Part 2 — Technical Requirements

NRCB Natural Resources Conservation Board

Application under the *Agricultural Operation Practices Act* for a confined feeding operation, manure collection area, and/or manure storage facility(ies)

NRCB USE ONLY	Application number	Legal land description
☑ Approval ☐ Registration ☐ Authorization ☐ Amendment	RA24004	NW 23-42-27 W4M (Lot 1)

APPLICATION DISCLOSURE

This information is collected under the authority of the *Agricultural Operation Practices Act* (AOPA), and is subject to the provisions of the *Freedom of Information and Protection of Privacy Act*. This information is public unless the NRCB grants a written request that certain sections remain private.

Any construction prior to obtaining an NRCB permit is an offence and is subject to enforcement action, including prosecution.

I, the applicant, or applicant's agent, have read and understand the statements above, and I acknowledge that the information provided in this application is true to the best of my knowledge.

Oct 21 2024
Date of signing

[redacted]
Signature

Dominicus Dairy Ltd.
Corporate name (if applicable)

Willem Dominicus
Print name

GENERAL INFORMATION REQUIREMENTS

Proposed facilities: list all proposed confined feeding operation facilities and their dimensions. Indicate whether any of the proposed facilities are additions to existing facilities. (attach additional pages if needed)

Proposed facilities	Dimensions (m) (length, width, and depth)
Addition to current dairy barn	25m x 37m
Finshed Total barn	85 x 37m
Lagoon Expansion 89m - 95m - 47m - 104m - 4.5m deep	
80 m x 68 m x 4.5 m deep (total dimensions)	

Existing facilities: list **ALL** existing confined feeding operation facilities and their dimensions

Existing facilities	Dimensions (m) (length, width, and depth)	NRCB USE ONLY
Current Dairy Barn East West (irregular shape - max extents)	118m x 50m	
Lagoon	77m x 42m	

NRCB USE ONLY

Last updated September 11, 2023

Part 2 — Technical Requirements

NRCB Natural Resources Conservation Board

Application under the *Agricultural Operation Practices Act* for a confined feeding operation, manure collection area, and/or manure storage facility(ies)

Existing facilities continued	Dimensions (m) (length, width, and depth)	NRCB USE ONLY
Corral with sheds	88 x 34	
"	30 x 9	
"	19 x 9	
Catch Basin	25 x 20	
Calf pen with associated barn	40 x 15	

Part 2 — Technical Requirements

NRCB Natural Resources Conservation Board

Application under the *Agricultural Operation Practices Act* for a confined feeding operation, manure collection area, and/or manure storage facility(ies)

If a new facility is replacing an old facility, please explain what will happen to the old facility and when. ☑ N/A

Construction completion date for proposed facilities Dec 2025

Additional information

Livestock numbers: Complete only if livestock numbers are different from what was identified in the Part 1 application. Note: if livestock numbers increase in your Part 2 application, a new Part 1 application must be submitted which may result in a loss of priority for minimum distance separation (MDS).

Livestock category and type (Available in the Schedule 2 of the Part 2 Matters Regulation)	**Permitted number**	**Proposed increase or decrease in number (if applicable)**	**Total**
Milking Cows + Dry cow + Young Stock	225	135	360

Last updated September 11, 2023

Part 2 — Technical Requirements

NRCB Natural Resources Conservation Board

Application under the *Agricultural Operation Practices Act* for a confined feeding operation, manure collection area, and/or manure storage facility(ies)

DECLARATION AND ACKNOWLEDGMENT OF APPLICANT CONCERNING *WATER ACT* LICENCE
issued by Alberta Environment and Protected Areas (EPA) for a confined feeding operation (CFO)
Date and sign one of the following four options

OPTION 1: Applying through the NRCB for both the AOPA permit and the *Water Act* licence

I **DO** want my water licence application coupled to my AOPA permit application.

Signed this ____day of _____, 20____. _____

Signature of Applicant or Agent

OPTION 2: Processing the AOPA permit and *Water Act* licence separately

1. I (we) acknowledge that the CFO will need a new water licence from EPA under the *Water Act* for the development or activity proposed in this AOPA application.
2. I (we) request that the NRCB process the AOPA application **independently of** EPA's processing of the CFO's application for a water licence.
3. In making this request, I (we) recognize that, if this AOPA application is granted by the NRCB, the NRCB's decision will not be considered by EPA as improving or enhancing the CFO's eligibility for a water licence under the *Water Act*.
4. I (we) acknowledge that any construction or actions to populate the CFO with livestock pursuant to an AOPA permit in the absence of a *Water Act* licence will **not** be relevant to EPA's consideration of whether to grant the *Water Act* licence application.
5. I (we) acknowledge that any such construction or livestock populating will be at the CFO's sole risk if the *Water Act* licence application is denied or if the operation of the CFO is otherwise deemed to be in violation of the *Water Act*. This risk includes being required to depopulate the CFO and/or to cease further construction, or to remove "works" or "undertakings" (as defined in the *Water Act*).
6. **AS RELEVANT:** I (we) acknowledge that the CFO is located in the South Saskatchewan River Basin and that, pursuant to the *Bow, Oldman and South Saskatchewan River Basin Water Allocation Order* [Alta. Reg. 171/2007], this basin is currently closed to new surface water allocations.
7. **Provide:** Water licence application number(s) 00316586-00-00

Signed this 21 day of October, 2024. [redacted]

Signature of Applicant or Agent

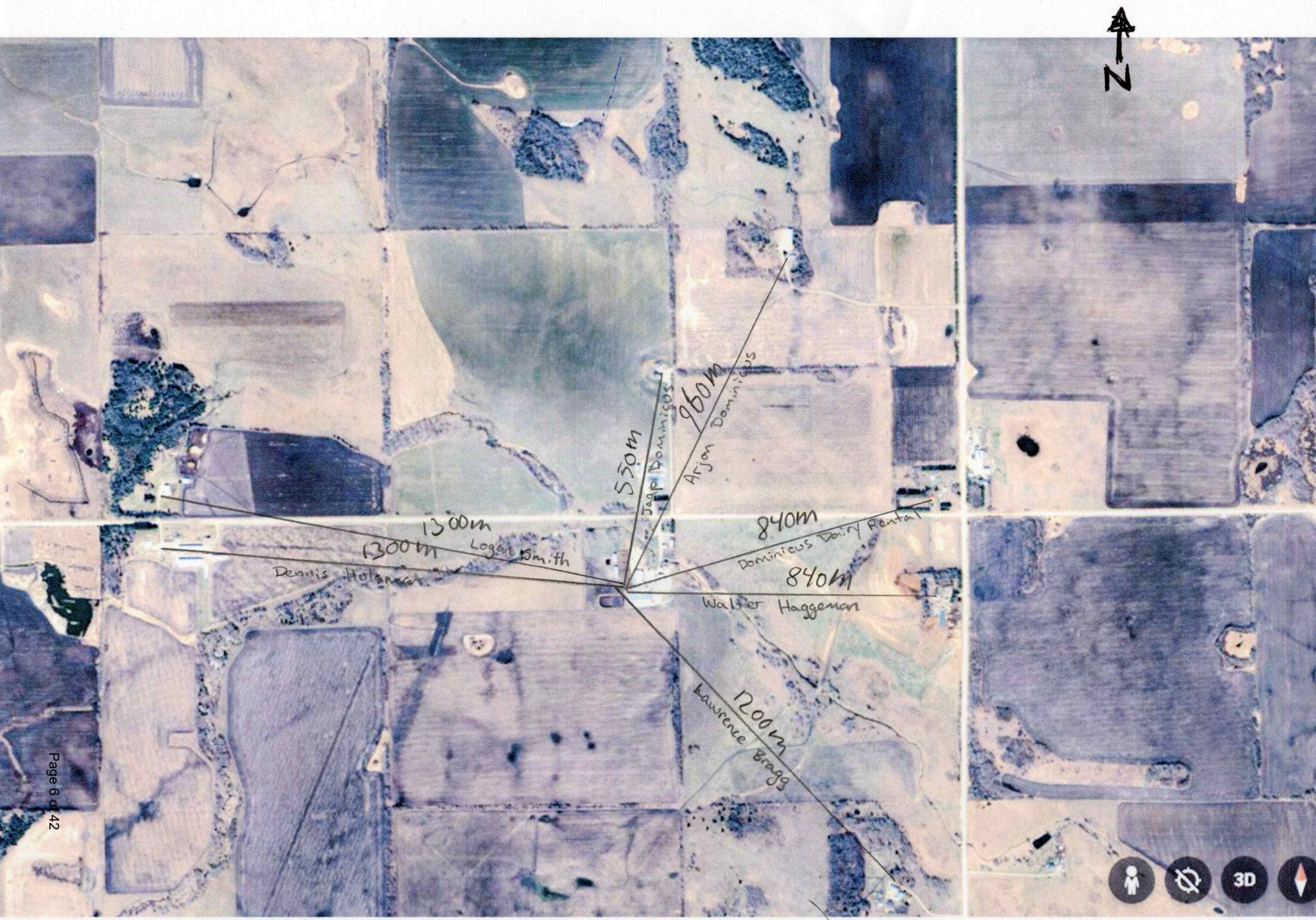
OPTION 3: Additional water licence not required

