

Environment Act Proposal Form



Name of the development: Crystal Spring Colony New Development - Domestic Wastewater Lagoon		
Type of development per Classes of Development Regulation (Manitoba Regulation 164/88): Class 2 - Wastewater Treatment Lagoon		
Legal name of the applicant: 7317434 Manitoba Ltd. - Crystal Spring Colony Farms Ltd.		
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Location of the development: SE 28-18-03 EPM		
Contact Person: Victor Kleinsasser		
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Legal Description: SE 28-18-03 EPM		
City/Town: N/A	Province: Manitoba	Postal Code: R0G 1Y0
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A complete **Environment Act Proposal (EAP)** consists of the following components:

- Cover letter**
- Environment Act Proposal Form**
- Reports/plans supporting the EAP** (see "Information Bulletin - Environment Act Proposal Report Guidelines" for required information and number of copies)
- Application fee** (Cheque, payable to Minister of Finance, for the appropriate fee)

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Class 1 Developments	\$1,000
Class 2 Developments	\$7,500
Class 3 Developments:	
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Director
Environmental Approvals Branch Manitoba
Environment and Climate
14 Fultz Boulevard
Winnipeg, Manitoba R3H 0W4

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August 17, 2023

Environmental Approvals Branch
Manitoba Environment, Climate and Parks
14 Fultz Boulevard
Winnipeg MB R3Y 0L6

**Reference: Environmental Act Proposal
Domestic Wastewater lagoon
Municipality of Armstrong, MB**

Dear Director,

Burns Maendel Consulting Engineers Ltd. is pleased to submit an Environment Act Proposal for the proposed domestic wastewater lagoon in the Municipality of Armstrong on behalf of 7317434 Manitoba Ltd. (Crystal Spring Colony New Development). This Domestic Wastewater Lagoon will be designed to treat wastewater for the expected population of 250 people, an abattoir, and hold runoff from the residential weeping tile.

All the information relating to the Environmental Act Proposal has been compiled in the attached document. Two (2) copies of our proposal have been included as required. If you have any questions or comments, please feel free to contact the undersigned.

Regards,



Ashley Haigh, P.Eng.
Civil Engineer



Environmental Approvals Branch
Manitoba Environment, Climate and Parks
14 Fultz Boulevard
Winnipeg MB R3Y 0L6

Environmental Act Proposal

Crystal Spring Colony New Development

SE 28-18-03 EPM

Submitted by:

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On behalf of:

7317434 Manitoba Ltd.
Crystal Spring Colony Farms Ltd.
Municipality of Armstrong
Box 10
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August 17, 2023

Executive Summary

Crystal Spring Colony, 7317434 Manitoba Ltd., has proposed a new colony development in the RM of Armstrong, located at SE 28-18-3 EPM. The proposed site is currently undeveloped land consisting of areas of long grass, low-lying shrubs, marsh, and intermittent sections of wooded area. The proposed colony will include residences, a school, and communal buildings including a church, kitchen, and dining hall. Additionally, the colony intends to operate a farm-based operation at the proposed site that includes light manufacturing and livestock production.

As part of the development, a wastewater treatment facility is required. BMCE has been retained for the design of the water treatment lagoon as well as the corresponding Environment Act Proposal. Due to the isolated nature of the site and its adjacency to a natural drainage path, a facultative wastewater lagoon was selected as the method of treatment.

The lagoon will consist of two cells: a primary cell with a capacity of 6,538 m³, and a secondary cell with a capacity of 21,856 m³ for a total of 28,394 m³. The lagoon will include a synthetic HDPE liner complete with a gas venting system.

The lagoon will discharge into the Road 15E drain and travel north to Willow Creek. The effluent will follow Willow Creek east approximately 15km where it will enter Lake Winnipeg. Willow Creek is considered a Class A drain, where indicator species of fish are present, and the channel is considered complex. Special consideration will be taken during construction to ensure no deleterious substances are deposited into the drain. During operation, wastewater effluent will be tested prior to release, in accordance with Manitoba Environment, Conservation and Parks requirements. As such, any possible or anticipated risks are minimized.

No registered Points of Use (> 25 000 L/d) were identified downstream the discharge path. Additionally, well logs show the nearest domestic well user is approximately 2km downstream. The distance, as well as lagoon liner requirements prohibiting infiltration, reduce the likelihood of any impact on this user or any users further downstream.



Standard Limitations

This report was prepared by Burns Maendel Consulting Engineers Ltd. (BMCE) for the account of Crystal Spring Colony Farms Ltd., 7317434 Manitoba Ltd. (the Client). The disclosure of any information contained in this report is the sole responsibility of the Client. The material in this report reflects BMCE's best judgment in light of the information available to it at the time of preparation. Should this report be used by a third party, any reliance or decisions made based on this report are the responsibility of such third party. BMCE accepts no responsibility for damages, if any, suffered by a third party as a result of decisions made or actions based on this report. BMCE makes no representation concerning the legal significance of the findings or the information contained within this report.

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1. Introduction and Background

Crystal Spring Colony (7317434 Manitoba Ltd.) has proposed a new colony development in the Municipality of Armstrong. The name of the new colony has yet to be determined and is herein referred to as Crystal Spring Colony (the colony); the official name of the licensee will be provided at a later date. The proposed location is SE 28-18-3 EPM, west of the border between the Rural Municipality of Gimli and the Municipality of Armstrong.

The colony intends to construct residences, communal buildings including kitchen facilities, a school, and a church, and several industrial shops. It is the colony's intent to construct a farm-based operation at the proposed site that may include light manufacturing, a feed mill, a chicken barn, a multi-purpose barn, an abattoir, and supporting infrastructure as required.

To aid in the development process, the colony has retained Burns Maendel Consulting Engineers Ltd. (BMCE) to provide engineering design and technical support. This Environment Act Proposal (EAP) has been prepared by BMCE on behalf of the colony to obtain a license for the proposed domestic lagoon.

1.1. Wastewater Production

Typical colony developments in Manitoba account for a population of approximately 125, however, modern trends for growth and industrialization have resulted in larger settlement sizes.

1.1.1. Population

The new colony has been designed to permanently accommodate a maximum population of 200 persons at full construction. Per traditional colony development, as the colony nears capacity it will then divide and establish another subsequent colony. As the establishment of the subsequent colony proceeds it is reasonable to understand the colony population will continue to naturally increase in the interim. Therefore, BMCE has assumed a domestic population of 250 to accommodate a larger-than-standard population during the construction of the subsequent colony.

1.1.2. Domestic Wastewater Production Rate

Domestic wastewater production rates were calculated using a loading rate of 0.077 kgBOD₅/cap/day for organic loading and a value of 300 L/cap/day was used to determine hydraulic loading. This organic loading rate is typical for wastewater projects within Manitoba. The rate for hydraulic loading is in accordance with literature values as well as historical design wastewater loading rates from other colonies.

Table 1 – Domestic Organic and Hydraulic Loading Rates

Population	Organic Loading Rate (kg BOD₅/c/d)	Organic Loading (kgBOD5/d)	Hydraulic Loading Rate (m³/c/d)	Hydraulic Loading (m³/d)
250	0.077	19.25	0.3	75.0

1.1.3. Truck Wash Production Rate

Once fully constructed, the colony plans to include a truck wash. The runoff from the truck wash will be collected in the wastewater lagoon at an assumed rate of 3.89 m³/day. This loading rate uses an assumed usage of 4 hours/day, 6 days/ week of a 5 gpm pressure washer, based on observed loading rates from the New Rosedale Colony and discussions with Crystal Spring representatives.

1.1.4. Abattoir Production Rate

The proposed development includes plans for an abattoir for colony use, with no commercial processing in the facility. It is anticipated that the colony will process 25 beef cattle, 500 hogs, 6000 broiler chickens, and 2000 broiler ducks/turkeys annually, at full occupancy and operations.

Typical wastewater requirements and loading rates for the slaughter of cattle, hogs, and poultry were obtained from *The Characterization of Provincial Inspected Slaughterhouse Wastewater in Ontario, 2011*. Utilizing these values, BMCE calculated the average daily organic and hydraulic loading from the proposed abattoir. As summarized in Table 2, the abattoir, at full operation, is expected to contribute 1387 L/day and 6.82 kg BOD₅/d.

Table 2 - Abattoir Organic and Hydraulic Loading Rates

Parameter		Result	
Livestock Type	Quantity (head)	Washwater Loading (L/head)	Daily Loading (L/day)
Chicken	6,000	11	181
Ducks/Turkeys	2,000	12	66
Hogs	500	757	1037
Cattle	25	1,514	104
Chicken – Washwater BOD ₅ Concentration (mg/L)		1,648	
Ducks/Turkeys - Washwater BOD ₅ Concentration (mg/L)		1,999	
Hogs – Washwater BOD ₅ Concentration (mg/L)		4,711	
Cattle – Washwater BOD ₅ Concentration (mg/L)		14,545	
Chicken – Washwater BOD ₅ Loading (kg BOD ₅ /d)		0.30	
Ducks/Turkeys – Washwater BOD ₅ Loading (kg BOD ₅ /d)		0.13	
Hogs – Washwater BOD ₅ Loading (kg BOD ₅ /d)		4.89	
Cattle – Washwater BOD ₅ Loading (kg BOD ₅ /d)		1.51	

1.1.5. Additional Hydraulic Loading

Backwash flow rates from the future water treatment plant were obtained via records of similar colony Water Treatment Plants and their observed usage, and other colony domestic lagoons on the public registry. These values were then improved upon based on the anticipated treatment system and published literature regarding the frequency and volumes of reverse osmosis and filter backwash as a percentage of domestic water consumption.

The colony intends to connect the residential weeping tile to the domestic lagoon. As such, infiltration and inflow must be accounted for. A value of 15% of total flow was utilized based on a study of *Infiltration/Inflow Control/Reduction for Wastewater Collection Systems*, with assumptions verified based on soil type, regional climate, and contributing area.

Organic and hydraulic loading is summarized below, demonstrating the contributions of population, abattoir, backwash, and weeping tile/infiltration.

Table 3 - Organic and Hydraulic Loading Rate Summary

Contributor	Organic Loading (kg BOD₅/d)	Hydraulic Loading (m³/d)
Population	19.25	75.00
Abattoir	6.82	1.39
Truck Wash	N/A	3.89
Backwash	N/A	13.27
Weeping Tile	N/A	14.15
TOTAL	26.07	107.70

1.2. Topographical Survey

BMCE conducted a topographical survey utilizing GPS survey technology and a review of LiDAR data for the area to gain an understanding of the drainage patterns of the project site. The objective of the survey was to determine existing elevation across the site. This data indicated the direction of existing runoff flow as well as any areas of ponding.

The project site has several large areas of heavy tree cover, limiting the ability to properly determine elevations exclusively using LiDAR. A GPS survey conducted in March 2021 determined accurate elevations around the areas of heavy tree cover and other areas of interest.

The majority of surface water drains towards the north-east corner, into Willow Creek, or south-east into the unnamed drain which conveys water to the south edge of the site. These existing topographical features have been optimized and improved upon during BMCE's detailed design of the overall colony development.

1.3. Geotechnical Review

Accurate geotechnical investigations play a pivotal role in domestic lagoon design. Proper soil analysis determines whether a clay liner can be used, compacted or otherwise, or if a synthetic liner is needed. Additionally, determining the location of the water table is necessary to determine possible interference with the present groundwater system.

BMCE retained Trek Geotechnical to conduct a geotechnical investigation of the project site.

1.3.1. Geotechnical Investigation

The geotechnical investigation completed May 3 to 6, 2021, included a sub-surface investigation, laboratory testing, and provisions of geotechnical recommendations. A total of 23 test holes and 6 test pits were drilled or excavated across the project site, with test holes #15 – 19 (TH21-15 to TH21-19) located under the proposed lagoon footprint. Detailed test hole summary logs are included in the Geotechnical Report in

Appendix **A**.

The holes were drilled by Paddock Drilling Ltd. using a track mounted geotechnical rig with a 125mm solid stem auger under the supervision of Trek personnel. Test pits were excavated by Graboweski Concrete using a track mounted excavator. Test holes were filled with auger cutting and/or bentonite chips and test pits were backfilled with excavated material and track packed.

The soil stratigraphy was visually classified at the time of drilling using the modified Unified Soil Classification System (USCS). Soil samples were collected off the auger flights, via Shelby Tubes, and split spoons. All samples were retained for testing at TREK'S Winnipeg laboratory.

1.3.1.1. Laboratory Program

Laboratory testing consisted of moisture content determination on all samples, grain size analysis via hydrometer, Atterberg limits, permeability, undrained shear strength testing via pocket penetrometer, torvane and unconfined compression, and Standard Proctor testing on select samples.

1.3.2. Soil Stratigraphy

Detailed soil stratigraphy is provided in the test hole logs located in Appendix A. Generally, the proposed lagoon site includes a covering of organic clay or silt topsoil, overlaying layers of sand, silt and clay, and/or silty clay, which are underlain by silt till.

1.3.3. Groundwater

Minimal groundwater was encountered in the geotechnical test holes. Seepage occurred at a depth of 2.1 m in TH15. The other four test holes did not encounter any seepage or groundwater during or after drilling. TH15 saw sloughing occur at a depth of 0.1 to 1.5 m while sloughing was encountered at the bottom of all other test holes. Additional information regarding existing groundwater conditions is discussed in Section 3.5.

1.3.4. Liner Recommendations

Trek Geotechnical provided BMCE with liner recommendations based on the geotechnical investigation and lab analysis. Per the investigation, it was identified that due to the variability of in-situ surface soils, that an in-situ liner would not meet provincial requirements for hydraulic conductivity. The permeability of consolidated in-situ soil was analyzed and was found to be 1.78×10^{-8} cm/s, which exceeds the provincial standards for hydraulic conductivity (1×10^{-7} cm/s, per the province of *Manitoba's Information Bulletin – Design Objectives for Wastewater Treatment Lagoons*).

As the in-situ soil was found to not meet permeability requirements, a compacted in-situ liner or synthetic liner was recommended. Due to the minimal availability of suitable clay deposits at or adjacent to the project site, BMCE determined a synthetic liner.

2. Description of Proposed Development

2.1. Certificate of Title

The legal land description where the proposed wastewater lagoon will be situated is SE 28-18-3 EPM. The legal landowner of the quarter section is 7317434 Manitoba Ltd. under Title No.3047937/1 refer to Appendix B for a copy of the Certificate of Title.

2.2. Sealed Engineering Drawings

BMCE has prepared a detailed drawing set for the lagoon siting plan, site layout, lagoon plan view, section views and details. Sealed engineering drawings detailing the proposed wastewater lagoon have been included in Appendix C.

2.3. Site Selection

In selecting the location of the new Crystal Spring Colony, BMCE was retained to provide a technical opinion on the suitability of the proposed site. The following sections detail the reviews and research used to determine the location of the lagoon inside SE 28-18-3 EPM.

2.3.1. Land Use Planning Review

BMCE completed a comprehensive policy review, considering regulations, planning documents, and regional goals.

Per the Armstrong Zoning By-law. The project site is included under AG: general agricultural which states wastewater lagoons are permitted use so long as they conform to the Manitoba Environmental Act. Lagoons must follow setback distances as stated in sections 12.4-12.6 of the bylaw. Finally, a development permit is required to construct a lagoon within the RM of Armstrong, which has been obtained October 14th, 2021.

The project site is located on the border between the RM of Armstrong and the RM of Gimli, because of this, requirements of the Gimli Zoning By-Law must be considered. Per the Gimli Zoning By-law, 1000 ft (305 m) shall be maintained between a dwelling and a sewage treatment lagoon.

As per the nutrient management regulations, part of *The Water Protection Act*, no lagoon will be located in the buffer zone adjacent to waterways.

The Fisher Armstrong Planning District Development Plan specifies that livestock and other activities that may cause pollution under normal operating conditions are not permitted in an identified groundwater pollution hazard area with engineering investigation and appropriate precautionary measures. However, it was found that 28-18-3 EPM is not considered a groundwater pollution hazard area, therefore this is not applicable.

A review of Willow Creek Integrated Watershed Management Plan showed that the project site is not located in a source water protection zone.

2.3.2. Flood Protection

BMCE contacted the Water Management, Planning and Standards: Hydrologic Forecasting & Water Management division of Manitoba Infrastructure. It was determined that no official flood elevation was available for the project site. Therefore, it was recommended that permanent structures should be located 1.5 m above ordinary high-water levels with a minimum setback of 30.5 m from the top of the waterway embankment.

Additionally, A hydrologic and hydraulic assessment of the project site was conducted by Trek Geotechnical on November 21, 2022, which can be found in Appendix E. Their findings indicate a necessary flood protection level be set at an elevation of 248.4 m which includes a 0.6 m freeboard added. The proposed lagoon has been designed with berm elevations of 248.5 m to meet these required flood protection levels.

2.3.3. Siting and Location

The province of *Manitoba's Information Bulletin – Design Objectives for Wastewater Treatment Lagoons* states that a lagoon site should be as far as practical from habitation or any area which may be built up within a reasonable future period. Lagoons should not be located closer than 460 m from any center of population with individual residences not being any closer than 300 m with both distances being measured from the outer toe of the nearest dyke.

Additionally, the design objectives state that the preference should be given to sites which will permit an unobstructed wind sweep across the cells of the lagoon. Consideration should be given to the lagoon location such that prevailing winds will be in the direction of uninhabited areas. Lagoons should also be located such that sufficient distance is available between the lagoon and property line or the lagoon and the fence line for access of maintenance equipment. It is recommended that a minimum distance of 30 m be maintained between the outside toe of the embankment and the fence line or property.

The proposed location of the lagoon is in the south-east corner of the project site. As per both the Armstrong and Gimli zoning by-laws, the lagoon meets or exceeds all setback requirements, it will be located more than 300 m away from the nearest residential residence and more than 460 m away from any center of population. Additionally, the lagoon footprint is not nearby any nutrient zones and as stated in Section 2.3.1 the project site, SE 28-18-3 EPM, is not considered a groundwater pollution hazard area. Proposed lagoon configuration and associated setbacks are provided on drawing C1.2 in **Error! Reference source not found..**

2.4. Lagoon Design

The following sections provide information on the design considerations, assumptions, and methods used in the lagoon design.

