SOUTH-MAN
DESIGN GROUP LTD

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www.southmandesign.ca
204-371-7314

MANITOBA SUSTAINABLE DEVELOPMENT
ENVIRONMENTAL APPROVALS BRANCH
APR 02 2024
RECEIVED

March 22, 2024

Environmental Approvals Branch
Manitoba Environment and Climate
14 Fultz Blvd.
Winnipeg, MB
R3Y 0L6

ATTENTION: Director

Re: Environment Act Proposal
Trileaf Colony Farms at NE 25-4-14W in the Rural Municipality of Argyle

To Whom it May Concern;

On behalf of Trileaf Colony Farms Ltd, South-Man Design Group Ltd. is pleased to submit a report for an Environment Act Proposal to obtain a licence for the construction and operation of a wastewater treatment lagoon for Trileaf Colony. Currently, the wastewater generated by the Colony is treated in a single cell domestic lagoon with limited capacity. The expansion of the existing wastewater treatment lagoon has been prompted by the limited capacity of the existing wastewater treatment facility and the colony's intentions to increase in population size from 130 to 160 people as well as the requirement to obtain a licence for the existing wastewater treatment facility in accordance with *The Environment Act*.

As part of the licensing process, a Manitoba Environment Act Proposal Form with the $7,500.00 application fee has been included with this Environment Act Proposal report.

Please do not hesitate to contact myself at (204) 223-8289 if you have any questions or require additional information.

Respectfully Submitted,

South-Man Design Group Ltd.

Per, [redacted]

Peter Grieger, P. Eng.

Environment Act Proposal Form

Manitoba

Name of the development:
Trileaf Colony Wastewater Treatment Lagoon

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

Legal name of the applicant:
Trileaf Colony Farms Ltd

Mailing address of the applicant: Box 100

Contact Person: Conway Waldner

City: Baldur Province: MB Postal Code: R0K 0B0

Phone Number: (204) 825-8427 Fax: email: conway@trileaf.ca

Location of the development: RM of Argyle on NE 25-4-14W

Contact Person: Conway Waldner

Street Address: Box 100

Legal Description: NE 25-4-14W

City/Town: Baldur Province: MB Postal Code: R0K 0B0

Phone Number: (204) 825-8427 Fax: email: conway@trileaf.ca

Name of proponent contact person for purposes of the environmental assessment:
Peter Grieger, P.Eng.

Phone: (204) 223-8289
Fax:

Mailing address: 8-851 Lagimodiere BLVD,
Winnipeg, MB R2J 3K4

Email address: peterg@southmandesign.ca

Webpage address:

Date: 2024-03-22

Signature of proponent, or corporate principal of corporate proponent:
[redacted]

Printed name: Peter Grieger

PRINT RESET

MANITOBA SUSTAINABLE DEVELOPMENT
ENVIRONMENTAL APPROVALS BRANCH
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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)

Per Environment Act Fees Regulation (Manitoba Regulation 168/96):

Class 1 Developments	$1,000
Class 2 Developments	$7,500
Class 3 Developments:	
Transportation and Transmission Lines	$10,000
Water Developments	$60,000
Energy and Mining	$120,000

Submit the complete EAP to:
Director
Environmental Approvals Branch
Manitoba Environment, Climate and Parks
1007 Century Street
Winnipeg, Manitoba R3H 0W4

For more information:
Email: EABDirector@gov.mb.ca
Phone: (204) 945-8321
Fax: (204) 945-5229
https://www.gov.mb.ca/sd/permits_licenses_approvals/eal/licence/index.html

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Proposal for an Environment Licence towards a New Domestic Wastewater Treatment Lagoon for Trileaf Colony Farms Ltd. at NE 25-4-14W in the Rural Municipality of Argyle

Submitted to:

Director
Environment Approvals Branch
Manitoba Environment and Climate
14 Fultz Blvd.
Winnipeg, MB R3Y 0L6

ENGINEERS
GEOSCIENTISTS
MANITOBA
Certificate of Authorization
South-Man Design Group Ltd.
No. 7810

Proponent:
Trileaf Colony Farms Ltd.
As Represented by
South-Man Design Group Ltd.
8-851 Lagimodiere Blvd.
Winnipeg, MB.
R2J 3K4

[redacted]

March 22, 2024

Table of Contents

1 Executive Summary

Trileaf Colony Farms retained the services of South-Man Design Group Ltd. for the design and supervision of a Wastewater Treatment Lagoon (WWTL) for the Colony. A review of Manitoba Environment, Climate and Parks records on existing licensed wastewater treatments suggests that there is presently no licensed domestic wastewater treatment lagoon at Trileaf Colony. Therefore, the development proposal has been prompted by the Colony's intentions to continue expanding up to approximately 160 people and the requirement to licence the existing domestic wastewater treatment lagoon in compliance with The Environment Act.

Trileaf Colony is currently home to 130 persons. As customary for Hutterite Brethren Colonies, the Colony is set to slowly expand in population up to approximately 160 people, at which point the Colony will undertake plans to establish a separate daughter colony. Trileaf Colony is also operating a seasonal livestock meat slaughter and packing facility, which contributes to the wastewater treatment volume and organic load.

As typical for Colonies, Trileaf Colony owns vast stretches of land and holds agricultural land adjacent to the existing facility, where construction of a new wastewater treatment lagoon is logical. Geotechnical investigations revealed that the soil at a location to the east of the Colony's premises is not suited for the construction of a wastewater treatment lagoon comprising a compacted clay liner. As a result, the new wastewater treatment lagoon is proposed to be constructed using a geosynthetic (HDPE) liner.

Owing to its location, the proposed site is ideal to mitigate any nuisance concerns to neighbours, and visitors of the site. No impacts to wildlife or fish are anticipated as a result of the proposed development. The new wastewater treatment lagoon will significantly improve Trileaf Colony's environmental performance.

Following issuance of an Environment Act Licence for construction and operation of the proposed wastewater treatment facility, Trileaf Colony will take steps to ensure that a certified operator will be available to operate the new wastewater treatment facility. Finally, the existing facility will be decommissioned once the new facility is set into operation.

The treated wastewater from the secondary cell will be discharged into roadside ditch 23N north of the development site via an intermittent drain located east of the proposed lagoon site prior to being discharged into a first order drain approximately 2.7 km northeast of the development site which eventually meets with a tributary of Oak Creek approximately 10 km downstream of the development site. It is our understanding that the implementation of the proposed WWTL will be considered a Class 2 Development under *The Environment Act*.

2 Introduction

A review of Manitoba Environment, Climate and Parks records on existing Environment Act Licences suggests that there are presently no licensed domestic wastewater treatment facilities at Trileaf Colony Farms Ltd; this situation arose from the historical development of the existing wastewater treatment facility at the colony, dating back to 1980. Under *The Environment Act, Classes of Development Regulation* MR164/88, all wastewater facilities fall under Class 2 developments, and can only be erected in compliance with the environment act licensing process as prescribed by the *Licensing Procedures Regulation* MR163/88 and be operated under the licence requirements defined by Manitoba Environment, Climate and Parks. Trileaf Colony is anxious to rectify the historical issues regarding their wastewater treatment process and submit a proposal under the aforementioned legislations to better serve the Colony and reduce its environmental impacts.

Traditionally, Hutterite Colonies range in size from 120 to 150 persons before an additional colony is developed and the population decreases momentarily. At the present time, 130 persons are currently residing at Trileaf Colony; the Colony intends to continue expanding up to approximately 160 persons, after which the Colony will take steps to establish a new daughter Colony. The Colony also operates on a seasonal basis a small livestock slaughterhouse and packing facility providing primarily for the Colony's own meat and poultry consumption. Liquid waste from this facility is routed to the wastewater treatment facility, while segregated and screened solids are treated separately.

Due to the fact that the existing wastewater treatment lagoon has been operating without licence and is erected too close to the Colony's residences and is the cause of unnecessary nuisance odors to Colony residents, construction of a new wastewater treatment lagoon is required. To facilitate the implementation of a new wastewater treatment lagoon, we propose that the existing facility will remain in operation, while this Environment Act Proposal is reviewed, and continue its operation up to the completion and commissioning of the anticipated new construction.

South-man Design Group Ltd. has been retained to provide the design services for the proposed wastewater treatment lagoon. The following information has been compiled to provide the information requested by the *Licensing Procedures Regulation* MR163/88.

3 Land Ownership and Municipal Land-Use Designation

The proposed site of this domestic wastewater treatment lagoon is located on NE 25-4-14W in the rural municipality of Argyle; this land is owned by Trileaf Colony Farms and it is situated in the immediate vicinity of the Colony's premises. A copy of the Certificate of Title for the land is included in the certificate of land ownership (Appendix A). The surrounding land area is currently designated as "Agriculture General Area" as defined by the Pelican-Rock Lake Planning District Development Plan (Appendix B).

To date, Trileaf Colony Farms has used this land mainly for agricultural purposes, primarily for the cultivation of cereal and oilseeds crops. Under the provisions of Zoning By-Law No. 19 of the 23 West District, the development site and adjoining land is designated "Agriculture General Area – AG". Parts 3 and 4 of the zoning by-law, indicate that wastewater treatment lagoons are allowed as a conditional use development in this zone. Conditions for development of wastewater treatment lagoons are as follows:

- Part 3, Section 52 prescribes reciprocal separation distance of 457 m (1500ft) between sewage lagoons and dwellings.
- Part 4, Section 3, Table 4-1 describes site requirements for the development of a sewage lagoon as follows:
    - Land zoning criteria: AG
    - Minimum site area: 0.8 ha (2 acres)
    - Minimum site width: 61 m (200 ft)
    - Minimum front yard: 38 m (125 ft)
    - Minimum side yard: 7.6 m (25 ft)
    - Minimum rear yard: 7.6 m (25 ft)

There have been no previous studies or activities relating to this potential site development. As the surrounding property is primarily agricultural land mostly under the ownership of Trileaf Colony Farms, there is little expectation that any residential development will occur in the immediate area. Public consultations will be carried out as part of the conditional use application review process required by *The Environment Act*.

4 Site Conditions

Given the proposed location for the new domestic wastewater treatment lagoon and the historical experience with the existing wastewater facility at the site, little or no additional environmental impacts are foreseen with the new development.

Sewage collection at the site consists of a pressure rated gravity system draining into a lift station; sewage will be pumped from the lift station to the proposed stabilization lagoon. The present proposal will make use of the existing lift station, by simply re-routing the influent pipeline to the proposed wastewater treatment lagoon.

4.1 Location

The wastewater treatment lagoon is located within the Pembina Valley Watershed District, approximately 950 m from the nearest neighboring rural residence southeast of the proposed development site and approximately 460 m east of the colony's residential development. The nearest urban residential development is Baldur located approximately 5 km north of the proposed project site, Figure 1. Information obtained from satellite images of the site indicates that there

are approximately eight rural residences and two manure storage lagoons within a 3 km radius of the proposed site. However, there is no wastewater treatment lagoons within this radius.

Access to the proposed development site is attainable via PTH 23 which intersects municipal road 77W approximately 3 miles northeast of the development site, which in turn intersects with municipal road 23 N, one of the border lines of the development site, approximately 1 mile east of the development site.

Figure 1. Location of the proposed wastewater lagoon.

The location where the lagoon is to be situated is such that prevailing winds from the northwest, west, south, and southwest will not affect a significant number of people in the area (Figure 2). The nearest residence to the southeast is approximately 950 m away meeting the minimum setback requirements set by Manitoba Environment, Climate and Parks. It is anticipated that this separation distance will significantly mitigate any odour concerns for winds from the northwest direction. The facility would be erected about 460 m east of the colony's residence. This location is most suitable as the prevailing winds directly from the east occur infrequently. Wetlands and forest habitats separating the proposed lagoon from neighbouring residents will further aid in

mitigating potential odor concerns. The release of odorous hydrogen sulphide gas (H_2S) from the wastewater treatment system usually occurs during the spring season for a short period of time while the ice thaws and the system returns to an aerobic non-odorous condition typically coinciding with the melting of ice cover.

No municipal underground cable or pipes were detected in the vicinity of the chosen site during test hole drilling. The Colony sources their domestic water directly from a deep artesian well, which is far removed from any surface or base flow contamination.

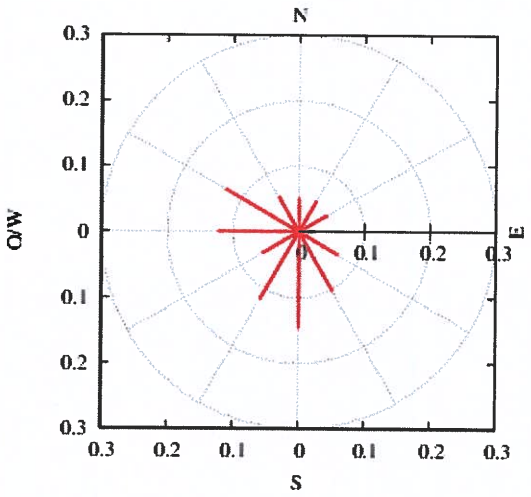


Figure 2. Frequency distribution of wind. (Source: Wind Atlas, http://www.windatlas.ca/maps-en.php)

4.2 Groundwater and Surface Water Resources

Based on well logs recorded by Manitoba Water Stewardship (GW Drill Logs), it was found that there are 17 well records on NE 25-4-14W. Review of this well logs revealed that the water table in the area is generally in the range of 2–3 m below the ground surface. The soil formation in the quarter section is generally characterized by the presence of shale gravel in the top 2–6 m in most locations underlain by brown/grey clay, grey till and fine sand.

In consultation with water use licensing section of Manitoba Environment, Climate and Parks, it has been confirmed that there is no licensed surface water user in the area. However, there are three licensed groundwater users in the vicinity of the proposed development site. It is anticipated that the quality of effluent discharged from the proposed wastewater treatment lagoon will not significantly impact the quality of surface water in the Oak Creek for agricultural use. Moreover, activities on the surface in this region are generally not considered a significant threat to groundwater quality, thereby resulting in a low pollution hazard potential.

A review of topography in the area indicates that natural drainage patterns are to the north and northeast from the proposed site. In consultation with Manitoba Infrastructure, it has been determined that there is no flooding history in the proposed development site (Appendix D). However, to prevent isolated surface accumulations from causing property damage it is recommended that any structure built be slightly elevated and graded to enhance drainage. Structures such as the wastewater treatment lagoon will be constructed with inherent flood protection by way of berms which will extend approximately 1.22 meters above surrounding grade. Any natural drainage impeded by the proposed facility will be re-established by the construction of drainage swales with a minimum 0.1% slope to ensure ponding does not occur adjacent to the structure.

4.3 Soil Conditions

A geo-technical investigation was conducted by South-Man Design Group Ltd. on September 30, 2022, in order to assess the soil characteristics to facilitate construction of the proposed wastewater treatment lagoon. Three test holes were drilled in the vicinity of the proposed lagoon site to depths of up to 9 m to identify soil hydrogeological characteristics. Soil conditions were visually inspected and representative samples were collected for laboratory analysis. Test hole logs are included in Appendix C.