1. I (we) declare that the CFO will not need a new licence from EPA under the *Water Act* for the development or activity proposed in this AOPA application.
2. **Provide**: Water license number(s) or water conveyance agreement details _____

Signed this ____ day of _____, 20____. _____

Signature of Applicant or Agent


North
424
Dominicus Dairy
water well 0275663
water well 0273666
water well 2088980
95 m
Image © 2017 DigitalGlobe
Google Earth
Tour Guide
2008


N
550m
Jaap Dominicus
960m
Arjon Dominicus
1300m
Logan Smith
1300m
Dennis Holsman
840m
Dominicus Dairy Rental
840m
Walter Haggeman
1200m
Lawrence Bragg
3D

ENVIROWEST ENGINEERING

Title:

Borehole Locations
Site and Soil Assessment
NW¼-Sec.23-Twp.042-Rge.27-W4M
Ponoka County, Alberta

Project No: 2401-43050	**Date:** Septmeber 11, 2024	**Figure No.:** 1.0
Scale:	**Prepared By:** L. Predy	
Image Source: Google Earth Pro (February 22, 2024)		

Part 2 — Technical Requirements

NRCB Natural Resources Conservation Board

Application under the *Agricultural Operation Practices Act* for a confined feeding operation, manure collection area, and/or manure storage facility(ies)

GENERAL ENVIRONMENTAL INFORMATION

(complete this section for the worst case of the existing facility which is the closest to water bodies or water wells and for each of the proposed facilities)

Facility description / name *(as indicated on site plan)*

Existing: Dairy Barn **Proposed 1:** Lagoon Expansion

Proposed 2: Barn expansion **Proposed 3:**

Facility and environmental risk information		Facilities				NRCB USE ONLY	
		Existing	Proposed 1	Proposed 2	Proposed 3	Meets requirements	Comments
Flood plain information	What is the elevation of the floor of the lowest manure storage or collection facility above the 1:25 year flood plain or the highest known flood level?	☑ >1 m ☐ ≤ 1 m	☑ >1 m ☐ ≤ 1 m	☐ >1 m ☐ ≤ 1 m	☐ > 1 m ☐ ≤ 1 m	☐ YES ☐ NO ☐ YES with exemption	
Surface water information	How many springs are within 100 m of the manure storage facility or manure collection area?	0	0	0		☐ YES ☐ NO ☐ YES with exemption	
	How many water wells are within 100 m of the manure storage facility or manure collection area?	2	1	2		☐ YES ☐ NO ☐ YES with exemption	
	What is the shortest distance from the manure collection or storage facility to a surface water body? (e.g., lake, creek, slough, seasonal)	100	150	100		☐ YES ☐ NO ☐ YES with exemption	
Groundwater information	What is the depth to the water table?		4.2	4.2		☐ YES ☐ NO ☐ YES with exemption	
	What is the depth to the groundwater resource/aquifer you draw water from?		15	15		☐ YES ☐ NO ☐ YES with exemption	

Additional information (attach supporting information, e.g. borehole logs, records, etc. you consider relevant to your application)

Part 2 — Technical Requirements

NRCB Natural Resources Conservation Board

Application under the *Agricultural Operation Practices Act* for a confined feeding operation, manure collection area, and/or manure storage facility(ies)

DISTANCE OF ANY MANURE STORAGE FACILITY (EXISTING OR PROPOSED) TO NEIGHBOURING RESIDENCES

			NRCB USE ONLY				
Neighbour name(s)	**Legal land description**	**Distance (m)**	**Zoning (LUB) category**	**MDS category (1-4)**	**Distance (m)**	**Waiver attached (if required)**	**Meets regulations**
Jaap + Wilma Dominicus	SW 26-42-27-W4	550m					
Walter Haggeman	NE 23-42-27-W4	840m					
Dominicus Dairy Ltd.	SE 26-42-27-W4	840m					
Arjan + Carien Dominicus	SE 26-42-27-W4	960m					
Laurence Bragg	SE-23-42-27-W4	1200m					

LAND BASE FOR MANURE AND COMPOST APPLICATION (complete only if an increase in livestock or manure production will occur)

				NRCB USE ONLY	
Name of land owner(s)*	**Legal land description**	**Usable area** (ha)**	**Soil zone ***	**Usable area (ha)**	**Agreement attached (if required)**
Dominicus Dairy	NW-22-42-27-W4	52	Black		
Dominicus Dairy	NE 24-42-27-W4	60	Black		
Dominicus Dairy	SE 26-42-27-W4	55	Black		
Dominicus Dairy	NE 28-42-27-W4	62	Black		
Jaap + Wilma Dominicus	SW 26-42-27-W4	56	Black		
Walt Millar	NE 31-42-27-W4	36	Black Total		
Walt Millar	SE 31-42-27-W4	36	Black		

* If you are **not** the registered landowner, you must attach copies of land use agreements signed by all landowners.

** Available manure spreading area (excluding setback areas from residences, common bodies of water, water wells, etc. as identified in Agdex 096-5 Manure Spreading Regulations)

*** Brown, dark brown, black, grey wooded, or irrigated

Additional information (attach any additional information as required)

Land Use Agreement – July 2024

This Agreement is between Landowner(s), Walt Millar and Dominicus Dairy Ltd. (Jacobus, Willemijntje, Willem, and Anna Marie Dominicus).

Dominicus Dairy Ltd. is allowed (for a 3 year period) to spread manure on (72 Hectares) of cultivated land, owned by Walt Millar.

Land Location: NE 31-42-27-W4
SE 31-42-27-W4

This agreement is for manure spreading purpose only (no rights or claims can be made from this document).

Date signed:

Owner(s): Walt Millar [redacted]

Users: Dominicus Dairy Ltd.

[redacted]

Land Use Agreement – October 2024

This Agreement is between Landowner(s): 'Jaap and Wilma Dominicus' and 'Dominicus Dairy Ltd. (Jacobus, Willemijntje, Willem, and Anna Marie Dominicus)'.

Dominicus Dairy Ltd. is allowed (for a 3 year period) to spread manure on (52 Hectares) of cultivated land, owned by Jaap and Wilma Dominicus.

Land Location: SW-26-42-27-W4

This agreement is for manure spreading purpose only (no rights or claims can be made from this document).

Date signed:
Oct 21 2024

Owner(s): Jaap and Wilma Dominicus [redacted]

Users: Dominicus Dairy Ltd. [redacted]

Part 2 — Technical Requirements

NRCB Natural Resources Conservation Board

Application under the *Agricultural Operation Practices Act* for a confined feeding operation, manure collection area and/or manure storage facility(ies)

LIQUID MANURE STORAGE: Earthen manure storage (EMS): Compacted soil liner

*(complete a copy of this section for **EACH** proposed earthen liquid manure storage facility with a compacted soil liner)*

Facility description / name *(as indicated on site plan)*

1. Lagoon
2. _____

Manure storage capacity *(complete a separate row of this table for each cell of the EMS)*

	Length (m)	Width (m)	Total depth (m)	Depth below ground level (m)	Slope run:rise			NRCB USE ONLY	
					Inside end walls	Inside side walls	Outside walls	Calculated storage capacity (excl. 0.5 m freeboard) (m^3)	Filled in lower ¼? Y/N
1.	95	50	4.5	4.0	3:1	3:1	4:1		
2.									
							TOTAL CAPACITY		

Surface water control systems

Describe the run-on and runoff control system

Above grade dykes of 0.5m to prevent run off
Crest of dyke should slope slightly outward

Sealing

Describe sealing practices for piping, etc. that penetrates the liner

Bentonite sealer

NRCB USE ONLY
Requirements met: ☐ YES ☐ NO

Liner protection

Describe how the inside walls, bottom and outside walls are protected from erosion

They will be seeded with grass

Describe how the physical integrity of the liner will be maintained from other damage

fence around outside of lagoon

NRCB USE ONLY
Requirements met: ☐ YES ☐ NO

LIQUID MANURE STORAGE: Earthen manure storage (EMS): Compacted soil liner (cont.)