2.4.1. Design Parameters

BMCE utilized the following rationale to establish design parameters for the proposed lagoon:

- The detention time was set at **230 days**. 227-230 days are standard detention times, based on the operational requirement that the wastewater effluent be discharged between June 15 and November 1 of a given year.
- The design organic loading rate per person is set at **0.077 kg BOD/person/day**. This is a value used commonly in wastewater treatment design in Manitoba.
- The maximum organic loading rate is set at **56 kg BOD5/ha/day**. This value is commonly used in wastewater lagoon design across Manitoba per *Manitoba's Information Bulletin – Design Objectives for Wastewater Treatment Lagoons*.
- Per common practice and design standards for wastewater lagoon design, the available storage will be **1.50 m**, and active storage will be **1.20 m**.
- Per common practice and design standards for wastewater lagoon design, the available freeboard will be **1.00 m**.
- The area below the interconnecting pipe inverts is considered dead storage and is not part of the design storage volume or freeboard. The dead storage height is **0.30 m**, as per common design practice and MECP standards.
- The interior slope of the primary and secondary cells will be **4:1** in accordance with the province of Manitoba's *Information Bulletin – Design Objectives for Wastewater Treatment Lagoons*.

Details of the lagoon design parameters utilized during design of the wastewater lagoon are summarized in Table 4. These parameters are in conformance with the province of Manitoba's *Information Bulletin – Design Objectives for Wastewater Treatment Lagoons*.

Table 4 – Lagoon Design Parameters

Parameter	Result
Winter Storage Period	Nov. 1 to Jun. 15
Detention Time (days)	230
Organic Loading Rate (kg BOD ₅ / cap / d)	0.077
Organic Treatment Rate (kg BOD ₅ / ha/ d)	56.0
Active Storage Depth (m)	1.20
Freeboard (m)	1.00
Dead Space (m)	0.30
Total Depth (m)	2.50
Cell Interior Side Slope	4:1

2.4.2. Primary Cell Design (Organic Loading)

The area outlined in Table 5 was determined at the active storage depth in the lagoon using the 56 kg BOD₅/ha/d as outline in Section 2.4.1. This represents a depth of 0.6 m from the high-water level or 0.9 m from the bottom of cell which will represent the average water depth in the lagoon throughout the year.

Table 5 – Primary Cell Design Summary

Parameter	Result
Top of Berm Dimensions – L x W (m)	83 x 90
Floor Dimensions – L x W (m)	63 x 70
Area at Average Active Storage Depth (m ²)	6,150
Organic Treatment Capacity Provided (kg BOD ₅ / d)	34.4
Organic Loading Rate (kg BOD ₅ / d)	26.1
Volume Required (m ³)	5,597
Volume Provided (m ³)	6,538

2.4.3. Secondary Cell Design (Hydraulic Loading)

The total active storage volume provided for the secondary cells was calculated using the volume of the secondary cell plus half of the volume of the primary cell, per *Manitoba Sustainable Development's Design Objectives for Wastewater Treatment Lagoons*. The subsequent hydraulic capacity provided is then calculated by dividing the total active storage volume provided by the detention time to get an average inflow rate over this period of time that the lagoon can accommodate. This hydraulic capacity can then be compared to the hydraulic loading calculated in Section 1.1 (loading for population, abattoir, and extra considerations).

Table 6 – Secondary Cell Design Summary

Parameter	Result
Top of Berm Dimensions – L x W (m)	83 x 272
Floor Dimensions – L x W (m)	63 x 252
Secondary Cell Volume Provided (m ³)	21,856
Primary Cell Volume Provided (m ³)	3,269
Total Active Storage Provided (m ³)	25,125
Hydraulic Capacity Provided (m ³ /d)	109.2
Hydraulic Loading (m ³ /d)	107.7

2.5. Lagoon Liner

The lagoon containment will consist of a 60 MIL textured HDPE liner. This synthetic liner will be underlain with a 12 oz, non-woven, geotextile fabric and overlain with a protective sand cover varying from 0.3 m to 0.46 m in thickness across the cell bottom. The liner will be secured using sand-filled anchor trenches, as shown in the drawing details on Drawing C3.2 of Appendix C – Drawings.

Threats of groundwater underlying the cells will be mitigated through the installation of Multi-flow (or equivalent) collection pipes. These pipes will allow any percolating

groundwater or entrapped gasses to evacuate from under the liner to either the sump pits or the trap vents.

2.6. Effluent Discharge

The proposed lagoon will be located in the south-east corner of SE 28-18-3 EPM, adjacent to Road 15E.

The cell outlet will release from the secondary cell through a release pipe sloped at 0.3% to the outfall with an invert elevation of 246.23 m. This outfall will be armoured with a 3.0 x 3.0 m, grouted, riprap splash pad. Topographical survey indicates the ditch invert at the junction of the outfall swale and the municipal ditch is 246.00 m.

The effluent will discharge into the roadside drain where it will flow north to Willow Creek. The effluent will then flow approximately 15 km east into Lake Winnipeg as shown in Figure 1.

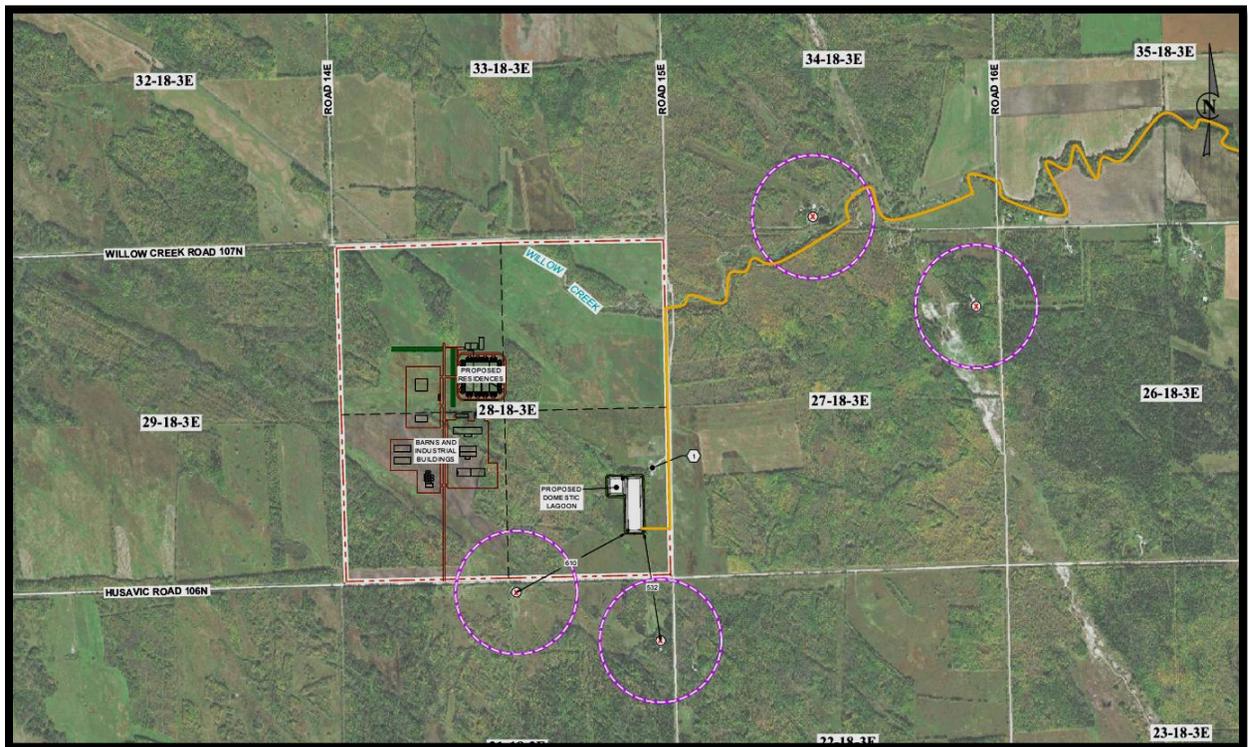


Figure 1 – Drainage Path

Between the months of June and November, once the secondary cell has been tested and meets MECP effluent quality requirements, the effluent will be discharged into the roadside drain parallel to Road 15E. A trickle discharge will be used to slowly release the effluent and prevent overflow and erosion. This will allow the vegetation along the channel to further dilute and polish the effluent.

Based on the project location and effluent testing protocols that will be implemented, no effect is anticipated to downstream users.

2.7. Wastewater Collection System

The colony will utilize a combination of gravity and low-pressure sewer systems to convey wastewater to the lift station located in the North-East corner of the proposed site. The lift station will then pump the water into the primary cell of the wastewater lagoon via a forcemain. Additionally, the flow from the colony's weeping tile will be conveyed into the sewer system. The wastewater collection system will be submitted separately with an Application for a Certificate of Approval for a Wastewater Collection system to MECP.

2.8. Facility Operation

Wastewater effluent collected by the sewer network will be pumped to the lagoon where the wastewater will be stored and treated until it is released in the summer/fall.

The discharge operation is summarized in the following steps:

Two weeks prior to the time of sampling, the valve permitting flow between the primary and secondary cell will be closed. This will ensure a representative water sample can be collected from the secondary cell to be discharged.

Two weeks after the valve has been closed, a water sample from the secondary cell will be obtained, using sample bottles supplied from an accredited laboratory. Water sampling and submission procedures will be performed in accordance with MECP guidelines.

If the samples do not meet MECP requirements, testing will be repeated until the samples have passed the testing criteria. Additional time will allow for natural processes, including sunlight and settling, to remove unwanted constituents from the effluent. When water samples successfully meet MECP requirements, water from the secondary cell can be discharged. Discharge will only occur within the June 15 to November 1 period each year.

Once the effluent has been drained from the secondary cell, the discharge valve will be closed. At this time, the valve regulating flow between the primary and secondary cell will be reopened.

Once the water level between the primary and secondary cell has been equalized, the secondary cell effluent can be released a second time to provide adequate capacity for winter. In the event of a subsequent release is required, the isolation sampling and release process shall be repeated. However, based on the loading calculations, we do not anticipate a second discharge will be necessary in a typical operating year.

2.9. Seasonal Maintenance

Regular observation of the lagoon will be undertaken by colony members to ensure that there are no damages to the lagoon structure.

The following tasks will be performed to ensure that the integrity of the lagoon is maintained and is functioning properly:

- Venting piping and visible sections of the liner will be inspected for damage and repaired immediately to maintain the integrity of the facility.
- The lagoon will be inspected for signs of wildlife. Any wildlife burrowing into the berm or otherwise causing damage will be removed.
- Valves and drainage areas will be checked and cleared of obstructions on a regular basis.
- HDPE sump pits accumulating releases from the collection pipes will be inspected and pumped out regularly, as site topography does not allow for these sumps to be naturally free-draining.
- Snow will be cleared on the access road so that the lagoon may be accessed at any time.
- Areas inside fencing will be mowed so berms are visible for inspection.

Records of all maintenance will be recorded and retained for a minimum of five (5) calendar years.

3. Description of Existing Environment in the Project Area

The project site is SE 28-18-3 EPM, located on the border of the RM of Gimli and the RM of Armstrong. It is bounded by Road 15E to the east, 107N to the north, and 106N to the south.

3.1. Land Use

The subject site is classified as “AG” (Agricultural General), which provides for a full range of agricultural activities per the Armstrong and Gimli Zoning By-laws. The footprint of the proposed lagoon is presently utilized as grasslands, while adjacent land consists of cultivated agricultural cropland with isolated areas of deciduous forest.

3.2. Topography

The location of the lagoon will be the southeast corner of SE 28-18-3 EPM. The area is clear of major tree cover and is adjacent to the roadside drain parallel to Road 15E. Elevations within and adjacent to the footprint of the lagoon show slopes running towards the roadside drain. These slopes will provide positive drainage from the lagoon to minimize the impact of stormwater on the facility during operations.

3.3. Climate

All climate information has been obtained from the *Terrestrial Ecozones, Ecoregions, and Ecodistricts of Manitoba – An Ecological Stratification of Manitoba’s Natural Landscapes, 2001*. The project is located in the Gimli Ecodistrict. This ecodistrict lies within the more humid and

cooler subdivision of the Subhumid Low Boreal Ecoclimatic Region, which is characterized by short, warm summers and cold winters. The mean annual precipitation is about 520 mm, of which about one-quarter falls as snow. Precipitation varies greatly from year to year and is highest from late spring through summer. The average annual moisture deficit is nearly 100 mm. The ecodistrict has a humid, moderately cold, Cryoboreal to subhumid, cool, Boreal soil climate.

The climate data from the Gimili station (#5031042) is relevant to the ecodistrict.

3.4. Soil Conditions

See Section 1.3 and Appendix A for a summary of the soil conditions for the project.

3.5. Groundwater

BMCE retained Friesen Drillers to conduct a desktop hydrogeological study for the proposed project site. The study included a review of surficial geology, local wells, and historical reports for the area to determine aquifer conditions. Additionally, the study looked at expected annual usage, as well as regional hydrograph data to provide recommendations for regulatory requirements and groundwater supply locations.

Regional hydrogeology indicates that aquifers can be found in all major geologic units across the Interlake region. The most extensive of these aquifers is known as the Carbonate Aquifer which is also the most widely developed groundwater source in Manitoba. Per the desktop review completed by Friesen Drillers, the project site lies within the Western Canadian Sedimentary Basin and lays over the bedrock carbonate aquifer found approximately 30-40 meters below grade.

3.6. Surface Waterbodies

The project site drains towards the NE corner into Willow Creek. Willow Creek runs east for approximately 15 km before draining into Lake Winnipeg. The project site is in the SE section of the Icelandic River/Willow Creek Watershed.

3.7. Wildlife in Project Area

3.7.1. Existing Aquatic Environment

Willow Creek is classified as a Class A fish habitat by Fisheries and Oceans Canada. This means that the creek contains indicator species including pike and walleye and is considered complex due to variations in the channel and the presence of vegetation.

3.7.2. Existing Terrestrial Environment

The project site is part of the Interlake Plain Ecoregion, no permanent habitats are expected within the cultivated areas; however, this ecoregion usually provides shelter for several species of animal. Some of the terrestrial wildlife that may be present at or near the project site are:

- **Small Mammals:** Rabbits, foxes, racoons, squirrels, chipmunks, skunks
- **Large Mammals:** Bears, Deer, Moose
- **Reptiles and Amphibians:** Frogs, turtles, snakes
- **Birds:** Woodpeckers, hummingbirds, bluebirds, cardinals

The Narcisse Snake dens, located in the Narcisse Wildlife Management area, has been identified approximately 30 km NW of the project site. The Narcisse Snake Dens are home to a large number of red sided garter snakes who migrate there in the summer. Due to the considerable distance between the project site and the snake dens, no impact or interference is anticipated due to proximity to the proposed lagoon.

3.7.3. Rare, Threatened, Protected or Endangered Species

BMCE contacted the Manitoba Conservation Data Centre (MBCDC) to request a search of the threatened species database for the project's area of interest. The review considers the primary location, as well as a two-kilometer radius buffer from the footprint boundary. Per the Species at Risk Act (SARA), "threatened species" means a wildlife species that is likely to become an endangered species if nothing is done to reverse the factors leading to its extirpation or extinction.

During this review, two species of threatened bird, the barn swallow (*Hirundo rustica*), and the bobolink (*Dolichonyx oryzivorus*), were found to reside in the general area of the project site, in apparently similar habitats. Bobolinks are commonly found in grasslands, marshes, and cultivated fields, where barn swallows are found in similar areas with emphasis on fields and farmland.

As the lagoon expansion is proposed to be constructed on lands that are currently utilized as cultivated agricultural land, it is unlikely there are nests, burrows, or dens in the project site. As the project location is within lands currently cultivated for agriculture, and there are no recorded observations of these species at the project site, there will be minimal impact to any threatened species, endangered species, or species of special concern.

3.8. Socioeconomic Environment

The socioeconomic environment is not a large factor in the development of this wastewater lagoon. The project site is a moderately isolated location in an undeveloped area with approximately 7 non-associated residences within 2.5 kilometers. The proposed lagoon will be located approximately 530 meters from the nearest residence not associated with the colony.

It is important to note that the lagoon will be discharging downstream into a known populated recreational area which has concerns over algae blooms. However, due to the standards in place for effluent discharge from wastewater lagoons as well as the length of the effluent path, it is expected downstream users and the recreational area will be unaffected.

3.9. Heritage Resources

Manitoba's Historic Resources Branch was contacted to identify any potential heritage resources, historical characteristics, sites, or structures at 28-18-3 EPM that would be of archaeological significance and thus impact the project development. Through conversations with the senior impact assessment archaeologist, it was identified that the property is adjacent to an ancient beach ridge, within which the creeks and channel remnants may have heritage potential. They identified the northeast corner, near Bass Drain, and the southwest corner, in the low area, as potential areas of interest.

A heritage resource impact assessment (HRIA) was commissioned to investigate areas of interest. Finlay Heritage Consulting Inc. conducted the HRIA of the project site, and it was found that no heritage resources were present. BMCE's correspondence with the HRB and a copy of the HRIA can be found in Appendix D.

3.10. Indigenous Communities in Vicinity of Project

The proposed project is within Treaty 1 lands. The nearest indigenous community to the project is Brokenhead Ojibway Reserve, in the Rural Municipality of St. Clements, approximately 42.5 km south-east of the project site.

No direct consultations were conducted with the regional indigenous bodies.

4. Possible Effects & Planned Mitigation of Proposed Development

Wastewater lagoons that are designed constructed, operated, and maintained in accordance with MECP regulations pose negligible impacts to the environment nor to human health. Potential impacts that may be encountered during lagoon construction or operation, and the mitigation measures to remove or minimize these effects have been provided as follows.

4.1. Air Quality

During construction, emissions from construction equipment will be present. These emissions will be addressed and minimized by emphasizing the use of construction equipment in good operative condition and minimizing equipment idle time.

Odour nuisance is only expected to be a factor during spring and fall turnover, as this is the time when noxious gases are released. Odour will be mitigated by the fact that prevailing wind will direct the odours away from the populous regions. The period in which odours are released is short and therefore odour effects should not be a nuisance for residents in the immediate area.

Ongoing monitoring of the lagoon will be performed to ensure the proper functioning of the lagoon. Further attention will be paid to odour, and if excessive odour is noticeable the cause will be identified and dealt with accordingly. For a detailed review of the facility operation, please refer back to Section 2.8.

4.2. Soils

In situ soils will be disturbed during the construction of the new cell. While construction equipment is on-site, there is the risk of fuel spills from the operation of heavy equipment. This risk will be reduced by prohibiting the storage of fuels and other contaminants on-site during construction. Any small spills or leaks that may occur would be addressed with standard soil contamination protocol.

