the Environment Act Proposal document we are preparing.

Regards,

Bereket Assefa, Ph.D., P.Eng.
Environmental Engineer

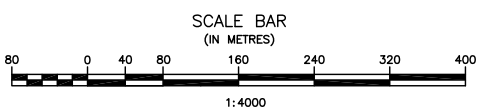
J.R. Cousin Consultants Ltd.
Phone: (204) 489-0474
Fax: (204) 489-0487
www.ircc.ca

Appendix B

- Plan 1: Proposed Facultative Lagoon Site Location
- Plan 2: Test Hole Locations at Proposed Facultative Lagoon Site
- Plan 3: Proposed Forcemain Layout and Discharge Route
- Plan 4: Red River Selected Water Quality and Flow Monitoring Stations



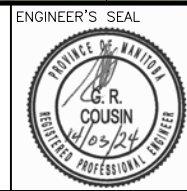
PRELIMINARY
NOT FOR CONSTRUCTION



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.

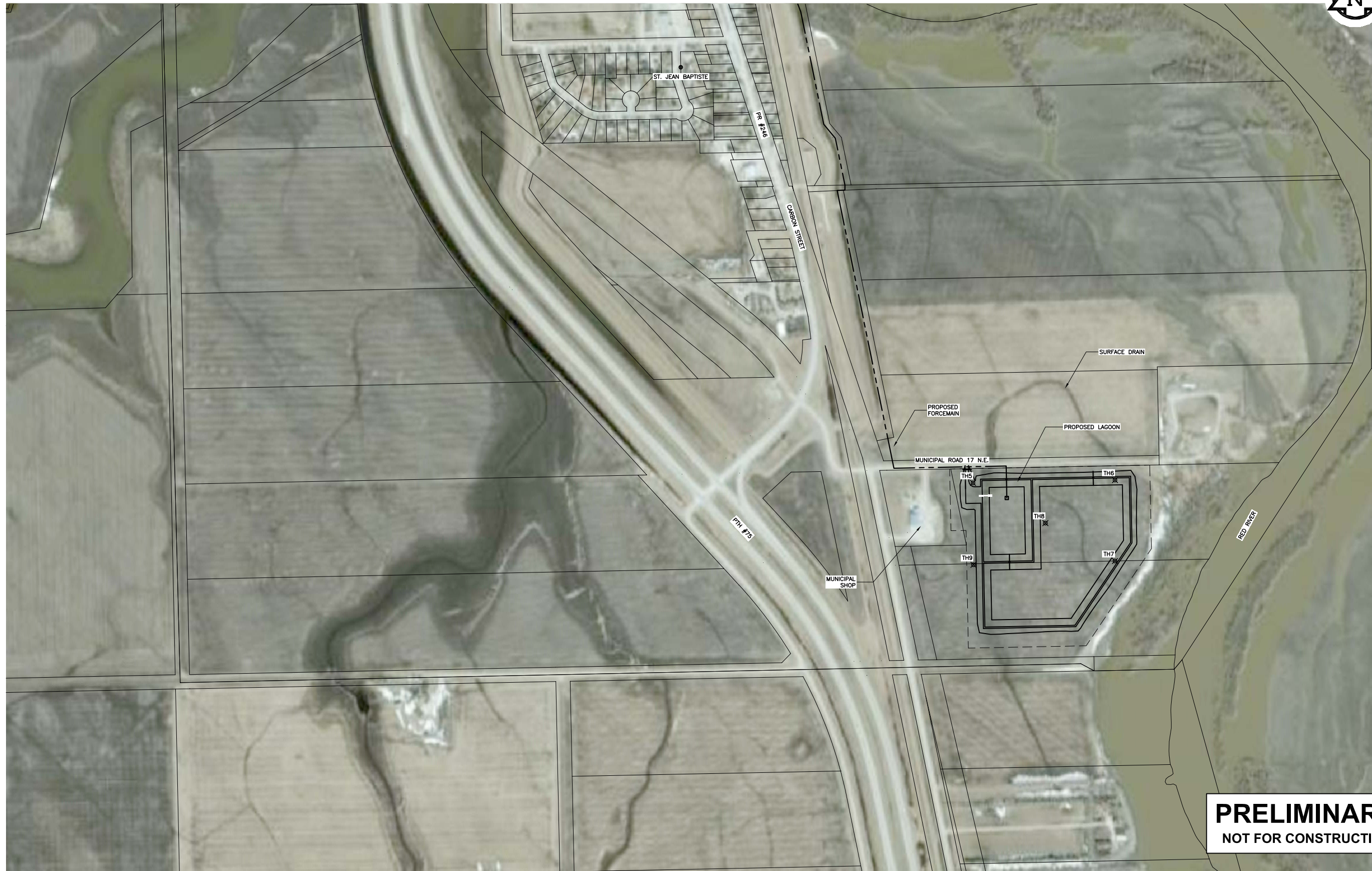


JR Cousin Consultants Ltd.
 91A Scurfield Blvd. Winnipeg MB R3Y 1G4
 p. (204) 489-0474
 f. (204) 489-0487
 www.jrcc.ca

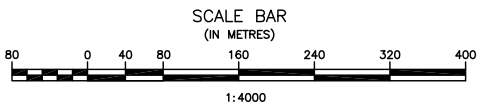
ENGINEERING CONSULTANTS
 ENGINEERING EXCELLENCE SINCE 1981

CODE: M-575.01	PROJECT: R.M. OF MONTCALM ST. JEAN LAGOON ASSESSMENT
DESIGNED BY: OW	TITLE: PROPOSED FACULTATIVE LAGOON WITH SETBACKS
DRAWN BY: RH	SCALE: 1:4000
REVIEWED BY: OW	DATE: 14/03/24
	PLAN: 1
	SHEET: 1 of 4

Apr 01, 2014 - 9:05am I:\000075 Montcalm RA\375.01 St. Jean Lagoon Assessment\04 Drawings\Map\GP 2014\1.dwg



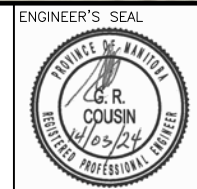
PRELIMINARY
NOT FOR CONSTRUCTION



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.

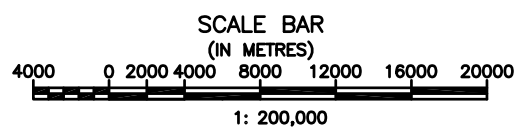


JR Cousin Consultants Ltd.
 91A Scurfield Blvd. Winnipeg MB R3Y 1G4
 p. (204) 489-0474
 f. (204) 489-0487
 www.jrcc.ca

ENGINEERING CONSULTANTS
 ENGINEERING EXCELLENCE SINCE 1981

CODE: M-575.01	PROJECT: R.M. OF MONTCALM ST. JEAN LAGOON ASSESSMENT
DESIGNED BY: OW	TITLE: TEST HOLE LOCATIONS AT PROPOSED FACULTATIVE LAGOON SITE
DRAWN BY: RH	SCALE: 1:4000
REVIEWED BY: OW	DATE: 14/03/24
	PLAN: 2
	SHEET: 2 of 4

Apr 01, 2014 - B:\data\1\000\078 Montcalm RMA\078.01 St. Jean Lagoon Assessment\04 Engineering\Map\GP 2014\3.dwg



PRELIMINARY
NOT FOR CONSTRUCTION

Apr 01, 2014 - 8:43am F:\500\575 Montcalm RM\575.01 St. Jean Lagoon Assessment\04 Drawings\dwg\EAP 2014\4.dwg

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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p. (204) 489-0474
f. (204) 489-0487
www.jrcc.ca

ENGINEERING EXCELLENCE SINCE 1981

CODE:	M-575.01	PROJECT:	R.M. OF MONTCALM ST. JEAN LAGOON ASSESSMENT
DESIGNED BY:	BA	TITLE:	RED RIVER SELECTED WATER QUALITY AND FLOW MONITORING STATIONS
DRAWN BY:	RH	SCALE:	1:200,000
REVIEWED BY:	JC	DATE:	14/03/24
		PLAN:	4
		SHEET:	4 of 4

Appendix C


















Test Hole Logs

The National Testing Laboratories Ltd. Soil Analysis Results

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.

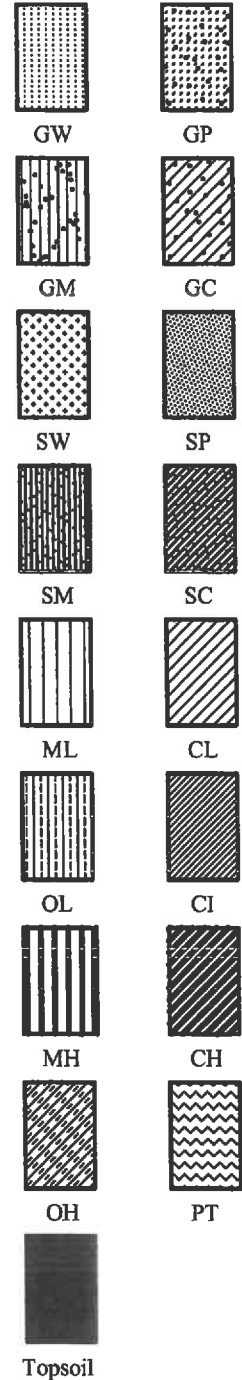
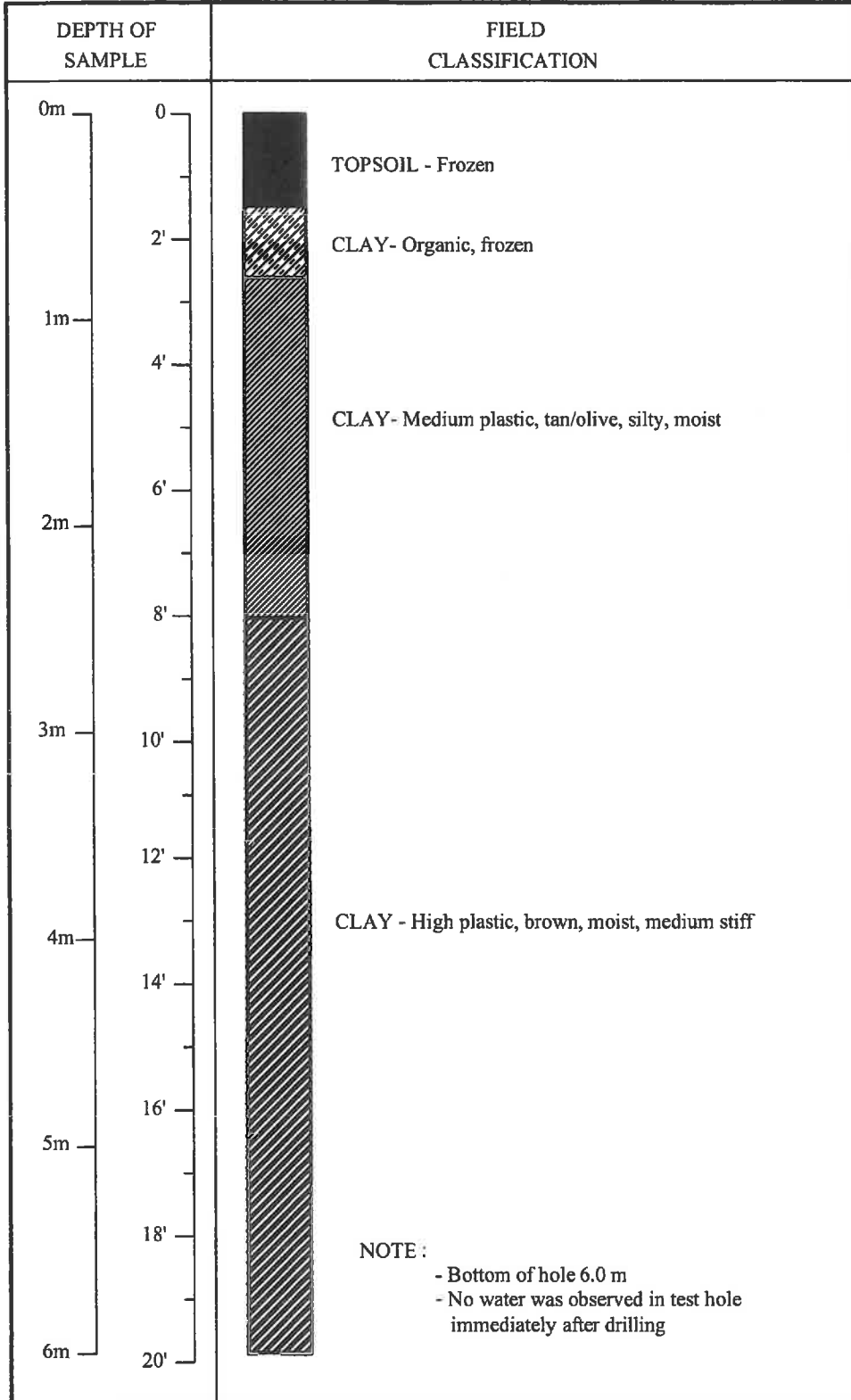
TEST HOLE LOG SHEET

LOCATION: R.M. OF MONTCALM, MANITOBA

DATE: DECEMBER 17, 2008

PROJECT : St. JEAN LAGOON ASSESSMENT

TEST HOLE # 5



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 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.

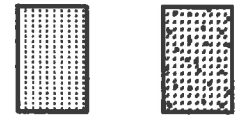
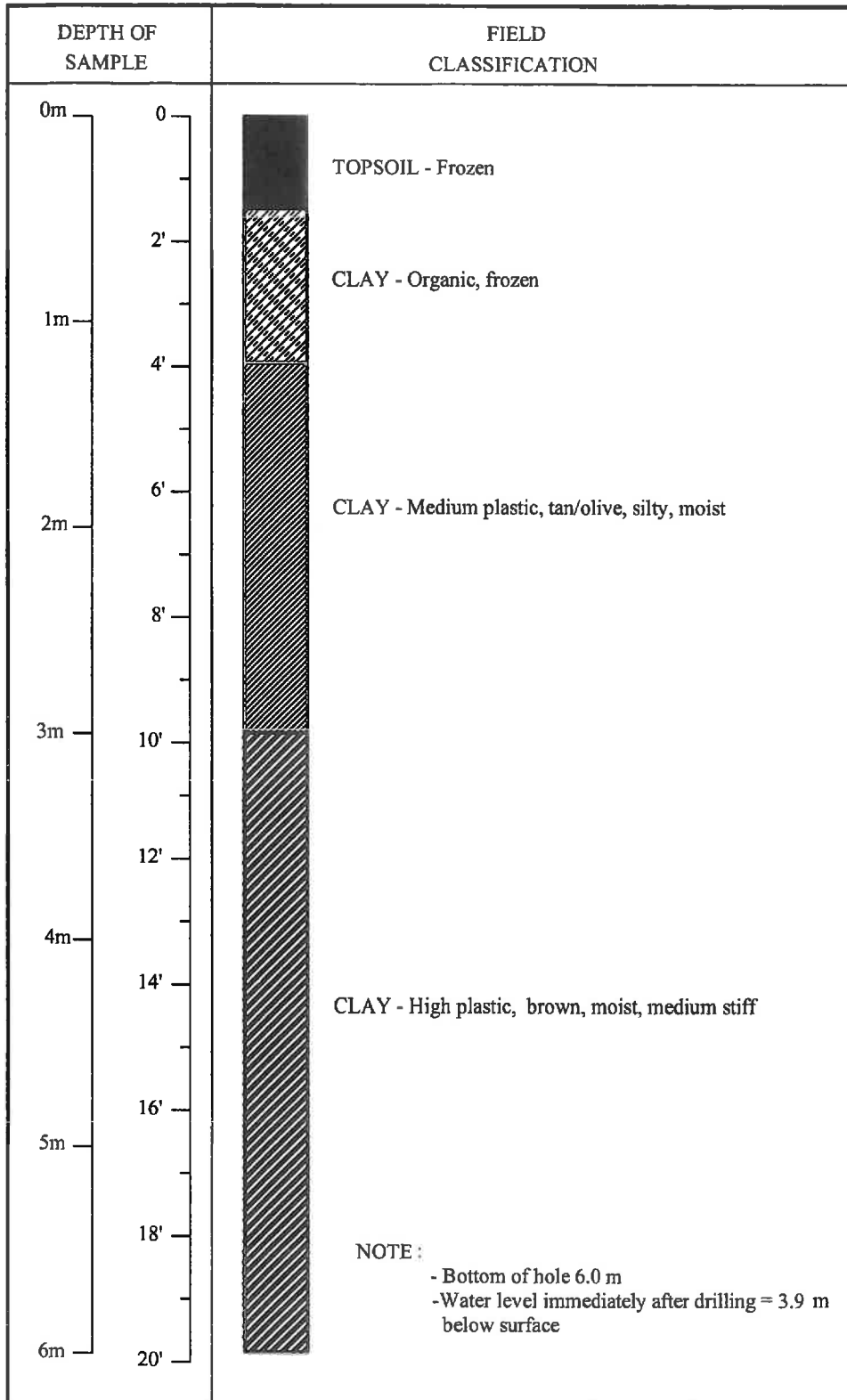
TEST HOLE LOG SHEET

LOCATION: R.M. OF MONTCALM, MANITOBA

DATE: DECEMBER 17, 2008

PROJECT : St. JEAN LAGOON ASSESSMENT

TEST HOLE # 6



GW

GP



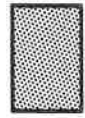
GM



GC



SW



SP



SM



SC



ML



CL



OL



CI



MH



CH



OH



PT



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 a unlimited number of test holes. Every effort is made to evaluate the information by methods generally recognized. The soil 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.

