Technical Document RA24004

Part 2 - Technical Requirements



Von inicu

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	RA24004	NW 23-42-27 W4M
Amendment		

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.

Date of signing

Dom

Signature lea

Print name

Corporate name (if appli

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 curr.	ent dairy basin	25 m x 37 m
in the	Finshed Total bas	n 85×37m
Lagoon Expansio	on 89m-95	5m-47m-104m - 4,5mdeep
0	80 m x 68 m	n x 4.5 m deep (total dimensions)

xisting facilities	Dimensions (m) (length, width, and depth)	NRCB USE ONLY
Current Dairy Bash East West (irregular shape - max exten	(to be expanded)	Existing facilities confirmed
(to be expanded)	77m × 42m	
IRCB USE ONLY		

Last updated September 11, 2023



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 × 34	
14	30×9	
1	19×9	
Catch Basin		
Calfpen with associated born	25×20 40 × 15	
Larper with association of		
	23.4	
	-	
	1	



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

Dec 2025

ew facility is replaci	ing an old facility, please explain what will	I happen to the old facility and when.	IN/A
*			

Construction completion date for proposed facilities

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 + Stock	225	135	360
		1	10 may -
		1	•
	1	1	

Last updated September 11, 2023



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.

Signed this 2 day of atoper 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 _____

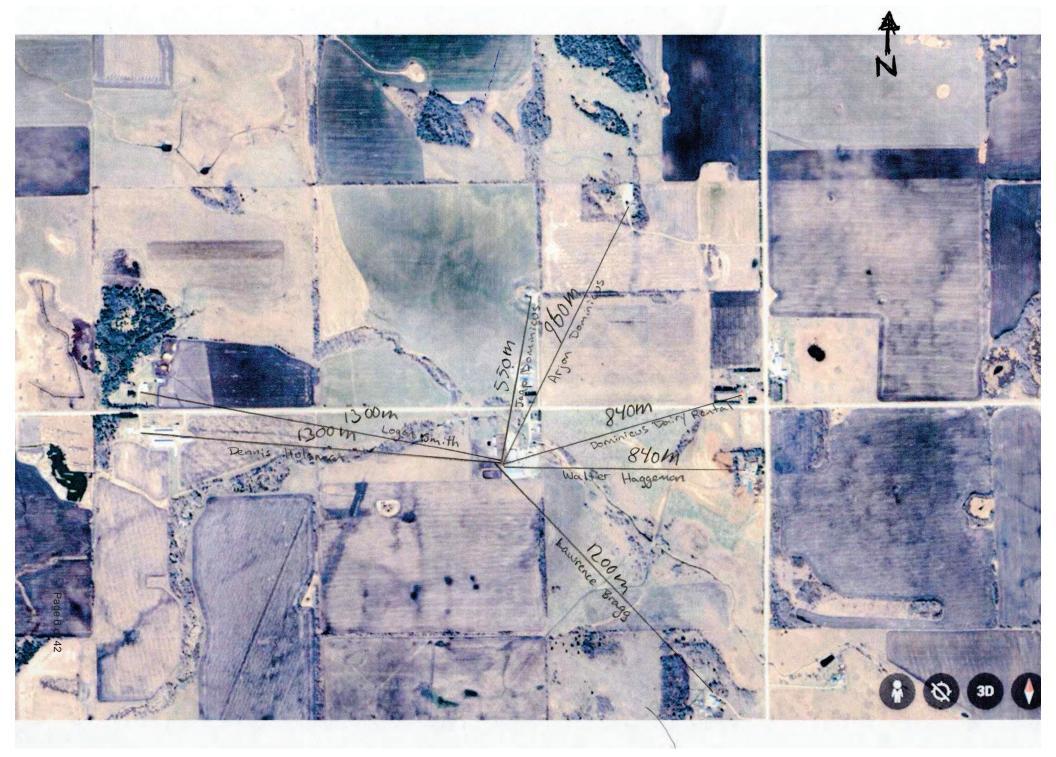
Signed this _____ day of ______, 20____.