Ongoing monitoring of the lagoon will be performed to ensure the proper functioning of the lagoon. Regular inspection will ensure that there is no damage to the lagoon from erosion, liner failures, or other causes. The general condition of the lagoon will be observed on an ongoing basis during all seasons.

4.3. Groundwater

While construction equipment is on-site, there is the risk of fuel spills from the operation of heavy equipment. This risk will be reduced by prohibiting the storage of fuels and other contaminants on-site during construction. Any small spills or leaks that may occur would be addressed with standard soil contamination protocol, so it does not reach the ground water table.

Properly designed wastewater lagoons liners do not allow for any infiltration of wastewater into the surrounding environment except during wastewater discharge where it has been treated to an acceptable level by MECP standards. Additionally, regular inspections of the liner will occur to determine if the liner is functioning as designed. For these reasons no impact is expected to groundwater during the lagoon operation.

4.4. Forestry and Vegetation

As the lagoon is proposed to be constructed on lands that consist of cultivated fields with intermittent deciduous forest, small sections of treed areas will be cleared during the construction of the lagoon. When performing tree cutting and clearing the following responsible practices will be followed:

- Minimize cutting, only removing what is required,
- Avoid noise and dust nuisances by following good construction practices regarding operation time and dust mitigation measures,
- Responsibly grub by repurposing or recycling useable lumber, and
- Follow construction practices set by MBCDC.

During regular operation, vehicular access will be limited to the access road within the fenced enclosure. As such operational impacts to forestry and vegetation will be minimal.

4.5. Surface Water, Fish, and Fish Habitats

Minimal impacts on surface water and fish habitat are anticipated during project construction. While construction equipment is on-site, there is the risk of fuel spills from the operation of

heavy equipment. This risk will be reduced by storing equipment and fuel a minimum of 100m away from waterbodies, as per Petroleum Products & Allied Products Regulation.

Additionally, during operation, impact to surface water bodies is expected to be minimal. All effluent is tested according to the MECP license requirements and discharged between June 16th and November 1st of any year. Additionally, Lake Winnipeg is 15 km downstream from the discharge location, this allows for additional natural filtering of any contamination before reaching the vulnerable water body.

Because no effluent will be discharged from the lagoon until it meets MECP license requirements, no risk to fish is anticipated during operation, as potential risks of pollution can be properly monitored and mitigated.

4.6. Wildlife

Sections of the deciduous forest areas on the project site will be cleared during the construction of the lagoon. As mentioned in Section 3.7.2, several species of animal use these forests for shelter. However, as mentioned in Section 4.4 the amount of area removed will be minimized and as such the amount of animal shelter removed will be minimized.

During operation any burrowing or nesting animals will be relocated so no damage to the lagoon will occur. This monitoring practice will also mitigate any impacts on said animals due to contaminated water consumption or equipment usage within the fenced area of the lagoon.

4.7. Rare/Threatened Species

Manitoba Conservation Data Centre (MBCDC) identified two species of threatened bird within the area, barn swallow and bobolink. During construction, the land clearing, excavation, and general operation of large machinery may cause disturbances to these species.

The MBCDC provides recommendations for construction practices in areas where sensitive species may be present in or near the project area. Following these recommendations for construction of the proposed development, the following practices will be adhered to:

- Disturbances will occur outside of breeding season,
- Minimal clearing/disturbance techniques will be utilized during and outside breeding season,
- Suitable habitat that is unavoidably disturbed will be reclaimed, and
- Where exact nesting sites cannot be identified, setback distances will be applied.

With the application of these recommendations, disturbance to these threatened species during construction will be minimized.

There is minimal expected impact on these species during the operation of the lagoon. Operation and maintenance will be carried out by minimal staff and equipment, where reeds and other vegetation will be removed making it undesirable as a nesting area. The clearing

of vegetation will also deter the birds from entering the site and potentially consuming untreated effluent.

4.8. Climate Change

Impacts due to equipment usage and emissions will be mitigated by minimizing idle times and using responsible construction practices.

As this lagoon is taking advantage of natural treatment processes, no significant climate change impacts are expected during operation.

4.9. Human Health

The site location is located in the SE section of 28-18-3 EPM, separated from the proposed colony, with a max population of 250, by a section of forest and a setback distance of over 600 m from the nearest colony residence. MECP guidelines require new lagoons to be constructed with a minimum setback of 300 m from any individual residence. The nearest residence not associated with the colony is setback a distance of 532 m and the nearest community is a distance of 7 km away from the lagoon.

Increased dust, noise, and vehicle traffic is expected during construction. Noise pollution may be a nuisance to nearby residents, while dust and vehicles could pose a more dangerous threat with reduced visibility, and minor health issues. Dust and noise will be mitigated by using proper construction methods including specific working hours and dust reduction materials and practices. Proper signage and vehicles in good working order will minimize risks due to traffic.

As outlined in Section 4.1, odour will only be a problem for short periods of time during the spring and summer. Nuisance odours can cause several minor health effects such as headaches, eye irritation, and respiratory problems. However, due to the proposed tree line and distance of separation from the nearest residences, no adverse effects on nearby residents are anticipated.

Safety features will include a 1.8 m tall, 150 x 150 field wire fence topped with barbed wire, and descriptive signs to discourage unauthorized access to the lagoon, and to make known the potential danger. In the event that an unauthorized person accesses the lagoon facility area and falls into the cells, the 4:1 interior side slope and access ramps will provide a sufficient surface to assist the person in exiting.

The effluent discharge path was examined to determine if there were any downstream users within sufficient range to be affected. It was found that there is a downstream user located within 34-18-3E with a well connected to a groundwater aquifer. As the user is approximately 2 km downstream of the discharge location, and a properly designed wastewater lagoon will not allow infiltration of untreated water, no impact on this user, or any additional downstream users, is expected. A review of MECP's *Water Rights Licensing Public Map Viewer* showed there are no registered Points of Use (> 25 000 L/d) downstream of the proposed lagoon. A review of the *Ground Water Drill Data, 2016* showed three recorded well logs within a 3.5 km

radius downstream of the proposed lagoon. As the nearest user is more than 1.5 km downstream of the discharge location and a properly designed wastewater lagoon will not allow infiltration of untreated water, no impact on this user, or any additional downstream users, is expected.

4.10. Socioeconomic

The proposed lagoon site is located in a reasonably isolated area, with less than 10 residences in a 2.5 km radius, and adjacent roads are not considered main throughfares. As such, construction of the lagoon is not expected to impact the socioeconomic structure of area.

Once the lagoon is constructed and the colony is fully built, it will provide major consumer and supplier goods as well as a significant source of tax revenue for the Municipality of Armstrong.

4.11. Heritage Resources

No heritage resources were found during the HRIA of the areas of interest on 25-18-3 EPM. However, a Heritage Resource Protection Plan (HRPP) will be included in the construction specifications to ensure the project team and contractors are aware of the proper contacts and procedures, should heritage resources accidentally be encountered during site development.

4.12. Indigenous Communities

As the nearest indigenous community is approximately 40 km south-east of the project site, no impact is expected on indigenous communities during construction or operation of the wastewater lagoon.

5. Follow-Up Plans

To ensure follow-up, plans including the monitoring and reporting tasks listed herein will be performed. These are to be conducted in addition to any monitoring and reporting requirements under the Environmental Act License (EAL).

5.1. Monitoring

On-going monitoring of the lagoon will be performed to ensure the proper functioning of the lagoon. Regular inspection will ensure that there is no damage to the lagoon from erosion, failures, wildlife, or other causes. Further attention will be paid to odour, and if excessive odour is detected the cause will be identified and dealt with accordingly. The general condition of the lagoon will be observed on an ongoing basis during all seasons.

Prior to all discharges of the lagoon, all wastewater samples will be collected in accordance with Standard Methods for the Examination of Water and Wastewater, and have all analyses completed by an accredited laboratory before release.

5.2. Reporting

The following will be monitored, recorded, and retained for a minimum of five calendar years, as per similar lagoon environmental act licenses:

- Reports of visual inspections conducted a minimum of once per month,
- Wastewater sample dates,
- Original copies of laboratory analytical results of the sampled wastewater,
- A summary and discussion of laboratory analytical results,
- Cell isolation dates (i.e., valve operation records),
- Effluent discharge dates,
- Estimated effluent discharge volumes,
- A statement whether the effluent was used for golf course irrigation purposes, volumes, dates, and times of irrigation applications,
- Maintenance and repairs,
- Expansions to the collection system with associated capacity assessment,
- updated organization charts identifying all certified operators, including backup operators, and
- A summary of any wastewater collection system overflows sanitary sewer overflows/combined sewer overflows.

6. Summary

The development of a domestic lagoon at SE 28-18-3 EPM in the RM of Armstrong will meet the need of wastewater storage and treatment for the proposed colony development. All applicable regulatory requirements, guidelines, and industry standards will be adhered to for the construction, operation, and maintenance of the lagoon. Through appropriate mitigation measures, any potential negative effects associated with the lagoon can be reasonably prevented, minimized, or mitigated.



Appendix A – Geotechnical Review



Appendix B – Certificate of Title

STATUS OF TITLE

Title Number **3047937/1**
Title Status **Accepted**
Client File **2021-011**



1. REGISTERED OWNERS, TENANCY AND LAND DESCRIPTION

7317434 MANITOBA LTD.

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

THE SLY 1320 FEET PERP OF THE SE 1/4 OF SECTION 28-18-3 EPM

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

2. ACTIVE INSTRUMENTS

No active instruments

3. ADDRESSES FOR SERVICE

7317434 MANITOBA LTD.
Box 10
Ste Agathe MB
R0G 1Y0

4. TITLE NOTES

No title notes

5. LAND TITLES DISTRICT

Winnipeg

6. DUPLICATE TITLE INFORMATION

Duplicate not produced

7. FROM TITLE NUMBERS

2525394/1 All

8. REAL PROPERTY APPLICATION / CROWN GRANT NUMBERS

No real property application or grant information

9. ORIGINATING INSTRUMENTS

Instrument Type:	Transfer Of Land
Registration Number:	5156885/1
Registration Date:	2020-02-28
From/By:	ELISABETH C. M. STIGLMAYR & NICHOLAS L. SMANDO
To:	7317434 MANITOBA LTD.
Consideration:	\$250,000.00

10. LAND INDEX

SE 28-18-3E
SLY 1320 FEET PERP

CERTIFIED TRUE EXTRACT PRODUCED FROM THE LAND TITLES DATA STORAGE
SYSTEM OF TITLE NUMBER 3047937/1



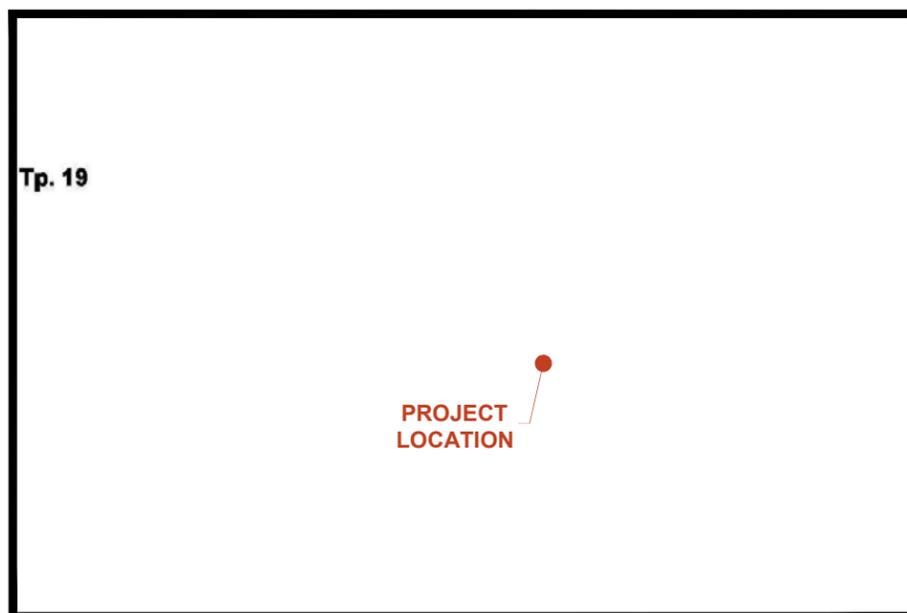
Appendix C – Sealed Engineering Drawings

903 Rosser Ave.
Brandon, Manitoba
R7A 0L3
Tel: (204) 728-7364
Fax: (204) 728-4418

BURNS MAENDEL
CONSULTING ENGINEERS LTD.



7317434 MANITOBA LTD DOMESTIC LAGOON DESIGN



SE 28-18-3 EPM
RM OF ARMSTRONG
MANITOBA

CIVIL DRAWINGS		
DWG NO.	DRAWING NAME	REV
C1.1	LAGOON SITING PLAN	0
C1.2	LAGOON SITE PLAN	0
C1.3	LAGOON PLAN VIEW	0
C3.1	LAGOON SECTIONS	0
C3.2	LAGOON DETAILS	0
C3.3	SECTIONS AND DETAILS	0

DATE

AUGUST 17, 2023

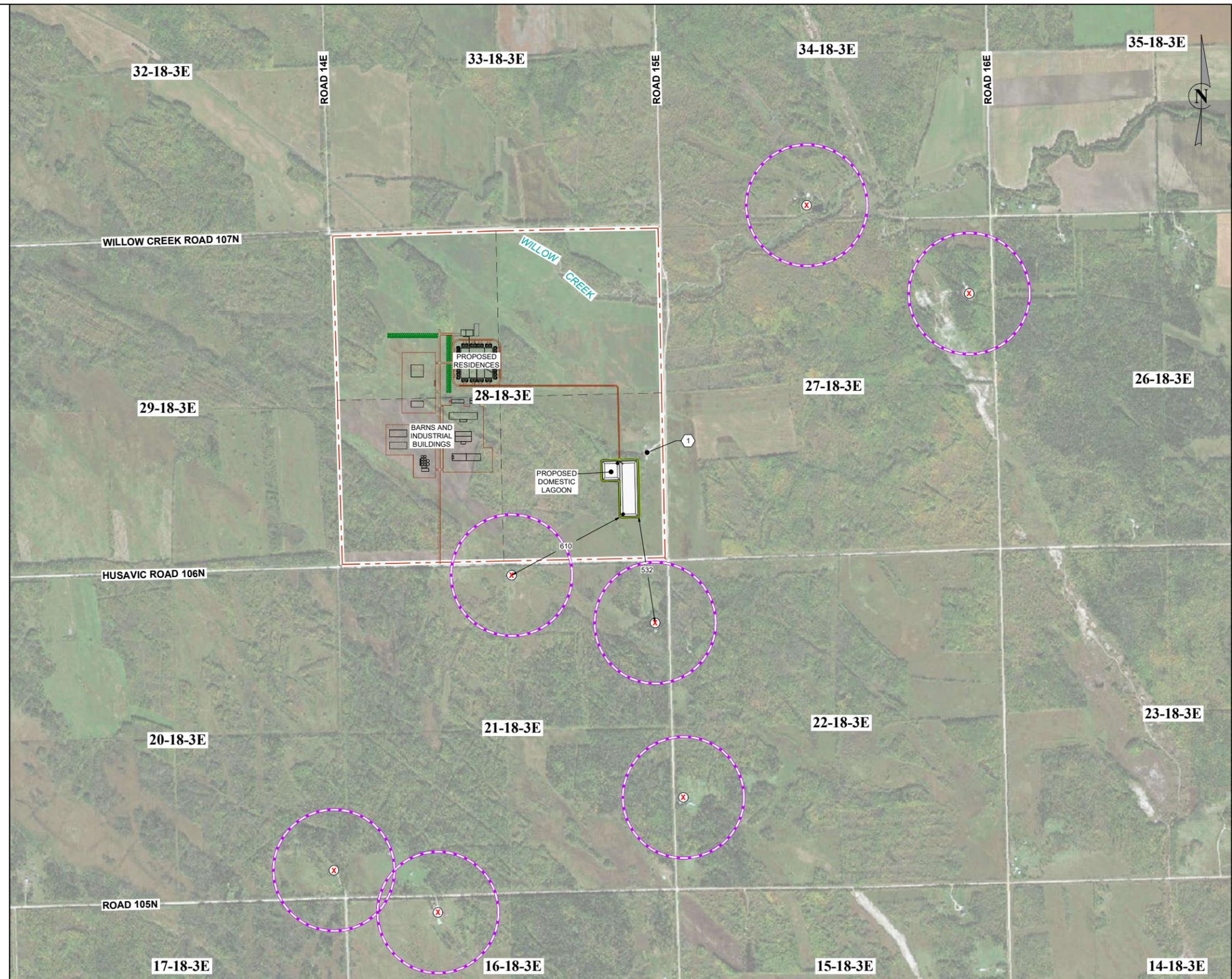
PROJECT NO:

BMCE-21-011:35

LEGEND	
ADJACENT SINGLE RESIDENCE	(X)
SUBJECT SITE PROPERTY LINE	--- --
300m SETBACK TO RESIDENCE	-----

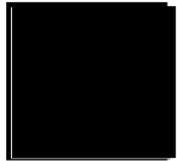
KEYNOTES:

① EXISTING ABANDONED RESIDENCE;
OWNED BY 7317434 MANITOBA LTD.



NO.	DATE	APP.	BY	DESCRIPTION
0	AUGUST 17, 2023	AH	CR	ISSUED FOR EAP SUBMISSION TO MECF
REVISIONS				

**ENGINEERS
GEOSCIENTISTS
MANITOBA**
Certificate of Authorization
Burns Maendel Consulting
Engineers Ltd.
No. 4559



DESIGNED BY: KD
REVIEWED BY: AH
DRAWN BY: CR
PROJECT START DATE: JAN 12, 2023
PLOT SIZE: A1 (594x841)
SCALE: 1:10,000

PROJECT NAME:
7317434 MANITOBA LTD
DOMESTIC LAGOON DESIGN
SE 28-18-3 EPM, RM OF ARMSTRONG, MB

BURNS MAENDEL
CONSULTING ENGINEERS LTD.