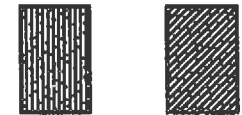
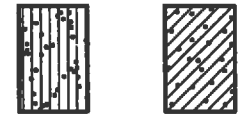
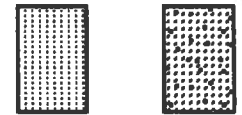
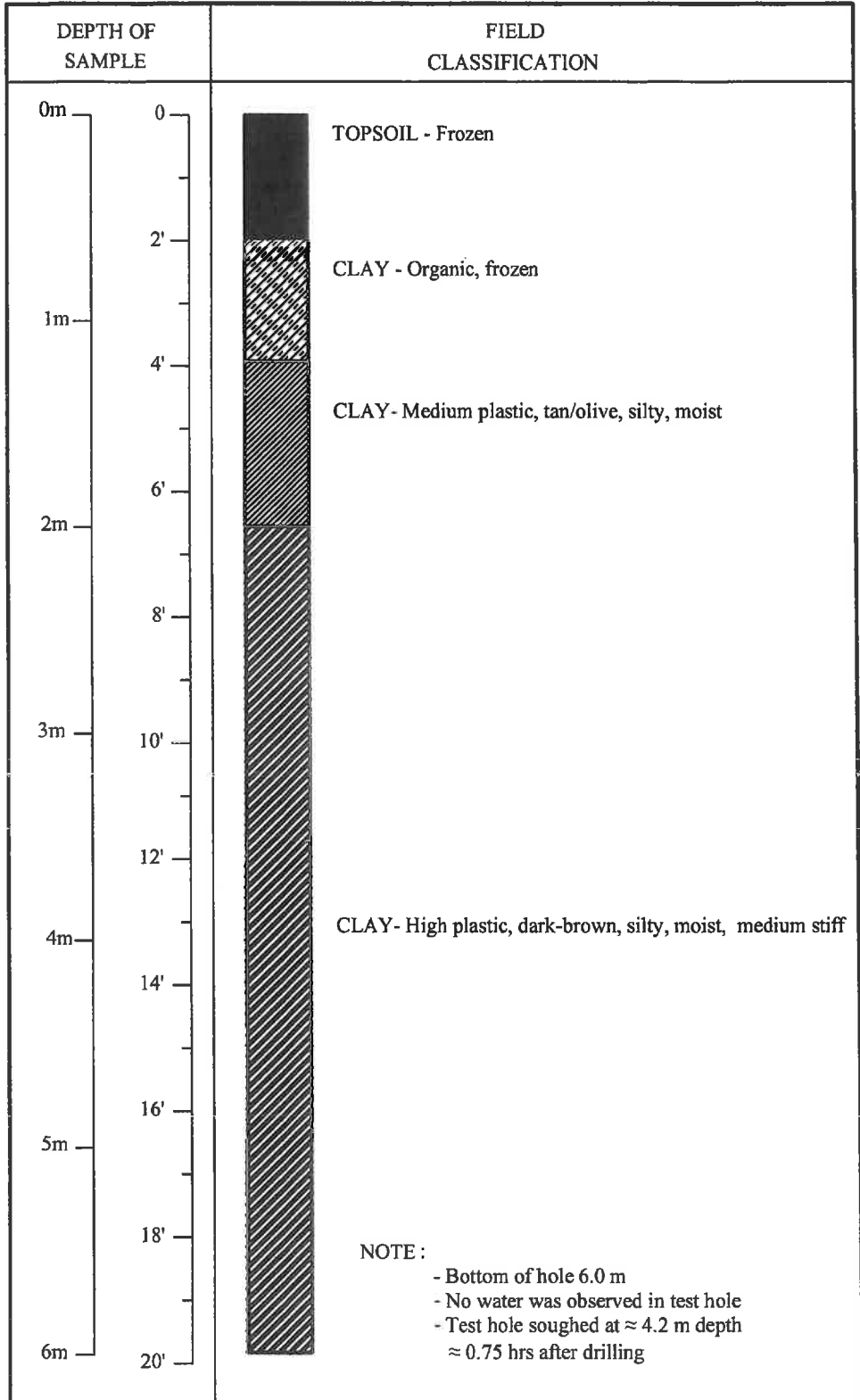
TEST HOLE LOG SHEET

LOCATION: R.M. OF MONTCALM, MANITOBA

DATE: DECEMBER 17, 2008

PROJECT : St. JEAN LAGOON ASSESSMENT

TEST HOLE # 7



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 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.

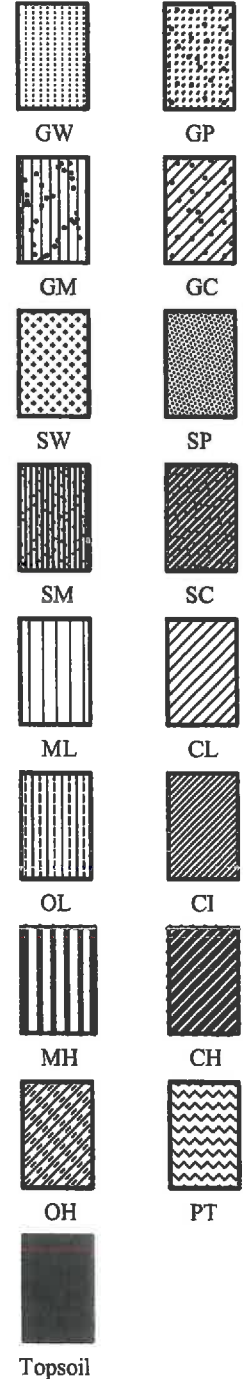
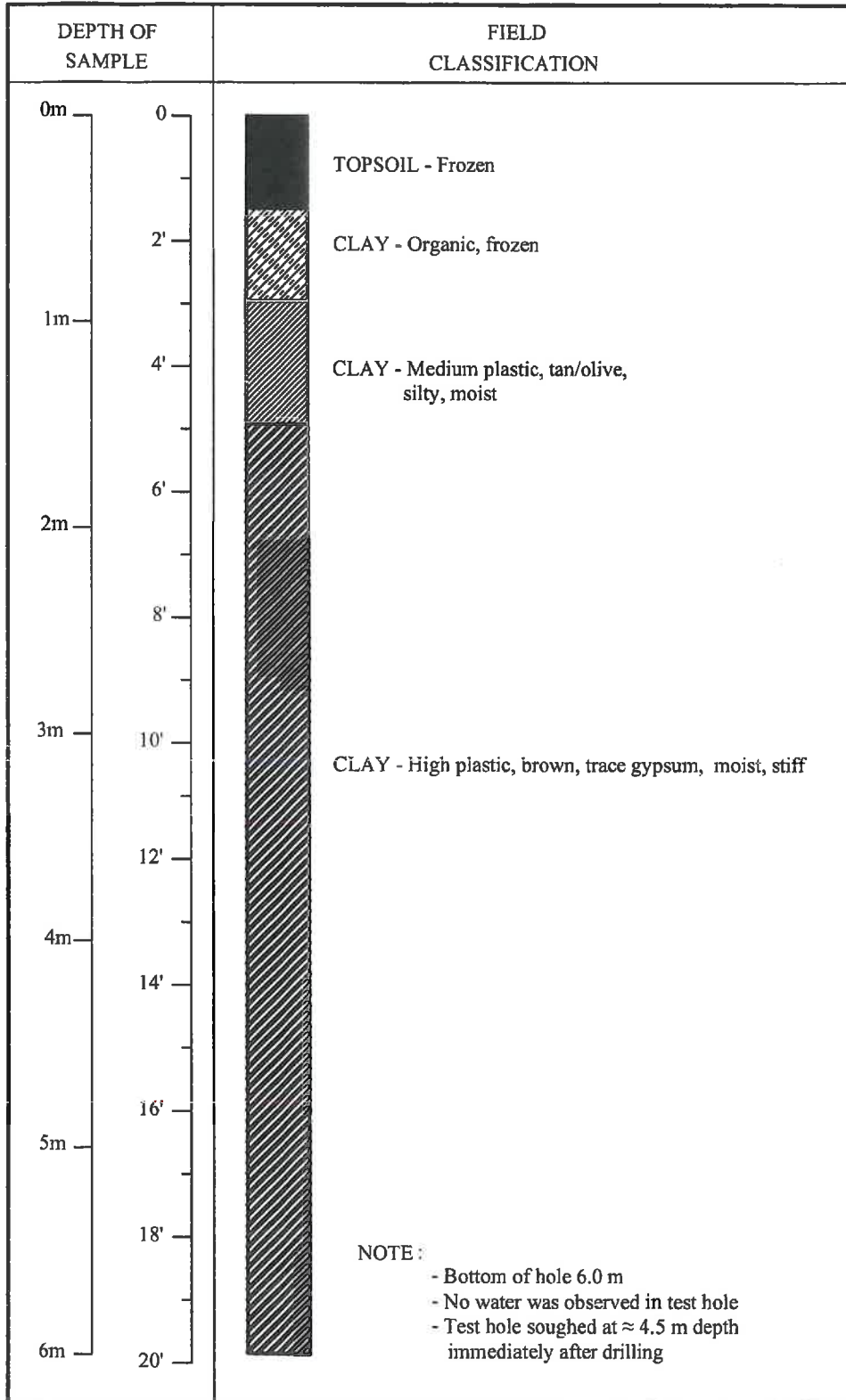
TEST HOLE LOG SHEET

LOCATION: R.M. OF MONTCALM, MANITOBA

DATE: DECEMBER 17, 2008

PROJECT : St. JEAN LAGOON ASSESSMENT

TEST HOLE # 8



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 a unlimited number of test holes. Every effort is made to evaluate the information by methods generally recognized. The soil 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.

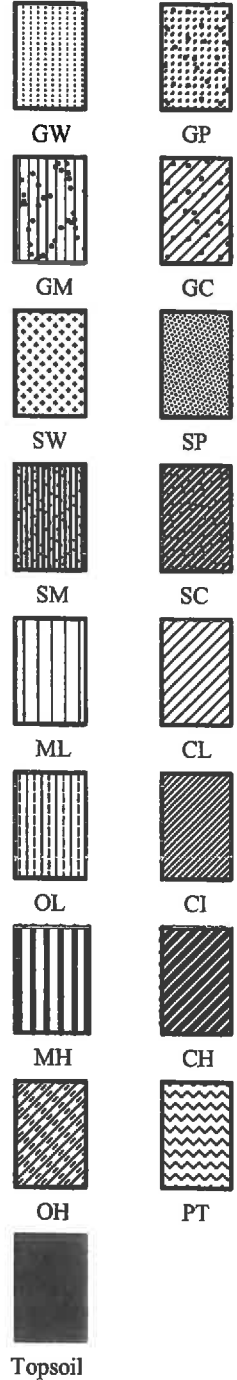
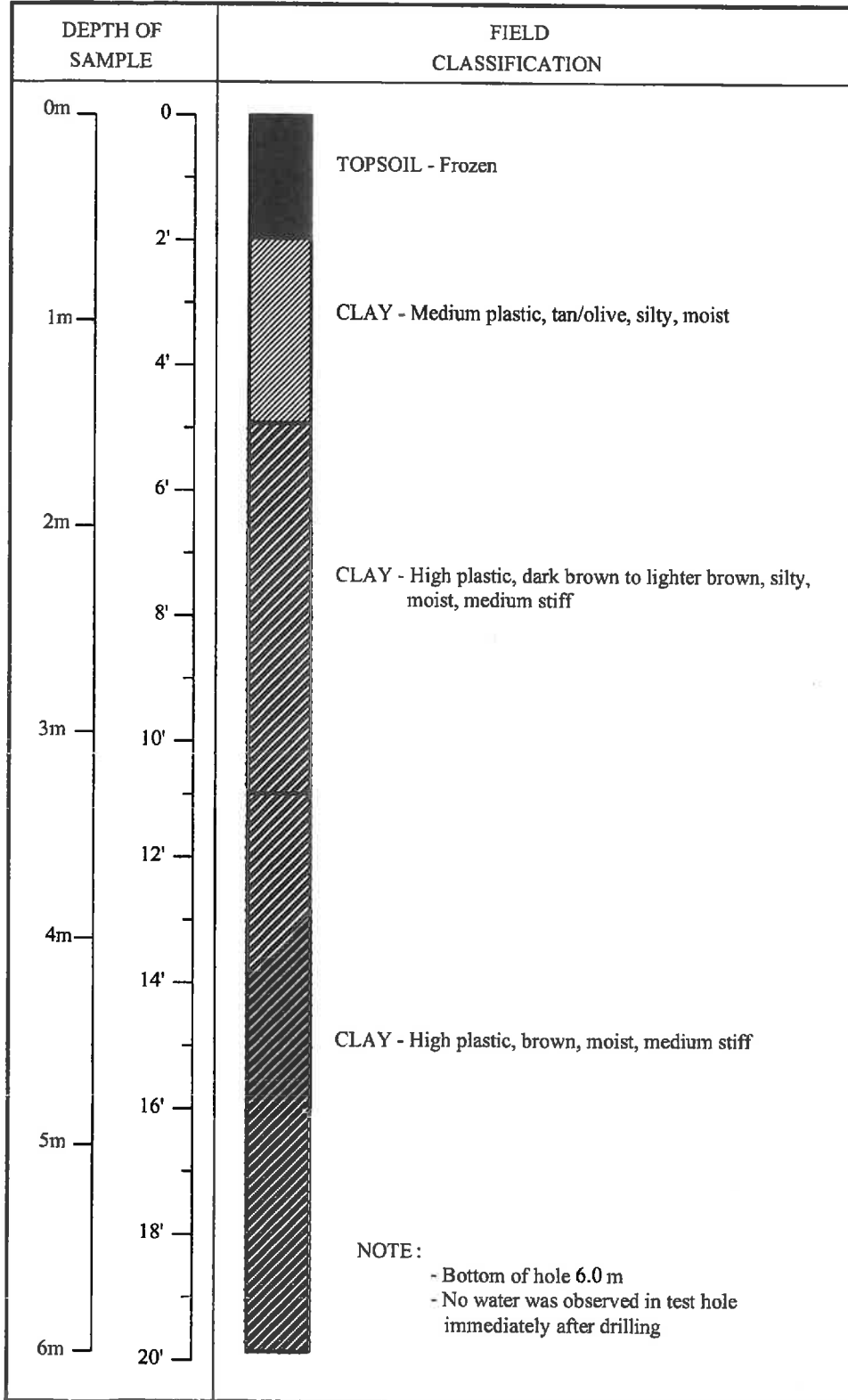
TEST HOLE LOG SHEET

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DATE: DECEMBER 17, 2008

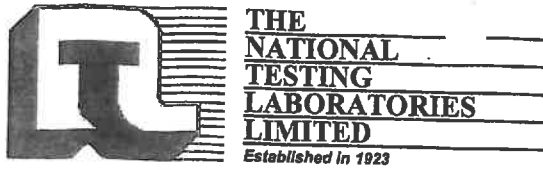
PROJECT : St. JEAN LAGOON ASSESSMENT

TEST HOLE # 9



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 a unlimited number of test holes. Every effort is made to evaluate the information by methods generally recognized. The soil 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.

The National Testing Laboratories Ltd. Soil Analysis Results



THE
NATIONAL
TESTING
LABORATORIES
LIMITED
Established in 1923

199 Henlow Bay
Winnipeg, MB R3Y 1G4
Phone (204) 488-6999
Fax (204) 488-6947
Email info@nationaltestlabs.com
www.nationaltestlabs.com

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

Attention: Bereket Assefa

January 15, 2009

Project: St. Jean Baptiste
Lagoon Sites

Soil samples were submitted to our laboratory on December 23, 2008. The following tests were conducted on selected samples:

- moisture content (ASTM D2216)
- particle size analysis (ASTM D422)
- liquid limit, plastic limit, and plasticity index (ASTM D4318)
- soil classification (ASTM D2487)

The test results for the soil samples are summarized in Tables 1 to 4.

An assessment of the soil samples was conducted to determine whether the soil represented by the bagged samples would be suitable as a lagoon liner and would obtain a hydraulic conductivity of less than 1.0×10^{-7} cm/sec without being reworked and when re-moulded and re-compacted. A summary of the laboratory test data and our comments are provided in Table 5. Our comments regarding the potential use of the material as a lagoon liner are based upon the soil being homogeneous with no preferential flow paths. Hydraulic conductivity testing is recommended for the soil samples classified as a lean clay. These soil samples typically have a higher silt content and consequently, are expected to have a hydraulic conductivity greater than 1.0×10^{-7} cm/sec.

