

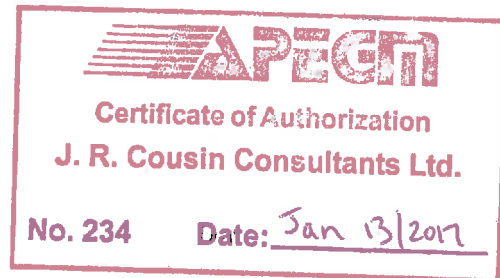


**Municipality of Gilbert Plains**  
**Environment Act Proposal**  
**for the**  
**Gilbert Plains Lagoon Sludge Removal**



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January 2017



## **ACKNOWLEDGMENTS**

To prepare this report various sources of information were investigated and researched. JR Cousin Consultants Ltd. (JRCC) wishes to thank the Municipality of Gilbert Plains and the Manitoba Water Services Board (MWSB) who contributed to the data and content of this report.

## **REMARKS**

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

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#### **Appendix A**

Land Use Agreement & Title – NE 02-25-22 W

Land Use Agreement & Title – NW 02-25-22 W

Land Use Agreement & Title – SW 02-25-22 W

#### **Appendix B**

Manitoba Conservation Data Centre – Wildlife Branch, Manitoba Sustainable Development, December 22, 2016 Email Correspondence

Manitoba Sport, Culture and Heritage – Historic Resources Branch, December 19, 2016 Email Correspondence

### **Appendix C**

Sludge Assessment Report, Assiniboine Injections Ltd, October 13, 2015

Sludge Test Report, ALS Environmental, September 22, 2016

NutriMax Soil Test Report, October 28, 2016

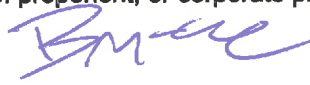
Driller Well Logs

### **Appendix D**

Plan 1: Overall Site Plan

Environment Act Proposal Form



Name of the development: <b>Gilbert Plains Lagoon Sludge Removal</b>	
Type of development per Classes of Development Regulation (Manitoba Regulation 164/88): <b>Class 2</b>	
Legal name of the applicant: <b>Municipality of Gilbert Plains</b>	
Mailing address of the applicant: <b>Box 220, 114 Main Street North</b>	
Contact Person: <b>Susan Boyachek, CAO</b>	
City: <b>Gilbert Plains</b>	Province: <b>Manitoba</b> Postal Code: <b>R0L 0X0</b>
Phone Number: <b>(204) 548-2326</b>	Fax: <b>(204) 548-2564</b> email: <b>rmofgilbertplains@mymts.net</b>
Location of the development: <b>Stoughton Seed Farms (3km southeast of town)</b>	
Contact Person: <b>Susan Boyachek, CAO</b>	
Street Address: <b>N/A</b>	
Legal Description: <b>NE, NW and SW of 02-25-22 WPM</b>	
City/Town: <b>Gilbert Plains</b>	Province: <b>Manitoba</b> Postal Code: <b>R0L 0X0</b>
Phone Number: <b>(204) 548-2326</b>	Fax: <b>(204) 548-2564</b> email: <b>rmofgilbertplains@mymts.net</b>
Name of proponent contact person for purposes of the environmental assessment: <b>Brett McCormac, JR Cousin Consultants Ltd.</b>	
Phone: <b>(204) 489-0474</b> Fax: <b>(204) 489-0487</b>	Mailing address: <b>91 A Scurfield Blvd Winnipeg, Manitoba R3Y 1G4</b>
Email address: <b>bmccormac@jrcc.ca</b>	
Webpage address: <b>www.jrcc.ca</b>	
Date: <b>Jan 13/2017</b>	Signature of proponent, or corporate principal of corporate proponent:  Printed name: <b>Brett McCormac</b>

## EXECUTIVE SUMMARY

### General

The Municipality of Gilbert Plains has requested assistance from the Manitoba Water Services Board (MWSB) for the land application of biosolid material to be removed from the existing wastewater treatment lagoon for the Community of Gilbert Plains, Manitoba. An Environment Act Licence will be required from Manitoba Sustainable Development for the lagoon sludge removal, transportation and subsequent land application of the sludge accumulated in the primary cells. JR Cousin Consultants Ltd. (JRCC) was retained for the related engineering services.

### Project Description

An Environmental Order was presented to the Gilbert Plains Municipality by Manitoba Sustainable Development for the investigation of the existing wastewater treatment lagoon and related infrastructure at Gilbert Plains. The Environmental Order is to determine the ability or inability of the existing lagoon and infrastructure to meet the hydraulic and organic loading from the service population. Based on the study it was recommended that the Municipality remove sludge from the existing Primary Cells to reduce impacts to hydraulic loading on the lagoon.

### Sludge Assessment and Removal

A sludge assessment was conducted by Assiniboine Injections Ltd. in February 2015. The assessment of Primary Cell 1 indicated a sludge accumulation of 9,720 m<sup>3</sup>, with an average sludge thickness of 0.55 m, and a maximum thickness of 1.5 m near the influent pipe inlet. The assessment of Primary Cell 2 indicated a sludge accumulation of 4,965 m<sup>3</sup>, with an average sludge thickness of 0.27 m, and a maximum thickness of 0.6 m near the intercell pipe in the southeast corner. Proposed options for the sludge removal include dredging sludge from the lagoon cells and:

- Pumping or truck hauling to nearby agricultural land for direct injection.
- Pumping or truck hauling to nearby agricultural land for surface application and incorporation within 48 hours.

For land application of biosolids, a minimum of 60 ha of land would be required; assuming the limiting factor in the soils is plant available nitrogen and residual nitrogen levels.

### Potential Concerns and Mitigation Measures

The potential concerns identified with the proposed sludge removal and land application, and associated mitigation measures include:

Potential Concern	Mitigation Measure
Spills or leaks during collection/removal and transportation of biosolids	Contractor to have emergency spill kit on site. Hazardous materials and fuel to be handled in accordance with all federal and provincial regulations.

Potential Concern	Mitigation Measure
Leaching or overland flow of nutrients into surface or ground water	Incorporation of applied biosolids to take place within 48 hours of application. Contractor to maintain appropriate setback distances from drains/water bodies in accordance with all federal and provincial regulations.
Heavy metal/salt accumulation in the receiving fields	Soils to be tested for background metal concentrations. Land application rates may need to be adjusted to remain within criteria defined by Canadian Soil Quality Guidelines.
Emissions/leaks from construction equipment	The construction contractor will maintain heavy equipment in good working order and to meet provincial and local emission standards.
Dust generation in residential areas	Dust suppression will be utilized if dry and windy conditions are a nuisance to nearby residents.
Noise Impacts	Construction works will be limited to daylight hours only and neighbouring residents will be informed of the proposed construction schedule.
Health and safety	Construction workers will be required to adhere to the safety program which will include utilizing personal protective equipment while on site. Access to the site will be restricted and appropriate residential setback distances will be maintained throughout the land application program.
Wildlife and Heritage Resources	Contact provincial authorities to re-confirm absence of rare species or archaeological sites prior to land application.

### Schedule and Approvals

The sludge removal and injection works are scheduled to begin in the spring or fall of 2017. An Environment Act Licence is required from Manitoba Sustainable Development for the de-sludging and land application works, as well as the continued lagoon operation.

## 1.0 INTRODUCTION AND BACKGROUND

The project described herein is for sludge removal and land application of biosolids from the existing wastewater treatment lagoon servicing the Town of Gilbert Plains and the Gilbert Plains Municipality in Manitoba.

### 1.1 Introduction

The Municipality of Gilbert Plains and the Manitoba Water Services Board (MWSB) are proposing to initiate a land application program for biosolid materials from the Gilbert Plains wastewater treatment lagoon Primary Cells 1 and 2, located on quarter sections NW 10-25-22 WPM and SW 15-25-22 WPM, as shown on Plan 1 in Appendix D. An Environment Act License is required from Manitoba Sustainable Development for the proposed removal and land application of sludge accumulated in the existing lagoon primary cells.

### 1.2 Contact Information

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Mr. Cory Vitt, P.Eng  
Manitoba Water Services Board  
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Brandon, Manitoba  
R7B 4E7  
Phone: (204) 726-6096, Fax (204) 726-7196

### 1.3 Background Information

The Town of Gilbert Plains is located approximately 31 km west of Dauphin, Manitoba, along PTH 5. The service population utilizing the Gilbert Plains lagoon includes residential and commercial populations within the Town of Gilbert Plains and the surrounding rural residents. The residents within the town are serviced via a gravity wastewater collection system, while the surrounding rural residents utilize truck hauling to the lagoon.

The Gilbert Plains Municipality operates a three-celled wastewater treatment lagoon, located northeast of the Town of Gilbert Plains. A new secondary cell was constructed in 1988 to meet hydraulic loading requirements. The lagoon currently operates under Clean Environment Commission Order 1143, and discharges to the nearby Valley River to the north. On June 13, 2014, the Municipality of Gilbert Plains was presented with an Environmental Protection Order from the Director of Manitoba Sustainable Development and Water Stewardship for the site assessment and investigation of the Gilbert Plains Wastewater Treatment Lagoon and related infrastructure, which included sources of infiltration, current hydraulic and organic loading, hydraulic and organic lagoon capacity, and finally sludge accumulation. Recommendations for modifying, repairing or upgrading the lagoon and collection infrastructure were included in the 2016 feasibility study conducted by JR Cousin Consultants Ltd. (JRCC). Based on the analysis conducted, it was recommended that the sludge accumulated in the lagoon primary cells be removed and disposed of through land application.

## 1.4 Objective

The objective of this proposal is to provide justification in support of obtaining an Environment Act License for the land application of biosolid materials from the Gilbert Plains wastewater treatment lagoon. One of the goals of this proposal is to conduct works in an environmentally conscious and agronomically sustainable manner. Biosolid loading limits have been determined to target optimum available nitrogen and phosphorus levels for the appropriate crop at the receiving agricultural fields.

## 1.5 Regulatory Requirements

The following Acts and Regulations apply to the works and will be followed throughout the project, including any requirements assigned in the subsequent Environment Act License.

1. *The Environment Act C.C.S.M. c. E125 (1987)*
  - a. Licensing Procedures Regulation 163/88
  - b. Classes of Development Regulation 164/88
  - c. Environment Act Fees Regulation 168/96
  - d. Livestock Manure and Mortalities Management Regulation 42/98
  - e. Environmental Regulations for Treatment and Disposal of Biosolids in Manitoba, Mike Van Den Bosch, P. Eng., Municipalities & Industrial Approvals, Manitoba Environment.
2. *The Water Protection Act C.C.S.M. c. W65 (2005)*
  - a. Nutrient Management Regulation 62/2008.

## 1.6 Description of Previous Studies

### 1.6.1 Infrastructure Reports

***Gilbert Plains Municipality Gilbert Plains Lagoon Assessment Feasibility Study, JR Cousin Consultants Ltd., June 2016***

JR Cousin Consultants Ltd. was retained by the Municipality to provide a study on the existing Lagoon and related infrastructure of the Town of Gilbert Plains. The report describes current and future population estimates, reviews organic and hydraulic loadings into the wastewater

treatment lagoon, evaluates geotechnical conditions of the site (existing cells and area for expansion), discusses nutrient reduction methods and provides descriptions of feasible upgrading schemes and cost estimates for implementation.

### **1.6.2 Geotechnical and Sludge Investigations**

#### ***Gilbert Plains Municipality Geotechnical Investigation for the Gilbert Plains Lagoon Assessment, JR Cousin Consultants Ltd., May 2016***

This report was prepared as part of the existing wastewater treatment lagoon assessment, in the Gilbert Plains Municipality. The geotechnical investigation included the existing lagoon dikes and land north of the existing lagoon cells, along the lagoon drainage ditch. This report outlines the findings of the geotechnical investigation conducted at the lagoon site and evaluates the soils to determine their suitability for use as cell liner material in the existing lagoon dikes and for the potential construction of an expansion cell, as well as any potential difficulties associated with the construction works, related to soil or groundwater conditions.

#### ***Gilbert Plains Lagoon Sludge Assessment, Assiniboine Injections Ltd., October 2015***

This report outlines the biosolids survey of the existing primary cells that was completed by probing the sludge layer with a measuring pole from a boat. The grid measurements, average thicknesses and total volumes of sludge are presented in this sludge assessment.

### **1.6.3 Other Reference Documents**

#### ***Village of Gilbert Plains – Proposed Wastewater Stabilization Pond Expansion – Submission to the Clean Environment Commission, AJ Poetker and Associates Ltd., October 1987***

This CEC submission outlines the construction works for the expanded lagoon storage cell that was built in 1988.

#### ***Order No. 1143 of the Clean Environment Commission under the Clean Environment Act, January 1988***

This license outlines the operating requirements of the previously expanded wastewater treatment lagoon. The Municipality of Gilbert Plains wastewater lagoon currently operates under this license.

#### ***Gilbert Plains Wastewater Stabilization Pond Expansion – Record Drawings, AJ Poetker and Associates Ltd., January 1988***

This set of record drawings was prepared following the lagoon expansion.

***Terrestrial Ecozones, Ecoregions and Ecodistricts of Manitoba, An Ecological Stratification of Manitoba's Natural Landscapes, R.E. Smith, H. Veldhuis, G.F. Mills, R.G. Eilers, W.R. Fraser and G.W. Lelyk. Lands Resources Unit, Brandon Research Centre, Research Branch, Agriculture and Agri-Food Canada, 1998***

This public technical bulletin was referenced for information regarding the existing environment in the project area, described below in section 3.

## 2.0 DESCRIPTION OF THE DEVELOPMENT

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

### 2.1 Land Title/Location

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

The existing Gilbert Plains wastewater treatment lagoon is located in SW 15-25-22 WPM and NW 10-25-22 WPM, approximately 400 m east of the Town of Gilbert Plains, Manitoba. The Municipality owns the land the lagoon is located on, which is a valley with steep slopes to the east and west. The adjacent lands to the north, east and west are mostly forested, with a low-lying marshland to the south. The location of the existing lagoon cells is shown on Plan 1 in Appendix D.

The parcels of land proposed to be used for land application of biosolids are located within NE, NW and SW of 02-25-22 WPM. These land sections are owned by various individuals who have agreed to the land application program. The certificates of title for each of the receiving lands are included in Appendix A.

### 2.2 Existing Land Use

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

The land is being used as an active wastewater treatment lagoon servicing the residents in the Town of Gilbert Plains and the surrounding Municipality. The lagoon access road is located to the west along with a sports field, and the Valley River is located to the north of the lagoon. To the east, the access road runs through the lagoon site to a firing range, and further to the east are agricultural fields.

The land to be used for sludge application is currently used for agricultural crop production; typically canola has been cultivated in recent years. Land use agreements between the land owners and the Municipality have been included in Appendix A.

### 2.3 Description of Development

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

The proposed development will involve:

- The removal and land application of approximately 15,000 m<sup>3</sup> of biosolid material from the Town of Gilbert Plains wastewater treatment lagoon Primary Cells.

- The biosolid material from Primary Cells 1 and 2 will be land applied based on appropriate agronomic rates calculated for the agricultural fields identified. All of the agricultural fields are located within 02-25-22 WPM, located approximately 2.5 km to the southeast of the lagoon. The main components and activities of the project are described in the sections below.

### 2.3.1 Project Activities Completed to Date

- Biosolid quality was assessed through laboratory testing conducted in August 2016 for samples from each of the lagoon Primary Cells.
- Parcels located at Stoughton Seed Farms have been identified as potentially suitable receiving agricultural lands for the biosolids application.
  - Land use agreements have been acquired from the respective land owners of each parcel (Appendix A).
  - A review of environmental considerations for these lands included: agricultural capability, nutrient management requirements and distance from sensitive areas.
  - Based on anticipated residual soil fertility levels and phosphorus crop uptake and removal, it is estimated that a minimum of 60 hectares of agricultural land will be required. The receiving parcels consist of annual croplands used to produce oil seeds, typically canola in recent years.
  - Soil nutrient parameters were assessed in October 2016. Background metals content and soil nutrient parameters will be re-assessed through a field sampling program and laboratory analytical testing approximately three weeks prior to land application of biosolid materials.
- Based on the soil and biosolid analytical results, agronomically appropriate application rates for the lands receiving these materials have been calculated. These rates may be adjusted upon review of the laboratory results prior to application.

