ENVIRONMENT ACT PROPOSAL
R.M. OF ST. FRANCOIS XAVIER
WASTEWATER STABILIZATION POND EXPANSION

Prepared for:

R.M. of St. Francois Xavier

Project No: 121-15696-00

January 2013

GENIVAR

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0.0 EXECUTIVE SUMMARY

Leading up to this Environment Act Proposal (EAP), GENIVAR was retained by the R.M. of St. Francois Xavier to undertake a study for the Rural Municipality of St. Francois Xavier wastewater treatment system. The study was to review potential ways of increasing the community's wastewater treatment and storage capacity to treat an additional 600 people over the next 20 years.

The existing lagoon is located northeast of the Rural Municipality of St Francois Xavier in the Outer Two Mile Lots FXOT 183 & FXOT 184 in the Parish of St. Francois Xavier; it services the R.M. of St. Francois Xavier and receives some trucked loadings from outside of the R.M. The existing lagoon consists of a primary cell and two secondary cells that collectively function in the treatment and storage of the wastewater. Considering that the R.M. of St. Francois Xavier anticipates continued growth and based on the organic and hydraulic loadings for the 20-year design period, expansion of the existing lagoon is required.

It is recommended to expand the existing primary cell and to construct a new secondary cell southeast of the existing lagoon to accommodate future organic and hydraulic loadings. As the land available is more than required, an area to the south has been set aside for future nutrient removal options (possible constructed wetland), and the remaining land added to the primary and secondary cells to accommodate loadings beyond 20-year design loadings (approximately 240 people). The proposed primary cell expansion and the new secondary cell will be constructed with a clay core based on the recommendations of the Geotechnical Report. The new secondary cell will discharge to Second Creek which drains into the Assiniboine River. Major design appurtenances include a perimeter fence, valves, piping, rip rap and lagoon signage.

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

1.0 DEVELOPMENT INFORMATION

R.M. of St. Francois Xavier – Wastewater Stabilization Pond Expansion
Name of development

R.M. of St. Francois Xavier
Legal name of the proponent of the development

FXOT 184 & FXOT 185 in the Parish of St. Francois Xavier
Location of development

Contact Person for Proponent:

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Contact Person for Environmental Assessment:

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2.0 DESCRIPTION OF DEVELOPMENT

2.1 CERTIFICATE OF TITLE

The new expansion is to be located to the southeast of the existing lagoon system in FXOT 184 & FXOT 185 in the Parish of St. Francois Xavier. The Certificate of Title for the existing and proposed development is included in Appendix A.

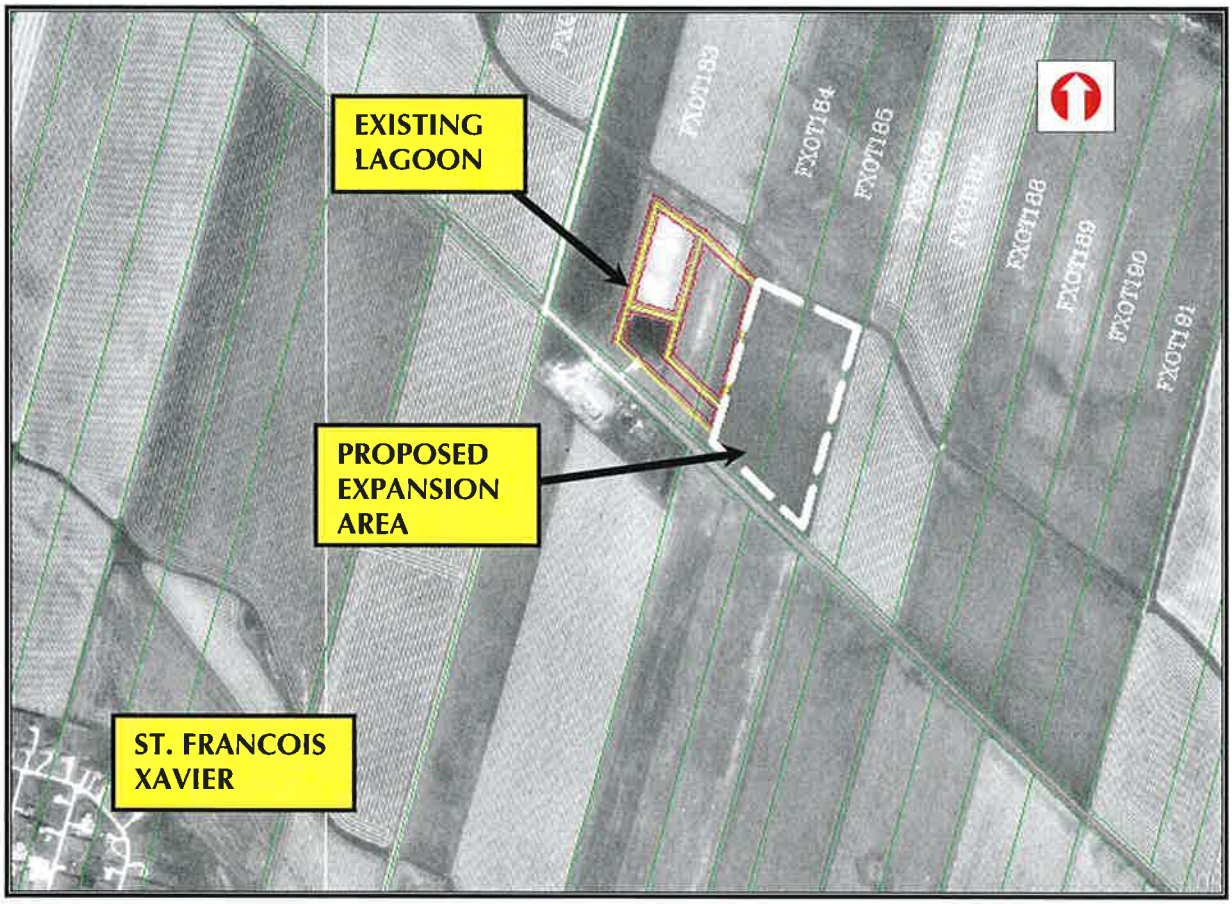


Figure 2.1: Location map of the existing and proposed development

2.2 NAME OF OWNER

The lagoon expansion area is owned by the R.M. of St. Francois Xavier.

2.3 MINERAL RIGHTS

According to correspondence with Crown Lands & Property Agency – Lands Branch, the Mines & Minerals and Sand & Gravel were transferred from the Crown with the surface ownership in 1883 & 1884 for OT 184 & 185 the Parish of St. Francois Xavier. Correspondence is included in Appendix D.

2.4 DESCRIPTION OF EXISTING LAND USE

The land intended for lagoon expansion is currently agricultural land.

2.5 PREVIOUS STUDIES

2012 *"R.M. of St. Francois Xavier Wastewater Stabilization Pond Expansion" Assessment Report prepared* by GENIVAR for the *R.M. of St. Francois Xavier*

This report documents all existing and future wastewater sources and provides an assessment of the wastewater treatment and storage requirements arising from the current and projected loadings. The study concludes with a review of lagoon expansion options and the associated costs.

2012 *Geotechnical Report: "Proposed St. Francois Xavier WWSP Expansion"* prepared by GENIVAR for the *R.M. of St. Francois Xavier*

This report provides a detailed geotechnical investigation of the proposed development site conducted by GENIVAR on April 30 and May 17, 2012. The investigation included two site visits, testhole drilling, sample collection and laboratory testing. The report concluded that based on soil conditions, the proposed lagoon could be constructed with a clay core within the proposed dykes to meet present requirements of one metre of clay soil with a hydraulic conductivity of $< 1x10^{-7}$ cm/sec.

3.0 EXISTING WASTEWATER STABILIZATION POND

3.1 DESCRIPTION

The existing wastewater stabilization pond is located approximately 1,250 metres northwest of the nearest residence in the Community of St. Francois Xavier in the Outer Two Mile Lots FXOT 183 & FXOT 184 in the Parish of St. Francois Xavier. The existing facility has one primary cell and two secondary cells that collectively function in the treatment and storage of the piped and trucked in wastewater / septage.

The existing R.M. of St. Francois Xavier lagoon services the existing R.M. of St. Francois Xavier population of 1,240 people or 450 residences with an average of 2.76 people per house. 237 of those houses are on a low pressure sewer system (LPS), 193 houses have septic tanks and 20 houses have holding tanks. In addition, the existing lagoon services 12 holding tanks in White Horse Village (in the R.M. of Cartier) and 86 holding tanks and 21 septic tanks from elsewhere outside of the R.M. In the future, the R.M. is anticipating the closing of the White Horse Village and associated holding tanks. The R.M. of St. Francois Xavier is expecting a population increase of 600 people or 217 residences with an average of 2.76 people per house over the next 20-year period.

The existing licence directing lagoon operation is Environment Act Licence No. 2661, dated July 15, 2004.

3.2 EXISTING CAPACITY

The existing R.M. of St. Francois Xavier lagoon has one primary cell and two secondary cells that collectively function in the treatment and storage of the wastewater. Information regarding the actual dimensions of the existing R.M. of St. Francois Xavier lagoon was obtained from the 2012 GENIVAR survey data. The primary cell has an approximate volume of 20,680 m^3 at an operating depth of 1.5 metres. However, Manitoba Conservation stipulates that only half of this volume, or 10,340 m^3, can be used in determining the total lagoon storage. The secondary cells have approximate storage volumes of 20,945 m^3 and 36,950 m^3 at an operating depth of 1.5 metres with a 0.3 metre dead storage assumed for the bottom of the cells. The total storage capacity (primary cell + two secondary cells) is **68,235 m^3**.

The storage capacities of the existing cells are listed in Table 1. All cells are detailed as having 4:1 interior and exterior side slopes.

TABLE 1: EXISTING WASTEWATER STABILIZATION POND STORAGE CAPACITY

Type	Storage Volume [m^3]
Primary Cell	10,340
Secondary Cell #1	20,945
Secondary Cell #2	36,950
Total	**68,235**

According to the Manitoba Conservation guideline, a primary treatment cell requires one hectare of liquid surface area per 56 kg-BOD_5 daily loading. The existing primary cell has a surface area of approximately 1.6 hectares at a liquid level of 1.5 m and can accommodate a daily organic loading of **89.6 kg-BOD_5**.

3.3 EFFLUENT QUALITY AND DISCHARGE ROUTE

The proposed secondary cell will discharge into the same route as the existing secondary cells, as illustrated in Figure 3.1. From the discharge point into a drainage ditch, the treated effluent will flow into an existing second order drain (Second Creek) that drains into the Assiniboine River. The distance of the route from the discharge point of the proposed lagoon to the Assiniboine River is approximately 9 kilometres. The proposed lagoon facility is in the Sturgeon Creek and Adjacent Watershed (No. 26).

To meet the requirements of the *Water Quality Standards, Objectives and Guidelines Regulation under The Water Protection Act* (2011), the R.M. of St. Francois Xavier will implement a nutrient reduction strategy consisting of a trickle discharge. A trickle discharge extending from two to four weeks will allow the vegetation and the soil in the bottom of the discharge ditch and the second order drain to absorb nutrients and reduce the nutrient load to the Assiniboine River. For the future, the R.M. of St. Francois Xavier has set aside an area of land, which could be developed into a constructed wetland to the east of the lagoon to provide additional treatment to the effluent to ensure that effluent quality meets the nutrient removal requirements in the future.

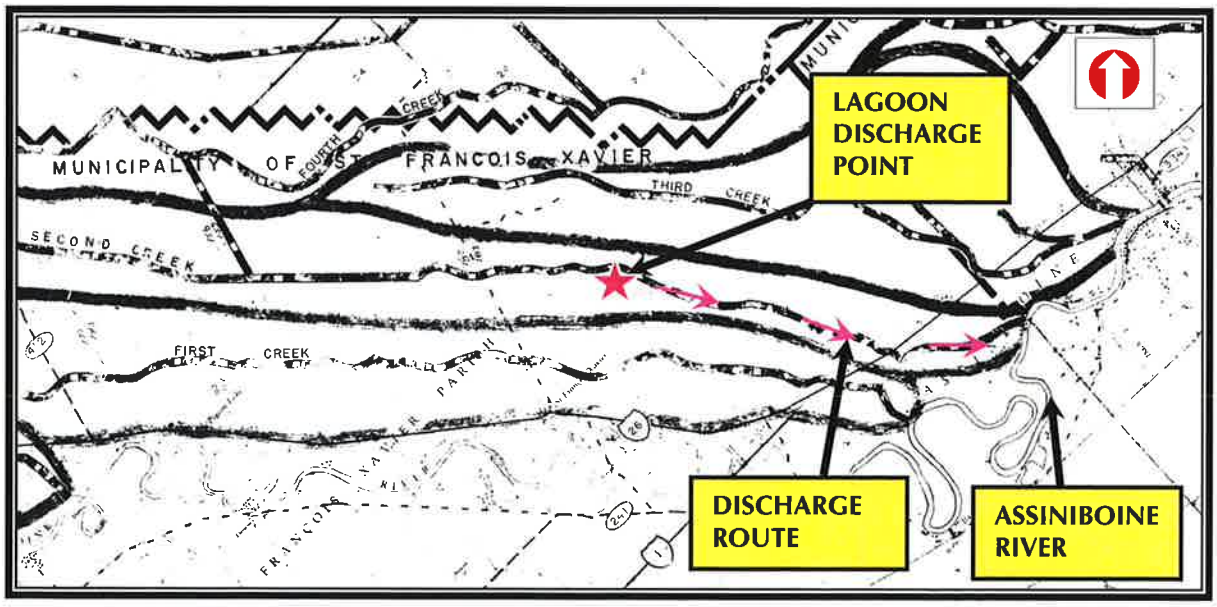


Figure 3.1: Effluent discharge route from the St. Francois Xavier lagoon

4.0 POPULATION SERVICED AND DESIGN LOADING

4.1 SOURCES OF WASTEWATER

The existing R.M. of St. Francois Xavier lagoon services the existing R.M. of St. Francois Xavier population of 1,240 people or 450 residences with an average of 2.76 people per house. 237 of those houses are on a low pressure sewer system (LPS), 193 houses have septic tanks and 20 houses have holding tanks. In addition, the existing lagoon services 12 holding tanks in White Horse Village (in the R.M. of Cartier) and 86 holding tanks and 21 septic tanks from elsewhere outside of the R.M. The R.M. of St. Francois Xavier is expecting a population increase of 600 people or 217 residences with an average of 2.76 people per house over the next 20-year period. Out of those 600, it is assumed that 540 people or 195 residences will be on the LPS, 15 residences will have holding tanks and 7 residences will have septic tanks. In the future, the R.M. is anticipating the closing of the White Horse Village and the associated 12 holding tanks. There are no significant industrial or high strength contributors. Table 4.1 lists all of the existing and proposed wastewater sources to be serviced by the R.M. of St. Francois Xavier lagoon.

TABLE 4.1: EXISTING AND PROPOSED WASTEWATER SOURCES

Wastewater Source	Existing (2012)	Proposed (2032)
Serviced Lots (LPS)	237	432
Holding Tanks	118	121
Septic Tanks	214	221

4.2 ASSESSMENT DETAILS

As typical, a 20-year projection is used to calculate design populations and corresponding loadings from all contributing wastewater sources. Prior to the documentation of the wastewater loadings, the following approximations and assumptions are first outlined for the calculations used in assessing the wastewater loadings.

To calculate the organic loading to a treatment facility, it is assumed that the daily BOD_5 contribution for domestic wastewater collected via a piped system is 0.077 kg-BOD_5/person/day.

Septic tank emptying relies on certain assumptions to determine its loading effects. The following calculations outline the methodology used in estimating the septage loading. Presumably, each home has one septic tank. It is estimated that approximately 75% of the total number of septic tanks are emptied in any given year. Typically, the peak septic tank emptying occurs within a 45-day period in the fall months. Essentially, in this time period, the septic tank systems will contribute the highest volume and therefore the greatest BOD_5 loading to a treatment system. It is estimated that approximately 55% of tanks that are emptied in the year will be emptied into the facility during this peak period. In general, the average volume discharged during a single septic tank emptying is 2,725 L (600 IG) and the average organic load contribution per tank is calculated to be 12 kg-BOD_5.

The holding tanks are emptied on average 18 times a year and each load is approximately 3,600 L. The wastewater strength for holding tanks is approximately 400 mg/L or 1.5 kg-BOD_5 /tank.

4.3 ORGANIC LOADING

Organic loading refers to the quantity of organic material present in the incoming wastewater and is measured as the five day Biochemical Oxygen Demand (BOD_5). The organic loading becomes the total mass of BOD_5 in kg/d in the wastewater discharged to the lagoon. The wastewater from the piped serviced area is consistent on a year-round basis and does not have a seasonal variation. However, the peak loading from the rural area residents occurs within the fall months.

4.3.1 R.M. of St. Francois Xavier

On the basis of accepted practice, the daily BOD_5 production for domestic wastewater is 0.077 kg per person. Currently, the existing lagoon services 450 residences in the R.M. with an average of 2.76 people per house. 237 of those houses are on a low pressure sewer system (LPS), 193 houses have septic tanks and 20 houses have holding tanks. The R.M. is anticipating a population growth of 600, with 90% or 540 people on LPS, 15 residences with holding tanks and 7 residences with septic tanks.

LPS System:

With a current population of 654 on LPS, the organic loading to the existing St Francois Xavier lagoon is 50.4 kg-BOD_5/d. With the design population increase of 540 (on LPS), the organic loading is projected to increase to 92.0 kg-BOD_5/d

Septic Tanks:

Based on methodology discussed in Section 2.2, 145 of the 193 septic tanks (75%) are emptied in any given year and approximately 80 of those 145 tanks (~55%) will be emptied into the lagoon facility during the 45-day peak period in the fall months. The wastewater strength of each tank is approximately 12 kg-BOD_5 for a current (2012) organic loading total of 21.2 kg-BOD_5/d. This loading is projected to increase to 22.0 kg-BOD_5/d over the course of the 20-year design period (2032).

Holding Tanks:

Currently, there are 20 holding tanks hauled to the lagoon from the R.M. St. Francois Xavier. It is assumed that the wastewater strength for holding tanks is 400 mg/L. For 2012, the organic

loading attributed to these holding tanks totals 1.5 kg-BOD_5/d. The R.M. is anticipating a population growth including additional 15 residences having holding tanks in the future. For 2032, the organic loading attributed to holding tanks totals 2.6 kg-BOD_5/d.