Based on the test hole logs information, the soil in the proposed development site generally varies from sandy silt to coarse gravel. It is unlikely that soils exhibiting these characteristics will yield a hydraulic conductivity of 1.0×10^{-7} cm/s or less when remolded and compacted to 95% of maximum proctor dry density at plus or minus two percent of optimum moisture content. Consequently, the wastewater treatment lagoon design will be based on the use of a high-density polyethylene (HDPE) liner.

5 Design Criteria for the Proposed Wastewater Lagoon

The domestic wastewater treatment lagoon will service the wastewater from the residential and community facilities at Trileaf Colony's premises, as well as the wastewater from a truck wash bay and a small-scale livestock slaughter and packing facility. For the purpose of estimating maximum required facility dimensions, calculations were based on a maximum population of 160 persons at the Colony. In addition, the wastewater from the livestock slaughter and packing facility was accounted for; wastewater production for this facility is based on an average historical annual meat/poultry consumption of approximately 10,210 kg of live weight killed (Table 1). Finally, the Colony operates a truck wash bay, which adds wash waters to the wastewater collection system.

Table 1. Historical data of livestock slaughtered in the colony's facility

Livestock	# of livestock killed per year	Live weight per animal (kg)	Total LWK per year (kg)
Broiler chicken	3,000	2.27	6,810
Hogs	50	68	3,400
		TOTAL	**10,210**

5.1 Hydraulic Loading

5.1.1 Domestic

Hydraulic loading refers to the volume of raw sewage that will flow to the treatment lagoon per day. This volume is impacted by the number of residents the system is servicing, the amount of water used by each resident and the amount of water infiltration into the infrastructure.

Based on historical data and industry-adopted production rates for this type of application, an estimated 250 liters per day is used as the "per capita" daily water consumption/wastewater generation. Given a projected maximum population of 160 people at the Colony, the total flow is projected to be 40,000 liters per day (**40 m³/day**). The contribution from groundwater infiltration into the sewer system is considered negligible due to the design criteria implemented and the utilization of pressure rated piping.

$$Domestic\ WW = \frac{250\ L/person.day \times 160\ person}{1000\ L/m^3} = \mathbf{40\ m^3/day}$$

5.1.2 Slaughterhouse

The existing slaughterhouse is used for butchering and packaging broiler chickens and hogs for the colony's own consumption. Annual consumption of the colony is indicated in Table 1 above. Current practices include segregation of most of the blood and entrails from hogs and birds, which are collected for treatment by composting. Wastewater is generated mainly from the plucking/skinning and washing of the carcasses and cleaning the slaughterhouse after each kill batch. For large commercial poultry processing plants, values of 3,800 litres per tonne of LWK (Verheijen, 1996) and 7,560 litres per tonne of LWK (USEPA, 2004) have been reported. The higher values reported for processing plants likely arise from the fact that large commercial facilities include full processing of birds or meat products and their access to ample supply of water. This is in contrast with a processing scenario limited to only slaughtering and packing of birds and minimal processing of meat products at the colony, the operation taking place in a small facility supplied with well water, and a situation where more operations are manual.

Based on our experience with similar facilities at other Hutterite Brethren Colonies with simple commercial slaughterhouses and low-processing packing facilities it is estimated that 760 litres of wash water will be produced per 455 kg of live weight killed. On an annual basis this represents a total hydraulic load of 17,051 litres (17.051 m³) from the colony's slaughterhouse. Although it is likely that slaughtering will not occur on a daily basis, for the purpose of determining the daily hydraulic loading the annual production has been divided evenly into each day. The resulting daily hydraulic loading from the slaughterhouse is 47 litres/day (**0.047 m³/day**).

$$Slaughterhouse\ WW = \left(\frac{760\ L}{455\ kg\ LWK \times 1000\ L/m^3}\right) \times \left(\frac{10{,}210\ kg\ LWK/yr}{365\ d/yr}\right) = \mathbf{0.047\ m^3/day}$$

5.1.3 Truck Wash Bay

The truck wash bay is operated on average 2 hours per day, considering heavier uses in the summer, and less use in the winter months. The main purpose is for washing domestic vehicles and livestock trucks. The Colony intends to ship livestock twice a week, therefore there are only two trucks being thoroughly washed and disinfected each week. These trucks are washed and

have the manure removed prior to returning from their destination thereby eliminating any introduction of livestock manure into the wastewater. The other uses for the wash bay will include washing of other farm equipment and domestic vehicles. Nichols (2012) reports amounts as much as 2.4 m^3/truck of wash water production for livestock haul trucks, using pressure spray washers. Trileaf Colony will use a high-pressure washer as the main cleaning tool; the rated flow for the high-pressure washer is 27 L/min. The use of this high-pressure washer over a continuous operation for 2 hours would result in **3.24 m^3/day** of wastewater on average throughout the year.

$$Truck\ wash\ bay\ WW = \left(\frac{27\ L/min}{1000\ L/m^3}\right) \times (2\ h/d \times 60\ min/h) = \mathbf{3.24\ m^3/day}$$

5.1.4 Total Hydraulic Loading

The total combined hydraulic loading for the domestic wastewater, the livestock slaughter facility and the truck wash bay is:

$$Total\ daily\ hydraulic\ load = 40 + 0.047 + 3.24 = \mathbf{43.29\ m^3/day}$$

5.2 Organic Loading

5.2.1 Domestic

Based on accepted practice the daily BOD_5 (5-day Biochemical Oxygen Demand) production has been estimated to be 0.077 kg per person. The total daily BOD_5 contribution to the stabilization pond will be **12.32 kg** based on a population of 160 people.

$$Domestic\ BOD_5 = 0.077\ kg\ BOD_5/person.day \times 160\ person = \mathbf{12.32\ kg\ BOD_5\ /day}$$

5.2.2 Slaughterhouse

The average daily BOD_5 contribution from the slaughterhouse is estimated to be **0.36 kg** based on 13 kg BOD_5 per tonne of live weight killed.

$$Slaughterhouse\ BOD_5 = \frac{13\ kg\ BOD_5/tonne \times 10.21\ tonne/yr}{365\ days/yr} = \mathbf{0.36\ kg\ BOD_5\ /day}$$

Traditionally the BOD_5 of wastewater from a red meat slaughterhouse is estimated at 26 kg/tonne of live weight killed, with blood being the single largest contributor. As the blood will not be disposed of through the sewer and the paunch will be disposed of through composting, these contributors have been subtracted resulting in an estimated 13 kg/tonne of live weight killed.

5.2.3 Truck Wash Bay

The BOD_5 from the truck wash water comes primarily from washing domestic vehicles, livestock trucks and farm equipment. Nichols (2012) reports values of 1.05 kg BOD_5/livestock truck washed. As far as the wash water from the other equipment, the material washed out is primarily soil and mud. The wash bay sewer system has incorporate a large settling tank which allows separation of sand and silts, and other dense solids. It is anticipated that the main contribution to the BOD_5 for the wash bay would come from the livestock truck wash water. Reported on a daily basis, the BOD_5 for two truck washes per week is as follows:

$$Truch\ wash\ bay\ BOD_5 = \frac{1.05\,kg\ BOD_5/truck \times 2\ trucks/week}{7\ days/week} = \mathbf{0.30\ kg\ BOD_5/day}$$

5.2.4 Total Organic Loading

Consequently, the average daily design value for the wastewater treatment lagoon is the sum of the BOD_5 from the residential sources, the livestock processing facility and the truck wash bay. This equates to a combined BOD_5 loading of **12.98 kg/day**:

$$Combined\ BOD_5\ loading = 12.32 + 0.36 + 0.30 = \mathbf{12.98\ kg\ BOD_5/day}$$

5.3 General Design Parameters

The maximum design liquid depth in the storage is 1.13 meters. A one meter freeboard is provided to protect against catastrophic levels of precipitation and to shelter the liquid surface to minimize the effects of wave action. Moreover, a 0.37 m depth is set aside as reserve storage to hold the wastewater flow in the primary cell without surpassing the freeboard level when the transfer pipe connecting the primary cell to secondary cell is closed to facilitate effluent discharge. The interior slopes of the embankments will be constructed at 4:1 and the exterior slopes will be constructed at 5:1 in order to facilitate proper maintenance and grooming. The embankment top width will be 3.05 metres to permit access of maintenance equipment.

Due to the fact that the soil types available in the area are not suitable for a clay liner, it is recommended that the lagoon be constructed with a synthetic liner utilizing 60 mil HDPE. The synthetic liner material is proposed as a means of ensuring seepage losses are essentially eliminated in the absence of suitable clay soils. With the exception of topsoil, which is to be utilized for landscaping only, any deleterious soil containing high percentages of silt or sand shall only be used in constructing the outer embankments and as the sand bedding layer beneath the HDPE liner.

The first phase of construction will consist of removing all topsoil and organic matter from the entire footprint of the proposed cells, including beneath the embankments. This material is to be stockpiled for future use in landscaping and final dressing of the embankments in order to promote

the growth of grass. In addition to the removal of the topsoil, a 0.3 m deep key is to be constructed beneath the embankments to provide additional lateral support. Prior to starting placement of the in-situ material to construct the embankments, the material in the key is to be scarified and compacted to at least 95% of maximum dry density (MDD).

During construction of the embankments, the material is to be placed in maximum 150 mm thick lifts and compacted using a sheepsfoot packer to achieve a minimum of 95% of MDD. To achieve the desired compaction rate, the moisture content of the fill material should be within plus or minus two percent of the optimum moisture content as determined from the Standard Proctor moisture versus density relationship curve. The amount of compaction effort required to achieve the minimum 95% will be dependant on the moisture content of the material. In general, a minimum of 5 to 10 passes over each lift will be required. Discing or wetting of the fill material may be necessary to attain the optimum moisture content.

Construction of the storage will consist of removing all sharp objects from the finished surface of the earth work to prevent puncturing the HDPE liner. The interior surface will be proof rolled to conceal small stones and gravel. However, all rocks greater than 50 mm are to be removed from the surface of the storage prior to proof rolling interior surface. Surfaces containing sharp stones or shale will require a 3" sand bedding layer or 12oz geotextile placed between the sub-base and HDPE liner if physical removal of the sharp objects is not possible. The in-situ sand/sandy silt soil that was encountered below the topsoil layer during the bore hole tests could be utilized for the 3" sand bedding layer below the HDPE liner. Moreover, a 406 g/m^2 (12 oz/yard^2) nonwoven geotextile fabric will be installed under the concrete access ramps and any other appurtenances installed on top of the liner, to prevent punctures during and after construction. The HDPE liner will be anchored at the top of the berms via a 0.45×0.45m anchor trench. A 0.3 m thick ballast layer consisting of clean granular sand material will be installed onto the floor of each cell of the facility; this granular material shall be devoid of sharp stones and any stones greater than 50 mm in diameter.

A gas venting system and de-watering sump will be installed to prevent the formation of biogas under the liner material and as a means for leachate detection, respectively.

For safety reasons it is recommended that fencing and warning signs be installed around the facility to discourage the entry of livestock, wildlife and trespassers. Gates sufficient to permit the entry of mowing and maintenance equipment shall be provided and be locked when access is not required.

6 Design Capacity

6.1 Primary Cell

The size of the primary cell has been determined based on the liquid surface area at 0.565 m above the cell floor. The surface area at 0.565 m height is 4,880 m^2 (0.488 ha). Based on the

BOD_5 contribution of 12.98 kg per day anticipated at the maximum design capacity, the primary cell BOD_5 loading will be 26.60 kg/ha/day. A conservative BOD_5 loading has been used to minimize the potential for odour production during spring thaw and to limit the potential for offensive odour production throughout the year. Given the geometry of the proposed cells the larger size minimizes the potential for short circuiting of effluent between the cells. Construction drawings for the lagoon are included in Appendix E.

6.2 Secondary Cell

Given the design criteria to be implemented, it is reasonable to assume that seepage losses from the storage will be negligible. Based on resources from the University of Manitoba, annual precipitation for this area is approximately 530 mm while annual evaporation values from open water bodies are as high as 800 mm (Figure 3). Therefore, it is assumed that evaporation will, at a minimum, meet or exceed precipitation levels, as is generally the case in southern Manitoba, thereby eliminating the need to provide additional storage capacity to facilitate excess precipitation.

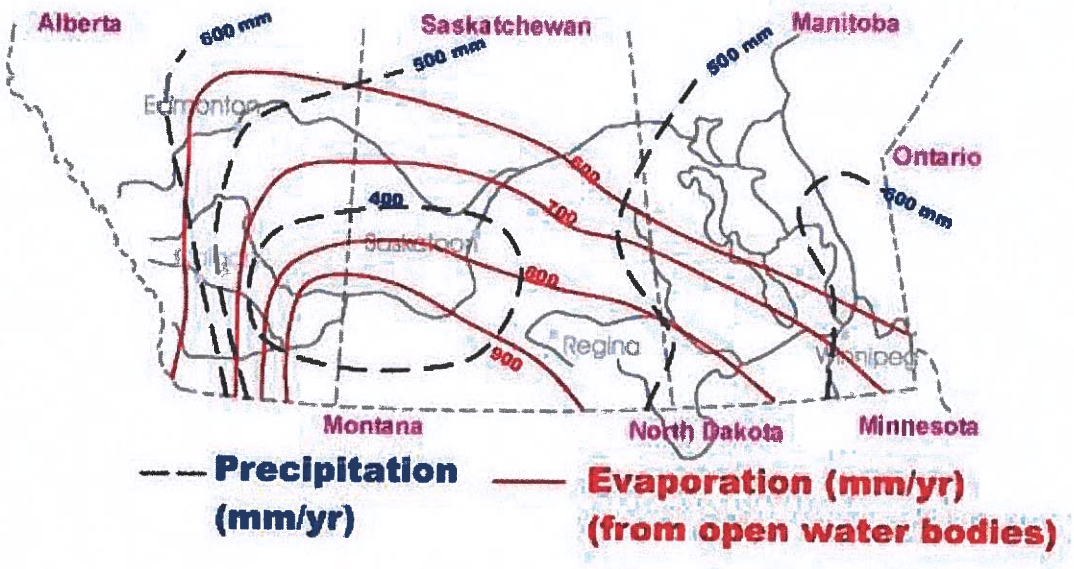


Figure 3. Annual precipitation and evaporation in Manitoba.
(Source: http://home.cc.umanitoba.ca/~mlast/lakelevel/page3/page3.html)

Operation of the lagoon is based on once per year discharge, thereby requiring that the total storage capacity of the wastewater lagoon be equivalent to the estimated hydraulic flow, multiplied by the retention time. To eliminate the need for discharging treated effluent more than once per year or discharging in the period between November 1st and June 15th of the following year, the secondary cell is sized to accommodate a minimum of 302 days of retention time, not taking into consideration any contribution in allowable storage capacity of the primary cell. Therefore, the

storage capacity of the secondary cell is 13,073 m^3, excluding 0.3 m of dead storage below the discharge pipe. The footprint of the storage is such that the design storage capacity is achieved at a maximum liquid depth of 1.13 m. In addition to the 1.0 m freeboard required to accommodate a significant rainfall event and to shelter the liquid surface from wind, another 0.37 m depth is also available to accommodate flow into the primary cell during the period when effluent is discharged. The retention capacity of the secondary cell alone is 302 days, and when combined with 50% of the capacity of the primary cell will achieve a total retention time of 366 days at the design population of 160 people.