### 2.3.2 Future Project Activities

- The biosolid materials will be collected, pumped or dredged using heavy equipment, then placed into tanker trucks and transported to the receiving land location(s). Direct pumping of sludge with a temporary pipeline to the farmland is also being considered.
- These materials will then be injected or surface applied to the parcels of land at the prescribed agronomic rates for biosolid material from each of the Primary Cells.
- Surface applied biosolid materials will be incorporated into the soil sub-surface for each parcel of land through cultivation within 48 hours of application.
- Appropriate record keeping for load application by parcel and on-site monitoring of the application program will be completed as per the license requirements.

### 2.3.3 Project Schedule

The sludge removal works are proposed to begin upon receipt of the Environment Act Licence with site works beginning in the spring of 2017 prior to seeding or in the fall of 2017 post harvest.

## 2.4 Sludge Removal and Disposal

### 2.4.1 Sludge Quantity and Quality Assessment

For the sludge quantity assessment, Assiniboine Injections Ltd. completed a sludge survey of each of the primary cells in February 2015 and summarized the assessment in a report dated October 13, 2015. The measurements were obtained by sampling on a boat in each of the cells. The sludge assessment of Primary Cell 1 indicated a sludge accumulation of 9,720 m<sup>3</sup>, with a sludge thickness ranging from 0.3 m to 1.5 m. The thickest accumulation (1.5 m) of sludge was near the pipe inlet, while the average sludge thickness throughout the cell was 0.55 m. The sludge assessment of Primary Cell 2 indicated a sludge accumulation of 4,965 m<sup>3</sup>, with a sludge thickness ranging from 0.025 m to 0.6 m. The thickest accumulation (0.6 m) of sludge was in the southeast corner, near the intercell pipe, while the average sludge thickness throughout the cell was 0.27 m.

Representative sludge samples were submitted to ALS for laboratory testing in August of 2016. Table 2.1 below presents selected key parameters for each of the cells. See Appendix C for the sludge assessment report completed by Assiniboine Injections Ltd. and detailed ALS test results.

**Table 2.1 – Selected Sludge Sampling Test Results**

Miscellaneous	Units	Primary Cell 1	Primary Cell 2
Available Nitrate-N	mg/kg	<3.0	<1.0
Total Nitrogen by LECO	%	1.69	0.137
Available Ammonium-N	mg/kg	1920	69.1
Total Organic Nitrogen	%	1.30	0.135
Total Kjeldahl Nitrogen	%	1.49	0.142
Available Phosphate-P	mg/kg	136	22.9
Available Potassium	mg/kg	393	166
Total Solids (TS)	%	9.14	77.1
Total Volatile Solids (TVS)	%	41.8	2.78
Metals	Units	Primary Cell 1	Primary Cell 2
Arsenic (As)	mg/kg	4.95	4.93
Cadmium (Cd)	mg/kg	1.83	0.452
Chromium (Cr)	mg/kg	17.9	16.8
Copper (Cu)	mg/kg	373	21.3
Lead (Pb)	mg/kg	40.4	7.0
Mercury (Hg)	mg/kg	0.439	0.0492
Nickel (Ni)	mg/kg	27.0	20.1
Zinc (Zn)	mg/kg	420	55.4

Based on review of the sludge parameters, the sludge from Primary Cell 2 generally has lower nutrient levels and lower metal concentrations than Primary Cell 1. The total solids content of

Primary Cell 2 sludge was reported at 77.1%, which is abnormally high for lagoon sludge. Calculations for the land requirements of the sludge application were based on a typical solid content of 15%.

## 2.4.2 Sludge Disposal

The most common options for the removal and disposal of sludge from a wastewater lagoon are land application/injection with tilling, or drying and disposal at a landfill site. Based on previous discussions with Manitoba Sustainable Development, the preferred method of sludge disposal would be incorporation into soil for beneficial re-use of nutrients on agricultural fields. Disposal of sludge to a landfill would typically only be considered if land application was not a reasonable option, which is not the case for Gilbert Plains. The following sections include a detailed description of the sludge disposal procedure.

### 2.4.2.1 Land Application

#### *Description of Methodology*

The method of sludge removal and disposal will include dredging sludge from the lagoon cells into tanker trucks. After hauling to the proposed land application site, the trucks or other heavy equipment will then surface apply or inject sludge to the fields at the approved loading rates. If applied to the surface, the fields will then be tilled to incorporate the sludge into the soil. For this methodology, the sludge would require a maximum of 7% solids to be pumped from the lagoon cell into the trucks.

Alternatively, sludge could be dredged from the lagoon cells and pumped directly to the agricultural fields for surface application or injection into the soil. The sludge would require a solids concentration of 3 - 6% for this method, to pump the sludge over approximately 3 km to the land application site. A temporary pipeline would be utilized to transport the sludge, which would be placed along ditches and through road culverts to reach the site. Appropriate approvals would be obtained to cross the rail line and PTH 5 if this method was selected.

Land application of sludge from municipal sewage lagoons in Manitoba must comply with the requirements of the Manitoba Nutrient Management Regulation 62/2008, under The Water Protection Act. Guidelines for sludge removal and disposal are also described in *The Environmental Requirements for Treatment and Disposal of Biosolids in Manitoba* by Mike Van Den Bosch, P.Eng., Municipal and Industrial Approvals, Manitoba Environment (undated).

#### *Nutrient Management Zone*

The following table shows the land classification and Nutrient Management Zone for the land parcels to the southeast of the lagoon and south of PTH 5, based on the Canada Land Inventory Soil Capability mapping for the Gilbert Plains Region, and the *Nutrient Management Regulation 62/2008*.

**Table 2.2 – Soil Classification and Nutrient Management Zone**

Land Location	Soil Classification	Nutrient Management Zone
NE, NW and SW 02-25-22 WPM	2x [Class 2 with minor cumulative limitations]	N1

With a Nutrient Management Zone designation of N1, the residual concentration of nitrate nitrogen within the top 0.6 m of soil at the end of the growing season, at any place within the application area, shall be no greater than 157.1 kg/ha.

#### 2.4.2.2 Land Application Rates

##### *Land Application Rates – Nitrogen*

The document *Environmental Requirements for Treatment and Disposal of Biosolids in Manitoba* indicates that the amount of plant available nitrogen (PAN) added to the land from all sources should not exceed 100 kg/ha during any given year when biosolids are applied. The document defines plant available nitrogen as:

PAN = 20% of the organic nitrogen-N + 100% of the ammonia-N + 100 % of the nitrate-N

The following table provides calculations on the PAN for the sludge in the primary cells.

**Table 2.3 – Land Application Rates - Nitrogen**

Parameter	Unit	Primary Cell 1	Primary Cell 2
Sludge Volume	m <sup>3</sup>	9,720	4,965
Sludge Volume for calculations (+10%)	m <sup>3</sup>	10,692	5,462
Total Solids	%	9.14	15*
Dry Tonnes Biosolids Available	tonne	977	819
Total Nitrogen by LECO	mg/kg	16,900	1,370
Available Nitrate-N	mg/kg	<3.0	<1.0
Available Ammonium-N	mg/kg	1920	69.1
Total Organic Nitrogen	%	1.30	0.135
Total Organic Nitrogen	mg/kg	13,000	1,350
Plant Available Nitrogen (PAN)	mg/kg	4523	340
Plant Available Nitrogen (PAN)	kg/tonne	4.523	0.340
Total PAN From Sludge	kg	4420	279
Land Required at 100 kg PAN/ha	ha	44.2	2.8
<b>Sludge Application Rate</b>	<b>dry tonnes/ha</b>	<b>22</b>	<b>294</b>

\*Total solids based on typical sludge parameters.

Based on the PAN from Primary Cell 1, sludge can be applied at a rate of 22 tonnes/ha. If sludge was applied at a solids concentration of approximately 7%, a volume of 13,961 m<sup>3</sup> of sludge would be applied at an application rate of 316 m<sup>3</sup>/ha.

Based on the PAN from Primary Cell 2, sludge can be applied at a rate of 294 tonnes/ha. If sludge was applied at a solids concentration of approximately 7%, a volume of 11,703 m<sup>3</sup> of sludge could be applied at a maximum application rate of 4,200 m<sup>3</sup>/ha. For practicality of operations, sludge from Primary Cell 2 will be applied over a larger area and with a decreased application rate of 836 m<sup>3</sup>/ha or 59 dry tonnes/ha. The area of available land is more than sufficient to accommodate this adjustment.

### Land Application Rates - Phosphorus

The following table shows the phosphorus loading rates based on the application rate determined above for PAN.

**Table 2.4 – Land Application Rates - Phosphorus**

Parameter	Unit	Primary Cell 1	Primary Cell 2
Available Phosphate-P	mg/kg	136	22.9
Available Phosphate-P	kg/tonne	0.136	0.023
P <sub>2</sub> O <sub>5</sub> Equivalent (2.3x P)	kg/tonne	0.3128	0.05267
Available P <sub>2</sub> O <sub>5</sub> * (50% available)	kg/tonne	0.1564	0.026335
Sludge Application Rate (Calculated based on PAN)	dry tonne/ha	22	294
Phosphorus (P <sub>2</sub> O <sub>5</sub> ) Application Rate	kg/ha	3.44	7.74

\*Note: According to the *Process Design Manual Land Application of Sewage Sludge and Domestic Septage* by the United States EPA, 1995 the majority of P in sewage sludge is present as inorganic compounds and approximately 50% is available for plant uptake as the P normally applied in commercial fertilizers.

The allowable phosphorus application rate is determined based on the background phosphorus levels in the soils as per the following:

- If soil test phosphorus levels are 120 mg/L or less: phosphorus may be applied at two times the applicable phosphorus removal rate
- If soil test phosphorus levels are 120 - 180 mg/L, phosphorus may be applied at the applicable phosphorus removal rate.

The phosphorus removal rate is determined by the type of crop to be planted in the field. A chart with typical removal rates is available in the *Manitoba Soil Fertility Guide*, 2007. Phosphorus removal rates vary from 16 kg/ha to 85 kg/ha depending on the crop type. A crop removal rate of 37 kg/ha of P<sub>2</sub>O<sub>5</sub> was used for calculations based on the low end of uptake for a 35 bu/A canola crop which ranges between 37 - 45 kg/ha according to the *Manitoba Soil Fertility Guide*, 2007.

Laboratory analysis of soils from the agricultural fields determined that phosphorus levels in the upper 150 mm of soil is 39 lb/acre which corresponds to a P concentration of 19.5 mg/L assuming a soil bulk density of 1.5 kg/m<sup>3</sup>. The background phosphorus concentration is less than 120 mg/L, which would allow

phosphorus to be applied at two times the crop removal rate or 74 kg/ha of available P<sub>2</sub>O<sub>5</sub>. Based on the phosphorus application rate determined based on the N limits, Phosphorus will not be a limiting factor for the sludge application rate.

### Land Application Rates - Heavy Metals

The sludge application rates also cannot exceed heavy metal concentrations recommended by Canadian Soil Quality Guidelines.

**Table 2.5 – Land Application Rates - Metals**

Metal	Primary Cell 1		Primary Cell 2		Cumulative Rate Allowed by Regulation (kg/ha)
	mg/kg	Metal Loading Rate Based on 22 dry tonnes/ha (kg/ha)	mg/kg	Metal Loading Rate Based on 294 dry tonnes/ha (kg/ha)	
Arsenic (As)	4.95	0.1089	4.93	1.4494	21.6
Cadmium (Cd)	1.83	0.04026	0.452	0.1323	2.5
Chromium (Cr)	17.9	0.3938	16.8	4.9392	115.2
Copper (Cu)	373	8.206	21.3	6.2622	113.4
Lead (Pb)	40.4	0.8888	7.0	2.058	126
Mercury (Hg)	0.439	0.009658	0.0492	0.014465	11.9
Nickel (Ni)	27	0.594	20.1	5.9094	90
Zinc (Zn)	420	9.24	55.4	16.2876	360

Background soil metal concentrations have not yet been determined and cumulative levels (background soils and sludge levels) would need to be below the regulated values as described in the above table. The metal concentrations in the sludge are significantly lower than the allowable rates and it is not anticipated that the metal concentrations will affect the allowable sludge application rate. This will be confirmed prior to land application.

At the receiving lands, the background soil conductivity is low at 0.1 dS/m. The analysis for background metal concentrations will include soluble ions such as Ca, Mg, Na, Cl, K and S to confirm that the receiving fields are not at risk for salinization. Due to the limited application of biosolids, it is not expected that any significant salinization will occur.

### Setbacks and Regulations

The Environmental Requirements for Treatment and Disposal of Biosolids in Manitoba document and recent Environment Act Licences issued for similar municipal sludge land application projects were reviewed. The following setbacks to various items would be required for land applications:

- Land (for application) must be 300 m from any occupied residence (other than owner of land where sludge is to be applied).
- Land (for application) must be 1,000 m from a residential area.
- Land (for application) must:
  - be 15 m from first order waterway, 30 m from second order waterway and 50 m from a groundwater well
  - be greater than 100 m from an identifiable boundary of an aquifer, which is exposed to the ground surface
  - not be subject to flooding
  - not be classified as N4 as per the Nutrient Management Regulation
  - not have depth of clay or clay till less than 1.5 m between the soil surface and the water table.

All the above setbacks can be met by the proposed lands for sludge application.

The following additional requirements would also apply:

- Surface slope must be less than 5%.
- There must be a written agreement between the landowner and the Municipality.
- Cattle pasture not permitted for three years from the date of sludge application.
- One of the following crops must be planted at the commencement of the next growing season, following sludge application, and only these crops permitted to be grown for a period of three years from date of sludge application:
  - a cereal crop
  - a forage crop
  - an oil seed crop
  - field peas
  - field beans
  - lentils.
- Annual reporting by the Licensee is required for a period of three years after biosolids application, which describes the levels of nitrate-N and phosphorus, additional nutrients provided and cropping information.

All the above requirements can be met by the proposed lands for sludge application and the restrictions are discussed in the land use agreement.

The following additional parameters must also be met:

- Soil pH must be greater than 6.0, prior to sludge application.
  - Based on initial soil testing the pH ranged from 8.2 – 8.4.
- Nitrate-Nitrogen level must not exceed 100 kg/ha in the upper 60 cm of soil, prior to nutrient application.
  - The background nitrogen levels in the soil were a maximum of 13 lb/acre from 0.15 m to 0.3 m which corresponds to 14.6 kg/ha.
- Sodium bicarbonate extractable phosphorus as P must not exceed 60 ppm in the upper 15 cm of the soil.
  - The background P level in the soil is 19.5 ppm.

As discussed above, all the above setbacks and requirements can be met by the proposed lands for sludge application.

#### **2.4.2.3 Summary of Land Requirements**

As discussed in the preceding sections the nitrogen application rate will be the limiting factor in the sludge application and a minimum of 60 hectares will be required for sludge application.

## 3.0 DESCRIPTION OF EXISTING ENVIRONMENT IN PROJECT AREA

### 3.1 Biophysical Environment

The proposed project area is located in the Grandview Ecodistrict of the Aspen Parkland Ecozone, which is a part of the Prairies Ecozone (Smith, et al. 1998).

#### 3.1.1 Climate

The Grandview Ecodistrict is located in a moist subdivision of the Grassland Transition Ecoclimatic Region. The climate is marked by short, warm summers and long, cold winters with a mean annual temperature of 1.2°C (Smith, et al. 1998). The average crop growing season is 173 days with approximately 1,470 growing degree-days. Mean annual precipitation is approximately 500 mm, of which over one quarter falls as snow. The Grandview Ecodistrict has a moderately cold, subhumid and Cryoboreal soil climate with an average yearly moisture deficit of approximately 140 mm (Smith, et al. 1998).