We appreciate the opportunity to assist you in this project. Please call if you have any questions regarding this report.

Kurtis Kulchyski
Senior Geotechnical Technologist

TABLE 1
MOISTURE CONTENT TEST DATA
ST. JEAN BAPTISTE LAGOON SITES

Site No.	Sample Identification	Water Content (%)	Site No.	Sample Identification	Water Content (%)
B:A Existing Site 1 Lagoon Site	TH2@ 0.025-0.75 m	27.8	Site 2	TH7@ 0.6-1.2 m	35.5
B:A Existing Site 1 Lagoon Site	TH2@ 0.75-3.6 m	22.7	Site 2	TH7@ 1.2-2.0 m	30.8
B:A Existing Site 1 Lagoon Site	TH2@ 3.6-5.0 m	32.2	Site 2	TH7@ 2.0-3.15 m	27.1
B:A Existing Site 1 Lagoon Site	TH2@ 5.0-6.0 m	31.2	Site 2	TH7@ 3.15-6.0 m	47.8
Borrow	TH3@ 0.25-1.8 m	34.7	Site 4 B:A Site 3	TH12@ 0.3-1.65 m	27.9
Site 2	TH7@ 0.0-0.6 m	44.5	Site 4 B:A Site 3	TH12@ 1.65-4.8 m	29.4

TABLE 2
PARTICLE SIZE ANALYSIS TEST DATA
ST. JEAN BAPTISTE LAGOON SITES

Site No.	Sample Identification	Gravel (%) 75 to 4.75 mm	Sand (%)			Silt (%) <0.075 to 0.005 mm	Clay (%) < 0.005 mm
			Coarse <4.75 to 2.0 mm	Medium <2.0 to 0.425 mm	Fine <0.425 to 0.075 mm		
B:A Existing Site 1 Lagoon Site	TH2@ 0.025-0.75 m	0	0	0.1	0.8	24.1	75.0
B:A Existing Site 1 Lagoon Site	TH2@ 0.75-3.6 m	0	0	0.0	0.9	26.8	72.3
B:A Existing Site 1 Lagoon Site	TH2@ 3.6-5.0 m	0	0	0.2	1.2	40.3	58.3
B:A Existing Site 1 Lagoon Site	TH2@ 5.0-6.0 m	0	0	0.0	1.4	45.9	52.7
Borrow	TH3@ 0.25-1.8 m	0	0	0.1	3.9	35.4	60.6
Site 2	TH7@ 0.6-1.2 m	0	0	0.5	4.0	26.1	69.4
Site 2	TH7@ 1.2-2.0 m	0	0	0.3	2.0	57.5	40.2
Site 2	TH7@ 2.0-3.15 m	0	0	0.9	2.2	43.4	53.5
Site 2	TH7@ 3.15-6.0 m	0	0	0.1	0.2	4.7	95.0
Site 4 B:A Site 3	TH12@ 0.3-1.65 m	0	0	0.3	3.5	53.6	42.6
Site 4 B:A Site 3	TH12@ 1.65-4.8 m	0	0	0.2	1.3	47.6	50.9

Notes

1. A high speed stirring device was used for 1 minute to disperse the test samples
2. The soil samples were air-dried during sample preparation

**TABLE 3
PLASTICITY INDEX TEST DATA
ST. JEAN BAPTISTE LAGOON SITES**

Site No.	Sample Identification	Liquid Limit	Plastic Limit	Plasticity Index	% Retained on 0.425 mm Sieve	Soil Classification ASTM D2487
Existing Lagoon Site 1B/A	TH2@ 0.025-0.75	81	29	52	<1	CH (Fat Clay)
Existing Lagoon Site 1B/A	TH2@ 0.75-3.6 m	81	20	61	0	CH (Fat Clay)
Existing Lagoon Site 1B/A	TH2@ 3.6-5.0 m	59	25	34	<1	CH (Fat Clay)
Existing Lagoon Site 1B/A	TH2@ 5.0-6.0 m	62	22	40	0	CH (Fat Clay)
Borrow	TH3@ 0.25-1.8 m	65	23	42	<1	CH (Fat Clay)
Site 2	TH7@ 0.6-1.2 m	74	25	49	<1	CH (Fat Clay)
Site 2	TH7@ 1.2-2.0 m	41	20	21	<1	CL (Lean Clay)
Site 2	TH7@ 2.0-3.15 m	54	20	34	<1	CH (Fat Clay)
Site 2	TH7@ 3.15-6.0 m	92	30	62	<1	CH (Fat Clay)
Site 4 Site 3B/A	TH12@ 0.3-1.65 m	45	19	26	<1	CL (Lean Clay)
Site 4 Site 3B/A	TH12@ 1.65-4.8 m	48	20	28	<1	CL (Lean Clay)

Notes

1. Test conducted in accordance with ASTM D4318 Method B (one-point liquid limit)
2. The soil samples were air-dried during sample preparation

**TABLE 4
VISUAL DESCRIPTION OF SOIL SAMPLES
ST. JEAN BAPTISTE LAGOON SITES**

Site No.	Sample Identification	Visual Description of Soil Sample
Existing Lagoon Site 1B/A	TH2@ 0.025-0.75 m	grey, moist, high plasticity clay, some silt
Existing Lagoon Site 1B/A	TH2@ 0.75-3.6 m	grey, moist, high plasticity clay, some silt
Existing Lagoon Site 1B/A	TH2@ 3.6-5.0 m	grey, moist, high plasticity silty clay
Existing Lagoon Site 1B/A	TH2@ 5.0-6.0 m	brown, moist, high plasticity silty clay with trace layers of silt
Borrow	TH3@ 0.25-1.8 m	black/grey, moist, high plasticity clay, some silt
Site 2	TH7@ 0.0-0.6 m	black, moist, high plasticity organic clay,
Site 2	TH7@ 0.6-1.2 m	black/grey, moist, high plasticity clay, some silt, trace fine sand
Site 2	TH7@ 1.2-2.0 m	light brown, moist, intermediate plasticity silty clay with layers of silt
Site 2	TH7@ 2.0-3.15 m	brown, moist, high plasticity silty clay with trace layers of silt
Site 2	TH7@ 3.15-6.0 m	brown, moist, high plasticity clay
Site 4 Site 3B/A	TH12@ 0.3-1.65 m	tan/light brown, moist, intermediate plasticity silty clay with layers of silt
Site 4 Site 3B/A	TH12@ 1.65-4.8 m	tan/light brown, moist, intermediate plasticity silty clay with layers of silt

**TABLE 5
SUMMARY OF SOIL TEST DATA
ST. JEAN BAPTISTE LAGOON SITES**

Site No.	Sample Identification	Atterberg Limits			Particle Size Analysis				Soil Classification	Potential Use as a Lagoon Liner
		Liquid Limit	Plastic Limit	Plasticity Index	Gravel (%) 75 to 4.75 mm	Sand (%) 4.75 to 0.075 mm	Silt (%) <0.075 to 0.005 mm	Clay (%) <0.005 mm		
Existing Lagoon Site 18A	TH2@ 0.025-0.6 m	81	29	52	0.0	0.9	24.1	75.0	CH-Fat clay	yes
Existing Lagoon Site 18A	TH2@ 0.75-3.6 m	81	20	61	0.0	0.9	26.8	72.3	CH-Fat clay	yes
Existing Lagoon Site 18A	TH2@ 3.6-5.0 m	59	25	34	0.0	1.4	40.3	58.3	CH-Fat clay	yes
Existing Lagoon Site 18A	TH2@ 5.0-6.0 m	62	22	40	0.0	1.4	45.9	52.7	CH-Fat clay	yes
Borrow	TH3 @ 0.25-1.8 m	65	23	42	0.0	4.0	35.4	60.6	CH-Fat clay	yes
Site 2	TH7@ 0.0-0.6 m	No testing requested							OH - Organic clay	no
Site 2	TH7 @ 0.6-1.2 m	74	25	49	0.0	4.5	26.1	69.4	CH-Fat clay	yes
Site 2	TH7 @ 1.2-2.0 m	41	20	21	0.0	2.3	57.5	40.2	CL-Lean clay	HC testing recommended
Site 2	TH7 @ 2-3.15 m	54	20	34	0.0	3.1	43.4	53.5	CH-Fat clay	yes
Site 2	TH7 @ 3.15-6.0 m	92	30	62	0.0	0.3	4.7	95.0	CH-Fat clay	yes
Site 4 Site 3 BA	TH12 @ 0.3- 1.65m	45	19	26	0.0	3.8	53.6	42.6	CL-Lean clay	HC testing recommended
Site 4 Site 3 BA	TH3 @ 1.65-4.8 m	48	20	28	0.0	1.5	47.6	50.9	CL-Lean clay	HC testing recommended

Note: The comment regarding the potential use of the material as a lagoon liner applies to the soil without being reworked and when the soil is re-moulded and re-compacted

Appendix D

Table 1: Community of St. Jean Baptiste - Population, Hydraulic, and Organic Loading Projections

Table 2: Water Quality of the Red River at Emerson (Stations MB050CS001 & MB050CS007) and at St. Jean (Station MB050CS031)

Tables: The 7Q10 Flow Data for the Red River at Emerson and Ste. Agathe Stations

TABLE 1: COMMUNITY OF ST. JEAN BAPTISTE - POPULATION, HYDRAULIC AND ORGANIC 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 17
Calendar Year	Design Year	Population			Hydraulic Loading					Organic Loading			
		Town Population	Town - New Subdivision Population	Town - Bussed-in Students Population	Daily/Capita Wastewater Production	Daily/Capita Wastewater Production	Rural Areas L/day	Daily Wastewater Production	Wastewater Volume For 230 Days	Daily/Capita B.O.D.	B.O.D.	Daily B.O.D. Production	Primary Cell Area Req'd at 0.75 m
		Growth per year	Growth per year	Growth per year	Town, Town-New Subdivision & Bussed-in Students (1/3 for Bussed-in Students) W/O Infiltration	Town, Town-New Subdivision & Bussed-in Students (1/3 for Bussed-in Students) c/w Infiltration 200 l/peron/day	Hauled Septage	All Sources ((Col 3 x Col 7) + (Col 4 x Col 7) + (Col 5 x Col 7 x 1/3) + Col 8)/1000	All Sources Except - Rural Areas ((Col 3 x Col 7)+(Col 4 x Col 7)+(Col 5 x Col 7 x 1/3)/1000) x 230	Town, Town-New Subdivision, Bussed-in Students (1/3 for Bussed-in Students)	Rural Areas	All Sources (Col 3 x Col 11)+(Col 4 x Col 11) + (Col 5 x Col 11 x 1/3) + (Col 8 /1000 x Col 12)	(@56kgBOD/ha/day)
0.10%	4 Persons/year	0.10%	(litres)	(litres)	1.00%	(cu. m.)	(cu. m.)	(kg)	(kg/cu.m.)	(kg)	(sq. m.)		
2014	0	520	0	81	300	500	1,950	275.45	62,905	0.076	7.0	55.22	9,861
2015	1	521	4	81	300	500	1,970	277.74	63,428	0.076	7.0	55.70	9,947
2016	2	521	8	81	300	500	1,989	280.04	63,951	0.076	7.0	56.19	10,033
2017	3	522	12	81	300	500	2,009	282.33	64,474	0.076	7.0	56.67	10,120
2018	4	522	16	81	300	500	2,029	284.62	64,997	0.076	7.0	57.16	10,207
2019	5	523	20	81	300	500	2,049	286.92	65,520	0.076	7.0	57.65	10,294
2020	6	523	24	81	300	500	2,070	289.22	66,043	0.076	7.0	58.14	10,381
2021	7	524	28	82	300	500	2,091	291.51	66,567	0.076	7.0	58.63	10,469
2022	8	524	32	82	300	500	2,112	293.81	67,090	0.076	7.0	59.12	10,557
2023	9	525	36	82	300	500	2,133	296.10	67,613	0.076	7.0	59.61	10,645
2024	10	525	40	82	300	500	2,154	298.40	68,137	0.076	7.0	60.11	10,734
2025	11	526	44	82	300	500	2,176	300.70	68,660	0.076	7.0	60.60	10,822
2026	12	526	48	82	300	500	2,197	303.00	69,184	0.076	7.0	61.10	10,911
2027	13	527	52	82	300	500	2,219	305.30	69,708	0.076	7.0	61.60	11,000
2028	14	527	56	82	300	500	2,241	307.60	70,231	0.076	7.0	62.10	11,090
2029	15	528	60	82	300	500	2,264	309.90	70,755	0.076	7.0	62.61	11,180
2030	16	528	64	82	300	500	2,287	312.20	71,279	0.076	7.0	63.11	11,270
2031	17	529	68	82	300	500	2,309	314.50	71,803	0.076	7.0	63.62	11,360
2032	18	529	72	82	300	500	2,332	316.80	72,327	0.076	7.0	64.13	11,451
2033	19	530	76	83	300	500	2,356	319.10	72,851	0.076	7.0	64.64	11,542
2034	20	530	80	83	300	500	2,379	321.40	73,375	0.076	7.0	65.15	11,633

Table 2. Water Quality of the Red River at Emerson (Stations MB05OCS001 & MB05OCS007) and at St. Jean (Station MB05OCS031)

Station	Year	Ammonia (Soluble)	Fecal Coliform	Total Coliform	Dissolved N (NO ₃ & NO ₂)	Soluble N (NO ₃ & NO ₂)	Total N (TKN)	BOD	Oxygen (Dissolved)	Total P
		mg/L	MPN/100 mL	MPN/100 mL	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Emerson MB05OCS001*	1973	0.21	26	809	0.22	NA	0.90	1.25	NA	0.24
	1974	0.02	NA	576	0.47	NA	NA	1.94	NA	0.26
	1975	NA	NA	843	0.64	NA	NA	3.21	NA	0.32
	1976	NA	NA	788	0.43	NA	NA	2.21	NA	0.46
	1977	NA	31	275	0.29	NA	NA	2.14	NA	0.43
Emerson MB05OCS007*	1978	NA	NA	NA	0.33	NA	1.24	NA	10.32	0.22
	1979	NA	NA	NA	0.30	NA	1.28	NA	9.26	0.25
	1980	NA	NA	NA	0.31	NA	NA	NA	10.89	0.24
	1981	0.10	NA	NA	0.32	NA	1.36	NA	10.40	0.31
	1982	0.12	NA	NA	0.31	NA	1.67	NA	10.01	0.28
	1983	0.13	NA	NA	0.48	NA	1.24	NA	10.37	0.23
	1997	0.11	NA	NA	NA	1.39	1.50	NA	NA	0.36
2008	NA	NA	NA	0.97	NA	1.10	1.33	NA	0.23	
St. Jean MB05OCS031**	1967	NA	NA	860	NA	NA	NA	2.29	9.21	NA
	1968	NA	NA	1,063	NA	NA	NA	1.63	8.57	NA
	1969	NA	NA	1,533	NA	NA	NA	1.68	8.80	NA
	1970	0.06	NA	769	0.27	NA	NA	1.99	8.79	0.10
	1971	NA	NA	3,235	0.30	NA	NA	2.04	9.59	0.27
	1972	NA	NA	5,877	0.30	NA	NA	2.42	9.78	0.26
	1973	NA	4	2,261	0.37	NA	NA	2.32	9.53	0.27
	1974	0.07	80	718	0.36	NA	0.76	1.79	8.13	0.25
	1975	0.10	125	887	0.57	NA	0.82	2.30	8.02	0.19
	1976	0.16	94	325	0.37	NA	0.91	1.75	9.54	0.20
	1977	0.22	222	454	0.26	NA	1.02	1.99	8.46	0.29

*The Emerson stations are located upstream of the future discharge point to Red River from the proposed aerated lagoon

**The St. Jean stations is located downstream of the future discharge point to Red River from the proposed aerated lagoon

Red River At Emerson Q10 Values (1912-2009)

Period	7Q10 Flow (cfs)	7Q10 Flow (cms)
January	153	4.3
February	144	4.1
March	202	5.7
April	970	27.5
May	1047	29.6
June	667	18.9
July	370	10.5
August	221	6.3
September	180	5.1
October	245	6.9
November	236	6.7
December	170	4.8
Open Water	160	4.5
Winter	125	3.5
Water Year	97	2.7

Red River At Ste. Agathe 7Q10 Flow Values (1913-2009)

Period	7Q10 Flow (cfs)	7Q10 Flow (cms)
January	218	6.2
February	213	6.0
March	408	11.5
April	1248	35.3
May	1395	39.5
June	838	23.7
July	499	14.1
August	258	7.3
September	222	6.3
October	254	7.2
November	261	7.4
December	214	6.0
Open Water	185	5.2
Winter	177	5.0
Water Year	137	3.9

Appendix E

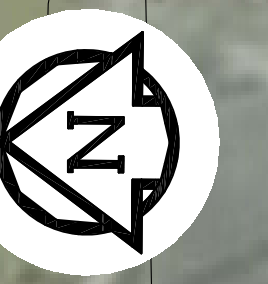
Plan L1: Proposed Facultative Lagoon with Setbacks