7 Effluent Discharge

7.1 Method of Discharge

It is proposed that treated effluent from the wastewater lagoon will be discharged, via constructed and natural field drains, into a roadside ditch north of the facility. As the lagoon will be constructed partially above grade, it is proposed to accomplish the cleanout by means of gravity. Once discharged into the roadside ditch, the effluent will flow east until it joins a first order drain at 2.7 km northeast of the development site and northeast until it joins a second order drain approximately 6.7 km northeast of the project site. This drain will then convey the effluent to the northeast until it enters the tributary of the Oak Creek approximately 10 km downstream of the development site. Installation of rip rap at the discharge of the effluent pipe and at the point of entry into the roadside ditch will prevent erosion of the embankments and disturbance of particulate matter in the water stream.

Trickle discharge will be implemented in order to limit the release of liquids into the ditch as a means of trying to minimize the amount of liquids and particulates that actually enter into the river. Over its entire length between the proposed construction site and Oak Creek, the treated effluent flows through vegetated drains which are permanently grassed. This provides the unique opportunity to recapture any nutrients within the treated effluent as well as any sediment within the water stream. Trickle discharge will allow the opportunity for maximum infiltration to occur and under low flow conditions will provide additional opportunity for further treatment to occur. Under normal conditions where soil conditions are not saturated or following an intense rainfall event, it is not anticipated that any effluent discharge will reach the Oak Creek. In the event that discharge does reach Oak Creek, it is anticipated that due to the length of the discharge path that the effluent reaching the Oak Creek will be equivalent to the water quality of the river under normal non-discharge conditions.

For the purpose of trickle discharge it is proposed to restrict the release of liquids to 0.006 m^3/sec. This can be accomplished by restricting the valve opening to approximately 10% of its maximum opening area. Discharge duration is computed iteratively as the total wastewater generated during the maximum residence period (365 days) less the amount generated when the valve in the connecting pipe between the primary and secondary cells is closed (21 days plus discharge

duration) divided by the trickle discharge (0.006 m^3/sec). At this rate, it would be anticipated to take approximately 27 days to complete an entire discharge.

Discharges should not be undertaken or contribute to localized flooding as the result of excessive or intense rainfalls. In the event that significant rainfall is experienced during the discharge period, discharge shall be halted until such time that runoff accumulation in the drainage system has subsided.

7.2 Discharge Procedure

In order to facilitate emptying the secondary cell, it must first be proven that the treated effluent meets the minimum effluent standards. Consideration must be given to the time required for the final treatment in the cell and the time required to perform the necessary testing in order to meet a specific discharge period, as may be specified in the licence. Realistically, the final treatment and testing phase may take in excess of four weeks.

Following is the general discharge procedure to be implemented:

1) Close the valve in the connecting piping between the primary and secondary cells a minimum of two weeks before collecting the effluent samples for laboratory analysis. This valve is to remain closed until discharge of the secondary cell is complete.

2) Collect samples from the secondary cell and submit for analysis. Laboratory results can usually be expected in approximately two weeks.

3) If the results of the laboratory analysis meet the minimum effluent quality requirements, discharge of the secondary cell can proceed. If the results are not favorable, additional treatment will be required. In the event that the BOD_5 level exceeds the limit, additional time will be required to allow the contents of the secondary cell to further stabilize. Alternately, mechanical aeration can be provided to speed up the treatment process. If the coliform MPN exceeds the limit, dry chlorine may be spread over the surface of the secondary cell at a rate of 100 kg/ha. Re-testing to verify that the minimum standards are met will be required. Discharge the secondary cell when all requirements are met.

4) With discharge of the secondary cell complete, the discharge valve is closed and the valve between the primary and secondary cells is opened to allow the liquid levels of the two cells to equalize. This valve will remain open until the next discharge procedure is initiated. Sizing of the secondary cell is such that one discharge will be required per year at the maximum design population of 160 persons.

5) If additional discharges are required due to unforeseen scheduling issues, repeat the entire procedure.

8 Environmental Impact

8.1 Odor Production

Sizing of the primary cell has been based on an organic loading rate of 26.60 kg BOD_5/ha/day. This level, which is significantly less than the maximum allowable (56 kg BOD_5/ha/day) as prescribed in the Province of Manitoba's document "Design Objectives for Standard Sewage Lagoons" will ensure that the facility operates odour-free for the majority of the year.

Potential does exist for odour to be present during the spring thaw when gases such as hydrogen sulfide, which have been trapped under the ice, are released. Production of these gases are the result of anaerobic decomposition of organic compounds which occurs when the ice cover prevents the introduction of oxygen into the wastewater. The duration of these odours is not anticipated to last any longer than two to three weeks depending on the time it takes for the ice cover to completely melt. With the removal of the ice cover the lagoon will quickly return to an aerobic state and odour production will return to a minimal level.

The large separation distance between the lagoon and the nearest residence not associated with the lagoon will serve to further reduce any potential impacts of odour production. Wind data available for the area indicates that the prevailing wind directions are from the northwest, west, south, and southwest directions. The large separation distance to the neighbouring residence in the direction of the prevailing wind is such that little to no effect is anticipated.

In summary, odor reduction has been taken into consideration in the design of the treatment lagoon and separation distances from neighbouring residences are significantly greater than the required minimums. For these reasons, it is not anticipated that odour will have any significant environmental impacts.

8.2 Impact of Discharge on Waterways

The treated effluent from the secondary cell of the lagoon will be discharged once per year during the period prescribed in the Environment Act Licence. In order to discharge treated domestic effluent into a waterway, specific treatment levels must be achieved before any release is permitted. Laboratory analysis of the treated effluent will be used to verify that the minimum requirements as specified in the Environment Act Licence are met. Discharge will not be permitted unless the minimum requirements are met. Table 2 summarizes published information for the minimum accepted standards of specific constituents.

Table 2: Minimum Standards for Effluent Quality

CONSTITUENT	TREATED WASTERWATER
$CBOD_5$ (mg/L)	Less than 25
Total Suspended Sediments (mg/L)	Less than 25

(excluding growing algae)	
Fecal Coliform (MPN/100mL)	Less than 200
Un-ionized ammonia (mg/L) expressed as nitrogen, at 15°C±1°C	Less than 1.25
Total Phosphorus (mg/L)	Less than 1

Stream flow statistics are not available for Oak Creek and its tributaries. The first, second and third order natural drains into which the effluent is discharged, exhibit a tortuous path over 10 km before it reaches the tributary of Oak Creek. As the proposed effluent route crosses a sizable marshy area, it is very likely that the entire discharge will be retained within the bed of this intermittent drain. The effluent will also benefit from additional treatment in the marshy areas crossed by this drain. Under trickle discharge conditions, no flow would be anticipated to reach the Oak Creek when flow rates in the natural drain are minimal as most of the treated effluent would be absorbed into the soil or utilized by the vegetation within the drain.

Moderate levels of SAR in treated wastewater are not anticipated to affect the quality of water significantly in waterways. The cumulative effect of numerous sources within the watershed region should be considered in coordinating the discharge periods in order to lessen the impact on water quality. In the event that discharge is necessary during a period of low flow in the waterway, it is anticipated that any precipitated salts will be re-suspended and diluted by the next significant rainfall and corresponding flow event.

The implementation of trickle discharge, except under extremely wet surface soil conditions, will in most situations prevent or minimize any significant amount of treated effluent from reaching the Oak Creek, thereby further minimizing the threat to the downstream environment. During periods of increased flows, dilution of any residual constituents from the treated effluent will be afforded.

The minimum standards for effluent quality, requires that the maximum phosphorus level in the treated effluent be less than 1.0 mg/L. The Colony has been made aware of this requirement and have committed to reducing the use of phosphate-based soaps in order to achieve this goal. Testing of the treated effluent for phosphorus levels prior to discharge is suggested as a means of monitoring levels. When levels exceed the allowable levels at the facility, monitoring will also be performed at the ditch along Rd 23N to ensure the regulatory levels are achieved. In the event that levels exceed the allowable minimum, alum may be applied to the lagoon as a means of reducing the phosphorus level in the discharge effluent stream.

Periodic removal of vegetative growth within the discharge route is also recommended as a means of removing the nutrient stores within the plant material in order to minimize the long-term potential for nutrient movement into waterways. Removal of this material, however, should be done in a manner that does not disturb the soil surface in order to avoid the potential for introducing sediment into the water stream. Removed material can be utilized as animal feed if of a desirable plant species or alternately recycled as organic material and applied to surrounding cropland as a source of fertilizer.

Agricultural waterways are generally classified into five fish habitat types (A, B, C, D or E) based on gross measurements of fish habitat complexity and the fish species presence (Milani, 2013). Type E habitat typically has insufficient flow duration for fish to complete one or more of their life processes (spawning, rearing, feeding, over wintering or migration) and provides indirect fish habitat. Type A habitat includes all fish species with sport or commercial, domestic, or sport fishery value such as Northern Pike, Walleye or White Sucker, and species at risk whereas all other fish species are classified as Type C habitat.

It has been determined that type E fish habitat exists in the drain proposed for discharge (Figure 4). However, type A fish habitats are found further downstream once this drain runs into the tributary of the Oak Creek 10 km downstream of the proposed development site. As this habitat represents potential spawning grounds, discharge of treated wastewater during the spawning period is not recommended. It is generally accepted that discharge after June 15th will mitigate any negative effects on fish spawning.

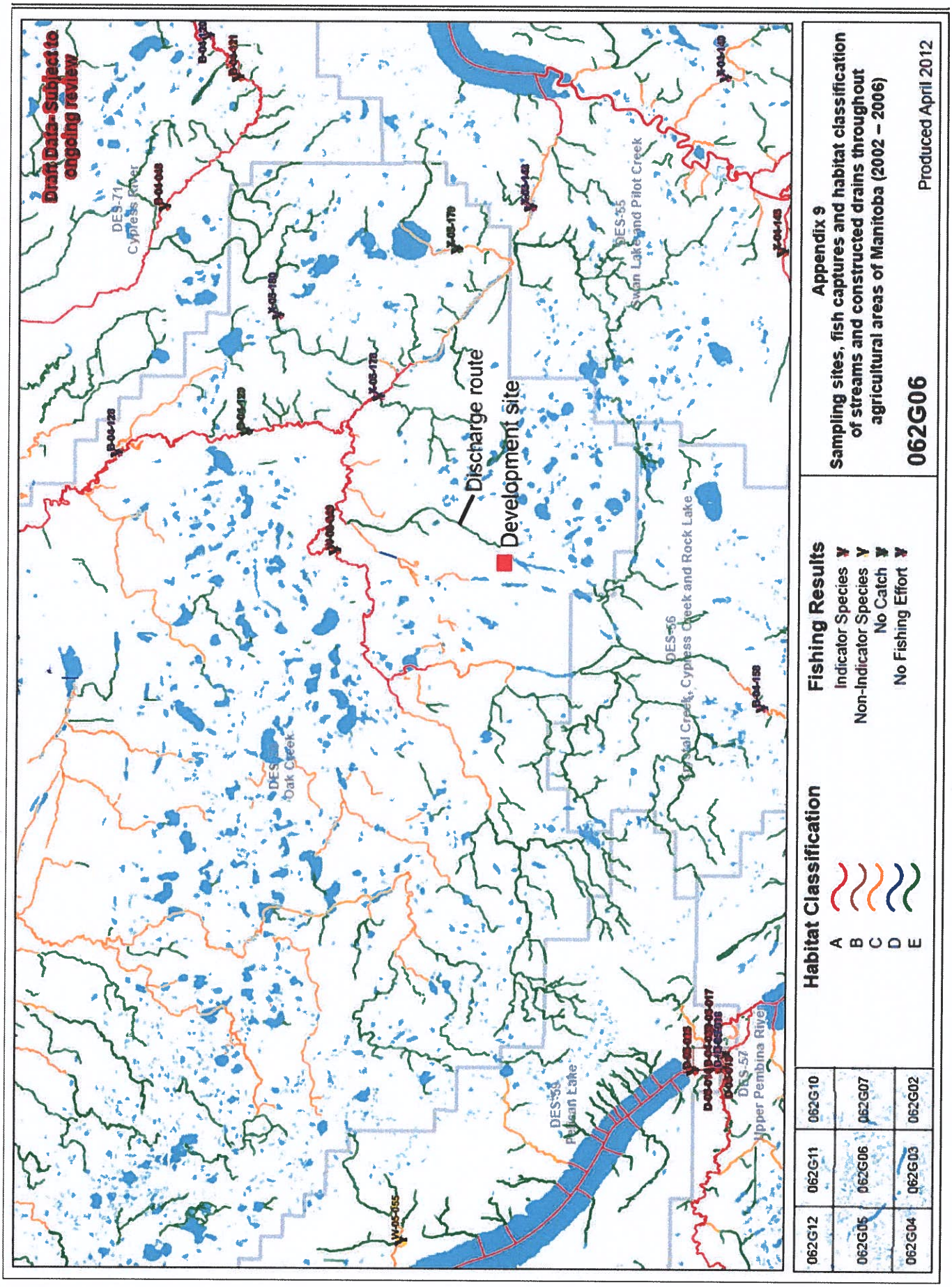


Figure 4. Fish habitat classification along the proposed discharge route

8.3 Impact on Groundwater

Construction methods to be utilized in constructing the lagoon will limit potential seepage losses to a minimum. The HDPE liner to be installed in the proposed lagoon will adequately protect the sub-surface groundwater resources beneath the facility. For this reason, the impact on groundwater is considered negligible. The dewatering system will also readily identify any breaches in the liner that may warrant repair to further protect groundwater resources.

8.4 Impacts on Wildlife, Forestry and Heritage Resources

Presently the land at the proposed construction site is used for agricultural production of annual crops. Consequently, the construction of this wastewater treatment facility does not represent a significant threat to wildlife habitat or forest. The construction will not disturb either the landscape or fisheries habitat in any way.

In consultation with Manitoba Conservation Data Centre, it was determined that there are no rare species identified at this time within the quarter section where the proposed development is situated (Appendix D).

In consultation with the Historic Resources Branch of Manitoba Sport, Culture and Heritage, it was determined that the potential to impact significant heritage resources in the proposed project site has been deemed non-existent (Appendix D).

8.5 Gasoline and Associated Product Storage

No storage of gasoline or associated petroleum products are expected on site due to the proposed development. Refueling and storage of petroleum products will be done within the developed yard site far from the proposed lagoon and is to maintain a minimum 100 m setback from any waterway.

8.6 Socio-economic Implication

As no significant environmental impacts are anticipated, no socio-economic implications are likely. Construction of the proposed facility will in fact generate economic opportunities for local contractors, having a beneficial impact.

9 Maintenance and Inspection

9.1 General Maintenance

Plastic liners require routine inspections to identify and repair punctured areas to protect leakage of wastewater. Damaged areas identified during routine inspections are exposed carefully by removing the soil cover and patched according to the manufacturer's specifications. The repaired area of the liner needs to be covered with soil and the project engineer should inspect all repairs and either approve the repairs or require additional protection such as erosion protection at inlet pipes, transfer lines, or agitator pads and protection from wheel damage. Moreover, lagoon embankments should be inspected for signs of animal burrowing activity.

