

Part 2 – Technical Requirements

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	RA25044	NE 16-35-1 W5M

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.

Mark Vaessen

Date of signing

02-02-2026

Corporate name (if applicable)

MMH Vaessen

Digitaal ondertekend door MMH Vaessen
Datum: 2026.02.02 13:36:09 -07'00'

Signature

M. Vaessen

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)
Lagoon	73x73x4
Dairy Barn	120x70
Milkhouse attached to dairy barn	40x25
Outdoor solid pad	10x6
Heifer Barn	100x30

Existing facilities: list ALL existing confined feeding operation facilities and their dimensions		
Existing facilities	Dimensions (m) (length, width, and depth)	NRCB USE ONLY
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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 november 2029

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
Applicant is purposing 200 milking cows plus associated dries and replacements			

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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)

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) in progress

Signed this 2 day of february, 2026.

MMH Vaessen

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Datum: 2026.02.02 13:34:54 -07'00'

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

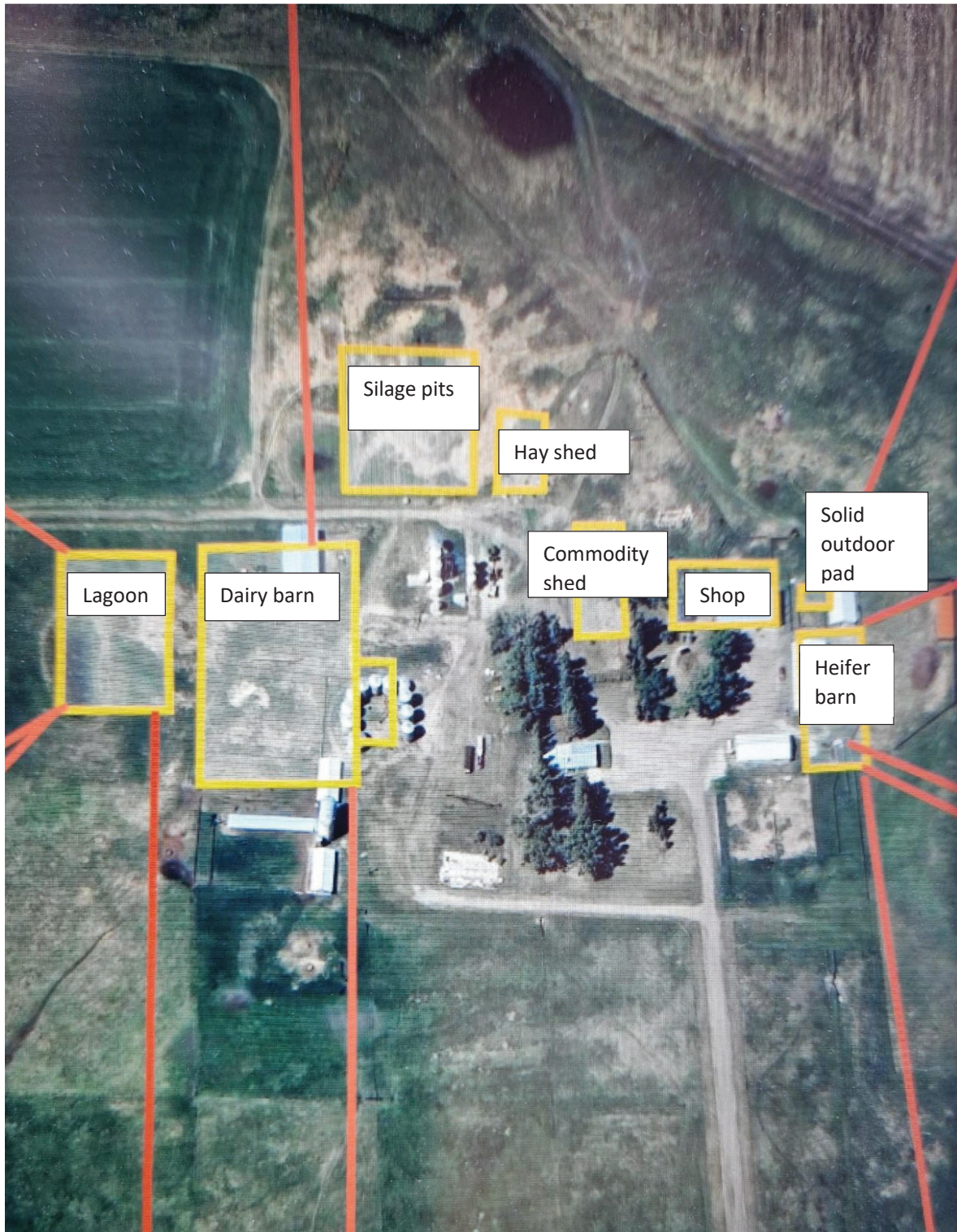
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OPTION 4: Uncertain if *Water Act* licence is needed; acknowledgement of risk (for existing CFOs only)

1. At this time, I (we) do not know whether a new water licence is needed from EPA under the *Water Act* for the development or activity proposed in this AOPA application.
2. If a new *Water Act* licence is needed, 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 additional 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 my *Water Act* licence application, if a new water licence is needed.
5. I (we) acknowledge that any such construction or livestock increase 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 license number(s) or water conveyance agreement details _____

Signed this ____ day of _____, 20____.

Signature of Applicant or Agent



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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: _____

Proposed 1: Dairy barn

Proposed 2: Lagoon

Proposed 3: Heifer barn

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?		1	0	0	☐ 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)		195m	229m	105m	☐ YES ☐ NO ☐ YES with exemption	
Groundwater information	What is the depth to the water table?		-	5,3m	-	☐ YES ☐ NO ☐ YES with exemption	
	What is the depth to the groundwater resource/aquifer you draw water from?		30m	30m	30m	☐ YES ☐ NO ☐ YES with exemption	

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

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

Neighbour name(s)	Legal land description	Distance (m)	NRCB USE ONLY				
			Zoning (LUB) category	MDS category (1-4)	Distance (m)	Waiver attached (if required)	Meets regulations
house on Cotton wood road	SW	1386					
range road 13	east	454					
little Red Deer Community hall	North	1011					
house on Cotton Wood Road	SE	1526					

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

Name of land owner(s)*	Legal land description	Usable area** (ha)	Soil zone ***	NRCB USE ONLY	
				Usable area (ha)	Agreement attached (if required)
Vaessen Farms	5;1;35;16;NE	35	Black		
Vaessen Farms	5;1;35;16;SE	60	Black		
Vaessen Farms	5;1;35;16;SW	33	Black		
Vaessen Farms	5;1;35;16;NW	64	Black		
Total					

* 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)

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LIQUID MANURE STORAGE: Earthen manure storage (EMS): Naturally occurring protective layer (complete a copy of this section for **EACH** proposed earthen liquid manure storage facility with a naturally occurring protective layer)

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 (m ³) (excl. 0.5 m freeboard)	Filled in lower 1/4? Y/N
1.	73	73	4	3.3	3:1	3:1	4:1		
2.									
TOTAL CAPACITY									

Surface water control systems

Describe the run-on and runoff control system
berms for run on
building adequate for run off

Naturally occurring protective layer details

Thickness of naturally occurring protective layer	_____ (m)	Provide details (as required) see attached report	
Soil texture	_____ % sand	_____ % silt	_____ % clay
Hydraulic conductivity - naturally occurring protective layer	Depth and type of soil tested	Hydraulic conductivity (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

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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. Dairy barn
2. in barn pits
- 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.	120	70	0	0	
2.	70	3	max 2.40	max 2.40	
3.	70	3	max 2.40	max 2.40	
TOTAL CAPACITY					