Plan L2: Proposed Facultative Lagoon Layout

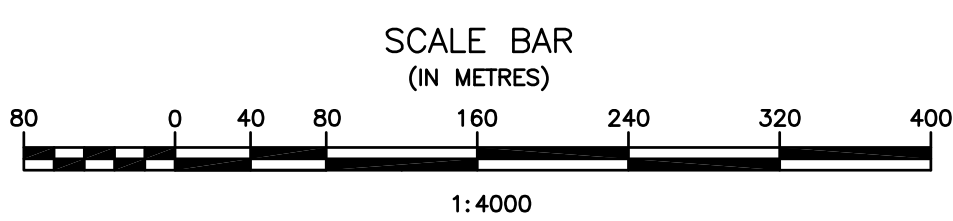
Plan L3: Proposed Facultative Lagoon Dike Details

Plan L4: Spillway, Truck Turnaround, Fence, Gate, Bollard, Site Marker, and Access
Road Cross Section Details

Plan L5: Valve, Valve Marker, Rip Rap, Ditch, Silt Fence and Miscellaneous Details



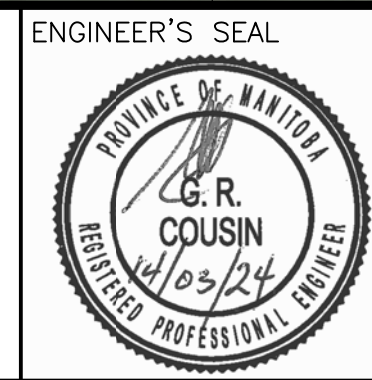
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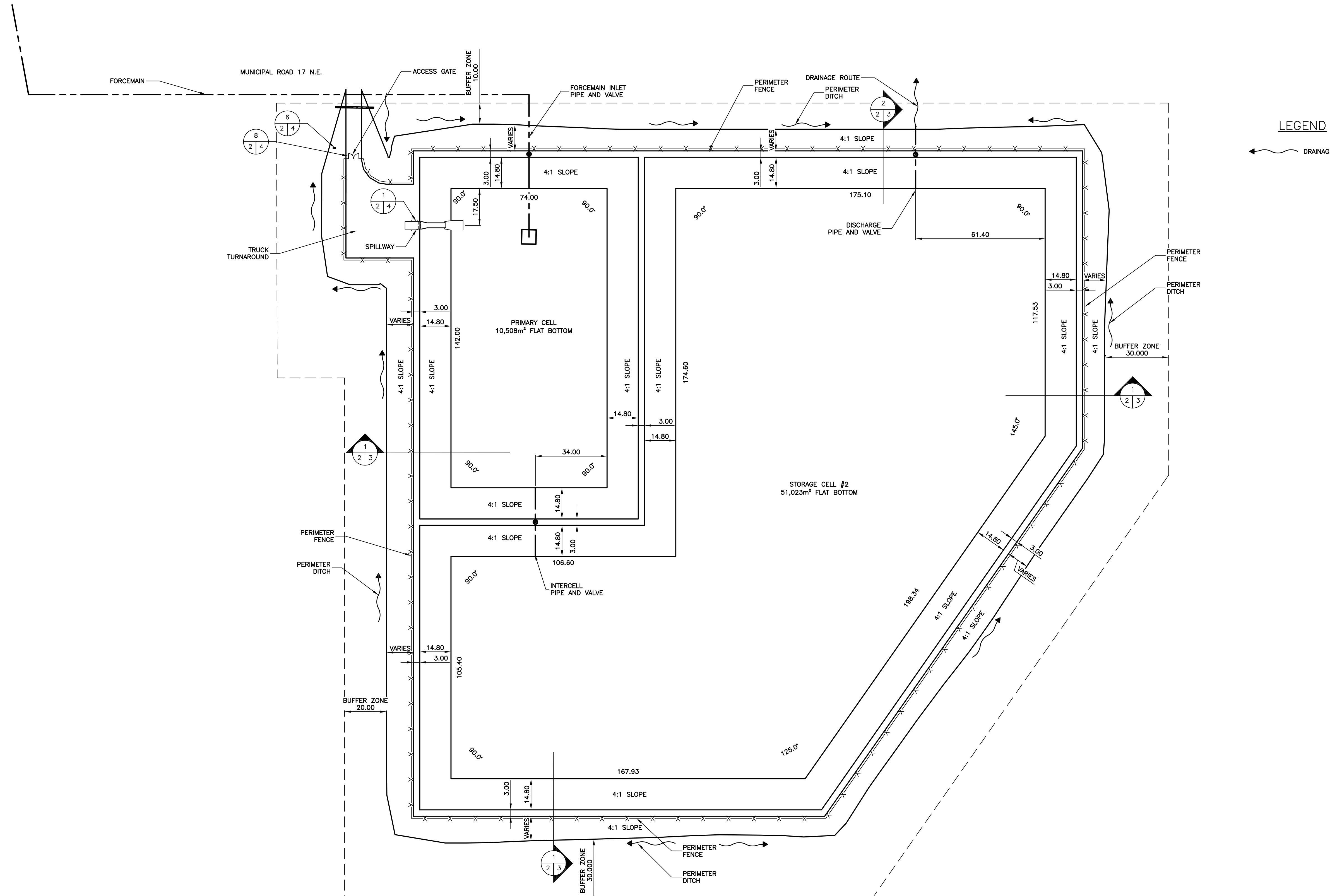
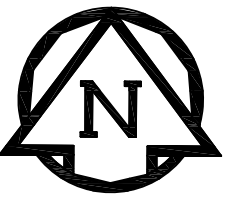
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REVIEWED BY: OW	DATE: 14/03/24
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	SHEET: 1 of 5

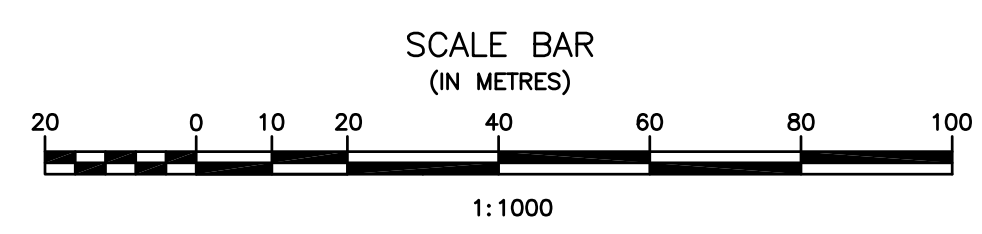
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LEGEND

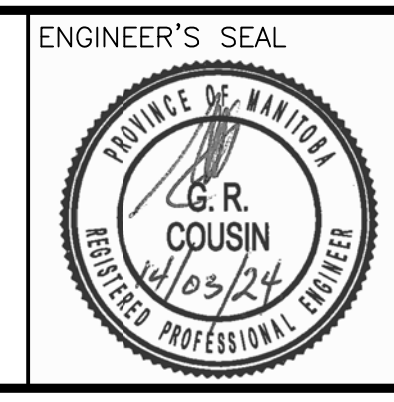


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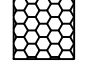




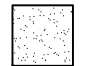


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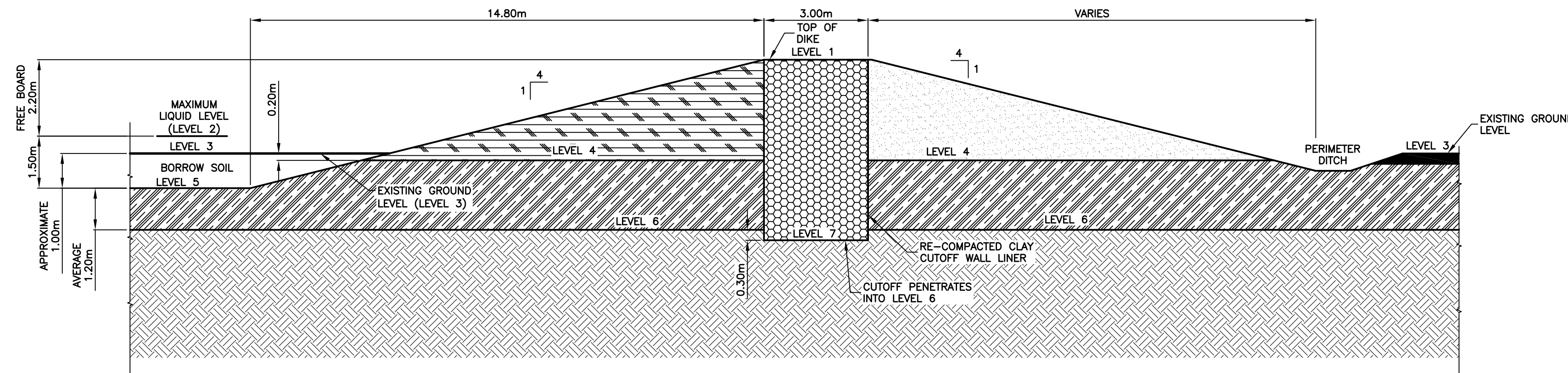
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REVIEWED BY: OW	DATE: 14/03/24
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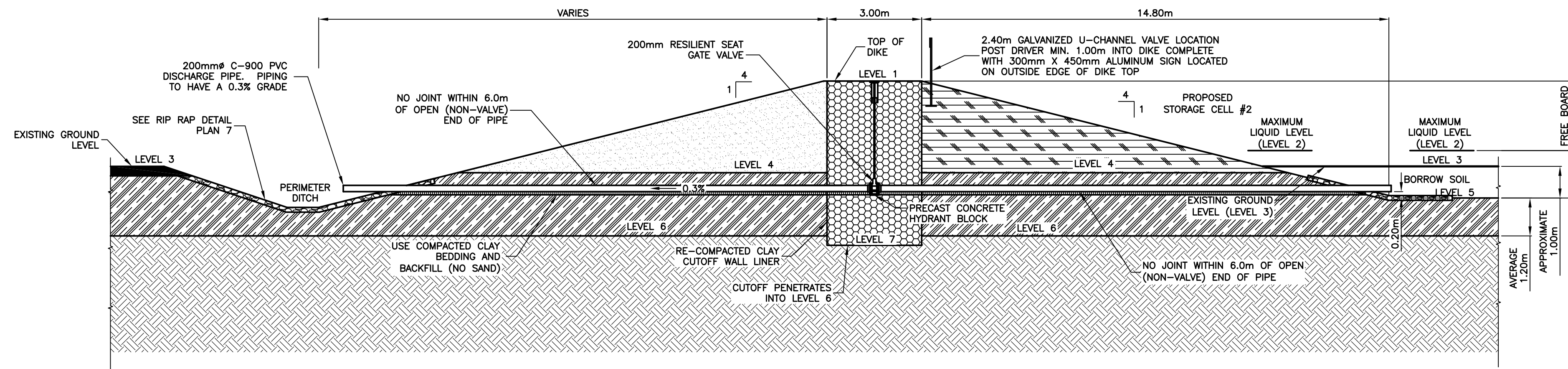
LEGEND:

-  EXCAVATED AND COMPACTED HIGH PLASTIC CLAY TYPE SOIL
-  EXCAVATED AND COMPACTED MATERIAL
-  INSITU HIGH PLASTIC SOIL
-  COMPACTED CLAY BEDDING AND BACKFILL
-  TOPSOIL
-  EXCAVATED AND COMPACTED MIXTURE OF SOILS
-  MEDIUM PLASTIC CLAY
-  RIP RAP

- LEVEL 1 - 100 YEAR FLOOD ELEVATION REQUIREMENT 239.7m
- LEVEL 2 - MAXIMUM LIQUID LEVEL 1.5m FROM CELL BOTTOM
- LEVEL 3 - PRE-CONSTRUCTION EXISTING PRAIRIE ELEVATION AVERAGE ELEVATION 237.0m
- LEVEL 4 - ELEVATION FOLLOWING REMOVAL OF ORGANICS APPROXIMATE 0.2m
- LEVEL 5 - ELEVATION FOR ORGANIC AND HYDRAULIC CALCULATIONS WHICH IS APPROXIMATE BOTTOM OF BORROW AREA
- LEVEL 6 - AVERAGE DEPTH OF HIGH PLASTIC CLAY
- LEVEL 7 - CUTOFF PENETRATES HIGH PLASTIC CLAY BY 0.3m



1 TYPICAL CELL PERIMETER DIKE
SCALE = 1:100



2 PERIMETER DIKE AT DISCHARGE PIPE
SCALE = 1:100

NOTE:

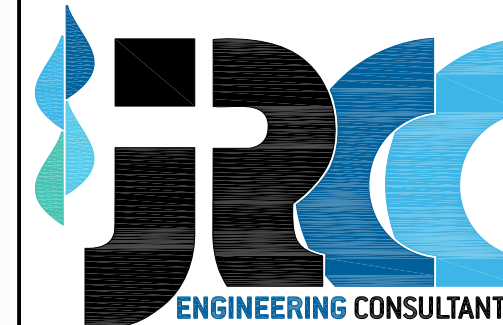
INTERCELL DIKE AND INTERCELL VALVE SIMILAR INTERIOR DIKE AS ABOVE DETAILS ie BOTH SIDE SLOPES OF 1:4 BUT WITHOUT CUTOFF WALL. INSTEAD DIKE CENTRAL CORE TO LEVEL 4 WOULD BE EXCAVATED AND COMPACTED SOIL MATERIAL.

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OW

DRAWN BY:

RH

REVIEWED BY:

OW

PROJECT:
R.M. OF MONTCALM
ST. JEAN LAGOON ASSESSMENT

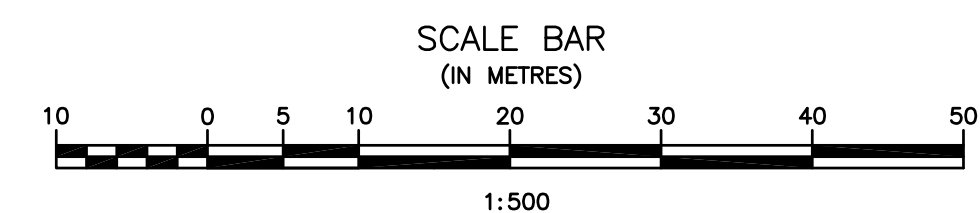
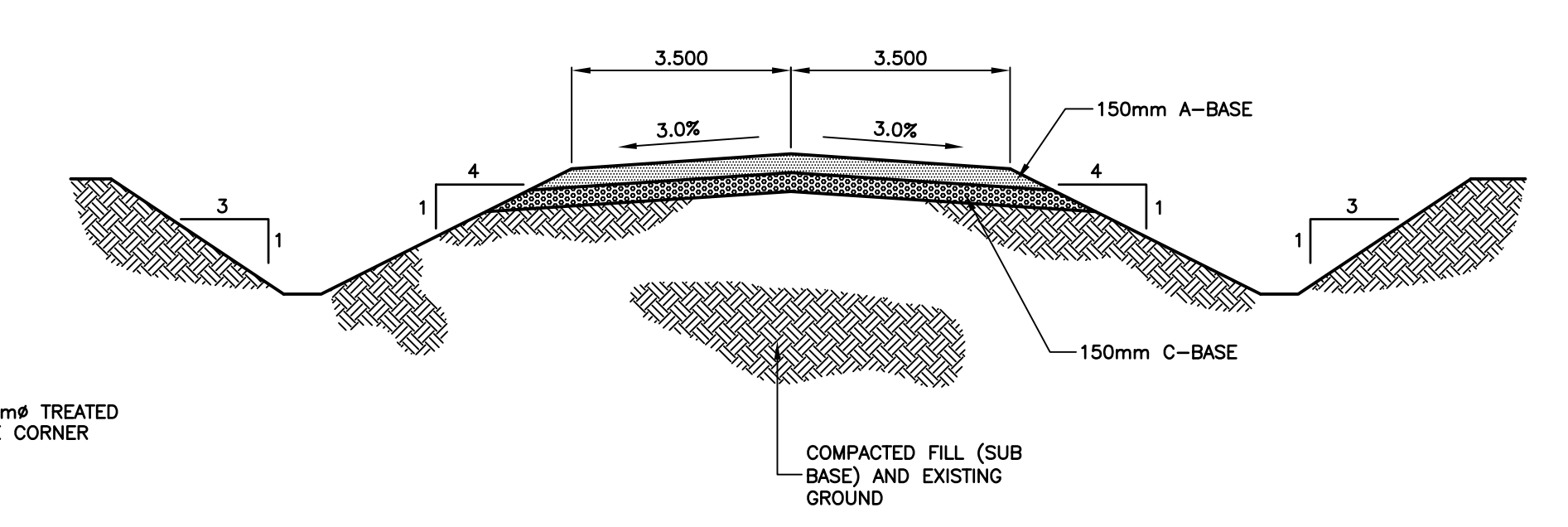
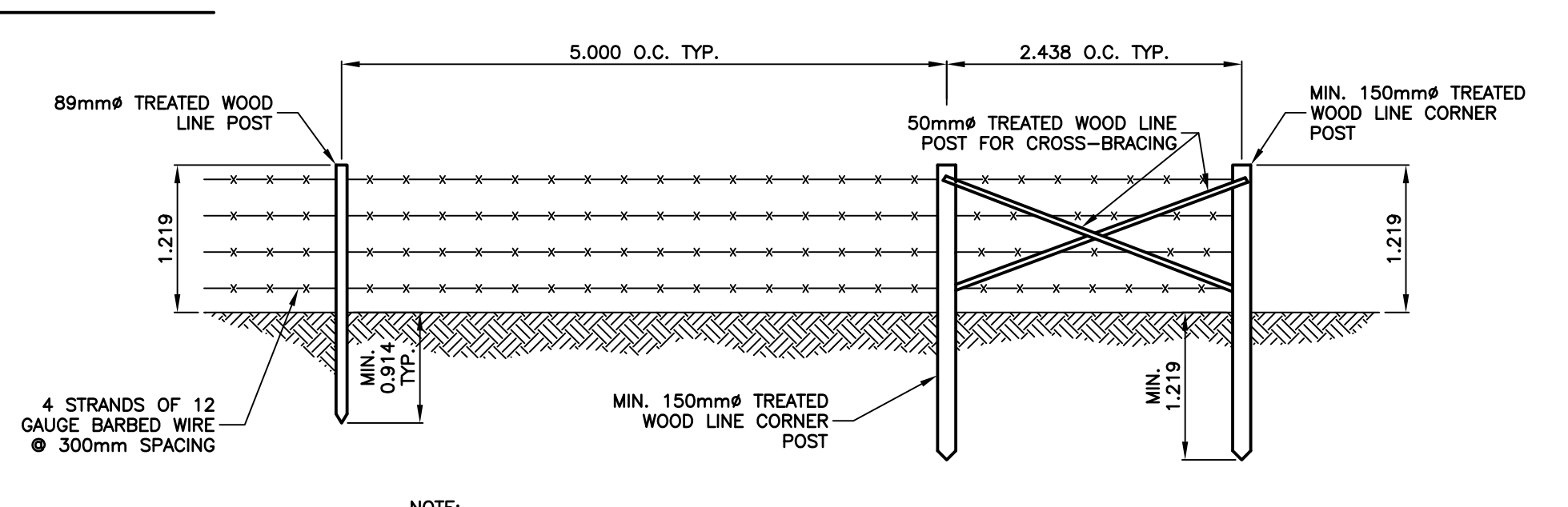
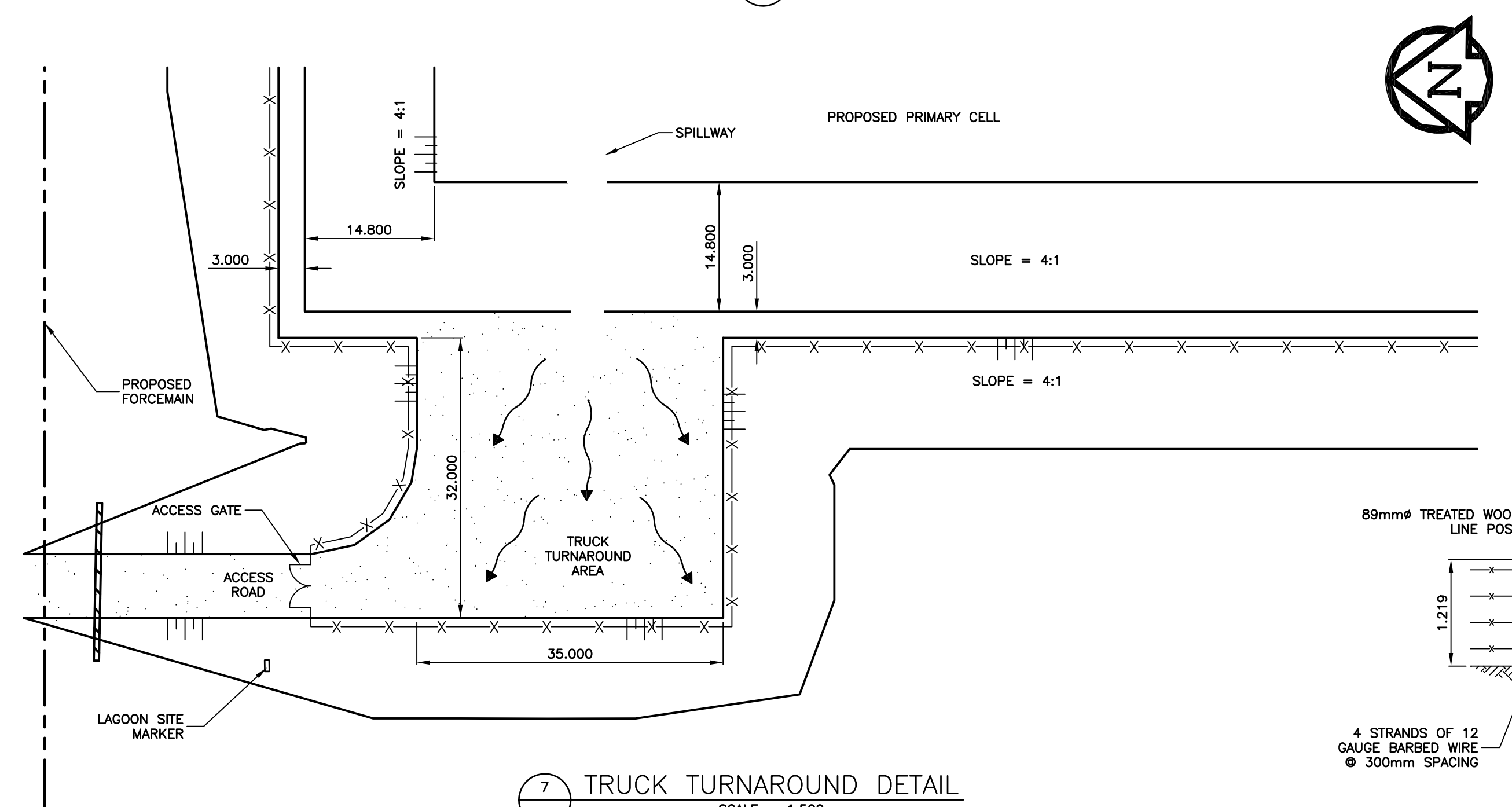
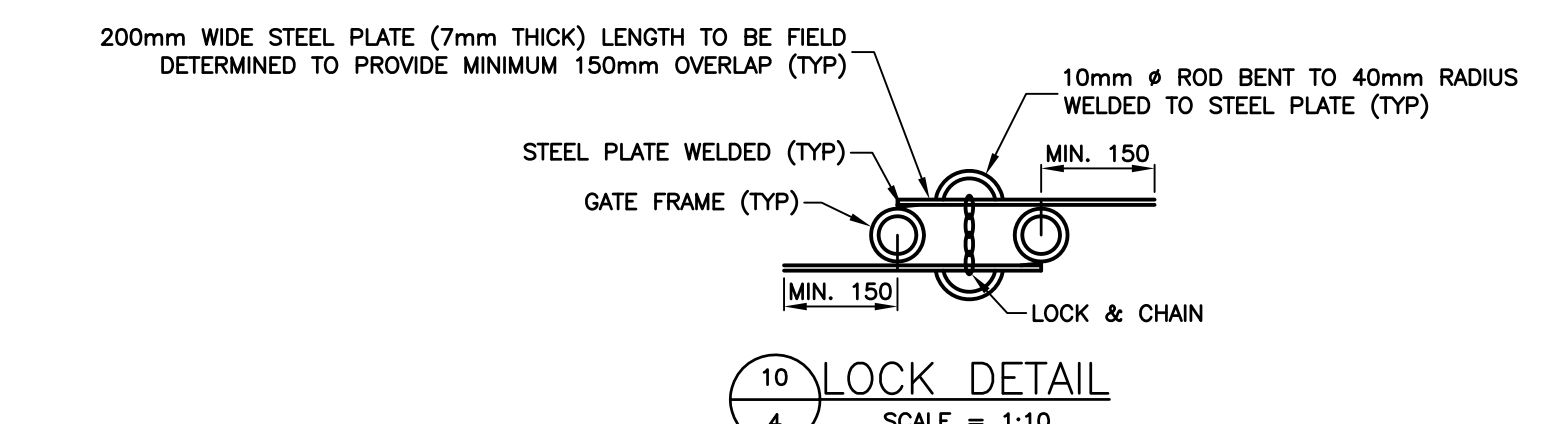
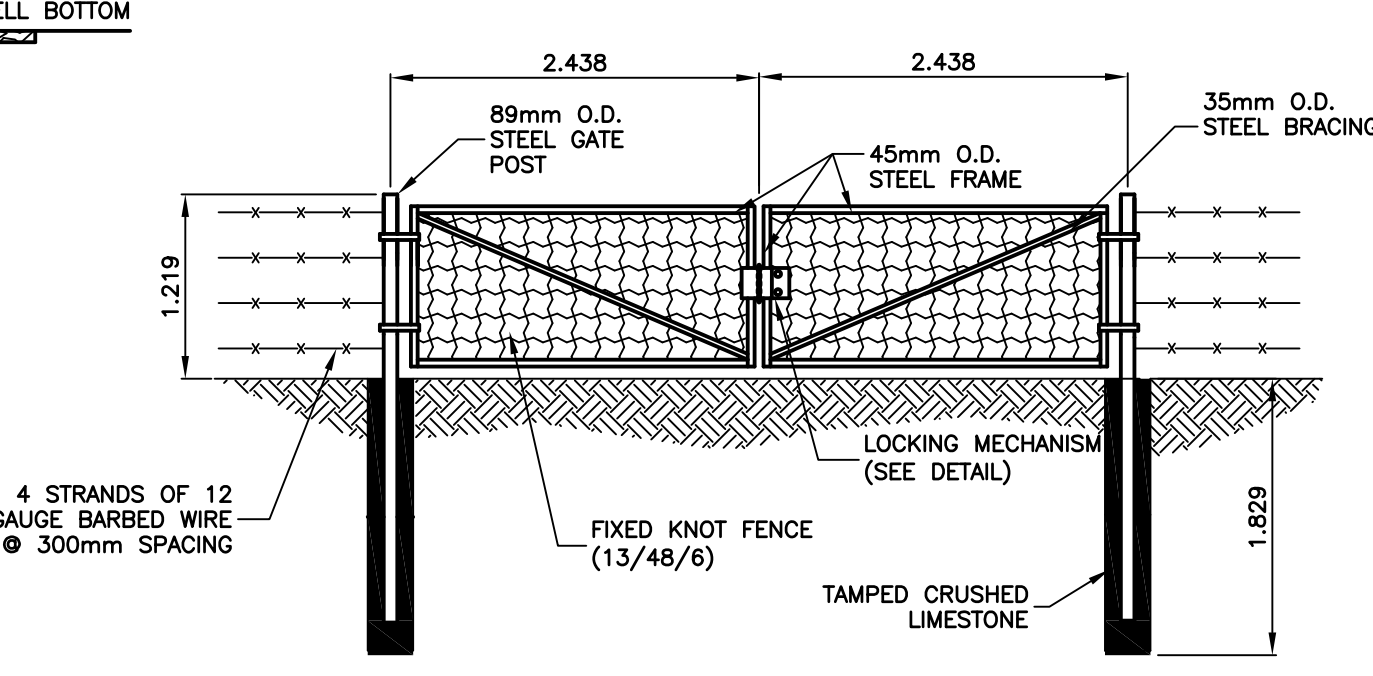
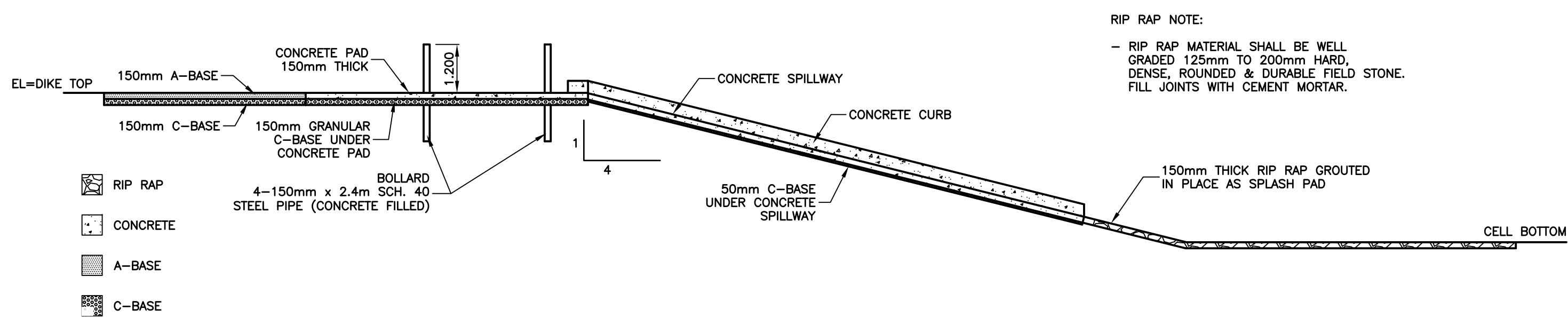
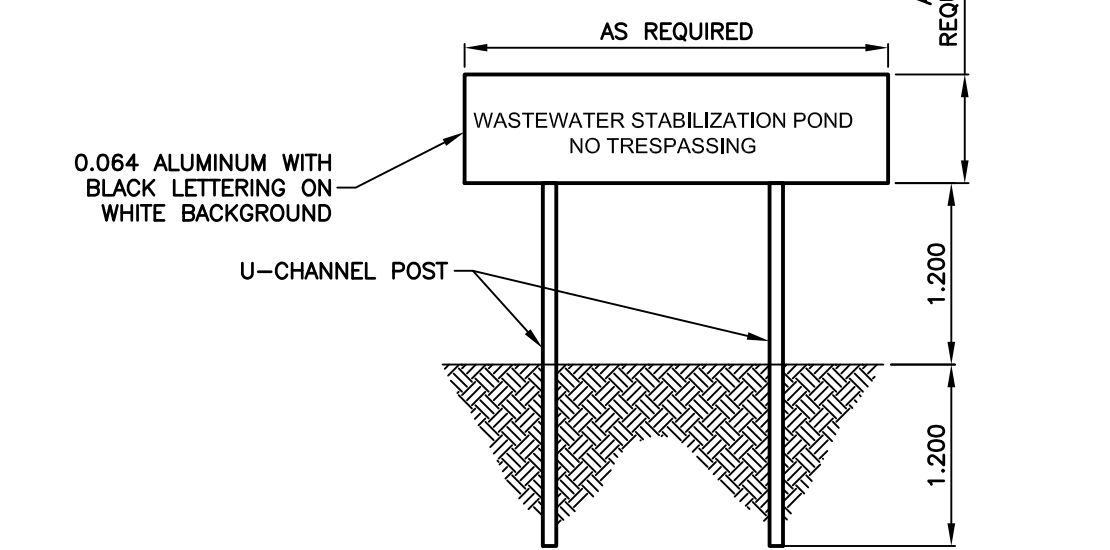
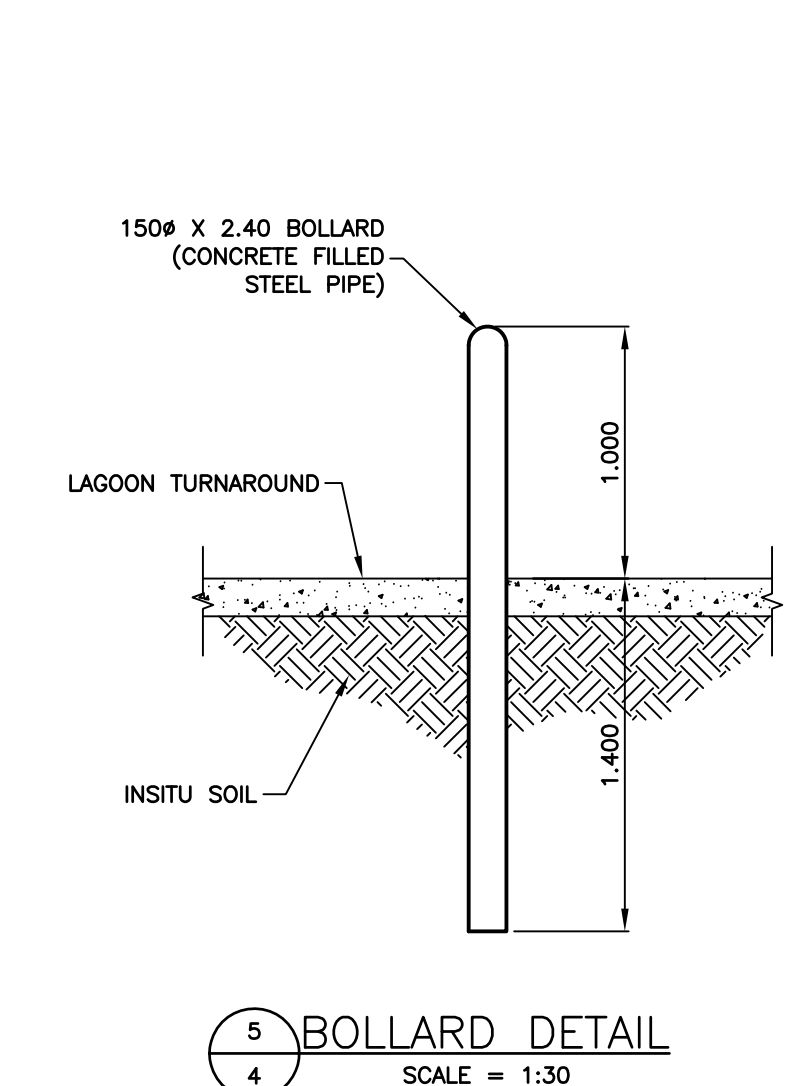
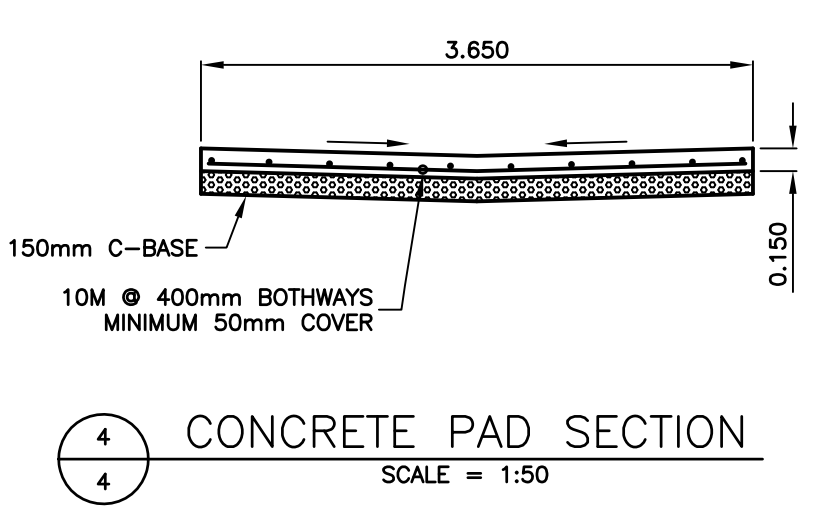
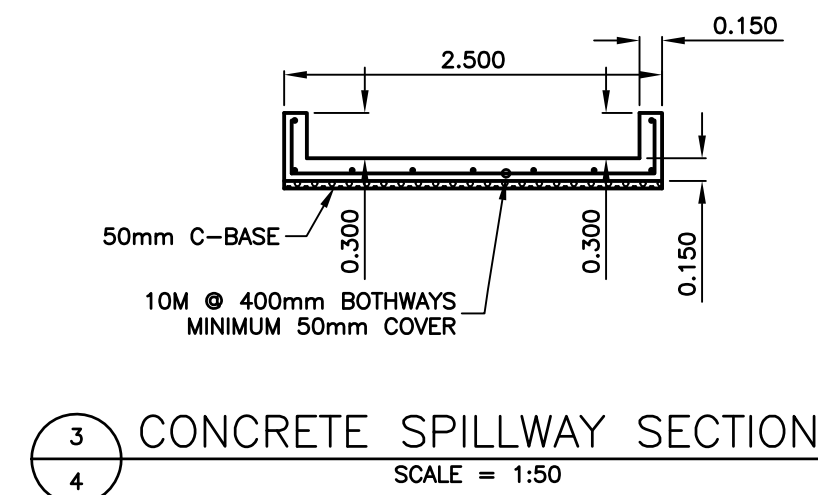
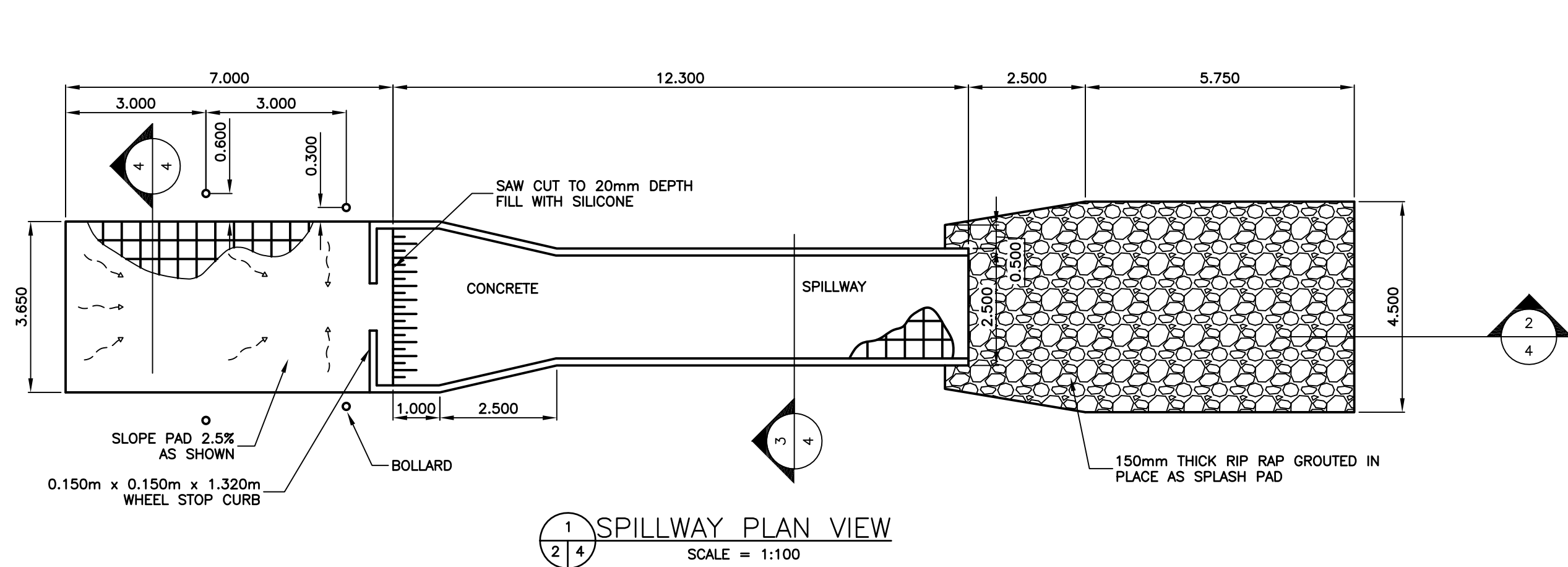
TITLE:
PROPOSED FACULTATIVE LAGOON DIKE DETAILS