4.3.2 Organic Loading From Outside of the R.M.

Septic Tanks:

The local haulers indicated that approximately 21 residences with septic tanks from outside of the R.M. hauled to the lagoon. Based on methodology discussed in Section 2.2, 16 of the 21 tanks (75%) are emptied in any given year and approximately 9 of those 16 tanks (~55%) will be emptied into the lagoon facility during the 45-day peak period in the fall months. The wastewater strength of each tank is approximately 12 kg-BOD_5 for a current (2012) organic loading total of 2.3 kg-BOD_5/d. This loading is projected to remain the same over the course of the 20-year design period (2032).

Holding Tanks:

There are currently 98 holding tanks from outside of the R.M. hauled to the lagoon, 12 of them are in White Horse Village. It is assumed that the wastewater strength for holding tanks is 400 mg/L. For 2012, the organic loading attributed to these holding tanks totals 7.2 kg-BOD_5/d. Since the White Horse Village will be closed in the near future and there is no increase projected in the number of holding tanks in the year 2032, this loading will essentially decrease over the course of the 20-year design period (2032) and therefore will total 6.4 kg-BOD_5/d.

4.3.3 Summary

A summary of the existing (2012) and proposed (2032) organic loading from each wastewater source is detailed in Table 2.2.

TABLE 4.2: SUMMARY OF THE ORGANIC LOADING TO THE ST. FRANCOIS XAVIER LAGOON

Wastewater Source	Type	Wastewater Strength	Existing (2009) [kg-BOD_5/d]	Proposed (2029) [kg-BOD_5/d]
R.M. of St. Francois Xavier	LPS	0.077 kg-BOD_5/person	50.4	92.0
	Septic Tank	12 kg-BOD_5/tank	21.2	22.0
	Holding Tank	400 mg-BOD_5/L	1.5	2.6
Outside of the R.M.	Septic Tank	12 kg-BOD_5/tank	2.3	2.3
	Holding Tank	400 mg-BOD_5/L	7.2	6.4
TOTAL			82.6	125.3

As stated in Section 1.0, the existing primary cell of the lagoon has an organic loading capacity of 89.6 kg-BOD_5/d. Therefore, the existing primary cell has adequate treatment capacity for the present loading but requires expansion for the 20-year design loading.

4.4 HYDRAULIC LOADING

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

4.4.1 R.M. of St. Francois Xavier

Annual water consumption records were utilized to determine the wastewater flow to the lagoon from the Community of the St. Francois Xavier, assuming wastewater equals water consumption, which should be slightly conservative. Quarterly data was available from 2007 to 2011 showing that water consumption typically increases over the summer period, but as this is not part of the storage period, the third quarter data was not used in the calculations. On a per capita basis, the 2009 – 2011 storage periods average water usage, of 233 Lpcd, was used in the calculation with the 2011 census data. Average infiltration is assumed to be 0.01 L/sec/house over a 50-day period, which corresponds approximately to the month of May and half of June, when infiltration would affect storage.

Figure 2.1 shows the Community of St. Francois Xavier quarterly waster consumption.

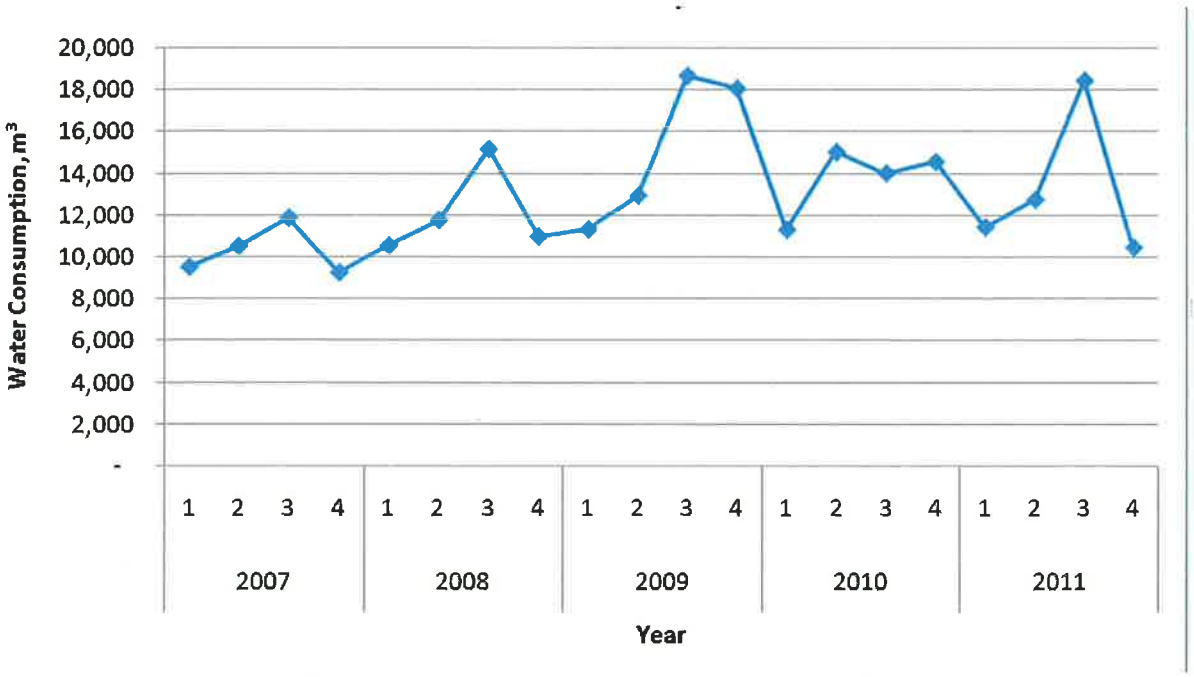


Figure 4.1: The Community of St Francois Xavier quarterly water consumption

The total storage requirement for the sewer system includes:

1. Domestic wastewater flow: (654 people x 233 L/c/d x 227 d =) 34,590,714 L or 34,591 m^3. This wastewater generation will increase to 63,153 m^3 with projected population growth within the Community over the course of the 20-year design period.
2. Infiltration: (237 h x 0.01 L/sec/house x 60 sec/min x 60 min/hr x 24 hr/day x 50 days =) 10,238,400 L or 10,239 m^3. This wastewater generation will increase to 18,660 m^3 with projected population growth within the Community over the course of the 20-year design period.

The existing R.M. of St. Francois Xavier lagoon currently receives wastewater from 193 facilities with septic tanks in the R.M. of St Francois Xavier. However, the great majority of the septage hauling will not occur over the storage period. Of the 75% of tanks that will be emptied any given year, only 20% of these tanks may be emptied over the storage period. The present contribution (2012) of the septic tanks is 79 m^3 and with the additional 7 septic tanks, it would be 82 m^3 of septage requiring winter storage in 2032.

There are 20 holding tanks hauled to the lagoon from the R.M. St. Francois Xavier. The present contribution (2012) of the holding tanks is 806 m^3. The R.M. is anticipating a population growth with 15 residences having holding tanks in the future. For 2032, the hydraulic loading attributed to holding tanks totals 1,410 m^3.

4.4.2 Hydraulic Loading From Outside of the R.M.

Hauling records were utilized to determine wastewater generation to the existing St. Francois Xavier facility from outside of the R.M. 21 rural households with septic tanks and 98 households with holding tanks from outside of the R.M. St. Francois Xavier, with one tank per house, currently contribute septage and wastewater to the St. Francois Xavier facility. However, the great majority of the septage hauling will not occur over the storage period. Of the 75% of septic tanks that will be emptied any given year, only 20% of these tanks will be emptied over the storage period. The present contribution (2012) from the out-of-R.M. area is 3,958 m^3. Since the White Horse Village will be closed in the near future and there is no increase projected in the number of holding/septic tanks hauling to the lagoon from outside of

the R.M. in the year 2032, this loading will essentially decrease over the course of the 20-year design period (2032) and therefore will total 3,474 m^3.

4.4.3 Summary

A summary of the existing and proposed hydraulic loading from each wastewater source is detailed in Table 2.3.

TABLE 2.3: SUMMARY OF THE HYDRAULIC LOADING TO THE ST. FRANCOIS XAVIER LAGOON

Wastewater Source	**Type**	**Existing (2012)** [m^3]	**Proposed (2032)** [m^3]
R.M. of St. Francois Xavier	LPS	34,591	63,153
	Infiltration	10,239	18,660
	Septic Tank	79	82
	Holding Tank	806	1,410
Outside of the R.M.	Septic/Holding Tanks	3,958	3,474
TOTAL		49,673	86,779

As stated in Section 1.0, the existing storage capacity of the St. Francois Xavier lagoon is 68,235 m^3. Therefore, the existing lagoon has adequate treatment capacity for the present loading but requires expansion for the 20-year design loading.

5.0 PROPOSED DEVELOPMENT

Considering that the organic and hydraulic loading sections conclude that the existing lagoon is not capable of servicing the future wastewater generation, expansion of the existing primary cell and construction of a new secondary cell is proposed.

5.1 SITE CONDITIONS

In April and May 2012, GENIVAR conducted a geotechnical investigation at the existing lagoon and proposed expansion area in the Parish of St. Francois Xavier) during which a drill rig was used to drill a total of 13 testholes (TH1 to TH9, TH7A to TH7B, and TH 9A to TH 9B) between 4.6 m and 7.6 m depths below grade. The complete Geotechnical Report is included in Appendix B.

5.1.1 Local Topography

The proposed site is located in an area known as the Red River Plain of Central Lowland Area. The Red River Plain is a clay basin with local flood plains and river levees. Most of this central clay plain may be designated as flat with an evidence of low clay ridges that impart a very slightly undulating appearance to much of this area.

Surficial deposits are composed of mainly lacustrine clay and alluvial deposits which range from a few metres to 17 or more metres in thickness, thin veneers of glaciolacustrine clays and more rarely glaciofluvial sands. Much of the surficial deposits is underlain by dolomitic limestone, shale, gypsum or anhydrite of Jurassic or earlier period.

5.1.2 Soil Conditions

The general soil profile reveals a topsoil layer of about 150 mm to 250 mm followed by a thick clay layer, which extended to the bottom of the testholes at 7.6 m below grade. The thick clay layer was comprised of a grey-black clay followed by a brown, high plasticity clay below 1.1 m depth. The exception to this profile is at the additional testholes (TH 7, TH 7A, TH 7B, TH 8, TH 9, TH 9A, TH 9B) where significant fill, about 0.8 m to 2.7 m was encountered in the existing dykes.

No seepage and caving conditions were observed from the testholes.

A detailed description of the testholes, TH1 to TH9, TH7A to TH7B, and TH 9A to TH 9B, is presented in the attached logs in Appendix B, (Geotechnical Report).

5.1.3 Groundwater

Groundwater Pollution Hazard Maps indicate that the subject area is not in a groundwater pollution hazard area. Well logs from Manitoba Water Well Driller's Reports showed a number of entries near the expansion area as attached in Appendix B, (Geotechnical Report). The overburden comprised of clay and till ranged from a thickness of 11.6 m to 22.2 m usually followed by limestone. Based on the nearby well logs, the limestone aquifer has been noted in this section at about 11.6 m to 22.2 m below grade.

Based on the drainage map of the area, groundwater flow at the site is immediately towards the south and eventually heading to the east, to the Assiniboine River.

5.1.4 Site Investigation

As classified during our field investigation, the clay layer encountered at the site is high plasticity clay (both grey-black and brown) beneath the topsoil layer. Hydraulic conductivity of the in-situ clay at about 1.5 m was tested. The clay material of the upper 1.5 m depths is a CH material based on Atterberg limit tests. The estimated hydraulic conductivity of this material should range between 10^{-8} to 10^{-9} cm/sec. The hydraulic conductivity of the in-situ clay obtained at 1.5 m depth for TH2 was 7.3 $x10^{-9}$ cm/sec.

5.2 SUMMARY OF PROPOSED DEVELOPMENT

As identified previously, the existing St. Francois Xavier lagoon requires an expansion in order to provide adequate wastewater treatment and storage for the proposed loadings for a 20-year design period (2032).

The proposed expansion consists of the existing primary cell expansion and the construction of a new secondary cell, as illustrated in the design drawings (Appendix C). The expansion work is to be completed while the facility remains in operation.

In order to optimize the land available, which is more than that required for the 20-year design, the R.M. has decided to enlarge both the primary cell and new secondary cell now rather than undertake a small expansion in the future, which would not be that cost effective. The R.M. has also set aside as area to the east for future nutrient removal, which could accommodate a constructed wetland or other treatment component.

5.2.1 Remediated Primary Cell

The existing primary cell requires expansion to treat the projected 2032 wastewater flows. It is proposed to expand the existing primary cell to the southwest as illustrated in the design drawings (Appendix C). The expanded cell will provide a surface area of 2.56 ha and a treatment capacity of **143.3 kg-BOD_5/d**, which would exceed the requirements for the proposed 2032 organic loading with an extra capacity of 19.1 kg-BOD_5/d or 240 people. As typical, the normal operating depth will be 1.5 m with a minimum 1.0 m freeboard. Table 5.1 provides the details for the preliminary design specifications for the remediated primary cell.

TABLE 5.1: PRELIMINARY DESIGN SPECIFICATIONS FOR THE REMEDIATED PRIMARY CELL

Parameter	Primary Cell
Cell bottom	Irregular
Liquid surface (at 1.5 m depth)	Irregular
Top of dyke (inside to inside)	Irregular
Operating depth	1.5 m
Freeboard height	1.0 m
Interior side slope	4:1
Exterior side slope	4:1
Total volume (at 1.5 m depth)	33,740 m^3
Storage volume (at 1.5 m depth)	16,870 m^3
Influent loading (2032)	124.2 kg-BOD_5/d
BOD_5 design loading	56 kg-BOD_5/ha/d
Surface area (at 1.5 m depth)	2.56 ha
Liner system	Clay Core

5.2.2 New Secondary Cell

The secondary cell will be constructed as illustrated in the design drawings (Appendix C). The secondary cell is designed with a clay core having a permeability of $1x10^{-7}$ cm/s or less. The cell is designed to provide an influent wastewater storage of 227 days for the proposed 20-year design hydraulic loading but as additional land was available, the cell is designed with a storage capacity of approximately 28,895 m^3. The total storage capacity of the upgraded lagoon facility would be approximately **103,660 m^3**, which exceeds the requirements for the proposed 2032 hydraulic loading by approximately 16,880 m^3 or approximately 240 people.

The cell will be constructed with 4:1 interior side slopes and 4:1 exterior side slopes and will have a normal operating depth of 1.5 metres with a minimum 1.0 metre freeboard. Table 5.2 provides the details for the preliminary design specifications for the new secondary cell.

TABLE 5.3: PRELIMINARY DESIGN SPECIFICATIONS FOR THE NEW SECONDARY CELL

Parameter	New Secondary Cell
Cell bottom	Irregular
Liquid surface (at 1.5 m depth)	Irregular
Top of dyke (inside to inside)	Irregular
Operating depth	1.5 m
Freeboard height	1.0 m
Interior side slope	4:1
Exterior side slope	4:1
Total volume (at 1.5 m depth)	35,515 m^3
Dead storage volume (at 0.3 m depth)	6,620 m^3
Storage volume (at 1.5 m depth)	28,895 m^3
Liner system	Clay Core

5.2.3 Construction Details

According to the subsurface profiles in the 2012 Geotechnical Report, the depth of topsoil in the proposed area was approximately 150 mm - 250 mm. Organic soil from the lagoon area will be stockpiled and reapplied at the end of construction on the applicable disturbed areas and on the dykes as shown in the drawings.

Since the facility will remain in operation during construction, the wastewater flow into the primary cell could require interim diversion into another cell for the duration of the remediation work on the primary cell, or remediation could be done when the water level is lowered in the fall / late summer.

For lagoon construction, Manitoba Conservation's Environmental guidelines require that the proposed dykes and bottom of the proposed cells be provided with a layer consisting of at least one metre of soil having a permeability of less than $1x10^{-7}$ cm/s. The proposed pond site consists mainly of an area where such clay is present. The brown clay at 1.5 m depth was

tested and achieved a hydraulic conductivity test result of less than $1.0x10^{-7}$ cm/s, thus meeting the guidelines.

Based on our field investigation, well logs from Manitoba Water Well reports and laboratory analysis, the proposed pond liner (base and interior) for this site could be constructed with either a clay core within the proposed dykes or 1 m liner or a combination of a clay core with 1 m surface liner.

The clay core method is recommended considering the construction of the existing cells and soil conditions. It appears that the liner of the existing cell is at the centre of dyke where the clay fill is compacted and consists of a mixture of black and brown clay. *The clay fill on the east side of the dyke is composed of clay fill mix with silt lenses and traces of organics.* The clay core should involve excavating a trench approximately three metres wide around the perimeter of the bottom of the proposed pond and keying into the underlying impervious high plastic brown clay to an approximate depth between 1.1 m and 1.2 m below ground surface and into the existing cell liner. The trench will be backfilled with impervious clay in 150 mm lifts and compacted to 95% in at least eight passes with a sheepsfoot roller. The exterior half of the existing secondary cell #2 east perimeter dyke will be removed and backfilled with a compacted clay and keyed into the underlying high plasticity clay to provide with a liner with at least one metre of clay having a permeability of less than $1x10^{-7}$ cm/s.

The remediated primary cell will be constructed as detailed in the drawings. After construction, the interior and exterior side slopes of all dykes will be 4:1 and the expanded cell will have 1.5 metre operating depth with a minimum 1.0 metre freeboard.

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

permit vehicle access to all points of the lagoon. A clay core having a permeability of $1x10^{-7}$ cm/s or less will be installed into the new secondary cell. The clay core will be drilled in the presence of a Manitoba Conservation representative and the results of the laboratory testing will be reported to Manitoba Conservation.

A perimeter drainage ditch will be constructed around the expanded primary cell and the new secondary cell as indicated in the design drawings. New ditching will be constructed to a depth of 0.3 metres or less. The ditch will provide positive drainage and prevent any possibility of surface water ponding near the lagoon dykes. The new secondary cell will require a discharge swale and at the discharge point, rip rap is proposed to sufficiently protect against erosion. For disturbed areas where sediment or erosion control is necessary, areas will be seeded.