#### 3.1.2 Physiography and Drainage

The project area is located within the erosional gap between Duck Mountain and Riding Mountain, above and to the west of the Manitoba Escarpment. The physiography ranges from smooth, level glaciolacustrine plain to moderately sloping morainal plain with slopes ranging from level to about 10 percent in the morainal areas. The mean elevation in the area is approximately 345 metres above sea level (masl). The overall slope in the area drops eastward from the west boundary, and rises to the north and south from the Valley River, which runs eastward through the centre of the ecodistrict (Smith, et al. 1998).

The main drainage pathways for the area include the Valley River, which collects water from creeks originating in the adjacent mountains. The ecodistrict lies within the Dauphin River watershed, which is part of the Nelson River drainage system that drains into Hudson Bay (Smith, et al. 1998). Within the parcels identified for land application, there is a stream which drains to the northeast through a series of meandering creeks, towards Ashville and into Dauphin Lake.

#### 3.1.3 Groundwater and Subsurface Conditions

Based on a review of the available geotechnical information and groundwater well logs in sections surrounding the proposed land application site, the soil profile in the area generally consists of a surface layer of clay, sandy clay or silty clay between 4 - 10 m thick. The clay is typically underlain by till, silt, or clay till, with the occasional lens of sand or gravel. Boulders and stones are found at greater depths, but bedrock was not encountered in any of the test holes or driller well logs reviewed.

There are no groundwater wells known to exist within the receiving lands of section 02-25-22 WPM, or within 50 m from the areas identified for land application. A database review of driller well logs in the surrounding parcels (Appendix C) indicates depth to groundwater table between

3.6 and 36 metres below ground. Given that this data is historical and spatially distant; few conclusions can be made regarding groundwater in the immediate project area. Based on information provided by the landowner there is a minimum of 1.5 m of clay or clay till between the surface and the groundwater table.

#### **3.1.4 Soils**

The soils in the Grandview Ecodistrict consist dominantly of well to imperfectly drained Black Chernozems that have developed on shallow, strongly calcareous, loamy sand to clayey glaciolacustrine sediments. These sediments overlay extremely calcareous glacial till, and on exposed till [Smith, et al. 1998]. At higher elevations, Dark Gray Chernozems are the dominant soils found on till. Throughout the ecodistrict, there are also local areas of poorly drained peaty Gleysolic soils, shallow mesic and fibric organic soils, as well as some imperfectly drained Gleyed Regosols found on alluvial sediments [Smith, et al. 1998].

The soils within the proposed receiving lands have been identified as a sandy loam for the upper 610 mm. The soil test results, included in Appendix C, indicate that the soil is deficient in nitrogen, with marginal phosphorus levels.

#### **3.1.5 Vegetation**

The extent of natural vegetation in the Grandview Ecodistrict has been reduced significantly by agricultural crops. Most of the native parkland vegetation consisted of trembling aspen and balsam poplar with willow, dogwood and hazel shrub undergrowth, interspersed with grass and herb vegetation, or sedges and reeds in poorly drained low-lying areas. White spruce can be found in the upland forests of Duck and Riding Mountains, while tamarack and black spruce are found in peaty areas [Smith, et al. 1998].

#### **3.1.6 Wildlife Species**

Habitat for wildlife species is limited within ecodistrict due to the predominance of agricultural crops. The local wooded areas that remain in pockets provide habitat for white-tailed deer, black bear, ruffed grouse and various waterfowl species.

#### **3.1.7 Surface Water Bodies**

With the exception of the meandering stream running through SW, SE and NE of 2-25-22 WPM [See Plan 1, Appendix D], there are no natural lakes or rivers within the immediate project areas.

#### **3.1.8 Aquatic Life**

Aquatic life in the project area is restricted to the inhabitants of the narrow vegetated buffer strips immediately adjacent to the drainage stream running through the parcels of agricultural land. Species in the area may include frogs, snakes, turtles and various species of waterfowl. It is also possible that the stream contains some minnow and fish species that may be entering upstream from larger bodies of water.

## **3.2 Potential Species of Concern**

A request was made to the Manitoba Sustainable Development Wildlife Branch on December 15, 2016 with respect to the presence of vulnerable or protected species in the project areas, namely Section 2, Township 25, Range 22 W1. Chris Friesen, Coordinator at the Manitoba Conservation Data Centre, was able to verify that no rare species are currently known to exist in the area. The e-mail correspondence is attached in Appendix B.

## **3.3 Parks and Protected Areas**

There is a sports park to the west of the Gilbert Plains lagoon, as well as a shooting range to the east. There are several community green spaces within the town, and a golf course to the west. Based on the activities to be conducted in the project areas, there were no protected areas or designated wildlife areas identified.

## **3.4 Socioeconomic Environment**

### **3.4.1 Population**

The settled populations within and adjacent to the project study area include the town of Gilbert Plains with a population of approximately 830 individuals.

### **3.4.2 Existing Land and Resource Uses**

The quarter sections of land that will be receiving biosolid materials are classified as agricultural and have been used for the production of oilseeds, typically canola. The nearest residence is located on the northwest section of the property, and there is a meandering creek that runs through the entire mile section. All appropriate setback distances will be applied as required for adjacent and neighboring land use.

### **3.4.3 Heritage Resources**

A request was made to the Manitoba Historic Resources Branch (MHRB) on December 15, 2016 with respect to the location of heritage resources within the project areas including Section 2, Township 25, Range 22 W1. Suyoko Tsukamoto, Impact Assessment Archaeologist with the MHRB checked the records and confirmed that there are no heritage resources or archaeological sites known to exist within the project location. The e-mail correspondence is attached in Appendix B.

### **3.4.4 First Nation Communities**

No First Nation communities are located within the project study area and no lands owned by First Nations are included in the development.

## 4.0 POTENTIAL ENVIRONMENTAL IMPACTS

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

### 4.1 Impacts to Surface Water and Groundwater

Regarding land application of biosolid materials, one of the primary concerns is the contamination of surface water or groundwater through the leaching and/or runoff of nitrogen and phosphorus. This can occur if nutrient application rates exceed the crop removal rates and soil storage capacity.

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

Pollutants in the form of petroleum hydrocarbons may also be released into surface or ground water from potential equipment leaks or fuel spills during project operations. Leaching of pollutants to surface water or groundwater is a concern given the nearby stream running through the parcels selected for land application

### 4.2 Soil Impacts

#### 4.2.1 Metals

Overloading of heavy metals into soils can occur if the cumulative weight criterion for metals (background soil levels + loading rates from biosolids) exceeds the concentrations permitted by the Canadian Soil Quality Guidelines.

#### 4.2.2 Salinity

The biosolid materials may be considered saline, and as such may cause an environmental risk for soil salinization, since the electroconductivity and concentrations of soluble ions will increase directly with the rate of application. The biosolids from Primary Cell 1 are considered to be slightly saline (2.1 dS/m), while the biosolids from Primary Cell 2 are considered to be strongly saline (32 dS/m).

#### 4.2.3 Soil Compaction

Heavy equipment traffic can lead to soil compaction, which is the adhering of soil particles and loss of pore spaces that allow transport of air, water, ions and nutrients throughout the soil. This increase in soil density can affect various stages of crop growth, including seedling emergence, root distribution and the overall yield. The sandy loam soil texture identified in the receiving lands is somewhat susceptible to physical compaction due to the presence of clay particles and the range of pore sizes within the soil. Soil compaction may occur at points of access/egress for equipment used to surface apply/inject biosolids within the parcels identified for land application.

### **4.3 Wildlife**

The lagoon site is located in the Aspen Parkland Ecozone, within the Prairies Ecozone of Canada. Characteristic wildlife in the region includes white-tailed deer, coyote, red fox, ground squirrel, cottontail rabbit, hare, striped skunk, reback vole and deer mice. Bird species include various hawks, mourning dove, black billed magpie, red-winged blackbird, killdeer, meadowlark and various species of ducks and waterfowl (Smith, et al. 1998).

Potential impacts to wildlife include habitat disruption and collisions between vehicles and wildlife.

### **4.4 Fisheries**

The potential impacts to fish within the local stream or downstream water bodies include nutrient loading from surface runoff. Given the nature of the project activities, sediments are not expected to be released into surface water.

### **4.5 Forestry and Vegetation**

There are no potential impacts to forestry or vegetation since the areas selected for land application have been previously cleared and used for agricultural crop production since then. As such, no potential forestry areas or endangered vegetative species would be impacted.

### **4.6 Air Quality**

There is potential for greenhouse gas emissions caused by works associated with the land application program. Activities related to these emissions include the operation of heavy equipment used for removal, transportation, and application of the biosolids. The incorporation of biosolids into agricultural lands will reduce the amount of greenhouse gases that would otherwise be produced through landfill disposal.

The effects of odour associated with sludge removal and land application may cause a temporary reduction in air quality with nuisance odour effects. There is also a potential for impacts from dust generation during truck hauling, if conditions are dry and windy. This can be mitigated by temporary dust control measures if required.

### **4.7 Noise Impacts**

There is a potential for noise impacts in the immediate area of the lagoon due to the heavy equipment utilized to remove and pump the sludge. The vehicles used to haul biosolids to the designated lands will have potential to impact residents along the travel route. The equipment used for land application or injection will also have potential noise impacts for the nearest local residents.

#### **4.8 Public Health and Safety**

There is a potential for impacts to the health and safety of workers and the public during the biosolid application works, as heavy equipment will be utilized within the Municipality, at the lagoon and the receiving farmlands. There is also a health risk associated with public exposure to biological pathogens known to exist in lagoon biosolids.

#### **4.9 Heritage Resources**

Since the parcels identified for land application are agricultural lands, they do not contain any historic or heritage resources. The project will have no impact on any of these resources.

#### **4.10 Socio-Economic Implications**

The biosolids application program will provide positive economic benefits to both the agricultural crop producer(s) and the Town of Gilbert Plains. Providing a source of organic nutrients in the form of biosolids will increase the economic value of the agricultural lands. Nutrients are typically added through the application of fertilizer prior to planting. By increasing the nitrogen, phosphorus and other nutrients in the soil, requirements for inorganic fertilizer will be reduced for the next crop. As such, the cost of fertilizing is reduced by increasing the economic value of the land. The use of organic nutrients over petroleum based fertilizers also reduces the amount of greenhouse gases produced by agricultural production. There will be no payment of land use fees to the farm producer, whereas landfill disposal would incur additional costs for the Municipality.

It should also be noted that the removal of biosolids from the existing Gilbert Plains lagoon will have a positive effect on the Municipality's wastewater collection and treatment system, by increasing the hydraulic and organic storage capacities of the existing lagoon Primary Cells.

## 5.0 MANAGEMENT PRACTICE

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

### 5.1 Mitigation of Impacts to Water

When applied at the prescribed application rates, the land application of biosolids is a sustainable means to reuse nutrients within an agricultural system. The application of biosolid organic material provides benefits to land used for agriculture by enhancing the water holding capacity, soil structure, tilth and nutrient levels. The prescribed application rates target the uptake ability of the crops to a maximum of 100 kg/ha without exceeding the nutrient management regulatory criteria in zone N1. The application of biosolid materials at the appropriate rates determined in Section 2.4.2.2 above will ensure crop uptake of these nutrients throughout the growing season, thus reducing the potential for leaching. Direct injection of biosolids will eliminate the potential for overland flow of contaminants, whereas the incorporation of biosolids within 48 hours of application will also minimize the potential of leaching and overland flow to groundwater wells.

Prior to application, the appropriate setback distance will be established around the local drainage stream, as well as any other drainage pathways, wetlands, or domestic wells in the area. This will minimize the potential of overland surface runoff into downstream water bodies or groundwater wells.

#### *Surface Water*

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

- Diesel or gasoline should be stored in double walled tanks or have containment dikes around fuel containers for volumes greater than 68.2 L (15 gallons) or in compliance with provincial regulations
- Clean up material should be available at the site, consisting of a minimum of 25 kg of suitable commercial sorbent, 30 m<sup>2</sup> of 6 mil PVC, and an empty fuel barrel for spill collection and disposal
- Fuel storage and hazardous material areas established for project construction should be located a minimum of 100 m from a water body, and comply with provincial regulations
- Waste hazardous materials from construction activities and equipment must be properly collected and disposed of in compliance with provincial regulations
- Hazardous material handling and storage are to follow all provincial and federal regulations including WHMIS and spill containment requirements
- In the event of spills or leaks of fuels and hazardous materials, the contractor or operator should notify the project engineer and provincial authorities.

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

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

### *Groundwater*

The potential for groundwater contamination is minimal, given the soil conditions at the site selected for land application. The upper 2 feet of soil in these parcels consists of a sandy loam, which will allow some vertical infiltration of surface water. However, most domestic wells in the surrounding areas draw water from a sand/gravel aquifer that is overlain by layers of clay and/or clay till that act as permeability barriers to any contaminants that have seeped through the uppermost layers.

Mitigation of potential impacts to groundwater during the lagoon upgrading activities from fuel handling, equipment leaks or fuel spills, would follow the same procedures as described above for surface waters. In summary, Contractors will ensure that equipment is in good condition and proper working order prior to carrying out land application on the agricultural fields, and the appropriate setback distances will be established around all streams, residences and domestic wells.

## **5.2 Mitigation of Impacts to Land**

### *Metals*

To prevent overloading of heavy metals into soils, the prescribed application rates provide cumulative weight criteria for metals that are below the permitted concentrations. The loading rates for heavy metals in the biosolids from each of the lagoon cells have been determined based on the corresponding theoretical maximum application rates determined in Section 2.4.2.2 above. These heavy metal loading rates to the soil in the land application areas are all below the cumulative weight criteria.

### *Salinity*

The receiving lands for biosolids application are non-saline (0.1 dS/m), while the biosolids from the lagoon may be considered saline. Sludge will be removed and applied at lower solids content than test results have indicated. Therefore, the salinity of the applied biosolids will also be lower. Additional soil testing prior to application will include soluble ions to confirm that the receiving fields are not at risk for salinization.

Due to the limited application of biosolids, the low background salinity levels, the mitigation described above, no significant adverse impacts due to accumulation of salts within the receiving lands are expected.

### *Soil Compaction*

The field entrances are typically used by the local farmer with heavy equipment for crop production and harvesting. As such, soil compaction in these areas is not a significant concern. However, should the land owners have concerns with the potential soil compaction, entrances to the field can be ripped during

tillage operations to mitigate any compaction. It should also be noted that the field equipment utilized to complete direct injection of biosolid material into agricultural fields is capable of doing so with minimal soil compaction and run off potential. The direct injection method also maximizes the absorption of the applied nutrients. Should alternate methods be used, such as surface application followed by deep tillage, the field equipment will be equipped with large tires or tracks to minimize the potential for soil compaction.

### **5.3 Mitigation of Impacts to Wildlife**

The impact to habitat is considered to be insignificant since the land application site is currently cultivated land with minimal natural vegetation available as habitat. The project will likely take place in the fall, outside of the bird breeding period. Vehicle and equipment traffic required for the transportation of biosolids from the lagoon to the agricultural fields will be below posted speed limits, in order to reduce the possibility of wildlife collisions.

### **5.4 Mitigation of Impacts to Fisheries**

The potential impact to downstream fisheries is addressed by the above mitigation measures described in Section 5.1. Since the biosolid material will be applied at agronomically appropriate rates and incorporated into the soil within 48 hours of application, the potential for overland flow to carry nutrients into the stream is minimal. The appropriate setback distance from the local stream will also be established and maintained throughout the land application works.

### **5.5 Mitigation of Impacts to Forestry and Vegetation**

Land application will take place on previously cleared, cultivated land only. The vegetated buffer strips surrounding the stream and residence located within 02-25-22 WPM will be excluded from the lands receiving biosolids.