9.2 Monitoring Requirements

Operation of the lagoon is relatively self-sufficient, however regular inspections are required to ensure operation and water flows are occurring as designed.

During moderate temperatures when the lagoon surface is free of ice, it should be noted whether the wastewater introduced into the primary cell is dispersed evenly or whether it is short-circuiting to the cross-over into the secondary cell. Odour levels are to be assessed and if excessive, the cause of the odours determined and rectified. General condition of the embankments and any rip-rap should also be assessed for damage from wind and wave action and repaired as necessary.

Winter monitoring is limited to checking for frozen piping and verifying that the cross-over piping between the cells is not frozen. This can be accomplished by comparing that the water levels in the cells are the same.

10 Construction Schedule

It is proposed that construction would begin as soon as the Environment Act Licence has been granted and weather conditions are favorable. For practical purposes, construction would occur between May 1st and October 31st to avoid contending with frozen soil and freezing conditions.

11 Decommissioning of Existing Facilities

The existing facility will be decommissioned either as soon as the proposed facility is commissioned, or else the next growing season following completion of the new facility. Decommissioning will be accomplished in three (3) phases.

Emptying of the facility: Upon severing the wastewater pipeline to the existing facility and re-routing the pipeline to the new facility, the existing facility will be sampled to assess whether the effluent quality parameter meet the requirements shown in Table 2. If so, discharge will be carried out following the procedure laid out above, and in accordance with the terms and conditions for discharge set out in the Environment Act Licence issued for the proposed facility. If no, the effluent will be sampled again either in early October, or early May of the following year. In the event that the effluent quality parameters are not met in terms of BOD_5, coliforms or phosphorus, remedial action consisting of aeration, chlorination and/or alum addition will be implemented to accelerate stabilization and allow for emptying within two years of commissioning of the proposed facility. The facility will be emptied by pumping out the effluent, without agitation, to within 1 m of its bottom.

Disposal of sludge by land application: The contents of the last 1 m of the facility will be sampled for nitrogen and phosphorus content. Prior and during application the facility's sludge will be agitated to re-suspend all contents with equipment commonly available for the pump-out of livestock manure storage facilities. The facility's sludge will be land applied in accordance with the practices used by Trileaf Colony for liquid livestock manure, at rates based on crop removal for nitrogen or phosphorus, whichever dictates the lowest application rate.

Final decommissioning of the facility/Site restoration: When sludge removal is complete, the existing lagoon dykes will be levelled. Drainage will be directed away from the area and this levelled area will be seeded to grass.

12 Funding

Construction of the domestic lagoon will be funded primarily by Trileaf Colony. However, a grant may be requested from the Canada/Manitoba Infrastructure program to potentially recover some of these costs.

13 References

Milani, D.W. 2013. Fish community and fish habitat inventory of streams and constructed drains throughout agricultural areas of Manitoba (2002-2006). Can. Data Rep. Fish. Aquat. Sci. 1247: xvi + 6,153 p.

Nichols, D. 2012. Fact Sheet for State Waste Discharge Permit ST0008072 – Tidy Truck Wash, Inc. Wallula Facility. Feburary 3, 2012. 27pp. www.fortress.wa.gov/ecy/wqreports/public/f?p=110:1000:2300249960119429::NO:RP:P1000_FACI LITY_ID,P1000_FACILITY_NAME:21056,TIDY%20TRUCK%20WASH,%20INC, accessed on Aug 7, 2017.

USEPA (2004). Technical development for the final effluent limitations guidelines and standards for the meat and poultry products point source category (40 CFR 432). Report EPA-821-R04-

001. www.water.epa.gov/scitech/wastetech/guide/mpp/index.cfm., accessed on Sep 25, 2017.

Verheijen L.A.H.M, D. Wiersema, L.W. Hulshoff Pol, J. De Wit (1996). Management of waste from animal product processing. FAO corporate document repository. www.fao.org/wairdocs/lead/x6114e/x6114e00.htm, accessed on Sep 25, 2017.

14 Appendix A – Certificate of Land Ownership

STATUS OF TITLE

Title Number **1744581/4**
Title Status **Accepted**
Client File

Manitoba Land Titles Registry

1. REGISTERED OWNERS, TENANCY AND LAND DESCRIPTION

BALDUR HOLDING CO. LTD.

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

NE 1/4 25-4-14 WPM

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

2. ACTIVE INSTRUMENTS

No active instruments

3. ADDRESSES FOR SERVICE

BALDUR HOLDING CO. LTD.
BALDUR MB
R0K 0B0

4. TITLE NOTES

No title notes

5. LAND TITLES DISTRICT

Morden

6. DUPLICATE TITLE INFORMATION

Duplicate not produced

7. FROM TITLE NUMBERS

A70705/4 All

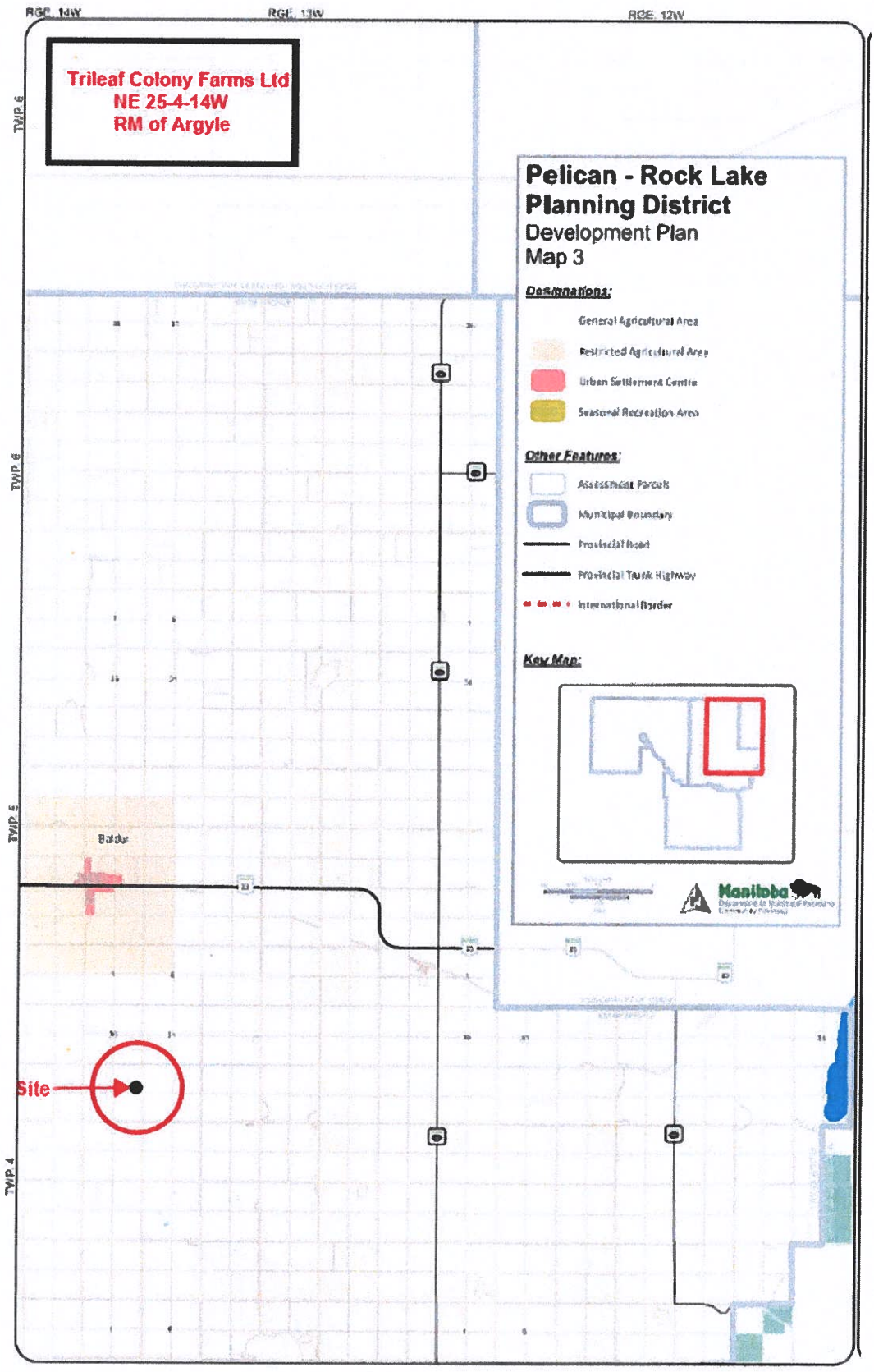
8. REAL PROPERTY APPLICATION / CROWN GRANT NUMBERS

No real property application or grant information

9.	**ORIGINATING INSTRUMENTS**	
	Instrument Type:	**Request Electronic Title Conversion**
	Registration Number:	**1034507/4**
	Registration Date:	2000-08-29
	From/By:	MORDEN LAND TITLES OFFICE
	To:	
	Amount:	
10.	**LAND INDEX**	
	NE 25-4-14W	

CERTIFIED TRUE EXTRACT PRODUCED FROM THE LAND TITLES DATA STORAGE SYSTEM OF TITLE NUMBER 1744581/4

15 Appendix B – Location of the proposed development


RGE. 14W
RGE. 13W
RGE. 12W
TWP. 6
TWP. 5
TWP. 4
Trileaf Colony Farms Ltd
NE 25-4-14W
RM of Argyle
Pelican - Rock Lake
Planning District
Development Plan
Map 3
Designations:
General Agricultural Area
Restricted Agricultural Area
Urban Settlement Centre
Seasonal Recreation Area
Other Features:
Assessment Parcels
Municipal Boundary
Provincial Road
Provincial Trunk Highway
International Border
Key Map:
Manitoba
Baldur
Site

16 Appendix C – Geo-Technical Information

Well log data in the vicinity of proposed lagoon site

Well log

LOCATION: NE25-4-14W

Well_PID: 66845
Owner: TRI LEAF COLONY
Driller: M & M Drilling Rivers Ltd.
Well Name: 1989 PRODUCTION WELL
Well Use: PRODUCTION
Water Use: Livestock
UTMX: 483315.768
UTMY: 5464929.24
Accuracy XY: UNKNOWN
UTMZ:
Accuracy Z:
Date Completed: 1989 Oct 11

WELL LOG

From (ft.)	To (ft.)	Log
0	15.0	COARSE SHALE GRAVEL
15.0	30.0	STONY GREY TILL

WELL CONSTRUCTION

From (ft.)	To (ft.)	Casing Type	Inside Dia.(in)	Outside Dia.(in)	Slot Size(in)	Type	Material
0	11.0	casing	5.00			INSERT	PVC
11.0	16.0	perforations	5.00		0.018	WIRE WOUND	S. S.
16.0	20.0	casing	5.00			INSERT	SILICA S.
11.0	16.0	gravel pack					SILICA S.

Top of Casing: 3.0 ft. above ground

PUMPING TEST

Date: 1989 Oct 11
Pumping Rate: 45.0 Imp. gallons/minute
Water level before pumping: 9.0 ft. below ground
Pumping level at end of test: 13.0 ft. below ground
Test duration: 2 hours, minutes
Water temperature: ?? degrees F

LOCATION: NE25-4-14W

Well_PID: 36270
Owner: SHAMROCK COLONY
Driller: M & M Drilling Rivers Ltd.
Well Name: MM-1979
Well Use: PRODUCTION
Water Use: Domestic
UTMX: 483315.768
UTMY: 5464929.24
Accuracy XY: UNKNOWN
UTMZ:
Accuracy Z:
Date Completed: 1979 Oct 02

WELL LOG

From (ft.)	To (ft.)	Log
0	17.5	GRAVEL, SHALE
17.5	19.0	GREY CLAYEY SILT

WELL CONSTRUCTION

From (ft.)	To (ft.)	Casing Type	Inside Dia.(in)	Outside Dia.(in)	Slot Size(in)	Type	Material
2.3	9.1	casing	5.00			INSERT	BLACK IRON
9.1	17.1	perforations	5.00		0.018	WIRE WOUND	S. S.
7.0	17.5	gravel pack		11.00		NO. 10-30	SILICA S.

Top of Casing: 2.3 ft. above ground

PUMPING TEST

Date:
Pumping Rate: 90.0 Imp. gallons/minute
Water level before pumping: 7.0 ft. below ground
Pumping level at end of test: 10.0 ft. below ground
Test duration: hours, 45 minutes
Water temperature: ?? degrees F

REMARKS

REPLACED BY 1989 PRODUCTION WELL OCT 11,1989

LOCATION: NE25-4-14W

Well_PID: 36253
Owner: SHAMROCK COLONY
Driller: M & M Drilling Rivers Ltd.
Well Name: MM-3
Well Use: TEST WELL
Water Use:
UTMX: 483315.768
UTMY: 5464929.24
Accuracy XY: UNKNOWN
UTMZ:
Accuracy Z:
Date Completed: 1979 Sep 28

WELL LOG

From (ft.)	To (ft.)	Log
0	17.5	SHALE GRAVEL BOTTOM 2 FEET IS FINEMEDIUM SAND
17.5	19.0	GREY CLAYEY SILT

WELL CONSTRUCTION

From (ft.)	To (ft.)	Casing Type	Inside Dia.(in)	Outside Dia.(in)	Slot Size(in)	Type	Material
0	10.0	casing	2.00				
10.0	16.0	perforations	2.00		0.018		

Top of Casing: ft. below ground

PUMPING TEST

Date:
Pumping Rate: 50.0 Imp. gallons/minute
Water level before pumping: 7.0 ft. below ground
Pumping level at end of test: ?? ft. below ground
Test duration: hours, minutes
Water temperature: ?? degrees F

LOCATION: NE25-4-14W

Well_PID: 67664
Owner: TRI LEAF COLONY
Driller: M & M Drilling Rivers Ltd.
Well Name: TH-7
Well Use: TEST WELL
Water Use:
UTMX: 483315.768
UTMY: 5464929.24
Accuracy XY: UNKNOWN
UTMZ:
Accuracy Z:
Date Completed: 1989 Oct 10

WELL LOG

From (ft.)	To (ft.)	Log
0	2.0	TOPSOIL
2.0	16.0	COARSE GRAVEL
16.0	17.0	GREY CLAY
17.0	19.0	SAND
19.0	30.0	GREY TILL

No construction data for this well.