Compacted soil liner details

Thickness of compacted liner: 1 (m)		Provide compacted liner details (as required): Compacted Clay liner	
Soil texture	7.8 % sand	44.2 % silt	48 % clay
Atterberg limits	Plastic limit: 21.21	Liquid limit: 46.89	Plasticity index: 25.68
Hydraulic conductivity	Hydraulic conductivity (cm/s): 5.2×10^{-9} cm/s		
	Describe test standard used:		

Additional information *(attach copies of soil test reports)*

NRCB USE ONLY

Requirements met: ☐ YES ☐ NO

Condition required: ☐ YES ☐ NO

Report attached: ☐ YES ☐ NO

NRCB USE ONLY

Liquid manure storage volume calculator attached: ☐ YES ☐ NO

Depth to water table: _____ Requirements met: ☐ YES ☐ NO

Depth to uppermost groundwater resource: _____ Requirements met: ☐ YES ☐ NO

ERST completed: ☐ see ERST page for details

Surface water control systems

Requirements met: ☐ YES ☐ NO Details/comments:

Compacted soil liner details

Liner specification comments (e.g. compaction, moisture content, thickness):

Leakage detection system required: ☐ YES ☐ NO If yes, please explain why.

LIQUID MANURE COLLECTION AND/OR STORAGE: In-barn - Concrete liner

*(complete a copy of this section for **EACH** proposed in-barn liquid manure storage facility with a concrete liner)*

Facility description / name *(as indicated on site plan)*

1. Barn Expansion
2. _____
3. _____

Manure storage capacity *(use one row in the table for **EACH** in-barn storage. Attach additional pages if you require more rows)*

	Length (m)	Width (m)	Total depth (m)	Depth below ground level (m)	**NRCB USE ONLY** Calculated storage capacity (m^3)
1.	25	37			
2.					
3.					
				TOTAL CAPACITY	

Concrete liner details

Scrape alleys or unslatted portions of barn floors (if applicable)	Concrete thickness: 5"		Method of sulphate protection: Flyash
	Concrete strength: 30 MPA		Concrete reinforcement size and spacing: 10 mm
In-barn manure pit floors	Concrete thickness		Method of sulphate protection
	Concrete strength		Concrete reinforcement size and spacing
In-barn manure pit walls	Concrete thickness		Method of sulphate protection
	Concrete strength	Horizontal reinforcement size and spacing	Vertical reinforcement size and spacing

LIQUID MANURE COLLECTION AND/OR STORAGE: In-barn - Concrete liner (cont.)

Describe how the joints at the junction of the pit walls, pit floors and any other joints will be sealed

Bentomite

Describe sealing practices for piping, etc. that penetrates the liner

Bentomite

Concrete requirements can be found in Technical Guideline Agdex 096-93
Guideline minimums:
Solid manure: 25MPa (D)
Solid manure (wet): 30MPa (C)
Liquid manure: 32MPa (B)
Category A is required to be engineered
Method of sulphate protection:
Type 50 or Type 10 with fly ash or equivalent

NRCB USE ONLY

Requirements met: ☐ YES ☐ NO

Condition required: ☐ YES ☐ NO

Additional information

NRCB USE ONLY

Liquid manure storage volume calculator attached: ☐ YES ☐ NO

Depth to water table: _____ Requirements met: ☐ YES ☐ NO

Depth to uppermost groundwater resource: _____ Requirements met: ☐ YES ☐ NO

ERST completed: ☐ see ERST page for details

Concrete liner requirements

Leakage detection system required: ☐ YES ☐ NO If yes, please explain why

ENVIROWEST
ENGINEERING

SITE AND SOIL ASSESSMENT

Current Dairy Operation – Manure Storage Lagoon Expansion
NW¼-23-042-27 W4M

Ponoka County, Alberta

Site and Soil Assessment
Current Dairy Operation – Manure Storage Lagoon Expansion
NW¼-23-42-27 W4M
Ponoka County, Alberta

Prepared For: Willem Dominicus

Delivered via Email: dominicusdairy@gmail.com

Prepared By: Envirowest Engineering
Box 4248, Ponoka, AB, T4J 1R6
(403) 783-8229

Report Date: September 20, 2024

Project Number: 2401-43050

Private and Confidential

Table of Contents

List of Tables

Appendices

1.0 Introduction and Scope of Work

Envirowest Engineering (Envirowest) was retained by Willem Dominicus to conduct a Site and Soil Assessment for the proposed construction of an earthen manure storage (EMS) lagoon expansion for a proposed 325 head dairy operation including dries and replacements.

The assessment was completed to assess soil properties of borrow material for construction of proposed facilities. The operation, herein referred to as "the Site," is located on NW-23-042-27 W4M in the County of Ponoka.

The assessment has been completed in accordance with the standards and regulations associated with the amended Agricultural Operation Practices Act and associated regulations which govern all new and modified confined feeding operations.

Scope of Work

Three investigative boreholes were drilled using a skid steer-mounted rotary auger and completed to a maximum depth of 1.5 m below ground surface (mbgs) on June 11, 2023. The boreholes were completed in the area proposed to collect borrow material. The borehole locations are shown on Figure 1 (attached).

A composite sample of soil was collected from below top soil to the depth of investigation and was submitted to an accredited third-party laboratory for analysis of soil properties as applicable for use in construction of a compacted earthen liner.

2.0 Assessment Results

The Site is sloping to the north and towards a creek which runs through the property. A Site assessment was completed at the Site by Envirowest Engineering Inc. under the original approval. The Site is a current dairy operation.

Three investigative boreholes were drilled on adjacent land using a skid steer-mounted rotary auger and completed to a maximum depth of 1.5mbgs on June 11, 2024 for assessment of borrow material.

Potential liner construction material (noted in borehole logs as silty clay of medium plasticity) was typically found beneath topsoil at depths between 0.3 to 1.5 mbgs.

The results of the soil analysis completed by a third-party laboratory are presented in Table 1 below. The soil sample locations are presented on Figure 1, and borehole logs are attached.

Table 1: Soil Properties Results

Parameter	Composite
Sample Depth (m)	0.3-1.5
Particle Size (%clay)	48.0
Particle Size (%sand+gravel)	7.8
Particle Size (%silt)	44.2
Texture Class	Silty Clay
Liquid Limit (%)	46.89
Plastic Limit (%)	21.21
Plasticity Index (%)	25.68
Moisture Content (%)	22.9
Laboratory Hydraulic Conductivity (cm/sec)	5.2×10^{-9}

The composite soils were identified as a silty clay with a clay content of 48%. The hydraulic conductivity was determined to be 5.2×10^{-9} cm/sec at 99% compaction. The maximum dry density was found to be 1,561 kg/m^3 with an optimum moisture content of 21.6%.

Conservatively a safety factor of 10 is to be applied to the hydraulic conductivity based on the NRCB Approvals Policy (2016-7), Section 8.7.2, stating "lab measurements of a sample of material taken from the field are not considered an accurate representation of the actual field hydraulic conductivity values. This is because of the potential variability of soils, differences in compaction methods and variances in compaction." The field hydraulic conductivity of the composite material tested is 5.2×10^{-9} cm/sec.

3.0 Conclusions

The following conclusions are based on the discussed scope of the construction.

The composite soils were determined to be appropriate for the construction of a compacted clay liner for use in a liquid manure storage facility.

4.0 Design and Construction Considerations

4.1 Earthen Lined Lagoon

Based on the information obtained it was determined that the native clay, from the borrow area, was found at depths between 0.3 to 1.5 mbgs.

Minimum Required Liner Depth for EMS:

$$\frac{1 \text{ m}}{1 \times 10^{-7} \text{ cm/sec}} = \frac{\mathbf{X} \text{ m}}{5.2 \times 10^{-8} \text{ cm/sec}}$$

$$\mathbf{X} = 0.52 \text{ m}$$

A compacted liner thickness of 1.0 meters is recommended.