### **5.6 Mitigation of Impacts to Air**

The dredging and removal of sludge from the lagoon will create an odour nuisance for the community of Gilbert Plains. Given that the lagoon site is located in a low-lying valley surrounded mostly by trees, the impacts to odour during sludge removal are expected to be local in nature. In fact, the removal of sludge from the lagoon is expected to minimize the long term odour impacts associated with sludge accumulation and over-loaded cells.

The residences adjacent to the proposed receiving fields are all beyond the residential setback distance (300 m) required for biosolids application projects. Odour related impacts are not expected to affect these residences. Emissions from construction equipment and transport vehicles will be controlled through regular maintenance by the contractor, and will meet all provincial and local standards. Dust suppression methods (i.e. water spraying) will be utilized at the construction site if dry and windy conditions create excessive dust, which becomes a nuisance to nearby residents.

## **5.7 Mitigation of Noise Impacts**

To minimize the potential for noise impacts, construction equipment and transport vehicles would have mufflers working properly, and project activities would be limited to daylight hours only. Adjacent residences will be notified of the proposed sludge hauling and application schedule.

## **5.8 Mitigation of Impacts to Health and Safety**

To minimize impacts to health and safety of workers and the public, the construction specifications should state that the contractor have a safety program in place, in accordance with all federal and provincial health and safety regulations. During construction, site access will be limited to the construction crew only. Personal protective equipment will be worn in accordance with the contractor's safety program.

The health and safety risks associated with biological pathogens such as coliforms are minimal. Potential impacts to the public will be mitigated by adhering to the license requirements for transportation of biosolids. The private farmlands have restricted public access, and the incorporation of biosolid material by direct injection or within 48 hours of surface application will minimize any odours and any potential for human exposure to pathogens.

The uptake and bioaccumulation of heavy metals in crops harvested for human consumption is also negligible, due to the metal loading rates of the biosolid materials that are well below the cumulative application rates recommended by Canadian Soil Quality Guidelines.

## **5.9 Mitigation of Impacts to Heritage Resources**

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

## 6.0 RESIDUAL AND CUMULATIVE EFFECTS

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

No negative residual effects are anticipated through the sludge removal and land application works, due to the mitigation measures described above. Positive residual effects are expected from the de-sludging of the wastewater treatment lagoon, which will restore the hydraulic capacity of the primary cells. The incorporation of organic nutrients in the agricultural fields is also expected to create positive residual effects by reducing the demand for fertilizer at the receiving farmlands. No cumulative effects are anticipated from other construction works in the area.

## 7.0 MONITORING AND FOLLOW-UP

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

Field monitoring and reporting of the biosolids removal and land application will be conducted by the Contractor, who will determine the volume and solids content of biosolids removed and applied on a daily basis, as well as the area of applied biosolids. Appropriate record keeping for load application by parcel and on-site monitoring of the program will be completed throughout the sludge disposal operations. A report of the field monitoring program will be submitted to Manitoba Sustainable Development following project completion. The report will include information and test results as required by *Environmental Regulations for Treatment and Disposal of Biosolids in Manitoba*. Restrictions will apply with respect to land use at the receiving fields for three years following the biosolids application. The Municipality and Land Owners will be responsible for adhering to the requirements of the Environment Act Licence.

## 8.0 FUNDING AND APPROVALS

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

Partial funding for the project works are being sought from the Manitoba Water Services Board. Other than the Environment Act Licence, no additional approvals, licences or permits are anticipated for the lagoon sludge removal and land application.

## 9.0 PUBLIC CONSULTATION

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

Public consultation by the Municipality has not been conducted to date for the residents of Gilbert Plains. Public comments will be received by Manitoba Sustainable Development through the public registry during the Environmental Act Proposal review period.

## 10.0 CONCLUSION

Based on the design of the project and the implementation of the mitigation measures identified in Section 5.0 above, no significant negative environmental impacts are anticipated.

The proponent would like to complete the requirements of the Environment Act Proposal as soon as possible so that the sludge removal and land application can be completed timely fashion.

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

## **APPENDIX**

### **Appendix A**

Land Use Agreement & Title – NE 02-25-22 W

Land Use Agreement & Title – NW 02-25-22 W

Land Use Agreement & Title – SW 02-25-22 W

### **Appendix B**

Manitoba Conservation Data Centre – Wildlife Branch, Manitoba Sustainable Development,  
December 22, 2016 Email Correspondence

Manitoba Sport, Culture and Heritage – Historic Resources Branch, December 19, 2016 Email  
Correspondence

### **Appendix C**

Sludge Assessment Report, Assiniboine Injections Ltd, October 13, 2015

Sludge Test Report, ALS Environmental, September 22, 2016

NutriMax Soil Test Report, October 28, 2016

Driller Well Logs

### **Appendix D**

Plan 1: Overall Site Plan

## **Appendix A**

Land Use Agreement & Title – NE 02-25-22 W

Land Use Agreement & Title – NW 02-25-22 W

Land Use Agreement & Title – SW 02-25-22 W

## Land Use Agreement

This land use agreement made in duplicate this 9 day of January, 2017;

BETWEEN: Gilbert Plains Municipality  
Box 220 Gilbert Plains, MB R0L 0X0

-And-

Robert Tokar, Nancy Tokar  
RR3 Gilbert Plains, MB R0L 0X0

The Municipality of Gilbert Plains requires agricultural land to apply sludge (biosolids) from the two primary cells at the existing Gilbert Plains Wastewater Lagoon. This is an agreement to allow land application to occur on the land parcel outlined below. The following outlines the points of this agreement for the prescribed land:

1. Each parcel of land will need to be soil sampled for nutrients, metals and salts. Soil sampling will be completed by truck or other required method. Soil test results are required for prescription of application rates.
2. Soil sampling may need to occur more than one occasion and will occur prior to spring seeding or post-harvest.
3. Land application of sludge will be completed with heavy field equipment and will need good access to the land parcels after crop harvest or prior to spring seeding.
4. If applicable, buffer zones may be left with no biosolid application near property lines, homes, groundwater wells and surface water features as required by the Manitoba Environment Act.
5. Sludge application will target appropriate agronomic crop uptake requirements.
6. Depending on the application method, sludge application may require tillage incorporation immediately after application.
7. There are no fees to be paid from the Municipality to the landowner for:
  - a. Sludge/biosolids or nutrients
  - b. Use of land
  - c. Application process
  - d. Tillage requirements
8. The landowner releases and forever discharges the Gilbert Plains Municipality, the employees and/or agents thereof, from and against any liability, claim or demand whatsoever arising out of the use of said land by the Gilbert Plains Municipality.
9. Volume of sludge is not exact, not all the land may be required for application.
10. The landowner has the right to pull out of the program, with sufficient notice (*6 weeks*).
11. Manitoba Sustainable Development imposes cropping restrictions, the following crops are allowed to be grown for 3 years after sludge application; cereal crops, oil seed crop, forage, field peas, field beans or lentils (including soybeans). Cattle pasture is also not permitted for 3 years after sludge application.

12. Manitoba Sustainable Development requires three years of follow-up soil sampling, access will be required for the subsequent three years, post-harvest. Soil sampling will be the responsibility of the Municipality.

Farm Producer Contact Information:

Name:	Robert Tokar
Mailing Address:	RR3 Gilbert Plains, MB R0L 0X0
Legal land location (quarter/section/township/range) for each parcel:	<b>NE 2-25-22W</b>
Phone #:	Home: 204-548-2805 Cell: 204- 648-7070
Fax/email:	
Crop to be planted:	2017: <i>corn</i> 2018: <i>wheat</i>

Land Owner Signature: *Robert Tokar*                      Date: *Jan 9/2017*  
 Robert Tokar

Land Owner Signature: *Nancy Tokar*                      Date: *Jan 9/2017*  
 Nancy Tokar

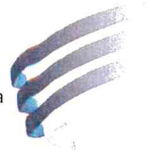
Municipality Signature: *[Signature]*                      Date: *Jan 9/2017*  
 PWM, Charles Jeffers

## STATUS OF TITLE

Title Number      **2224983/6**  
Title Status        **Accepted**  
Client File         **AJ**

## The Property Registry

A Service Provider for the Province of Manitoba



### 1. REGISTERED OWNERS, TENANCY AND LAND DESCRIPTION

ROBERT CHARLES MICHAEL TOKAR AND NANCY CAROL TOKAR  
BOTH OF GILBERT PLAINS IN MANITOBA

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

NE 1/4 2-25-22 WPM  
SUBJECT TO SPECIAL RESERVATIONS AS TO MINES AND MINERALS  
AS CONTAINED IN THE ORIGINAL GRANT FROM THE CROWN

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

### 2. ACTIVE INSTRUMENTS

Instrument Type:      **Caveat**  
Registration Number:   **26189/6**  
Instrument Status:     **Accepted**

Registration Date:     1964-10-19  
From/By:                INTER CITY GAS TRANSMISSION LTD.  
To:

Amount:  
Notes:                    AFF. AWL  
Description:              No description

### 3. ADDRESSES FOR SERVICE

ROBERT CHARLES MICHAEL TOKAR  
R.R.#3  
GILBERT PLAINS MB  
ROL 0X0

NANCY CAROL TOKAR  
R.R.#3  
GILBERT PLAINS MB  
ROL 0X0

<b>4. TITLE NOTES</b>	No title notes												
<b>5. LAND TITLES DISTRICT</b>	Dauphin												
<b>6. DUPLICATE TITLE INFORMATION</b>	Duplicate not produced												
<b>7. FROM TITLE NUMBERS</b>	68104/6                  Partial												
<b>8. REAL PROPERTY APPLICATION / CROWN GRANT NUMBERS</b>	No real property application or grant information												
<b>9. ORIGINATING INSTRUMENTS</b>	<table> <tr> <td>Instrument Type:</td> <td><b>Transfer Of Land</b></td> </tr> <tr> <td>Registration Number:</td> <td><b>1056496/6</b></td> </tr> <tr> <td>Registration Date:</td> <td>2007-05-22</td> </tr> <tr> <td>From/By:</td> <td>IVAN DOHAN</td> </tr> <tr> <td>To:</td> <td>ROBERT CHARLES MICHAEL TOKAR AND NANCY CAROL TOKAR</td> </tr> <tr> <td>Consideration:</td> <td>\$62,000.00</td> </tr> </table>	Instrument Type:	<b>Transfer Of Land</b>	Registration Number:	<b>1056496/6</b>	Registration Date:	2007-05-22	From/By:	IVAN DOHAN	To:	ROBERT CHARLES MICHAEL TOKAR AND NANCY CAROL TOKAR	Consideration:	\$62,000.00
Instrument Type:	<b>Transfer Of Land</b>												
Registration Number:	<b>1056496/6</b>												
Registration Date:	2007-05-22												
From/By:	IVAN DOHAN												
To:	ROBERT CHARLES MICHAEL TOKAR AND NANCY CAROL TOKAR												
Consideration:	\$62,000.00												
<b>10. LAND INDEX</b>	<p>NE 2-25-22W EX RES</p>												

CERTIFIED TRUE EXTRACT PRODUCED FROM THE LAND TITLES DATA STORAGE SYSTEM OF TITLE NUMBER 2224983/6



12. Manitoba Sustainable Development requires three years of follow-up soil sampling, access will be required for the subsequent three years, post-harvest. Soil sampling will be the responsibility of the Municipality.

Farm Producer Contact Information:

Name:	Murray Stoughton
Mailing Address:	RR3 Gilbert Plains, MB R0L 0X0
Legal land location (quarter/section/township/range) for each parcel:	<b>NW 2-25-22W</b>
Phone #:	Home: 204-548-4165 Cell: 204- 648-4523
Fax/email:	kstoughton@yahoo.com
Crop to be planted:	2017: <i>Canola</i> 2018: <i>wheat</i>

Land Owner Signature: *Murray Stoughton* Date: 17/01/04  
 Murray Stoughton

Land Owner Signature: *Karen Stoughton* Date: 17/01/04  
 Karen Stoughton

Municipality Signature: *[Signature]* Date: 17/01/04  
 PWM, Charles Jeffers

## STATUS OF TITLE

Title Number       **2630890/6**  
Title Status        **Accepted**  
Client File         **AJ**

**The Property Registry**

A Service Provider for the Province of Manitoba



### 1. REGISTERED OWNERS, TENANCY AND LAND DESCRIPTION

MURRAY CECIL STOUGHTON AND KAREN ISABEL STOUGHTON  
BOTH OF GILBERT PLAINS IN MANITOBA

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

THE NW 1/4 OF SECTION 2-25-22 WPM  
SUBJECT TO SPECIAL RESERVATIONS AS TO MINES AND MINERALS  
AS CONTAINED IN THE ORIGINAL GRANT FROM THE CROWN

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

### 2. ACTIVE INSTRUMENTS

Instrument Type:       **Caveat**  
Registration Number:   **26189/6**  
Instrument Status:     **Accepted**

Registration Date:     1964-10-19  
From/By:              INTER CITY GAS TRANSMISSION LTD.  
To:

Amount:  
Notes:                 AFF. AWL  
Description:          No description

Instrument Type:       **Mortgage**  
Registration Number:   **1087890/6**  
Instrument Status:     **Accepted**

Registration Date:     2012-08-13  
From/By:              SHAWN MICHAEL STOUGHTON  
To:                     DAUPHIN PLAINS CREDIT UNION LIMITED

Amount:                \$250,000.00  
Notes:                 No notes  
Description:          No description

**3. ADDRESSES FOR SERVICE**

MURRAY CECIL STOUGHTON  
BOX 573  
GILBERT PLAINS MB  
ROL OX0

KAREN ISABEL STOUGHTON  
BOX 573  
GILBERT PLAINS MB  
ROL OX0

**4. TITLE NOTES**

No title notes

**5. LAND TITLES DISTRICT**

Dauphin

**6. DUPLICATE TITLE INFORMATION**

Duplicate not produced

**7. FROM TITLE NUMBERS**

2224987/6          All

**8. REAL PROPERTY APPLICATION / CROWN GRANT NUMBERS**

No real property application or grant information

**9. ORIGINATING INSTRUMENTS**

Instrument Type:	<b>Transfer Of Land</b>
Registration Number:	<b>1089263/6</b>
Registration Date:	2012-11-15
From/By:	SHAWN MICHAEL STOUGHTON
To:	MURRAY CECIL STOUGHTON AND KAREN ISABEL STOUGHTON
Consideration:	\$1.00

**10. LAND INDEX**

NW 2-25-22W  
EX RES

**CERTIFIED TRUE EXTRACT PRODUCED FROM THE LAND TITLES DATA STORAGE SYSTEM OF TITLE NUMBER 2630890/6**

## Land Use Agreement

This land use agreement made in duplicate this 4 day of January, 2017;

BETWEEN: Gilbert Plains Municipality  
Box 220 Gilbert Plains, MB R0L 0X0

-And-

Murray Stoughton, Karen Stoughton And Shawn Stoughton  
RR3 Gilbert Plains, MB R0L 0X0


The Gilbert Plains Municipality requires agricultural land to apply sludge (biosolids) from the two primary cells at the existing Gilbert Plains Wastewater Lagoon. This is an agreement to allow land application to occur on the land parcel outlined below. The following outlines the points of this agreement for the prescribed land:


1. Each parcel of land will need to be soil sampled for nutrients, metals and salts. Soil sampling will be completed by truck or other required method. Soil test results are required for prescription of application rates.
2. Soil sampling may need to occur more than one occasion and will occur prior to spring seeding or post-harvest.
3. Land application of sludge will be completed with heavy field equipment and will need good access to the land parcels after crop harvest or prior to spring seeding.
4. If applicable, buffer zones may be left with no biosolid application near property lines, homes, groundwater wells and surface water features as required by the Manitoba Environment Act.
5. Sludge application will target appropriate agronomic crop uptake requirements.
6. Depending on the application method, sludge application may require tillage incorporation immediately after application.
7. There are no fees to be paid from the Municipality to the landowner for:
  - a. Sludge/biosolids or nutrients
  - b. Use of land
  - c. Application process
  - d. Tillage requirements
8. Volume of sludge is not exact, not all the land may be required for application.
9. The landowner has the right to pull out of the program, with sufficient notice (6 weeks).
10. Manitoba Sustainable Development imposes cropping restrictions, the following crops are allowed to be grown for 3 years after sludge application; cereal crops, oil seed crop, forage, field peas, field beans or lentils (including soybeans). Cattle pasture is also not permitted for 3 years after sludge application.
11. Manitoba Sustainable Development requires three years of follow-up soil sampling, access will be required for the subsequent three years, post-harvest. Soil sampling will be the responsibility of the Municipality.