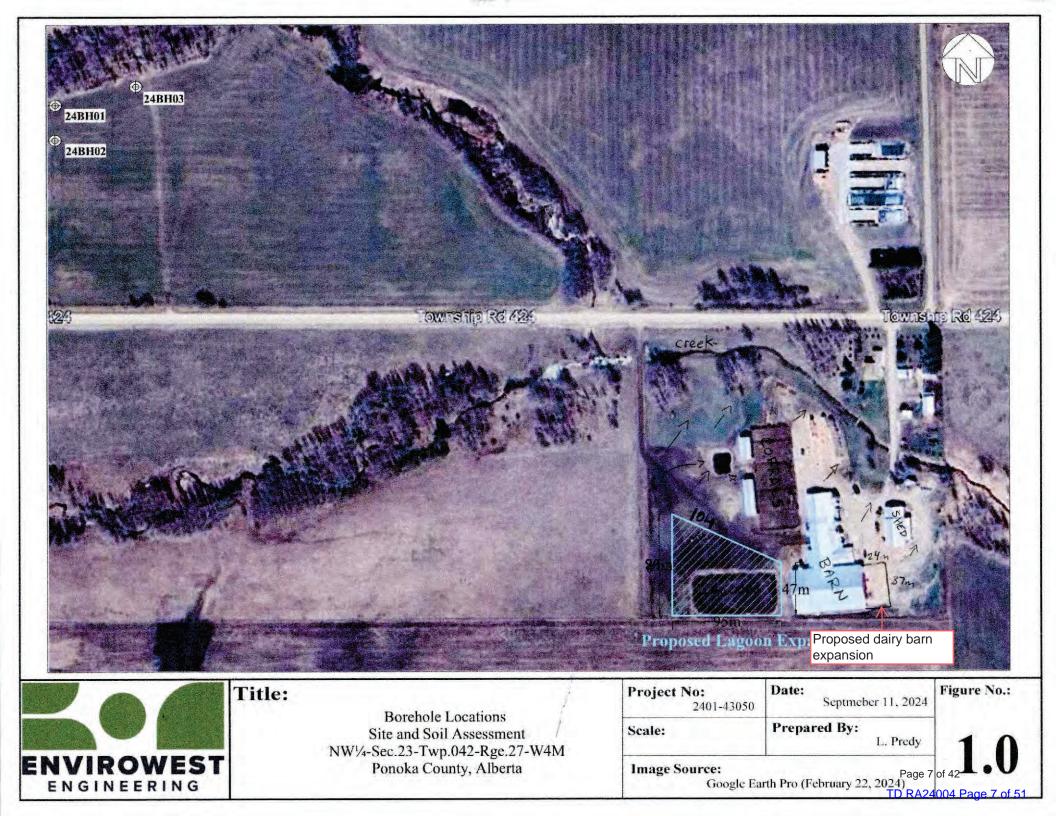
Signature of Applicant or Agent

Last updated September 11, 2023



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Borehole Locations Site and Soil Assessment Amendment NW¹/₄-Sec.23-Twp.042-Rge.27-W4M Ponoka County, Alberta

Project I	No: 2401-43050	Date: Septmeber 11, 2024	Figure No.:
Scale:	1:2700	Prepared By: L. Predy	1 1
Image Se		th Pro (February 22, 2024)	4004 Page 8 of 51



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

GENERAL ENVIRONMENTAL INFORMATION

Dairy

(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:

-

Proposed 1: ____

: Logoon Expansion

Pro	pose	ed 2	:

Yourn expansion

Bash

	Proposed	3:	-
--	----------	----	---

Facility and environmental risk information		Facilities				NRCB USE ONLY	
		Existing	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 INO YES with exemption	Not in a known flood plain
	How many springs are within 100 m of the manure storage facility or manure collection area?	0	0	6		YES NO YES with exemption	None observed on site
Surface water information	How many water wells are within 100 m of the manure storage facility or manure collection area?	2	1	2		YES NO XES with exemption	2 wells within 100 m of proposed construction
Sur	What is the shortest distance from the manure collection or storage facility to a surface water body? (e.g., lake, creek, slough, seasonal)	(00	150	100		YES NO YES with exemption	Barn expansion ~100 m from creek
water ation	What is the depth to the water table?		4.2	4.2		YES NO YES with exemption	*Measured at 5.9 m in monitoring well
Groundwater information	What is the depth to the groundwater resource/aquifer you draw water from?		15	15		YES NO YES with exemption	8.5 m in water well 2088980

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

*AO note: On May 22, 2025, I received an email from the engineer stating the measured water table level on site.