903 Rosser Ave.
Brandon, Manitoba
R7A 0L3
Tel: (204) 728-7364
Fax: (204) 728-4418

DRAWING TITLE:
LAGOON SITING PLAN

PROJECT NUMBER: **BMCE-21-011:35**
DRAWING NO: **C1.1**

GENERAL NOTES

1. ALL DISTANCES ARE IN METRES AND DECIMALS THEREOF.
2. EXISTING FEATURE LOCATIONS HAVE BEEN DERIVED FROM SURVEY INFORMATION COLLECTED BY BMCE ON MARCH 10, 11 & 12 2021, AND OCTOBER 5, 2022.
3. CADASTRAL PROPERTY LINE INFORMATION WAS OBTAINED FROM MANITOBA LAND INITIATIVE ON MARCH 5, 2021.
4. CONFIRMATION OF EXISTENCE AND EXACT LOCATION OF ALL SERVICES MUST BE OBTAINED FROM THE INDIVIDUAL UTILITIES BEFORE PROCEEDING WITH CONSTRUCTION.
5. ALL CONSTRUCTION TO BE IN ACCORDANCE WITH THE LATEST EDITION OF MANITOBA WATER SERVICES BOARD STANDARD CONSTRUCTION SPECIFICATIONS.

CONSTRUCTION NOTES

1. ALL HDPE LINER TO BE 60MIL SINGLE SIDED TEXTURED HDPE UNDERLAIN BY 12oz NON WOVEN GEOTEXTILE FABRIC.

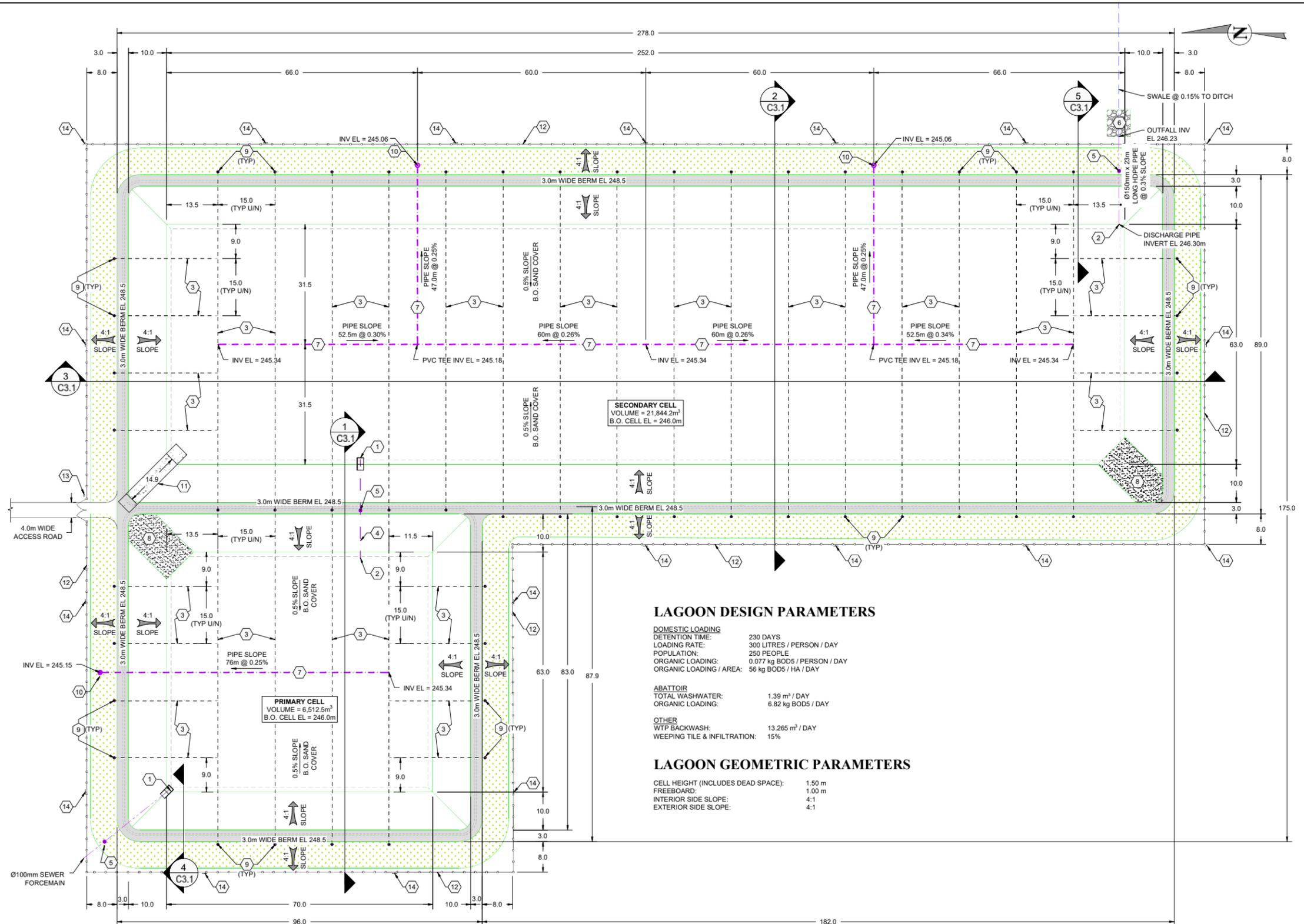
KEYNOTES

- 1 POLY-PLATE PIPE PENETRATION c/w 1800mm WIDE x 150mm THICK CONCRETE SPLASH PAD w/ 200mm HIGH CURB. SEE DETAIL.
- 2 POLY-PLATE PIPE PENETRATION. SEE DETAIL.
- 3 Ø150mm MULTI FLOW (OR APPROVED EQUAL) GAS VENTING AND DEWATERING PIPE SPACED @ 15.0m o/c U.N.
- 4 Ø150mm HDPE EQUALIZATION PIPE.
- 5 GATE VALVE.
- 6 OUTFALL c/w GEOTEXTILE FABRIC AND 3.0m x 3.0m CONCRETE GROUTED RIP RAP.
- 7 Ø100mm PVC COLLECTION PIPE (NON-PERFORATED).
- 8 10.0m WIDE ACCESS PAD c/w 300mm SAND COVER ON 12OZ GEOTEXTILE OVER HDPE LINER.
- 9 TRAP VENT COMPLETE w/ INSECT SCREEN. (TYP 52 LOCATIONS)
- 10 Ø400mm HDPE SUMP c/w WELDED END CAP AND LOCKABLE METAL LID.
- 11 4.0m WIDE BOAT ACCESS RAMP. (SEE SECTION)
- 12 PERIMETER FENCING, SEE DETAIL.
- 13 MAIN ENTRANCE SIGN, SEE DETAIL.
- 14 PERIMETER SIGN TO BE INSTALLED EVERY 50m; (19 LOCATIONS) SEE DETAIL.

NOTES FOR OPERATION

1. PRIOR TO DISCHARGING LAGOON, DEWATERING SUMP SHALL BE INSPECTED TO DETERMINE IF GROUND WATER IS PRESENT WITHIN THE SUMP.
2. IF GROUND WATER IS PRESENT, PUMP SUMP UNTIL SUCH A TIME AS ALL GROUND WATER HAS BEEN REMOVED FROM SUMP.
3. MAINTAIN THE PUMPING OPERATION AS REQUIRED DURING THE LAGOON DISCHARGE AND SUBSEQUENT FILLING TO ENSURE THAT GROUNDWATER ELEVATION REMAINS BELOW THAT OF THE LAGOON BOTTOM AT ALL TIMES.

LEGEND	
FENCE LINE	
GATE VALVE	
SUMP PIT	
TRAP VENT	
SANITARY MAIN	
COLLECTION PIPE	
MULTI-FLOW GAS VENTING	
CONCRETE	
SAND	
SOD	



LAGOON DESIGN PARAMETERS

DOMESTIC LOADING
 DETENTION TIME: 230 DAYS
 LOADING RATE: 300 LITRES / PERSON / DAY
 POPULATION: 250 PEOPLE
 ORGANIC LOADING: 0.077 kg BOD5 / PERSON / DAY
 ORGANIC LOADING / AREA: 56 kg BOD5 / HA / DAY

ABATTOIR
 TOTAL WASHWATER: 1.39 m³ / DAY
 ORGANIC LOADING: 6.82 kg BOD5 / DAY

OTHER
 WTP BACKWASH: 13,265 m³ / DAY
 WEEPING TILE & INFILTRATION: 15%

LAGOON GEOMETRIC PARAMETERS

CELL HEIGHT (INCLUDES DEAD SPACE): 1.50 m
 FREEBOARD: 1.00 m
 INTERIOR SIDE SLOPE: 4:1
 EXTERIOR SIDE SLOPE: 4:1

NO.	DATE	APP.	BY	DESCRIPTION
0	AUGUST 17, 2023	AH	CR	ISSUED FOR EAP SUBMISSION TO MECF
REVISIONS				

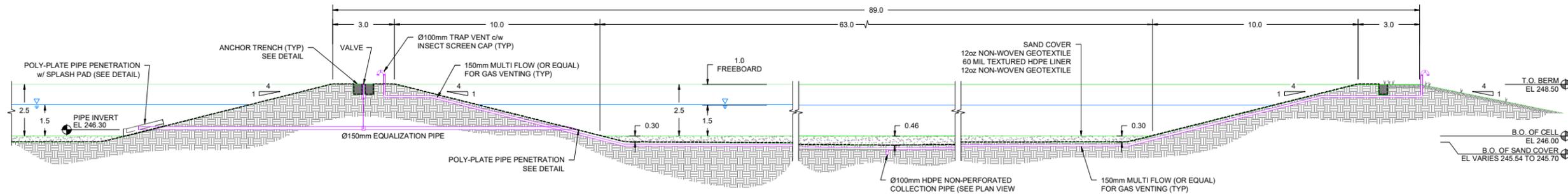


DESIGNED BY: KD	REVIEWED BY: AH
DRAWN BY: CR	
PROJECT START DATE: JAN 2023	
PLOT SIZE: A1 (594x841)	
SCALE: 1:500	

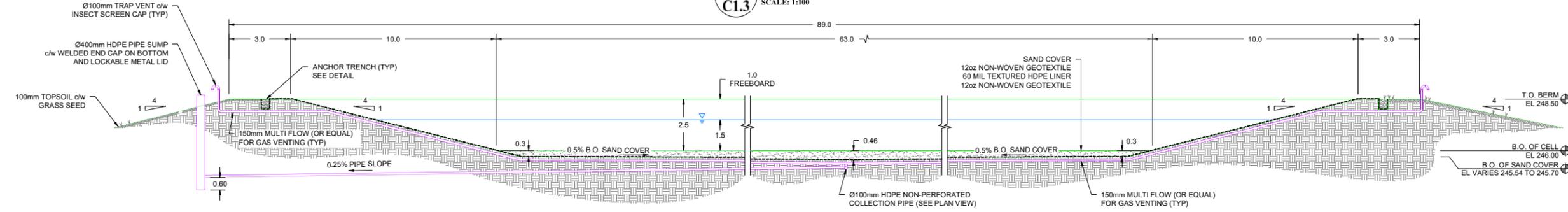
PROJECT NAME:
7317434 MANITOBA LTD
DOMESTIC LAGOON DESIGN
SE 28-18-3 EPM, RM OF ARMSTRONG, MB

903 Rosser Ave.
 Brandon, Manitoba
 R7A 0L3
 Tel: (204) 728-7364
 Fax: (204) 728-4418

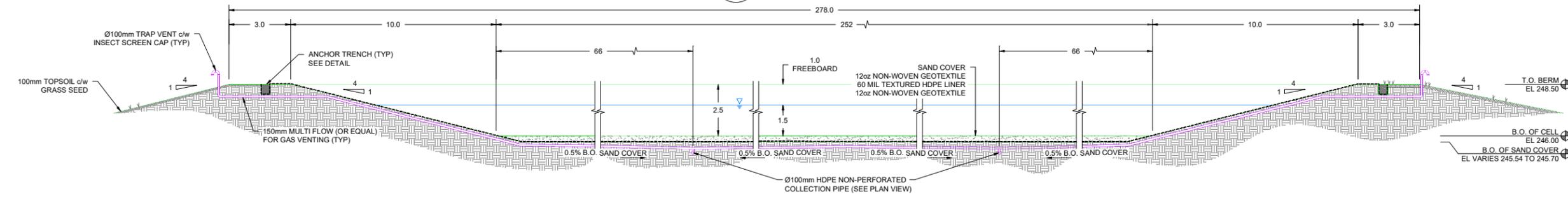
DRAWING TITLE: LAGOON PLAN VIEW	
PROJECT NUMBER: BMCE-21-011:35	DRAWING NO: C1.3



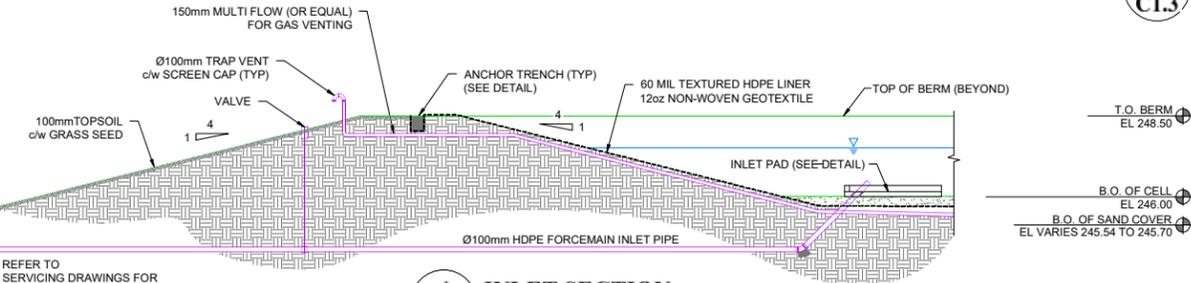
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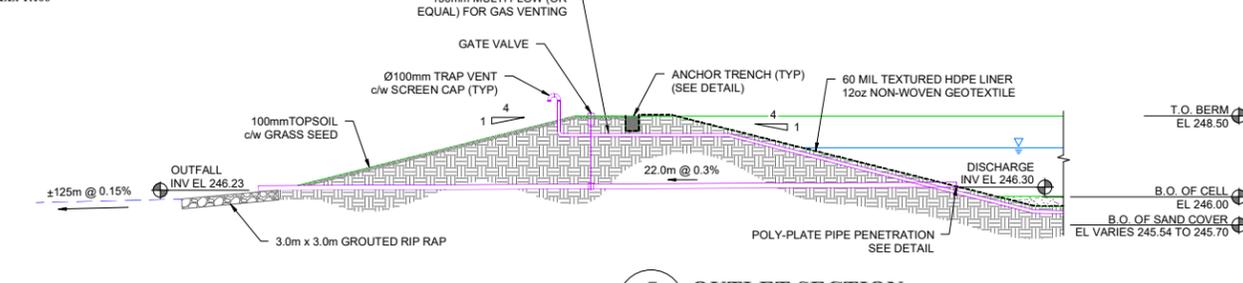
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3 SECONDARY CELL SECTION
C1.3 SCALE: 1:100



4 INLET SECTION
C1.3 SCALE: 1:100



5 OUTLET SECTION
C1.3 SCALE: 1:100

NO.	DATE	APP.	BY	DESCRIPTION
0	AUGUST 17, 2023	AH	CR	ISSUED FOR EAP SUBMISSION TO MECF
REVISIONS				

**ENGINEERS
 GEOSCIENTISTS
 MANITOBA**
 Certificate of Authorization
 Burns Maendel Consulting
 Engineers Ltd.
 No. 4559

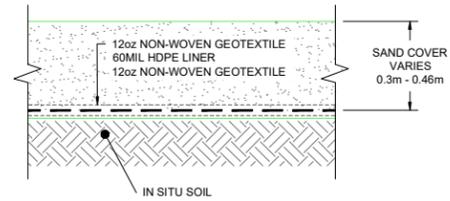
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DRAWN BY: CR	
PROJECT START DATE: JAN 2023	
PLOT SIZE: A1 (594x841)	
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PROJECT NAME:
**7317434 MANITOBA LTD
 DOMESTIC LAGOON DESIGN
 SE 28-18-3 EPM, RM OF ARMSTRONG, MB**

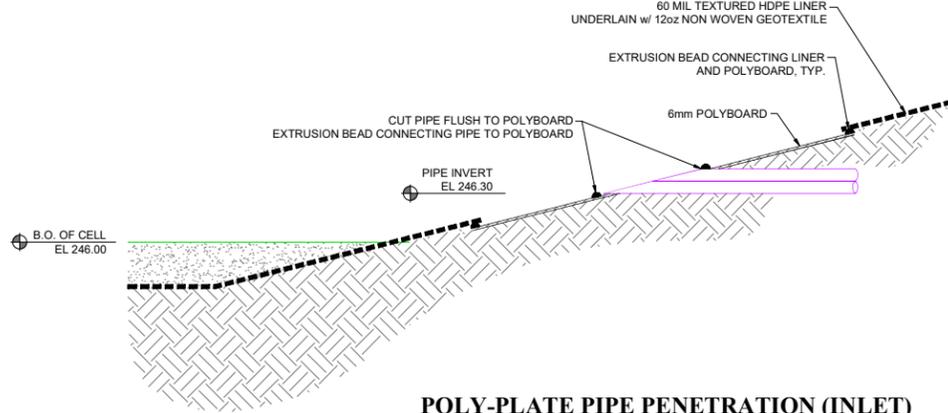
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**BURNS MAENDEL
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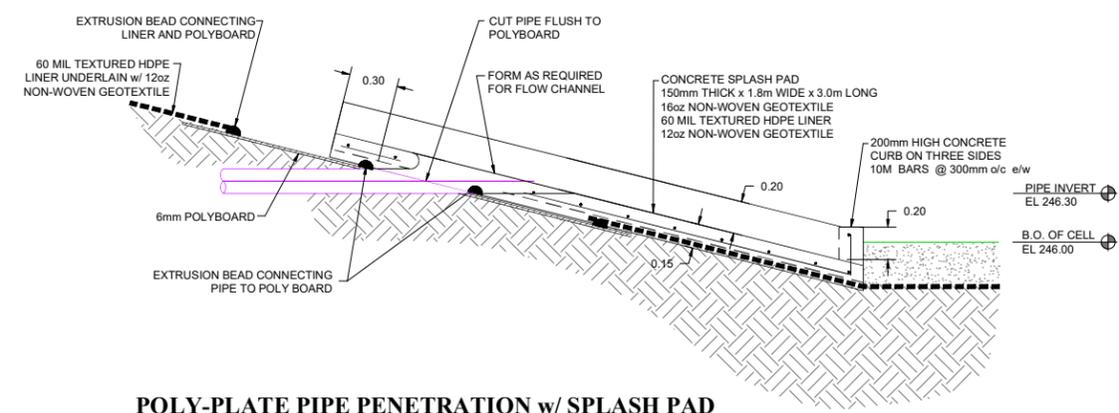
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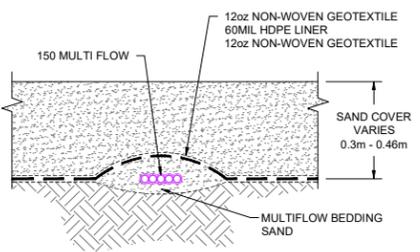
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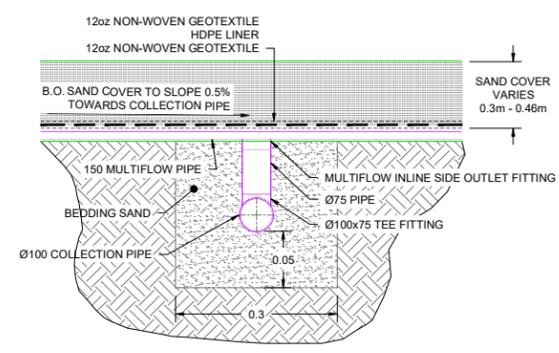
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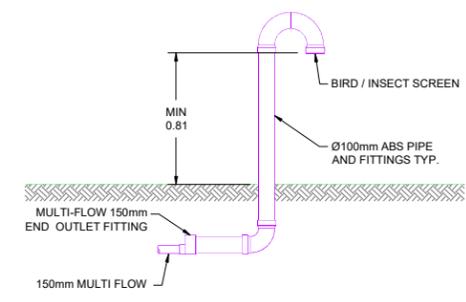
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SCALE: 1:20