Concrete liner details

Scrape alleys or unslatted portions of barn floors (if applicable)	Concrete thickness meet nrcb requirements		Method of sulphate protection meet nrcb requirements	
	Concrete strength meet nrcb requirements		Concrete reinforcement size and spacing meet nrcb requirements	
In-barn manure pit floors	Concrete thickness meet nrcb requirements		Method of sulphate protection meet nrcb requirements	
	Concrete strength meet nrcb requirements		Concrete reinforcement size and spacing meet nrcb requirements	
In-barn manure pit walls	Concrete thickness meet nrcb requirements		Method of sulphate protection meet nrcb requirements	
	Concrete strength meet nrcb requirements	Horizontal reinforcement size and spacing meet nrcb requirements	Vertical reinforcement size and spacing meet nrcb requirements	

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SOLID MANURE, COMPOST, & COMPOSTING MATERIALS: Barns, feedlots, & storage facilities - Concrete liner

(complete a copy of this section for **EACH** barn, feedlot, and storage facility for solid manure, composting materials, or compost with a concrete liner)

Facility description / name (as indicated on site plan) 1. heifer barn
2. outdoor solid pad

Manure storage capacity

	Length (m)	Width (m)	Depth below grade to the bottom of the liner (m)	NRCB USE ONLY Estimated storage capacity (m ³)
1.	100	30		
2.	10	6		
TOTAL CAPACITY				

☐ I plan to use a short-term solid manure storage (STMS) as part of my manure storage and handling plan for this CFO. The AOPA requirements for STMS are set out in the NRCB [Short-Term Solid Manure Storage Requirements Fact Sheet](#).

Surface water control systems

Describe the run-on and runoff control system
heifer barn is indoor
outdoor pad we use concrete blocks on concrete liner

Liner protection

Describe how the physical integrity of the liner will be maintained
general repair maintenance

NRCB USE ONLY

Requirements met: ☐ YES ☐ NO

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SOLID MANURE, COMPOST, & COMPOSTING MATERIALS: Barns, feedlots, & storage facilities - Concrete liner (cont.)

Concrete liner details

Concrete thickness will meet nrcb requirements	Method of sulphate protection: will meet nrcb requirements
Concrete strength will meet nrcb requirements	Concrete reinforcement size and spacing will meet nrcb requirements

Concrete requirements can be found in Technical Guideline Agdex 096-93

Guideline minimums:

Solid manure: 25MPa (D)

Solid manure (wet): 30MPa (C)

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

Report attached: ☐ YES ☐ NO

Additional information *(attach as required)*

NRCB USE ONLY

Nine month manure storage volume requirements met ☐ YES ☐ YES With STMS ☐ 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:

Concrete liner details

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



SITE AND SOIL ASSESSMENT

Proposed Liquid Manure Storage
NE $\frac{1}{4}$ -16-035-01-W5M

Red Deer County, Alberta



**Site and Soil Assessment
Proposed Liquid Manure Storage
NE¼-16-035-01-W5M
Red Deer County, Alberta**

Prepared For: Mark and Marian Vaessen

Delivered via Email: [REDACTED]

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

Report Date: November 24, 2025

Project Number: 2507-43092

Private and Confidential



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1.0 Introduction and Scope of Work

Envirowest Engineering (Envirowest) was retained by Mark and Marian Vaessen to conduct a Site and Soil Assessment for the proposed construction of an earthen manure storage (EMS) lagoon for a new dairy operation.

The assessment was completed to determine conditions beneath the proposed construction area and assess soil properties for construction of the proposed EMS. The operation, herein referred to as “the Site,” is located on NE¼-16-035-01-W5M in Red Deer County.

The assessment has been completed in accordance with the standards and regulations associated with the amended Agricultural Operation Practices Act (GOA, 2025) and associated regulations which govern all new and modified confined feeding operations.

Scope of Work

Three investigative boreholes were drilled using a truck-mounted rotary auger and completed to maximum depths of 7.5 metres below ground surface (mbgs) on July 31, 2025. The boreholes were completed in the area of the proposed EMS. The borehole locations are shown on Figure 1.0 (attached).

One borehole was completed as a groundwater monitoring well within borehole 25BH01 to allow for in-situ hydraulic conductivity testing, which was completed between November 7 and 14, 2025.

One borehole was completed as a 2.54 cm piezometer within borehole 25BH02 to allow for the assessment of the depth of the water table. An uppermost groundwater resource (UGR) was conservatively determined to be below 7.5 mbgs. No further assessment was completed to confirm the UGR.

Representative soil samples were collected from boreholes within the proposed construction area and was submitted to an accredited third-party laboratory for analysis of soil properties.



2.0 Assessment Results

The proposed area of construction is relatively flat. The area surrounding the proposed construction is primarily used for cultivation, with some pastures. A partially treed area and residence is located to the north.

Potential liner construction material (noted in the borehole logs as sandy clay) was found just below surface to 3.0 mbgs, however intermittent dry loose sand/silt was noted at surface to 1.5 meters in all boreholes. A potential natural barrier material was found below the sandy clay from approximately 3.0 mbgs to the depth of investigation (noted in the borehole logs as silty clay).

Bedrock was not encountered to the maximum depth of investigation (7.5 mbgs).

Boreholes were backfilled with the material removed by back spinning the solid stem auger and compacting to depth of the borehole.

A piezometer was installed at the location of the proposed earthen manure storage lagoon, to a depth of 7.5 mbgs. Depth to groundwater was measured to be 5.32 mbgs on August 7, 2025. Wet to saturated material was noted in borehole 25BH01 at 7.25 mbgs and 5.5 mbgs during the soil investigation.

Remaining boreholes were backfilled with the material removed by back spinning the solid stem auger and compacting to depth of the borehole.

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 1.0, and borehole logs are attached.



Table 1: Soil Properties Results

Parameter	25BH01-01	25BH01-02	25BH01-03	25BH02-01	25BH03-01	Composite
Sample Depth (mbgs)	2.75	3.25	6.75	2.5	3.75	1.75-3.0
Particle Size (%sand)	30	<2	35	<2	3	1.8
Particle Size (%silt)	25	41	36	40	36	48.5
Particle Size (%clay)	46	58	30	59	62	49.7
Texture Class	Clay	Silt Clay	Clay Loam	Clay	Heavy Clay	Silt Clay
Plastic Limit (%)	-	-	-	-	-	23.9
Liquid Limit (%)	-	-	-	-	-	51.4
Plasticity Index (%)	-	-	-	-	-	27.5
Hydraulic Conductivity (Lab)	-	-	-	-	-	2.02×10^{-8}
Hydraulic Conductivity (Field)	-	-	2.78×10^{-7}	-	-	2.02×10^{-7}

The samples highlighted in brown were also included in the composite sample for compacted liner analysis. Soil from 1.75 to 3.0 mbgs from all three boreholes were included in the composite sample.

The soils suspected to be suitable for a potential clay liner are italicized were identified as clay with a clay content ranging from 46 – 59 %.

The composite soils were determined to be silt clay. The hydraulic conductivity was determined to be 2.02×10^{-8} cm/sec at 99% compaction. The maximum dry density was found to be 1,652 kg/m³ with an optimum moisture content of 21.5%.

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.” Therefore, the field hydraulic conductivity of the composite material tested is determined to be 2.02×10^{-7} cm/sec.



The monitoring well installed at borehole 25BH01 (25MW01) was sufficiently hydrated prior to completing the in-situ hydraulic conductivity testing. The in-situ hydraulic conductivity test was completed between November 7 and 14, 2025. The monitoring well was placed to assess the suspected natural barrier, and was screened from 6.0 to 7.5 meters below ground surface (mbgs) with bentonite filling the annulus from surface to 7.5 mbgs.