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

NRCB USE ONLY WATER WELL AND SURFACE WATER INFORMATION								
	2088980		73666	0275663				
Well IDs:2000900								
Surface water rel	ated concerns from d	irectly affected parties or ref	erral agencies:	🗙 yes 🗖 no				
Groundwater related concerns from directly affected parties or referral agencies: XES 🗆 NO								
Water wells	□ N/A							
If applicable, exe	mption for 100 m dis	tance requirements applied:	YES 🛛 NO 🔹 Condition	n required: 🛛 💢 YES 🗖 NO				
Surface water	X N/A							
If applicable, exe	mption for 30 m dista	ance requirements applied:	YES NO Condition	required: YES NO				
Water Well Fxe	mption Screening T	οοι 🛛 Ν/Α						
Wate	er Well ID	Preliminary Screening Score	Secondary Screening Score	Facility				
2088980		11 = continue to next section	21 = exemption less likely	Barn expansion				
0275663		27 = continue to next section	21 = exemption less likely	Barn expansion				
0275663		27 = continue to next section	10 = exemption more likely	EMS expansion				
Groundwater or	r surface water rela	ited comments:						
		ondition for the protection on dition will be carried forwa		annual water sampling of 4. Additionally, Approval				
RA24004 will	include a condition	requiring water well samp		due to the proximity of the				
well to the pro	oposed barn expan	51011.						



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

NRCB USE ONLY

ENVIRONMENTAL RISK SCREENING INFORMATION

ERST for proposed facilities

Facility	Groundwater score	Surface water score	File number
Barn expansion	Low	Low	RA24004
EMS expansion	Low	Low	RA24004

ERST for existing facilities

Facility	Groundwater score	Surface water score	File number
Existing dairy barn	Moderate	Low	RA17057
Calf barn with assoc. corrals	low	low	
Corrals	low	low	
Catch basin	low	low	
Existing EMS	low	low	\checkmark

ERST related comments:

The proximity of water well 275663 to the existing dairy barn was the predominant reason for the moderate groundwater risk score. Approval RA11060 contains a condition for the protection of groundwater, requiring annual water sampling of that well. This condition will be carried forward into Approval RA24004.



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 Domnous	SW26-42-27-W4	550m	Ag	1	490	N/A	Yes	
Walter Haggeman	NE23-42-27-W4	,840 m	Ag	1	785			
Dominicus Dairy Ltd.	SE-26-42-27-W4	840 m	Owned by	applicant				
Arjon + Carlen Dominicus	SE 26-42-27-W4	960m	CRH *	2	939			
Laurence Bragg	SE -23-42-27-64	1200m	Ag	1	1,048	V	V	

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)	
Dominius Datry	NW-22-42-27-W4	52	Black		N/A	
Dominicus Dairy	NE 24-42-27- W4	60	Black			
Dominicus Dairy	SE 26-42-27 - W4	55	Black			
Doninicus Dairy	NE 28-42-27 . W4	62	Black		V	
Jaap+ Wilma Dominicus	SW 26-42-27-W4	56	Black		Yes	
Walt Millar Walt Millar	NE 31-42-27-W4 SE 31-42-27-W4	36	Black Total Black	357 ha	Yes Yes	

* 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)

*CRH = County residential hobby farm

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

Users: Dominicus Dairy Ltd.

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:

July 15th 2024 Owner(s): Walt Millar

Users: Dominicus Dairy Ltd.