Earthen Manure Storage Sizing

The new liquid EMS facility was designed for 325 head including dries and replacements for approximately 12 months storage (exceeding the minimum required 9 months storage). The manure storage lagoon is recommended to have the following specifications:

- To provide the required capacity the EMS expansion will be added to the current lagoon to the west and northwest. The lagoon will be an irregular shape (as shown in the attached figure) with the elongated sides measuring 95 m in length x 89 m in width. The overall depth will be consistent with the current lagoon which had been designed as 4.5 m. The storage capacity of the new EMS will be 14,000 cubic metres which accounts for the required 0.5 m of freeboard and approximately 12 months storage. The sizing is based on an inside end and side wall slope of 3:1 (run/rise)
- The overall depth of 4.0 m will be achieved through a below-grade as required. The grade slopes to the north. The above-grade dykes of a minimum 0.5 m will also prevent runoff from entering the facility. The outside dyke walls should be completed to a slope of 4:1. The crest of the dyke should be sloped slightly outward to direct rainfall away from the storage facility
- The below-grade depth of the EMS must maintain a minimum of a 1.0 m separation above the water table at the time of construction, should one be encountered
- Construction of the clay liner should be completed in approximately 0.15 m lifts. Preferably, compaction of each lift will be undertaken with a padfoot roller, or the like. The equipment being used for soil compaction must fully penetrate each lift. Each lift should be compacted to not less than 99 percent Standard Proctor Dry Density prior to addition of the subsequent lift
- The soil should be within 2 percent of the optimum moisture as determined by a Standard Proctor Maximum Dry Density to ensure the lowest possible hydraulic conductivity for the completed liner
- Lifts should continue to be added until the recommended liner thickness is achieved. Particular attention should be paid to ensuring that the liner is integrally connected to the lower soil strata and that the soil around the inlet pipe is compacted to the same standard as the remainder of the liner
- Sand pockets that may be encountered during construction should be removed prior to liner installation
- Control of liner moisture content is critical during the construction process. Liner material should not be allowed to become saturated or to become dry. Should a lift surface become dry, the lift should be scarified prior to the placement of the next lift. Lifts which are above the required moisture content due to precipitation etc. should be removed or allowed to dry and re-compacted. The liner should not be allowed to freeze during construction

- Topsoil, frozen soil or rocks larger than 6 inches should not be included in the liner material
- Construction of the lagoon should be supervised by a professional engineer
- The freeboard depth of 0.5 m and outside dyke walls should be covered with 0.1-0.2 m of topsoil and seeded to prevent soil erosion.
- The inlet pipe to the EMS should be located in the bottom 1/4 of the lagoon. The annulus around the inlet pipe should be sealed with a bentonite sealer.

Earthen Manure Storage Construction

The following general construction procedures are recommended, though some modifications may be required based on actual site conditions encountered during construction:

- The topsoil should be stripped from the area for construction. The topsoil can be reused on the freeboard area after construction completion
- Sand and gravel seams, if encountered, should be excavated during construction and should be removed
- Construction of the lagoon should be supervised by a professional engineer

Following completion of the lagoon the operator should:

- Ensure that shrubs, trees, and deep-rooted plants are not allowed to grow on or near the walls of the facility

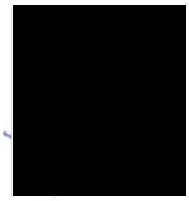
5.0 Closure

Envirowest Engineering is pleased to submit the report to Willem Dominicus. The information and conclusions contained in this report are for their sole use. No other party is to rely upon the information contained within the report without the express written authorization of Envirowest Engineering.

Envirowest Engineering is not responsible for any damages that may be suffered as the result of any unauthorized use of, or reliance on, this report. Envirowest Engineering has performed the work and made the findings and conclusions set out in the report in a manner consistent with the level of care and skill normally exercised by members of the environmental engineer profession practicing under similar conditions at the time the work was performed. Envirowest Engineering accepts no responsibility for any deficiency, misstatement or inaccuracy in this report resulting from misinformation from any individuals or parties that provided information as part of this report.

We trust that this report meets your present needs. Please feel free to contact the undersigned with any questions or should you require additional information.

Respectfully submitted,



September 20, 2024

Prepared by:
Emily J. Low, P.Eng.
Envirowest Engineering

Reviewed by:
Leah Predy, P.Ag.
Envirowest Engineering

PERMIT TO PRACTICE
2206165 ALBERTA LTD.

RM SIGNATURE: _____

RM APEGA ID #: 110373

DATE: September 20, 2024

PERMIT NUMBER: P014810
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)

2206165 Alberta Ltd. o/a Envirowest Engineering
Association of Professional Engineers and Geoscientists of Alberta
Permit to Practice No. P14810

6.0 Qualifications of Assessors

Ms. Emily Low, B.Sc., P.Eng, is an Environmental Engineer with Envirowest Engineering and has approximately 15 years of environmental assessment, monitoring, and remediation experience in the agricultural, industrial, real estate and development, and oil and gas sectors. Ms. Low has a Bachelor of Science in Chemical Engineering from the University of Alberta and is a certified Professional Engineer in Alberta (Association of Professional Engineers and Geoscientists of Alberta).

Leah Predy, B.A., B.Sc., P.Ag., is a Professional Agrologist with Envirowest Engineering and has approximately 5 years of experience in the environmental field, both in field data collection and report preparation for environmental assessments, monitoring, and remediation, as well as agricultural projects. Prior to her employment with Envirowest Engineering, Leah had five years of experience managing rangelands and navigating legislation and regulations as a Rangeland Agrologist with the Government of Alberta. She is a Professional Agrologist in Alberta (Alberta Institute of Agrologists).

7.0 References

GOA (Government of Alberta). (January 2020). Agricultural Operation Practices Act and Regulations. Edmonton, AB: Author.

GOA (Government of Alberta). (2017). Agricultural Operation Practices Act: Standards and Administration Regulation. Edmonton, AB: Author.

Appendix A

Figure

ENVIROWEST ENGINEERING

Title:

Borehole Locations
Site and Soil Assessment
NW¼-Sec.23-Twp.042-Rge.27-W4M
Ponoka County, Alberta

Project No: 2401-43050	**Date:** Septmeber 11, 2024	**Figure No.:** 1.0
Scale:	**Prepared By:** L. Predy	
Image Source: Google Earth Pro (February 22, 2024)		

Appendix B

Borehole Logs

ENVIROWEST ENGINEERING

LOG OF BORING 24BH01

Site and Soil Assessment
NW1/2-Sec.23-Twp.042-Rng.27-W4M
Ponoka County, Alberta

Project Number: 2401-43050

Driller: : Owner
Drilling Method: : Skid Steer Auger
Drill Date : June 11, 2024
Logged By: : Emily Low P.Eng.

Well:
Elev.:

Depth in Meters	Gastech Reading (ppm) 0 100 200 300 400 500	VOC Reading	GRAPHIC	DESCRIPTION	Water Level
0.0				Top Soil	
0.3				SILTY CLAY, firm , damp, mottled brown, medium plasticity	
0.5					
0.8					
1.0					
1.3					
1.5					

09-20-2024 Z:\Operations\Client Data\43050 Willem Dominicus\24BH01.bor

ENVIROWEST ENGINEERING

LOG OF BORING 24BH02

Site and Soil Assessment
NW1/2-Sec.23-Twp.042-Rng.27-W4M
Ponoka County, Alberta

Project Number: 2401-43050

Driller: : Owner
Drilling Method: : Skid Steer Auger
Drill Date : June 11, 2024
Logged By: : Emily Low P.Eng.

Well:
Elev.:

Depth in Meters	Gastech Reading (ppm) 0 100 200 300 400 500	VOC Reading	GRAPHIC	DESCRIPTION	Water Level
0.0				Top Soil	
0.3				SILTY CLAY, firm , damp, mottled brown, medium plasticity	
0.5					
0.8					
1.0					
1.3					
1.5					

09-20-2024 Z:\Operations\Client Data\43050 Willem Dominicus\24BH02.bor

ENVIROWEST ENGINEERING

LOG OF BORING 24BH03

Site and Soil Assessment
NW1/2-Sec.23-Twp.042-Rng.27-W4M
Ponoka County, Alberta

Project Number: 2401-43050

Driller: : Owner
Drilling Method: : Skid Steer Auger
Drill Date : June 11, 2024
Logged By: : Emily Low P.Eng.