12. Manitoba Sustainable Development requires three years of follow-up soil sampling, access will be required for the subsequent three years, post-harvest. Soil sampling will be the responsibility of the Municipality.

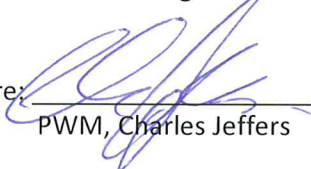
Farm Producer Contact Information:

Name:	Murray Stoughton
Mailing Address:	RR3 Gilbert Plains, MB R0L 0X0
Legal land location (quarter/section/township/range) for each parcel:	<b>SW 2-25-22W</b>
Phone #:	Home: 204-548-4165 Cell: 204- 648-4523
Fax/email:	kstoughton@yahoo.com
Crop to be planted:	2017: <i>Canola</i> 2018: <i>wheat</i>

Land Owner Signature:  Date: 17/01/04  
Murray Stoughton

Land Owner Signature:  Date: 17/01/04  
Karen Stoughton

Land Owner Signature:  Date: 17/01/04  
Shawn Stoughton

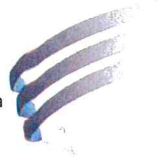
Municipality Signature:  Date: 17/01/04  
PWM, Charles Jeffers

## STATUS OF TITLE

Title Number       **2284898/6**  
Title Status        **Accepted**  
Client File         **AJ**

## The Property Registry

A Service Provider for the Province of Manitoba



### 1. REGISTERED OWNERS, TENANCY AND LAND DESCRIPTION

MURRAY CECIL STOUGHTON , KAREN ISABEL STOUGHTON AND  
SHAWN MICHAEL STOUGHTON  
ALL OF GILBERT PLAINS IN MANITOBA

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

SW 1/4 2-25-22 WPM  
SUBJECT TO THE RESERVATIONS AND PROVISIOES  
CONTAINED IN THE GRANT FROM THE CROWN

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

### 2. ACTIVE INSTRUMENTS

Instrument Type:       **Caveat**  
Registration Number:   **29377/6**  
Instrument Status:     **Accepted**

Registration Date:     1970-02-16  
From/By:              THE MANITOBA HYDRO-ELECTRIC BOARD  
To:

Amount:  
Notes:                 AFF. PART  
Description:           No description

### 3. ADDRESSES FOR SERVICE

MURRAY CECIL STOUGHTON  
R.R.#3  
GILBERT PLAINS MB  
ROL OXO

KAREN ISABEL STOUGHTON  
R.R.#3  
GILBERT PLAINS MB  
ROL OXO

SHAWN MICHAEL STOUGHTON R.R.#3 GILBERT PLAINS MB ROL OXO													
<b>4. TITLE NOTES</b>	No title notes												
<b>5. LAND TITLES DISTRICT</b>	Dauphin												
<b>6. DUPLICATE TITLE INFORMATION</b>	Duplicate not produced												
<b>7. FROM TITLE NUMBERS</b>	1976341/6          All												
<b>8. REAL PROPERTY APPLICATION / CROWN GRANT NUMBERS</b>	No real property application or grant information												
<b>9. ORIGINATING INSTRUMENTS</b>	<table> <tr> <td>Instrument Type:</td> <td><b>Transfer Of Land</b></td> </tr> <tr> <td>Registration Number:</td> <td><b>1061143/6</b></td> </tr> <tr> <td>Registration Date:</td> <td>2008-03-06</td> </tr> <tr> <td>From/By:</td> <td>MURRAY STOUGHTON, KAREN STOUGHTON &amp; DONALD B. STOUGHTON</td> </tr> <tr> <td>To:</td> <td>MURRAY CECIL STOUGHTON ET AL</td> </tr> <tr> <td>Consideration:</td> <td>\$1.00</td> </tr> </table>	Instrument Type:	<b>Transfer Of Land</b>	Registration Number:	<b>1061143/6</b>	Registration Date:	2008-03-06	From/By:	MURRAY STOUGHTON, KAREN STOUGHTON & DONALD B. STOUGHTON	To:	MURRAY CECIL STOUGHTON ET AL	Consideration:	\$1.00
Instrument Type:	<b>Transfer Of Land</b>												
Registration Number:	<b>1061143/6</b>												
Registration Date:	2008-03-06												
From/By:	MURRAY STOUGHTON, KAREN STOUGHTON & DONALD B. STOUGHTON												
To:	MURRAY CECIL STOUGHTON ET AL												
Consideration:	\$1.00												
<b>10. LAND INDEX</b>	SW 2-25-22W EX RES												

CERTIFIED TRUE EXTRACT PRODUCED FROM THE LAND TITLES DATA STORAGE SYSTEM OF TITLE NUMBER 2284898/6

## **Appendix B**

Manitoba Conservation Data Centre – Wildlife Branch, Manitoba Sustainable Development,  
December 22, 2016 Email Correspondence

Manitoba Sport, Culture and Heritage – Historic Resources Branch, December 19, 2016 Email  
Correspondence

Manitoba Conservation Data Centre – Wildlife Branch, Manitoba Sustainable Development,  
December 22, 2016 Email Correspondence

**From:** "Friesen, Chris (SD)" <Chris.Friesen@gov.mb.ca>  
**Subject:** RE: RM of Gilbert Plains - Land Application of Biosolids  
**Sent date:** 12/22/2016 03:32:13 PM  
**To:** "csmith@jrcc.ca" <csmith@jrcc.ca>

Cameron

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

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

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

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

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

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

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

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

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

From: csmith@jrcc.ca [mailto:csmith@jrcc.ca]  
Sent: December-15-16 1:05 PM  
To: 'Nicole.Firlotte@gov.mb.ca'; 'Chris.Friesen@gov.mb.ca'  
Subject: RM of Gilbert Plains - Land Application of Biosolids

Hello,

J.R. Cousin Consultants Ltd. (JRCC) is preparing an Environment Act Proposal for the removal of sludge from the existing Gilbert Plains lagoon, and the subsequent land application of the biosolid materials on agricultural lands to the southeast.

The parcels identified for land application are located within 02-25-22 W1.

Could you please confirm there are no species of concern known to exist on the property.

Thank you,

Cameron Smith, E.I.T.

Environmental Engineer-in-Training

J.R. Cousin Consultants Ltd.

Phone: (204) 489-0474

Fax: (204) 489-0487

[www.jrcc.ca](http://www.jrcc.ca)

\*\*\*

The information contained in this email and any attachments is privileged, confidential and subject to copyright. It is intended solely for the use of the person(s) to whom it is addressed. If you receive this email in error, please notify the sender by return email and permanently delete it from your system. Note: We have taken precautions against viruses, but take no responsibility for loss or damage caused by any virus present.

Manitoba Sport, Culture and Heritage – Historic Resources Branch, December 19, 2016 Email  
Correspondence

**From:** "+WPG574 - HRB Archaeology (SCH)" <HRB.archaeology@gov.mb.ca>  
**Subject:** RE: RM of Gilbert Plains - Land Application of Biosolids  
**Sent date:** 12/19/2016 08:18:30 PM  
**To:** "csmith@jrcc.ca" <csmith@jrcc.ca>  
**Cc:** "Nesbitt, Christina (SCH)" <Christina.Nesbitt@gov.mb.ca>  
**Attachments:** [2016-12-19 AAS 16-11331 \(Cousins-Gilbert Plains\).pdf \[ 109 KB \]](#)

Dear Cameron,

Please find attached a copy of the heritage screening for this property.

Sincerely,  
Suyoko

Suyoko Anne Tsukamoto  
Impact Assessment Archaeologist

Historic Resources Branch  
Sport, Culture and Heritage  
Main Floor, 213 Notre Dame Avenue  
Winnipeg, Manitoba, R3B 1N3  
Office: (204) 945-3893  
Fax: (204) 948-2384  
e-mail: [Suyoko.Tsukamoto@gov.mb.ca](mailto:Suyoko.Tsukamoto@gov.mb.ca)

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

From: [csmith@jrcc.ca](mailto:csmith@jrcc.ca) [<mailto:csmith@jrcc.ca>]  
Sent: December-15-16 11:56 AM  
To: +WPG574 - HRB (SCH)  
Subject: RM of Gilbert Plains - Land Application of Biosolids

Hello,

J.R. Cousin Consultants Ltd. (JRCC) is preparing an Environment Act Proposal for the removal of sludge from the existing Gilbert Plains lagoon, and the subsequent land application of the biosolid materials on agricultural land to the southeast.

The parcels identified for land application are located within 02-25-22 W1.

Could you please confirm whether there may be an impact to heritage resources.

Thank you,

Cameron Smith, E.I.T.

Environmental Engineer-in-Training

J.R. Cousin Consultants Ltd.

Phone: (204) 489-0474

Fax: (204) 489-0487

[www.jrcc.ca](http://www.jrcc.ca)

\*\*\*

The information contained in this email and any attachments is privileged, confidential and subject to copyright. It is intended solely for the use of the person(s) to whom it is addressed. If you receive this email in error, please notify the sender by return email and permanently delete it from your system. Note: We have taken precautions against viruses, but take no responsibility for loss or damage caused by any virus present.

**DATE:** 2016-12-12

**TO: Cameron SMITH**  
**Environmental E.I.T.**  
J.R. Cousin Consultants Ltd.  
91 Scurfield Blvd.  
Winnipeg, Manitoba  
R3Y 1G4

**Cc.: Christina NESBITT**  
**Impact Assessment Archaeologist**  
Historic Resources Branch

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

**PHONE NO:** (204) 945-3893  
**FAX:** (204) 948-2384  
**E-MAIL:** [Suyoko.Tsukamoto@gov.mb.ca](mailto:Suyoko.Tsukamoto@gov.mb.ca)

**SUBJECT: RM of Gilbert Plains – Land Application of Biosolids**  
**HRB File #: AAS-16-11331**

No concerns at this time.

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

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

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

Suyoko Tsukamoto

## **Appendix C**

Sludge Assessment Report, Assiniboine Injections Ltd, October 13, 2015

Sludge Test Report, ALS Environmental, September 22, 2016

NutriMax Soil Test Report, October 28, 2016

Driller Well Logs

Sludge Assessment Report, Assiniboine Injections Ltd, October 13, 2015



## Assiniboine Injections Ltd.

Box 160      177 Notre Dame Ave      Notre Dame de Lourdes, MB      ROG-1M0  
PH: 204-248-2559      FAX: 204-248-2799      EMAIL: [info@lagooncleaning.com](mailto:info@lagooncleaning.com)

DATE: Oct. 13, 2015  
TOWN: GILBERT PLAINS

As requested, Assiniboine Injections Ltd completed our biosolids survey of cell# primary and secondary. This survey was completed on.

### Methodology

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

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

### Cell Sludge Volume

CELL	SLUDGE VOLUME
Primary Cell	4750 m3 Section A
Primary Cell	4970 m3 Section B
Secondary Cell	4965 m3

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

Yours Truly,  
Assiniboine Injections Ltd

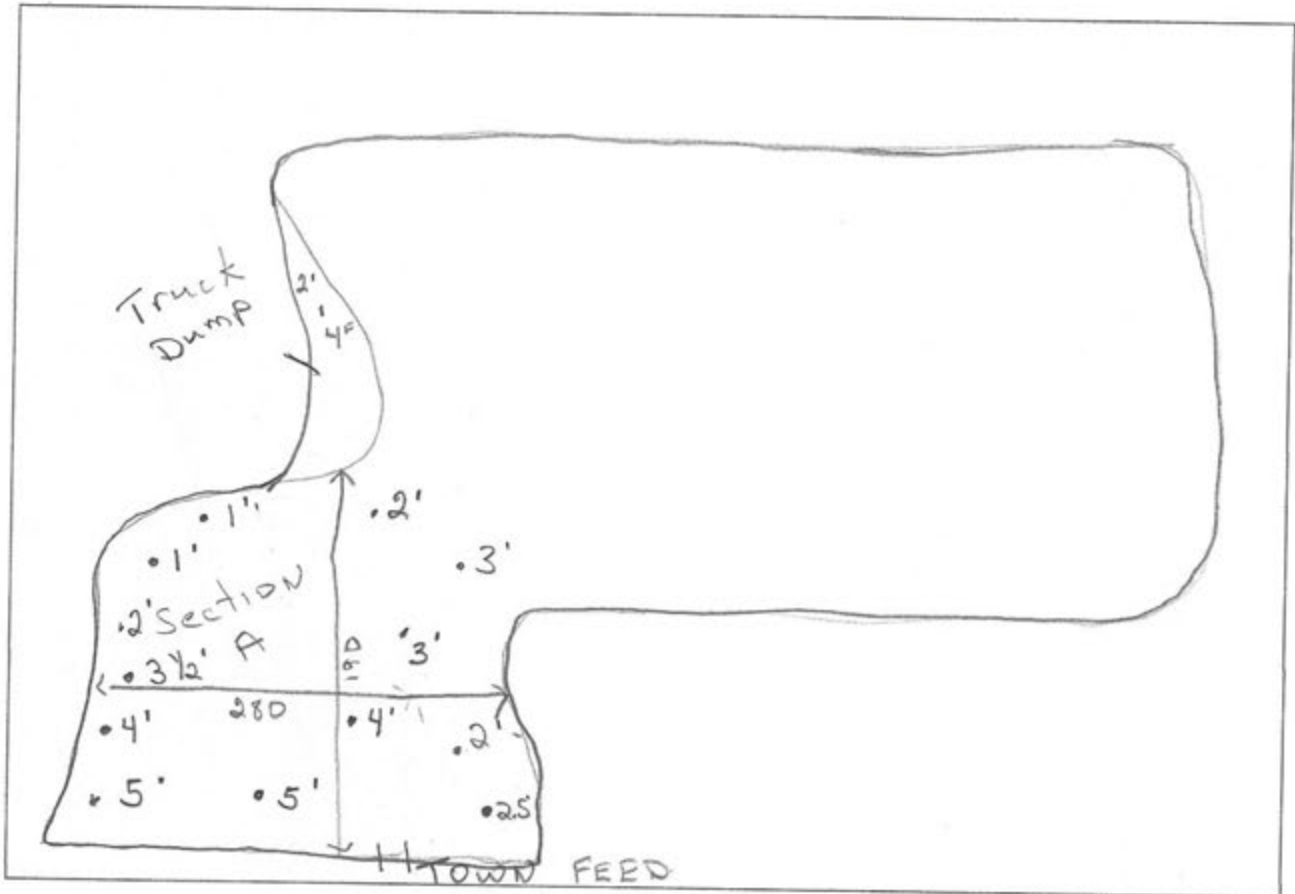


# Assiniboine Injections Ltd.

Box 160      177 Notre Dame Ave      Notre Dame de Lourdes, MB      ROG-1M0  
PH: 204-248-2559      FAX: 204-248-2799      EMAIL: [info@lagooncleaning.com](mailto:info@lagooncleaning.com)

Project No. 1      Survey Date: Feb 2, 2015      Survey Crew: Jeff  
Client: Gilbert Plains Lagoon      Lagoon Id: Primary Cell A      Lagoon Dimensions: 190ft x 280ft  
Total M3: 4750      Avg. Sludge Depth: 4-5 ft      Samples Taken:

N



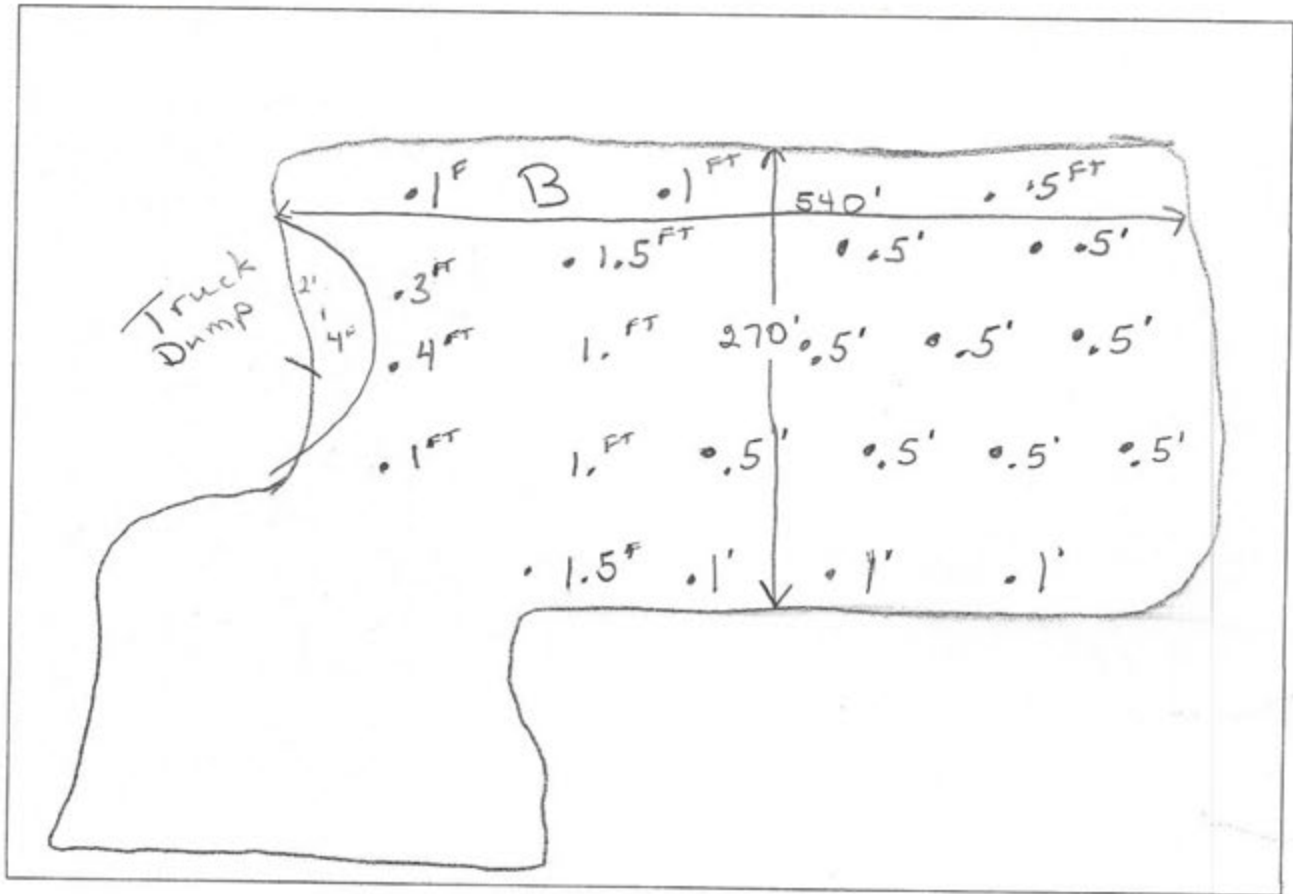


**Assiniboine Injections Ltd.**

Box 160      177 Notre Dame Ave      Notre Dame de Lourdes, MB      ROG-1M0  
 PH: 204-248-2559      FAX: 204-248-2799      EMAIL: [info@lagooncleaning.com](mailto:info@lagooncleaning.com)

Project No: 2      Survey Date: Feb 2, 2015      Survey Crew: Jeff  
 Client: Gilbert Plains Lagoon Lagoon Id: Primary Cell B      Lagoon Dimensions: 270ft x 540ft  
 Total M3: 4970      Avg. Sludge Depth: 2-4 ft      Samples Taken:

N



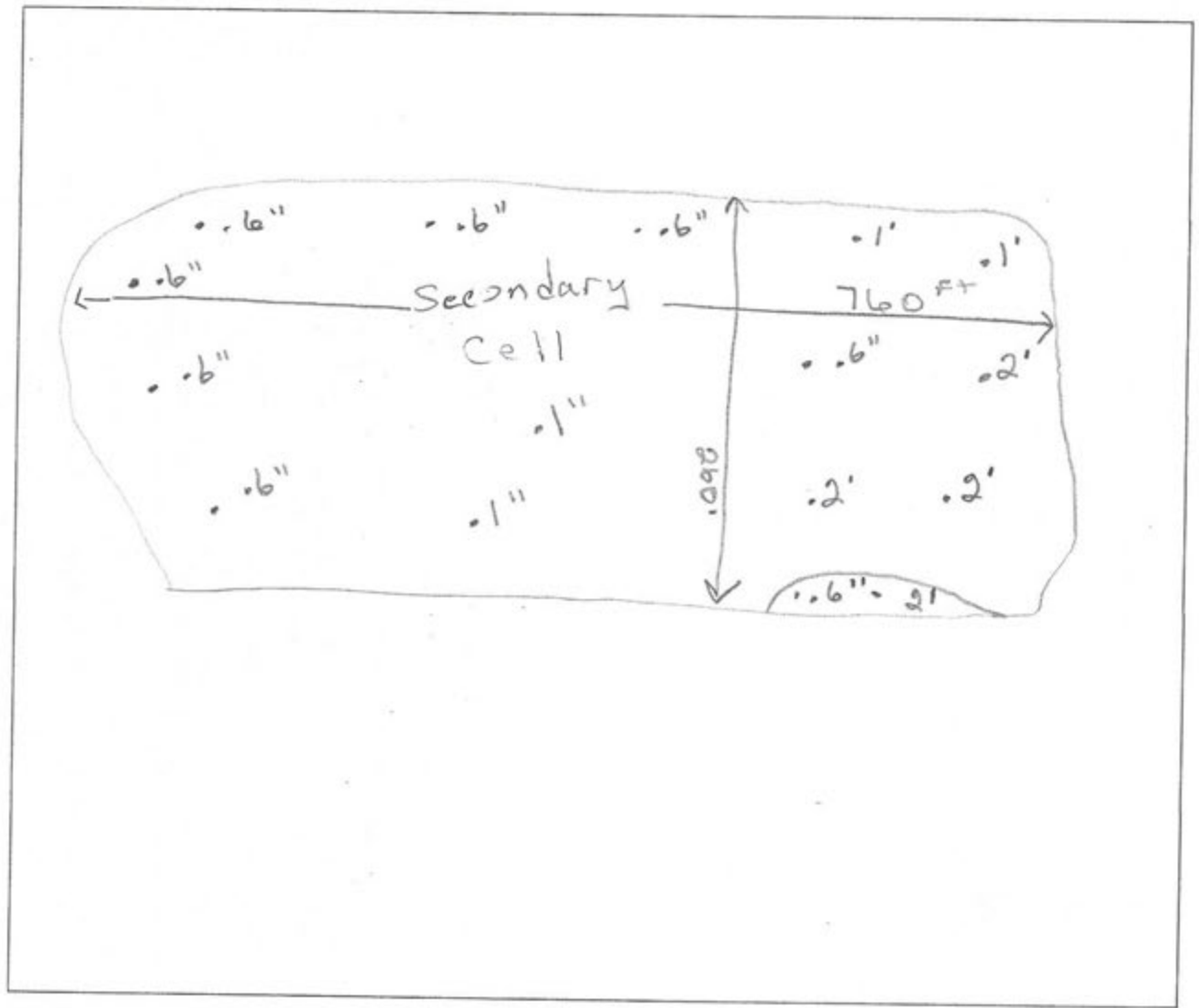


# Assiniboine Injections Ltd.

Box 160      177 Notre Dame Ave      Notre Dame de Lourdes, MB      ROG-1M0  
PH: 204-248-2559      FAX: 204-248-2799      EMAIL: [info@lagooncleaning.com](mailto:info@lagooncleaning.com)

Project No. 3      Survey Date: Feb 2, 2015      Survey Crew: Jeff  
Client: Gilbert Plains Lagoon      Lagoon Id: Secondary      Lagoon Dimensions: 260Ft X 760Ft  
Total M3: 4965      Avg. Sludge Depth: .6 inches -2ft.      Samples Taken:

N



Sludge Test Report, ALS Environmental, September 22, 2016



Assiniboine Injections Ltd. (Notre Dame De  
Lourdes)  
ATTN: NOEL  
Box 160  
126 Notre Dame Ave W.  
Notre Dame De Lourdes MB ROG 1M0

Date Received: 18-AUG-16  
Report Date: 22-SEP-16 07:22 (MT)  
Version: FINAL

Client Phone: 204-248-2559

# Certificate of Analysis

Lab Work Order #: L1815618  
Project P.O. #: NOT SUBMITTED  
Job Reference: GILBERT PLAINS  
C of C Numbers:  
Legal Site Desc:

Hua Wo  
Chemistry Laboratory Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 1329 Niakwa Road East, Unit 12, Winnipeg, MB R2J 3T4 Canada | Phone: +1 204 255 9720 | Fax: +1 204 255 9721  
ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

GILBERT PLAINS

L1815618 CONTD....

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Version: FINAL

# ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1815618-1 PRIMARY							
Sampled By: NOEL on 11-AUG-16 @ 13:00							
Matrix: SEWAGE/WASTE WATER							
<b>Miscellaneous Parameters</b>							
Available Nitrate-N	<3.0	DLR	3.0	mg/kg	17-SEP-16	17-SEP-16	R3550769
Available Phosphate-P	136	DLHC	5.0	mg/kg	19-SEP-16	19-SEP-16	R3552568
Available Potassium	393		20	mg/kg	17-SEP-16	17-SEP-16	R3550761
Mercury (Hg)	0.439		0.0050	mg/kg	20-SEP-16	20-SEP-16	R3552898
% Moisture	90.0		0.10	%	17-SEP-16	17-SEP-16	R3550453
Total Nitrogen by LECO	1.69		0.020	%	17-SEP-16	17-SEP-16	R3551419
<b>Total Solids and Total Volatile Solids</b>							
Total Solids	9.14		0.10	%	20-SEP-16	20-SEP-16	R3552721
Total Volatile Solids (dry basis)	41.8		0.10	%	20-SEP-16	20-SEP-16	R3552721
<b>pH and Conductivity of Liquid Manure</b>							
pH	6.92		0.10	pH	19-SEP-16	19-SEP-16	R3551852
Conductivity (EC)	2100		10	uS/cm	19-SEP-16	19-SEP-16	R3551852
<b>Metals in Soil by CRC ICPMS</b>							
Aluminum (Al)	8130		50	mg/kg	20-SEP-16	20-SEP-16	R3552923
Antimony (Sb)	1.18		0.10	mg/kg	20-SEP-16	20-SEP-16	R3552923
Arsenic (As)	4.95		0.10	mg/kg	20-SEP-16	20-SEP-16	R3552923
Barium (Ba)	324		0.50	mg/kg	20-SEP-16	20-SEP-16	R3552923
Beryllium (Be)	0.21		0.10	mg/kg	20-SEP-16	20-SEP-16	R3552923
Boron (B)	25.9		5.0	mg/kg	20-SEP-16	20-SEP-16	R3552923
Bismuth (Bi)	14.7		0.20	mg/kg	20-SEP-16	20-SEP-16	R3552923
Cadmium (Cd)	1.83		0.020	mg/kg	20-SEP-16	20-SEP-16	R3552923
Calcium (Ca)	49900		50	mg/kg	20-SEP-16	20-SEP-16	R3552923
Chromium (Cr)	17.9		0.50	mg/kg	20-SEP-16	20-SEP-16	R3552923
Cobalt (Co)	3.27		0.10	mg/kg	20-SEP-16	20-SEP-16	R3552923
Copper (Cu)	373		0.50	mg/kg	20-SEP-16	20-SEP-16	R3552923
Iron (Fe)	11300		50	mg/kg	20-SEP-16	20-SEP-16	R3552923
Lead (Pb)	40.4		0.50	mg/kg	20-SEP-16	20-SEP-16	R3552923
Lithium (Li)	3.8		2.0	mg/kg	20-SEP-16	20-SEP-16	R3552923
Magnesium (Mg)	13700		20	mg/kg	20-SEP-16	20-SEP-16	R3552923
Manganese (Mn)	218		1.0	mg/kg	20-SEP-16	20-SEP-16	R3552923
Molybdenum (Mo)	8.75		0.10	mg/kg	20-SEP-16	20-SEP-16	R3552923
Nickel (Ni)	27.0		0.50	mg/kg	20-SEP-16	20-SEP-16	R3552923
Phosphorus (P)	5910		50	mg/kg	20-SEP-16	20-SEP-16	R3552923
Potassium (K)	1030		100	mg/kg	20-SEP-16	20-SEP-16	R3552923
Selenium (Se)	3.89		0.20	mg/kg	20-SEP-16	20-SEP-16	R3552923
Silver (Ag)	3.16		0.10	mg/kg	20-SEP-16	20-SEP-16	R3552923
Sodium (Na)	632		50	mg/kg	20-SEP-16	20-SEP-16	R3552923
Strontium (Sr)	67.3		0.50	mg/kg	20-SEP-16	20-SEP-16	R3552923
Thallium (Tl)	0.181		0.050	mg/kg	20-SEP-16	20-SEP-16	R3552923
Tin (Sn)	21.1		1.0	mg/kg	20-SEP-16	20-SEP-16	R3552923
Titanium (Ti)	33.8		1.0	mg/kg	20-SEP-16	20-SEP-16	R3552923
Uranium (U)	4.03		0.050	mg/kg	20-SEP-16	20-SEP-16	R3552923
Vanadium (V)	15.1		0.20	mg/kg	20-SEP-16	20-SEP-16	R3552923
Zinc (Zn)	420		2.0	mg/kg	20-SEP-16	20-SEP-16	R3552923
Zirconium (Zr)	2.0		1.0	mg/kg	20-SEP-16	20-SEP-16	R3552923
<b>Total Organic Nitrogen - Soil</b>							
Available Ammonium-N							
Available Ammonium-N	1920	NSSM	14	mg/kg	20-SEP-16	20-SEP-16	R3553823
Note: Done as received and cacluated to dry.							
<b>Nitrogen, Total Organic - calculation</b>							
Total Organic Nitrogen	1.30		0.020	%		21-SEP-16	

\* Refer to Referenced Information for Qualifiers (if any) and Methodology.

GILBERT PLAINS

L1815618 CONTD....