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

NRCB USE ONLY							
	CE SEPARATI	ON					
Methods used to determin Margin of error (if applicab	e distance (if appl ble):+/- 3 m	icable): _	Aerial p	ohotogra	iphy		
Requirements (m): Catego	ory 1:	Ca	tegory 2:	577	Category 3	721	Category 4: 1,153
Technology factor:						🗆 yes 🔀	NO
Expansion factor:						🗆 yes 🔀	NO
MDS related concerns from	n directly affected	parties of	or referral	agencie	s:	🛛 YES 🔀	NO
LAND BASE FOR MA	ANURE AND (COMPC	ST APP	PLICAT			
Land base required:	334.1 ha						
Land base listed:	357 ha						
Area not suitable:	Already accoun	ted for					
Available area	357 ha				Requirement me	t: 🛛 YES 🛛	J NO
Land spreading agreemen	ts required:	X YES	🗆 NO				
Manure management plan	:	☐ YES	X NO		If yes, plan is at	ttached: 🔲	
PLANS							
Submitted and attached co	onstruction plans:		X YES	🗆 NO			
Submitted aerial photos:			X YES	🗆 NO			
Submitted photos:			☐ YES	X NO			
GRANDFATHERING	i						
Already completed: If already completed, see	RA02040X		X YES	🗆 NO [□ N/A		



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.

			Slope run:rise			se	NRCB USE ONLY		
	Length (m)	Width (m)	Total depth (m)	Depth below ground level (m)	Inside end walls	Inside side walls	Outside walls	Calculated storage capacity (excl. 0.5 m freeboard) (m ³)	Filled in lower 1/4? Y/N
1,	-95-	50	4.5	4.0	ן.ב	3.1	4.1		Y
2.	80 m	68 m							
		1	I	iary 29, 2025, s		C 72 . 1 C 21	CAPACITY	13,972 m ³	

AO note: rec'd email from applicant on January 29, 2025, stating the ar Surface water control systems

Describe the run-on and runoff control system Above goode dykes of 0.5m to prevent run off (rest of dyke should slope slighty autward

Sealing

Describe sealing practices for piping, etc. that penetrates the liner Dentonite Sector Dentonite Sector **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 logon

> NRCB USE ONLY Requirements met: X YES INO

Last updated February 26, 2021



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

	iner	Provide	compacted liner details (as required)	
		(m)	Computed Clay liner		- VIII
Soil texture	7.8	_% sand	44, Z_% silt	48	% cla
Atterberg limits	21.21	astic limit	Hiquid limit 16.89	25,60	ticity inde
Hydraulic conductivity	Hydraulic conduct 5 - Describe test star	2×10-3 (h	ls		
Additional information	(attach copies of so	il test reports)	NRCB USE ONLY Requirements m Condition requir		
			Report attached	: XES	L NO
			indena so		
				initia di second	ic hpc dat
liquid manùre storage vo		ached: 💢 YES 🗆	NO		ic horn le/
iquid manùre storage vo Depth to water table:	5.9 m	and the second	NO Requirements met:	YES INO	
NRCB USE ONLY Liquid manure storage vo Depth to water table: Depth to uppermost grou	5.9 m	ached: X YES 8.5 m	NO Requirements met:		
Liquid manùre storage vo Depth to water table: Depth to uppermost grou	5.9 m ndwater resource:	8.5 m	NO Requirements met:	{YES □ NO YES □ NO	in machine
Liquid manùre storage vo Depth to water table: Depth to uppermost grou ERST completed: 💢 see	5.9 m ndwater resource: ERST page for detai	8.5 m	NO Requirements met:	{YES □ NO YES □ NO	
Liquid manùre storage vo Depth to water table: Depth to uppermost grou	5.9 m ndwater resource: ERST page for deta	8.5 m	NO Requirements met:	{YES □ NO YES □ NO	
Liquid manùre storage vo Depth to water table: Depth to uppermost grou ERST completed: X see Surface water control s	5.9 m ndwater resource: ERST page for deta systems	8.5 m ils Details/comments:	NO Requirements met:	YES INO	
Liquid manure storage vo Depth to water table: Depth to uppermost grou ERST completed: See Surface water control s Requirements met:	5.9 m ndwater resource: ERST page for detains systems X YES _NO I	8.5 m ils Details/comments:	NO Requirements met:	YES INO	
Liquid manure storage vo Depth to water table: Depth to uppermost grou ERST completed: 🔍 see Surface water control s Requirements met: Compacted soil liner de	5.9 m ndwater resource: ERST page for detai systems X YES NO 1 etails	8.5 m ils Details/comments:	NO Requirements met:	YES INO	
Liquid manùre storage vo Depth to water table: Depth to uppermost grou ERST completed: 🔀 see Surface water control s	5.9 m ndwater resource: ERST page for detai systems X YES NO 1 etails	8.5 m ils Details/comments:	NO Requirements met:	YES INO	