The initial depth to water was measured in the well. A microdiver was installed to log and measure water level, temperature, and time. A volume of water was then removed from the well and the change in depth measured over time to assess hydraulic conductivity of the clay strata. It is assumed (as per AGDEX 096-01) that all flow occurs under saturated conditions. The depth was measured every 30 seconds for 1 week. The results of the test were analyzed as a falling head test using AQTESOLV Bouwer-Rice method for unconfined wells. The results of the assessment were an in-situ hydraulic conductivity of 2.78×10^{-7} cm/sec.



3.0 Liner Assessments

3.1 Compacted Earthen Liner Assessment (Liquid Earthen Manure Storage)

Based on the information obtained, it was determined that the native clay within the proposed area of construction was found from 1.75 and 3.0 mbgs.

Minimum Required Liner Depth for EMS:

$$\frac{1 \text{ m}}{1 \times 10^{-7} \text{ cm/sec}} = \frac{X \text{ m}}{2.02 \times 10^{-7} \text{ cm/sec}}$$

$$X = 2.02 \text{ m}$$

A compacted liner alone would require a thickness of 2.02 m.

3.2 Natural Barrier Assessment (Liquid Earthen Manure Storage)

Based on the information obtained it was determined that the native clay within the proposed area of construction for liquid manure storage was found from approximately 3.0 mbgs to the maximum depth of investigation to a maximum of 7.5 meters.

Minimum Required Liner Depth for a natural barrier for liquid manure storage:

$$\frac{10 \text{ m}}{1 \times 10^{-6} \text{ cm/sec}} = \frac{X \text{ m}}{2.78 \times 10^{-7} \text{ cm/sec}}$$

$$X = 2.78 \text{ m}$$

A minimum of 2.78 m of native clay is required to be present to provide a sufficient protective barrier.



3.3 Equivalent Calculation

It is proposed that a combination of a compacted liner and a natural barrier are utilized. The following was an iterative calculation to optimize the depth of the lagoon (below grade) while taking into account the depth to groundwater, natural barrier and clay liner properties as well as sufficient lateral and vertical protection.

$$\frac{b}{K} = \sum_{i=1}^n \left(\frac{b_i}{K_i} \right) = \frac{\text{Compacted Liner Thickness}}{2.02 \times 10^{-7}} + \frac{\text{Natural Barrier Thickness}}{2.78 \times 10^{-7}}$$

It was determined that a compacted liner thickness of 1.0 m and a natural barrier thickness of 1.5 m would provide equivalent protection to that required by AOPA for a liquid manure storage.



4.0 Conclusions

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

The that will be excavated are appropriate for a compacted liner and soils beneath the proposed area of construction were determined to be appropriate for a naturally occurring protective layer for a liquid EMS lagoon.



5.0 Design and Construction Considerations

5.1 Earthen Manure Storage Lagoon

Earthen Lagoon Storage Sizing

The new liquid EMS facility was designed for 290 head including dries and replacements for a 12 months storage (12,354 m³). The manure storage lagoon is recommended to have the following specifications:

- To provide the required capacity the new EMS should be 73 m in length x 73 m in width. The overall depth has been designed as 4.0 m. The overall capacity of the new EMS will be 15,076 cubic metres (3.3 million imperial gallons) which accounts for the required 0.5 m of freeboard, a storage capacity of 12,519 cubic metres. 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 depth of 3.3 m as measured from borehole 25BH02 and above-grade dykes of 0.7 m. The outside dyke walls should be completed to at 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.
- 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
- If any significant amount of coarse grained material is encountered, the NRCB or the engineer should be contacted prior to proceeding
- 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 and overburden 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 within 10 meters of the facility



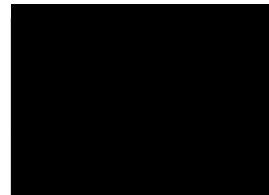
6.0 Closure

Envirowest Engineering is pleased to submit the report to Mark and Marian Vaessen. 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,



November 25, 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 #: <u>110373</u>
DATE: <u>November 25, 2025</u>
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



7.0 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 6 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).



8.0 References

- GOA (Government of Alberta). (2025). Agricultural Operation Practices Act and Regulations. Edmonton, AB: Author.
- GOA (Government of Alberta). (2025). Agricultural Operation Practices Act: Standards and Administration Regulation. Edmonton, AB: Author.

Appendix A

Figures





Title:

Site Location
Site and Soil Assessment
NE-16-035-01-W5M
Red Deer County, Alberta

Project No:

2507-43092

Date:

November 25, 2025

Scale:

Prepared By:

L. Predy

Image Source:

Application RA25044 Page 28 of 50
Google Earth Pro (2025)

Figure No.:

1.0



Proposed EMS Lagoon



Title:

Site Plan
 Site and Soil Assessment
 NE-16-035-01-W5M
 Red Deer County, Alberta

Project No:
 2507-43092

Date:
 November 25, 2025

Figure No.:

Scale:
 1:3700

Prepared By:
 L. Predy

Image Source:
 Google Earth Pro (2023)