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

Signage identifying the nature of the facility will be placed accordingly around the lagoon perimeter fence.

6.0 ENVIRONMENTAL IMPACTS

6.1 ODOUR CONSIDERATIONS

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

The closest residence to the lagoon is located more than 1000 metres away, which meets the Manitoba Conservation minimum setback distance of 300 metres.

6.2 LAND IMPACT

The land intended for lagoon development is currently agricultural land. Natural native land and habitat is not being disturbed by the new lagoon construction.

6.3 SURFACE WATER

From the discharge point into a drainage ditch, the treated effluent will flow into an existing second order drain (Second Creek) that drains into the Assiniboine River. The distance of the route from the discharge point of the proposed lagoon to the Assiniboine River is approximately 9 kilometres. Perimeter ditching will be constructed to provide positive drainage for surface water around the lagoon.

The Community of St. Francois Xavier and the proposed lagoon facility are in the Sturgeon Creek and Adjacent Watershed (No. 26). Figure 3.1 illustrates this discharge route in the specified watershed.

The water licensing branch of Manitoba Water Stewardship was consulted to provide a list of water users along the drainage route up to the Assiniboine River. It was reported that there are no water users along the drainage route (Appendix D).

6.3.1 Fuel Storage on Site

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

6.4 GROUNDWATER

Ground Water Pollution Hazard Maps indicate that the subject area is not in a groundwater pollution hazard area. Well logs from Manitoba Water Well Driller's Reports showed a number of entries near the proposed expansion area as attached in the testhole logs, Geotechnical Report. The overburden comprised of clay and till ranged from a thickness of 11.6 m to 22.2 m usually followed by limestone. Based on the nearby well logs, the limestone aquifer has been noted in this section at about 10.7 m to 22.2 m below grade.

Based on the drainage map of the area, groundwater flow at the site is immediately towards the south and eventually heading to the east, Assiniboine River.

6.5 SPECIES IMPACT

A file search with the Biodiversity Conservation Wildlife and Ecosystem Protection Branch of Manitoba Conservation resulted in no historic occurrences found near the development site. Correspondence is included in Appendix D.

6.6 FISHERIES

The lagoon discharges into a drainage ditch, which runs into an existing second order drain (Second Creek) that converges with the Assiniboine River (Figure 3.1). According to Fisheries and Oceans Canada (DFO) the identified segment of the second order drain is classified as type B habitat (direct habitat, indicators present), but it becomes type A habitat (complex habitat, indicators present) starting from FXRL216 to the Assiniboine River. Correspondence is included in Appendix D.

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

6.6.1 Fisheries Act Information

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

6.7 FORESTRY

There is no known forestry activity in the area.

6.8 HERITAGE RESOURCES

In a letter dated May 23, 2012 from the Historic Resources Branch (Appendix D), it was stated that the potential to impact significant heritage resources is low, and therefore, the Historic Resources Brach has no concerns with the project.

6.9 SOCIO-ECONOMIC IMPACTS

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

6.10 PUBLIC INVOLVEMENT

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

7.0 MANAGEMENT PRACTICE

The new wastewater treatment facility is specifically designed to provide wastewater treatment and storage capacity for the existing infrastructure and proposed developments. The proposed R.M. of St. Francois Xavier lagoon is designed to treat wastewater up to an average loading of 142.3 kg-BOD_5/d and storage capacity of 103,485 m^3. The facility will normally discharge in spring soon after June 15th, and again in fall prior to October 31st. Treated effluent will be discharged from an isolated secondary cell. After the new development, the lagoon will consist of one primary and three secondary cells.

Manitoba Conservation generally requires treated effluent to have total suspended solids <25 mg/L, BOD_5 < 25 mg/L, fecal coliform MPN of <200 organisms/100 mL, total coliform MPN <1500 organisms/100 mL, and chlorine <0.02 mg/L. The proposed facility should not have difficulty meeting these requirements. Nutrient reduction will be addressed by trickle discharge initially and other methods will be reviewed for future requirements.

7.1 DISCHARGE PROCEDURE

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

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

3) If all parameters meet the discharge requirements, the secondary cell(s) may be discharged. If one or more parameters does not meet the requirements, re-testing will be required.

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

5) Once the secondary cell(s) are discharged, close the discharge valve(s), and reopen the valve(s) between the primary cell and the secondary cell(s). This will allow the water levels in the cells to equalize. In many cases a sufficient amount of treated effluent is

discharged from the secondary cell(s) using this procedure to permit operation until the next scheduled discharge period. However, it may be necessary to discharge additional treated effluent to have enough storage for the wastewater flows in the following operational season.

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

7.2 RECORD KEEPING AND INSPECTION ROUTINE

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

1) Daily Records – Water consumption records should be collected and retained for future estimation of flows to the wastewater treatment facility as there are no lift station pumping records that can be collected. Septic hauling records (dates and volumes) from the individual haulers trucking to the lagoon should also be collected and retained.
2) Weekly Records - The weekly summer inspection would consist of recording the following: the water level, presence of odours and their source, and presence of floating objects (removal). The summer maintenance should also include grass cutting on the dykes, if necessary, elimination of emergent vegetation, extermination of burrowing animals, repair of the dykes and rip rap if damaged by wind erosion and wave action, repair of the fence and gate.
3) Periodic Winter Inspection is confined to inspecting for frozen piping, checking if the water level in the cells is as it should be.
4) Discharge Records - The records should contain all treated effluent quality analyses, dates of discharge, discharge procedure followed, water levels and other pertinent data.

8.0 SCHEDULE

It is anticipated that the Environmental Act Licence process will be finalized by the summer / fall of 2013 and construction will begin in 2014.

9.0 FUNDING

The R.M. of St. Francois Xavier will pursue any and all applicable funding sources for this project.

Submitted by:
GENIVAR

Prepared by: Liliya Chunderova, C.E.T.
Environmental Process Designer

Reviewed by: Ross Webster, P.Eng.
Manager, Environmental Group

APPENDIX A

Certificate of Title

ew CT#: Winnipeg - 2517978 Status: Active

Instrument Type	TRANSFER OF LAND	Sale Date	Mar 18, 2011
Vendor	MCCAUGHAN FARMS LTD.	Consideration	$17,000
Consolidated?	Yes	Sworn Value	$17,000

\RURAL MUNICIPALITY OF ST FRANCOIS XAVIER\

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

SP LOTS 3, 5 AND 6 PLAN 43589 WLTO
IN OTM LOTS 183, 184 AND 185 PARISH OF ST FRANCOIS XAVIER

(+ 9.5 AC)
54.40AC

Address:
R.M. OF ST FRANCOIS XAVIER
1060 HIGHWAY 26
ST FRANCOIS XAVIER MB
R4L 1A5

From CT: Winnipeg - 2071261 PART
Winnipeg - 2071297 ALL

Roll entries for this instrument: 177 - RM OF ST. FRANCOIS X Roll: ~~145350~~ R
177 - RM OF ST. FRANCOIS X Roll: 145150 R

PIN: 004474168

APPENDIX B

Geotechnical Report

GEOTECHNICAL REPORT
PROPOSED ST. FRANCOIS XAVIER WWSP EXPANSION
ST.FRANCOIS XAVIER, MANITOBA

Prepared for:

RM of St. Francois Xavier
1060 Hwy. 26
St. Francois Xavier, MB.
R4L 1A5

Project No: 121-15696- 00 WE
August, 2012

GENIVAR

GENIVAR
10 PRAIRIE WAY
WINNIPEG, MB R2J 3J8

ENGINEERS, SCIENTISTS & PROJECT MANAGERS

TABLE OF CONTENTS

1.0 INTRODUCTION

The existing lagoon is located northeast of the community of St. Francois Xavier in outer two mile lots FXOT 183 & FXOT 184 in the Parish of St. Francois Xavier. The RM is proposing to construct an expansion to existing wastewater stabilization pond, southeast of existing lagoon. The proposal involves construction of a new secondary cell to match projected growth and organic capacity.

This report deals with the geotechnical investigation for the proposed construction of the new secondary cell of the wastewater stabilization (WWSP) storage treatment facility. A site plan of the existing lagoon as well as the proposed WWSP expansion and testhole locations are shown in Figure 1, C01, Appendix A.

This report is written with respect to the recent Environmental Act passed in 1988. Manitoba Conservation's Environmental guidelines now require that the dykes and the bottom of any lagoon be provided with a layer consisting of at least one metre of soil having a permeability of $1x10^{-7}$ cm/s or less or equivalence, i.e. the used of plastic liner.

2.0 BACKGROUND

RM of St. Francois Xavier is proposing to construct an expansion to existing wastewater storage pond comprised of one huge secondary cell located at the southeast of existing lagoon, FXOT 183 & FXOT 184 in the Parish of St. Francois Xavier .

3.0 TOPOGRAPHY

The proposed site is located in an area known as the Red River Plain of Central Lowland Area. The Red River Plain is a clay basin with local flood plains and river levees. Most of this central clay plain may be designated as flat with an evidence of low clay ridges that impart a very slightly undulating appearance to much of this area.

Surficial deposits are composed of mainly lacustrine clay and alluvial deposits which range from a few metres to 17 or more metres in thickness, thin veneers of glaciolacustrine clays and more rarely glaciofluvial sands. Much of the surficial deposits is underlain by dolomitic limestone, shale, gypsum or anhydrite of Jurassic or earlier period.

4.0 FIELD METHODOLOGY AND TESTING

The subsoils encountered were visually classified to the full extent in the testholes and representative soil samples were recovered at regular depth intervals and some samples were submitted for moisture content, particle size analysis and Atterberg limit tests. Pocket penetrometer tests were conducted on the cohesive soil to determine the approximate unconfined compressive strength and relative density respectively. In addition, two shelby tube soil samples were obtained and one tested for hydraulic conductivity. Any groundwater seepage and sloughing encountered in the testholes were noted.

The field investigation was undertaken on April 30 and May 17, 2012; the different drilling dates were due to a wet and soft surface condition on April 30, 2012 at the proposed expansion. A drill rig was used to drill a total of 13 testholes (TH1 to TH9, TH7A to TH7B, and TH9A to TH9B) between 4.6m and 7.6m depths below grade. The testhole locations are shown on the site plan in Appendix A. Detailed descriptions of the soil profiles in each testhole are shown on the attached logs, TH1 to TH9 which includes 7A to 7B and 9A to 9B in Appendix B. Laboratory test results for moisture contents, Atterberg limit, particle size analysis and hydraulic conductivity are attached in Appendix C. *The additional testholes, TH7A to TH7B, TH8 and TH9A to TH9B, were drilled to determine the actual liner of the existing cells.*

5.0 SUBSURFACE CONDITIONS

5.1 SOIL PROFILE/GROUNDWATER

The general soil profile reveals a topsoil layer of about 150mm to 250mm followed by a thick clay layer, which extended to the bottom of the testhole at 7.6m below grade. The

thick clay layer was comprised of grey-black clay followed by brown, high plasticity clay below 1.1m depth depth. The exception to this profile is at the additional testholes where significant fill about 0.8m to 2.7m were encountered.

No seepage and caving conditions were observed from the testholes.

Groundwater

Ground Water Pollution Hazard Maps indicate that the subject area is not in a groundwater pollution hazard area. Well logs from Manitoba Water Well Driller's Reports showed a number of entries near river lots 183 and 184 as attached in the testhole logs. The overburden comprised of clay and till ranged from a thickness of 11.6m to 22.2m usually followed by limestone. Based on the nearby well logs (attached), the limestone aquifer has been noted in this section at about 11.6m to 22.2m below grade.

A review of the Groundwater Pollution Hazard Map shows that the property is located outside a groundwater pollution hazard area.

Based on the drainage map of the area, groundwater flow at the site is immediately towards the south and eventually heading to the east, Assiniboine River.

5.2 LABORATORY TESTING

In the laboratory, selected samples as shown in Appendix C were submitted for moisture contents, Atterberg limit for classification and hydraulic conductivity. The test results are shown in Appendix C.

As classified during our field investigation, the clay layer encountered at the site is high plasticity clay (both grey-black and brown) beneath the topsoil layer. Since the proposed excavation is about 1.5m below grade (5 ft), hydraulic conductivity of the in-situ clay at about 1.5m was tested.

The clay material of the upper 1.5m depths is a CH material based on Atterberg limit tests. The estimated hydraulic conductivity of this material should range between 10^{-8} to 10^{-9} cm/sec.

The hydraulic conductivity of the in-situ clay obtained at 1.5m depth for TH2 was 7.3×10^{-9} cm/sec.

6.0 DESIGN CONSIDERATIONS

For detailed comparisons, the proposed WWSP will be designed in accordance with the Province of Manitoba Design Objectives for Standard Sewage Lagoons (1985).

The proposed cells will contain a liquid depth of 1.5m and 1m freeboard to minimize the effects of wave action and provide stability. The inside and outside side slopes of the dykes will be 4:1. The top of the dykes will be designed to be 3m wide to permit vehicles to be driven on the dyke crest. *Depth more than 2.5m (vertical height from top of dyke to bottom of lagoon) should not be attempted without further analysis (slope or settlement).*

For lagoon construction, Manitoba Conservation's Environmental guidelines require that the proposed dykes and bottom of the proposed cells be provided with a layer consisting of at least one metre of soil having a permeability of less than 1×10^{-7} cm/s. The proposed pond site consists mainly of an area where such clay is present.

The selected area, fortunately, consists mainly of upper CH clay, which may meet the specified hydraulic conductivity of 1x10-7 cm/s. Beneath the proposed excavation (1.5m) and where fractured clay is not encountered, the brown clay at this depth achieved a hydraulic conductivity test result of less than 1.0×10^{-7} cm/s, thus meeting the guidelines.

Based on our field investigation, well logs from Manitoba Water Well reports and laboratory analysis, the proposed pond liner (base and interior) for this site should be constructed with a either clay core or 1m liner within the proposed dykes or a combination of a clay core with 1m surface liner.

The clay core method is appropriate in connecting the existing cell with the proposed expansion. It appears that the liner of existing cell is at the centre of dyke where the clay fill is compacted and a mixture of black and brown clay. *The clay fill to the east of the dyke is composed of clay fill mix with silt lenses and traces of organics.* The clay core would involve excavating a trench approximately two metres wide (minimum) around the inside perimeter of the bottom of the proposed pond and keying into the underlying impervious high plastic brown clay to an approximate depth between 1.1m and 1.2m below ground surface. The trench will be backfilled with impervious clay in 150mm lifts compacted to at least eight passes with a sheepsfoot roller. *A combination of clay core would involve the clay core at the connection and 1m liner at the proposed expansion.*

During construction of the proposed cells, the following steps should be followed.

1. The entire area for the proposed pond should be stripped of vegetation, topsoil and organic material; the depth of stripping is approximately 150mm to 250mm. The stripped materials should be stockpiled and reused later for the outer slopes and top of the dykes.

2. Layout the proposed pond to the dimensions indicated in the design drawings.

3. For the proposed bottom and interior dykes, the liner and the key should be compacted to 95% standard Proctor density at ±2 to 3% of optimum moisture content with a sheepsfoot roller. *Any unsuitable material such as sand or high percentage silt materials should be removed and replaced with the recommended liner and compacted to 95% standard Proctor density.* Ensure that the liner(either a clay core or 1m clay liner) consists of at least one metre width of impervious clay compacted to at least a minimum of 95% standard Proctor maximum density in 150mm to 200mm lifts. A shrinkage factor of about 25% should be used in calculating volumes of material to be used.

4. The unsuitable material can be used as backfill on the outside face of the dykes. The embankment material should be placed in 150mm lifts compacted with at least eight passes with a sheepsfoot roller having a foot pressure of no less than 700 kPa.

Further erosion control against wind and rain action using riprap placement on the dykes should be provided, if needed, after construction. A well-developed and maintained grass cover below the riprap should add integrity to the dykes.

The entire completed pond system should be fenced to keep people, children in particular away from the pond. All gates should be locked to prevent access.

Appropriate warning signs should be provided on the fence around the pond, to designate the nature of the facility, and advice against trespassing.

We recommend that a minimum distance of 5 meters be maintained between the outside toe of the embankment and the fence.

7.0 ADDITIONAL CONSIDERATIONS

On the basis of the soil conditions encountered during drilling (i.e. mainly a grey-black or brown clay subgrade), the recommended road pavement construction at this site should be as follows:

Pavement Thicknesses

	Truck Route	% Compaction
Base Coarse	150 mm	100% Std Proctor
Subbase	225 mm	100% Std Proctor

The above pavement sections should be constructed on a prepared stiff clay subgrade, which should be free of any fibrous organics, softened and disturbed soils. The average

depth of site stripping is about 150mm to 250mm below ground surface. The prepared subgrade should be proof rolled with a heavy sheepsfoot roller (min. 20 passes) which translates to at least 95% Std Proctor and inspected by a qualified geotechnical engineer prior to the placement of the overlying granular fill.

The granular base course and subbase materials should include organic-free, non-frozen, aggregate conforming to the Manitoba Highway gradation limits as shown in Appendix D.

Where soft spots are encountered at the subgrade level, construction traffic should be restricted. Soft spots should be excavated with a large backhoe fitted with a smooth bucket, to at least 300mm below the underside of the subbase and replaced with a 300mm thick layer of 100mm down crushed aggregate/limestone. In this regard, the total granular fill thickness would be 675mm for truck access.

Sieve analysis and compaction testing of the granular base and subbase materials should be conducted by qualified geotechnical personnel to ensure that the materials supplied and percent compactions are in accordance with design specifications.

8.0 STANDARD LIMITATIONS

The factual data, interpretations and recommendations contained in this report pertain to the specific project as described in this report and are not applicable to any other project, site location or party. The comments given in this report are intended only for the guidance of the design engineer. Contractors bidding on, or undertaking the work, should rely on their own investigations, as well as their own interpretations of the factual test data, as to how subsurface conditions may affect their work.

Soil descriptions in this report are based on commonly accepted methods of classification and identification employed in professional geotechnical practice. Classification and identification of soil involves judgement and GENIVAR does not guarantee descriptions as exact, but infers accuracy only to the extent that is common in current geotechnical practice.