SCALE: AS NOTED

DATE: 14/03/24

PLAN: L3

SHEET: 3 of 5



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.

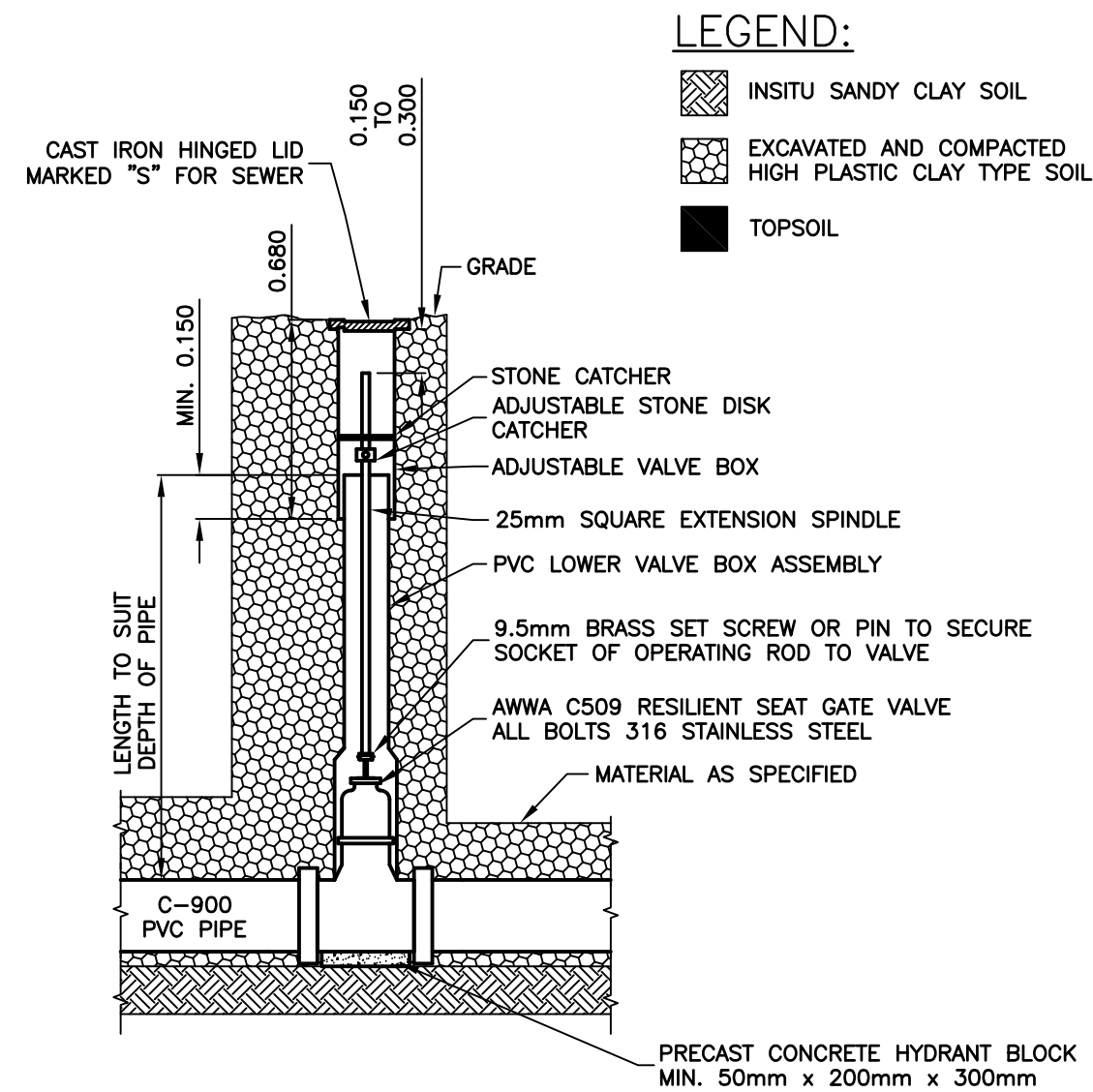
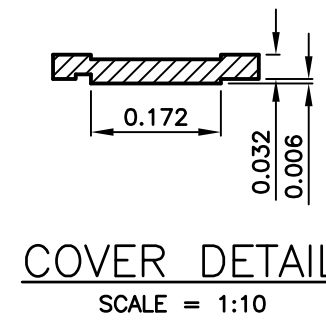
ENGINEER'S SEAL
PROVINCE OF MANITOBA
G.R. COUSIN
REGISTERED PROFESSIONAL ENGINEER
1/03/24

JR Cousin Consultants Ltd.
91A Scurfield Blvd. Winnipeg MB R3Y 1G4
p. [204] 489-0474
f. [204] 489-0487
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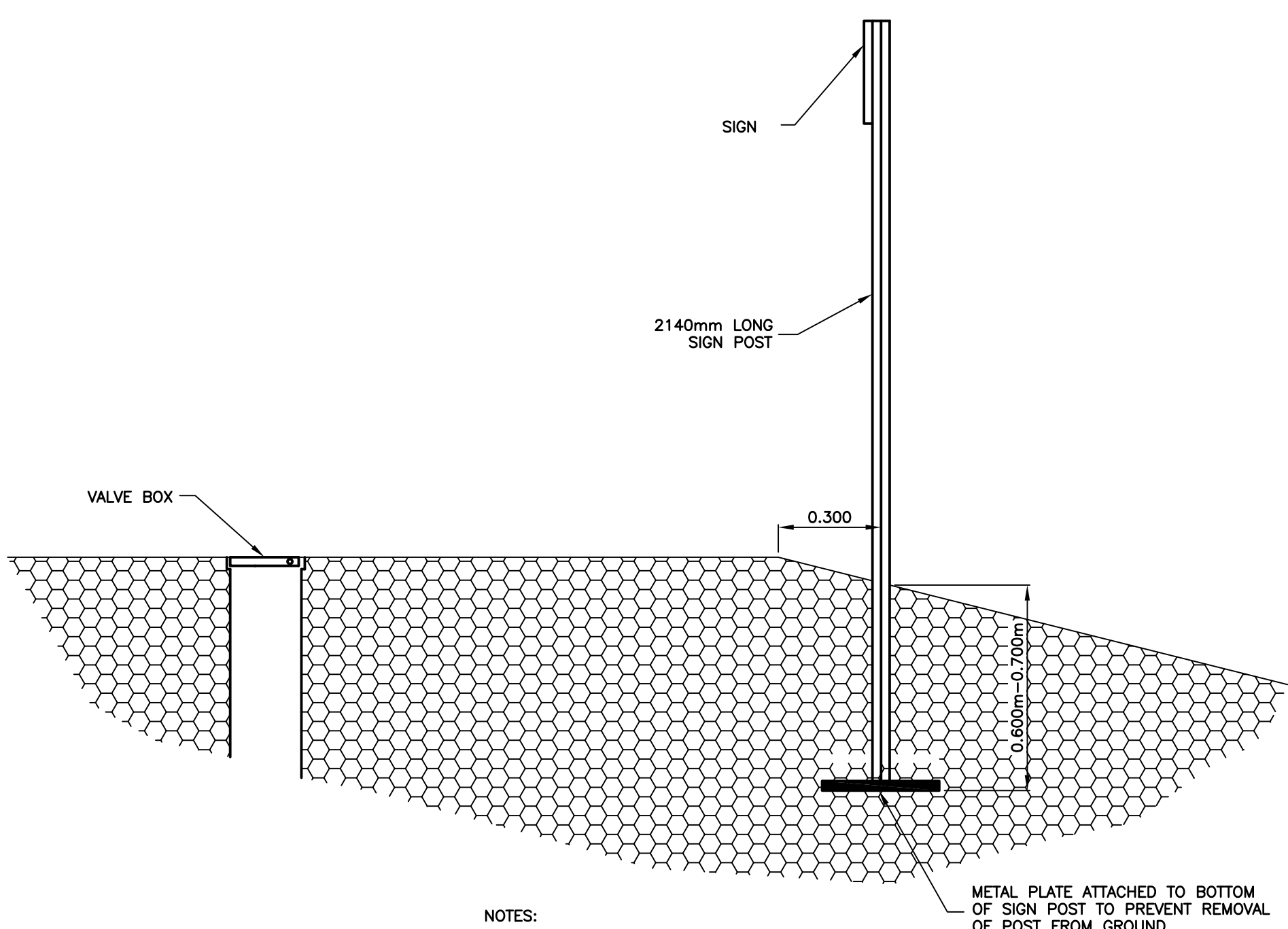
CODE: M-575.01	PROJECT: R.M. OF MONTCALM ST. JEAN LAGOON ASSESSMENT
DESIGNED BY: OW	TITLE: SPILLWAY, TRUCK TURNAROUND, FENCE, GATE, BOLLARD, SITE MARKER AND ACCESS ROAD CROSS SECTION DETAILS
DRAWN BY: RH	SCALE: AS NOTED
REVIEWED BY: OW	DATE: 14/03/24
	PLAN: L4
	SHEET: 4 of 5

Apr 01, 2014 - 8:51am P:\000075 Montreal_RM575.01 St. Jean Lagoon Assessment\04 Drawings\DWG 2014\Plan 4 - 1000.dwg