Top of Casing: ft. below ground

PUMPING TEST

Date: 1989 Oct 10
Pumping Rate: 30.0 Imp. gallons/minute
Water level before pumping: ft. below ground
Pumping level at end of test: ?? ft. below ground
Test duration: hours, minutes
Water temperature: ?? degrees F

REMARKS

BESIDE OLD WELL (1979)

TEST HOLE LOGS

For: Trileaf Colony Farms Ltd
Operation: Domestic Wastewater Lagoon
Location: NE 25-4-14W
RM: Argyle

City/Town, Prov.: Baldur, MB
Test Hole Logs by: Desalegn Edossa, P. Eng.
Drilling Performed by: Maple Leaf Drilling Ltd
Date: Sep 30, 2022

Test hole #1	**140 ft north and 160 ft east of SE corner of NE 25-4-14W**
0-8"	Topsoil;
8"-5'	Grey sandy silt, loose, dry;
5'-6'	Sandy gravel, dry, loose;
6'-10'	Sandy gravel, moist, loose;
10'-12.5'	Dark till, loose, gravel inclusions, moist;
	Water @ 11'
12.5'-15'	Dark till, stiff, gravel inclusions, wet;
15'-17.5'	Dark till, moderately stiff, wet, gravel inclusions;
17.5'-20'	Dark till, wet, stiff;
20'-23'	Same as above
23'-25'	Gravel, loose, wet;
25'-30'	Same as above
	Hole sealed with bentonite;

Test hole #2	**244 ft north and 175 ft east of TH #1**
0-12"	Topsoil;
12"-5'	Grey sandy silt, dry, loose;
5'-9'	Sandy silt, dry, loose, gravel inclusions;
9'-10'	Sandy silt, loose, moist, gravel inclusions;
10'-14'	Brown sandy silt, loose, wet, gravel inclusions;
	Water at 12'
14'-15'	Dark/brown sandy silt, loose, wet, pebble inclusions;
15'-17'	Black sandy clay, stiff, wet, gravel inclusions
17'-20'	Black silty clay, loose, wet;
	Hole sealed with bentonite;

Test hole # 3	**244 ft north and 175 ft east of TH #2**
0-12"	Topsoil;
12"-4'	Grey sand, loose, dry;
4'-5'	Grey sandy silt, loose, dry, oxide inclusions;
5'-7'	Grey sandy silt, loose, dry;
7'-10'	Grey sandy silt, moist, loose;
10'-20'	Coarse gravel, wet, loose;
	Water at 11'
	Hole sealed with bentonite;

17 Appendix D – Correspondence

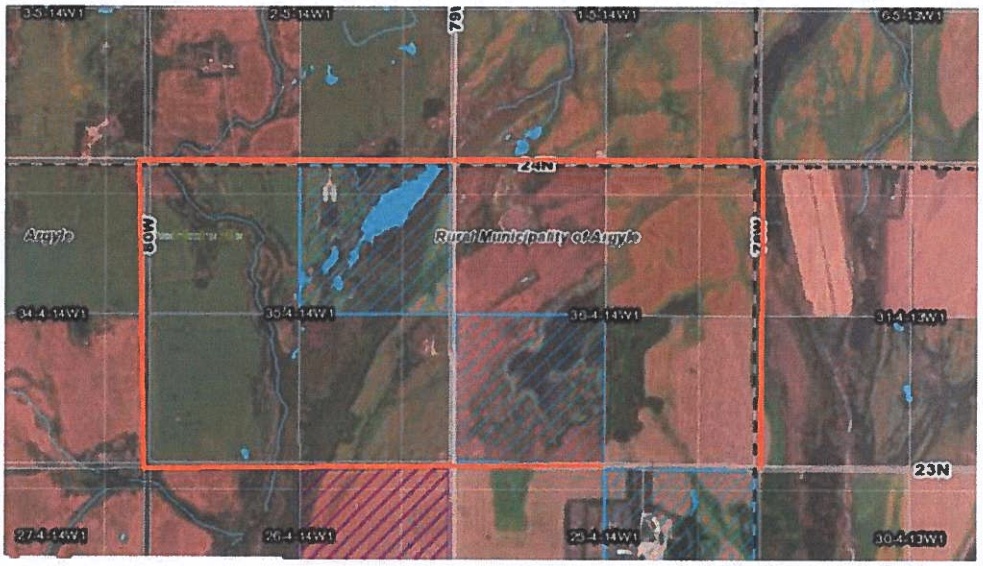
Information about licenced surface water users downstream of the site

Desalegn Edossa

From: +WPG1212 - Water Use (CC) <wateruse@gov.mb.ca>
Sent: April 22, 2022 11:31 AM
To: Desalegn Edossa
Cc: Butterfield, Tamara (CC)
Subject: RE: Surface water user-Trileaf Colony (NE 25-4-14W)

Good afternoon Desalegn. According to the Portal Mapviewer that is available to the public, our staff identified three licensees within the vicinity of the boundary highlighted in orange below.

- Rural Municipality of Argyle. Water Use Licence no. 2019-021 (groundwater) at SE-33-3-13W
- 4130642 Manitoba Ltd. Water Use Licence no. 2019-098 (groundwater) at NE-35-4-14W



In the northeast/east direction of the of the proposed works, the nearest water use licensee is over 4.6 km away (or greater if you account for municipal ditches).

Please note that there may be additional stakeholders that withdraw water along the discharge route – but do not meet the threshold to require a Water Use Licence.

If you have any questions regarding this email or would like instructions on how to use the online public Portal Map Viewer, please do not hesitate to reply.

Sincerely,

Trevor Cielen
Registrar, Drainage and Water Rights Licensing

Information about historical record of flooding in the area

Desalegn Edossa

From: Ahsan Badhan, Mahid <Mahid.AhsanBadhan@gov.mb.ca>
Sent: August 4, 2022 9:00 AM
To: Desalegn Edossa
Subject: RE: Flooding History at NE 25-4-14W (Trileaf Colony Farms)

Hi Desalegn,

I replied your email your email couple of weeks ago.

We have looked into our records and found no flood record for your requested property.

And about the authorization please contact with the respective RM. Thanks

Regards

Mahid Ahsan Badhan, MSc, EIT (Pronouns: He/Him)
Planning and Flood Protection Technologist
Hydrologic Forecasting and Water Management | Engineering and Technical Services
Manitoba Transportation and Infrastructure
280 Broadway (2nd Floor) | Winnipeg MB R3C 0R8 | 204.470.7617

From: Desalegn Edossa <desalegne@southmandesign.ca>
Sent: August 4, 2022 8:06 AM
To: +WPG1166 - MIT Water Review <MITWaterReview@gov.mb.ca>; Ahsan Badhan, Mahid <Mahid.AhsanBadhan@gov.mb.ca>
Cc: Graham, Evan <Evan.Graham2@gov.mb.ca>
Subject: FW: Flooding History at NE 25-4-14W (Trileaf Colony Farms)

CAUTION: This email originated from an External Sender. Please do not click links or open attachments unless you recognize the source.
ATTENTION: ce courriel provient d'un expéditeur externe. Ne cliquez sur aucun lien et n'ouvrez pas de pièce jointe, excepté si vous connaissez l'expéditeur.

Information about rare species in the area

Desalegn Edossa

From: Murray, Colin (ARD) <Colin.Murray@gov.mb.ca>
Sent: May 3, 2022 2:08 PM
To: Desalegn Edossa
Subject: DR D Edossa South-Man 20220422 Trileaf
Attachments: NE-25-004-14W1 and b2k.zip; DR D Edossa South-Man 20220422 Trileaf.xlsx

Hi Desalegne
Thank you for your information request. I completed a search of the Manitoba Conservation Data Centre's (CDC) rare species database for your area of interest. This includes the primary location: NE-25-004-14W1; and a 2km radius buffer from the footprint boundary.

I am attaching a Microsoft Excel spreadsheet summarizing these occurrences. The spreadsheet includes scientific and common names, the provincial (SRank) rank for each species as well as the Manitoba Endangered Species and Ecosystem Act, and the federal Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and Species at Risk Act (SARA) designations. I'm also including the ESRI Shapefiles used to fulfill the request.

Manitoba Conservation Data Centre's (CDC) rare species database for your area of interest

SEARCH CRITERIA	SITE	SCINAME	COMNAME	S_RANK	ESEA	SARA	COSEWIC	FIRSTOBS	LASTOBS	EO_RANK	REPACC
Within	NE-25-004-14W1	No listed or tracked species occurrences found at this time									
Within 2km radius of site boundary	NE-25-004-14W1	Dalea villosa var. villosa	Hairy Prairie-clover	S2S3	Threatened	Special Conc	Special Concern	Aug-30	Aug-30	H - Historical	Very Low
Within 2km radius of site boundary	NE-25-004-14W1	Sporobolus neglectus	Annual Dropseed	S2S3				Aug-41	Aug-41	H - Historical	Very Low
Records in general area of	NE-25-004-14W1	Ambystoma mavortium	Western Tiger Salamander	S4S5		Special Conc	Special Concern	2014-08-18	2014-08-18	E - Verified extant (via	High
Records in general area of	NE-25-004-14W1	Sayornis saya	Say's Phoebe	S3B				2012-07-23	2012-07-23	E - Verified extant (via	
Records in general area of	NE-25-004-14W1	Melanerpes erythrocephalus	Red-headed Woodpecker	S3B	Threatened	Endangered	Endangered	2013-06-02	2013-06-02	E - Verified extant (via	Medium
Records in general area of	NE-25-004-14W1	Odocoileus hemionus	Mule or Black-tailed Deer	S3	Threatened			2015-07-02	2015-07-02	E - Verified extant (via	High
Records in general area of	NE-25-004-14W1	Dalea villosa var. villosa	Hairy Prairie-clover	S2S3	Threatened	Special Conc	Special Concern	Aug-30	Aug-30	H - Historical	Very Low
Records in general area of	NE-25-004-14W1	Nassella viridula	Green Needlegrass	S3S4				1941-08-16	1941-08-16	H - Historical	Very Low
Records in general area of	NE-25-004-14W1	Ammodramus savannarum	Grasshopper Sparrow	S2S3B				1988-06-07	1988-06-07	H - Historical	Low
Records in general area of	NE-25-004-14W1	Chordeiles minor	Common Nighthawk	S2S3B	Threatened	Threatened	Special Concern	2013-05-02	2013-06-02	E - Verified extant (via	Medium
Records in general area of	NE-25-004-14W1	Dolichonyx oryzivorus	Bobolink	S3S4B		Threatened	Threatened	2012-06-07	2014-07-05	E - Verified extant (via	Medium
Records in general area of	NE-25-004-14W1	Hirundo rustica	Barn Swallow	S4B		Threatened	Threatened	2010-06-27	2010-06-27	E - Verified extant (via	Medium
Records in general area of	NE-25-004-14W1	Riparia riparia	Bank Swallow	S4B		Threatened	Threatened	2011-06-29	2013-07-09	E - Verified extant (via	Medium
Records in general area of	NE-25-004-14W1	Centronyx bairdii	Baird's Sparrow	S1B	Endangered	Special Conc	Special Concern	1986-06-07	1986-06-07	H - Historical	High
Records in general area of	NE-25-004-14W1	Sporobolus neglectus	Annual Dropseed	S2S3				Aug-41	Aug-41	H - Historical	Very Low
Records in general area of	NE-25-004-14W1	Corispermum americanum var. americanum	American Bugseed	S3				1922-07-01	1922-07-01	H - Historical	Low

Information about heritage sites in the area

Manitoba
Sport, Culture and Heritage

Memorandum

DATE: 2022-04-28

TO: **Desalegn EDOSSA**
South-Man Design Group Ltd.
Unit 8-851 Lagimodiere Blvd.
Winnipeg, MB
R3H 0W4

CC: **Reid GRAHAM**
Impact Assessment Archaeologist
Historic Resources Branch

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

T: (204) 945-2118
F: (204) 948-2384
e: Hrb.archaeology@gov.mb.ca

SUBJECT: **Heritage Resources Report for NE-25-4-14W in RM of Argyle**
AAS File No. AAS-22-18759

No concerns at this time – Please implement an HRPP if heritage resources are accidentally encountered.

The potential to impact heritage resources is believed to be low and, therefore, the Historic Resources Branch has no immediate concerns with the proposed lagoon project at this time.

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

A heritage resource protection plan (HRPP) be included in planning and construction in the event heritage resources (including human remains and palaeontological resources) are accidentally encountered. The HRPP consists of operational procedures to limit damage or destruction of heritage resources accidentally found during site work. This document assists informing managers, employees, contractors on what to do and whom to call should heritage resources accidentally be encountered when testing and development is underway on site.

Please find attached a Heritage Resources Protection Plan (HRPP) template that proponents/contractors/operators can use as a guide, as well as a fact sheet outlining the legal provisions involving found human remains.

If you have any questions or comments, please contact the Branch at (204) 945-2118 or hrb.archaeology@gov.mb.ca.

Historic Resources Branch
Archaeological Assessment Services

Enclosures: Heritage Resources Protection Planning
Provisions Regarding Found Human Remains

18 Appendix E –Drawing Plan

Plans and Engineering by:

SOUTH-MAN
DESIGN GROUP LTD

Unit 8 - 851 Lagimodiere Blvd. Winnipeg, MB. R2J 3K4
www.southmandesign.ca
204-371-7314

Sheet List	
No.	Sheet Name
CS	Cover Sheet
GN	General Notes
S-0	Site Plan
S-1	Proposed Floor Plan
S-2	Proposed Cross Sections
S-3	Inlet Piping Detail
S-4	Trench Detail
S-5	Ramp Details
S-6	Rebar Splice Detail
S-7	Gas Venting Plan
S-8	Gas Venting Details
S-9	Gate Valve Details
S-10	Cleanout Detail
S-11	Fence Details

Project Information:

NUMBER: 2209-103
LOCATION: NE-25-4-14W, RM of Argyle, MB
CLIENT: Trileaf Colony

PROJECT NAME:
Wastewater Treatment Lagoon

DRAWN BY:	RF
CHECKED BY:	DE
DATE:	10/12/22

CS

Cover Sheet

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GENERAL NOTES AND SPECIFICATIONS:

THIS WASTE WATER TREATMENT LAGOON AND ASSOCIATED PRODUCTS SHALL CONFORM TO ASTM AND AWWA STD. SPECIFICATIONS. ALL CONSTRUCTION SHALL CONFORM TO SPECIFICATIONS.

- STRIP ALL ORGANIC MATERIAL AND TOPSOIL FROM STORAGE SITE TO OUTSIDE TOE OF BERM. REMOVE MATERIAL TO STOCK PILE FOR USE IN LANDSCAPING IN THE FUTURE.

- PROVIDE A 0.30M DEEP X 2.44M WIDE KEYWAY BENEATH BERMS PRIOR TO STARTING CONSTRUCTION OF BERMS. REMOVE ALL TOPSOIL AND ORGANIC MATERIAL BENEATH NEW BERM CONSTRUCTION.

- INTERIOR SURFACE OF FACILITY TO CONSIST OF A 60MIL HDPE LINER (TEXTURED SHEET) WITH 0.30M THICK GRANULAR COVER MATERIAL OVERTOP OF THE SYNTHETIC LINER.

- CONSTRUCT BERMS IN MAXIMUM 150MM LIFTS. COMPACT EACH LIFT USING A FULLY BALLASTED SHEEPSFOOT PACKER (2400KPA OF COMPACTION PRESSURE) TO ACHIEVE 95% OF STANDARD PROCTOR DENSITY. PRIOR APPROVAL REQUIRED FOR OTHER TYPES OF PACKING EQUIPMENT.

- UNACCEPTABLE MATERIAL CONSISTING OF ORGANIC MATERIAL, FROZEN SOIL OR STONES GREATER THAN 75MM SHALL NOT BE USED IN CONSTRUCTION OF THE BERMS. CONSULT ENGINEER IF QUALITY OF MATERIAL IS QUESTIONABLE.