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

NRCB USE ONLY						
LIQUID MANURE STORAGE VOLUME CALCULATOR (if applicable)						
Facility 1 Expanded EMS						
Facility 1 Expanded EMS						
Name / description	Capacity 13	3,972 m ³				
Facility 2						
Name / description	Capacity					
Facility 3						
Name / description	Capacity					
Facility 4						
Name / description	Capacity					
ΤΟΤΛ	AL CAPACITY	13,972 m ³				
REQUIRED 9 MONTH STORAG	GE CAPACITY	11,502 m ³				
MEETS THE REQUIREMENTS FOR A MINIMUM OF 9 MONT	HS STORAGE	XYES 🗆 NO				



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

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) 1. Barn Expansion Facility description / name (as indicated on site plan) 2. 3. Manure storage capacity (use one row in the table for EACH in-barn storage. Attach additional pages if you require more rows) NRCB USE ONLY Depth below ground Length (m) Width (m) Total depth (m) level (m) Calculated storage capacity (m³) 1. 0 0 25 37 2. 3. TOTAL CAPACITY - 1 **Concrete liner details** Method of sulphate protection Concrete thickness 511 Flyash Scrape alleys or unslatted portions of barn floors (if Concrete strength Concrete reinforcement size and spacing applicable) 30 MPA 10 mm Concrete thickness Method of sulphate protection In-barn manure pit floors Concrete strength Concrete reinforcement size and spacing Concrete thickness Method of sulphate protection In-barn manure pit Vertical reinforcement size and walls Concrete strength Horizontal reinforcement size and spacing spacing

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

Describe how the joints at the junction of the pit walls, pit floor Bentomite Describe sealing practices for piping, etc. that penetrates the line		
escribe sealing practices for piping, etc. that penetrates the lin		
Describe sealing practices for piping, etc. that penetrates the lin		
escribe sealing practices for piping, etc. that penetrates the lin		
reserve searing practices for piping, etc. that penetrates the in	ner	
DIL		
Bentomite		
0.0 01		
oncrete requirements can be found in Technical Guideline Agdex 096-93	NRCB USE ONLY	
uideline minimums: olid manure: 25MPa (D)	Requirements met	
olid manure (wet): 30MPa (C) quid manure: 32MPa (B)	Condition required	
ategory A is required to be engineered lethod of sulphate protection:	Condition required	
ype 50 or Type 10 with fly ash or equivalent		
Incestorage volume volume </th <th>NO Requirements met:</th> <th>YES 🗆 NO</th>	NO Requirements met:	YES 🗆 NO
8.5 m	_	
Depth to uppermost groundwater resource: 0.5 III	Requirements met:	YES INO
RST completed: 📈 see ERST page for details		
concrete liner requirements		
eakage detection system required:	NO If yes, please explain why	
Requirements not met as applicant did not list re-bar spatche concrete liner to meet the specifications for category 096-93 "Non-engineered concrete liners for manure colle	C (solid manure - wet) in Technical (

Last updated February 26, 2021



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

NRCB USE ONLY							
ALL SIGNATURES I	N FILE	XYES C	NO				
DATES OF APPROV	AL OFFICER SITE	/ISITS					
December 5, 2023							
October 21, 2024							
CORRESPONDENCE		LITIES AN		AL AG	GENCIES		
Date deeming letters sent	Feb 5, 2025						
Municipality:P							
K letter sent	K response received	🔀 writter	n/email	U ve	erbal		s received
Alberta Health Service	s: 💢 N/A						
Letter sent	response received	uritter writter	n/email	U ve	erbal	no comments	received
Alberta Environment ar	nd Parks: N/A	L.					
K letter sent	X response received	💢 writter	n/email	🗆 ve	erbal		s received
Alberta Transportation:	. 🗆 N/A	N					
ketter sent	Kresponse received	🕅 writter	n/email	🗆 ve	erbal		s received
Alberta Regulatory Serv	vices:	L.					
Ketter sent	response received	🔲 writter	n/email	🗌 ve	erbal	X no comments	s received
Other:Atco Gas and	l Pipelines Ltd				🗆 N/	А	
letter sent	response received	🗌 writter	y/email			no comments	received
letter sent			i/email			no comments	received
Other:					🗆 N/	A	
Letter sent	response received	uritter	n/email		erbal	no comments	s received