Well:
Elev.:

Depth in Meters	Gastech Reading (ppm) 0 100 200 300 400 500	VOC Reading	GRAPHIC	DESCRIPTION	Water Level
0.0				Top Soil	
0.3				SILTY CLAY, firm , damp, mottled brown, medium plasticity	
0.5					
0.8					
1.0					
1.3					
1.5					

09-20-2024 Z:\Operations\Client Data\43050 Willem Dominicus\24BH03.bor

Appendix C

Certificate of Analysis

Laboratory Proctor — Sample No.: W450

Sample Information

Date: 12-Jun-24 **By:** E.L. **of:** Envirowest Eng. **Type:** Pail

Location: Dominicus, Project No. 43050-02 **Natural Moisture:** 34.1 %

Description: Clay and silt, trace sand

Specfication: ASTM D 698 - Method A

Comments:

Proctor Results:

Test Number	1	2	3	4	5
Dry Density (Kg/m^3)	**1532**	**1545**	**1552**	**1531**	**1514**
Moisture Content (%)	**17.4**	**19.7**	**21.6**	**25.3**	**27.3**

Oversize Correction (Calculated using assumed Specific Gravity of 2.40)

Oversize (%)	5	10	15	20	25
Density	**1594**	**1634**	**1675**	**1716**	**1757**

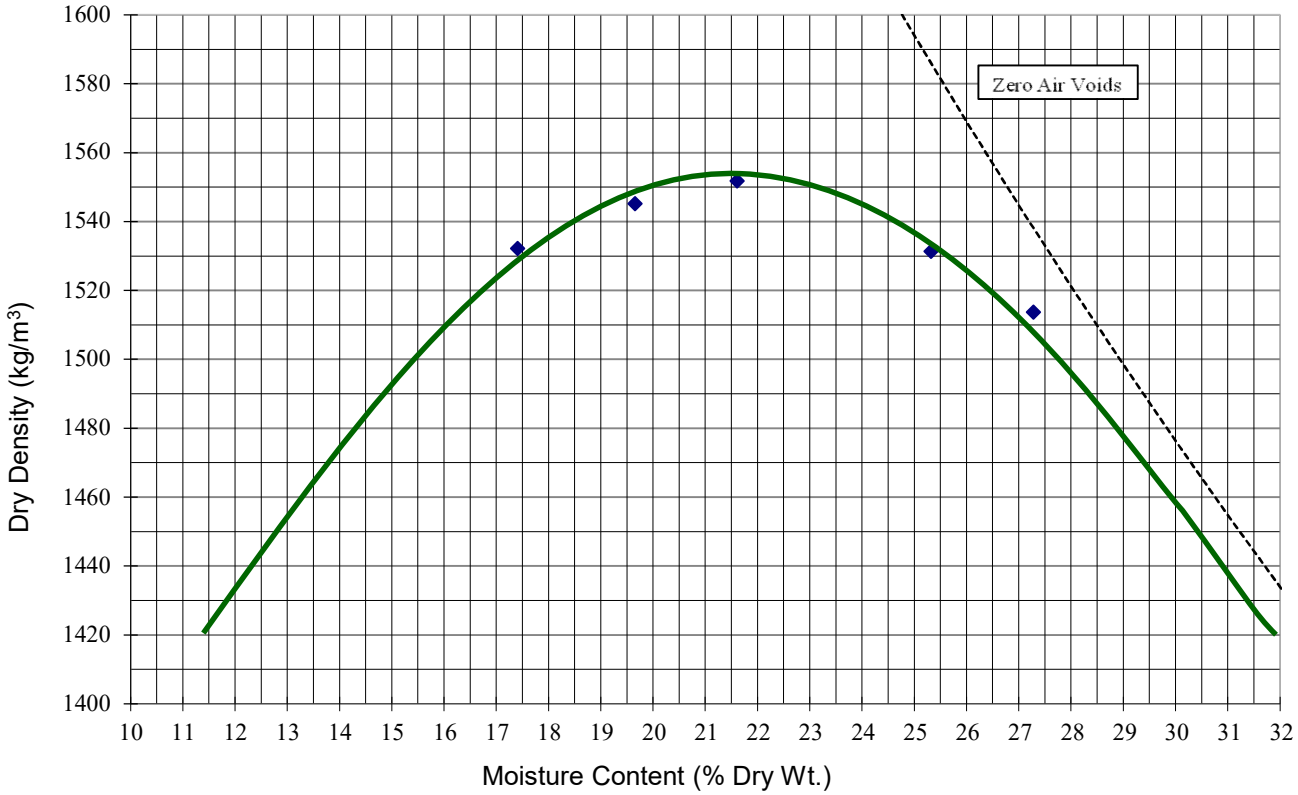
Optimum Results:

Moisture Content = **21.6** %

Dry Density = **1553** Kg/m^3

Corrected Density = **1561** Kg/m^3

Oversize Material = **1.0** %



Union Street Geotechnical

CLIENT:	Envirowest Engineering	**FILE No.:**	USG1851
PROJECT:	Geotechnical Inv.	**DATE:**	18-Jun-24
LOCATION:	Red Deer, Alberta	**TECH:**	G.S.

Laboratory Hydrometer — Sample No.: W450

Sample Information

Date: 12-Jun-24 **By:** E.L. **of:** Envirowest Eng. **Type:** Pail / Bag

Location: Dominicus, Project No. 43050-02 **Specification:** ASTM D 422

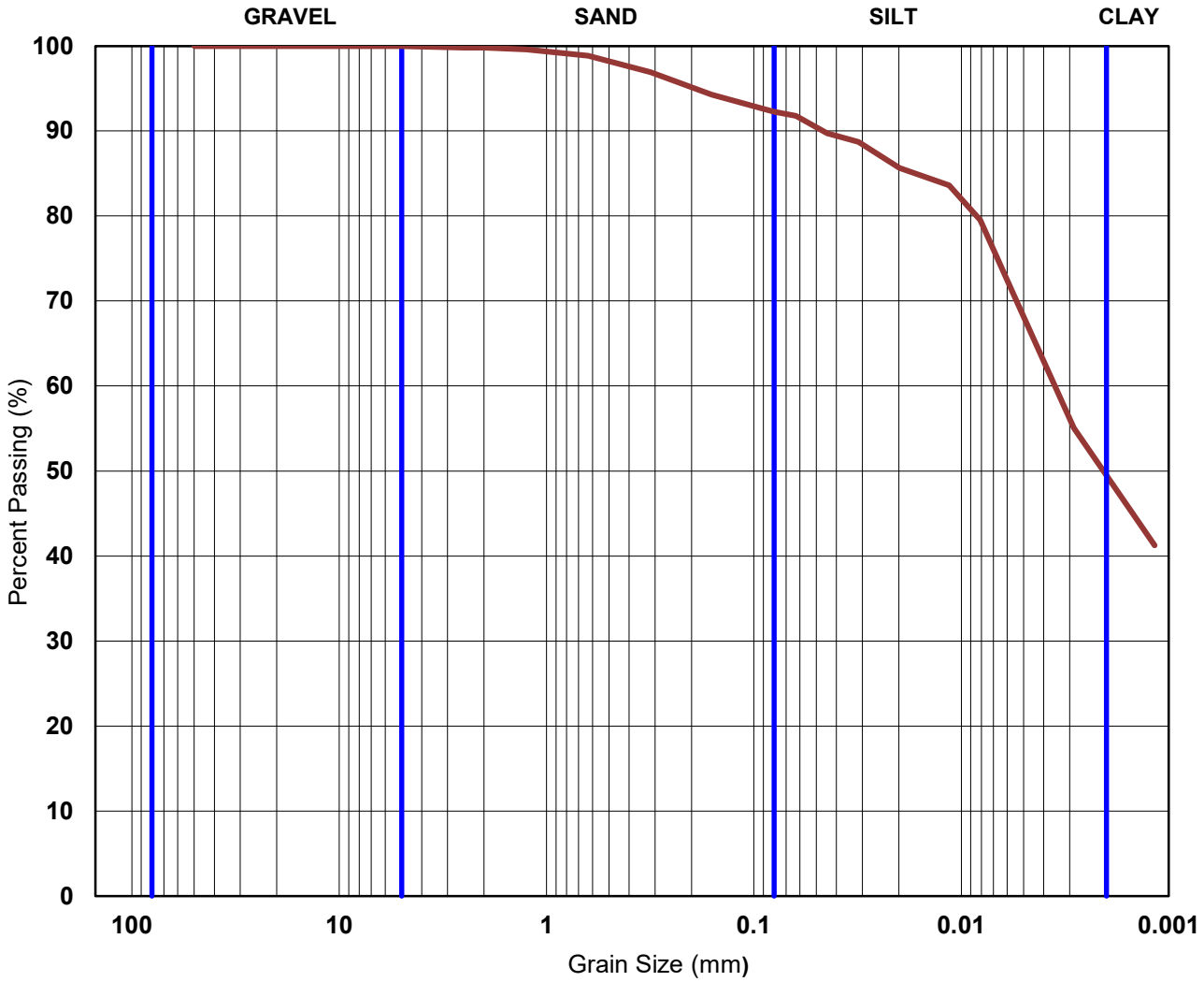
Description: Clay and silt, trace sand

Specifications: Laboratory Specifications as per ASTM D 422.

Comments:

Sieve Results:

By Type (%): Gravel = **0.0** Sand = **7.8** Silt = **44.2** Clay = **48.0**



Union Street Geotechnical

CLIENT:	Envirowest Engineering	**FILE No.:**	USG1851
PROJECT:	Geotechnical Inv.	**DATE:**	19-Jun-24
LOCATION:	Red Deer, Alberta	**TECH:**	G.S.