- THE MOISTURE CONTENT OF THE FILL MATERIAL SHALL BE SUCH THAT PROPER PACKING CAN BE ACHIEVED (0.9-1.2 OPTIMUM). MATERIAL SHOULD BE STIFF TO THE TOUCH BUT NOT CRUMBLE WHEN HANDLED. ALLOW DRYING OR PROVIDE WETTING BETWEEN CONSECUTIVE LIFTS AS REQUIRED.

- THE FINISHED INTERIOR SURFACE OF STORAGE SHALL BE LEVELLED AND PROOF ROLLED WITH A SMOOTH DRUM VIBRATORY ROLLER TO CONCEAL ALL STONES, GRAVEL AND POTENTIALLY SHARP OBJECTS.

- WHERE SHARP OBJECTS OR STONY MATERIAL IS STILL PRESENT ON INTERIOR SURFACE OF STRUCTURE, EITHER A 76MM LAYER OF CLEAN SAND OR 12OZ. NON-WOVEN GEOTEXTILE SHALL BE INSTALLED OVER THE INTERIOR SURFACE LAYER TO PROTECT THE HDPE LINER FROM PUNCTURE OR ABRASION.

- ACCESS RAMPS AND SPLASH PADS TO BE CONSTRUCTED USING 0.15M REINFORCED CONRETE, C/W 10M @ 0.40M O/C BOTH WAYS. ACCESS RAMPS TO HAVE 0.15M WIDE BY 0.30M HIGH RAISED CURB ALONG EDGES. INSTALL 12OZ. NON-WOVEN GEO-TEXTILE OVER LINER WHERE CONCRETE IS TO BE POURED FOR RAMPS AND PADS.

- MINIMUM SPLICE LENGTH FOR 10M BARS TO BE 0.45M.

- ALL CONCRETE TO BE 25MPa TYPE 10 W/5-8% AIR ENTRAINMENT.

- CONCRETE PLACED IN COLD WEATHER (BELOW 0°C AIR TEMP. AND WINDCHILL) SHALL BE PROTECTED WITH INSULATED TARPS. BELOW -3°C CONCRETE IS TO BE HEATED TO MAINTAIN 10° CELSIUS FOR A MINIMUM OF TWO DAYS AFTER PLACEMENT. REMOVE INSULATION AND HEATING GRADUALLY TO AVOID THERMAL SHOCK.

- INSTALL FENCE AROUND ENTIRE PERIMETER OF WASTE WATER LAGOON AS PER DETAIL ATTACHED.

- SIGNAGE SHALL BE PROVIDED INDICATING THAT POTENTIAL FOR DANGER EXISTS.

- SEED BERMS WITH GRASS TO PREVENT LONG TERM EROSION.

- SYNTHETIC LINER MATERIAL SPECIFICATION: 60MIL PREMIUM GRADE HDPE GEOMEMBRANE (TEXTURED SHEET) OR EQUIVALENT.

- SYNTHETIC LINER INSTALLATION TO BE IMPLEMENTED IN ACCORDANCE WITH THE MANUFACTURER'S INSTALLATION INSTRUCTIONS. INSTALLATION OF THE HDPE LINER SHALL BE CONTINUOUSLY SUPERVISED BY A QUALIFIED INSTALLATION SUPERVISOR. PROOF OF CERTIFICATION OR TRAINING REQUIRED UPON DEMAND.

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ISSUED FOR CONSTRUCTION

CLIENT NAME: Trileaf Colony	*PROJECT LOCATION:* NE-25-4-14W, RM of Argyle, MB	*PROJECT NAME:* Wastewater Treatment Lagoon
SOUTH-MAN DESIGN GROUP LTD Unit 8 - 851 Lagimodiere Blvd. Winnipeg, MB. R2J 3K4 www.southmandesign.ca Pete K: 204-371-7314 | Peter G: 204-223-8289	*PROJECT NUMBER:* 2209-103	GN
	DRAWN BY: RF	
	CHECKED BY: DE	General Notes
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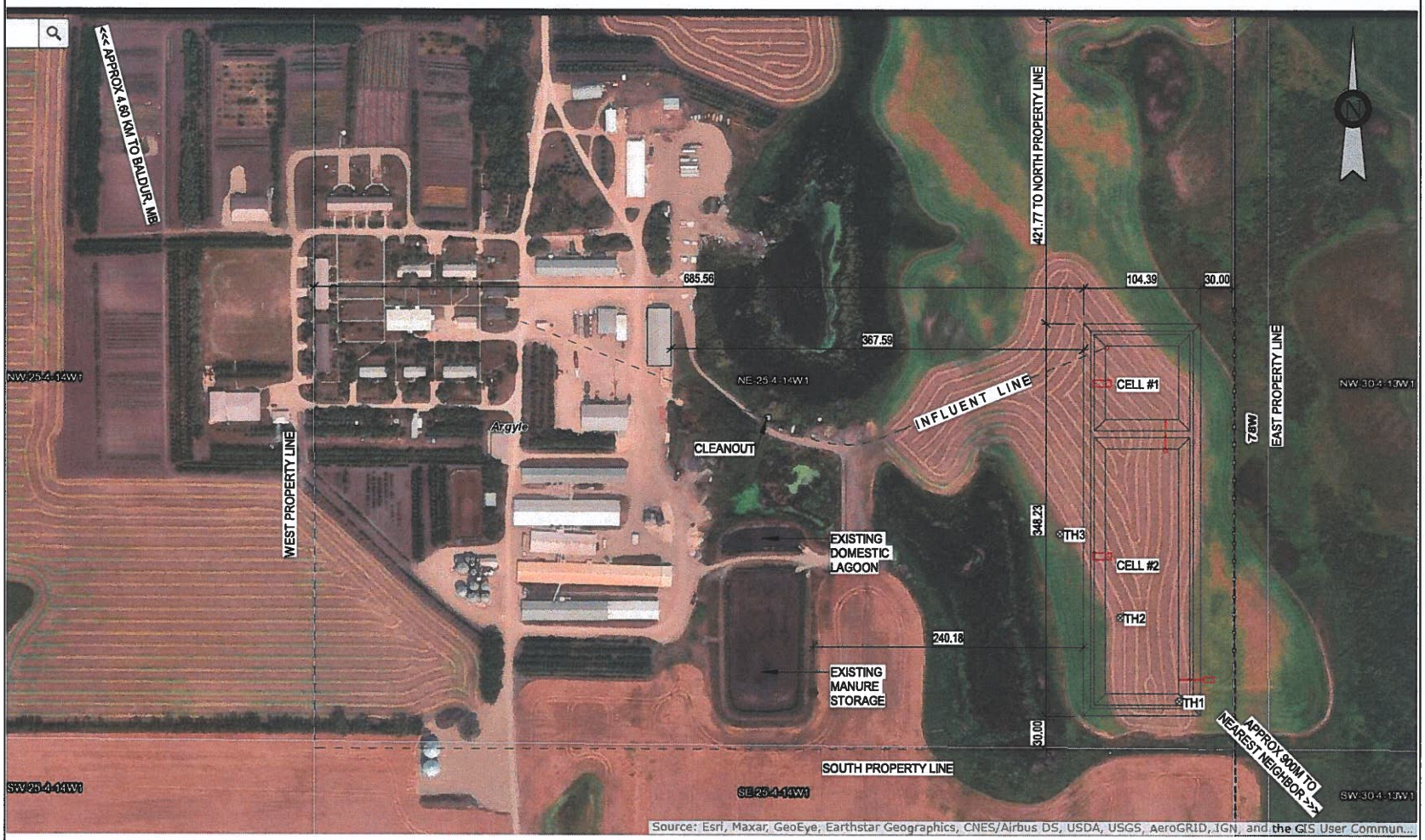

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CLIENT NAME:	**Trileaf Colony**
PROJECT LOCATION:	**NE-25-4-14W, RM of Argyle, MB**
PROJECT NAME:	**Wastewater Treatment Lagoon**
PROJECT NUMBER:	2209-103
DRAWN BY:	RF
CHECKED BY:	DE
DATE:	**10/05/22**
	S-0
	Site Plan

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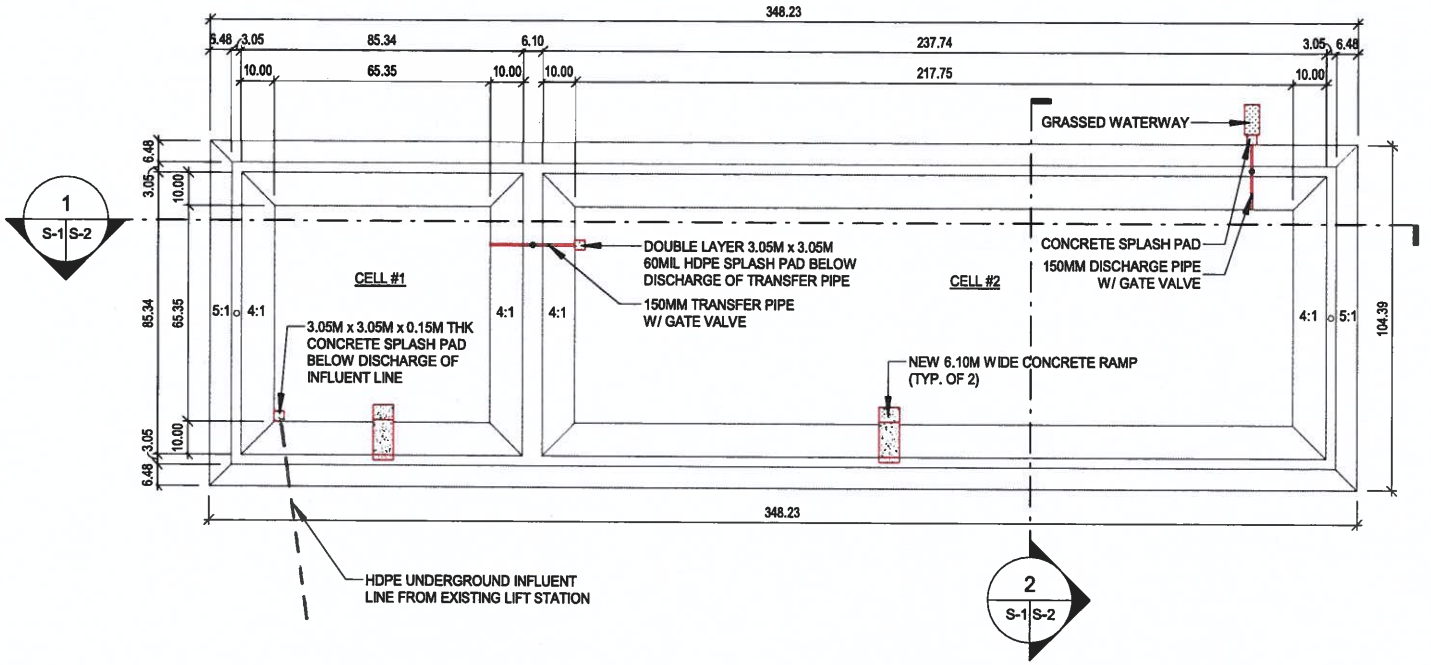

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CLIENT NAME:	**Trileaf Colony**
PROJECT LOCATION:	**NE-25-4-14W, RM of Argyle, MB**
PROJECT NAME:	**Wastewater Treatment Lagoon**
PROJECT NUMBER:	2209-103
DRAWN BY:	RF
CHECKED BY:	DE
DATE:	**10/05/22**
	S-1
	Proposed Floor Plan

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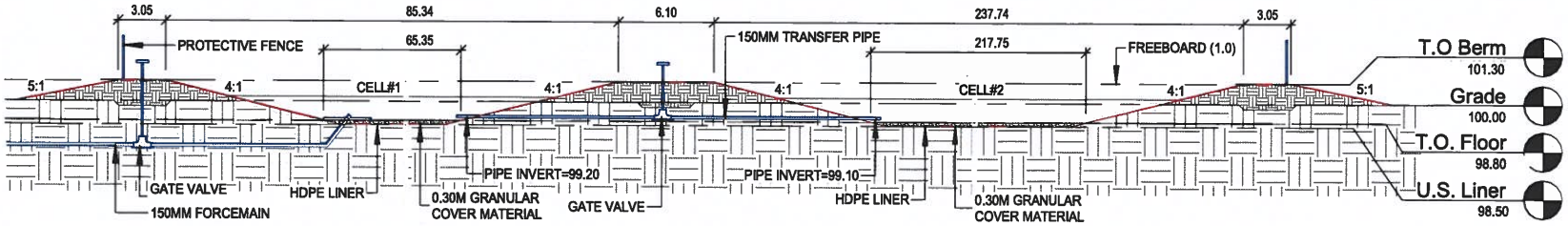
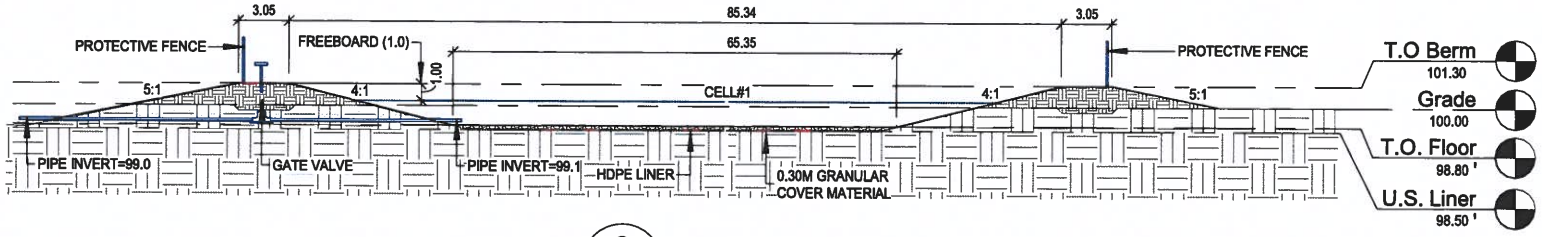


1 / S-1 | S-2 — Section 1
1/32" = 1'-0"



2 / S-1 | S-2 — Section 2
1/32" = 1'-0"

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CLIENT NAME: **Trileaf Colony**	*PROJECT LOCATION:* **NE-25-4-14W, RM of Argyle, MB**
SOUTH-MAN DESIGN GROUP LTD	*PROJECT NUMBER:* 2209-103
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	DATE: **10/05/22**