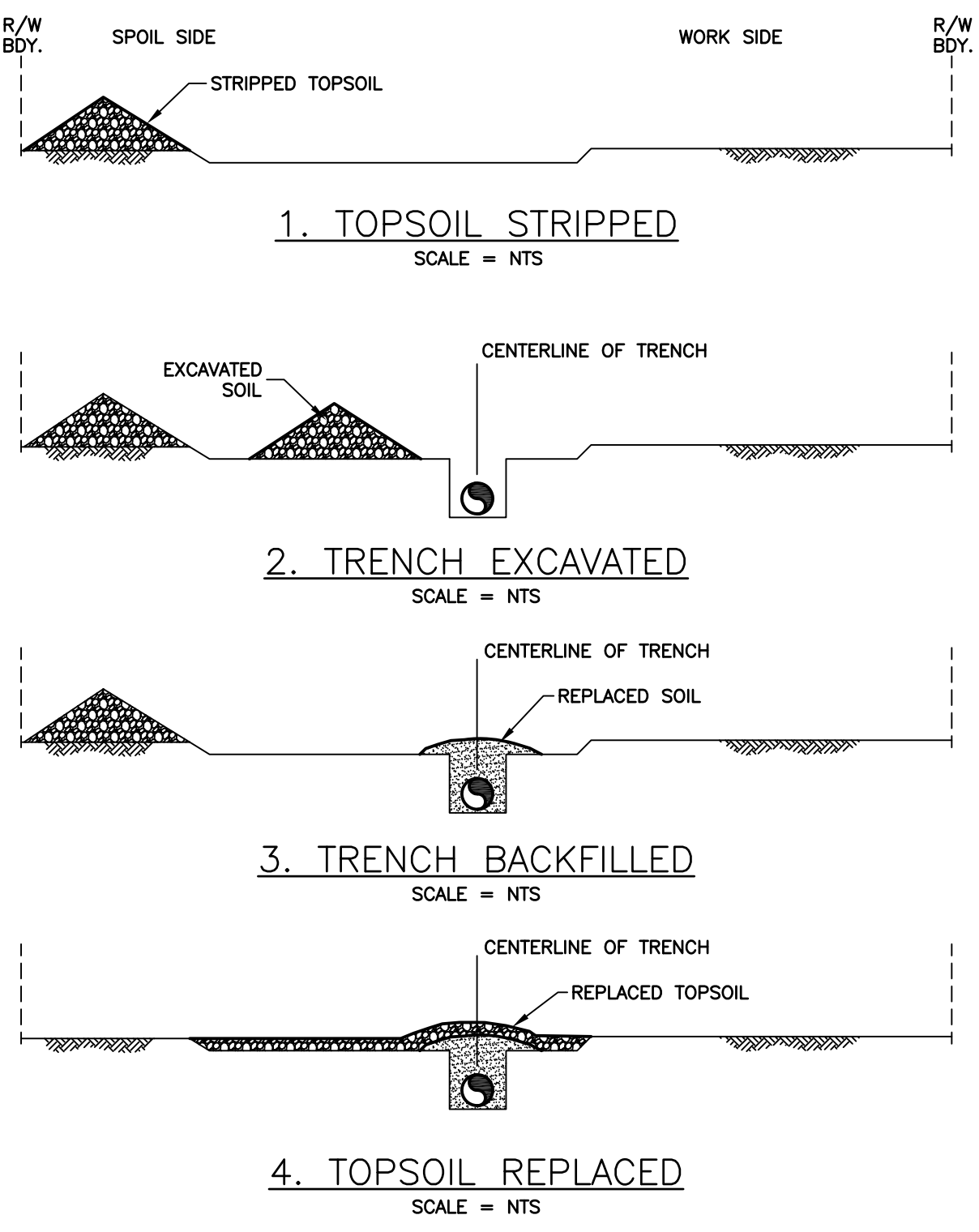
1 LAGOON DIKE VALVE DETAIL SCALE = 1:25

LEGEND:
 INSITU SANDY CLAY SOIL
 EXCAVATED AND COMPACTED HIGH PLASTIC CLAY TYPE SOIL
 TOPSOIL

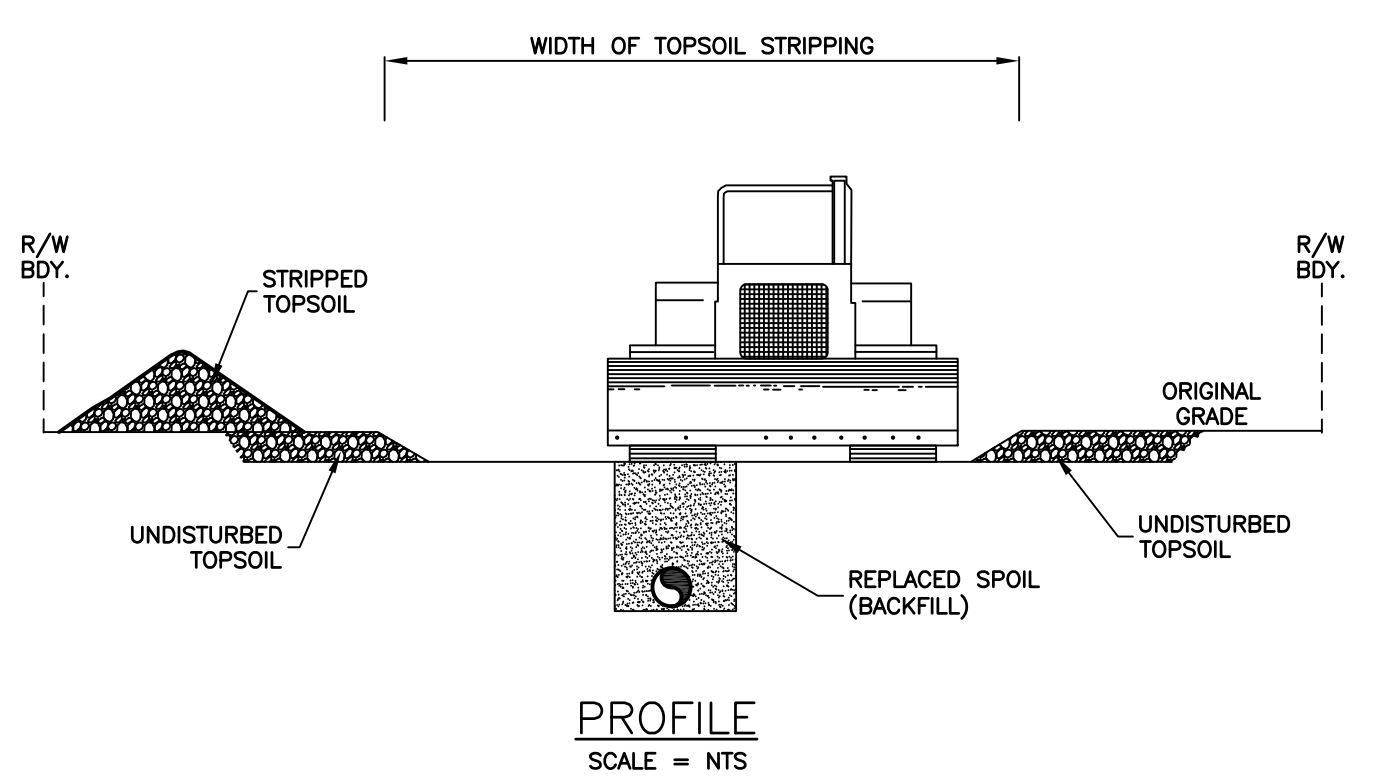


NOTES:
 - MINIMUM SIGN SIZE: 300mm X 450mm
 - MINIMUM POST LENGTH: 2140mm
 - CROSSING MARKERS TO BE SET IN 200mmØ X 1.0m CONCRETE AS PER SPECIFICATIONS

2 VALVE MARKER DETAIL SCALE = 1:15

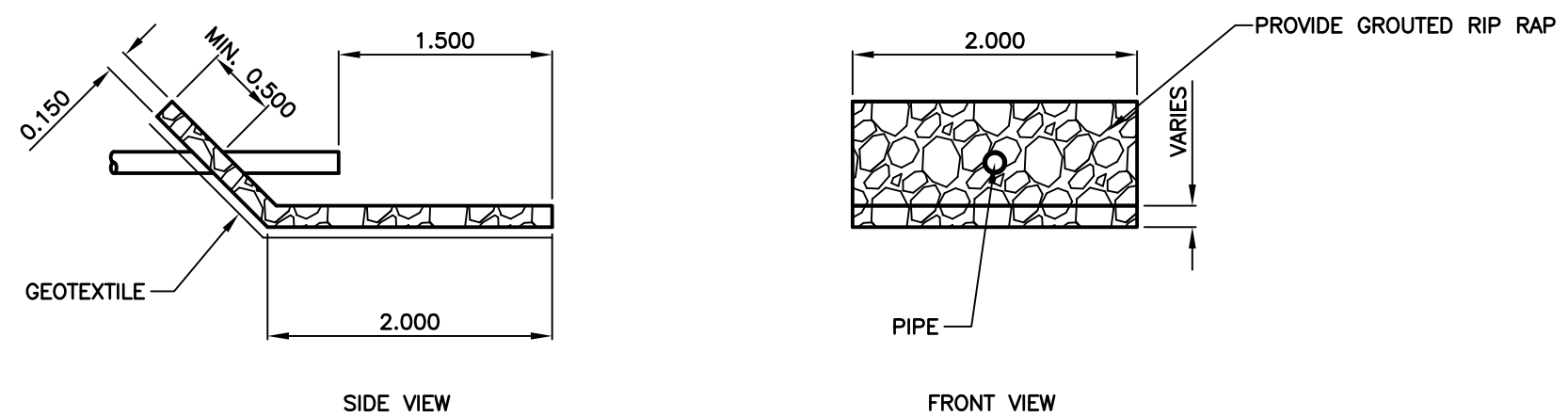


SOURCE: ADAPTED FROM TRANSCANADA PIPELINES, 1979.



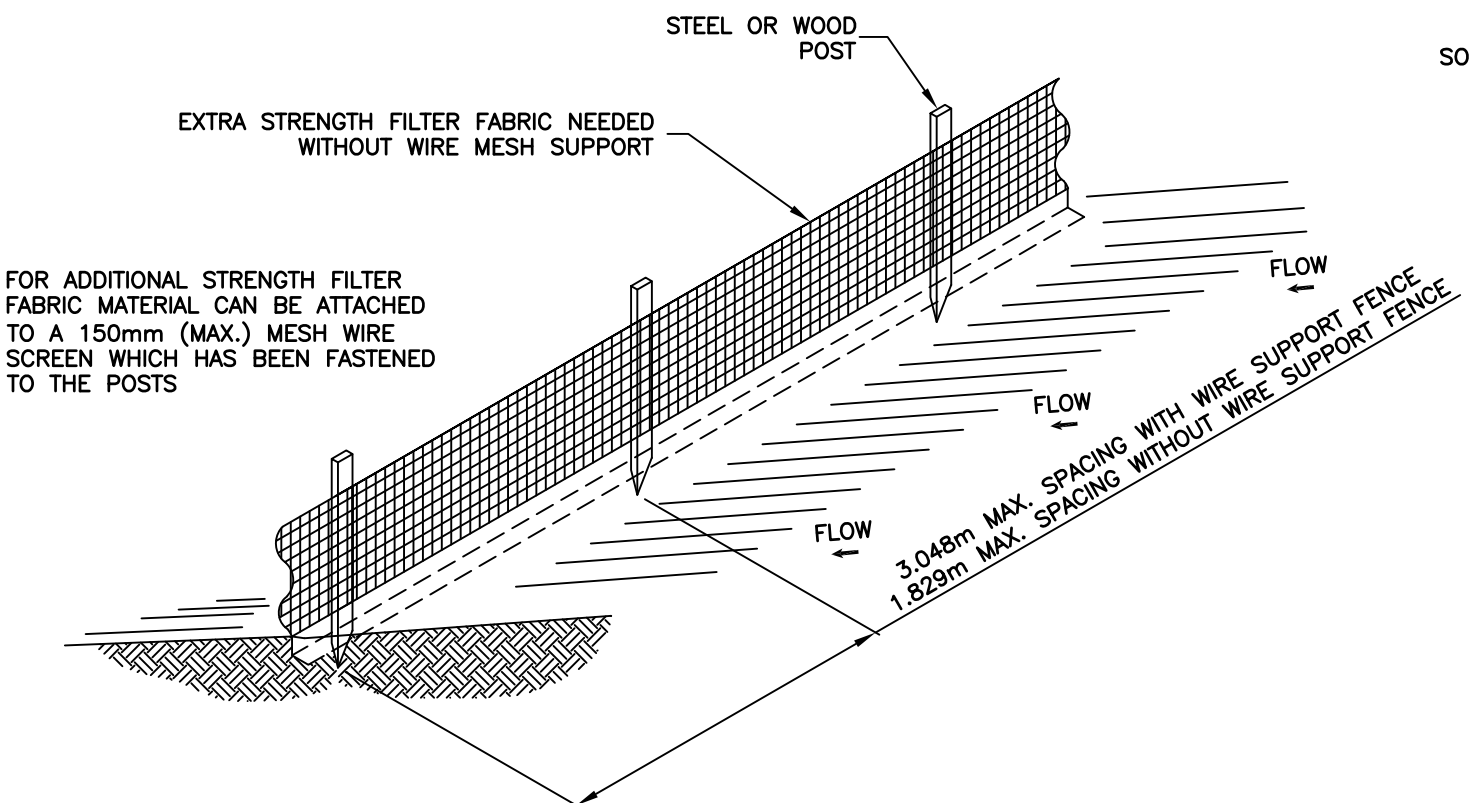
NOTES:
 1. EXCEPT IN ROCKY OR MUSKEG AREAS, COMPACT THE BACKFILLED SUBSOIL TO MINIMIZE SETTLEMENT. THE DEGREE OF COMPACTION WHICH CAN BE ACHIEVED IS LIMITED BY SOIL TYPE, FROST AND MOISTURE CONTENT, DEPTH OF COVER, PIPE STRENGTH AND INSULATION, AND OTHER FACTORS. TYPICALLY, COMPACTION IS ACHIEVED BY A FEW PASSES WITH A CRAWLER TRACTOR. IN SPECIAL CASES SUCH AS IRRIGATED FIELDS AND OPEN CUT ROAD CROSSINGS, 100% COMPACTION IS DESIRABLE AND REQUIRES SPECIAL EQUIPMENT AND COMPACTION IN MULTIPLE LIFTS.
 2. DISPOSE OF EXCESS SUBSOIL IN LOCATIONS SATISFACTORY TO THE LANDOWNER AND IN A MANNER WHICH WILL PREVENT MIXING WITH TOPSOIL.

SOURCE: ADAPTED FROM TRANSCANADA PIPELINES, 1979.



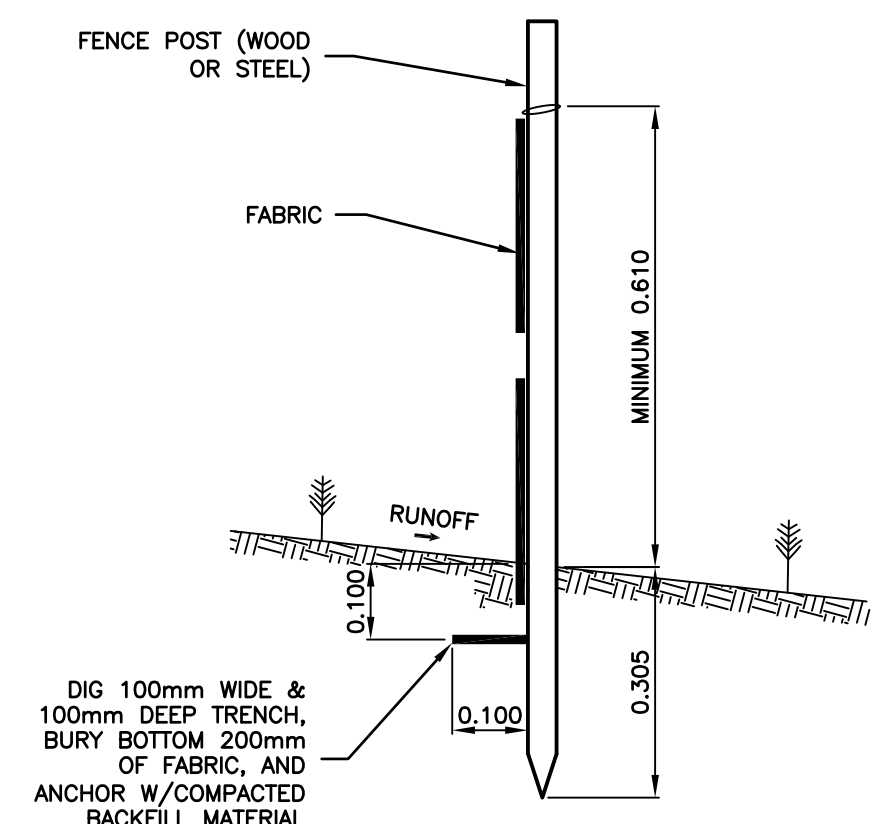
NOTE:
 -RIP RAP MATERIAL SHALL BE WELL GRADED 125mm TO 200mm HARD, DENSE, ROUNDED & DURABLE FIELD STONE.