Project Name:	2024 Geotechnical Investigation	Depth:	
Project Number:	USG1851	Testing Company:	Union Street Geo.
Client:	Dominicus	Field Technician:	E.L.
Testhole:		Sample Date:	June, 2024
Location:		Lab Technician:	B.B.
Sample Number:	W450	Date Tested:	16 August, 2024

Flexible Wall Permeameter (ASTM D5084-10)

Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

Material and Test Description

Material Description:

CLAY

Test Type:	Constant Head
Mould Size:	Flexible Wall
Sample Source:	Re-moulded
Fluid Used:	Deaired Water
Fluid Reservoir:	Burrettes

Remoulding Details	
Max Dry Density (kg/m^3):	-
Proctor ID:	-
Percent Max (%):	-
Target Dry Density (kg/m^3):	-

Initial Sample Characteristics

Water Content	
Wet + Tare (g):	537.1
Dry + Tare (g):	439.1
Tare (g):	11.0
Water Content (%):	22.9%

Sample Size					
Trial	1	2	3	4	Average
Diameter (mm):	73.3	73	73.4	73.1	73.2
Length (mm):	77.9	78.3	78.2	77.7	78.0
Weight (g)	656.4				

Area (cm^2):	42.1	Specific Gravity (Note 2):	2.67
Volume (cm^3):	328.4	Void Ratio:	0.64
Wet Density (kg/m^3):	1999	Saturation:	95.4%
Dry Density (kg/m^3):	1627	Porosity:	39.0%

Final Sample Characteristics

Water Content	
Wet + Tare (g):	680.5
Dry + Tare (g):	546.8
Tare (g):	10.8
Water Content (%):	24.9%

Sample Size					
Trial	1	2	3	4	Average
Diameter (mm):	73.7	74.1	73.8	73.6	73.8
Length (mm):	78.4	78.3	78.3	78	78.3
Weight (g)	669.9				

Area (cm^2):	42.8	Specific Gravity (Note 1):	2.67
Volume (cm^3):	334.7	Void Ratio:	0.67
Wet Density (kg/m^3):	2001	Saturation:	100.0%
Dry Density (kg/m^3):	1602	Porosity:	40.0%

Note 1: Specific gravity for final sample characteristics calculation adjusted to result in 100.0% saturation.

Note 2: Specific gravity for initial sample characteristics calculation set equal to that of the final.

Project Name:	2024 Geotechnical Investigation	Depth:	
Project Number:	USG1851	Testing Company:	Union Street Geo.
Client:	Dominicus	Field Technician:	E.L.
Testhole:		Sample Date:	June 2024
Location:		Lab Technician:	B.B.
Sample Number:	W450	Date Tested:	16 August, 2024

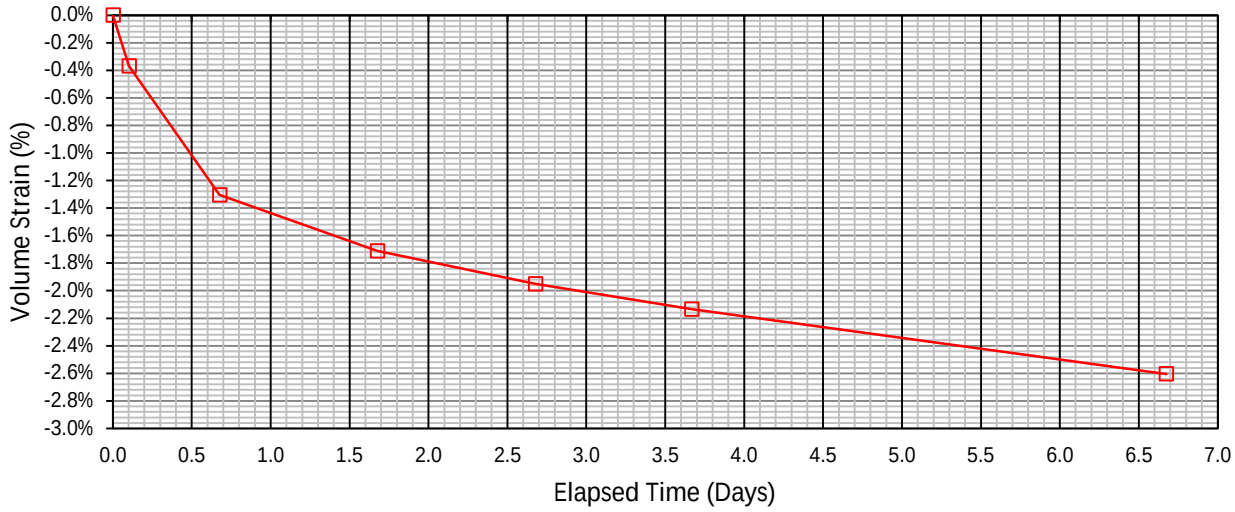
Flexible Wall Permeameter (ASTM D5084-10)

Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

Saturation Data

Cell Pressure (kPa):	160.0	Top Pressure (kPa):	130.0
Bottom Pressure (kPa):	130.0	Pressure Difference (kPa):	-

Date & Time	Elapsed Time (Days)	Room Temp (^{o}C)	Top Burret (mL)	Bottom Burret (mL)	Cell (mL)	Total Vol. Change (mL)	Volume Strain (%)
7/30/24 15:03	0.00	23.0	4.7	4.8	14.3	0	0.00%
7/30/24 17:29	0.10	23.0	4.8	4.9	15.3	-1.21	-0.37%
7/31/24 7:16	0.68	23.0	4.9	5.1	18.1	-4.28	-1.30%
8/1/24 7:14	1.67	23.0	5.0	5.4	19.0	-5.62	-1.71%
8/2/24 7:19	2.68	23.0	5.2	5.6	19.4	-6.40	-1.95%
8/3/24 7:02	3.67	23.0	5.3	5.6	19.9	-7.01	-2.13%
8/6/24 7:12	6.67	23.0	5.3	5.3	21.7	-8.55	-2.60%
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-



Project Name:	2024 Geotechnical Investigation	Depth:	
Project Number:	USG1851	Testing Company:	Union Street Geo.
Client:	Dominicus	Field Technician:	E.L.
Testhole:		Sample Date:	June, 2024
Location:		Lab Technician:	B.B.
Sample Number:	W450	Date Tested:	16 August, 2024

Flexible Wall Permeameter (ASTM D5084-10)

Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

Permeation Data

Cell Pressure (kPa):	160.0	Top Pressure (kPa):	120.0
Bottom Pressure (kPa):	140.0	Pressure Difference (kPa):	20.0

Date & Time	Elapsed Time (Minutes)	Room Temp (^{o}C)	Top Burret (mL)	Bottom Burret (mL)	Top Vol. Change (mL)	Bottom Vol. Change (mL)	Average Vol. Change (mL)
8/6/24 7:20	0	22.0	9.82	0.07	0.00	0.00	0.00
8/9/24 7:03	4303	22.0	7.81	1.47	2.01	1.40	1.71
8/12/24 7:06	8626	22.0	5.97	2.62	3.85	2.55	3.20
8/12/24 9:05	8745	22.0	5.93	2.66	3.89	2.59	3.24
8/12/24 11:05	8865	22.0	5.89	2.70	3.93	2.63	3.28
8/12/24 13:05	8985	22.0	5.85	2.73	3.97	2.66	3.32
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
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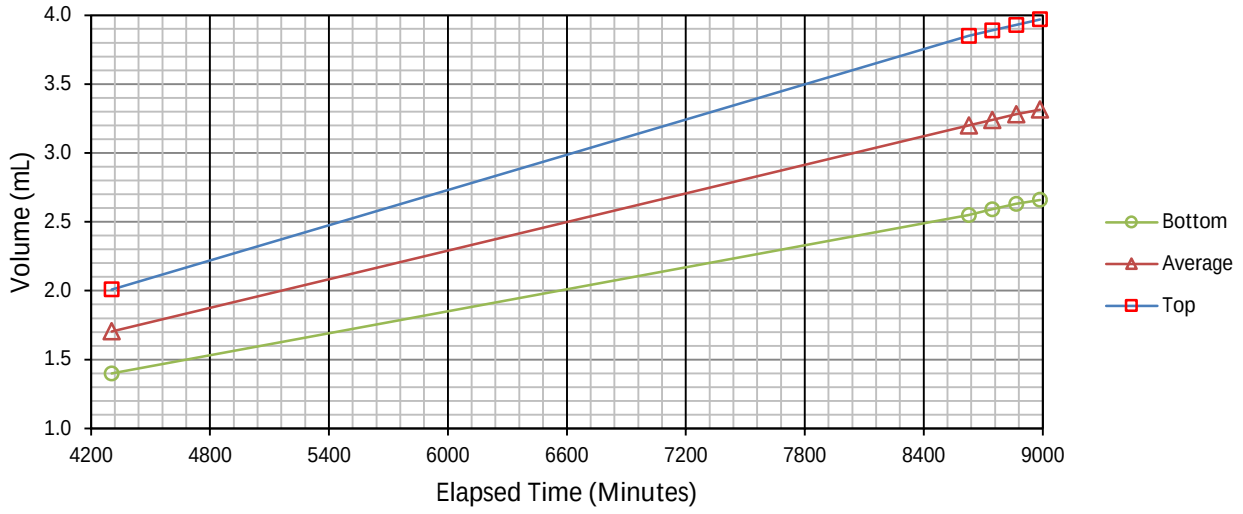