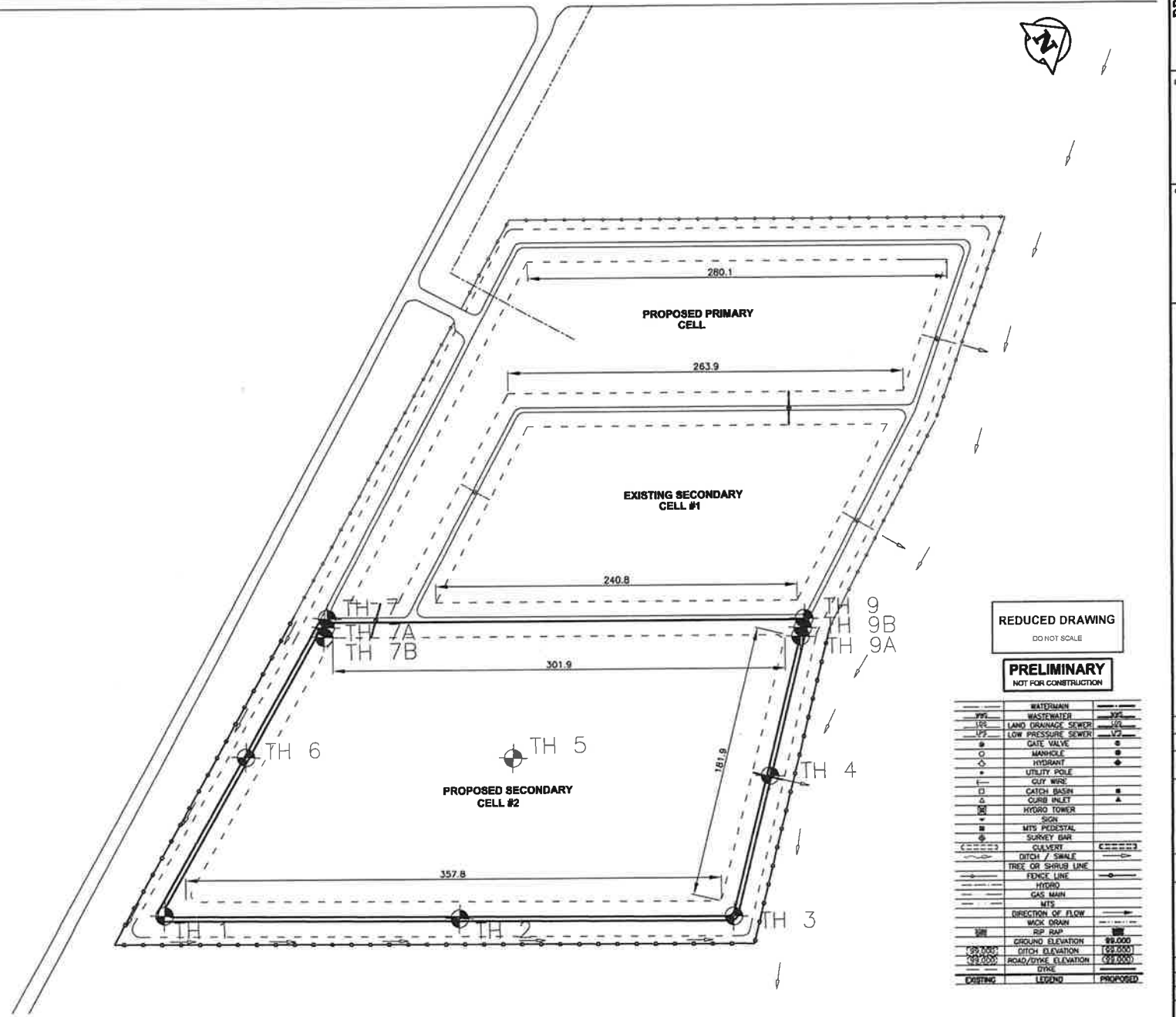
Soil formations are variable to a greater or lesser extent. The testhole logs indicate the approximate subsurface conditions only at the locations of the testhole. Boundaries between zones on the logs are often not distinct, but rather transitional, and have been interpreted. Subsurface conditions between test holes are inferred and may vary significantly from conditions encountered at the testhole.

Where conditions encountered at the site differ significantly from those anticipated in the report, either due to natural variability of subsurface conditions or construction activities, it is a condition of the use, or reliance by the client, of this report that GENIVAR is notified of the changes and provided with an opportunity to review the recommendations of this report.

Prepared by: S.S. Urbano Jr., P. Eng.
Reviewed by: Ross Webster, P.Eng.

APPENDIX A

SITE PLAN



REDUCED DRAWING
DO NOT SCALE

PRELIMINARY
NOT FOR CONSTRUCTION

EXISTING	LEGEND	PROPOSED
	WATERMAIN	
WW	WASTEWATER	WW
LD2	LAND DRAINAGE SEWER	LD2
LP2	LOW PRESSURE SEWER	LP2
	GATE VALVE	
	MANHOLE	
	HYDRANT	
	UTILITY POLE	
	GUY WIRE	
	CATCH BASIN	
	CURB INLET	
	HYDRO TOWER	
	SIGN	
	MTS PEDESTAL	
	SURVEY BAR	
	CULVERT	
	DITCH / SWALE	
	TREE OR SHRUB LINE	
	FENCE LINE	
	HYDRO	
	GAS MAIN	
	MTS	
	DIRECTION OF FLOW	
	WICK DRAIN	
	RIP RAP	
99.000	GROUND ELEVATION	99.000
(99.000)	DITCH ELEVATION	(99.000)
(99.000)	ROAD/DYKE ELEVATION	(99.000)
	DYKE	

GENIVAR
10 PRAIRIE WAY
WINNIPEG, MB R2J 3J8
Tel: (204)477-6650
Fax: (204)474-2864

Seals

Consultants

ISS.	REV.	DATE (YY/MM/DD)	APP.	DESCRIPTION
1	0	10/06/24	KWW	TENDER SUBMISSION

R.M. OF FRANCOIS XAVIER WASTEWATER STABILIZATION POND

FRANCOIS XAVIER MANITOBA

CIVIL

SITE PLAN

THe LOCATION

DESIGNED	LVC	APPROVED	BBU
DRAWN	LVC	SCALE	1:1000
CHECKED	BBU	DATE (YY/MM/DD)	12/07/13

PROJECT NO. 121-15696-00 | DRAWING NO. C01 | REV 0

ACAD No. 07065C02

APPENDIX B

TESTHOLE LOGS and WELL LOGS

GENIVAR

Project No: 121-15696-00

TH1

Project: RM of Francois Xavier WWSP Expansion

Client: RM of Francois Xavier

Enclosure:

Location: St Francis Xavier, MB.

Engineer: SSU

SUBSURFACE PROFILE

Depth (ft / m)	Symbol	Description	Elevation, m	Number	Blows/0.3m	Pocket Penetrometer Test kPa	Water Content %
0 / 0		Ground Surface	100				
		TOPSOIL 200mm thick, sandy, black, trace of rootlets	99.9			150	
		CLAY stiff, grey-black, fissured, high plasticity; brown at 1.1m; trace of till inclusions below 1.5m				150	
						100	
			95.5			75	

Pocket Penetrometer Test kPa: 50 150 250 350

Water Content %: Wp |------0------| Wl; 20 40 60 80

Drill Method: S/S Auger

Drill Date: 05/17/12

Hole Size: 125 mm

GENIVAR
#10 Prairie Way
Winnipeg, Mb.
R2J 3J8

Datum: Road Elevation(100.0m)

Checked by: SSU

Sheet: 1 of 1

GENIVAR

Project No: 121-15696-00

TH2

Project: RM of Francois Xavier WWSP Expansion

Client: RM of Francois Xavier

Enclosure:

Location: St Francis Xavier, MB.

Engineer: SSU

SUBSURFACE PROFILE

Depth (ft / m)	Symbol	Description	Elevation, m	Number	Blows/0.3m	Pocket Penetrometer Test kPa	Water Content %
0 / 0		Ground Surface	100				
		TOPSOIL 250mm thick, sandy, black, trace of rootlets	99.8			150	
		CLAY stiff, grey-black, fissured, high plasticity; brown at 1.1m; trace of till inclusions below 1.5m				150	
						100	
			95.5			75	

Pocket Penetrometer Test kPa: 50 150 250 350

Water Content %: Wp 20 40 0 60 80 Wl

Drill Method: S/S Auger

Drill Date: 05/17/12

Hole Size: 125 mm

GENIVAR
#10 Prairie Way
Winnipeg, Mb.
R2J 3J8

Datum: Road Elevation(100.0m)

Checked by: SSU

Sheet: 1 of 1

GENIVAR

Project No: 121-15696-00 **TH3**

Project: RM of Francois Xavier WWSP Expansion

Client: RM of Francois Xavier **Enclosure:**

Location: St Francis Xavier, MB. **Engineer:** SSU

SUBSURFACE PROFILE

Depth (ft / m)	Symbol	Description	Elevation, m	Number	Blows/0.3m	Pocket Penetrometer Test kPa	Water Content %
0 / 0		Ground Surface	100				
		TOPSOIL 200mm thick, sandy, black, trace of rootlets	99.9			150	
1							
2							
3 / 1							
4							
5						150	
6							
2							
7		***CLAY*** stiff, grey-black, fissured, high plasticity; brown at 1.2m					
8							
9							
10 / 3						100	
11							
12							
13 / 4							
14							
15			95.5			90	

Pocket Penetrometer Test kPa: 50 150 250 350

Water Content %: Wp 20 40 — 0 — 60 80 Wl

Drill Method: S/S Auger

Drill Date: 05/17/12

Hole Size: 125 mm

GENIVAR
#10 Prairie Way
Winnipeg, Mb.
R2J 3J8

Datum: Road Elevation(100.0m)

Checked by: SSU

Sheet: 1 of 1

GENIVAR

Project No: 121-15696-00

TH4

Project: RM of Francois Xavier WWSP Expansion

Client: RM of Francois Xavier

Enclosure:

Location: St Francis Xavier, MB.

Engineer: SSU

SUBSURFACE PROFILE

Depth (ft / m)	Symbol	Description	Elevation, m	Number	Blows/0.3m	Pocket Penetrometer Test kPa	Water Content %
0 / 0		Ground Surface	100				
		TOPSOIL 175mm thick, sandy, black, trace of rootlets	99.9			175	
		CLAY stiff, grey-black, fractured, high plasticity; brown at 1.1m, fissured; trace of till inclusions below 2.4m				150	
						100	
			95.5			80	

Pocket Penetrometer Test kPa: 50 150 250 350

Water Content %: Wp 0 Wl; 20 40 60 80

Drill Method: S/S Auger

Drill Date: 05/17/12

Hole Size: 125 mm

GENIVAR
#10 Prairie Way
Winnipeg, Mb.
R2J 3J8

Datum: Road Elevation(100.0m)

Checked by: SSU

Sheet: 1 of 1

GENIVAR

Project No: 121-15696-00

TH5

Project: RM of Francois Xavier WWSP Expansion

Client: RM of Francois Xavier

Enclosure:

Location: St Francis Xavier, MB.

Engineer: SSU

SUBSURFACE PROFILE

Depth (ft / m)	Symbol	Description	Elevation, m	Field Vane(m-kg)	Blows/0.3m	Pocket Penetrometer Test kPa (50 150 250 350)	Water Content % (Wp ----0---- Wl; 20 40 60 80)
0 / 0		Ground Surface	100				
		TOPSOIL 150mm thick, sandy, black, trace of rootlets					
		CLAY stiff, grey-black, fissured, high plasticity; brown at 1.2m; trace of till inclusions below 3m				175; 150; 100; 80; 80; 50	
			92.5				
		End of Testhole					

Drill Method: S/S Auger

Drill Date: 05/17/12

Hole Size: 125 mm

GENIVAR
#10 Prairie Way
Winnipeg, Mb.
R2J 3J8

Datum: Road Elevation(100.0m)

Checked by: SSU

Sheet: 1 of 1

GENIVAR

Project No: 121-15696-00

TH6

Project: RM of Francois Xavier WWSP Expansion

Client: RM of Francois Xavier

Enclosure:

Location: St Francis Xavier, MB.

Engineer: SSU

SUBSURFACE PROFILE

Depth (ft / m)	Symbol	Description	Elevation, m	Number	Blows/0.3m	Pocket Penetrometer Test kPa	Water Content %
0 / 0		Ground Surface	100				
		TOPSOIL 200mm thick, sandy, black, trace of rootlets	99.9			150	
		CLAY stiff, grey-black, fissured, high plasticity; brown at 1.1m; trace of till inclusions below 1.5m				150	
						100	
			95.5			75	

Pocket Penetrometer Test kPa: 50 150 250 350

Water Content %: Wp |------0------| Wl; 20 40 60 80

Drill Method: S/S Auger

Drill Date: 05/17/12

Hole Size: 125 mm

GENIVAR
#10 Prairie Way
Winnipeg, Mb.
R2J 3J8

Datum: Road Elevation(100.0m)

Checked by: SSU

Sheet: 1 of 1

GENIVAR

Project No: 121-15696-00

TH7

Project: RM of Francois Xavier WWSP Expansion

Client: RM of Francois Xavier

Enclosure:

Location: St Francis Xavier, MB.

Engineer: SSU

SUBSURFACE PROFILE

Depth (ft / m)	Symbol	Description	Elevation, m	Number	Blows/0.3m	Pocket Penetrometer Test kPa (50 150 250 350)	Water Content % (Wp |-------0------| Wl; 20 40 60 80)
0 / 0		Ground Surface	100				
		FILL clay material, mixed, brown and black, compacted, high plasticity	97.4				
		CLAY stiff, brown, fissured, high plasticity	95.5				

Drill Method: S/S Auger

Drill Date: 04/30/12

Hole Size: 125 mm

GENIVAR
#10 Prairie Way
Winnipeg, Mb.
R2J 3J8

Datum: (Top of Existing Dyke)

Checked by: SSU

Sheet: 1 of 1

GENIVAR

Project No: 121-15696-00

TH7A

Project: RM of Francois Xavier WWSP Expansion

Client: RM of Francois Xavier

Enclosure:

Location: St Francis Xavier, MB.

Engineer: SSU

SUBSURFACE PROFILE

Depth (ft / m)	Symbol	Description	Elevation, m	Number	Blows/0.3m	Pocket Penetrometer Test kPa (50 150 250 350)	Water Content % (Wp 20 40 60 80 Wl)
0 / 0		Ground Surface	100				
		FILL clay material, mixed, brown and black; trace of SILT LENSES at 0.9 to 1.2m below grade					
			97.7				
		CLAY stiff, brown, fissured, high plasticity					
			95.5				
15 / 4							

Drill Method: S/S Auger

Drill Date: 04/30/12

Hole Size: 125 mm

GENIVAR
#10 Prairie Way
Winnipeg, Mb.
R2J 3J8

Datum: 13m E of TH7

Checked by: SSU

Sheet: 1 of 1

GENIVAR

Project No: 121-15696-00

TH7B

Project: RM of Francois Xavier WWSP Expansion

Client: RM of Francois Xavier

Enclosure:

Location: St Francis Xavier, MB.

Engineer: SSU

SUBSURFACE PROFILE

Depth (ft / m)	Symbol	Description	Elevation, m	Number	Blows/0.3m	Pocket Penetrometer Test kPa (50 150 250 350)	Water Content % (Wp 20 40 0 60 80 Wl)
0 / 0		Ground Surface	100				
0 – 2 / 0		***FILL*** clay material, mixed, brown and black, high plasticity	99.3				
3 – 15 / 1 – 4		***CLAY*** stiff, brown, fissured, high plasticity	95.5				

Drill Method: S/S Auger

Drill Date: 04/30/12

Hole Size: 125 mm

GENIVAR
#10 Prairie Way
Winnipeg, Mb.
R2J 3J8

Datum: 22m E of TH7

Checked by: SSU

Sheet: 1 of 1

GENIVAR

Project No: 121-15696-00

TH8

Project: RM of Francois Xavier WWSP Expansion

Client: RM of Francois Xavier

Enclosure:

Location: St Francis Xavier, MB.

Engineer: SSU

SUBSURFACE PROFILE

Depth (ft / m)	Symbol	Description	Elevation, m	Number	Blows/0.3m	Pocket Penetrometer Test kPa (50 150 250 350)	Water Content % (Wp 20 40 60 80 Wl)
0 / 0		Ground Surface	100				
		FILL clay material, mixed, brown and black, high plasticity	97.7				
		CLAY stiff, brown, fissured, high plasticity	95.5				
15 / 4							

Drill Method: S/S Auger

Drill Date: 04/30/12

Hole Size: 125 mm

GENIVAR
#10 Prairie Way
Winnipeg, Mb.
R2J 3J8

Datum: Top of Dyke

Checked by: SSU

Sheet: 1 of 1

GENIVAR

Project No: 121-15696-00

TH9

Project: RM of Francois Xavier WWSP Expansion

Client: RM of Francois Xavier

Enclosure:

Location: St Francis Xavier, MB.

Engineer: SSU

SUBSURFACE PROFILE

Depth (ft / m)	Symbol	Description	Elevation, m	Number	Blows/0.3m	Pocket Penetrometer Test kPa (50 150 250 350)	Water Content % (Wp |-----0-----| Wl; 20 40 60 80)
0 / 0		Ground Surface	100				
		FILL clay material, mixed, brown and black, high plasticity					
			97.4				
		CLAY stiff, brown, fissured, high plasticity					
			95.5				
15 / 4							

Drill Method: S/S Auger

Drill Date: 04/30/12

Hole Size: 125 mm

GENIVAR
#10 Prairie Way
Winnipeg, Mb.
R2J 3J8

Datum: Top of Dyke

Checked by: SSU

Sheet: 1 of 1

GENIVAR

Project No: 121-15696-00

TH9A

Project: RM of Francois Xavier WWSP Expansion

Client: RM of Francois Xavier

Enclosure:

Location: St Francis Xavier, MB.