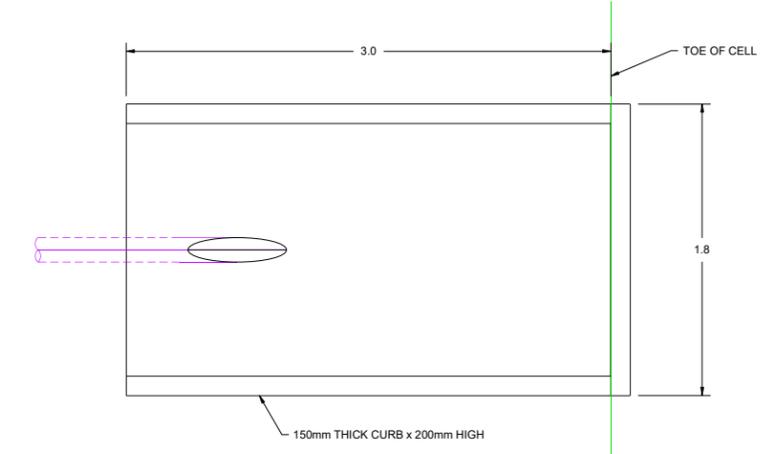
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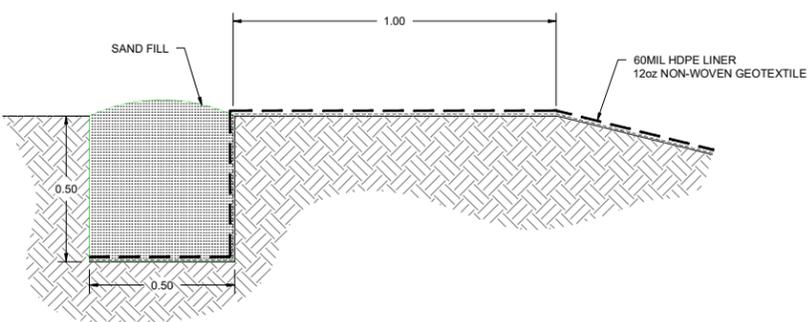
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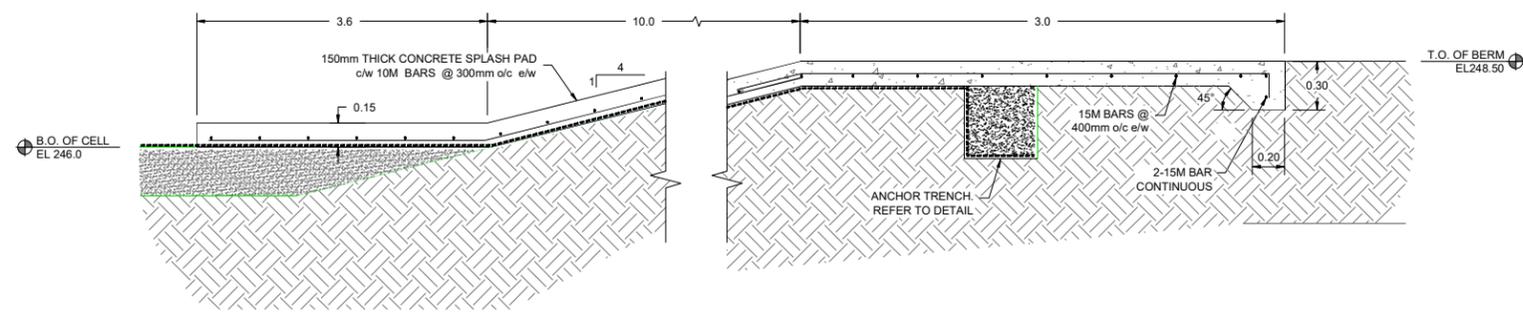
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SPLASH PAD PLAN VIEW
SCALE: 1:20



LINER ANCHOR DETAIL
SCALE: 1:10



BOAT ACCESS RAMP SECTION VIEW
SCALE: 1:20

0	AUGUST 17, 2023	AH	CR	ISSUED FOR EAP SUBMISSION TO MECP
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**ENGINEERS
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MANITOBA**
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No. 4559

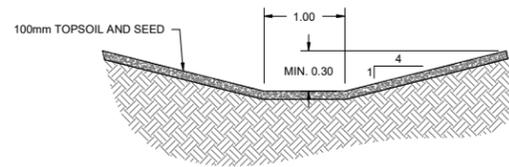
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DRAWN BY: CR	
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PLOT SIZE: A1 (594x841)	
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PROJECT NAME:
**7317434 MANITOBA LTD
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SE 28-18-3 EPM, RM OF ARMSTRONG, MB**

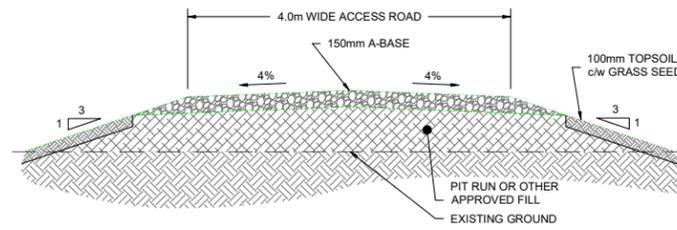
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DRAWING TITLE: LAGOON DETAILS	
PROJECT NUMBER: BMCE-21-011:35	DRAWING NO: C3.2

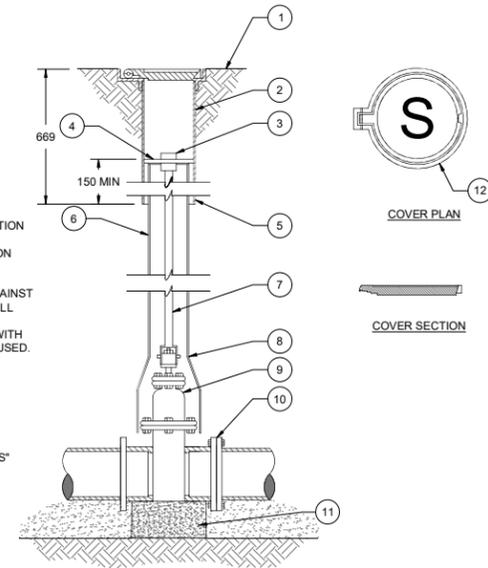


TYPICAL DITCH / SWALE SECTION
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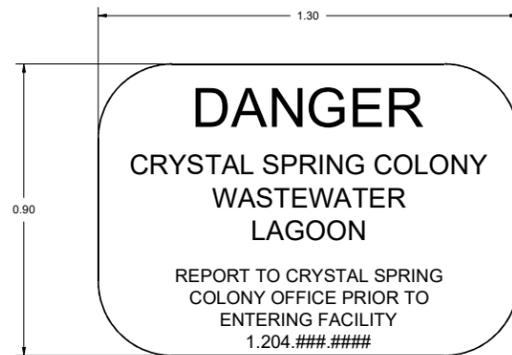


ACCESS ROAD DETAIL
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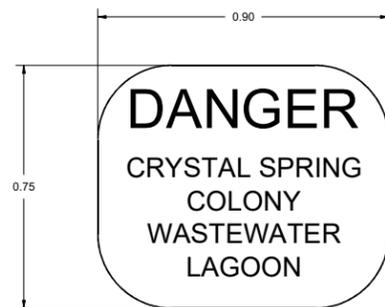
- (1) GRADE
- (2) DUCTILE IRON UPPER SECTION
- (3) 50mm SQUARE OPERATING NUT
- (4) STONE DISC.
- (5) ADJUSTABLE VALVE BOX
- (6) PVC or DUCTILE IRON LOWER SECTION
- (7) MINIMUM 50mm SQUARE EXTENSION SPINDLE
- (8) VALVE BOX TO BE PROTECTED AGAINST LATERAL MOVEMENT DURING BACKFILL
- (9) AWWA C500 or C509 GATE VALVE WITH JOINTS COMPATIBLE TO PIPE BEING USED. (FLANGED & PUSH ON ARE SHOWN)
- (10) GASKET
- (11) 450x450x150 CONCRETE BLOCK PLACED ON UNDISTURBED SOIL
- (12) DUCTILE IRON COVER, MARKED "S" FOR SEWER.



TYPICAL GATE VALVE DETAIL
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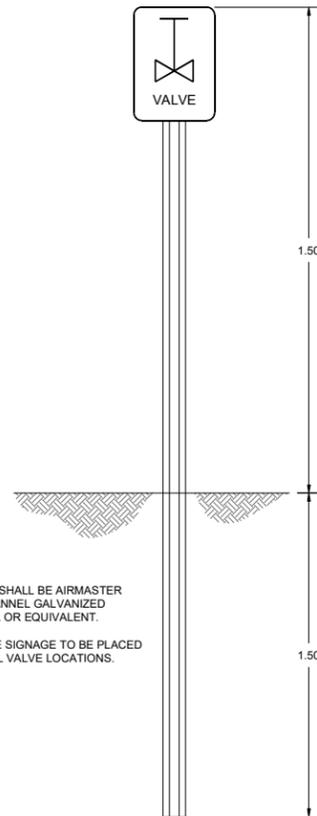


- NOTES:
- 1) MAIN ENTRANCE SIGNAGE TO BE ATTACHED AND INSTALLED WITH TWO 4x4 PRESSURE TREATED WOOD POSTS.
 - 2) SIGN TO BE CONSTRUCTED OF ALUMINUM AIR MASTER QUALITY OR APPROVED EQUAL.

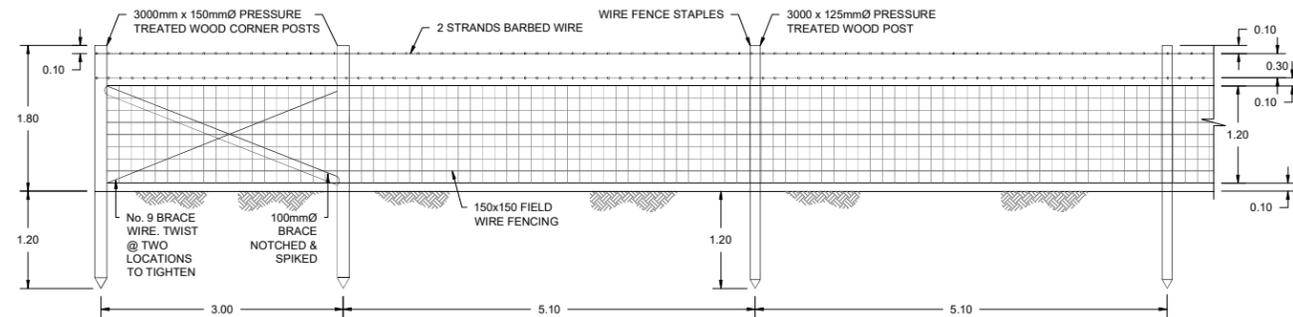


- NOTES:
- 1) PERIMETER SIGNAGE TO BE SECURED TO PERIMETER FENCE POSTS EVERY 50m AROUND ENTIRE FACILITY.
 - 2) SIGNS TO BE CONSTRUCTED OF ALUMINUM AIR MASTER QUALITY OR APPROVED EQUAL.

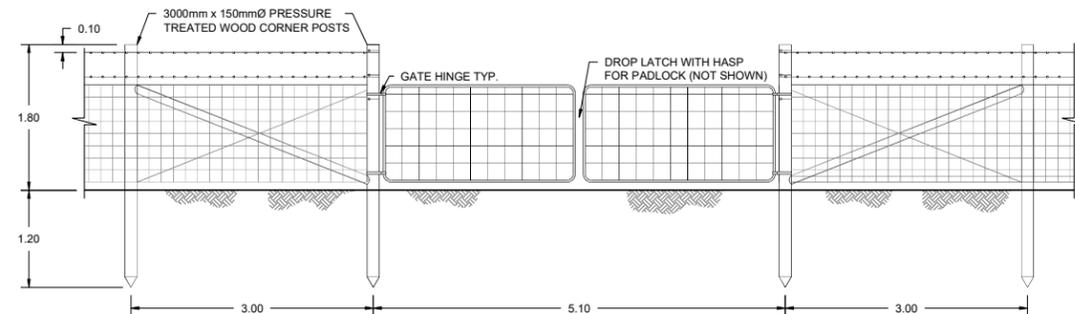
SIGNAGE DETAILS
SCALE: N.T.S.



- NOTES:
- 1) POST SHALL BE AIRMASTER U-CHANNEL GALVANIZED STEEL OR EQUIVALENT.
 - 2) VALVE SIGNAGE TO BE PLACED AT ALL VALVE LOCATIONS.



PAGE WIRE FENCE DETAIL
SCALE: N.T.S.



PAGE WIRE FENCE GATE DETAIL
SCALE: N.T.S.

NO.	DATE	APP.	BY	DESCRIPTION
0	AUGUST 17, 2023	AH	CR	ISSUED FOR EAP SUBMISSION TO MECF
REVISIONS				



DESIGNED BY: KD	REVIEWED BY: AH
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PROJECT START DATE: JAN 2023	
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**BURNS MAENDEL
CONSULTING ENGINEERS LTD.**

DRAWING TITLE: SECTIONS AND DETAILS	
PROJECT NUMBER: BMCE-21-011:35	DRAWING NO: C3.3



Appendix D – Heritage Resource Impact Assessment

**Proposed Crystal Spring Colony
Development SW 28-18-3 EPM**

Heritage Permit Pending
AAS file #: AAS-20-16708



Prepared for:
Kyla Dietrich, Engineer-in-Training
Junior Engineer
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602 Main Street
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Prepared by:
K. David McLeod
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Finlay Heritage Consulting Inc.
66 Woodchester Bay
Winnipeg MB R3R 3E6

May 3, 2021

This report entitled Proposed Crystal Spring Colony Development SW 28-18-3 EPM was prepared by Finlay Heritage Consultants Inc. for Burns Maendel Consulting Engineers. The material in it reflects Finlay Heritage Consultants Inc.'s professional judgment based on the scope of work, schedule, and any limitations stated in the document and/or in the agreement between Finlay Heritage Consultants Inc. and Burns Maendel Consulting Engineers. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. Any use that a third party makes of this document is the responsibility of such third party. Such third party agrees that Finlay Heritage Consultants Inc. shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

NOTE: APPENDIX A HERITAGE PERMIT IS INCOMPLETE AS THE FINAL PERMIT THAT HAS NOT BEEN RECEIVED

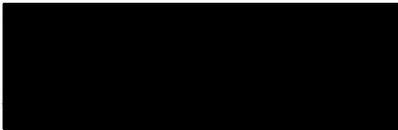
BACKGROUND SITE DATA FOR SECTION 4.0 HAS NOT BEEN PROVIDED BY THE HISTORIC RESOURCES BRANCH.

HOWEVER, RECOMMENDATIONS ARE A FINAL ASSESSMENT BASED ON COMPLETED FIELDWORK.

Prepared by 

(Signature)

K. David McLeod, M.A., President

Reviewed by 

(Signature)

Suzanne McLeod, Vice-President

Released by 

(Signature)

K. David McLeod, M.A., President

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3.0 CULTURE HISTORY	3.1
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Project Personnel

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Report Authors: K. David McLeod, Finlay Heritage Consultants Inc.
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Field Supervisor: K. David McLeod, Finlay Heritage Consultants Inc.

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Suzanne McLeod, Finlay Heritage Consultants Inc.
Paula Petch, Finlay Heritage Consultants Inc.

Executive Summary

Burns Maendel Consulting Engineers Ltd. (BMCE) retained Finlay Heritage Consultants Inc. (FHC) to complete a heritage resources impact assessment (HRIA) of the proposed Crystal Spring Colony (the development) in a portion of SW 28-18-3 EPM in the Rural Municipality (RM) of Armstrong. The final development plan has not been finalized but will consist of an access road egressing from Road 106N onto the property and construction of the colony infrastructure and buildings. The Historic Resources Branch (HRB) of Manitoba Sport, Culture, and Heritage reviewed the development proposal and requested an HRIA based on the potential for heritage resources adjacent to former and active water courses.

The HRIA was completed on April 26, 2021 by pedestrian transects and random shovel tests on the north side of an extensive wetland. The development location is within a hay field that was possibly cultivated and seeded to clover in the past.

No heritage resources were observed on the field surface or recovered in the shovel tests. FHC recommends the proposed development proceed with no further heritage resources concerns based on the absence of significant intact heritage resources.

PROPOSED CRYSTAL SPRING COLONY DEVELOPMENT SW 28-18-3 EPM

Background Information
May 3, 2021

1.0 BACKGROUND INFORMATION

Burns Maendel Consulting Engineers Ltd. (BMCE) retained Finlay Heritage Consultants Inc. (FHC) to complete a heritage resources impact assessment (HRIA) of the proposed Crystal Spring Colony (the development) in a portion of SW 28-18-3 EPM in the Rural Municipality (RM) of Armstrong. The Historic Resources Branch (HRB) of Manitoba Sport, Culture, and Heritage reviewed the development proposal and requested an HRIA as a consequence of Section 12 (2) of the Manitoba *Heritage Resources Act*. The HRB identified the potential for heritage resources adjacent to former and active water courses. FHC completed the HRIA on April 26, 2021 under Manitoba Heritage Permit AXX-21 relative to Sections 53 and 54 of *The Heritage Resources Act* (Appendix A).