2.0

Appendix B
Borehole Logs





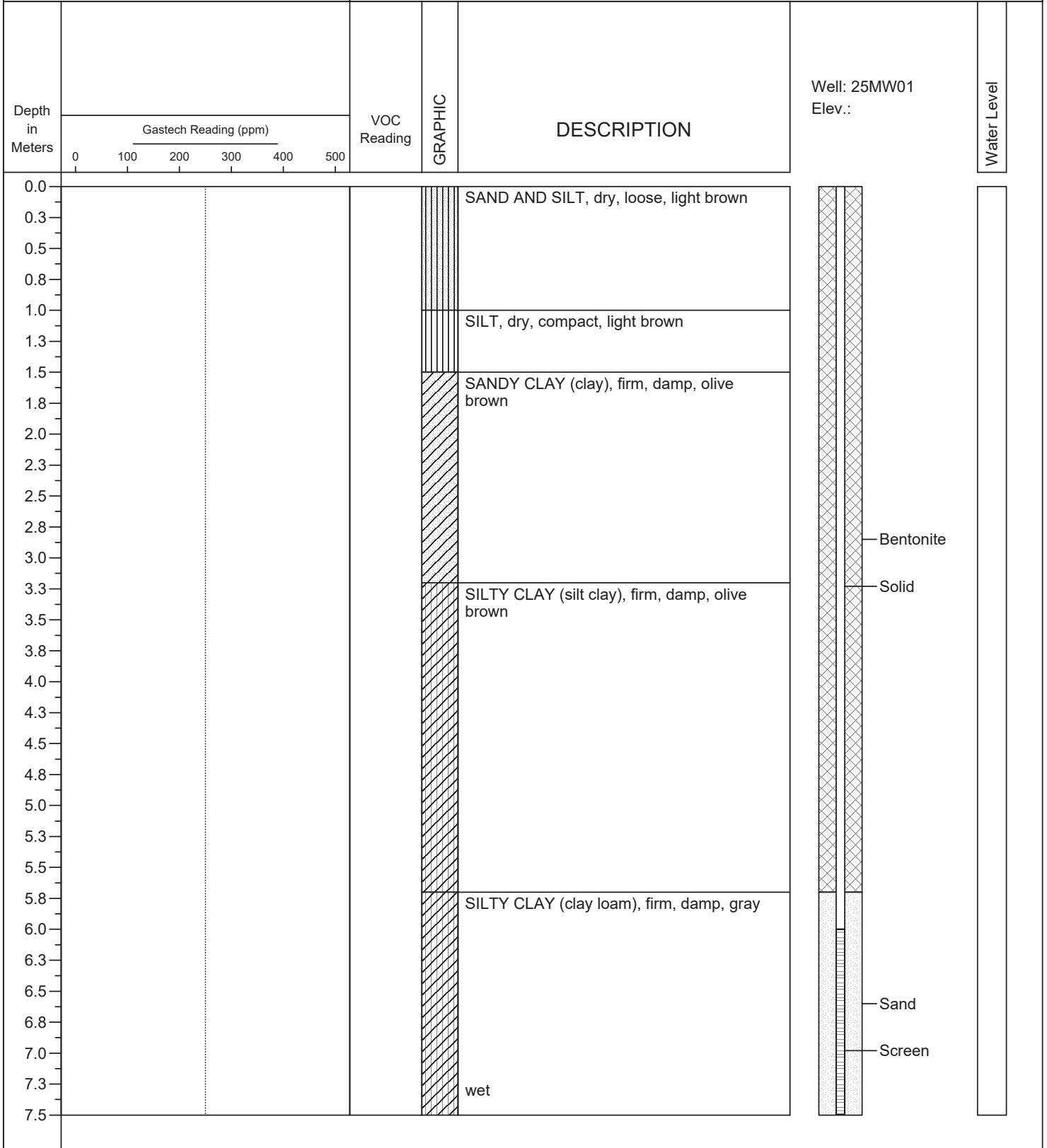
LOG OF BORING 25BH01

(Page 1 of 1)

Site and Soil Assessment
NE-16-35-1-W5
Red Deer County, Alberta

Driller: : Evergreen Drilling
Drilling Method: : Truck Mounted Auger
Drill Date : July 31, 2025
Logged By: : Emily Low P.Eng.

Project Number: 2507-43092





LOG OF BORING 25BH02

(Page 1 of 1)

Site and Soil Assessment
NE-16-35-1-W5
Red Deer County, Alberta

Driller: : Evergreen Drilling
Drilling Method: : Truck Mounted Auger
Drill Date : July 31, 2025
Logged By: : Emily Low P.Eng.

Project Number: 2507-43092

Depth in Meters	Gastech Reading (ppm)	VOC Reading	GRAPHIC	DESCRIPTION	Well: 25MW02 Elev.:	Water Level
0.0				SILT, trace sand, dry, loose, light brown		
0.3						
0.5						
0.8						
1.0						
1.3						
1.5						
1.8				SILT CLAY (clay), firm, olive brown, damp, medium plasticity		
2.0						
2.3						
2.5						
2.8						
3.0						
3.3						
3.5						
3.8						
4.0						
4.3						
4.5						
4.8						
5.0						
5.3						
5.5				saturated		
5.8						
6.0						



LOG OF BORING 25BH03

(Page 1 of 1)

Site and Soil Assessment
NE-16-35-1-W5
Red Deer County, Alberta

Driller: : Evergreen Drilling
Drilling Method: : Truck Mounted Auger
Drill Date : July 31, 2025
Logged By: : Emily Low P.Eng.

Project Number: 2507-43092

Depth in Meters	Gastech Reading (ppm)	VOC Reading	GRAPHIC	DESCRIPTION	Well: Elev.:	Water Level
0.0				SANDY CLAY, damp, firm, low plasticity		
0.3						
0.5						
0.8						
1.0						
1.3						
1.5						
1.8						
2.0						
2.3				medium plasticity		
2.5						
2.8						
3.0						
3.3						
3.5						
3.8						
4.0						
4.3						
4.5						
4.8						
5.0						
5.3						
5.5						
5.8						
6.0						

Appendix C
Certificate of Analysis



Laboratory Proctor

Sample No.: W828

Sample Information

Date: 05-Aug-25 By: Amber of: Envirowest Type: Pail
Location: - Natural Moisture: 29.4 %
Description: Clay and silt, trace sand.

Specification: ASTM D 698 - Method A

Comments:

Proctor Results:

Test Number	1	2	3	4	5
Dry Density (Kg/m ³)	1526	1552	1600	1650	1647
Moisture Content (%)	15.1	16.2	18.1	20.8	22.5

Oversize Correction (Calculated using assumed Specific Gravity of 2.40)

Oversize (%)	5	10	15	20	25
Density	1688	1724	1759	1795	1831

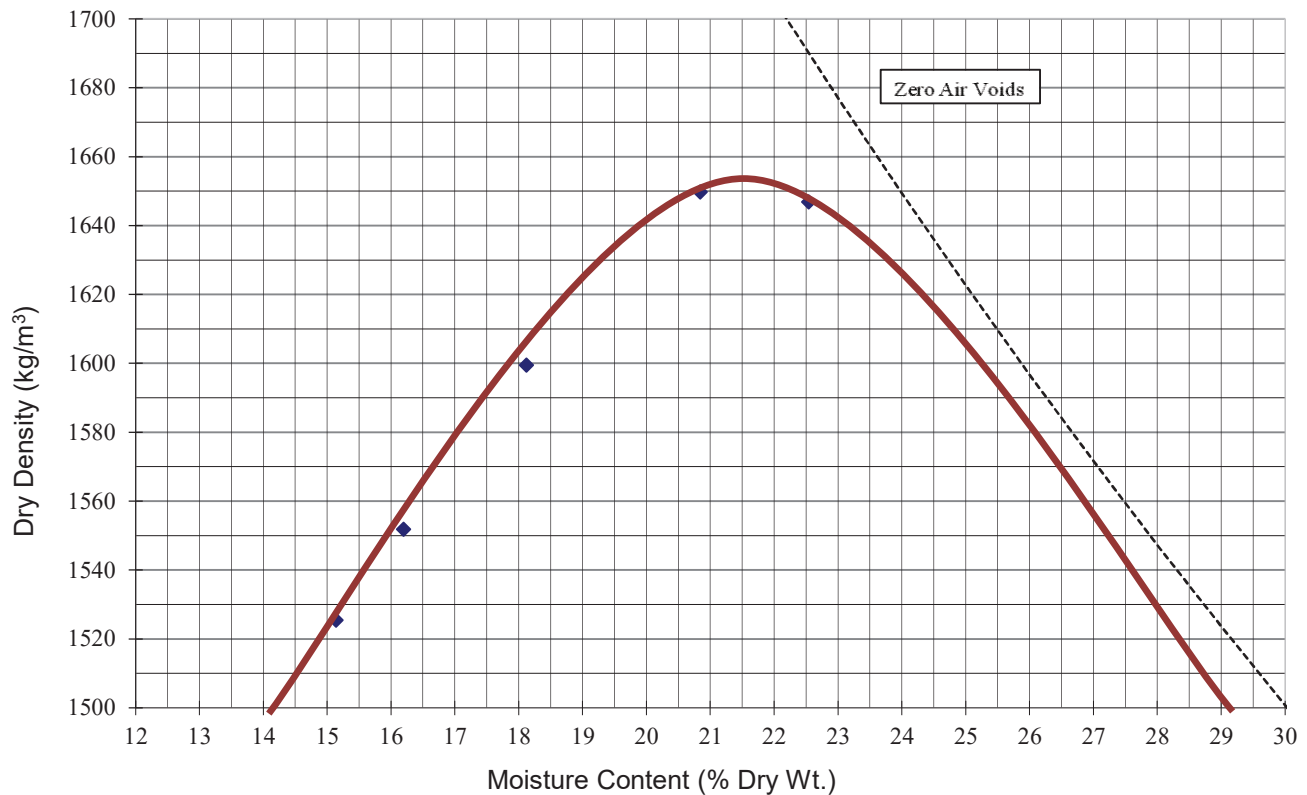
Optimum Results:

Moisture Content = 21.5 %

Dry Density = 1652 Kg/m³

Corrected Density = 1655 Kg/m³

Oversize Material = 0.4 %



CLIENT: Envirowest Eng.