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Version: FINAL

# ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1815618-1 PRIMARY Sampled By: NOEL on 11-AUG-16 @ 13:00 Matrix: SEWAGE/WASTE WATER <b>Total Kjeldahl Nitrogen</b> Total Kjeldahl Nitrogen	1.49	DLHC	0.16	%	19-SEP-16	20-SEP-16	R3552920
L1815618-2 SECONDARY Sampled By: NOEL on 11-AUG-16 @ 13:00 Matrix: SEWAGE/WASTE WATER <b>Miscellaneous Parameters</b> Available Nitrate-N	<1.0		1.0	mg/kg	17-SEP-16	17-SEP-16	R3550769
Available Phosphate-P	22.9		1.0	mg/kg	19-SEP-16	19-SEP-16	R3552568
Available Potassium	166		20	mg/kg	17-SEP-16	17-SEP-16	R3550761
Mercury (Hg)	0.0492		0.0050	mg/kg	20-SEP-16	20-SEP-16	R3552898
% Moisture	19.1		0.10	%	17-SEP-16	17-SEP-16	R3550453
Total Nitrogen by LECO	0.137		0.020	%	17-SEP-16	17-SEP-16	R3551419
<b>Total Solids and Total Volatile Solids</b> Total Solids	77.1		0.10	%	20-SEP-16	20-SEP-16	R3552721
Total Volatile Solids (dry basis)	2.78		0.10	%	20-SEP-16	20-SEP-16	R3552721
<b>pH and Conductivity of Liquid Manure</b> pH	7.26	NSSM	0.10	pH	19-SEP-16	19-SEP-16	R3551852
Conductivity (EC)	32000	NSSM	10	uS/cm	19-SEP-16	19-SEP-16	R3551852
<b>Metals in Soil by CRC ICPMS</b> Aluminum (Al)	6930		50	mg/kg	20-SEP-16	20-SEP-16	R3552923
Antimony (Sb)	0.45		0.10	mg/kg	20-SEP-16	20-SEP-16	R3552923
Arsenic (As)	4.93		0.10	mg/kg	20-SEP-16	20-SEP-16	R3552923
Barium (Ba)	83.0		0.50	mg/kg	20-SEP-16	20-SEP-16	R3552923
Beryllium (Be)	0.40		0.10	mg/kg	20-SEP-16	20-SEP-16	R3552923
Boron (B)	14.6		5.0	mg/kg	20-SEP-16	20-SEP-16	R3552923
Bismuth (Bi)	0.32		0.20	mg/kg	20-SEP-16	20-SEP-16	R3552923
Cadmium (Cd)	0.452		0.020	mg/kg	20-SEP-16	20-SEP-16	R3552923
Calcium (Ca)	99500	DLHC	130	mg/kg	20-SEP-16	20-SEP-16	R3552923
Chromium (Cr)	16.8		0.50	mg/kg	20-SEP-16	20-SEP-16	R3552923
Cobalt (Co)	5.42		0.10	mg/kg	20-SEP-16	20-SEP-16	R3552923
Copper (Cu)	21.3		0.50	mg/kg	20-SEP-16	20-SEP-16	R3552923
Iron (Fe)	13200		50	mg/kg	20-SEP-16	20-SEP-16	R3552923
Lead (Pb)	7.00		0.50	mg/kg	20-SEP-16	20-SEP-16	R3552923
Lithium (Li)	9.1		2.0	mg/kg	20-SEP-16	20-SEP-16	R3552923
Magnesium (Mg)	33500		20	mg/kg	20-SEP-16	20-SEP-16	R3552923
Manganese (Mn)	390		1.0	mg/kg	20-SEP-16	20-SEP-16	R3552923
Molybdenum (Mo)	3.68		0.10	mg/kg	20-SEP-16	20-SEP-16	R3552923
Nickel (Ni)	20.1		0.50	mg/kg	20-SEP-16	20-SEP-16	R3552923
Phosphorus (P)	694		50	mg/kg	20-SEP-16	20-SEP-16	R3552923
Potassium (K)	1600		100	mg/kg	20-SEP-16	20-SEP-16	R3552923
Selenium (Se)	1.31		0.20	mg/kg	20-SEP-16	20-SEP-16	R3552923
Silver (Ag)	0.45		0.10	mg/kg	20-SEP-16	20-SEP-16	R3552923
Sodium (Na)	251		50	mg/kg	20-SEP-16	20-SEP-16	R3552923
Strontium (Sr)	88.9		0.50	mg/kg	20-SEP-16	20-SEP-16	R3552923
Thallium (Tl)	0.332		0.050	mg/kg	20-SEP-16	20-SEP-16	R3552923
Tin (Sn)	1.1		1.0	mg/kg	20-SEP-16	20-SEP-16	R3552923
Titanium (Ti)	145		1.0	mg/kg	20-SEP-16	20-SEP-16	R3552923
Uranium (U)	3.41		0.050	mg/kg	20-SEP-16	20-SEP-16	R3552923
Vanadium (V)	27.2		0.20	mg/kg	20-SEP-16	20-SEP-16	R3552923
Zinc (Zn)	55.4		2.0	mg/kg	20-SEP-16	20-SEP-16	R3552923
Zirconium (Zr)	4.9		1.0	mg/kg	20-SEP-16	20-SEP-16	R3552923
<b>Total Organic Nitrogen - Soil</b>							

\* Refer to Referenced Information for Qualifiers (if any) and Methodology.



GILBERT PLAINS

L1815618 CONTD....

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## Reference Information

**Sample Parameter Qualifier Key:**

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLR	Detection Limit Raised due to required dilution, limited sample amount, and/or high moisture content (soil samples)
NSSM	Non-standard sample matrix. Modified methods were used for sample processing and analysis.
NSSM	Non-standard sample matrix. Modified methods were used for sample processing and analysis.

**Test Method References:**

ALS Test Code	Matrix	Test Description	Method Reference**
ETL-N-TOTORG-CALC-SK	Soil	Nitrogen, Total Organic - calculation	APHA 4500 Norg-Calculated as TKN - NH3-N
HG-200.2-CVAF-SK	Soil	Mercury in Soil by CVAFS	EPA 200.2/1631E (mod)
Soil samples are digested with nitric and hydrochloric acids, followed by analysis by CVAFS.			
K-AVAIL-SK	Soil	Available Potassium	Comm. Soil Sci. Plant, 25 (5&6)
Plant available potassium is extracted from the soil using Modified Kelowna solution. Potassium in the soil extract is determined by flame emission at 770 nm.			
MET-200.2-CCMS-SK	Soil	Metals in Soil by CRC ICPMS	EPA 200.2/6020A (mod)
Soil samples are digested with nitric and hydrochloric acids, followed by analysis by CRC ICPMS.			
Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. This method does not dissolve all silicate materials and may result in a partial extraction, depending on the sample matrix, for some metals, including, but not limited to Al, Ba, Be, Cr, Sr, Ti, Tl, and V.			
MOIST-SK	Soil	Moisture Content	ASTM D2216-80
The weighed portion of soil is placed in a 105 C oven overnight. The dried soil is allowed to cooled to room temperature, weighed and the % moisture is calculated.			
Reference: ASTM D2216-80			
N-TOT-LECO-SK	Soil	Total Nitrogen by combustion method	SSSA (1996) P. 973-974
The sample is ignited in a combustion analyzer where nitrogen in the reduced nitrous oxide gas is determined using a thermal conductivity detector.			
N-TOTKJ-COL-SK	Soil	Total Kjeldahl Nitrogen	CSSS (2008) 22.2.3
The soil is digested with sulfuric acid in the presence of CuSO4 and K2SO4 catalysts. Ammonia in the soil extract is determined colorimetrically at 660 nm.			
NH4-AVAIL-SK	Soil	Available Ammonium-N	CSSS(1993) 4.2/COMM SOIL SCI 19(6)
Ammonium (NH4-N) is extracted from the soil using 2 N KCl. Ammonium in the extract is mixed with hypochlorite and salicylate to form indophenol blue, which is determined colorimetrically by auto analysis at 660 nm.			
NO3-AVAIL-SK	Soil	Available Nitrate-N	Method = Alberta Ag (1988)
Available Nitrate and Nitrite are extracted from the soil using a dilute calcium chloride solution. Nitrate is quantitatively reduced to nitrite by passage of the sample through a copperized cadmium column. The nitrite (reduced nitrate plus original nitrite) is then determined by diazotizing with sulfanilamide followed by coupling with N-(1-naphthyl) ethylenediamine dihydrochloride. The resulting water soluble dye has a magenta color which is measured at colorimetrically at 520nm.			
Reference: Recommended Methods of Soil Analysis for Canadian Prairie Agricultural Soils. Alberta Agriculture (1988) p. 19 and 28			
PH/EC-AGL-SK	Manure	pH and Conductivity of Liquid Manure	RMMA A3769 7.5/8.5
The sample is analyzed directly using a calibrated pH/Conductivity meter.			
Reference: Wolf, A., Watson, M. and Nancy Wolf. 2005. In: John Peters(ed.) Recommended Methods for Manure Analysis. Methods 7.5 and 8.5			
PO4-AVAIL-OLSEN-SK	Soil	Available Phosphate-P by Olsen	CSSS (1993) 7.2,7.3.1
Plant available phosphorus is extracted from the sample with sodium bicarbonate. PO4-P in the filtered extract is determined colorimetrically at 880 nm.			
SOLIDS-TOT/TOTVOL-SK	Manure	Total Solids and Total Volatile Solids	APHA 2540G
A well-mixed sample is evaporated in a weighed dish and dried to constant weight in an oven at 103-105°C. The increase in weight over that of the			

GILBERT PLAINS

L1815618 CONTD....

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Version: FINAL

## Reference Information

## Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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empty dish represents the Total Solids. The crucible is then ignited at 550°-10°C for 1 hour. The remaining solids represent the Total Fixed Solids, while the weight lost on ignition represents the Total Volatile Solids.

\*\* ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
SK	ALS ENVIRONMENTAL - SASKATOON, SASKATCHEWAN, CANADA

## Chain of Custody Numbers:

## GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg wwt - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

NutriMax Soil Test Report, October 28, 2016



# NutriMax Soil Test Report

October 28, 2016

**Dealer :**

GILBERT PLAINS CO-OP  
 BOX 40  
 GILBERT PLAINS, MB R0L OXO  
 204-548-2099 / 204-548-2437(fax)  
 gpagro@mts.net

**Producer :**

STOUGHTON SEED FARMS  
 Gilbert Plains, MB R0L OXO

**Field :**

Description: S50 - 2017  
 Legal Location: *W/2* NE 2 25 22 W1  
 Acres: 420  
 Soil Climatic Zone: Moist Black Northwest  
 Previous Crop: *Unknown canola*  
 Cropping/ Residue: Continuous/ Spread

**Soil Characteristics and Levels (lb/ac):**

21-Oct-2016

ALS Reference 1507865

Nutrient Sufficiency Level



Depth	Texture	pH	EC	OM	N	P	K	S	Cu	Mn	Zn	B	Fe	Cl
0-6	Sandy Loam	8.2	0.1		4	39	315	14						
6-12	Sandy Loam	8.2	0.1		13			7						
12-24	Sandy Loam	8.4	0.1		6			14						

**Recommended Nutrient Application Rates (lb/ac):**

AgroMax I

Canola, Hybrid	N	P2O5	K2O	S	Cu	Mn	Zn	B	Fe	Cl
<b>46 bu/ac</b> 9.7 in. Precipitation (Wet) 25% Chance of this Precip.	103	20		23						
<b>38 bu/ac</b> 7.7 in. Precipitation (Average) 50% Chance of this Precip.	89	15		18						
<b>26 bu/ac</b> 4.7 in. Precipitation (Dry) 75% Chance of this Precip.	62	5		13						
<b>50 bu/ac</b> 10.8 in. Precipitation (User Defined) <25% Chance of this Precip.	120	20		23						

**Other Recommendations and Comments:**

AgroMax I

The rate of Phosphorus application is based on seed-placement. Broadcasting and incorporation requirement on the average is 2.5 times that of seed-placement.  
 There is a 25-50% chance that your crop will show a yield response to the application of Phosphorus.

*Olson Test for manure management.*



# NutriMax Soil Test Report

October 28, 2016

<b>Dealer :</b> GILBERT PLAINS CO-OP BOX 40 GILBERT PLAINS, MB R0L 0X0 204-548-2099 / 204-548-2437(fax) gpagro@mts.net	<b>Producer :</b> STOUGHTON SEED FARMS  Gilbert Plains, MB R0L 0X0	<b>Field :</b> Description: S50 - 2017 Legal Location: <i>W34</i> NE 2 25 22 W1 Acres: 420 Soil Climatic Zone: Moist Black Northwest Previous Crop: <i>Unknown canola</i> Cropping/ Residue: Continuous/ Spread
<b>Soil Characteristics and Levels (lb/ac):</b> 21-Oct-2016		<b>ALS Reference 1507865</b>



Depth	Texture	pH	EC	OM	N	P	K	S	Cu	Mn	Zn	B	Fe	Cl
0-6	Sandy Loam	8.2	0.1		4	39	315	14						
6-12	Sandy Loam	8.2	0.1		13			7						
12-24	Sandy Loam	8.4	0.1		6			14						

**Recommended Nutrient Application Rates (lb/ac):** AgroMax I

Wheat, CWRS	N	P2O5	K2O	S	Cu	Mn	Zn	B	Fe	Cl
<b>54 bu/ac - 11.0% protein</b> 9.7 in. Precipitation (Wet) 25% Chance of this Precip.	75	20	10	8						
<b>45 bu/ac - 12.0% protein</b> 7.7 in. Precipitation (Average) 50% Chance of this Precip.	78	15	10	5						
<b>30 bu/ac - 13.0% protein</b> 4.7 in. Precipitation (Dry) 75% Chance of this Precip.	60	5	10	5						
<b>50 bu/ac - 14.0% protein</b> 8.8 in. Precipitation (User Defined) 25-50% Chance of this Precip.	106	15	10	5						

**Other Recommendations and Comments:** AgroMax I

The rate of Phosphorus application is based on seed-placement. Broadcasting and incorporation requirement on the average is 2.5 times that of seed-placement.  
 There is a 25-50% chance that your crop will show a yield response to the application of Phosphorus.  
 Rates of Potassium less than 30 lbs/acre are for seed-placement. Broadcast and incorporate 60-80 lbs/acre of K2O as a substitute for 15-20 lbs/acre of K2O seed-placed potassium.



Quarter section: NE-02-25-22 W

Scale 1: 5,000



Quarter section: NW-02-25-22 W

Scale 1: 5,000

10



Quarter section: SE-02-25-22 W

Scale 1: 5,000

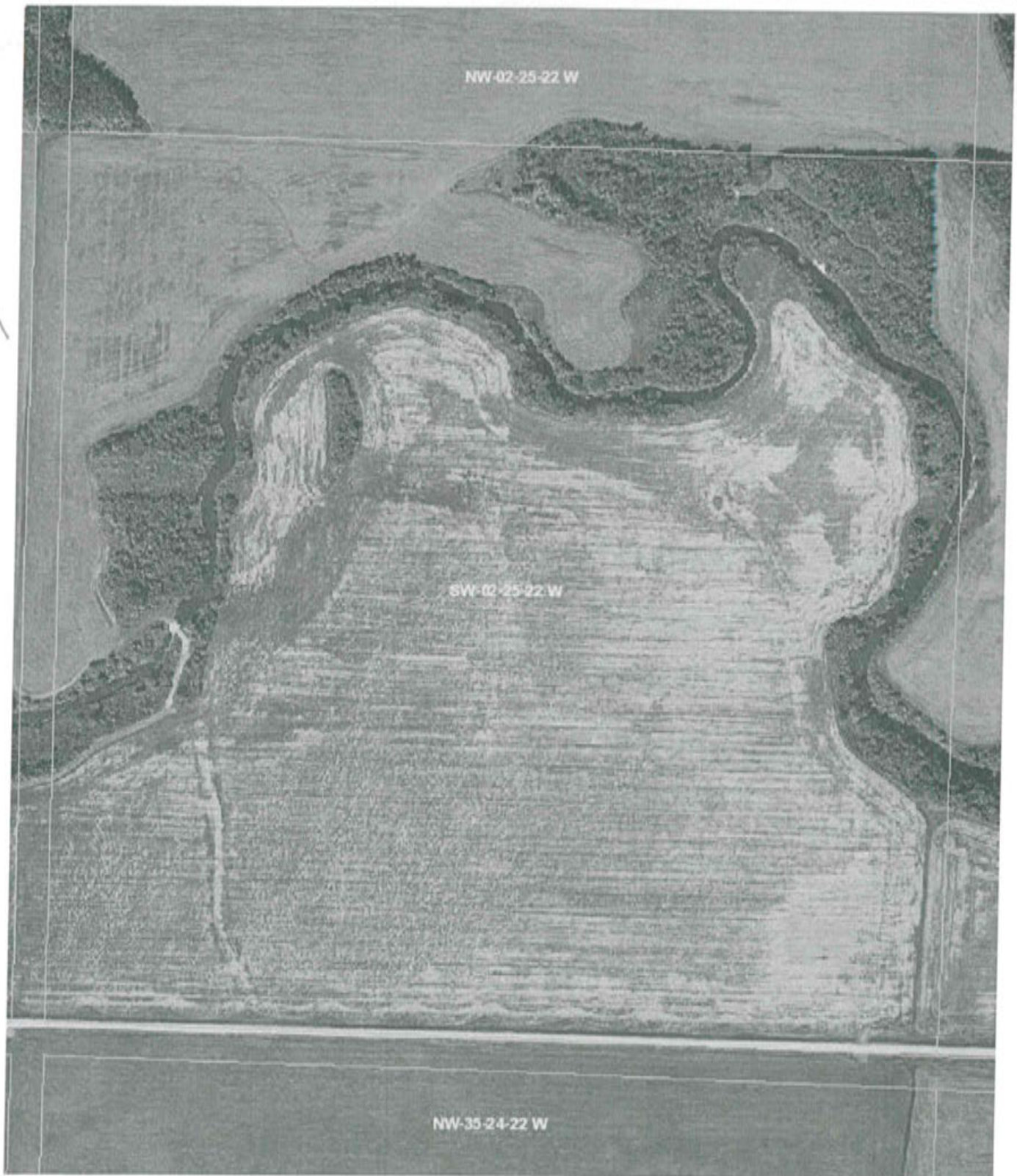


4 ←

3 ↑

Quarter section: SW-02-25-22 W

Scale 1: 5,000



## Driller Well Logs

Location: SE-1-25-22W

Well\_PID: 44944

Owner: P DUBEK

Driller: WATER'S DRILLING CO. LTD.