The final development plan has not been finalized but originally proposed development in portions of NE 28-18-3 EPM and SW 28-18-3 EPM. The area was reduced by removing NE 28-18-3 EPM from the development footprint. The development will include a north-south access road egressing from Road 106N onto the property.

The development 7.6 km west of Provincial Trunk Highway 8, 6.3 km southeast of Malonton, 3.2 km northwest of Foley, and 1.0 km west of the junction of grid roads 106N and 15E (Appendix B Maps 1 and 2). The access road is to be developed along an existing field trail and extends from Road 106 N north for approximately 1.5 km (Appendix B Map 3). The following report summarizes the environmental and cultural background of the study area, and the methods, results, and recommendations of the assessment.

FHC

PROPOSED CRYSTAL SPRING COLONY DEVELOPMENT SW 28-18-3 EPM

Environmental Background
May 3, 2021

2.0 ENVIRONMENTAL BACKGROUND

The project area is in the Interlake Plain ecoregion of the Boreal Plains ecozone (Ecological Framework of Canada 2014). This ecoregion extends northwestward from the southeastern corner of Manitoba to the Saskatchewan boundary north of the Porcupine Hills. The climate is marked by warm summers and cold winters, with a mean annual temperature of approximately 1°C, a mean summer temperature of 15.5°C, and the mean winter temperature -14.5°C.

The ecoregion has a subhumid low boreal ecoclimate and is a portion of the dominantly deciduous boreal forest. It ecoregion is comprised of a mixture of farmland and forest, marking the southern limit of closed boreal forest and northern extent of arable agriculture. Native vegetation consists of a closed cover of tall to low trembling aspen with secondary quantities of balsam poplar, an understory of tall shrubs, and a ground cover of mixed herbs. Open stands of tall jack pine occur on dry, sandy sites. Depressions are water-filled or are covered with sedges, willow, some black spruce, and tamarack.

The ecoregion includes habitat for white-tailed deer, black bear, moose, beaver, coyote, snowshoe hare, and eastern cottontail, plus waterfowl and water birds like cormorant, gull, tern, heron, American white pelican, and grebe.

The soil type within the development is the Inwood Meleb Complex consisting of the Inwood and Meleb series. Inwood soils occupy the low, narrow ridges and the Meleb soils occur in the intervening depressions (Pratt *et al* 1961:49). The Inwood series consists of imperfectly drained, gleyed dark grey soils that have developed on strongly calcareous till and water-worked till (Pratt *et al* 1961: 47). A typical profile consists of an Ahe horizon of very dark grey clay to clay loam from the surface to 5.0 cm below ground surface (BGS). This is underlain by the Bt horizon from 5.0 to 10.2 cm BGS that consists of greyish brown clay loam and rests on the BC horizon of light brownish grey loam extending from 10.0 to 15.2 cm BGS. The Ckg horizon is from 15.2 to 61.0 cm BGS and consists of light grey stony loam till.

The Meleb Series consists of poorly drained peaty calcareous meadow soils developed on strongly calcareous till and water-worked till (Pratt *et al* 1961: 61). A typical Meleb Series profile consists of a dark grey loam from the surface to 13.0 cm BGS underlain by the Ckg1 of white, stony, silty, clay, loam, till from 13.0 to 30.5 cm BGS. This rests on the Ckg2 horizon that extends from 30.5 to 61.0 cm BGS and is also a white, stony, silty, clay, loam till.

FAC

3.0 CULTURE HISTORY

Manitoba's cultural chronology can be divided into two periods, Precontact and Historic (Table 3-1). Each period can be further divided into Early, Middle, and Late. The Precontact Period dates from ca. 12,000 to 300 years ago and relates to the time when First Nation hunter/gatherer groups first moved into the area as Lake Agassiz receded. They brought a plains-adapted subsistence primarily based on bison hunting. Through time, woodland adapted groups from the south and southeast utilized the area and either displaced or merged their cultural traditions with earlier groups. Cultural traditions, history, and spirituality were passed to subsequent generations through the spoken word, or possibly by rock paintings (pictographs), alignments (petroforms) and figures cut into rock faces (petroglyphs).

The earliest Manitoba inhabitants were small family groups who followed large game into the southern portion of the province as Lake Agassiz receded. Lithic technology consisted of spears with large lanceolate or stemmed points, scrapers, knives, and adzes. Preferred kill sites consisted of settings where animals could be channeled into an area that restricted the speed at which they could escape (Pettipas 1984:36). Narrow river or creek channels or wet marshy areas where the animals could get mired would have been favoured hunting spots within the study area.

The Middle Precontact Period corresponds to a period of warmer and drier environmental conditions that created a northerly expansion of the grasslands and an easterly and northerly expansion of the bison range. The expansion of the bison range provided a more reliable resource for a longer portion of the year and resulted in an increased number of groups in the area for longer annual periods.

The Middle Precontact Period is characterized by use of the spear thrower, or atlatl, which may have diffused into the plains from the southeastern United States (Wright 1995:127). The lithic technology of this period consists of bifacially flaked and hafted stone knives, side-notched projectile points, large end scrapers, drills, and woodworking tools. Copper projectile points and wood working tools were also introduced during this period. Bone, antler, and shell were used to make awls, needles, hide scrapers and personal adornment articles (Syms 1970:132). Canoes, snowshoes, and toboggans were used as forms of transportation (Wright 1995:265).

The Late Precontact Period dates from about 2,000 to 400 years ago when local resource users combined bison and medium to small game hunting with fishing and gathering available fruit and plants as their main subsistence. Habitation sites tended to be more permanent where seasonal resources were plentiful over a lengthy period, such as fish spawning areas.

PROPOSED CRYSTAL SPRING COLONY DEVELOPMENT SW 28-18-3 EPM

Culture History
 May 3, 2021

Table 3-1 Archaeological Time Periods in Manitoba Based on Technology

Archaeological Period	Technology	
	Container Type	Food Procurement
Late Historic Period (ca. 143 – 80 Years Ago) (A.D. 1870 – 1945)	Porcelain Tableware Earthenware Dinnerware Stoneware Storage Jars Glass Sealers Tin Cans	Repeating Rifles Automatic Shotguns Steam/Gas/Diesel Farm Machinery
Middle Historic Period (ca. 192 – 143 Years Ago) (A.D. 1821 – 1870)	Earthenware Dinnerware Stoneware Storage Jars Glass Bottles Copper Pots/Kettles	Breach Loading Rifles/Shotguns Percussion Cap Muskets Animal Drawn Agricultural Implements
Early Historic Period (ca. 300 – 192 Years Ago) (A.D. 1700 – 1821)	Copper Pots/Kettles	Flintlock Muskets/Shotguns Metal Traps Metal Projectile Points Metal Knives/Axes
Late Precontact Period (ca. 2,500 - 300 Years Ago)	Clay Vessels: Selkirk (Late Woodland) Blackduck (Middle Woodland) Rainy River Composite (Middle Woodland) Laurel (Early Woodland)	Bow & Arrow Bone Harpoons Nets Side-notched Points Eastern and Plains Triangular Points Copper
Middle Precontact Period (ca. 6,500 – 2,500 Years Ago)	Fiber Baskets/Bags Animal Viscera/Hide	Atlatl Bone harpoons Nets Pelican Lake Duncan McKean Old Copper
Early Precontact Period (ca. 12,000 – 6,500 Years Ago)	Fiber Baskets/Bags Animal Viscera/Hide	Bone harpoons Lanceolate projectile points Stemmed Points Trihedral adzes Agate Basin Logan Creek Late Sisters Hill Plano

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PROPOSED CRYSTAL SPRING COLONY DEVELOPMENT SW 28-18-3 EPM

Culture History
May 3, 2021

Pottery making marks the boundary between the Middle and Late Precontact periods. Pottery was either brought into Manitoba by groups migrating from eastern Canada and/or the south central United States, or the technique of pottery manufacturing was transplanted into Manitoba through contacts with these groups. This period is also characterized by adoption of the bow and arrow, and the associated smaller side-notched points, and increased interaction with outside groups through trade.

Stone tools associated with this culture include small triangular and side-notched projectile points, a variety of stone and bone scraping tools, ovate knives, stone drills, and smoking pipes. Bone awls, needles, harpoons, and spatulas are also found. Personal ornaments were made from bone and copper. Native copper continued to be used for tools. Shell paint dishes, antler end-scraper handles, beaver tooth gouges, and scapula hoes were also used.

The first documented Europeans in Manitoba were members of the La Verendrye expedition who arrived in southeast Manitoba in the early 1730s during the Early Historic Period. In 1734, the La Verendryes established a post on the Red River near present-day Selkirk, and in 1738 they constructed Fort Rouge at the junction of the Red and Assiniboine rivers (Voorhis 1930: 150). They subsequently built a post, Fort La Reine, on the Assiniboine River near present-day Portage la Prairie (Voorhis 1930: 100). Their explorations subsequently turned north on the Saskatchewan River system and south along the Red River into present-day South Dakota.

Joseph Frobisher constructed a post along the lower Red River several kilometres upstream of the mouth of Netley Creek ca. 1774 (Voorhis 1930: 100). The post was only open for a short time. The Northwest Company (NWC) and the Hudson's Bay Company (HBC) constructed trade posts near the confluence of present-day Netley Creek, previously known as Rivière aux Morts, and the Red River in the early 1800s (Voorhis 149).

The Middle Historic Period was characterized by the 1821 merge of the NWC and HBC. This created a workforce surplus that resulted in approximately 1,300 employees being discharged (Sprague and Frye 1983:15). Many of the retired employees accepted land grants along the Red and Assiniboine rivers, with the size of the grant based on years of service.

The Late Historic Period coincides with Manitoba's entry into confederation, the negotiation and signing of treaties with First Nation groups, and homestead settlement. The development is within lands covered by Treaty 1 that was signed at Lower Fort Garry in August 1871 (Cloutier 1957). The closest reserve to the project area is Brokenhead Ojibwa Nation 43 km southeast (Figure 3-1).

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PROPOSED CRYSTAL SPRING COLONY DEVELOPMENT SW 28-18-3 EPM

Culture History
 May 3, 2021

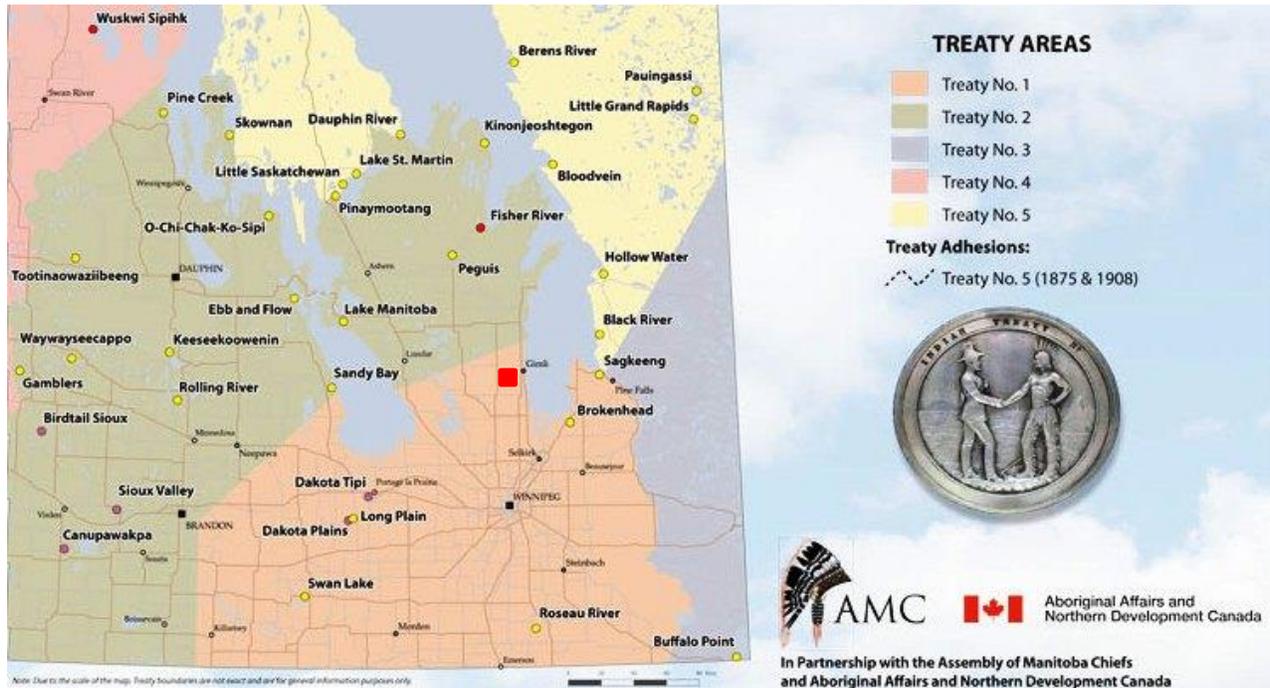


Figure 3-1 Section of Manitoba Treaties Boundary Map showing Treaty 2 (grey shaded area) and Project area (red square) (Source: Treaty Relations Commission of Manitoba, 2013).

Dominion Land surveyors first surveyed Township 18 Range 3 EPM in 1873 and again in 1898 (Figures 3-2 and 3-3). The 1873 survey plan shows Willow Creek meandering across NE 28-18-3 EPM and the standing vegetation is listed as poplar and willow. The 1898 township plan indicates that 28-18-3 EPM was covered with tamarack and poplar and several wetlands extending southeast to northwest were recorded. The 1898 plan also shows two cart trails entering the township in 4-18-3 EPM and merging in SW 10-18-3 EPM. The trail extends northeasterly and terminates on what appears to be a ridge in SE 14-18-3 EPM.

Application for ownership of SW 28-18-3 EPM was filed by Jakob Smith (or Schmidt) on October 26, 1900 (Ancestry.com 2016). A search of the Land Grants of Western Canada, 1870-1930 database found no additional landholdings for a Jakob, or Jacob, Smith, or Schmidt, in the immediate area.

The Local Government District (LGD) of Armstrong was formed in 1945 (Manitoba Historical Society 2020). The LGD replaced the RM of Kreuzburg that had been formed in 1913 (Yanchyshyn 1989: 8).

FAC

PROPOSED CRYSTAL SPRING COLONY DEVELOPMENT SW 28-18-3 EPM

Culture History
May 3, 2021



Figure 3-2 Township plan of Township 18 Range 3 EPM from 1873 Vaughn survey. (Source: P.A.M. Digital Image Number: GR13-002409.JPG Location Code: G 10647).

FAC

PROPOSED CRYSTAL SPRING COLONY DEVELOPMENT SW 28-18-3 EPM

Culture History
May 3, 2021

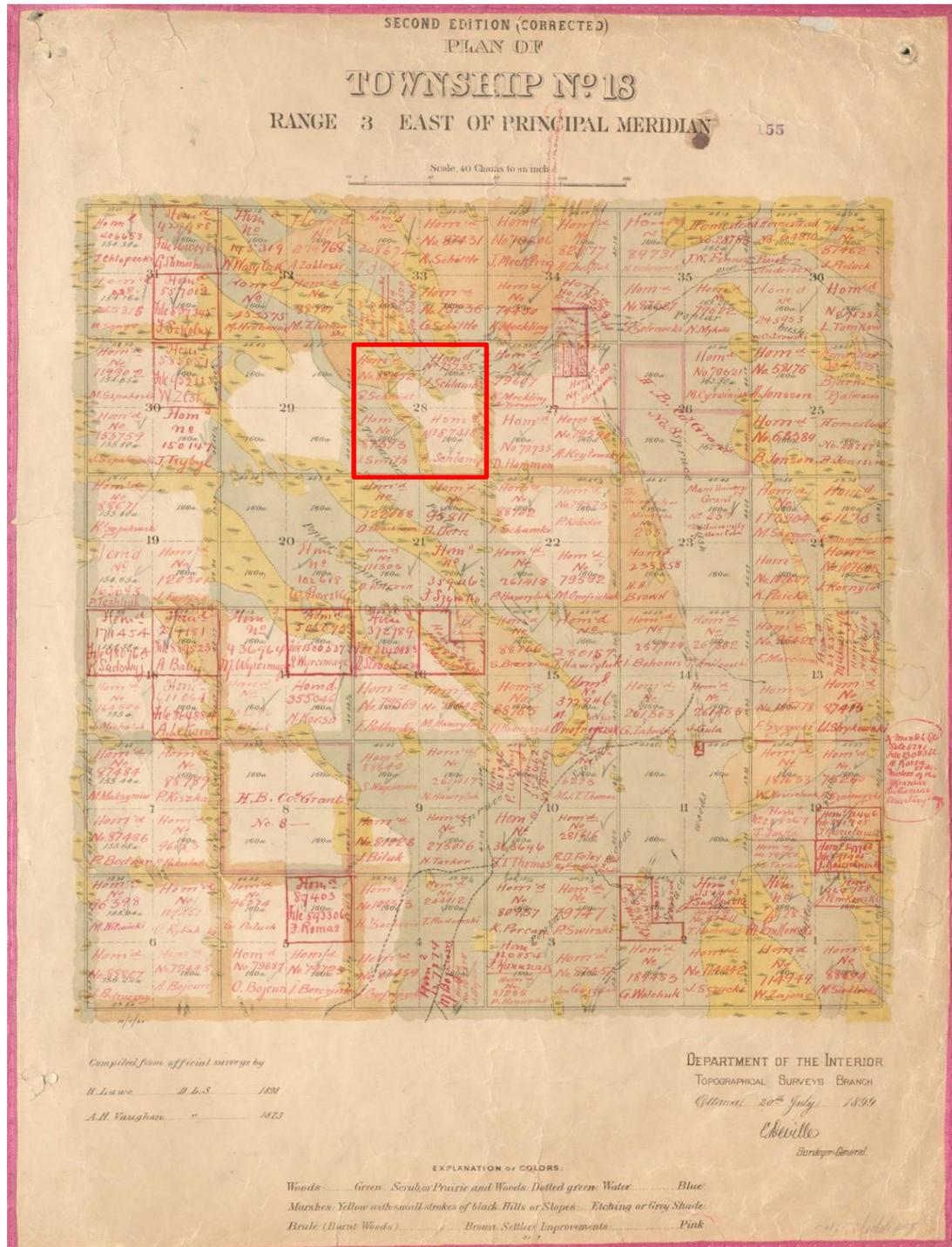


Figure 3-3 Township plan of Township 18 Range 3 EPM from 1898 Lawe survey. (Source: P.A.M. Digital Image Number: GR13-002408.JPG Location Code: G 10647).