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 NW¹/4-23-42-27 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:

- 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

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

110373

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

PERMIT TO PRACTICE 2206165 ALBERTA LTD.
RM SIGNATURE:
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





Borehole Locations Site and Soil Assessment Amendment NW¹/₄-Sec.23-Twp.042-Rge.27-W4M Ponoka County, Alberta

Project No: 2401-430	50 Date: Septmeber 11, 2024	Figure No.:
Scale: 1:2700	Prepared By: L. Predy	1 1
Image Source: Google	004 Page 24 of 51	



SITE AND SOIL ASSESSMENT

Current Dairy Operation – Manure Storage Lagoon Expansion NW½-23-042-27 W4M

Ponoka County, Alberta

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Site and Soil Assessment Current Dairy Operation – Manure Storage Lagoon Expansion NW¹/4-23-42-27 W4M Ponoka County, Alberta

Prepared For: Willem Dominicus

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Project Number: 2401-43050

Private and Confidential



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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.

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 x 10 ⁻⁹

Table 1: Soil Properties Results

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/m³ 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:

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

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

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

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)

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

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





Appendix B

Borehole Logs



	Kor				LOG OF BORING 24	BH01		
	ENVIROWE	3				(Page 1 of 1)		
	Site and Soil Assessmen NW1/2-Sec.23-Twp.042-Rng.2 Ponoka County, Alberta Project Number: 2401-430	7-W4M	Driller: Drilling M Drill Date Logged B		: Owner : Skid Steer Auger : June 11, 2024 : Emily Low P.Eng.			
Dep in Mete	Gastech Reading (ppr	n) 400 500	VOC Reading	GRAPHIC	DESCRIPTION	Well: Elev.:	Water Level	
0.0 0.0 0.0 0.1 0.0 0.0 0.0 0.0					Top Soil SILTY CLAY, firm , damp, mottled brown, medium plasticity			

	Kor				LOG OF BORING 24	BH02		
	ENGINEERING	6				(Page 1 of 1)		
	Site and Soil Assessment NW1/2-Sec.23-Twp.042-Rng.27-W Ponoka County, Alberta Project Number: 2401-43050	/4M	Driller: Drilling M Drill Date Logged B		: Owner : Skid Steer Auger : June 11, 2024 : Emily Low P.Eng.			
Dept in Meter	Gastech Reading (ppm) 0 100 200 300 40	0 500 I	VOC Reading	GRAPHIC	DESCRIPTION	Well: Elev.:	Water Level	
0.0 0.0 0.0 0.0 0.1 0.1 0.1 0.1					Top Soil SILTY CLAY, firm , damp, mottled brown, medium plasticity			