FILE No.: USG2178

PROJECT: Geotech. Inv.

DATE: 15-Aug-25

LOCATION: Red Deer, Alberta

TECH: C.K.

Laboratory Hydrometer

Sample No.: W828

Sample Information

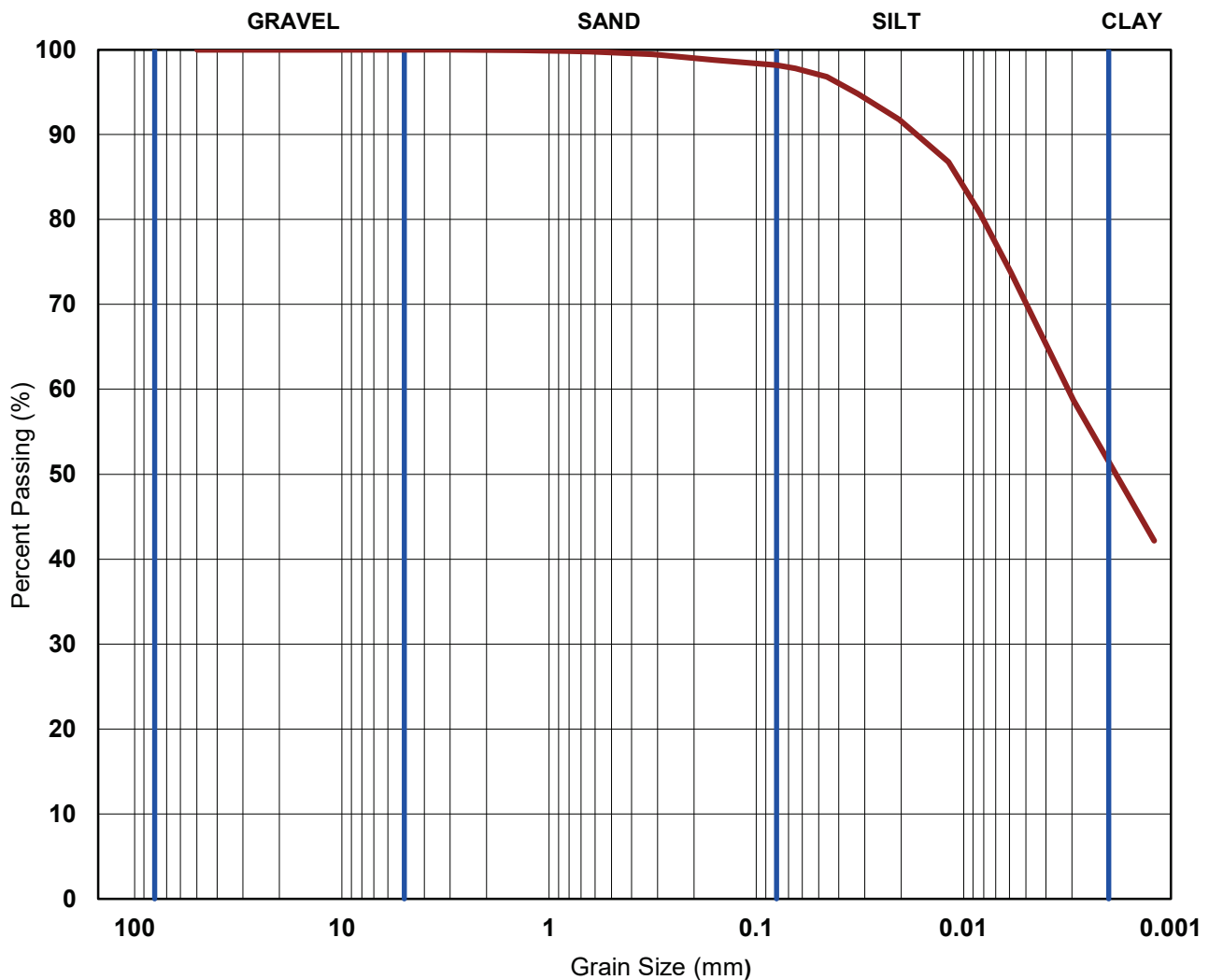
Date: 05-Aug-25 By: Amber of: Envirowest Type: Pail / Bag
Location: - Specification: ASTM D 422
Description: Clay and silt, trace sand

Specifications: Laboratory Specifications as per ASTM D 422.

Comments:

Sieve Results:

By Type (%): Gravel = 0.0 Sand = 1.8 Silt = 48.5 Clay = 49.7



CLIENT: Envirowest Eng.

FILE No.: USG2178

PROJECT: Geotech. Inv.

DATE: 25-Aug-25

LOCATION: Red Deer, Alberta

TECH: G.S.

Project Name: Geotech. Inv.
 Project Number: USG2178
 Client: Envirowest Eng.
 Testhole:
 Location:
 Sample Number: W828

Depth:
 Testing Company: Union Street Geo.
 Field Technician: Amber
 Sample Date: 5 August, 2025
 Lab Technician: B.B.
 Date Tested: 27 August, 2025

Flexible Wall Permeameter (ASTM D5084)

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	Remoulding Details	
Mould Size:	Flexible Wall	Max Dry Density (kg/m ³):	-
Sample Source:	Re-moulded	Proctor ID:	-
Fluid Used:	Deaired Water	Percent Max (%):	-
Fluid Reservoir:	Burrettes	Target Dry Density (kg/m ³):	-

Initial Sample Characteristics

Water Content		Sample Size				
Wet + Tare (g):	586.2	Trial	1	2	3	Average
Dry + Tare (g):	477.0	Diameter (mm):	73.6	73.8	73.6	73.7
Tare (g):	14.4	Length (mm):	74.2	74.4	74.4	74.4
Water Content (%):	23.6%	Weight (g)	631.8			
Area (cm ²):	42.7	Specific Gravity (Note 2):	2.69			
Volume (cm ³):	317.4	Void Ratio:	0.67			
Wet Density (kg/m ³):	1991	Saturation:	94.7%			
Dry Density (kg/m ³):	1610	Porosity:	40.1%			

Final Sample Characteristics

Water Content		Sample Size				
Wet + Tare (g):	647.4	Trial	1	2	3	Average
Dry + Tare (g):	519.9	Diameter (mm):	73.5	73.6	73.5	73.6
Tare (g):	12.1	Length (mm):	74.3	74.6	74.7	74.6
Water Content (%):	25.1%	Weight (g)	636.3			
Area (cm ²):	42.5	Specific Gravity (Note 1):	2.69			
Volume (cm ³):	316.7	Void Ratio:	0.68			
Wet Density (kg/m ³):	2009	Saturation:	100.0%			
Dry Density (kg/m ³):	1606	Porosity:	40.3%			

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: Geotech. Inv.
 Project Number: USG2178
 Client: Envirowest Eng.
 Testhole:
 Location:
 Sample Number: W828