FAC

PROPOSED CRYSTAL SPRING COLONY DEVELOPMENT SW 28-18-3 EPM

Previous Research
May 3, 2021

4.0 PREVIOUS RESEARCH

The inventory of recorded sites for a radius of 5 km from the development was requested from the HRB. To date, the data have not been provided.

FHC

PROPOSED CRYSTAL SPRING COLONY DEVELOPMENT SW 28-18-3 EPM

Field Methods
May 3, 2021

5.0 FIELD METHODS

The HRIA was conducted on April 26, 2021. Assessment methods consisted of pedestrian transects and shovel tests along the north side of the large wetland that extends through the quarter section (Appendix B Maps 4 to 6). Tests were initially placed at intervals of approximately 25 m, then expanded to 50 m intervals, and eventually 100 m intervals. Tests measured approximately 50 cm by 50 cm and were excavated to 65 cm BGS. One deep test was excavated to 75 cm BGS and natural soils were exposed throughout the entire test. All shovel tests were backfilled after recording relevant data. A hand-held GPS unit was used to record all field tracks, shovel tests, and photograph locations.

FHC

PROPOSED CRYSTAL SPRING COLONY DEVELOPMENT SW 28-18-3 EPM

Results

May 3, 2021

6.0 RESULTS

The development is characterized by a dense stand of mature aspen on the south side of the wetland and a large open hayfield on the north side (Appendix C Photos 1 to 5). Survey transects were oriented southeast to northwest along the north side of the wetland. Numerous stone piles were observed throughout the field and it was concluded that the area had been cultivated and seeded to clover at some point in the past (Appendix C Photos 6 and 7).

No heritage resources were observed on the surface nor were any soil strata indicative of past cultural activity recovered in any of the shovel tests. All tests exposed natural soils throughout the entire profile (Appendix C Photo 8; Appendix D Table 1). A shallow plow zone was observed in all tests with the exception of the one placed in the south portion of the wetland.

FHC

PROPOSED CRYSTAL SPRING COLONY DEVELOPMENT SW 28-18-3 EPM

Summary and Recommendations
May 3, 2021

7.0 SUMMARY AND RECOMMENDATIONS

BMCE retained FHC to complete an HRIA of the proposed Crystal Spring Colony in a portion of SW 28-18-3 EPM in the RM of Armstrong. The HRB reviewed the development proposal and requested an HRIA based on the potential for heritage resources to be present adjacent to former and active water courses. FHC completed the HRIA on April 26, 2021 under Manitoba Heritage Permit AXX-21.

The final development plan has not been finalized and originally proposed development in portions of NE 28-18-3 EPM and SW 28-18-3 EPM. The area was reduced by removing NE 28-18-3 EPM from the development footprint. The development will include a north-south access road egressing from Road 106N onto the property.

No heritage resources were observed on the surface or in the shovel tests placed along the north side of an extant wetland. The soil horizons exposed were typical of those described in available soil survey references.

FHC recommends no further heritage concerns with the proposed subdivision in NE 28-18-3 EPM given the absence of recovered surface heritage resources and that no cultural strata were observed in the shovel tests.

FHC

8.0 REFERENCES

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PROPOSED CRYSTAL SPRING COLONY DEVELOPMENT SW 28-18-3 EPM

Appendix A Heritage Permit
May 3, 2021

Appendix A HERITAGE PERMIT

PROPOSED CRYSTAL SPRING COLONY DEVELOPMENT SW 28-18-3 EPM

Appendix A Heritage Permit
May 3, 2021

NOT RECEIVED TO DATE

PROPOSED CRYSTAL SPRING COLONY DEVELOPMENT SW 28-18-3 EPM

Appendix A Heritage Permit
May 3, 2021

NOT RECEIVED TO DATE

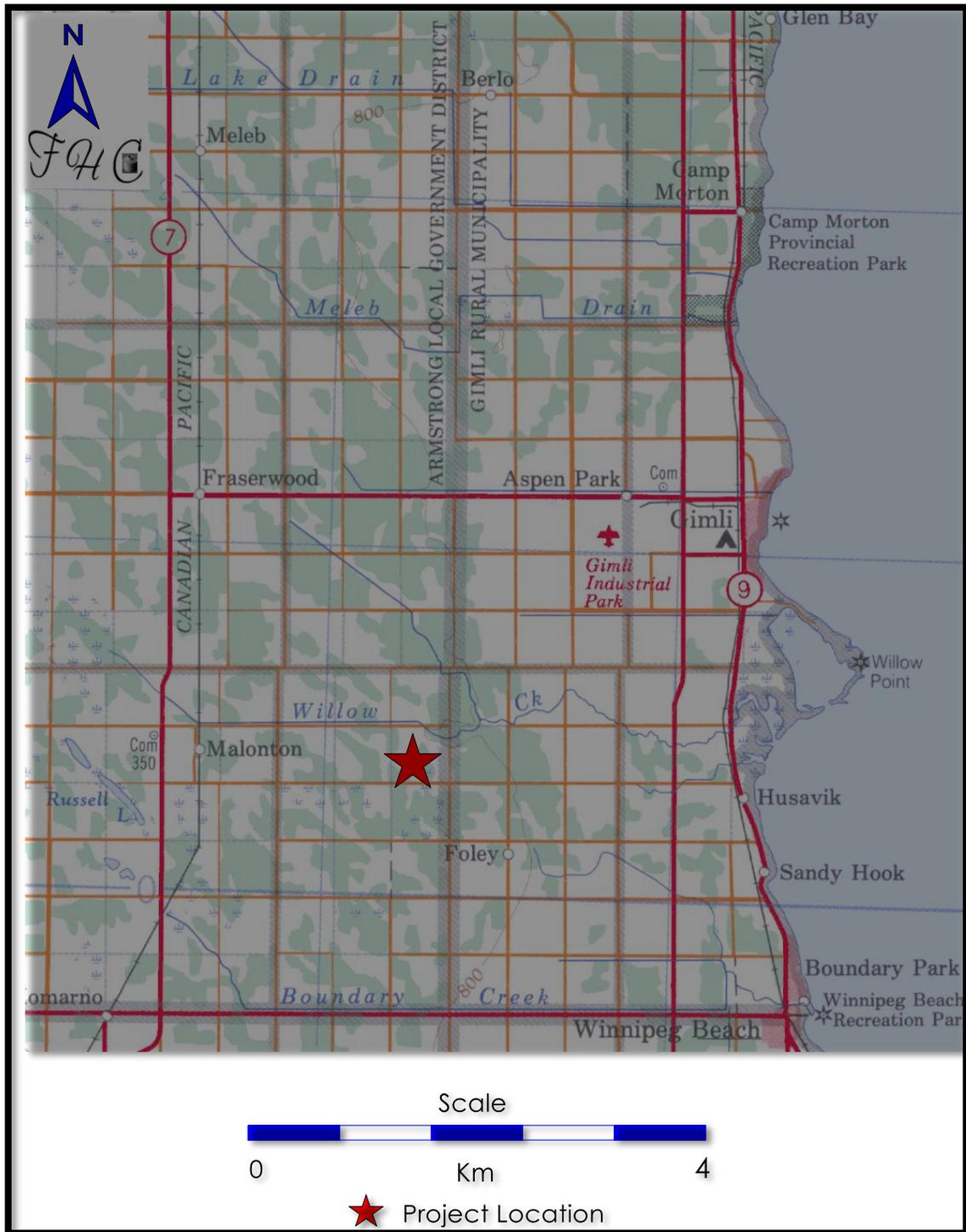
PROPOSED CRYSTAL SPRING COLONY DEVELOPMENT SW 28-18-3 EPM

Appendix B Maps
May 3, 2021

Appendix B **MAPS**

PROPOSED CRYSTAL SPRING COLONY DEVELOPMENT SW 28-18-3 EPM

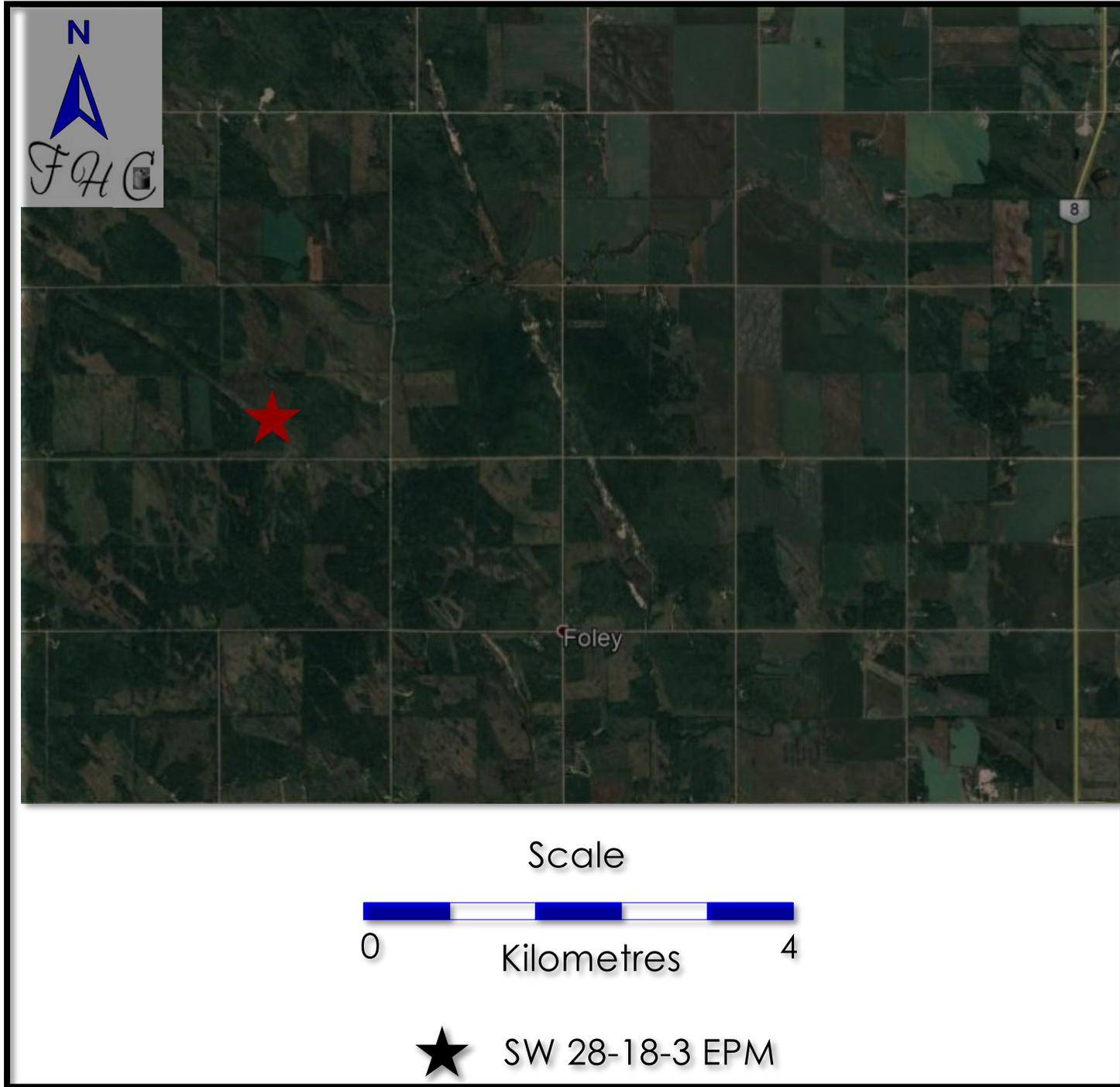
Appendix B Maps
May 3, 2021



Map 1 Clear Springs Colony SW 28-18-3 EPM project area.

PROPOSED CRYSTAL SPRING COLONY DEVELOPMENT SW 28-18-3 EPM

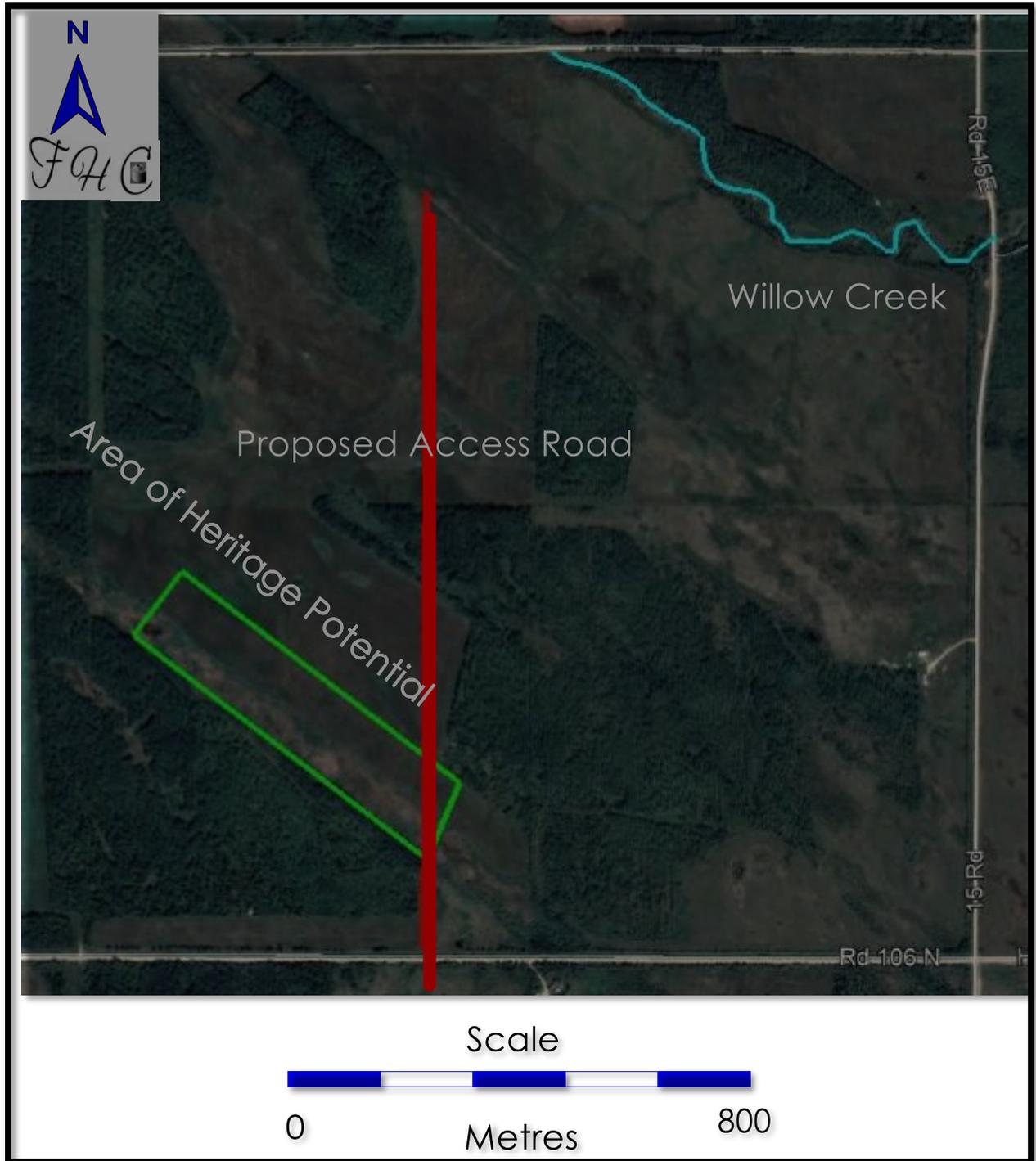
Appendix B Maps
May 3, 2021



Map 2 Clear Springs Colony SW 28-18-3 EPM project location.

PROPOSED CRYSTAL SPRING COLONY DEVELOPMENT SW 28-18-3 EPM

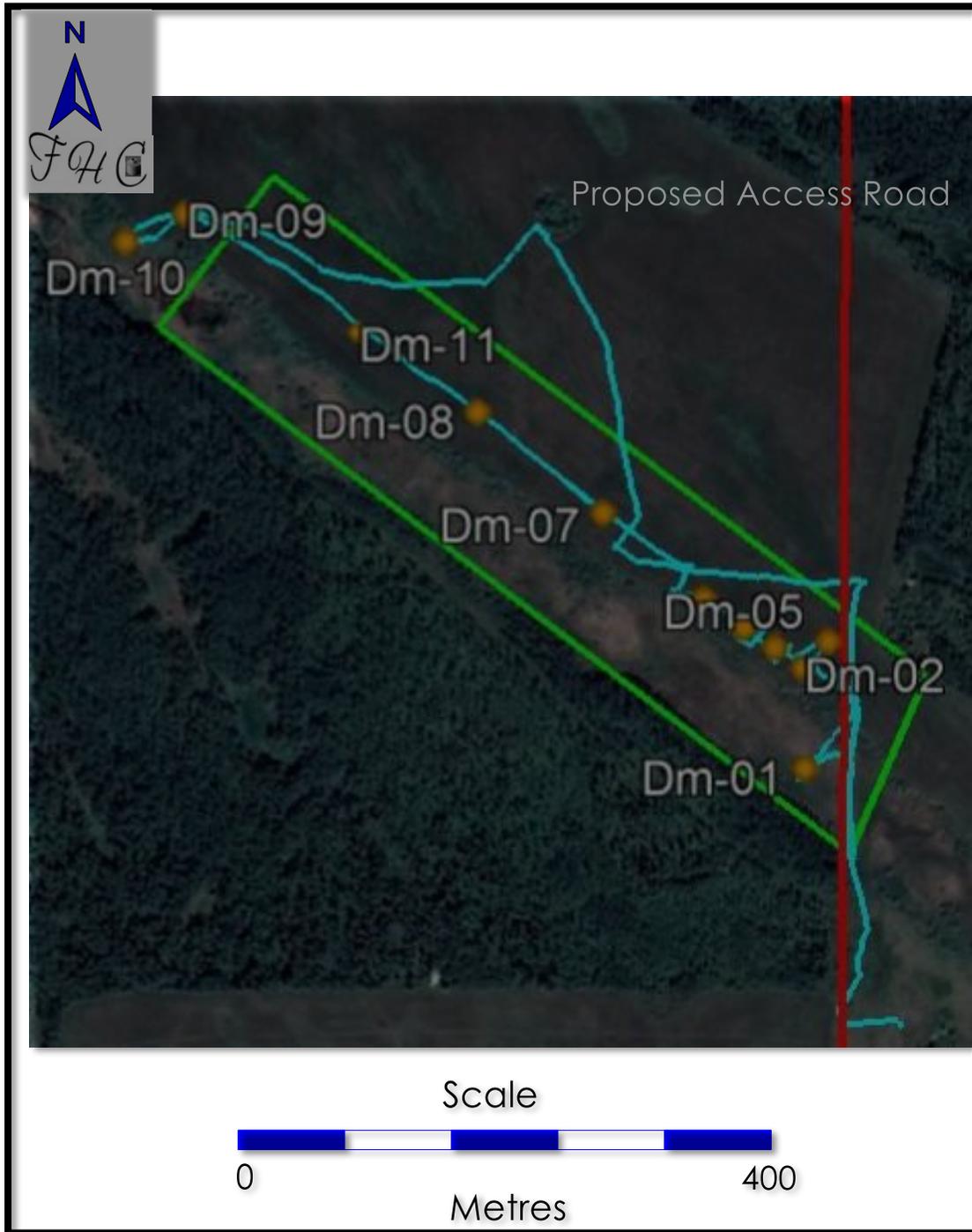
Appendix B Maps
May 3, 2021



Map 3 Clear Springs Colony SW 28-18-3 EPM proposed development plan.