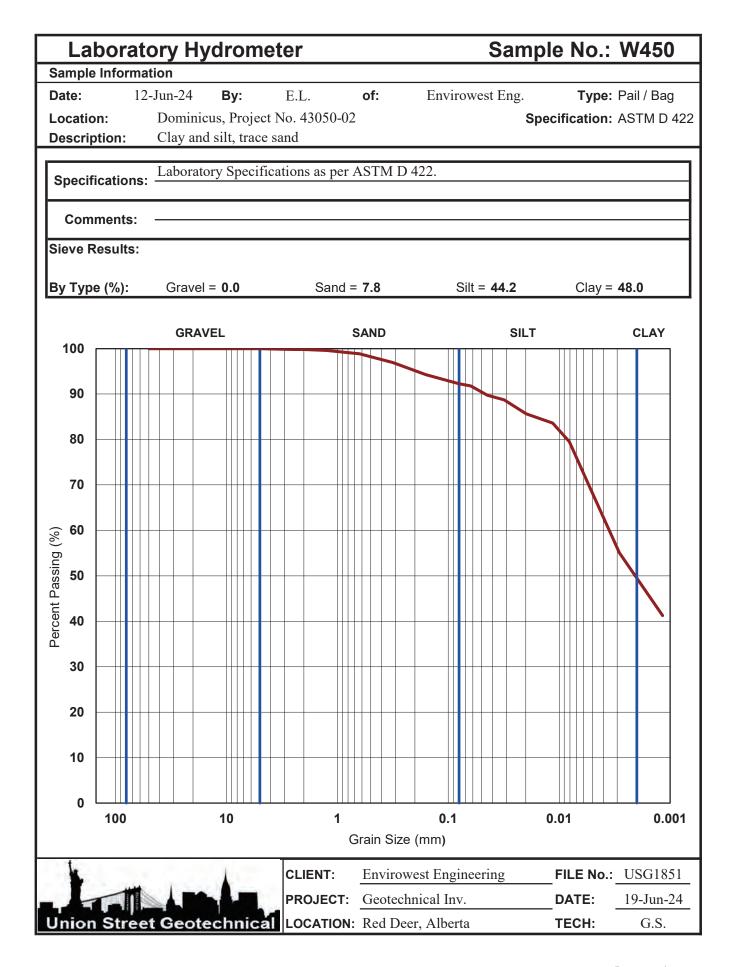
	Kon				LOG OF BORING 24	BH03		
	ENVIROWEST					(Page 1 of 1)		
	Site and Soil Assessment NW1/2-Sec.23-Twp.042-Rng.27-W4 Ponoka County, Alberta Project Number: 2401-43050	N	Driller: Drilling M Drill Date Logged E		: Owner : Skid Steer Auger : June 11, 2024 : Emily Low P.Eng.			
Dept in Meter	Gastech Reading (ppm) 0 100 200 300 400	500 I	VOC Reading	GRAPHIC	DESCRIPTION	Well: Elev.:	Water Level	
0.0 0.50-2024 Z:/Oberations/Client Data/43050 Willem Dominicus/24BH03.bol 2.0 3.0 3.0 3.1 5.1					Top Soil SILTY CLAY, firm , damp, mottled brown, medium plasticity			

Appendix C

Certificate of Analysis



Laborato	ory Pro	ctor			S	ample No.:	W450
Sample Informat	ion						
Date: 12-	-Jun-24	By:	E.L.	of:	Envirowe	st Eng. Type:	Pail
Location:	Dominicus	Project No	. 43050-02			Natural Moisture:	34.1 %
Description:	Clay and si	lt, trace sai	nd				
Specfication:	ASTM D 69	98 - Method	1 A				
Comments:							
Proctor Results:						Optimum I	Results:
Test Numbe	r 1	2	3	4	5	Moisture Content =	21.6 %
Dry Density (Kg/m ³) 1532	1545	1552	1531	1514		
Moisture Content (%) 17.4	19.7	21.6	25.3	27.3	Dry Density =	1553 Kg/m ³
Oversize	Correction (Ca	lculated usin	g assumed Spec	ific Gravity of	2.40)	Corrected Density =	1561 Kg/m ³
Oversize (%) 5	10	15	20	25		5
Density		1634	1675	1716	1757	Oversize Material =	1.0 %
1580 1560 1540 1540 1520 1520 1520 1500 1480 1480 1460 1440 1420 1400 10 11						Zero Air Voids	
			Moisture Co				
4		6	CLIENT:	Envirowest	t Engineerir	ng FILE No.:	USG1851
			PROJECT:	Geotechnic	cal Inv.	DATE:	18-Jun-24
Union Street	Geotech	nicál	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

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	Remould	ling Details					
Test Type: Mould Size:	Constant Head		ling Details					
Mould Size:	Constant Head Flexible Wall Re-moulded	Remould Max Dry Density (kg/m ³): Proctor ID:	ing Details - -					
Test Type: Mould Size: Sample Source: Fluid Used:	Flexible Wall	Max Dry Density (kg/m ³):	ing Details - - -					

Water Cor	ntent		9	Sample Siz	е		
Wet + Tare (g):	537.1	Trial	1	2	3	4	Average
Dry + Tare (g):	439.1	Diameter (mm):	73.3	73	73.4	73.1	73.2
Tare (g):	11.0	Length (mm):	77.9	78.3	78.2	77.7	78.0
Water Content (%):	22.9%	Weight (g)			656.4		