Well Name:

Well Use: TEST WELL

Water Use:

UTMX: 400614.608

UTMY: 5665117.3

Accuracy XY: UNKNOWN

UTMZ:

Accuracy Z:

Date Completed: 1982 Jul 29

#### WELL LOG

From	To	Log
------	----	-----

(ft.)	(ft.)	
-------	-------	--

0	22.0	BROWN CLAY
---	------	------------

22.0	52.0	BLUE TILL
------	------	-----------

52.0	194.9	SHALE, HARD AND SOFT LAYERS, SALTY
------	-------	------------------------------------

#### WELL CONSTRUCTION

From	To	Casing	Inside	Outside	Slot	Type	Material
------	----	--------	--------	---------	------	------	----------

(ft.)	(ft.)	Type	Dia.(in)	Dia.(in)	Size(in)		
-------	-------	------	----------	----------	----------	--	--

0	189.9	casing					
---	-------	--------	--	--	--	--	--

189.9	194.9	perforations				SL. PIPE	
-------	-------	--------------	--	--	--	----------	--

Top of Casing: 0 ft. below ground

#### PUMPING TEST

Date: 1982 Jul 29

Pumping Rate: 2.005 Imp. gallons/minute

Water level before pumping: 115.9 ft. below ground

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

Test duration: hours, minutes

Water temperature: ?? degrees F

---

Location: SW-3-25-22W

Well\_PID: 46399

Owner: AGRI-WATER

Driller: Paddock Drilling Ltd.

Well Name: SITE 9 A-1

Well Use: TEST WELL

Water Use:

UTMX: 396554.691

UTMY: 5665240.6

Accuracy XY: UNKNOWN

UTMZ:

Accuracy Z:

Date Completed: 1982 Oct 07

#### WELL LOG

From	To	Log
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(ft.)	(ft.)	
-------	-------	--

0	12.0	BROWN CLAY
---	------	------------

12.0	16.0	GREY TILL CLAYEY
------	------	------------------

No construction data for this well.

Top of Casing: 0 ft. below ground

No pump test data for this well.

---

Location: SW-3-25-22W

Well\_PID: 46400

Owner: AGRI-WATER

Driller: Paddock Drilling Ltd.

Well Name: SITE 9 A-2

Well Use: TEST WELL

Water Use:

UTMX: 396554.691

UTMY: 5665240.6

Accuracy XY: UNKNOWN

UTMZ:

Accuracy Z:

Date Completed: 1982 Oct 07

#### WELL LOG

From To Log

(ft.) (ft.)

0	13.5	CLAY, BROWN
13.5	15.0	GRAVELLY, SANDY CLAY, BROWN
15.0	15.5	GRAVEL
15.5	17.5	CLAY, GRAVELLY
17.5	18.0	BROWN TILL
18.0	21.0	DARK GREY TILL

No construction data for this well.

Top of Casing: 0 ft. below ground

No pump test data for this well.

---

Location: SW3-25-22W

Well\_PID: 120795

Owner: RM OF GILBERT PLAINS/PFRA

Driller: Wescan Drilling Ltd.

Well Name: TH 7

Well Use: TEST WELL

Water Use:

UTMX: 396554.691

UTMY: 5665240.6

Accuracy XY:

UTMZ:

Accuracy Z:

Date Completed: 1998 Jul 27

WELL LOG

From To Log

(ft.) (ft.)

0	3.0	BLACK ORGANIC TOPSOIL
3.0	13.0	SOFT, SILTY TAN CLAY
13.0	17.0	FIRM CLAY, MOTTLED GREY- TAN STONE
17.0	22.0	FIRM CLAY, MOTTLED GREY- TAN
22.0	25.0	CLAY TILL, GREY PEBBLES
25.0	40.0	CLAY SOFT, GREY SILT LAYERS
40.0	60.0	SILT, GREY SOFT
60.0	60.5	ROCK
60.5	65.0	CLAY, SILTY, GREY, SOFT
65.0	68.0	WASHED SAND, MEDIUM GRAINED
68.0	75.0	SILT, GREY SOFT
75.0	83.0	SAND TO FINE GRAVEL
83.0	84.0	CLAY, SILTY GREY SOFT
84.0	84.5	ROCKS
84.5	90.0	CLAY, TILL, FIRM GREY STONES

No construction data for this well.

Top of Casing:

No pump test data for this well.

REMARKS

LOCATED NE CORNER OF 1/4. INSTALLED 2" COARSE SLITTED STEEL, TOP OF SLOTS @ 75', AIR LIFT PUMPED, STATIC 11.31 M. COND=1950, FE=0.7, HARD=>80

---

Location: NE-10-25-22W

Well\_PID: 28915

Owner: R BERRY

Driller: PARKVILLE CAISSONS

Well Name:

Well Use: PRODUCTION

Water Use: Domestic,Livestock

UTMX: 397386.998

UTMY: 5667638.87

Accuracy XY: UNKNOWN

UTMZ:

Accuracy Z:

Date Completed: 1976 Mar 26

#### WELL LOG

From (ft.)	To (ft.)	Log
0	17.0	YELLOW SILTY CLAY
17.0	21.0	WET WATER BEARING, YELLOW CLAY
21.0	38.0	BLUE CLAY FEW STONES TILL
38.0	42.0	GREY CLAY
42.0	48.0	BLUE CLAY
48.0	49.0	BOULDERS GRAVEL SEAM, WATER BEARING
49.0	50.0	GREY TILL
50.0	51.0	TILL& BOULDERS

#### WELL CONSTRUCTION

From (ft.)	To (ft.)	Casing Type	Inside Dia.(in)	Outside Dia.(in)	Slot Size(in)	Type	Material
0	24.0	casing	36.00	2.00			CONCRETE

Top of Casing: 0 ft. below ground

No pump test data for this well.

---

Location: SE10-25-22W

Well\_PID: 72728

Owner: M MAKSYMETZ

Driller: A & S Well Drilling

Well Name:

Well Use: PRODUCTION

Water Use: Domestic

UTMX: 397375.752

UTMY: 5666839.1

Accuracy XY: UNKNOWN

UTMZ:

Accuracy Z:

Date Completed: 1991 Jun 12

#### WELL LOG

From To Log

(ft.) (ft.)

0 18.0 BROWN CLAY

18.0 35.0 BROWN AND BLUE CLAY

35.0 40.0 BROWN COARSE SAND

40.0 57.0 BLACK SAND LAYERS

57.0 58.5 BLUE CLAY

#### WELL CONSTRUCTION

From To Casing Inside Outside Slot Type Material

(ft.) (ft.) Type Dia.(in) Dia.(in) Size(in)

0 58.0 casing 30.00 CORRUGATED PVC

0 0 perforations

Top of Casing: 2.000 ft. above ground

#### PUMPING TEST

Date: 1991 Jun 12

Pumping Rate: 15.000 Imp. gallons/minute

Water level before pumping: 35.0 ft. below ground

Pumping level at end of test: 47.0 ft. below ground

Test duration: hours, minutes

Water temperature: ?? degrees F

---

Location: SW10-25-22W

Well\_PID: 131444

Owner: ERIC BESSELT

Driller: UNKNOWN

Well Name:

Well Use: PRODUCTION

Water Use:

UTMX: 396579.092

UTMY: 5666861.59

Accuracy XY:

UTMZ:

Accuracy Z:

Date Completed: 1900 Jan 01

No well log data for this well.

No construction data for this well.

Top of Casing: 1.000 ft. above ground

No pump test data for this well.

REMARKS

UNKNOWN DATE, NO LOG

---

Location: SW11-25-22W

Well\_PID: 120796

Owner: RM OF GILBERT PLAINS/PFRA

Driller: Wescan Drilling Ltd.

Well Name: TH 6

Well Use: TEST WELL

Water Use:

UTMX: 398211.014

UTMY: 5666819.42

Accuracy XY:

UTMZ:

Accuracy Z:

Date Completed: 1998 Jul 24

WELL LOG

From	To	Log
(ft.)	(ft.)	

0 34.0 CLAY, SILTY BROWN SOFT  
34.0 37.0 SAND, MEDIUM TO COARSE  
37.0 54.0 CLAY, SILTY GREY SOFT  
54.0 55.0 SAND  
55.0 56.0 BOULDER LIMESTONE  
56.0 161.0 CLAY TILL  
161.0 175.0 COARSE GRAVEL  
175.0 180.0 CLAY SHALE, HARD DARK GREY

No construction data for this well.

Top of Casing:

No pump test data for this well.

REMARKS

INSTALLED 2" COARSE SLOTTED PIPE, BOTTOM @ 170', AIR LIFT PUMPING < 1  
GPM, STATIC WL 6.62 M.

---

Location: SE12-25-22W

Well\_PID: 53316

Owner: G KILLFOR

Driller: A & S Well Drilling

Well Name:

Well Use: PRODUCTION

Water Use: Domestic

UTMX: 400647.018

UTMY: 5666763.32

Accuracy XY: UNKNOWN

UTMZ:

Accuracy Z:

Date Completed: 1985 Aug 09

WELL LOG

From To Log

(ft.) (ft.)

0 30.0 CLAY; BROWN

30.0 67.0 CLAY; GREY  
67.0 75.0 GRAVEL AND CLAY  
75.0 89.9 SHALE

WELL CONSTRUCTION

From (ft.)	To (ft.)	Casing Type	Inside Dia.(in)	Outside Dia.(in)	Slot Size(in)	Type	Material
0	84.9	casing	5.00			PLASTIC	
84.9	89.9	perforations			0.015	WIRE WOUND	S. S.

Top of Casing: 1.000 ft. above ground

PUMPING TEST

Date: 1985 Aug 09  
Pumping Rate: 10.000 Imp. gallons/minute  
Water level before pumping: 0 ft. below ground  
Pumping level at end of test: ?? ft. below ground  
Test duration: 2 hours, minutes  
Water temperature: ?? degrees F

---

Location: SE-12-25-22W

Well\_PID: 59492

Owner: G KILFORD

Driller: Wescan Drilling Ltd.

Well Name:

Well Use: TEST WELL

Water Use:

UTMX: 400647.018

UTMY: 5666763.32

Accuracy XY: UNKNOWN

UTMZ:

Accuracy Z:

Date Completed: 1987 Dec 15

WELL LOG

From	To	Log
(ft.)	(ft.)	
0	12.0	BROWN TILL
12.0	42.0	GREY TILL

No construction data for this well.

Top of Casing: 0 ft. below ground

No pump test data for this well.

#### REMARKS

A LITTLE SEEPAGE AT 36

---

Location: SW-12-25-22W

Well\_PID: 59489

Owner: G KILFORD

Driller: Wescan Drilling Ltd.

Well Name:

Well Use: TEST WELL

Water Use:

UTMX: 399853.797

UTMY: 5666786.49

Accuracy XY: UNKNOWN

UTMZ:

Accuracy Z:

Date Completed: 1987 Dec 15

#### WELL LOG

From	To	Log
(ft.)	(ft.)	
0	11.0	SANDY BROWN CLAY
11.0	16.0	SANDY GREY CLAY
16.0	25.0	GREY TILL

No construction data for this well.

Top of Casing: 0 ft. below ground

No pump test data for this well.

---

Location: SW12-25-22W

Well\_PID: 72721

Owner: G KILFORD

Driller: A & S Well Drilling

Well Name:

Well Use: PRODUCTION

Water Use: Domestic,Livestock

UTMX: 399853.797

UTMY: 5666786.49

Accuracy XY: UNKNOWN

UTMZ:

Accuracy Z:

Date Completed: 1991 Feb 19

#### WELL LOG

From To Log

(ft.) (ft.)

0 19.0 SAND AND SAND CLAY

19.0 30.0 BLUE SANDY CLAY

#### WELL CONSTRUCTION

From	To	Casing	Inside	Outside	Slot	Type	Material
------	----	--------	--------	---------	------	------	----------

(ft.)	(ft.)	Type	Dia.(in)	Dia.(in)	Size(in)		
-------	-------	------	----------	----------	----------	--	--

1.0	27.0	casing	30.00			CORRUGATED PVC	
-----	------	--------	-------	--	--	----------------	--

27.0	30.0	open hole					
------	------	-----------	--	--	--	--	--

0	0	perforations					
---	---	--------------	--	--	--	--	--

Top of Casing: 2.000 ft. above ground

#### PUMPING TEST

Date: 1991 Feb 19

Pumping Rate: 1.504 Imp. gallons/minute

Water level before pumping: 12.0 ft. below ground

Pumping level at end of test: 12.0 ft. below ground

Test duration: hours, minutes

Water temperature: ?? degrees F

---

Location: SW-12-25-22W

Well\_PID: 59491

Owner: G KILFORD

Driller: Wescan Drilling Ltd.

Well Name:

Well Use: TEST WELL

Water Use:

UTMX: 399853.797

UTMY: 5666786.49

Accuracy XY: UNKNOWN

UTMZ:

Accuracy Z:

Date Completed: 1987 Dec 15

WELL LOG

From	To	Log
------	----	-----

(ft.)	(ft.)	
-------	-------	--

0	10.0	SANDY CLAY
---	------	------------

10.0	17.0	GREY TILL SANDY
------	------	-----------------

17.0	25.0	GREY TILL
------	------	-----------

No construction data for this well.

Top of Casing: 0 ft. below ground

No pump test data for this well.

---

Location: SW-12-25-22W

Well\_PID: 59490

Owner: G KILFORD

Driller: Wescan Drilling Ltd.

Well Name:

Well Use: TEST WELL

Water Use:

UTMX: 399853.797

UTMY: 5666786.49

Accuracy XY: UNKNOWN

UTMZ:

Accuracy Z:

Date Completed: 1987 Dec 15

WELL LOG

From To Log

(ft.) (ft.)

0 12.0 SANDY CLAY

12.0 17.0 GREY SANDY CLAY

17.0 46.0 GREY TILL

No construction data for this well.

Top of Casing: 0 ft. below ground

No pump test data for this well.

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No wells are known to exist in sections 34, 35 or 36 of Township 24, Range 22W, to the south of the land application site.

## **Appendix D**

Plan 1: Overall Site Plan