Project Name:	2024 Geotechnical Investigation	Depth:	
Project Number:	USG1851	Testing Company:	Union Street Geo.
Client:	Dominicus	Field Technician:	E.L.
Testhole:		Sample Date:	June, 2024
Location:		Lab Technician:	B.B.
Sample Number:	W450	Date Tested:	16 August, 2024

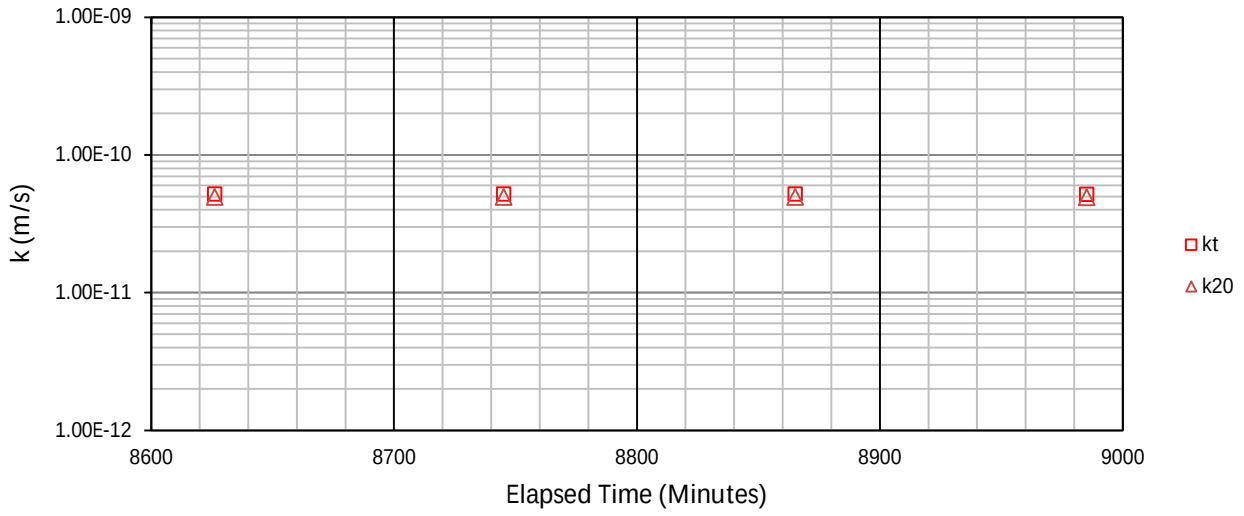
Flexible Wall Permeameter (ASTM D5084-10)

Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

Permeation Data

Head Difference (m):	2.0	Area of Sample (m^2)	4.243E-03
Length of Sample (m):	7.814E-02	Gradient, i	2.609E+01

Elapsed Time (Minutes)	Average Volume Change (mL)	Average Temperature (^oC)	k_t (m/s)	R_T	k_{20} (m/s)
8626	3.20	22.0	5.206E-11	0.953	4.961E-11
8745	3.24	22.0	5.202E-11	0.953	4.957E-11
8865	3.28	22.0	5.197E-11	0.953	4.953E-11
8985	3.32	22.0	5.176E-11	0.953	4.933E-11
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	AVERAGE	5.195E-11		4.951E-11

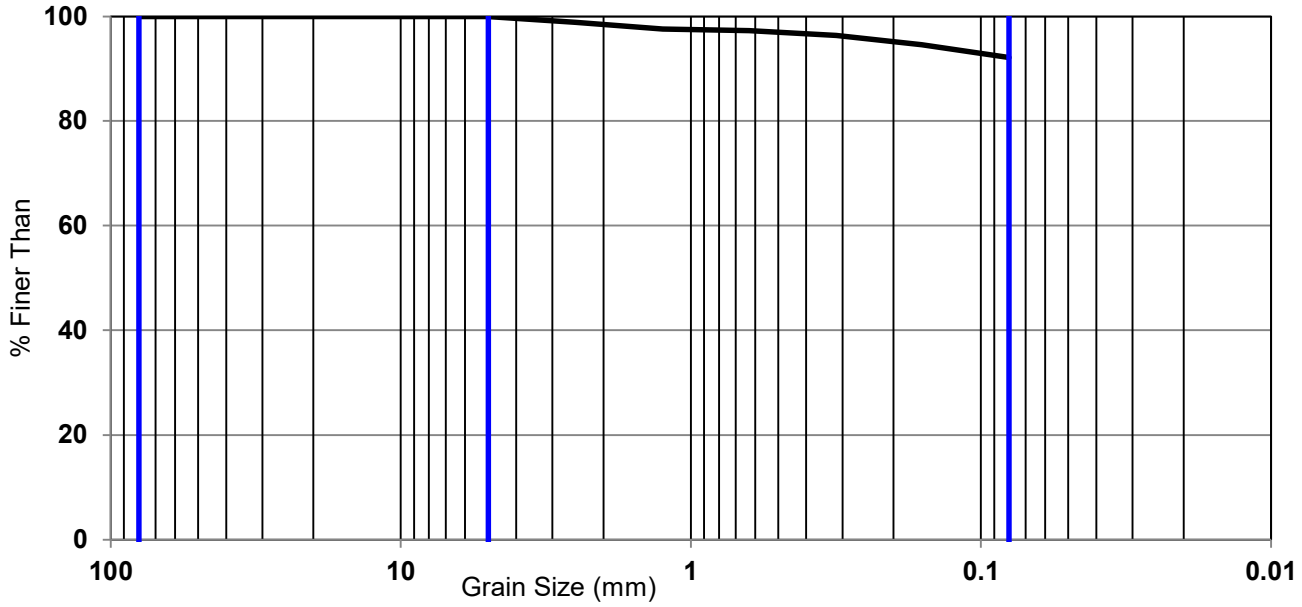


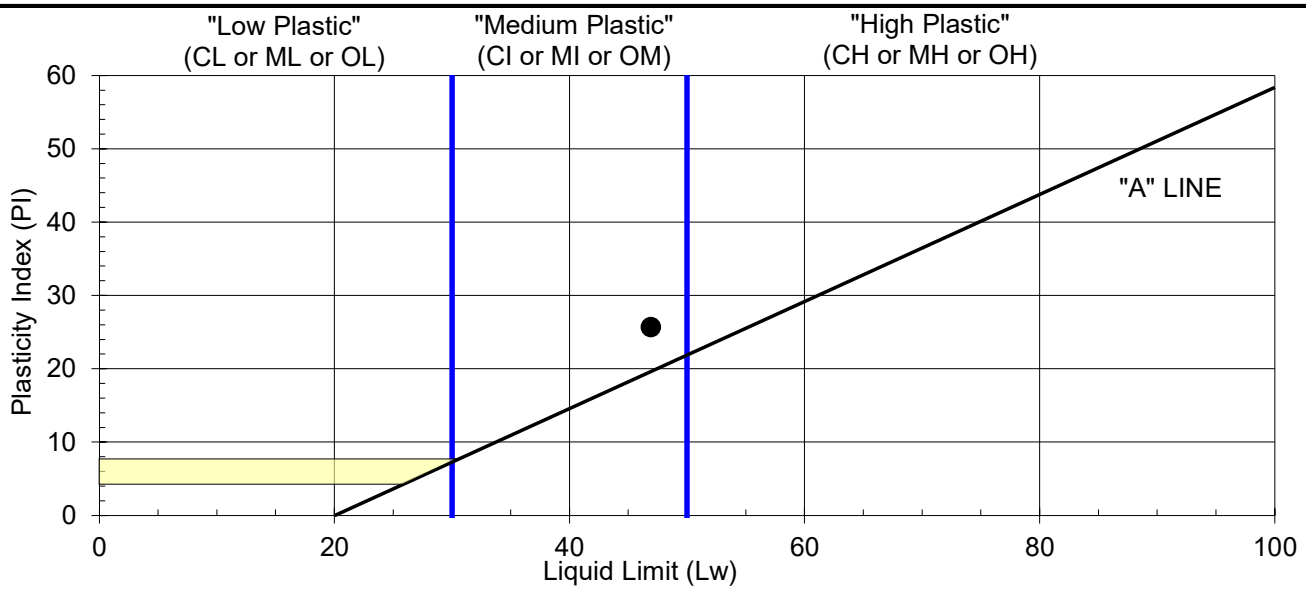
Lab Unified Soils Classification — Sample No.: W450