Engineer: SSU

SUBSURFACE PROFILE

Depth (ft / m)	Symbol	Description	Elevation, m	Number	Blows/0.3m	Pocket Penetrometer Test kPa (50 150 250 350)	Water Content % (Wp |----0----| Wl; 20 40 60 80)
0 / 0		Ground Surface	100				
		FILL clay material, mixed, grey-black, TRACE OF ROOTS down to 1.5m, sandy	97.8				
		CLAY stiff, brown, fissured, high plasticity	95.5				

Drill Method: S/S Auger

Drill Date: 04/30/12

Hole Size: 125 mm

GENIVAR
#10 Prairie Way
Winnipeg, Mb.
R2J 3J8

Datum: 25m E of TH9

Checked by: SSU

Sheet: 1 of 1

GENIVAR

Project No: 121-15696-00

TH9B

Project: RM of Francois Xavier WWSP Expansion

Client: RM of Francois Xavier

Enclosure:

Location: St Francis Xavier, MB.

Engineer: SSU

SUBSURFACE PROFILE

Depth (ft / m)	Symbol	Description	Elevation, m	Number	Blows/0.3m	Pocket Penetrometer Test kPa (50 150 250 350)	Water Content % (Wp |-----0-----| Wl; 20 40 60 80)
0 / 0		Ground Surface	100				
		FILL clay material, mixed, grey-black, high plasticity					
			97.5				
		CLAY stiff, brown, fissured, high plasticity					
			95.5				

Drill Method: S/S Auger

Drill Date: 04/30/12

Hole Size: 125 mm

GENIVAR
#10 Prairie Way
Winnipeg, Mb.
R2J 3J8

Datum: 12m E of TH9

Checked by: SSU

Sheet: 1 of 1

LOCATION: RIVER LOT 183 IN PARISH OF St. Fr-Xavier

Owner: ST FRANCIS XAVIER
Driller: PRUDEN DRILLING CO. LTD.
Well Name: COMMUNITY CLUB
Well Use: PRODUCTION
Water Use: Domestic
Date Completed: 1984 Dec 14

WELL LOG

From (ft.)	To (ft.)	Log
0	24.0	CLAY
24.0	35.0	TILL; SANDY
35.0	40.0	ROTTEN LIMESTONE
40.0	79.9	LIMESTONE; MEDIUM HARD

WELL CONSTRUCTION

From (ft.)	To (ft.)	Casing Type	Inside Dia.(in)	Outside Dia.(in)	Slot Size(in)	Type Material
0	42.0	casing	4.00			INSERT GALVANIZED
42.0	79.9	open hole	3.80			

Top of Casing: 2.0 ft. below ground

PUMPING TEST

Date: 1984 Dec 14
Pumping Rate: 15.0 Imp. gallons/minute
Water level before pumping: ft. below ground
Pumping level at end of test: 10.0 ft. below ground
Test duration: 1 hours, 30 minutes
Water temperature: ?? degrees F

LOCATION: RIVER LOT 183 IN PARISH OF St. Fr-Xavier

Owner: ST FRANCOIS SCHOOL
Driller: Friesen Drillers Ltd.
Well Name: RETURN
Well Use: RECHARGE
Water Use: Air Conditioning
Date Completed: 1992 Feb 05

WELL LOG

From (ft.)	To (ft.)	Log
0	30.0	CLAY
30.0	73.0	GREY TILL WITH BOULDERS
73.0	186.9	LIMESTONE

WELL CONSTRUCTION

From (ft.)	To (ft.)	Casing Type	Inside Dia.(in)	Outside Dia.(in)	Slot Size(in)	Type	Material
0	83.9	casing	6.00			INSERT	PVC
83.9	186.9	open hole	5.80				
20.0	79.9	casing grout					CEMENT

Top of Casing: 1.5 ft. below ground

PUMPING TEST

Date: 1992 Feb 05
Pumping Rate: 100.0 Imp. gallons/minute
Water level before pumping: 11.0 ft. below ground
Pumping level at end of test: 16.0 ft. below ground
Test duration: 2 hours, minutes
Water temperature: ?? degrees F

REMARKS

ST FRANCOIS XAVIER SCHOOL, 991- PTH #26, SW CORNER OF ADDITION TO SCHOOL

LOCATION: RIVER LOT 183 IN PARISH OF St. Fr-Xavier

Owner: WRB
Driller: International Water Supply
Well Name: SF #1
Well Use: TEST WELL
Water Use:
Date Completed: 1973 Nov 12

WELL LOG

From (ft.)	To (ft.)	Log
0	18.0	GREY BROWN CLAY
18.0	31.0	GREY CLAY
31.0	73.0	LIGHT GREY TILL,SANDY,L.S.BOULDERS
73.0	80.9	WHITE LIMESTONE
80.9	106.9	GREY LIMESTONE
106.9	108.9	ORANGE RED LIMESTONE
108.9	118.9	WHITE LIMESTONE;WATER SALTY

WELL CONSTRUCTION

From (ft.)	To (ft.)	Casing Type	Inside Dia.(in)	Outside Dia.(in)	Slot Size(in)	Type	Material
0	104.9	casing	2.00				
104.9	114.9	perforations	2.00			SL. PIPE	

Top of Casing: ft. below ground

PUMPING TEST

Date:

Flowing Rate: 20.0 Imp. gallons/minute
Water level before pumping: ft. below ground
Pumping level at end of test: 6.0 ft. below ground
Test duration: 1 hours, minutes
Water temperature: ?? degrees F

REMARKS

ST. FRANCOIS XAVIER TOWN INVESTIGATION, .2 MI N HWY 26, CHEMICAL ANALYSIS

LOCATION: RIVER LOT 183 IN PARISH OF St. Fr-Xavier

Owner: WRB
Driller: International Water Supply
Well Name: SF #3
Well Use: TEST WELL
Water Use:
Date Completed: 1973 Nov 15

WELL LOG

From (ft.)	To (ft.)	Log
0	4.0	BROWN,SILTY CLAY
4.0	16.0	FINE BROWN SAND
16.0	24.0	BROWN GREY CLAY
24.0	28.0	LIGHT BROWN GREY TILL
28.0	38.0	LIGHT GREY TILL,GRAVELLY SECTIONS
38.0	61.0	WHITE LIMESTONE
61.0	62.0	RED,ORGANIC SHALE
62.0	77.9	SOFT,WHITE LIMESTONE
77.9	114.9	SANDY WHITE& GREY LIMESTONE
114.9	117.9	RED BROWN LIMESTONE,WATER SLIGHTLY SALTY

WELL CONSTRUCTION

From (ft.)	To (ft.)	Casing Type	Inside Dia.(in)	Outside Dia.(in)	Slot Size(in)	Type Material
0	101.9	casing	2.00			
101.9	111.9	perforations				SL. PIPE

Top of Casing: ft. below ground

PUMPING TEST

Date:
Flowing Rate: 5.0 Imp. gallons/minute
Water level before pumping: ft. below ground
Pumping level at end of test: 13.0 ft. below ground
Test duration: 1 hours, 30 minutes
Water temperature: ?? degrees F

REMARKS

ST. FRANCOIS XAVIER TOWN INVESTIGATION, 2.2 MI N HWY 26, NEAR GRAVEL PIT, CHEMICAL ANALYSIS

LOCATION: RIVER LOT 183 IN PARISH OF St. Fr-Xavier

Owner: WRB
Driller: International Water Supply
Well Name: SF #7
Well Use: TEST WELL
Water Use:
Date Completed: 1973 Nov 28

WELL LOG

From (ft.)	To (ft.)	Log
0	16.0	GREY BROWN CLAY
16.0	56.0	SANDY BROWN TILL
56.0	61.0	SANDY GREY TILL
61.0	104.9	WHITE LIMESTONE,SANDY
104.9	108.9	RED LIMESTONE
108.9	115.9	WHITE GREY LIMESTONE
115.9	126.9	ORANGE-RED LIMESTONE WITH RED SHALE
126.9	139.9	WHITE GREY LIMESTONE SALTY WATER

WELL CONSTRUCTION

From (ft.)	To (ft.)	Casing Type	Inside Dia.(in)	Outside Dia.(in)	Slot Size(in)	Type Material
0	126.9	casing	2.00			
126.9	135.9	perforations	2.00			SL. PIPE

Top of Casing: ft. below ground

PUMPING TEST

Date:
Pumping Rate: 40.0 Imp. gallons/minute
Water level before pumping: 8.0 ft. below ground
Pumping level at end of test: ?? ft. below ground
Test duration: 1 hours, 6 minutes
Water temperature: ?? degrees F

REMARKS

ST. FRANCOIS XAVIER TOWN INVESTIGATION, 1 MI N HWY 26, CHEMICAL ANALYSIS EC=5500 MM, H=40 GPG, FE=1.5 PPM, NACL=2250 PPM

LOCATION: RIVER LOT 183 IN PARISH OF St. Fr-Xavier

Owner: ST FRANCOIS SCHOOL
Driller: Friesen Drillers Ltd.
Well Name: SUPPLY
Well Use: PRODUCTION
Water Use: Air Conditioning
Date Completed: 1992 Feb 04

WELL LOG

From (ft.)	To (ft.)	Log
0	30.0	CLAY
30.0	62.0	GREY TILL
62.0	159.9	LIMESTONE

WELL CONSTRUCTION

From (ft.)	To (ft.)	Casing Type	Inside Dia.(in)	Outside Dia.(in)	Slot Size(in)	Type	Material
0	72.0	casing	6.00			INSERT	PVC
72.0	159.9	open hole	5.80				

Top of Casing: 1.0 ft. below ground

PUMPING TEST

Date: 1992 Feb 04
Pumping Rate: 100.0 Imp. gallons/minute
Water level before pumping: 9.0 ft. below ground
Pumping level at end of test: 41.0 ft. below ground
Test duration: 2 hours, minutes
Water temperature: ?? degrees F

REMARKS

ST FRANCOIS XAVIER SCHOOL, 991- PTH #26, 65 FT N OF ADDITION TO SCHOOL

LOCATION: RIVER LOT 186 IN PARISH OF St. Fr-Xavier

Owner: WRB
Driller: International Water Supply
Well Name: SF #2
Well Use: TEST WELL
Water Use:
Date Completed: 1973 Nov 14

WELL LOG

From (ft.)	To (ft.)	Log
0	11.0	BROWN& GREY SILTY CLAY
11.0	16.0	SILT,SOME VERY FINE SAND
16.0	20.0	FINE GRAINED SAND
20.0	24.0	FINE TO MED GRAINED SAND CLEAN,SOME SHELL FRAGMENTS
24.0	30.0	SOFT GREY CLAY
30.0	39.0	SOFT TILL SOME STONES BOULDER OR BEDROCK AT 39 FEET, WATER SALTY

WELL CONSTRUCTION

From (ft.)	To (ft.)	Casing Type	Inside Dia.(in)	Outside Dia.(in)	Slot Size(in)	Type	Material

APPENDIX C

LABORATORY TEST RESULTS

TBT ENGINEERING
CONSULTING GROUP

TBT Engineering Limited
LABORATORY
110 Paramount Road, Wpg., MB R2X 2W3
PH: 204 633-6008 Fax: 204 633-6620

Natural Moisture Content Determination

Client: GENIVAR
Project: St Francis Lagoon

Report To: Silvestre Urbano, P. Eng.

TBTE Project No.: W12-705 I
Lab Sample No's: 8226 - 8235 & 8281
Reported By: CL
Report Date: 11-Jun-12
Reviewed By: PB

Lab No.:	8226	8227	8228	8229	8230	8231
Borehole No:	TH2	TH2	TH2	TH2	TH5	TH5
Sample ID:						
Depth, (ft):	2.5	5	10	15	2.5	5
% Moisture	37.0	43.0	43.9	37.8	38.4	37.2
Remarks:						

Lab No.:	8232	8233	8234	8235	8281
Borehole No:	TH5	TH5	TH5	TH5	TH2
Sample ID:					
Depth, (ft):	10	15	20	25	5 - 7.5
% Moisture	47.6	45.4	44.3	51.0	40.4
Remarks:					Shelby Tube

Lab No.:	
Borehole No:	
Sample ID:	
Depth, (ft):	
% Moisture	
Remarks:	

Test Procedure: ASTM D 2216

Remarks:

TBT ENGINEERING
CONSULTING GROUP

TBT Engineering Limited
LABORATORY
110 Paramount Road, Wpg., MB R2X 2W3
PH: 204 633-6008 Fax: 204 633-6620

Natural Moisture Content Determination

Client: GENIVAR
Project: St Francis Xavier Lagoon
Report To: Silvestre Urbano, P. Eng.

TBTE Project No.: W12-705 I
Lab Sample No's: 8207 - 8212
Reported By: CL
Report Date: 04-Jun-12
Reviewed By: CL P. Beaul

Lab No.:	8207	8208	8209	8210	8211	8212
Borehole No	TH7	TH7	TH7	TH9	TH9	TH9
Sample ID:						
Depth, (ft):	5	10	15	2.5-5	10	15
% Moisture	31.5	34.2	48.4	33.9	35.5	45.7
Remarks:						

Lab No.:	
Borehole No.	
Sample ID:	
Depth, (ft):	
% Moisture	
Remarks:	

Lab No.:	
Borehole No.	
Sample ID:	
Depth, (ft):	
% Moisture	
Remarks:	

Test Procedure: ASTM D 2216

Remarks:

TBT ENGINEERING
CONSULTING GROUP

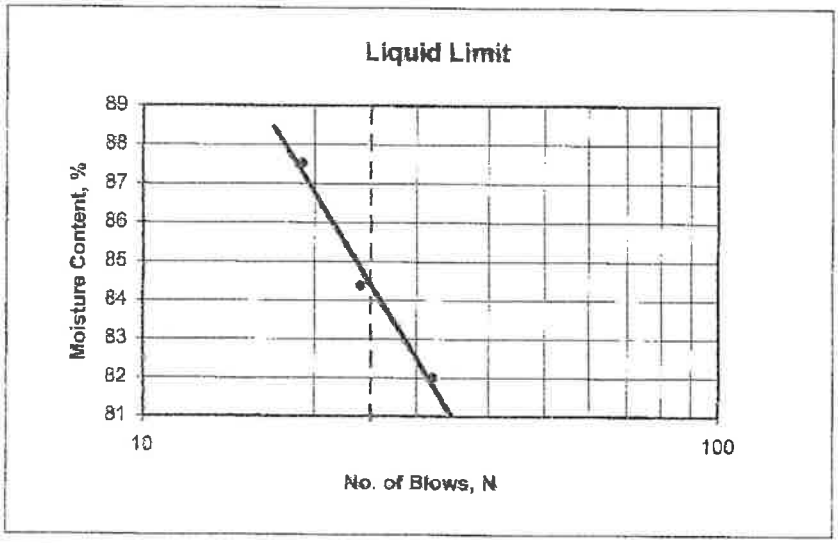
TBT Engineering Limited
110 Paramount Road
Winnipeg, MB R3X 2W3
PH: (204) 633-6008 Fax (204) 633-6620
E-Mail: manitoba@tbte.ca

Atterberg Limits

Client Name: Genivar
Project Description: St Francis Xavier
Report to: Silvestre Urbano, P. Eng.

TBT Project No.: 12-705 I
TBTE Lab No.: W12-8211
Borehole No. TH 9
Depth.: 10'
Tested By / Date: AD / May 24, 2012
Reviewed By: P. Bernal

Liquid Limit Determination					
Dish No.:	4	22	14		Liquid Limit 25 Blows
Wet Soil + Dish, (g):	26.3	29.43	29.14		
Dry Soil + Dish, (g):	20.2	21.98	22.08		
Moisture, (g):	6.1	7.45	7.06		
Dish, (g):	13.23	13.15	13.47		
Dry Soil, (g):	6.97	8.83	8.61		
% Moisture:	87.52	84.37	82.00		
No. of Blows:	19	24	32		
Liquid Limits:	85	84	84		84



Liquid Limit, %:	84
Plastic Limit, %:	17
Plasticity Index:	68

Plastic Limit Determination					Natural Moisture
Dish No.:	21	6			6.1
Wet Soil + Dish, (g):	29.26	29.56			131.5
Dry Soil + Dish, (g):	28.65	28.98			98.5
Moisture, (g):	0.61	0.58			33
Dish, (g):	25.03	25.43			5.6
Dry Soil, (g):	3.62	3.55			92.9
% Moisture:	16.85	16.34			35.52
Average M/C, (%):	17				

Test Method : ASTM: D4318, D2216

USCS Soil Classification (ASTM D2487): CH

CCIL Certified

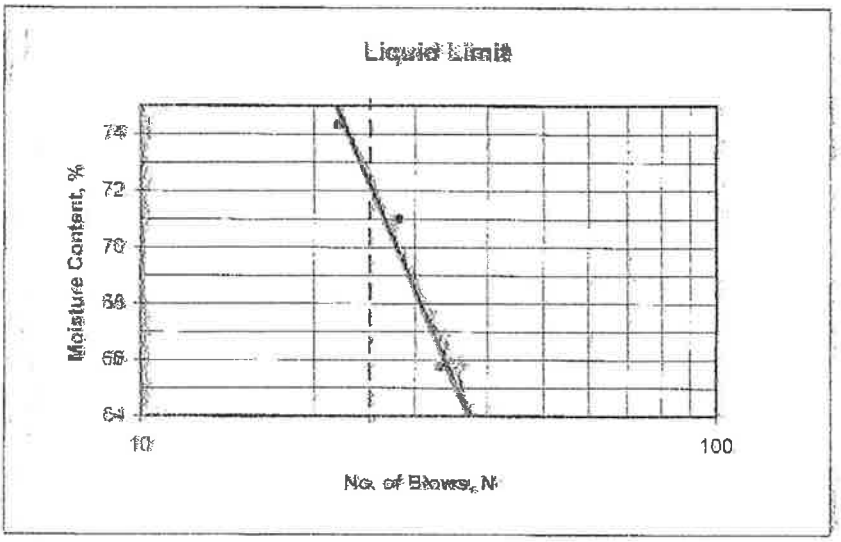
TBT ENGINEERING
CONSULTING GROUP

TBT Engineering Limited
110 Paramount Road
Winnipeg, MB R2X 2W3
PH: (204) 633-6699 Fax (204) 633-6620
E-Mail: manitoba@tbte.ca

Atterberg Limits

Client Name:	Geniver	TBT Project No.:	12-705 I
Project Description:	St Francis Xavier	TBTE Lab No.:	W12-8210
		Borehole No:	TH 9
Report to:	Silvestre Urbano, P. Eng.	Depth.:	2.5' - 5'
		Tested By / Date:	AD / May 24, 2012
		Reviewed By:	