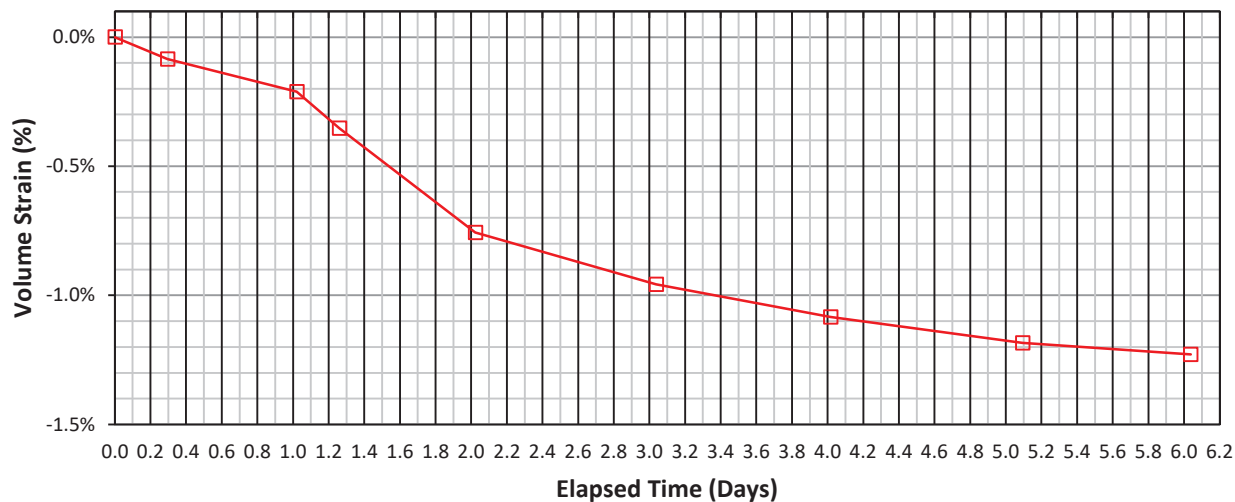
Depth:
 Testing Company: Union Street Geo.
 Field Technician: Amber
 Sample Date: 5 August, 2025
 Lab Technician: B.B.
 Date Tested: 27 August, 2025

Flexible Wall Permeameter (ASTM D5084)

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 (°C)	Top Buret (mL)	Bottom Buret (mL)	Cell (mL)	Total Vol. Change (mL)	Volume Strain (%)
8/27/25 7:08	0.00	22.0	4.6	4.6	14.2	0	0.00%
8/27/25 14:13	0.30	24.0	4.6	4.6	14.4	-0.27	-0.09%
8/28/25 7:37	1.02	23.0	4.7	4.9	14.5	-0.67	-0.21%
8/28/25 13:21	1.26	22.0	4.7	5.1	14.7	-1.12	-0.35%
8/29/25 7:41	2.02	22.0	4.8	5.2	15.8	-2.40	-0.76%
8/30/25 8:02	3.04	22.0	4.8	5.4	16.2	-3.04	-0.96%
8/31/25 7:31	4.02	22.0	4.9	5.5	16.4	-3.44	-1.08%
9/1/25 9:21	5.09	22.0	4.9	5.6	16.6	-3.76	-1.18%
9/2/25 8:00	6.04	22.0	4.9	5.7	16.7	-3.90	-1.23%
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-



Project Name: Geotech. Inv.
 Project Number: USG2178
 Client: Envirowest Eng.
 Testhole:
 Location:
 Sample Number: W828

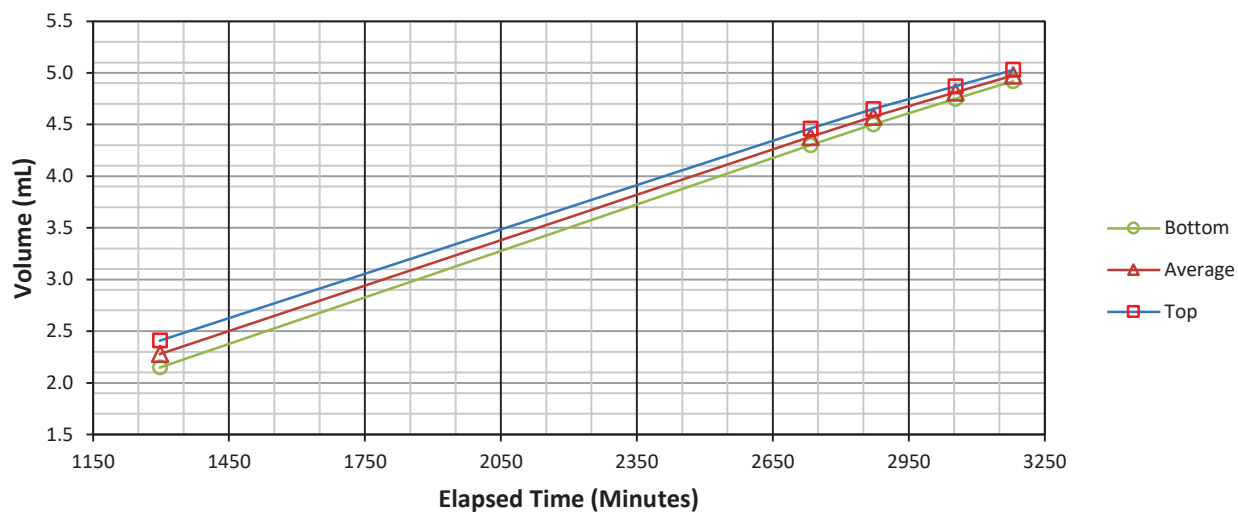
Depth:
 Testing Company: Union Street Geo.
 Field Technician: Amber
 Sample Date: 5 August, 2025
 Lab Technician: B.B.
 Date Tested: August 27, 2025

Flexible Wall Permeameter (ASTM D5084)

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 (°C)	Top Burret (mL)	Bottom Burret (mL)	Top Vol. Change (mL)	Bottom Vol. Change (mL)	Average Vol. Change (mL)
9/2/25 9:52	0	21.0	9.76	0.07	0.00	0.00	0.00
9/3/25 7:29	1297	21.0	7.35	2.22	2.41	2.15	2.28
9/4/25 7:25	2733	21.0	5.30	4.37	4.46	4.30	4.38
9/4/25 9:43	2871	21.0	5.11	4.57	4.65	4.50	4.58
9/4/25 12:45	3053	21.0	4.89	4.82	4.87	4.75	4.81
9/4/25 14:52	3180	21.0	4.73	4.99	5.03	4.92	4.98
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-



Project Name: Geotech. Inv.
 Project Number: USG2178
 Client: Envirowest Eng.
 Testhole:
 Location:
 Sample Number: W828

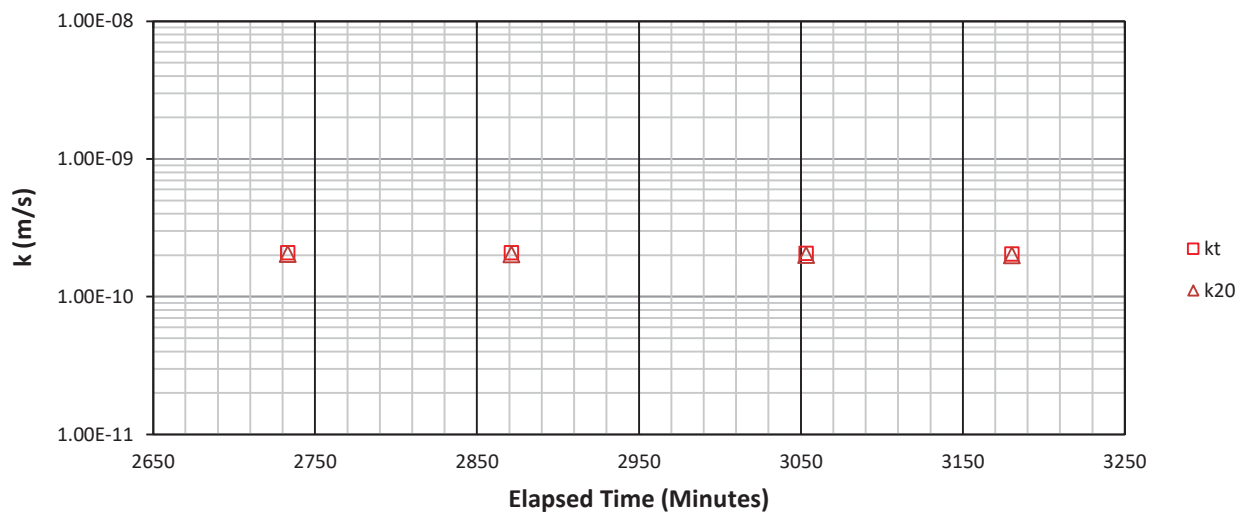
Depth:
 Testing Company: Union Street Geo.
 Field Technician: Amber
 Sample Date: 5 August, 2025
 Lab Technician: B.B.
 Date Tested: August 27, 2025