Area (cm ⁻):	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%

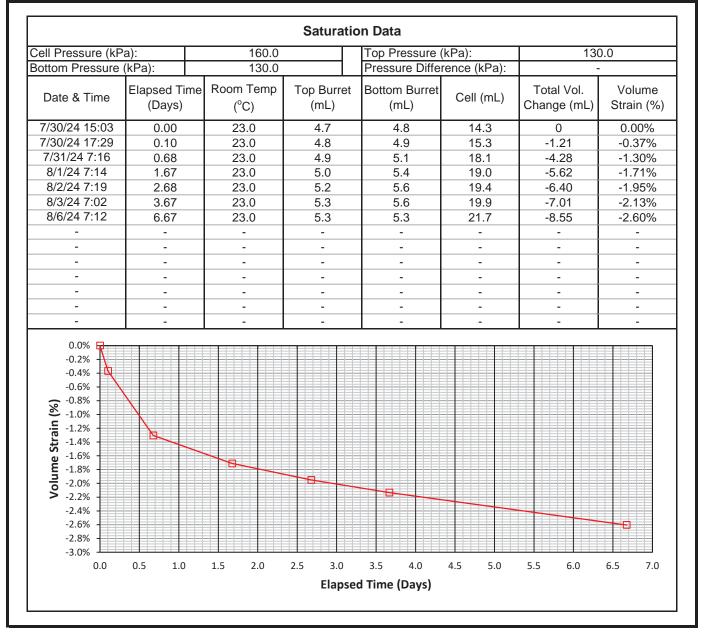
Final Sample Characteristics										
Water Cor	ntent		Sample Size							
Wet + Tare (g):	680.5	Trial	1	2	3	4	Average			
Dry + Tare (g):	546.8	Diameter (mm):	73.7	74.1	73.8	73.6	73.8			
Tare (g):	10.8	Length (mm):	78.4	78.3	78.3	78	78.3			
Water Content (%):	24.9%	Weight (g)			669.9					
Area (cm ²):		42.8	Specific Gravi		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 F	Porosity:			40.0%	, D			

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.

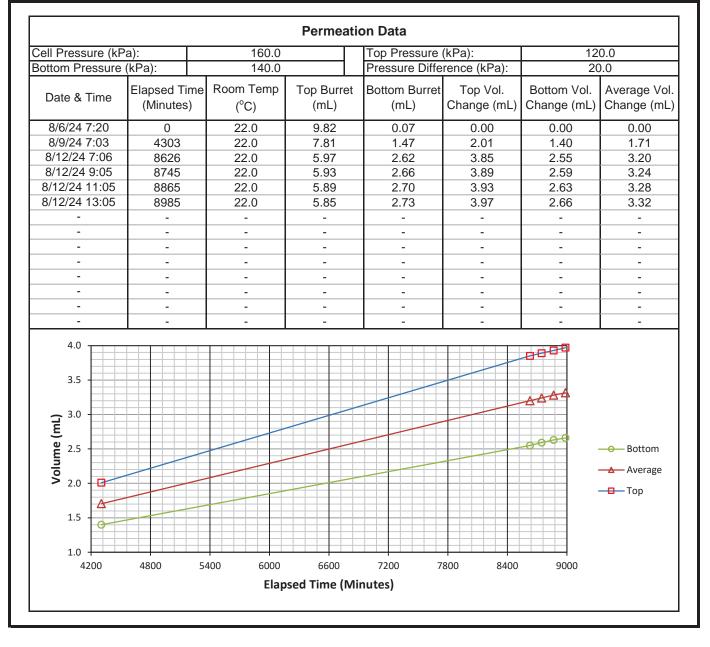
Project Name:	2024 Geotechnical Investigation	Depth:	
Project Number:	USG1851	Testing Company:	Union Street Geo.
Client:	Dominicus	Field Technician:	E.L.
Testhole:		Sample Date:	June 2024
Location:		Lab Technician:	B.B.
Sample Number:	W450	Date Tested:	16 August, 2024

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Project Number:	USG1851	Testing Company:	Union Street Geo.
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Project Number:	USG1851	Testing Company:	Union Street Geo.
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