Liquid Limit Determination					
Dish No.:	7	12	18		Liquid Limit
Wet Soil + Dish, (g):	26.38	28.46	26.61		25 Blows
Dry Soil + Dish, (g):	20.76	22.12	21.29		
Moisture, (g):	5.62	6.34	5.32		
Dish, (g):	13.2	13.19	13.2		
Dry Soil, (g):	7.56	8.93	8.09		
% Moisture:	74.34	71.00	65.76		
No. of Blows:	22	28	33		
Liquid Limits:	73	72	68		71



Liquid Limit, %:	72
Plastic Limit, %:	17
Plasticity Index:	55

Plastic Limit Determination					Natural Moisture
Dish No.:	18	36			21
Wet Soil + Dish, (g):	39.41	37.38			139.9
Dry Soil + Dish, (g):	37.35	35.56			105.9
Moisture, (g):	2.06	1.82			34
Dish, (g):	25.3	25.34			5.5
Dry Soil, (g):	12.05	10.22			100.4
% Moisture:	17.10	17.81			33.86
Average M/C, (%):	17				

Test Method : ASTM D4318, D2216

USCS Soil Classification (ASTM D2487): CH

CCIL Certified

TBT ENGINEERING
CONSULTING GROUP

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Winnipeg, MB R2X 2W3
PH: (204) 633-6008 FAX: (204) 633-6620
E-Mail: manitoba@tbte.ca

HYDRAULIC CONDUCTIVITY TEST REPORT

Client:	GENIVAR	TBT Project No.:	W12-705 I
Project Description:	St Francis Xavier Lagoon	Lab No.:	WL12-8281
		B.H./T.P. No.:	2
Report to:	Silvestre Urbano, P. Eng.	Sample No.:	-
Tested By/Date:	PB, VM / June 25, 2012	Depth:	5'-7'
		Reviewed By:	P. Bend

Test Specimen Data

Initial:	Mass	800.7 g	Final:	Mass	814.1 g
	Dimensions			Dimensions	
	Length:	11.07 cm		Length	11.05 cm
	Diameter:	7.28 cm		Diameter	7.30 cm
	Area	41.6 cm^2		Area	41.9 cm^2
	Volume	460.4 cm^3		Volume	462.7 cm^3
	Water Content	39.1 %		Water Content	45.4 %
	Dry Unit Weight	1216 kg/m^3		Dry Unit Weight	1210 kg/m^3
	Saturation	99.5 %		Saturation	100.4 %

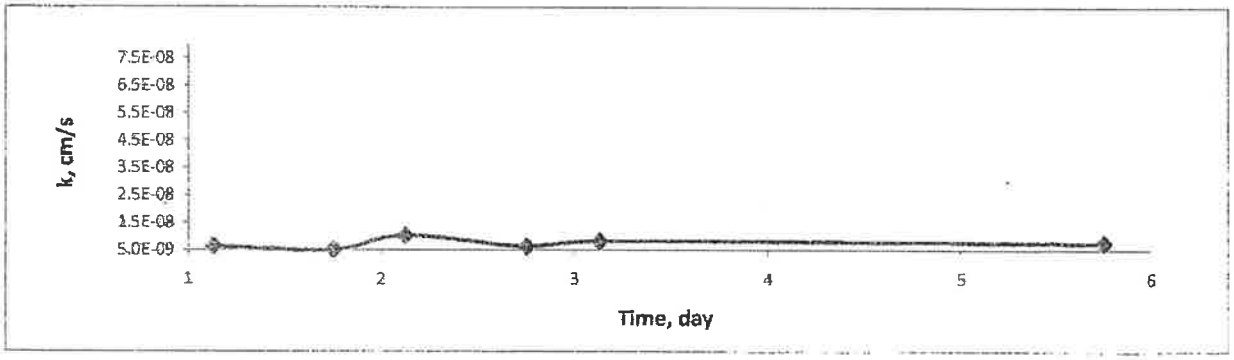
Assumed Specific Gravity of Soil : 2.7

Test Boundary Conditions

Permeant liquid:	De-aired tap water	Area of headwater/tailwater tube :	1 cm^3
Effective Back Pressure:	25.81 kPa	Average Hydraulic Gradient:	13.70

Permeation Data

Date and Time	Elapsed Time, s	Flow, cm^3 Influent	Flow, cm^3 Effluent	Corrected Hydraulic Conductivity, k (cm/s)
22/06/2012 8:00	54000	0.3	0.2	6.18 E-09
22/06/2012 17:00	32400	0.1	0.3	8.23 E-09
25/06/2012 8:00	226800	1.4	1.2	7.59 E-09



Average Hydraulic Conductivity = 7.33 E-09 cm/s

Soil Description:

Test Method: ASTM 5084-03
Remarks:

APPENDIX D

GRANULAR SPECIFICATION

900. 3.2 - Aggregate Requirements (Cont'd)

The Los Angeles Abrasion Loss on granular base course aggregate will be based on the total sample submitted.

Shale Content is the percent by weight of the particles retained on a 4.75 sieve that are shale particles.

Clay balls are the percent by weight of particles retained on a 12.5 mm sieve that are clay particles.

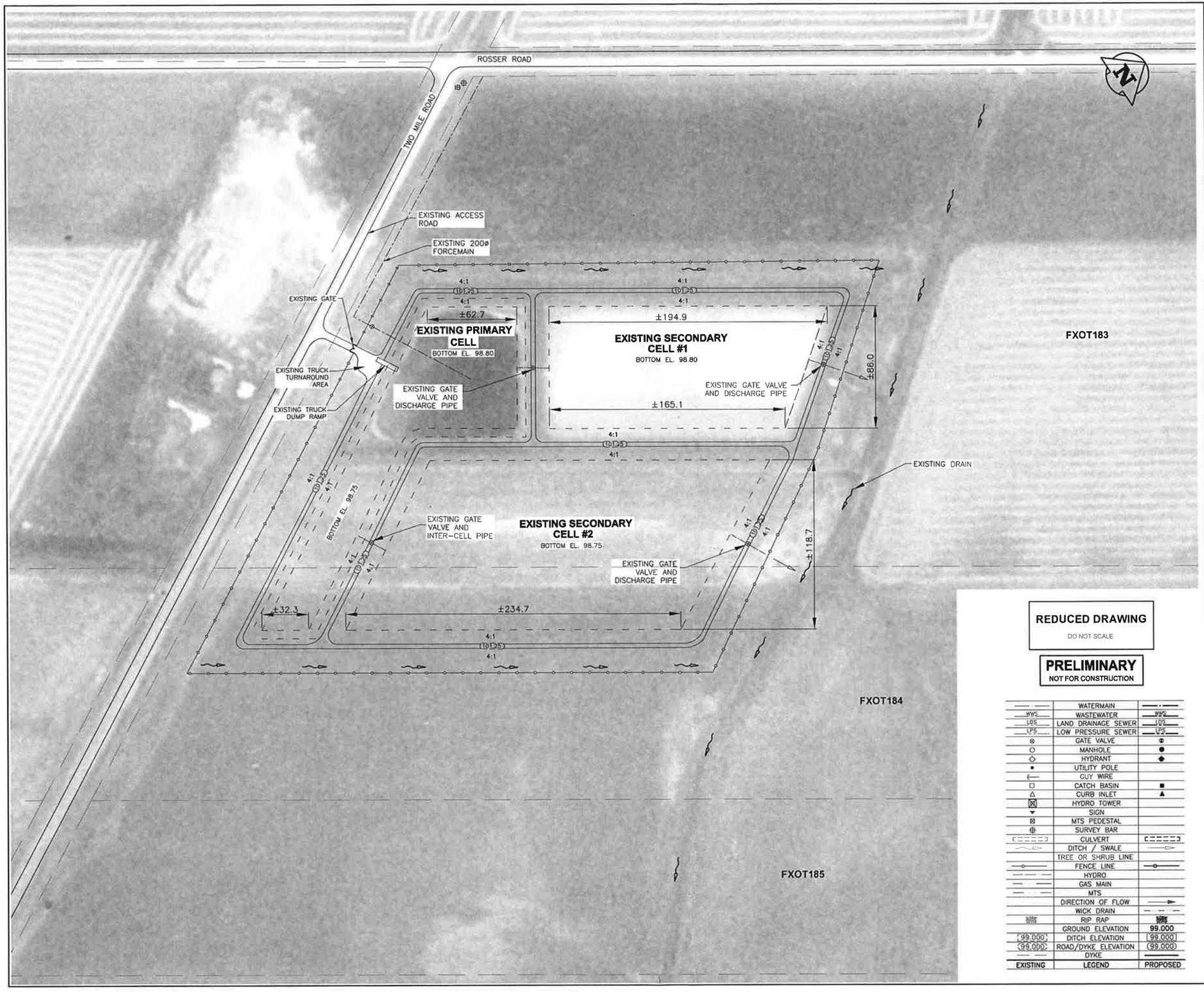
The aggregate shall be well graded and shall not vary from maximum to minimum of the specification ranges for consecutive tests.

The requirements for each Class will be as follows:

GRANULAR BASE COURSE					
Passing Standard Sieves	CLASS "A"		CLASS "B"	CLASS "C"	
	Gravel	Limestone	Gravel or Limestone	Gravel	Limestone
37.5 mm sieve				100%	
25 mm sieve				85 - 100%	100%
19 mm sieve	100%	100%	100%		
16 mm sieve	80 - 100%				
4.75 mm sieve	40 - 70%	35 - 70%	30 - 75%	25 - 80%	25 - 80%
2 mm sieve	25 - 55%		25 - 65%		
425 um sieve	15 - 30%	15 - 30%	15 - 35%	15 - 40%	
75 um sieve	8 - 15%	8 - 17%	8 - 18%	8 - 18%	8 - 20%
Minimum Crush Count	35%	100%	25%	15%	100%
Maximum					
a) Los Angeles Abrasion Loss	35%	35%	35%	40%	40%
b) Shale Content	12%		12%	20%	
c) Clay Balls	10%		10%		

APPENDIX C

Plans and Details



REDUCED DRAWING
DO NOT SCALE

PRELIMINARY
NOT FOR CONSTRUCTION

EXISTING	LEGEND	PROPOSED
	WATERMAIN	
WWS	WASTEWATER	WWS
LDS	LAND DRAINAGE SEWER	LDS
LPS	LOW PRESSURE SEWER	LPS
⊗	GATE VALVE	⊗
○	MANHOLE	●
◇	HYDRANT	◆
•	UTILITY POLE	
←	GUY WIRE	
□	CATCH BASIN	■
△	CURB INLET	▲
⊠	HYDRO TOWER	
▼	SIGN	
⊠	MTS PEDESTAL	
⊕	SURVEY BAR	
	CULVERT	
	DITCH / SWALE	
	TREE OR SHRUB LINE	
	FENCE LINE	
	HYDRO	
	GAS MAIN	
	MTS	
	DIRECTION OF FLOW	
	WICK DRAIN	
	RIP RAP	
	GROUND ELEVATION	99.000
99.000	DITCH ELEVATION	99.000
99.000	ROAD/DYKE ELEVATION	99.000
	DYKE	

GENIVAR
10 PRAIRIE WAY
WINNIPEG, MANITOBA
CANADA R2J 3J8
PHONE: 204-477-6650 FAX : 204-474-2864
WWW.GENIVAR.COM

APEGM Certificate of Authorization GENIVAR Inc. No. 5079 Date: November 30, 2012

PROVINCE OF MANITOBA
R.W. WEBSTER
Member
9569
REGISTERED PROFESSIONAL ENGINEER

R.M. OF ST. FRANCOIS XAVIER

R.M. OF ST. FRANCOIS XAVIER
WASTEWATER STABILIZATION
POND EXPANSION

B.M.: TBM IB @ SW CORNER OF THE ROSSER ROAD & TWO MILE ROAD INTERSECTION, ELEV. = 100.0 m

1	2012/11/00	ISSUED FOR EAP

PROJECT: 121-15696-00
2012/10/24
ORIGINAL_SCALE: 1250
DESIGNED_BY: LVC
DRAWN_BY: LVC
CHECKED_BY: RWW

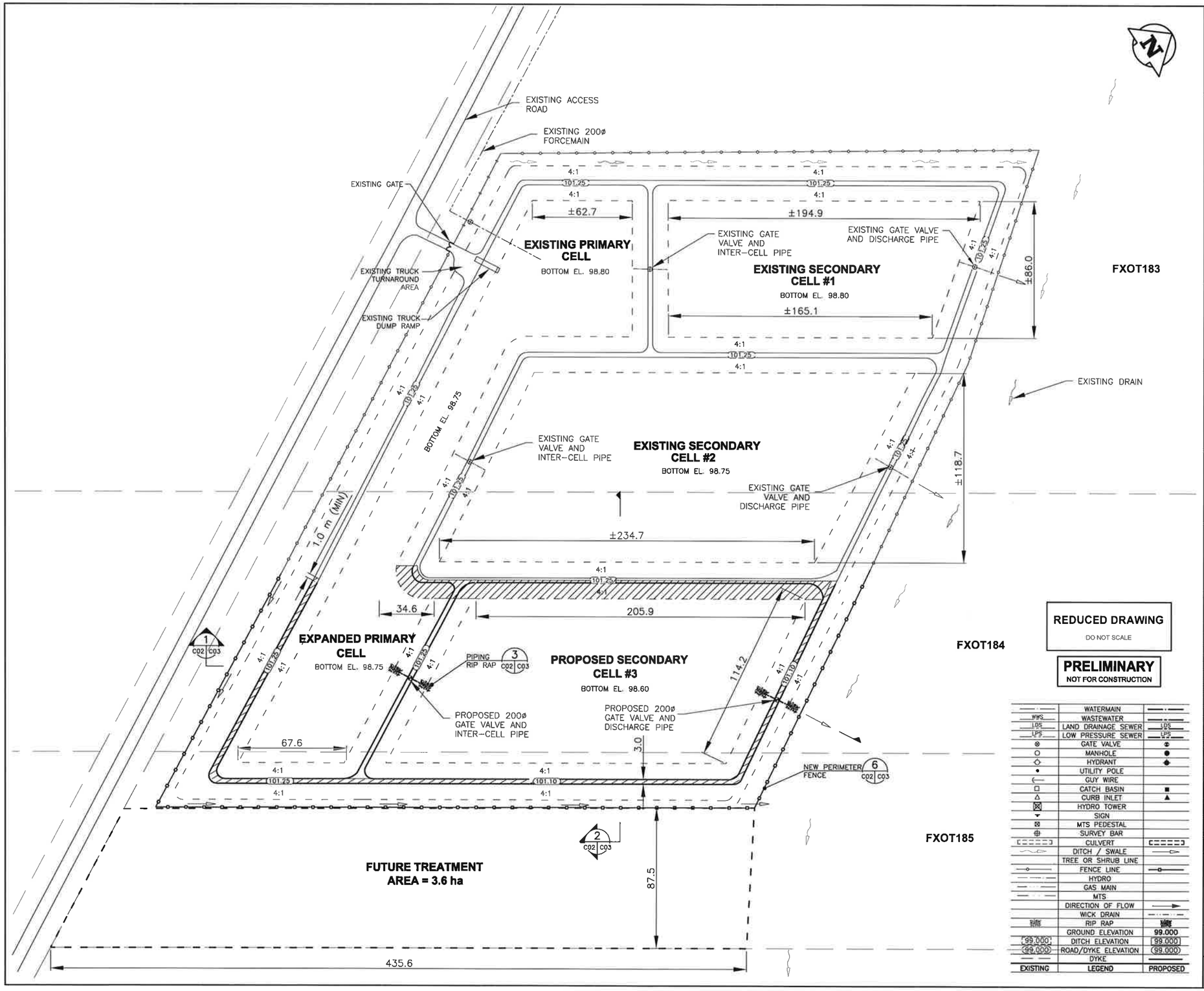
CIVIL

EXISTING LAGOON

C01
1 3

ISSUED FOR EAP
2012/11/00

0



REDUCED DRAWING
DO NOT SCALE

PRELIMINARY
NOT FOR CONSTRUCTION

EXISTING	LEGEND	PROPOSED
	WATERMAIN	
WWS	WASTEWATER	WWS
LDS	LAND DRAINAGE SEWER	LDS
LPS	LOW PRESSURE SEWER	LPS
⊗	GATE VALVE	⊗
○	MANHOLE	●
◇	HYDRANT	◆
•	UTILITY POLE	
←	GUY WIRE	
□	CATCH BASIN	■
△	CURB INLET	▲
⊠	HYDRO TOWER	
▼	SIGN	
⊠	MTS PEDESTAL	
⊕	SURVEY BAR	
	CULVERT	
	DITCH / SWALE	
	TREE OR SHRUB LINE	
	FENCE LINE	
	HYDRO	
	GAS MAIN	
	MTS	
	DIRECTION OF FLOW	
	WICK DRAIN	
	RIP RAP	
99.000	GROUND ELEVATION	99.000
[99.000]	DITCH ELEVATION	[99.000]
(99.000)	ROAD/DYKE ELEVATION	(99.000)
	DYKE	

GENIVAR
10 FRASER WAY
WINNIPEG, MANITOBA
CANADA R2J 3J8
PHONE: 204-477-6650 FAX : 204-474-2864
www.genivar.com