Flexible Wall Permeameter (ASTM D5084)

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)	4.257E-03			
Length of Sample (m):		7.448E-02			Gradient, i		2.738E+01	
Elapsed Time (Minutes)	Average Volume Change (mL)	Average Temperature (°C)		k _t (m/s)	R _T		k ₂₀ (m/s)	
2733	4.38	21.0		2.091E-10	0.976		2.041E-10	
2871	4.58	21.0		2.085E-10	0.976		2.035E-10	
3053	4.81	21.0		2.060E-10	0.976		2.011E-10	
3180	4.98	21.0		2.047E-10	0.976		1.997E-10	
-	-	-		-	-		-	
-	-	-		-	-		-	
-	-	-		-	-		-	
-	-	-		-	-		-	
-	-	-		-	-		-	
-	-	-		-	-		-	
-	-	-		-	-		-	
-	-	-		-	-		-	
-	-	-		-	-		-	
-	-	-		-	-		-	
-	-	AVERAGE		2.071E-10			2.021E-10	



Lab Unified Soils Classification

Sample No.: W828

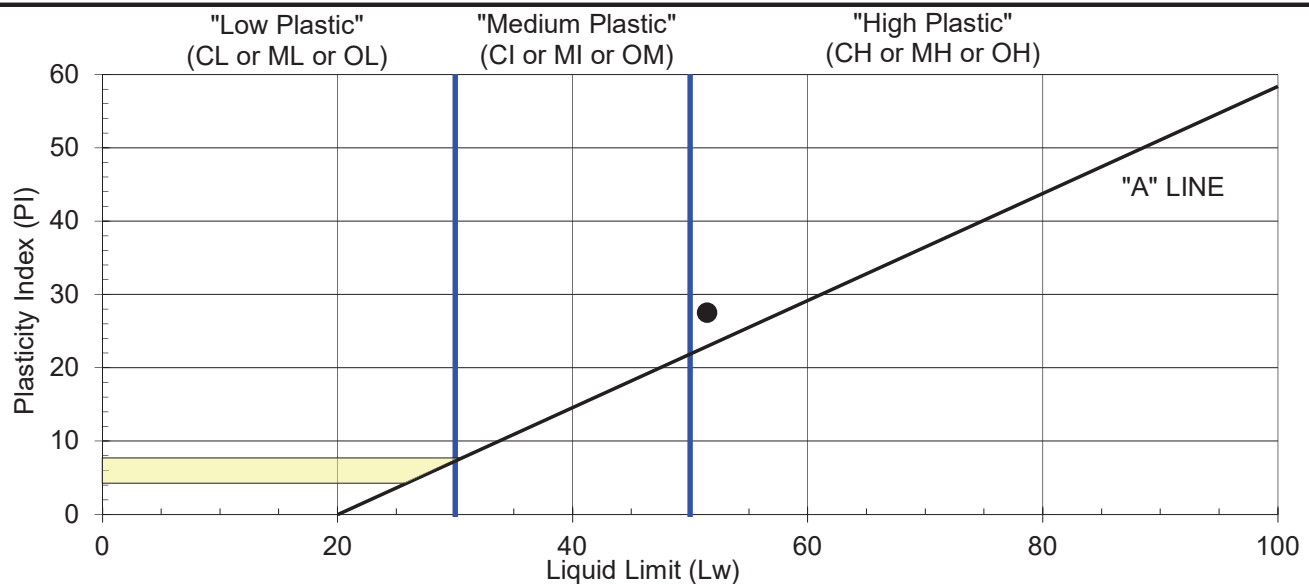
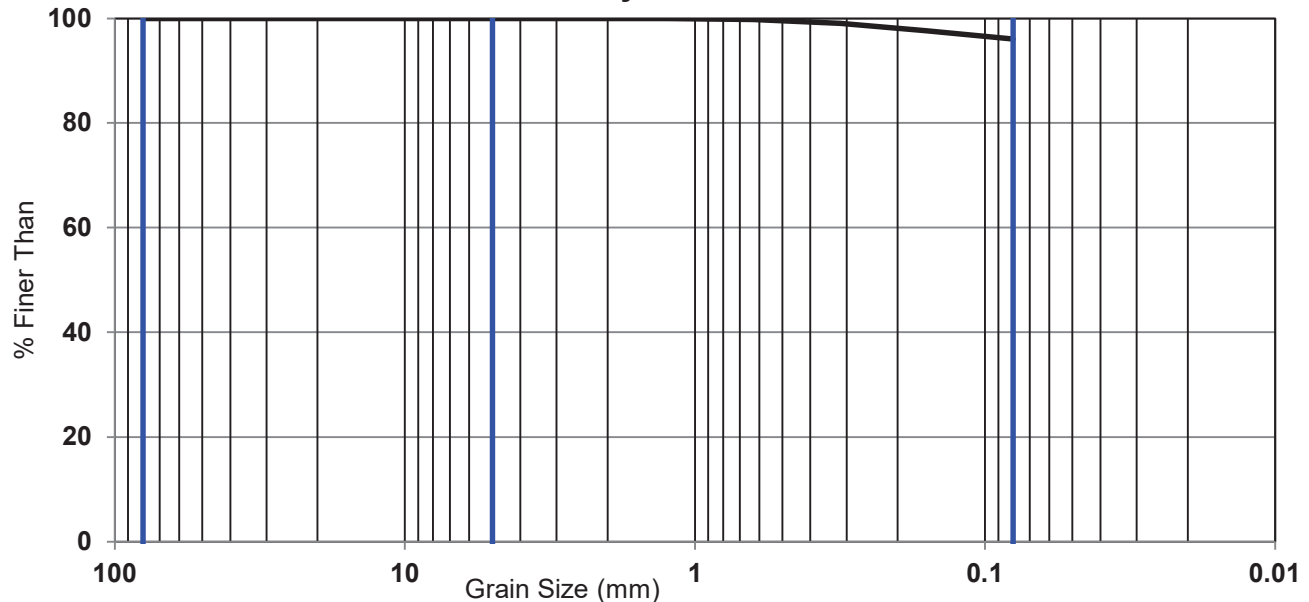
Sample Information

Classification:
Clay and silt, trace sand

Particle Size: Gravel = 0.0%
Sand = 3.9%
Silt & Clay = 96.1%

Borehole No.: -
Sample No.: -
Depth (m): -

Particle Size Analysis - Washed Sieve



Plastic Limit: 23.90%

Group Index: 29.9

Liquid Limit: 51.42%

Soil Type: Inorganic

Plasticity Index: 27.52%

Classification: CH : High Plastic Clay



CLIENT: Envirowest Eng.

FILE No.: USG2178

PROJECT: Geotech. Inv.