Sample Information

Classification:	**Particle Size:**	Gravel =	0.0%	**Borehole No.:** -
Clay and silt, trace sand.		Sand =	7.8%	**Sample No.:** -
		Silt & Clay =	92.2%	**Depth (m):** -

Particle Size Analysis - Washed Sieve





Plastic Limit:	21.21%	**Group Index:**	25.5
Liquid Limit:	46.89%	**Soil Type:**	Inorganic
Plasticity Index:	25.68%	**Classification:**	CI : Medium Plastic Clay

Union Street Geotechnical

CLIENT:	Envirowest Engineering	**FILE No.:**	USG1851
PROJECT:	Geotechnical Inv.	**DATE:**	17-Apr-24
LOCATION:	Red Deer, Alberta	**TECH:**	G.S.

ENVIROWEST
ENGINEERING

P.O. Box 4248
Ponoka, AB.
T4J 1R6
Telephone: 403-783-8229

January 24, 2025

Willem Dominicus
Dominicus Dairy Ltd.

Delivered Via Email: dominicusdairy@gmail.com

Re: Site and Soil Assessment Amendment
Current Dairy Operation – Manure Storage Lagoon Expansion
NW¼-23-42-27 W4M
Ponoka County, Alberta

Dear Willem Dominicus:

Envirowest Engineering (Envirowest) was retained by yourself to conduct a Site and Soil Assessment for the proposed construction of an earthen manure storage (EMS) lagoon expansion for a proposed 325 head dairy operation including dries and replacements as reported within the *Site and Soil Assessment (September 20, 2024)*. The following is considered an amendment and will supersede those sections as outlined below within the aforementioned report. An updated site figure is also attached.

4. Design and Construction Considerations

Earthen Manure Storage Sizing

The new liquid EMS facility was designed for 325 head including dries and replacements for approximately 12 months storage (exceeding the minimum required 9 months storage). The manure storage lagoon is recommended to have the following specifications:

1. To provide the required capacity the EMS expansion will be added to the current lagoon to the south. The lagoon will be rectangular in shape (as shown in the attached figure) measuring 95 m in length x 58 m in width. The overall depth will be consistent with the current lagoon which had been designed as 4.5 m. The storage capacity of the new EMS will be 13,952 cubic metres which accounts for the required 0.5 m of freeboard and approximately 12 months storage. The sizing is based on an inside end and side wall slope of 3:1 (run/rise)
2. The overall depth of 4.5 m will be achieved through 4.0 m below-grade as measured from the current lagoon. The grade slopes to the north. Above-grade dykes of a minimum 0.5 m will also prevent runoff from entering the facility. The outside dyke walls should be completed to a slope of 4:1. A berm may be required on the south wall of the lagoon to redirect unimpacted runoff

Closure

Envirowest Engineering is pleased to submit the report to Willem Dominicus. The information and conclusions contained in this report are for their sole use. No other party is to rely upon the information contained within the report without the express written authorization of Envirowest Engineering.

Envirowest Engineering is not responsible for any damages that may be suffered as the result of any unauthorized use of, or reliance on, this report. Envirowest Engineering has performed the work and made the findings and conclusions set out in the report in a manner consistent with the level of care and skill normally exercised by members of the environmental engineer profession practicing under similar conditions at the time the work was performed. Envirowest Engineering accepts no responsibility for any deficiency, misstatement or inaccuracy in this report resulting from misinformation from any individuals or parties that provided information as part of this report.

We trust that this report meets your present needs. Please feel free to contact the undersigned with any questions or should you require additional information.

Respectfully submitted,

January 27, 2025

Prepared by:
Emily J. Low, P.Eng.
Envirowest Engineering

Reviewed by:
Leah Predy, P.Ag.
Envirowest Engineering

PERMIT TO PRACTICE
2206165 ALBERTA LTD.

RM SIGNATURE: _____

RM APEGA ID #: 110373

DATE: January 27, 2025

PERMIT NUMBER: P014810

The Association of Professional Engineers and Geoscientists of Alberta (APEGA)

2206165 Alberta Ltd. o/a Envirowest Engineering
Association of Professional Engineers and Geoscientists of Alberta
Permit to Practice No. P14810

ENVIROWEST ENGINEERING

Title:

Borehole Locations
Site and Soil Assessment Amendment
NW¼-Sec.23-Twp.042-Rge.27-W4M
Ponoka County, Alberta

Project No: 2401-43050	**Date:** Septmeber 11, 2024	**Figure No.:** 1.1
Scale: 1:2700	**Prepared By:** L. Predy	
Image Source: Google Earth Pro (February 22, 2024)		

ENVIROWEST
ENGINEERING

P.O. Box 4248
Ponoka, AB.
T4J 1R6
Telephone: 403-783-8229

January 29, 2025

Willem Dominicus
Dominicus Dairy Ltd.

Delivered Via Email: dominicusdairy@gmail.com

Re: Site and Soil Assessment Amendment
Current Dairy Operation – Manure Storage Lagoon Expansion
NW¼-23-42-27 W4M
Ponoka County, Alberta

Dear Willem Dominicus:

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4. Design and Construction Considerations

Earthen Manure Storage Sizing

The new liquid EMS facility was designed for 325 head including dries and replacements for approximately 12 months storage (exceeding the minimum required 9 months storage). The manure storage lagoon is recommended to have the following specifications:

1. To provide the required capacity the EMS expansion will be added to the current lagoon to the south. The lagoon will be rectangular in shape (as shown in the attached figure) measuring 80 m in length x 68 m in width. The overall depth will be consistent with the current lagoon which had been designed as 4.5 m. The storage capacity of the new EMS will be 13,972 cubic metres which accounts for the required 0.5 m of freeboard and approximately 12 months storage. The sizing is based on an inside end and side wall slope of 3:1 (run/rise)
2. The overall depth of 4.5 m will be achieved through 4.0 m below-grade as measured from the current lagoon. The grade slopes to the north. Above-grade dykes of a minimum 0.5 m will also prevent runoff from entering the facility. The outside dyke walls should be completed to a slope of 4:1. A berm may be required on the south wall of the lagoon to redirect unimpacted runoff

Closure

Envirowest Engineering is pleased to submit the report to Willem Dominicus. The information and conclusions contained in this report are for their sole use. No other party is to rely upon the information contained within the report without the express written authorization of Envirowest Engineering.

Envirowest Engineering is not responsible for any damages that may be suffered as the result of any unauthorized use of, or reliance on, this report. Envirowest Engineering has performed the work and made the findings and conclusions set out in the report in a manner consistent with the level of care and skill normally exercised by members of the environmental engineer profession practicing under similar conditions at the time the work was performed. Envirowest Engineering accepts no responsibility for any deficiency, misstatement or inaccuracy in this report resulting from misinformation from any individuals or parties that provided information as part of this report.

We trust that this report meets your present needs. Please feel free to contact the undersigned with any questions or should you require additional information.

Respectfully submitted,

January 29, 2025

110373

Prepared by:
Emily J. Low, P.Eng.
Envirowest Engineering

Reviewed by:
Leah Predy, P.Ag.
Envirowest Engineering

PERMIT TO PRACTICE
2206165 ALBERTA LTD.

RM SIGNATURE: _____

RM APEGA ID #: 110373

DATE: January 29, 2025

PERMIT NUMBER: P014810

The Association of Professional Engineers and Geoscientists of Alberta (APEGA)

2206165 Alberta Ltd. o/a Envirowest Engineering
Association of Professional Engineers and Geoscientists of Alberta
Permit to Practice No. P14810

ENVIROWEST ENGINEERING

Title:

Borehole Locations
Site and Soil Assessment Amendment
NW¼-Sec.23-Twp.042-Rge.27-W4M
Ponoka County, Alberta

Project No: 2401-43050	**Date:** Septmeber 11, 2024	**Figure No.:** 1.1
Scale: 1:2700	**Prepared By:** L. Predy	
Image Source: Google Earth Pro (February 22, 2024)		