PROJECT NAME: **Wastewater Treatment Lagoon**

S-2

Proposed Cross Sections

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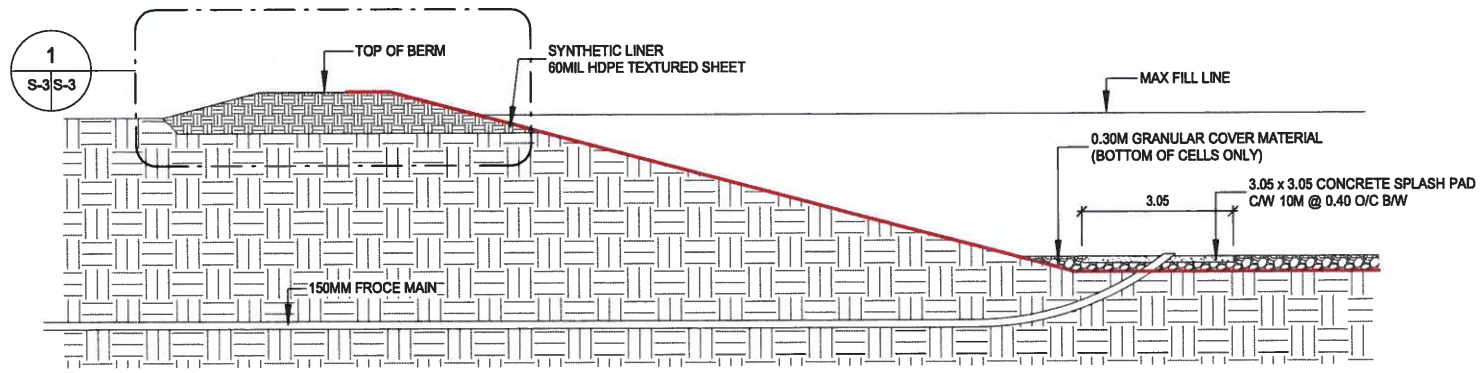
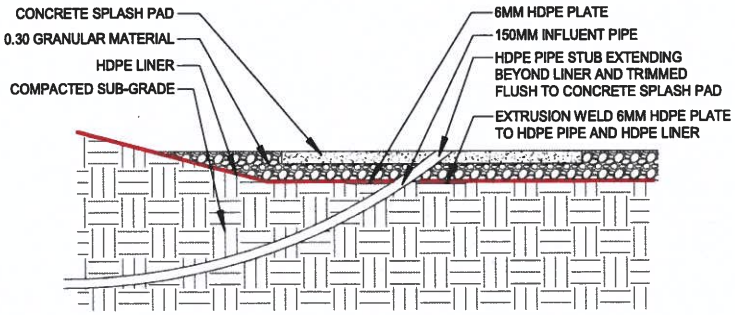
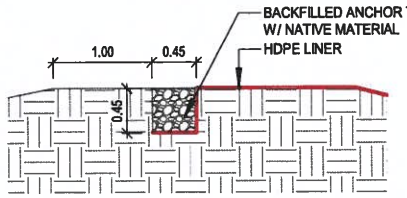


Inlet Piping Detail-Side View



Inlet Piping Detail

3/16" = 1'-0"



1 / S-3 S-3 Anchor Trench Detail

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CLIENT NAME: **Trileaf Colony**	*PROJECT LOCATION:* **NE-25-4-14W, RM of Argyle, MB**	*PROJECT NAME:* **Wastewater Treatment Lagoon**
SOUTH-MAN DESIGN GROUP LTD Unit 8 - 851 Lagimodiere Blvd. Winnipeg, MB. R2J 3K4 www.southmandesign.ca Pete K: 204-371-7314 | Peter G: 204-223-8289	*PROJECT NUMBER:* 2209-103	**S-3**
	DRAWN BY: RF	
	CHECKED BY: DE	**Inlet Piping Detail**
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PIPING GENERAL NOTES:

1. ALL PIPELINE CONSTRUCTION AND PRODUCTS INCORPORATED INTO PROJECT SHALL CONFORM TO ASTM AND AWWA STANDARD SPECIFICATIONS.

2. INSTALLATION TO CONFORM WITH PIPE MANUFACTURER'S INSTALLATION INSTRUCTIONS.

3. FROZEN MATERIAL SHOULD NOT BE USED TO SUPPORT OR BED THE PIPE.

4. AT LEAST 1.2M OF BEDDING MATERIAL SHOULD BE PLACED UNDER THE PIPE IF ROCKY CONDITIONS EXIST. PROJECTING BELLS OF THE PIPE SHOULD BE PROPERLY RELIEVED IN THE TRENCH BOTTOM SO THAT THE ENTIRE PIPE IS EVENLY SUPPORTED BY THE BEDDING.

5. DO NOT THROW THE PIPE & FITTINGS INTO THE TRENCH, OR ALLOW ANY PART OF THE PIPE TO TAKE AN UNRESTRAINED FALL ON TO THE TRENCH BOTTOM.

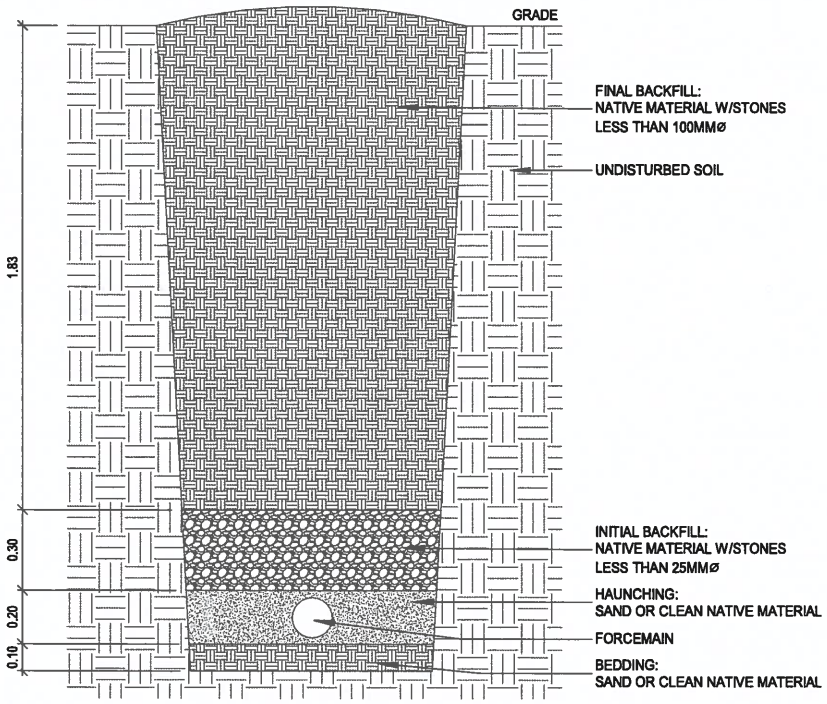
6. PIPE MACHINING & CHAMFERING:
   PIPE SHOULD BE CUT AS SQUARE AS POSSIBLE AND CHAMFERED SIMILAR TO THE PIPE SUPPLIED FROM THE FACTORY.

7. WHERE THE PIPE LINE EXPERIENCES CHANGES IN DIRECTION, THUST BLOCKS CONSISTING OF CONCRETE TO BE INSTALLED. MINIMUM THRUST BLOCK AREA IS 1.8 SQ.M.. CONCRETE USED FOR THRUST BLOCKS ARE TO HAVE A MIN. 28 DAY COMPRESSIVE STRENGTH OF 15MPA. CONCRETE SHALL BE SULPHATE RESISTANT (TYPE GU/TYPE 10 CEMENT), AND FOLLOW THE CURRENT CSA STANDARD A23.1. WATER USED FOR CONCRETE SHALL BE CLEAN AND EQUAL TO POTABLE (DRINKABLE) WATER IN PHYSICAL AND CHEMICAL PROPERTIES.

8. PRESSURE PIPE & FITTINGS TO MEET THE FOLLOWING STANDARDS
   CANADIAN STANDARDS ASSOCIATION
   B137.2 RIGID PVC PIPE FOR PRESSURE APPLICATIONS
   B137.3 LARGE DIAMETER FABRICATED FITTINGS
   AMERICAN WATER WORKS ASSOCIATION
   AWWA C900 PVC PRESSURE PIPE, 1.2M THROUGH - 3.7M FOR WATER
   AWWA C907 PVC PRESSURE FITTINGS FOR WATER - 1.2M THROUGH 3.7M
   ASTM D2241 PVC PRESSURE RATED PIPE (SDR SERIES) OR DR17 HDPE PIPE
   PIPING: DR17 HDPE UNLESS NOTED OTHERWISE

9. ALL UNDERGROUND PIPING IS TO BE PRESSURE TESTED TO ENSURE THE INTEGRITY OF THE PIPE AND CONNECTIONS. THE PRESSURE TEST SHALL BE CARRIED OUT AT 700KPA PRESSURE WITH PRESSURE DROP OVER 1HR PERIOD NOT TO EXCEED 1.5%.

10. CLEANOUTS TO BE PROVIDED ON PIPELINE AT MAXIMUM 300m (1000 ft) INTERVALS.



Trench Detail

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CLIENT NAME: Trileaf Colony	PROJECT LOCATION: NE-25-4-14W, RM of Argyle, MB	PROJECT NAME: Wastewater Treatment Lagoon
SOUTH-MAN DESIGN GROUP LTD Unit 8 - 851 Lagimodiere Blvd. Winnipeg, MB. R2J 3K4 www.southmandesign.ca Pete K: 204-371-7314 | Peter G: 204-223-8289	PROJECT NUMBER: 2209-103 DRAWN BY: RF CHECKED BY: DE	S-4
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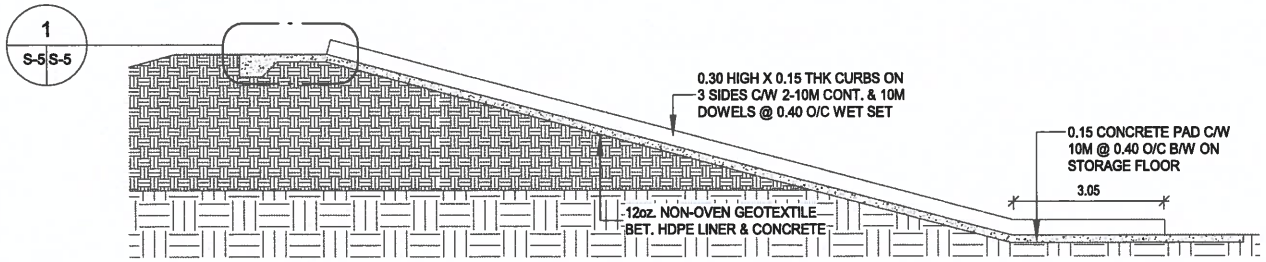
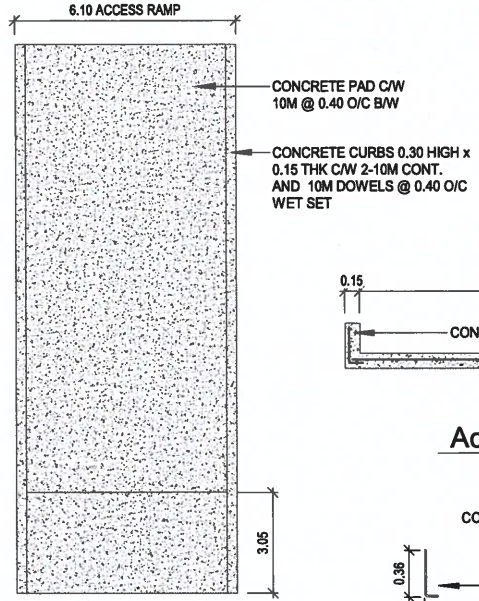
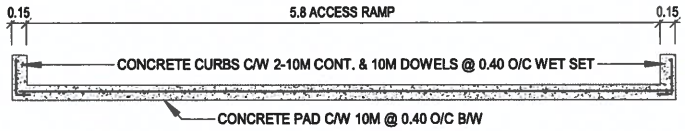


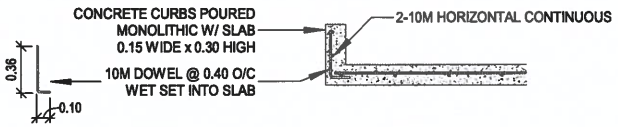
Access Ramp-Splash Pad - Side View



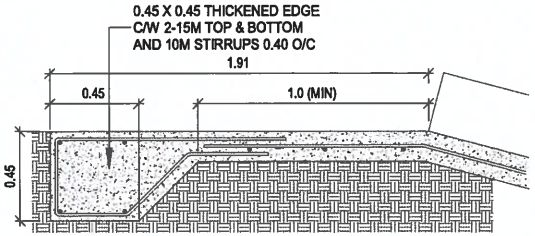
Access Ramp - Top View



Access Ramp - Cross Section Detail



Access Ramp Curb - Cross Section Detail



1 S-5 S-5 Access Ramp - Anchorage Detail

NOTE: EPOXY COATED DOWELS REQUIRED ONLY IF CURBS NOT POURED MONOLITHIC W/ SLAB.

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ISSUED FOR CONSTRUCTION

CLIENT NAME: **Trileaf Colony**	*PROJECT LOCATION:* **NE-25-4-14W, RM of Argyle, MB**	*PROJECT NAME:* **Wastewater Treatment Lagoon**
SOUTH-MAN DESIGN GROUP LTD Unit 8 - 851 Lagimodiere Blvd. Winnipeg, MB. R2J 3K4 www.southmandesign.ca Pete K: 204-371-7314 | Peter G: 204-223-8289	*PROJECT NUMBER:* 2209-103	**S-5**
	DRAWN BY: RF	
	CHECKED BY: DE	**Ramp Details**
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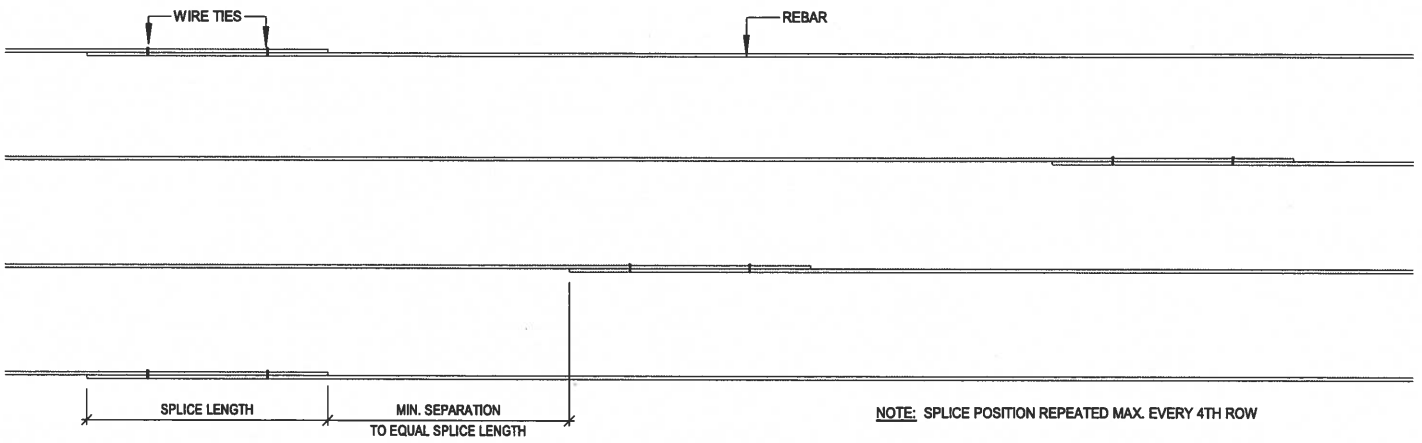

Rebar Splice Detail

NOTE:
-SPLICE POSITION REPEATED MAX. EVERY 4th ROW;
-ALTERNATELY IF SPLICES ALIGNED INCREASE SPLICE LENGTH BY 50% (10M-0.70, 15M-0.90);