APEGM Certificate of Authorization GENIVAR Inc. No. 5579 Date: November 30, 2012

PROVINCE OF MANITOBA R.W. WEBSTER Member 5568 REGISTERED PROFESSIONAL ENGINEER

R.M. OF ST. FRANCOIS XAVIER

R.M. OF ST. FRANCOIS XAVIER
WASTEWATER STABILIZATION
POND EXPANSION

B.M.: TBM 1B @ SW CORNER OF THE ROSSER ROAD & TWO MILE ROAD INTERSECTION, ELEV. = 100.0 m

1	2012/11/00	ISSUED FOR EAP

PROJECT: 121-15696-00	2012/10/24
ORIGINAL SCALE: 1:1250	
DESIGNED BY: LVC	
DRAWN BY: LVC	
CHECKED BY: RWW	

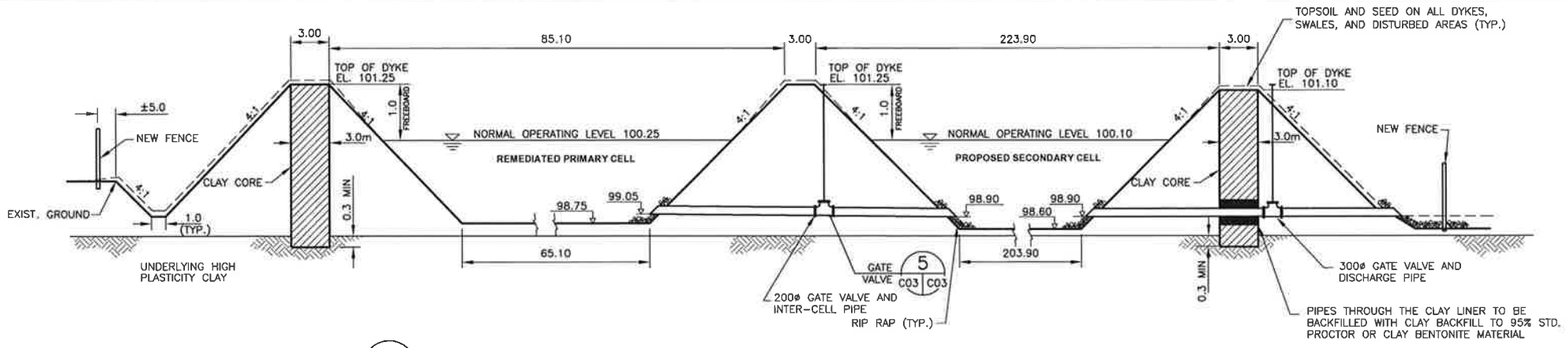
CIVIL

PROPOSED DEVELOPMENT SITE

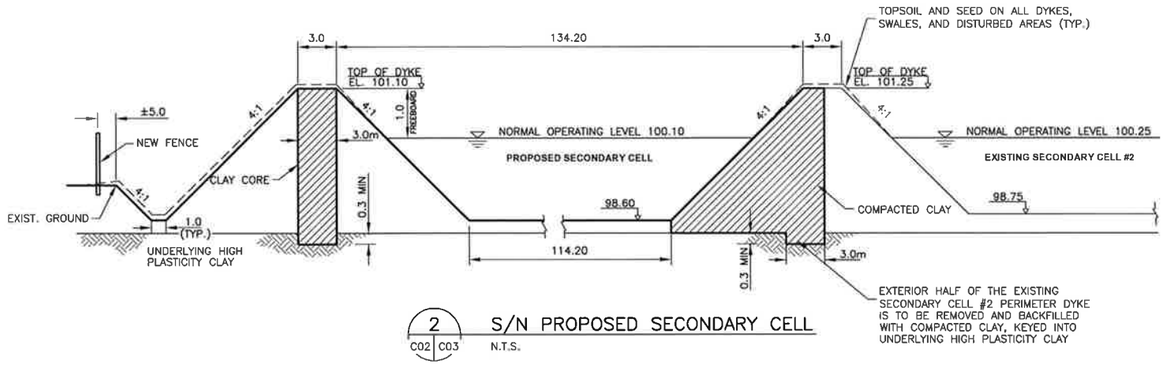
C02
2 3

ISSUED EAP
2012/11/00

0

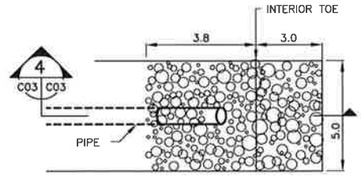


1 C02 C03 REMEDIATED PRIMARY CELL AND PROPOSED SECONDARY CELL
N.T.S.

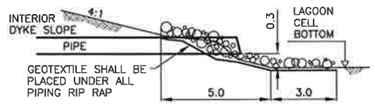


2 C02 C03 S/N PROPOSED SECONDARY CELL
N.T.S.

PROPOSED CLAY CORE



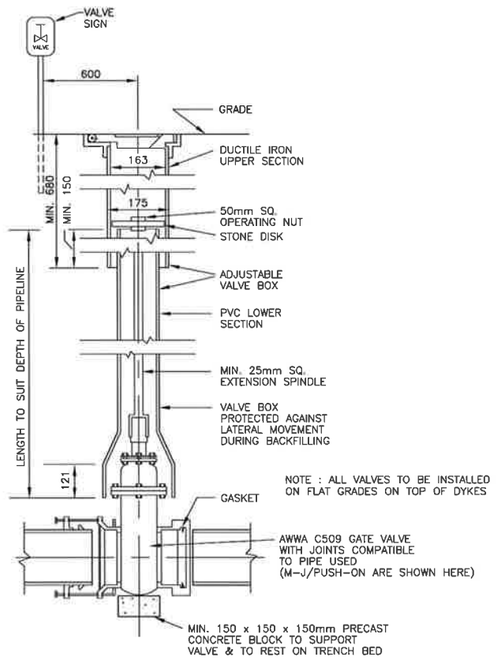
3 C02 C03 LAGOON RIP RAP DETAIL (TYP.)
N.T.S.



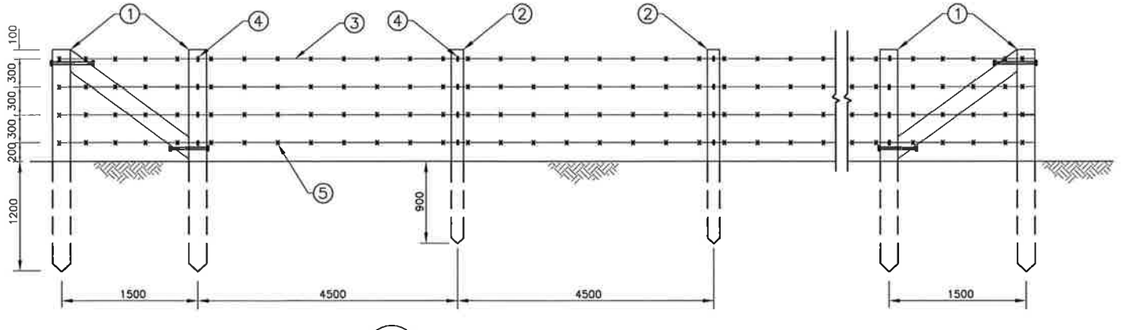
4 C03 C03 LAGOON RIP RAP SECTION (TYP.)
N.T.S.

NOTES:

1. CORNER POSTS: 175ø TREATED WOOD POST, 2400mm LONG
2. REGULAR POSTS: 125ø TREATED WOOD POST, 2100mm LONG
3. 2 STRAND 2ø GALVANIZED WIRE (TYP.)
4. WIRE FENCE STAPLES (TYP.)
5. 4 POINT BARBS (TYP.)



5 C03 C03 GATE VALVE INSTALLATION
N.T.S.



6 C02 C03 PERIMETER FENCE DETAIL
N.T.S.

GENIVAR
10 PRAIRIE WAY
WINNIPEG, MANITOBA
CANADA R2J 3J8
PHONE: 204-477-6650 FAX : 204-474-2864
WWW.GENIVAR.COM

CONSULTANT:

REDUCED DRAWING
DO NOT SCALE

PRELIMINARY
NOT FOR CONSTRUCTION

SEAL:

APEGM Certificate of Authorization GENIVAR Inc. No. 3579 Date: November 30, 2012

PROVINCE OF MANITOBA R.W. WEBSTER Member 5569 REGISTERED PROFESSIONAL ENGINEER

CLIENT:

R.M. OF ST. FRANCOIS XAVIER

CLIENT REF. #:

PROJECT:

R.M. OF ST. FRANCOIS XAVIER
WASTEWATER STABILIZATION
POND EXPANSION

KEY PLAN:

B.M.: TBM IB @ SW CORNER OF THE ROSSER ROAD & TWO MILE ROAD INTERSECTION, ELEV. = 100.0 m

ISSUED FOR - REVISION:

IS	RE	DATE	DESCRIPTION
1		2012/11/00	ISSUED FOR EAP

PROJECT NO.: PROJECT: 121-15696-00
DATE: 2012/10/24
ORIGINAL SCALE: N.T.S.
IF THIS BAR IS NOT 25mm LONG, ADJUST YOUR PLOTTING SCALE.
25mm
DESIGNED BY: DESIGNED BY: LVC
DRAWN BY: DRAWN BY: LVC
CHECKED BY: CHECKED BY: RWW
DISCIPLINE: CIVIL
TITLE: SECTIONS AND DETAILS
SHEET NUMBER: C03
SHEET #: 3 OF 3
ISSUE: ISSUED FOR EAP
DATE OF: 2012/11/00
REV #: 0

APPENDIX D

General Correspondence for Reference

Liliya Chunderova

From: Schwartz, Todd [Todd.Schwartz@dfo-mpo.gc.ca]
Sent: Monday, April 23, 2012 12:18 PM
To: Liliya Chunderova
Subject: RE: Habitat Type and Fish Presence Information Request, R.M. of Francois Xavier
Attachments: Genivar Wpg to Portage April 23, 2012.ppt

Hi Lilya,

In a rush. Please see if this set of Draft Habitat classification maps covers your area in question.

Second creek has lots of fish use. The fish below were captured by electrofishing (E1) and beach seining (B1) just upstream of Highway 1. Many pike were observed that were not captured.

Second Creek August 20, 2002

D-02-193_200802_E1	*Ictiobus cyprinellus*	bigmouth buffalo	2		YOY
D-02-193_200802_B1	*Culaea inconstans*	brook stickleback	2		
D-02-193_200802_E1	*Culaea inconstans*	brook stickleback	2		
D-02-193_200802_B1	*Umbra limi*	central mudminnow	4		
D-02-193_200802_E1	*Umbra limi*	central mudminnow	4		
D-02-193_200802_B1	*Cyprinus carpio*	common carp	1		YOY
D-02-193_200802_E1	*Cyprinus carpio*	common carp	23		YOY
D-02-193_200802_B1	*Notropis atherinoides*	emerald shiner	2		
D-02-193_200802_E1	*Notropis atherinoides*	emerald shiner	6		
D-02-193_200802_E1	*Esox lucius*	northern pike	1	204	
D-02-193_200802_B1	*Esox lucius*	northern pike	4		200-214
D-02-193_200802_E1	*Notropis stramineus*	sand shiner	4		

Todd Schwartz
Telephone/ Téléphone: 204 983-4231
Facsimile / Télécopieur: 204 984-2402
Email / Courriel: Todd.Schwartz@dfo-mpo.gc.ca

Fish Habitat Biologist.
Manitoba District.
Winnipeg Office.
Central and Arctic Region.
Fisheries and Oceans Canada.
501 University Crescent.
Winnipeg, MB R3T 2N6.
Government of Canada.

Biologiste, Habitat du poisson
District du Manitoba
Bureau de Winnipeg
Région du Centre et de l'Arctique
Pêches et Océans Canada
501 University Crescent
Winnipeg (Manitoba) R3T 2N6
Gouvernement du Canada

From: Liliya Chunderova [mailto:Liliya.Chunderova@genivar.com]
Sent: 2012–April-23 11:23 AM
To: Schwartz, Todd
Subject: Habitat Type and Fish Presence Information Request, R.M. of Francois Xavier

Hello Todd,

I'm working on an EAP for the R.M. of Francois Xavier. A new secondary cell is being constructed in the River lots 184 & 185 in the Parish of St. Francois Xavier, which will discharge into an existing second order drain that converges with the Assiniboine River. Please provide habitat type and fish presence for this route. (See attached map)

Sincerely,
Liliya Chunderova

GENIVAR

Liliya Chunderova, C.E.T., EIT (PEO)
Environmental Process Designer
GENIVAR INC.
10 Prairie Way, The Waters Business Park, Winnipeg (Manitoba) R2J 3J8
T 204-477-6650 ext 11010 | www.genivar.com

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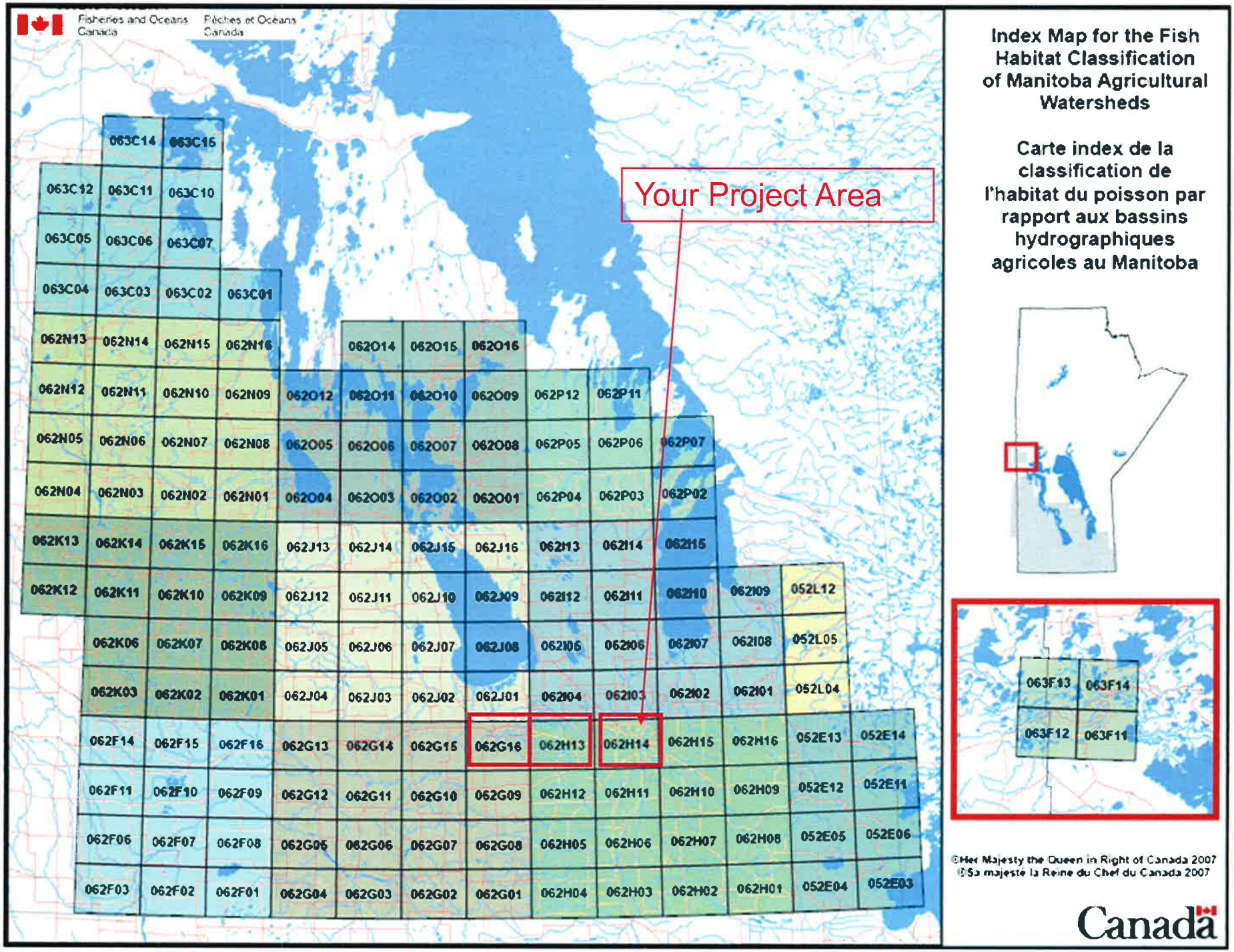
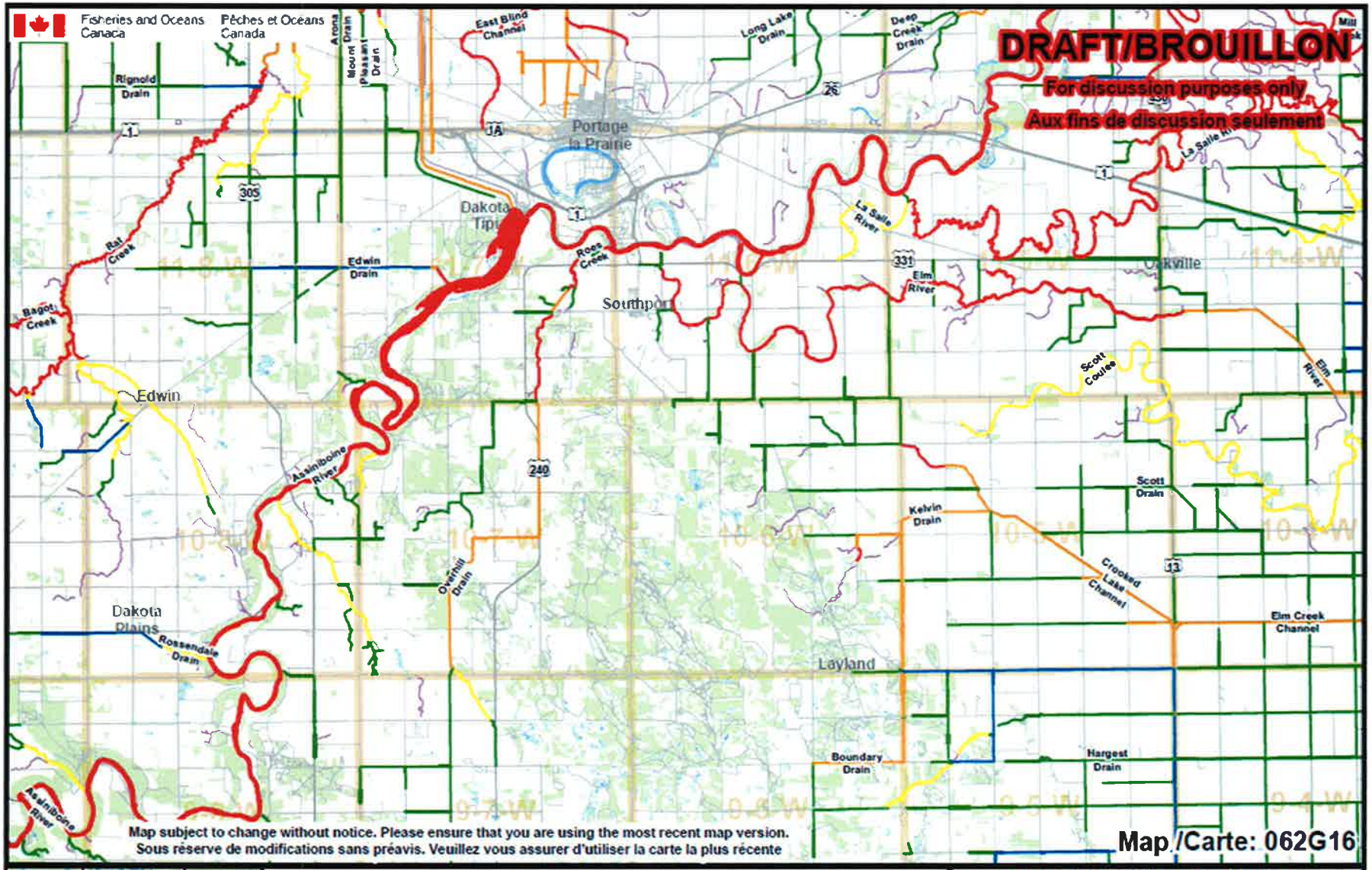
Fisheries and Oceans Canada | Pêches et Océans Canada