PROPOSED CRYSTAL SPRING COLONY DEVELOPMENT SW 28-18-3 EPM

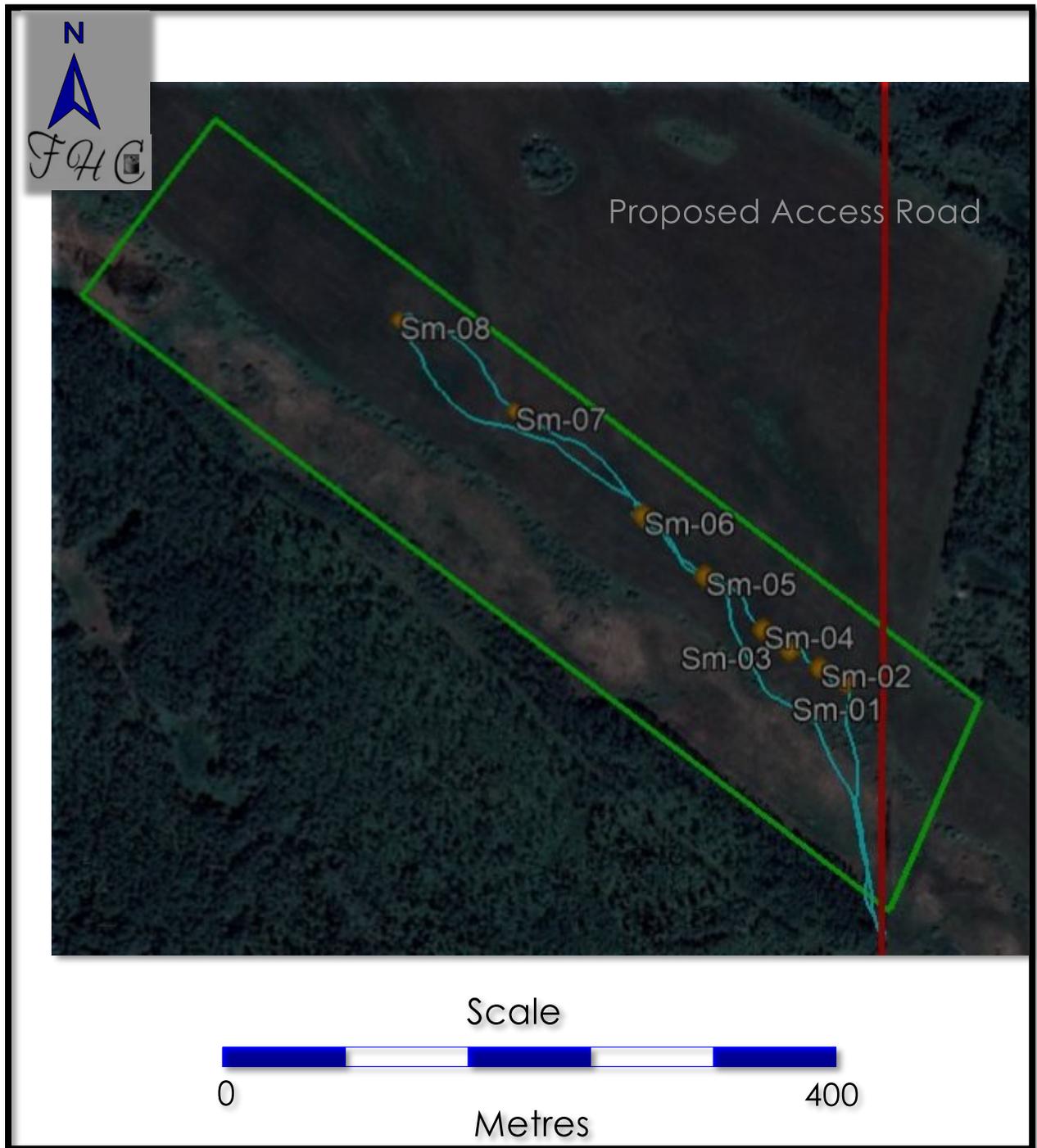
Appendix B Maps
May 3, 2021



Map 4 Clear Springs Colony SW 28-18-3 EPM K. D. McLeod transect tracks and test locations.

PROPOSED CRYSTAL SPRING COLONY DEVELOPMENT SW 28-18-3 EPM

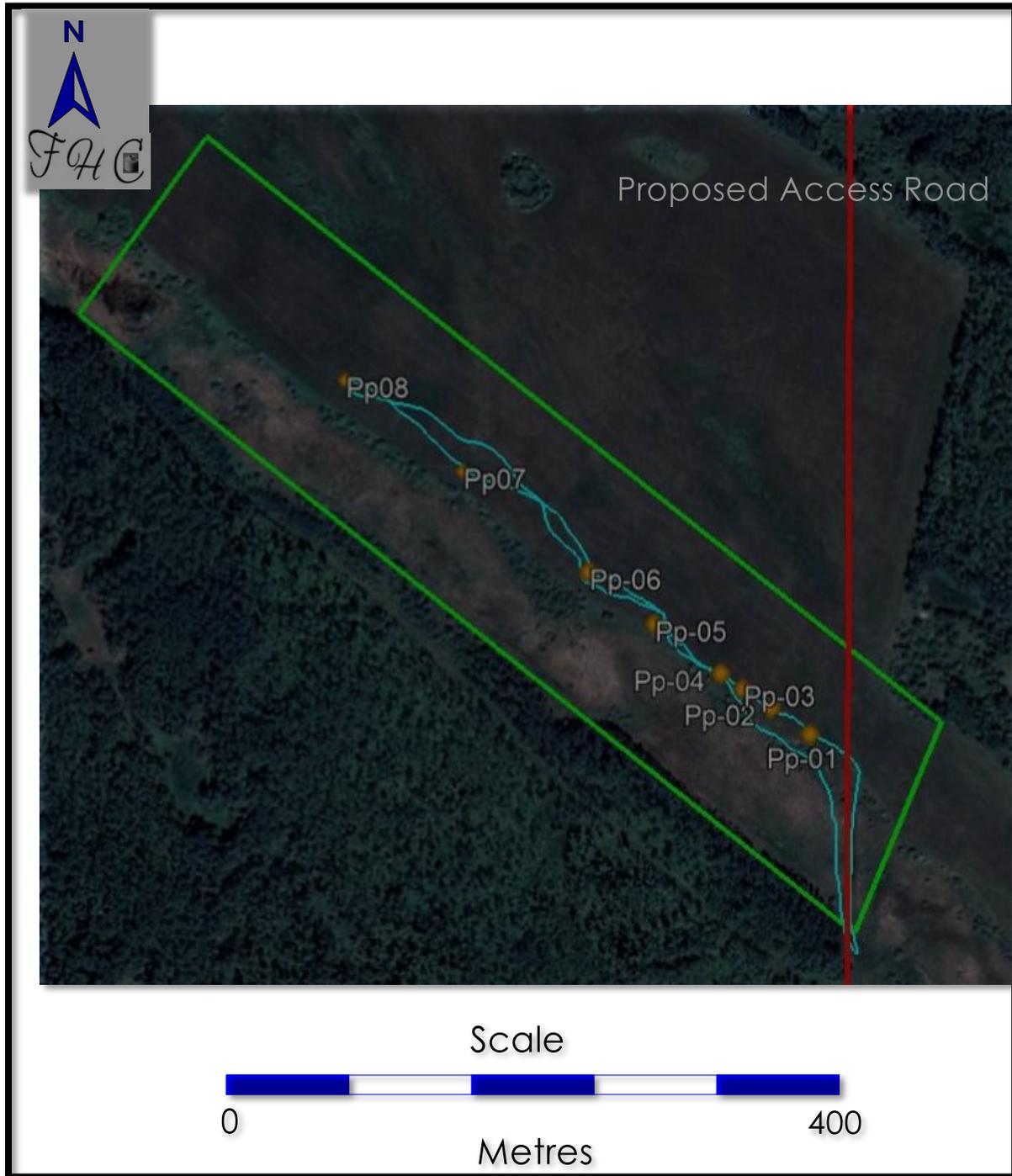
Appendix B Maps
May 3, 2021



Map 5 Clear Springs Colony SW 28-18-3 EPM S. McLeod transect tracks and test locations.

PROPOSED CRYSTAL SPRING COLONY DEVELOPMENT SW 28-18-3 EPM

Appendix B Maps
May 3, 2021



Map 6 Clear Springs Colony SW 28-18-3 EPM P. Petch transect tracks and test locations.

PROPOSED CRYSTAL SPRING COLONY DEVELOPMENT SW 28-18-3 EPM

Appendix C Site Photographs
May 3, 2021

Appendix C **SITE PHOTOGRAPHS**

PROPOSED CRYSTAL SPRING COLONY DEVELOPMENT SW 28-18-3 EPM



Photo C-1 Wetland in SW 28-18-3 EPM, looking west.



Photo C-2 Mature aspen-deciduous vegetation on south edge of wetland in SW 28-18-3 EPM, looking south.

PROPOSED CRYSTAL SPRING COLONY DEVELOPMENT SW 28-18-3 EPM



Photo C-3 Hay field in SW 28-18-3 EPM on north side of wetland, looking north.



Photo C-4 Hay field in SW 28-18-3 EPM on north side of wetland, looking west.

PROPOSED CRYSTAL SPRING COLONY DEVELOPMENT SW 28-18-3 EPM



Photo C- 5 Approximate location of proposed access road in SW 28-18-3 EPM, looking south.



Photo C-6 Stone pile along north edge of wetland in SW 28-18-3 EPM on north side of wetland, looking south.

PROPOSED CRYSTAL SPRING COLONY DEVELOPMENT SW 28-18-3 EPM



Photo C-7 Stone pile along east edge of hay field in SW 28-18-3 EPM, looking east.



Photo C-8 West wall Test Dm-02 at 50 cm BGS, looking west.

PROPOSED CRYSTAL SPRING COLONY DEVELOPMENT SW 28-18-3 EPM

Appendix D Shovel Test Summaries
May 3, 2021

Appendix D SHOVEL TEST SUMMARIES

PROPOSED CRYSTAL SPRING COLONY DEVELOPMENT SW 28-18-3 EPM

Appendix D Shovel Test Summaries
 May 3, 2021

Test	Easting	Northing	Profile	Result
Dm-01	14U-632469.720	5603489.959	Grey black sandy peat: Surface – 15 cm Frozen at 15 cm	Negative
Dm-02	14U-632466.201	5603567.637	Dark grey clay loam: Surface – 11 cm Grey stony clay loam: 11 – 26 cm White stony clay loam: 26 – 50 cm White silty clay loam till: 50 – 75 cm	Negative (Deep Test)
Dm-03	14U-632485.368	5603588.703	Dark grey clay loam: Surface – 10 cm Grey stony clay loam: 10 – 26 cm Light grey stony loam: 26 – 52 cm White silty clay loam till: 50 – 65 cm	Negative
Dm-04	14U-632443.920	5603582.985	Sod/grass: Surface – 3 cm Dark grey clay loam: 3 – 26 cm Light grey stony loam till: 26 – 50 cm Light grey stony loam: 50 – 65 cm	Negative
Dm-05	14U-632419.531	5603597.612	Sod/grass: Surface – 3 cm Dark grey clay loam: 3 – 17 cm Light grey stony loam till: 17 – 48 cm Light grey clay loam: 48 – 65 cm	Negative
Dm-06	14U-632387.740	5603619.172	Sod/grass: Surface – 3 cm Dark grey clay loam: 3 – 18 cm Light grey stony loam till: 18 – 49 cm Light grey clay loam: 49 – 65 cm	Negative
Dm-07	14U-632307.526	5603684.126	Sod/grass: Surface – 3 cm Grey stony clay loam: 3 – 25 cm Light grey stony loam: 25 – 50 cm Light grey clay loam: 50 – 65 cm	Negative
Dm-08	14U-632207.695	5603760.046	Dark grey clay loam: Surface – 11 cm Grey stony clay loam: 11 – 26 cm White stony clay loam: 26 – 50 cm White silty clay loam till: 50 – 65 cm	Negative
Dm-09	14U-631976.531	5603908.318	Sod/grass: Surface – 2 cm Dark grey clay loam: 2 – 28 cm Light grey clay loam: 28 – 65 cm	Negative
Dm-10	14U-631930.617	5603885.520	Sod/grass: Surface – 3 cm Dark grey clay loam: 3 – 29 cm Light grey clay loam: 29 – 65 cm	Negative
Sm-01	14U-632473.525	5603575.054	Sod/grass: Surface – 3 cm Grey stony clay loam: 3 – 24 cm White stony clay loam: 24 – 50 cm White silty clay loam till: 50 – 65 cm	Negative

PROPOSED CRYSTAL SPRING COLONY DEVELOPMENT SW 28-18-3 EPM

Appendix D Shovel Test Summaries
 May 3, 2021

Test	Easting	Northing	Profile	Result
Sm-02	14U-632455.717	5603584.395	Sod/grass: Surface – 3 cm Dark grey clay loam: 3 – 27 cm Light grey stony loam till: 27 – 50 cm Light grey stony loam: 50 – 65 cm	Negative
Sm-03	14U-632435.378	5603595.786	Sod/grass: Surface – 3 cm Dark grey stony clay loam: 3 – 32 cm Light grey stony loam till: 32 – 51 cm Light grey stony loam: 51 – 65 cm	Negative
Sm-04	14U-632417.330	5603609.015	Sod/grass: Surface – 3 cm Dark grey stony clay loam: 3 – 27 cm Light grey stony loam till: 27 – 53 cm Light grey clay loam: 53 – 65 cm	Negative
Sm-05	14U-632377.774	5603643.508	Sod/grass: Surface – 3 cm Dark grey stony clay loam: 3 – 25 cm Light grey stony loam till: 25 – 50 cm Light grey stony loam: 50 – 65 cm	Negative
Sm-06	14U-632335.475	5603682.828	Sod/grass: Surface – 3 cm Dark grey stony clay loam: 3 – 24 cm Light grey stony loam till: 24 – 52 cm Light grey stony loam: 52 – 65 cm	Negative
Sm-07	14U-632248.358	5603749.484	Sod/grass: Surface – 3 cm Dark grey clay loam: 3 – 11 cm Grey stony clay loam: 11 – 26 cm White stony clay loam: 26 – 50 cm White silty clay loam till: 50 – 65 cm	Negative
Sm-08	14U-632164.247	5603813.077	Sod/grass: Surface – 3 cm Dark grey clay loam: 3 – 15 cm Grey stony clay loam: 15 – 27 cm White stony clay loam: 27 – 50 cm White silty clay loam till: 50 – 65 cm	Negative
Pp-01	14U-632471.840	5603554.763	Sod/grass: Surface – 3 cm Dark grey stony clay loam: 3 – 27 cm White stony clay loam: 27 – 50 cm White silty clay loam: 50 – 65 cm	Negative
Pp-02	14U-632444.492	5603571.540	Sod/grass: Surface – 3 cm Dark grey stony clay loam: 3 – 29 cm White stony clay loam: 29 – 49 cm White silty clay loam: 49 – 65 cm	Negative
Pp-03	14U-632424.779	5603583.392	Sod/grass: Surface – 3 cm Dark grey stony clay loam: 3 – 18 cm White stony clay loam: 18 – 49 cm White silty clay loam: 49 – 65 cm	Negative

PROPOSED CRYSTAL SPRING COLONY DEVELOPMENT SW 28-18-3 EPM

Appendix D Shovel Test Summaries
 May 3, 2021

Test	Easting	Northing	Profile	Result
Pp-04	14U-632409.013	5603593.230	Sod/grass: Surface – 3 cm Dark grey clay loam: 3 – 27 cm Dark grey clay loam: 27 – 53 cm Light grey clay loam: 53 – 65 cm	Negative
Pp-05	14U-632362.375	5603624.763	Sod/grass: Surface – 2 cm Dark grey stony clay loam: 2 – 33 cm White stony clay loam: 33 – 48 cm White silty clay loam: 48 – 65 cm	Negative
Pp-06	14U-632316.123	5603657.864	Sod/grass: Surface – 3 cm Dark grey stony clay loam: 3 – 22 cm White stony clay loam: 22 – 53 cm White silty clay loam: 53 – 65 cm	Negative
Pp-07	14U-632231.658	5603715.284	Sod/grass: Surface – 3 cm Dark grey clay loam: 3 – 11 cm Grey stony clay loam: 11 – 24 cm White stony clay loam: 24 – 53 cm White silty clay loam till: 53 – 65 cm	Negative
Pp-08	14U-632145.486	5603775.710	Sod/grass: Surface – 3 cm Dark grey clay loam: 3 – 15 cm Grey stony clay loam: 15 – 28 cm White stony clay loam: 28 – 51 cm White silty clay loam till: 51 – 65 cm	Negative



Appendix E – Hydrologic and Hydraulic Assessment