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CLIENT NAME: **Trileaf Colony**

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PROJECT LOCATION: **NE-25-4-14W, RM of Argyle, MB**

PROJECT NUMBER: 2209-103

DRAWN BY: RF

CHECKED BY: DE

DATE: **10/05/22**

PROJECT NAME: **Wastewater Treatment Lagoon**

S-6

Rebar Splice Detail

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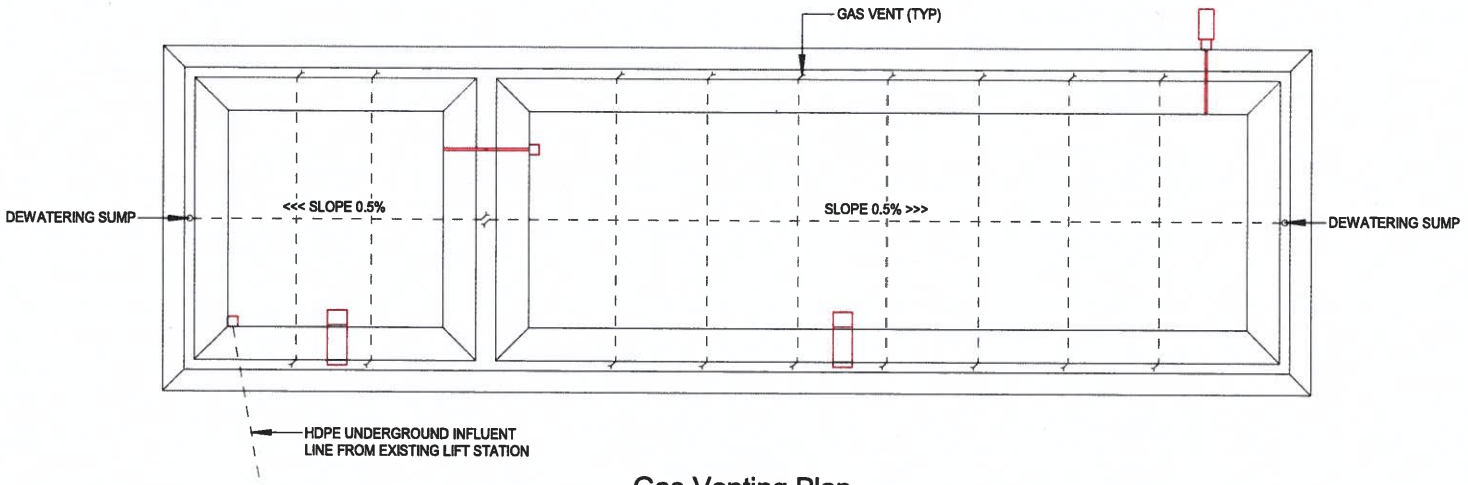

Gas Venting Plan

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Pete K: 204-371-7314 | Peter G: 204-223-8289

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CLIENT NAME:	**Trileaf Colony**
PROJECT LOCATION:	**NE-25-4-14W, RM of Argyle, MB**
PROJECT NUMBER:	2209-103
DRAWN BY:	RF
CHECKED BY:	DE
DATE:	**10/05/22**
PROJECT NAME:	**Wastewater Treatment Lagoon**
	S-7
	Gas Venting Plan

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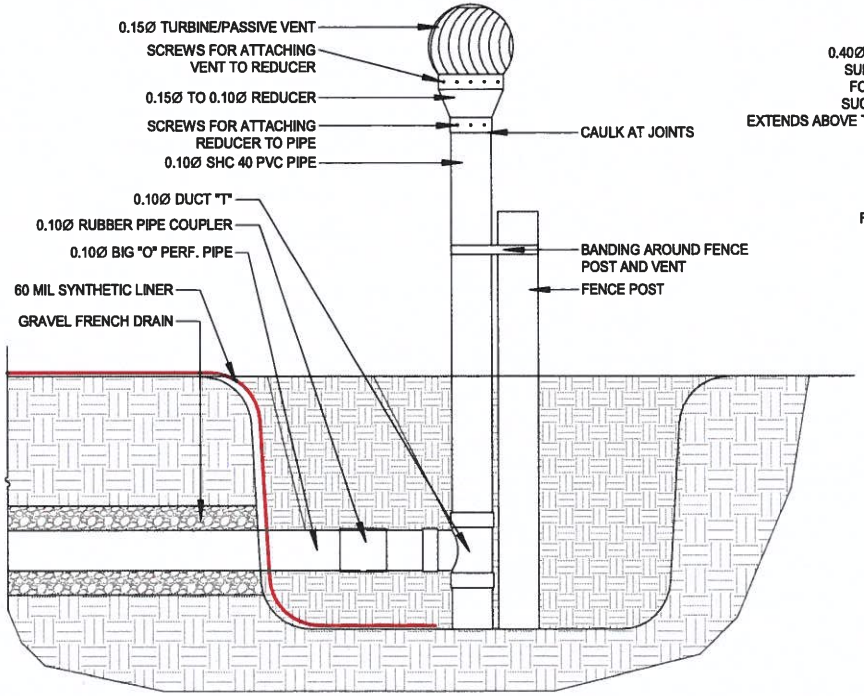
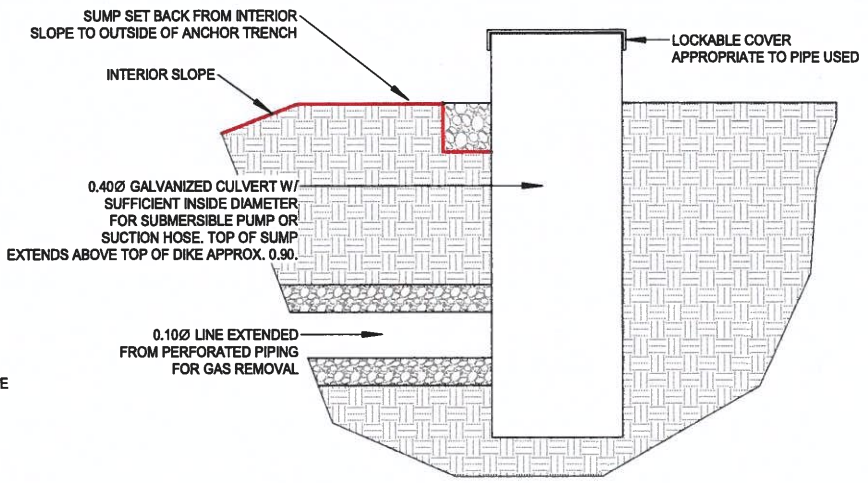
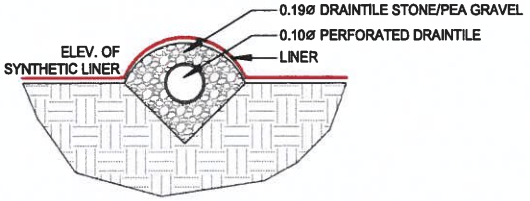


Gas Venting Detail



Dewatering Sump Detail



Gas Removal V-Trench Detail

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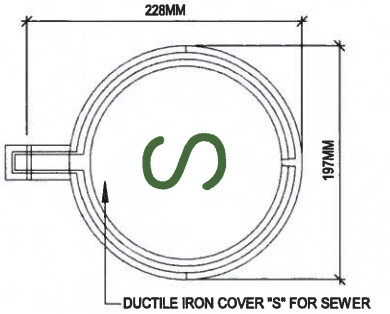

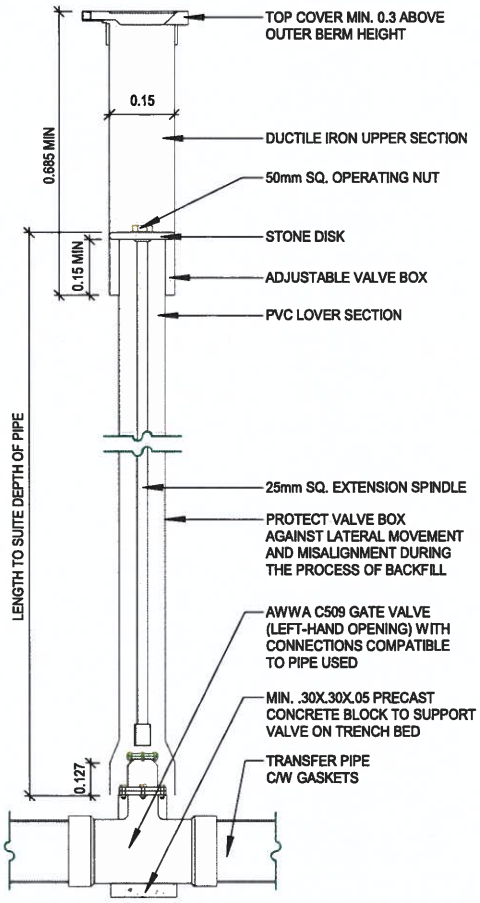

Gate Valve Details

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CLIENT NAME: **Trileaf Colony**	*PROJECT LOCATION:* **NE-25-4-14W, RM of Argyle, MB**	*PROJECT NAME:* **Wastewater Treatment Lagoon**
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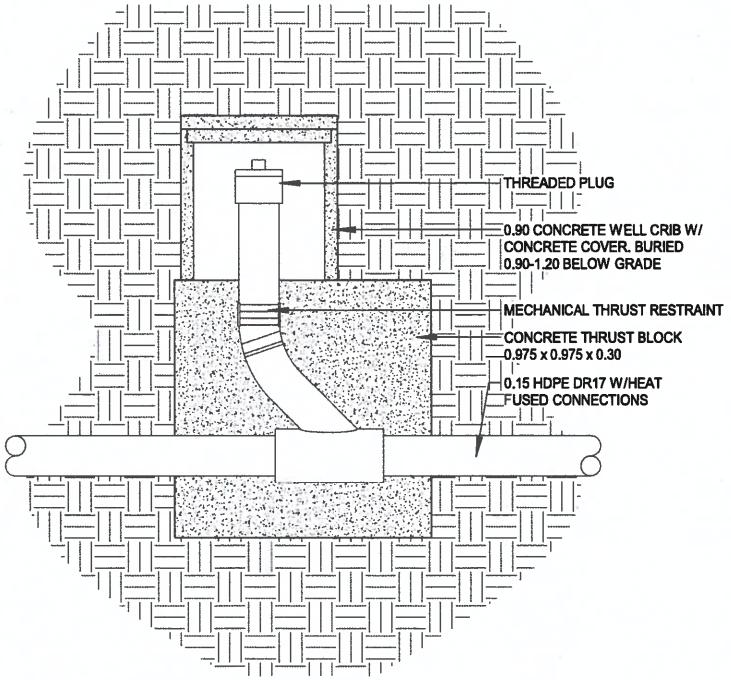

Cleanout Detail

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CLIENT NAME: **Trileaf Colony**	*PROJECT LOCATION:* **NE-25-4-14W, RM of Argyle, MB**	*PROJECT NAME:* **Wastewater Treatment Lagoon**
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Unit 8 - 851 Lagimodiere Blvd. Winnipeg, MB. R2J 3K4 www.southmandesign.ca Pete K: 204-371-7314 | Peter G: 204-223-8289	*DRAWN BY:* RF	
	CHECKED BY: DE	**Cleanout Detail**
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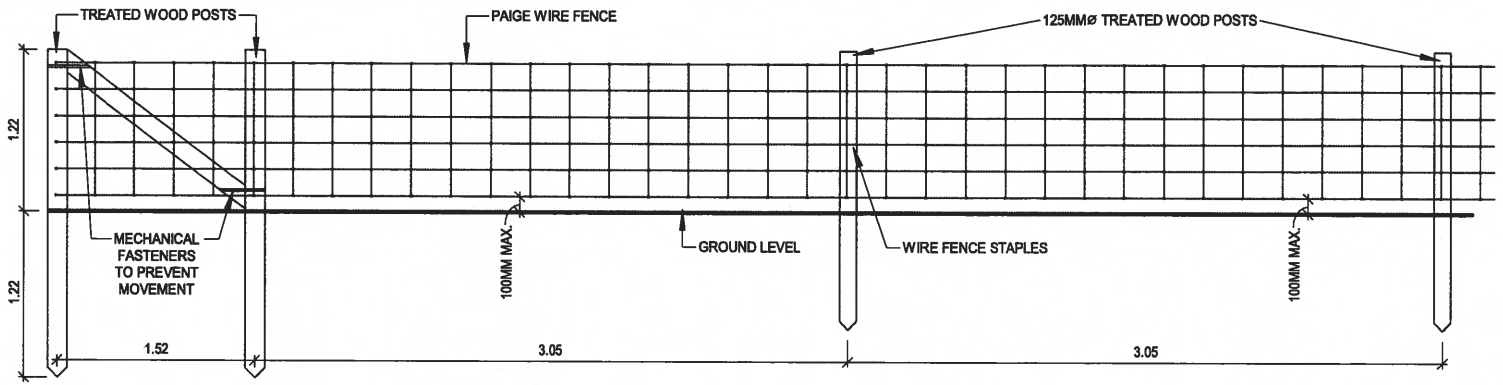

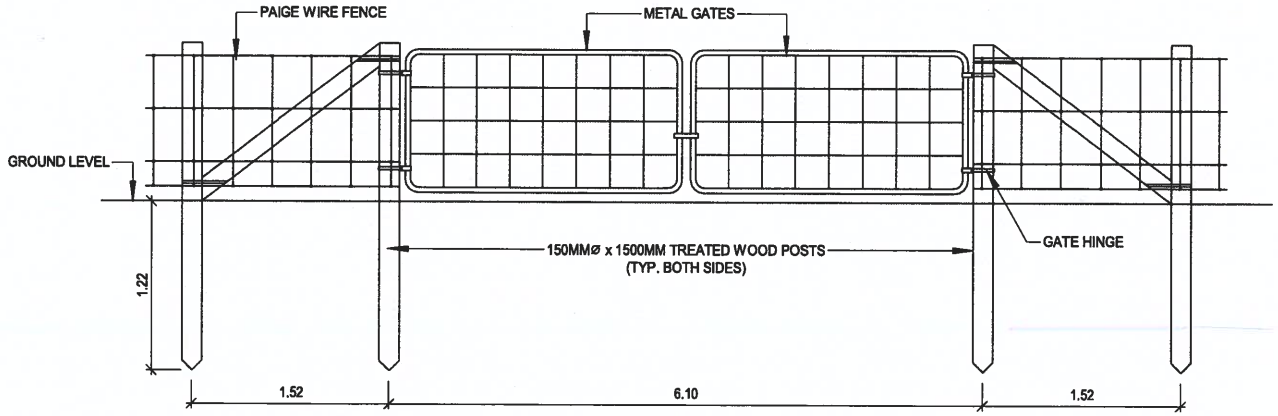

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CLIENT NAME: **Trileaf Colony**

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PROJECT LOCATION: **NE-25-4-14W, RM of Argyle, MB**

PROJECT NUMBER: 2209-103

DRAWN BY: RF

CHECKED BY: DE

DATE: **10/05/22**

PROJECT NAME: **Wastewater Treatment Lagoon**

S-11

Fence Details

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