Index Map for the Fish Habitat Classification of Manitoba Agricultural Watersheds

Carte index de la classification de l'habitat du poisson par rapport aux bassins hydrographiques agricoles au Manitoba



Canada



062J02	062J01	062I04
062G15	062G16	062H13
062G10	062G09	062H12

Kilometers 0 1 2 4 6 8 10 Kilomètres

Miles 0 1 2 4 6 Milles

Map not to be used for navigation/
Ne pas utiliser pour la navigation

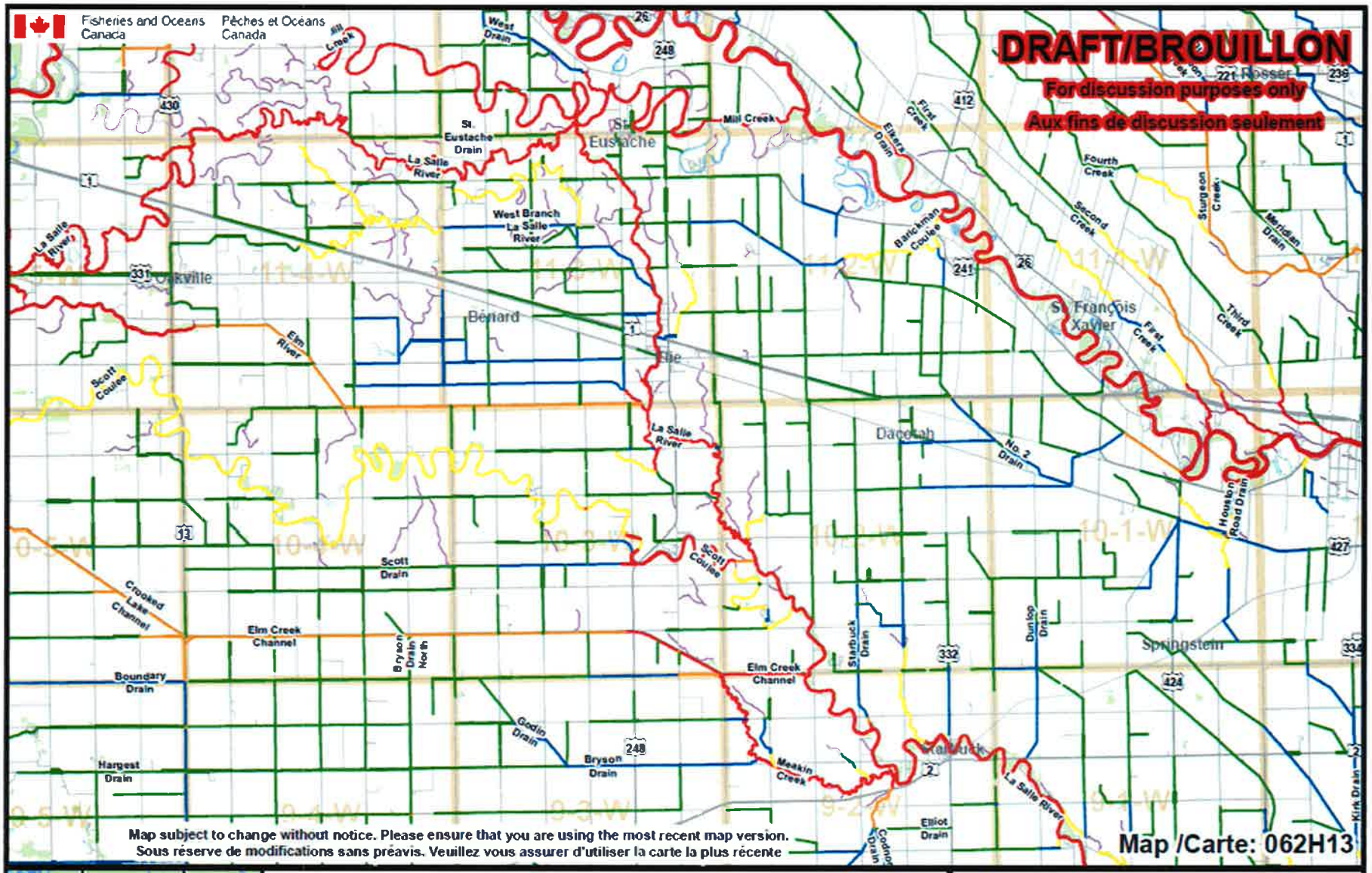
Habitat Type/ Type d'habitat	Color/ Couleur
A	
B	
C	
D	
E	
Unclassified/ Non classifié	

Fish Habitat Classification for Manitoba Agricultural Watersheds/ Classification de l'habitat du poisson par rapport aux bassins hydrographiques agricoles au Manitoba

Version 1.0

Valid until March 31, 2008
Valide jusqu'au 31 mars 2008

Canada



062J01	062I04	062I03
062G16	062H13	062H14
062G09	062H12	062H11

Kilometers 0 1 2 4 6 8 10 Kilomètres

Miles 0 1 2 4 6 Miles

Map not to be used for navigation/
Ne pas utiliser pour la navigation

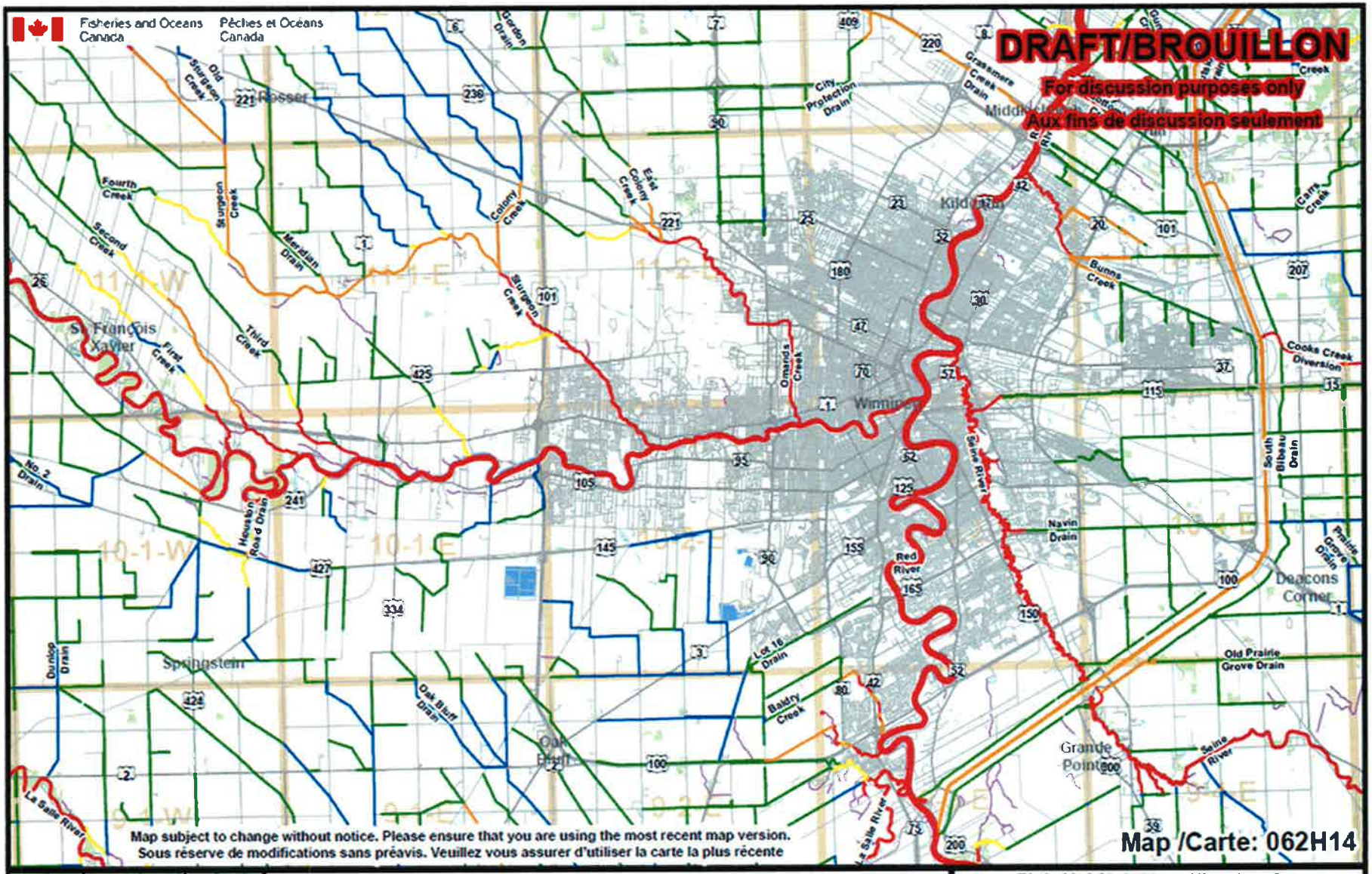
Habitat Type/ Type d'habitat	Color/ Couleur
A	
B	
C	
D	
E	
Unclassified/ Non classifié	

Fish Habitat Classification for Manitoba Agricultural Watersheds/ Classification de l'habitat du poisson par rapport aux bassins hydrographiques agricoles au Manitoba

Version 1.0

Valid until March 31, 2008
Valide jusqu'au 31 mars 2008

Canada



062I04	062I03	062I02
062H13	062H14	062H15
062H12	062H11	062H10

Kilometers 0 1 2 4 6 8 10 Kilomètres

Miles 0 1 2 4 6 Miles

Map not to be used for navigation/
Ne pas utiliser pour la navigation

Habitat Type/ Type d'habitat	Color/ Couleur
A	
B	
C	
D	
E	
Unclassified/ Non classifié	

Fish Habitat Classification for Manitoba Agricultural Watersheds/ Classification de l'habitat du poisson par rapport aux bassins hydrographiques agricoles au Manitoba

Version 1.0

Valid until March 31, 2008
Valide jusqu'au 31 mars 2008

Canada

Liliya Chunderova

From: Hill, Gordon C (CHT) [Gordon.Hill@gov.mb.ca]
Sent: Wednesday, May 23, 2012 3:05 PM
To: Liliya Chunderova
Subject: St Francois Xavier lagoon
Attachments: Genivar St FX lagoon.docx

Gordon Hill
Impact Assessment Archaeologist,
Archaeological Assessment Services Unit
Historic Resources Branch,
Main Floor- 213 Notre Dame Avenue, Winnipeg, MB R3B 1N3
Gordon.Hill@gov.mb.ca

Phone: (204) 945-7730
Fax: (204) 948-2384

Manitoba
Culture, Heritage, Tourism and Sport

Manitoba

Memorandum

DATE: May 23, 2012

TO: Liliya Chunderova
Genivar
Suite 600-5 Donald Street
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:

LAGOON EXPANSION
RIVER LOTS 184 & 185 PARISH ST. FRANCOIS XAVIER
RM ST FRANCOIS XAVIER

In response to your memo regarding the above-noted proposed 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 comments, please contact me at 945-7730.

C. Gordon Hill

Liliya Chunderova

From: Friesen, Chris (CON) [Chris.Friesen@gov.mb.ca]
Sent: Friday, April 27, 2012 8:28 AM
To: Liliya Chunderova
Subject: RE: A Listing of Rare Species Request - River lots 184 & 185 inthe Parish of St. Francois Xavier

Liliya

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

The information provided in this letter is based on existing data known to the Manitoba Conservation Data Centre at the time of the request. These data are dependent on the research and observations of CDC staff and others who have shared their data, and reflect our current state of knowledge. **An absence of data in any particular geographic area does not necessarily mean that species or ecological communities of concern are not present**; in many areas, comprehensive surveys have never been completed. Therefore, this information should be regarded neither as a final statement on the occurrence of any species of concern, nor as a substitute for on-site surveys for species as part of environmental assessments. 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- 7747.

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

From: Liliya Chunderova [mailto:Liliya.Chunderova@genivar.com]
Sent: April-23-12 11:20 AM
To: Friesen, Chris (CON)
Subject: A Listing of Rare Species Request - River lots 184 & 185 in the Parish of St. Francois Xavier

Hello Chris,

I'm preparing an EAP for the R.M. of Francois Xavier regarding their lagoon expansion located in the River lots 184 & 185 in the Parish of St. Francois Xavier (see the attached map). Please provide a listing of rare species for the identified area. I would greatly appreciate your information before May 30/2012.

Sincerely,
Liliya Chunderova

GENIVAR

Liliya Chunderova, C.E.T., EIT (PEO)
Environmental Process Designer
GENIVAR INC.
10 Prairie Way, The Waters Business Park, Winnipeg (Manitoba) R2J 3J8
T 204-477-6650 ext 11010 | www.genivar.com

Please consider the environment before printing...

Liliya Chunderova

From: Dey, Asit (MWS) [Asit.Dey@gov.mb.ca]
Sent: Wednesday, May 23, 2012 1:50 PM
To: Liliya Chunderova
Cc: Matthews, Rob (MWS); Butterfield, Tamara(MWS)
Subject: RE: Licensed Water Users Information Request, River lots 184 & 185in the Parish of St. Francois Xavier

Hello Liliya,

Good afternoon. Please note that my colleague, Tamara Butterfield, has checked our database and it appears from her review that there are no projects on the second order drain to its convergence with the Assiniboine River.

Should you require more information, please feel free to contact me.

Thanks,

Regards,

Asit

Asit Dey, Ph.D., P.Eng.
Senior Planning Engineer, Water Use Licensing Section (Surface Water Licensing)
Manitoba Conservation and Water Stewardship
Government of Manitoba
200 Saulteaux Crescent
Winnipeg MB R3J 3W3
T: (204) 945-6114 F (204) 945-7419
Email: asit.dey@gov.mb.ca

From: Liliya Chunderova [mailto:Liliya.Chunderova@genivar.com]
Sent: April-23-12 11:25 AM
To: Dey, Asit (MWS)
Subject: Licensed Water Users Information Request, River lots 184 & 185 in the Parish of St. Francois Xavier

Hello Asit,

I'm preparing an EAP for the R.M. of Francois Xavier regarding their lagoon expansion. A new secondary cell is being constructed in the River lots 184 & 185 in the Parish of St. Francois Xavier, which will discharge into an existing second order drain that converges with the Assiniboine River. Please provide the licensed water users for the drain in the mentioned section up to its convergence with the Assiniboine River (See attached map). I would greatly appreciate your information before May 30/2012.

Sincerely,
Liliya Chunderova

GENIVAR

Liliya Chunderova, C.E.T., EIT (PEO)
Environmental Process Designer
GENIVAR INC.

10 Prairie Way, The Waters Business Park, Winnipeg (Manitoba) R2J 3J8
T 204-477-6650 ext 11010 | www.genivar.com

Please consider the environment before printing...

Liliya Chunderova

From: Little, Karen (CLPA) [Karen.Little@gov.mb.ca]
Sent: Wednesday, April 25, 2012 3:34 PM
To: Liliya Chunderova
Subject: RE: River lots 184 & 185 in the Parish of St. Francois Xavier - Mineral Rights Information Request

Good afternoon Liliya, I have reviewed your Location map and it appears the lots affected are Outer Two Mile Lots (OT) 184 & 185 Parish of St. Francois Xavier and not River Lots (RL). FXOT184 FXOT185

According to our records this date:

-OT 184 & 185 in the Parish of St. Francois Xavier were originally granted in 1883 & 1884 along with the mines & minerals and sand & gravel. The Crown owns no interests.

-RL 184 & 185 in Parish of St. Francois Xavier were originally granted in 1883 & 1884 along with the mines & minerals and sand & gravel. The Crown owns no interests.

To determine current ownership of these mineral under-rights you will need to do title searches at The Winnipeg Land Titles Office. (Note: Under-rights may have reverted back to the Crown by way of tax sale, which we are not aware of).

If the

Good morning Liliya, according to our records this date, River Lots 92, 93, 94 & 95 in the Parish of St. Clements were originally granted in 1882, 1877 & 1888 along with the mines & minerals and sand & gravel. The Crown owns no interests.

To determine current ownership of the mineral under-rights you will need to do titles searches at The Winnipeg Land Titles Office. (Note: Under-rights may have reverted back to the Crown by way of tax sale, which we are not aware of).

Karen Little

Supervisor of Crown Lands Registry
Crown Lands and Property Agency
308 - 25 Tupper Street North
Portage la Prairie MB R1N 3K1
P (204) 239-3805 F (204) 239-3560
Toll Free 1-866-210-9589
karen.little@gov.mb.ca

CLPA

An Agency of MB Infrastructure and Transportation

From: Liliya Chunderova [mailto:Liliya.Chunderova@genivar.com]
Sent: April-23-12 11:27 AM
To: Little, Karen (CLPA)
Subject: River lots 184 & 185 in the Parish of St. Francois Xavier - Mineral Rights Information Request

Hello Karen,

I'm working on an EAP for the R.M. of Francois Xavier regarding their lagoon expansion and require the mineral rights designation for the River lots 184 & 185 in the Parish of St. Francois Xavier (See attached map). I would greatly appreciate your information before May 30/2012.

Sincerely,
Liliya Chunderova

GENIVAR

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