3 RIP RAP DETAIL SCALE = 1:50

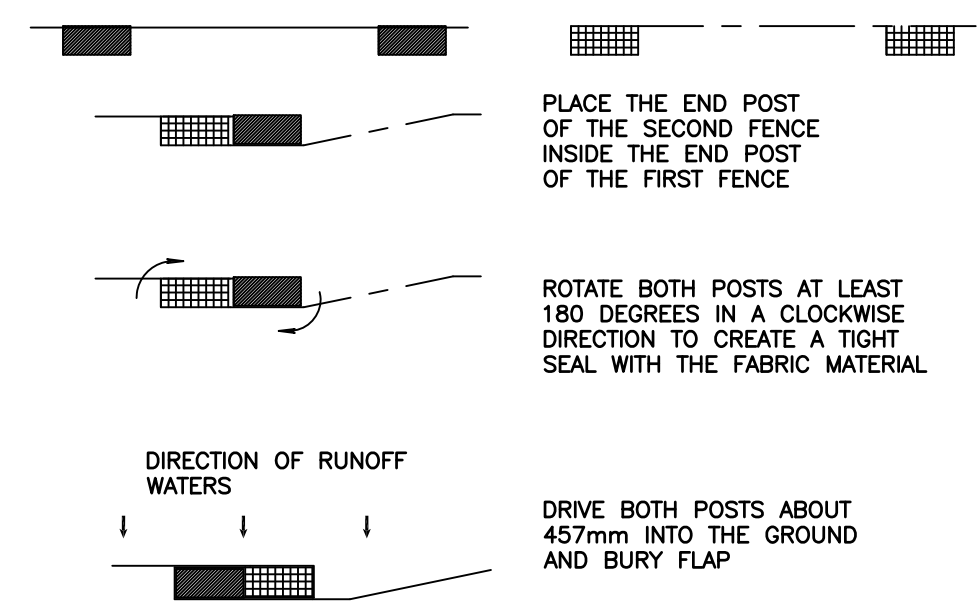


NOTES:
 1. THE HEIGHT OF A SILT FENCE SHALL NOT EXCEED 914mm.
 2. HE FILTER FABRIC SHALL BE PURCHASED IN A CONTINUOUS ROLL CUT TO THE LENGTH OF THE BARRIER TO AVOID THE USE OF JOINTS.
 3. POSTS SHALL BE SPACED A MAXIMUM OF 3.048m APART AT THE BARRIER LOCATION AND DRIVEN SECURELY INTO THE GROUND A MINIMUM OF 300mm. WHEN EXTRA STRENGTH FABRIC IS USED WITHOUT THE WIRE SUPPORT FENCE, POST SPACING SHALL NOT EXCEED 1.829m.
 4. A TRENCH SHALL BE EXCAVATED APPROXIMATELY 100mm WIDE AND 100mm DEEP ALONG THE LINE OF POSTS AND UPSLOPE FROM THE BARRIER.
 5. WHEN STANDARD STRENGTH FILTER FABRIC IS USED, A WIRE MESH SUPPORT FENCE SHALL BE FASTENED SECURELY TO THE UPSLOPE SIDE OF THE POSTS USING HEAVY DUTY WIRE STAPLES AT LEAST 25mm LONG, TIE WIRES, OR HOG RINGS. THE WIRE SHALL EXTEND INTO THE TRENCH A MINIMUM OF 50mm AND SHALL NOT EXTEND MORE THAN 914mm ABOVE THE ORIGINAL GROUND SURFACE.
 6. THE STANDARD STRENGTH FILTER FABRIC SHALL BE STAPLED OR WIRED TO THE FENCE, AND 200mm OF THE FABRIC SHALL BE EXTENDED INTO THE TRENCH. THE FABRIC SHALL NOT EXTEND MORE THAN 914mm ABOVE THE ORIGINAL GROUND SURFACE.
 7. THE TRENCH SHALL BE BACKFILLED AND THE SOIL COMPACTED OVER THE FILTER FABRIC.
 8. SILT FENCING TO BE POLYPROPYLENE SYNTHETIC FIBRE WITH ULTRAVIOLET STABILIZERS. AMOCO 1198 OR APPROVED EQUAL.
 9. WOOD POSTS TO BE 38mm X 89mm (2" X 4"), POINTED AT ONE END AND FABRICATED.
 10. INSTALL ALL SUPPORTING POSTS ON THE DOWN SLOPE SIDE OF THE FENCING
 11. MAINTAIN SILT FENCE THROUGHOUT CONSTRUCTION AND UNTIL REVEGETATION OCCURS.

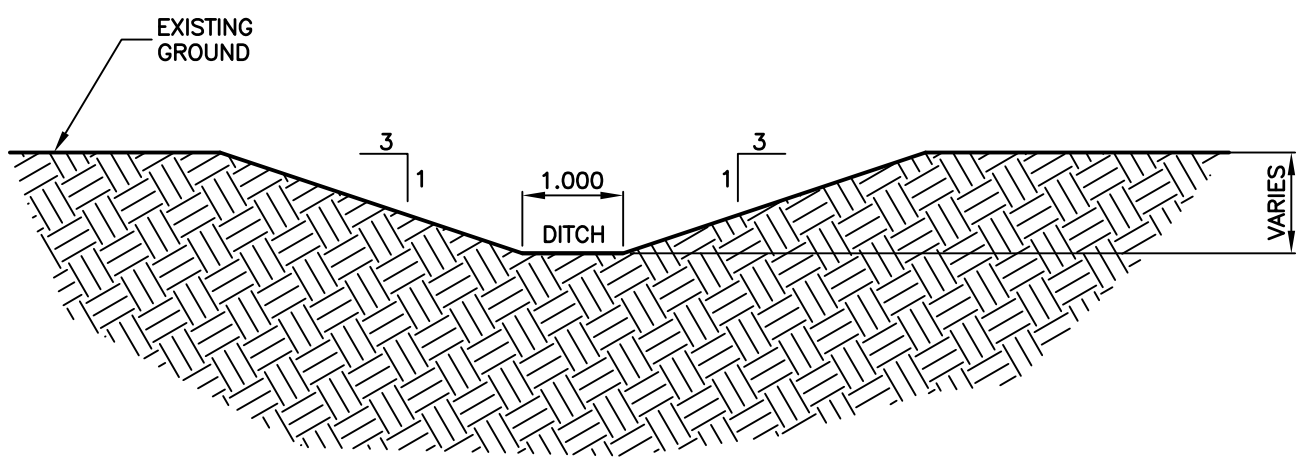
5 SILT FENCE DETAIL SCALE = 1:40



6 SILT FENCE SECTION SCALE = 1:10



7 ATTACHING TWO SILT FENCES SCALE = 1:10



4 TYPICAL DISCHARGE DITCH DETAIL SCALE = 1:75

PRELIMINARY NOT FOR CONSTRUCTION

No.	REVISIONS	DATE	INITIALS	B.M. EL.

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 www.jrcc.ca
 ENGINEERING EXCELLENCE SINCE 1981

CODE: M-575.01	PROJECT: R.M. OF MONTCALM ST. JEAN LAGOON ASSESSMENT
DESIGNED BY: OW	TITLE: VALVE, VALVE MARKER, RIP RAP, DITCH, SILT FENCE AND MISCELLANEOUS DETAILS
DRAWN BY: RH	SCALE: AS NOTED
REVIEWED BY: OW	DATE: 14/03/24
	PLAN: L5
	SHEET: 5 of 5

Appendix F

Fisheries Branch, Manitoba Water Stewardship, October 15, 2009 - E-mail Correspondence

Manitoba Conservation Wildlife & Ecosystem Protection Branch, October 20, 2009 - E-mail Correspondence

Manitoba Culture, Heritage, Tourism and Sport - Historic Resources Branch, November 9, 2009 - Memorandum

Fisheries Branch, Manitoba Water Stewardship, October 15, 2009
E-mail Correspondence

Bereket Assefa

From: Janusz, Lauren R (WSD) [Laureen.Janusz@gov.mb.ca]
Sent: Thursday, October 15, 2009 2:44 PM
To: Bereket Assefa
Subject: RE: St. Jean Lagoon - Fish Species in the Red River
Attachments: Red River Fish Species List (ME).doc

Hi Bereket,

Attached is a list of the Red River fish species that a co-worker put together for the International Joint Commission. When you open up the document the first page is blank, the list is on the second page. Any problems with it let me know. Thanks.

Laureen Janusz

Aquatic Ecosystem Section
Fisheries Branch
Manitoba Water Stewardship
Box 20, 200 Saulteaux Crescent
Winnipeg, MB R3J 3W3

Phone: (204) 945-7789
Fax: (204) 948-2308
Email: Laureen.Janusz@gov.mb.ca

From: Bereket Assefa [mailto:bassefa@jrcc.ca]
Sent: Friday, October 09, 2009 3:30 PM
To: Janusz, Lauren R (WSD)
Subject: St. Jean Lagoon - Fish Species in the Red River

Dear Laureen,

J.R. Cousin Consultants Ltd. is preparing an Environment Act Proposal (EAP) on behalf of the R.M. Montcalm for a proposed new aerated wastewater treatment lagoon construction to service the Community of St. Jean. The proposed aerated lagoon site is located on portions of River Lots 225 and 227 as shown on the attached Plan 1.

Treated effluent from the aerated lagoon would be continuously discharged into the Red River. Please provide a list of the Fish Species that exist in the Red River as we would like to include the information in the EAP. If possible, please respond by Friday October 16, 2009.

If you have any questions, please do not hesitate to contact me.

Thank you,

Bereket Assefa, Ph.D., P.Eng.
Environmental Engineer

J.R. Cousin Consultants Ltd.

Common Name	Genus	Species	Presence	Common Name	Genus	Species	Presence
Banded Killfish	Fundulus	diaphanus	Rare	Largemouth Bass +	Micropterus	salmoides	Uncommon
Bigmouth Buffalo *	Ictiobus	cyprinellus	Common	Logperch	Percina	caprodes	Common
Bigmouth Shiner	Notropis	dorsalis	Unknown	Longnose Dace	Rhinichthys	cataractae	Unknown
Black Bullhead	Ameiurus	melas	Common	Mimic Shiner	Notropis	volucellus	Unknown
Black Crappie	Pomoxis	nigromaculatus	Common	Mooneye	Hiodon	tergisus	Rare
Blackchin Shiner	Notropis	heterodon	Unknown	Northern Redbelly dace	Phoxinus	eos	Uncommon
Blacknose Shiner	Notropis	heterolepis	Unknown	Northern Pike	Esox	lucius	Common
Blackside Darter	Percina	maculata	Unknown	Pearl Dace	Margariscus	margarita	Unknown
Bluegill	Lepomis	macrochirus	uncommon	Quillback	Carpoides	cyprinus	Uncommon
Bluntnose Minnow	Pimephales	notatus	Unknown	Rainbow Smelt +	Osmerus	mordax	Uncommon
Brassy Minnow	Hybognathus	hankinsoni	Unknown	Rainbow Trout +	Oncorhynchus	mykiss	Uncommon
Brook Stickleback	Culaea	inconstans	Common	River Darter	Percina	shumardi	Common
Brown Bullhead	Ameiurus	nebulosus	Common	River Shiner	Notropis	blennioides	Unknown
Brown Trout +	Salmo	trutta	uncommon	Rock Bass	Ambloplites	rupestris	Common
Burbot	Lota	lota	Common	Rosyface Shiner	Notropis	rubellus	Unknown
Central Mudminnow	Umbra	limi	Common	Sand Shiner	Notropis	stramineus	Uncommon
Channel Catfish	Ictalurus	punctatus	Common	Sauger	Sander	canadensis	Common
Chestnut Lamprey *	Ichthyomyzon	castaneus	Unknown	Shorthead Redhorse	Moxostoma	macrolepidotum	Common
Cisco	Coregonus	artedii	Common	Silver Chub *	Macrhybopsis	storeriana	Common
Common Carp +	Cyprinus	carpio	Common	Silver Lamprey	Ichthyomyzon	unicuspis	Unknown
Common Shiner	Luxilus	cornutus	Rare	Silver Redhorse	Moxostoma	anisurum	Common
Creek Chub	Semotilus	atromaculatus	Unknown	Smallmouth Bass +	Micropterus	dolomieu	Unknown
Emerald Shiner	Notropis	atherinoides	Abundant	Spotfin Shiner	Cyprinella	spiloptera	Unknown
Fathead Minnow	Pimephales	promelas	Common	Spottail Shiner	Notropis	hudsonius	Common
Finescale dace	Phoxinus	neogaeus	uncommon	Stonecat	Noturus	flavus	Unknown
Fathead Chub	Platygobio	gracilis	Unknown	Tadpole Madtom	Noturus	gyrinus	Common
Freshwater Drum	Aplodinotus	grunniens	Abundant	Troutperch	Percopsis	omiscomaycus	Common
Golden Redhorse	Moxostoma	erythrum	Rare	Walleye	Sander	vitreus	Common
Golden Shiner	Notemigonus	crysoleucas	Unknown	Western Blacknose Dace	Rhinichthys	obtusus	Unknown
Goldeye	Hiodon	alosoides	Common	White Bass +	Morone	chrysops	Common
Goldfish +	Carassius	auratus	Unknown	White Crappie	Pomoxis	annularis	Unknown
Hornyhead Chub	Nocomis	biguttatus	Unknown	White Sucker	Catostomus	commersoni	Common
Iowa Darter	Etheostoma	exile	Common	Yellow Perch	Perca	flavescens	Common
Johnny Darter	Etheostoma	nigrum	Common				
Lake Chub	Couesius	plumbeus	Rare				
Lake Whitefish	Coregonus	clupeaformis	Uncommon				
Lake Sturgeon *	Acipenser	fulvescens	Rare				

Table 6. Fish Species of the Red River in Manitoba

Note

- 1) Data from Manitoba Water Stewardship – Fisheries Inventory and Classification System – 2005
- 2) * Indicates species at risk.
- 3) + Indicates introduced species (white bass and common carp and rainbow smelt considered invasive to Manitoba)
- 4) Stewart, K. and D. Watkinson. 2004 The Freshwater Fishes of Manitoba. University of Manitoba Press.

Manitoba Conservation Wildlife & Ecosystem Protection Branch, October 20, 2009
E-mail Correspondence

Bereket Assefa

From: Firlotte, Nicole (CON) [Nicole.Firlotte@gov.mb.ca]
Sent: Tuesday, October 20, 2009 1:14 PM
To: Bereket Assefa
Subject: RE: St. Jean Lagoon - Species at Risk

Bereket,

Thank you for your information request. I completed a search of the Manitoba Conservation Data Centre's rare species database and found no occurrences in at this time for River Lots 225 and 227. There is an occurrence of Silver Chub (*Macrhybopsis storeriana*) G5S3 in the Red River north of these lots. Further information on these ranking systems can be found on our website at <http://web2.gov.mb.ca/conservation/cdc/consranks.html>. This species is listed as Special Concern by COSEWIC and SARA under Schedule 1. Further information on these ranking systems can be found on our website at <http://web2.gov.mb.ca/conservation/cdc/consranks.html> and http://www.sararegistry.gc.ca/default_e.cfm.

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

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

Third party requests for products wholly or partially derived from Biotics must be approved by the Manitoba CDC before information is released. Once approved, the primary user will identify the Manitoba CDC as data contributors on any map or publication using Biotics

data, as follows as: Data developed by the Manitoba Conservation Data Centre; Wildlife and Ecosystem Protection Branch, Manitoba Conservation.

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

If you have any questions or require further information please contact me directly at (204) 945- 6998.

Regards,
Nicole

Nicole Firlotte
Biodiversity Information Manager
Manitoba Conservation
945-6998

Note new email: nicole.firlotte@gov.mb.ca

 Please consider the environment before printing this e-mail

From: Bereket Assefa [mailto:bassefa@jrcc.ca]
Sent: Friday, October 09, 2009 2:36 PM
To: Firlotte, Nicole (CON)
Subject: St. Jean Lagoon - Species at Risk

Hi Nicole,

J.R. Cousin Consultants Ltd. is preparing an Environment Act Proposal (EAP) on behalf of the R.M. Montcalm for a proposed new aerated wastewater treatment lagoon construction to service the Community of St. Jean. The proposed aerated lagoon site is located on portions of River Lots 225 and 227 as shown on the attached Plan 1.

Please provide information on the type of wildlife and plant species (especially any "species-at-risk") that are known to exist in the location indicated above. The information would be included in the EAP. If possible, please respond by Friday October 16, 2009.

If you have any questions, please do not hesitate to contact me.

Thank you.

Bereket Assefa, Ph.D., P.Eng.
Environmental Engineer

J.R. Cousin Consultants Ltd.
Phone: (204) 489-0474
Fax: (204) 489-0487
www.jrcc.ca

Manitoba Culture, Heritage, Tourism and Sport - Historic Resources Branch,
November 9, 2009 - Memorandum

DATE: November 9, 2009

TO: Bereket Assefa
JR Cousin Consultants Ltd.
91 A Scurfield Boulevard
Winnipeg MB

FROM: Gordon Hill
Impact Assessment
Archaeologist
Historic Resources
Branch
Main Floor 213 Notre
Dame Avenue
Winnipeg MB
R3B 1N3
PHONE NO: (204) 945-7730

SUBJECT: HERITAGE RESOURCES

YOUR FILE:

HRB FILE:

WASTEWATER TREATMENT LAGOON
RL 225 & 227 PARISH STE. AGATHE
RM MONTCALM

In response to your memo regarding the above-noted project, I have examined Branch records for areas of potential concern. The potential to impact significant heritage resources is low, and, therefore, the Historic Resources Branch has no concerns with the project.

If at any time however, significant heritage resources are recorded in association with these lands during development, the Historic Resources Branch may require that an acceptable heritage resource management strategy be implemented by the developer to mitigate the affects of development on the heritage resources.

If you have any questions or require further comments, please contact me at 945-7730.

C. Gordon Hill