DATE: 15-Aug-25

LOCATION: Red Deer, Alberta

TECH: C.K.

CLIENT NAME: ENVIROWEST
BOX 4248, 5118-50th STREET
PONOKA, AB T4J1R6
(403) 783-8229

ATTENTION TO: Emily Low

PROJECT: 43092 | Soil Samples

AGAT WORK ORDER: 25R330959

SOIL ANALYSIS REVIEWED BY: Parampreet Kaur, Report Writer

DATE REPORTED: Aug 16, 2025

PAGES (INCLUDING COVER): 8

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (403) 735-2005

*Notes

Disclaimer:

- All work conducted herein has been done using accepted standard protocols, and generally accepted practices and methods. AGAT test methods may incorporate modifications from the specified reference methods to improve performance.
- All samples will be disposed of within 30 days after receipt unless a Long Term Storage Agreement is signed and returned. Some specialty analysis may be exempt, please contact your Client Project Manager for details.
- AGAT's liability in connection with any delay, performance or non-performance of these services is only to the Client and does not extend to any other third party. Unless expressly agreed otherwise in writing, AGAT's liability is limited to the actual cost of the specific analysis or analyses included in the services.
- This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
- The test results reported herewith relate only to the samples as received by the laboratory.
- Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, or non-infringement. AGAT assumes no responsibility for any errors or omissions in the guidelines contained in this document.
- All reportable information is available on request from AGAT Laboratories, in accordance with ISO/IEC 17025:2017, ISO/IEC 17025:2005 (Quebec), DR-12-PALA and/or NELAP Standards.
- This document is signed by an authorized signatory who meets the requirements of the MELCCFP, CALA, CCN and NELAP.
- For environmental samples in the Province of Quebec: The analysis is performed on and results apply to samples as received. A temperature above 6°C upon receipt, as indicated in the Sample Reception Notification (SRN), could indicate the integrity of the samples has been compromised if the delay between sampling and submission to the laboratory could not be minimized.



Certificate of Analysis

AGAT WORK ORDER: 25R330959

PROJECT: 43092 | Soil Samples

2910 12TH STREET NE
CALGARY, ALBERTA
CANADA T2E 7P7
TEL (403)735-2005
FAX (403)735-2771
<http://www.agatlabs.com>

CLIENT NAME: ENVIROWEST

SAMPLING SITE:

ATTENTION TO: Emily Low

SAMPLED BY:

Particle Size - Texture (Sand, Silt, Clay)

DATE RECEIVED: 2025-08-05

DATE REPORTED: 2025-08-16

		SAMPLE DESCRIPTION:		25BH01-01	25BH01-02	25BH01-03	25BH02-01	25BH03-01
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2025-07-31	2025-07-31	2025-07-31	2025-07-31	2025-07-31
Parameter	Unit	G / S	RDL	6953795	6953815	6953816	6953817	6953818
Particle Size Distribution (Sand)	%	2	30	<2	35	<2	3	
Particle Size Distribution (Silt)	%	2	25	41	36	40	36	
Particle Size Distribution (Clay)	%	2	46	58	30	59	62	
Soil Texture			Clay	Silt Clay	Clay Loam	Clay	Heavy Clay	

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

6953795-6953818 Soil Texture is a calculated parameter. The calculated parameter is non-accredited. The parameters that are components of the calculation are accredited.

% Silt is a calculated parameter. The calculated value is determined by subtracting the percent sand and clay values from 100 percent.

Analysis performed at AGAT Calgary (unless marked by *)

Certified By:



Quality Assurance

CLIENT NAME: ENVIROWEST
PROJECT: 43092 | Soil Samples
SAMPLING SITE:

AGAT WORK ORDER: 25R330959
ATTENTION TO: Emily Low
SAMPLED BY:

Soil Analysis

RPT Date: Aug 16, 2025			DUPLICATE			Method Blank	REFERENCE MATERIAL		METHOD BLANK SPIKE			MATRIX SPIKE			
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

Particle Size - Texture (Sand, Silt, Clay)

Particle Size Distribution (Sand)	6953915	6953915	41	38	7.6%	< 2	104%	80%	120%
Particle Size Distribution (Silt)	6953915	6953915	26	27	3.8%	< 2	83%	80%	120%
Particle Size Distribution (Clay)	6953915	6953915	34	36	5.7%	< 2	109%	80%	120%

Comments: Duplicate NA: results are less than 5X the RDL and RPD will not be calculated.

Certified By: _____

Method Summary

CLIENT NAME: ENVIROWEST
PROJECT: 43092 | Soil Samples
SAMPLING SITE:

AGAT WORK ORDER: 25R330959
ATTENTION TO: Emily Low
SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Particle Size Distribution (Sand)	SOIL 0520; SOIL 0110; SOIL 0120	JONES 2001	HYDROMETER
Particle Size Distribution (Silt)	SOIL 0520; SOIL 0110; SOIL 0120	JONES 2001	HYDROMETER
Particle Size Distribution (Clay)	SOIL 0520; SOIL 0110; SOIL 0120	JONES 2001	HYDROMETER

Company/Consultant: Envirowest Engineering

Courier: Jazoo ☒ Prepaid ☐ Collect

Waybill# _____

Branch: CGY EDM EST FM FN FSJ GP LYD ☒ RD TCE VAN WH AZ

Multiple sites (LSDs) submitted at once: ☒ YES ☐ NO

Custody Seal Intact: YES ☒ NO ☐ N/A

COC submitted with samples: YES ☐ NO ☒ ECOC to follow 3:20pm Aug 5

➔ If NO: PROJECT #/LSD: 6502

TAT: <24HR 24-48HR 48-72HR 72-96HR 5 DAY REG OTHER _____

Cooler Quantity: 1 Quantity Coolers with Weight >50 lbs: _____

SAMPLE INTEGRITY

Hazardous Samples: YES ☐ NO ☒

Legal Samples: YES ☐ NO ☒

International Samples: YES ☐ NO ☒

Are Containers Tape Sealed? YES ☒ NO ☐ If yes: What kind? Packaging

Coolant Used: Icepack Bagged Ice Free Ice Free Water/Melted Ice

After Hours Fridge Snow Other: NONE

➔ Free Water/Melted Ice – samples submerged in water? YES ☐ NO ☐ N/A ☒

Coolant added by client upon submission: YES ☐ NO ☐ N/A ☒

Tedlar Bags – bags rec'd intact (full): YES ☐ NO ☐ N/A ☒

Are MeOH vials packed separately from jars? YES ☐ NO ☐ N/A ☒

➔ Are Alcohols requested on COC? YES ☐ NO ☐ N/A ☒

➔ _____

TIME SENSITIVE

ALREADY EXCEEDED HOLD TIME? YES ☐ NO ☒

Common Tests (Please Circle): Aldehydes, BOD, Color, Chlorine, Chloramines*, Chlorophyll*, Ferric/Ferrous Iron, MiBi, Microtox, Nitrate/Nitrite, O-PO4, Solids (Fixed/Total/Volatile), Toxicity/LC50, Turbidity, Tedlar Bag – Breathing Air

Earliest Expiry: _____

Hydrocarbons: Earliest Expiry: _____

TEMPERATURE (Bottles/Jars only) – N/A (Only Soil Bags Received)

FROZEN (Please Circle if samples received Frozen)

1 (Bottle/Jar) N/A + _____ + _____ = _____ °C 2 (Bottle/Jar) _____ + _____ + _____ = _____ °C

3 (Bottle/Jar) _____ + _____ + _____ = _____ °C 4 (Bottle/Jar) _____ + _____ + _____ = _____ °C

5 (Bottle/Jar) _____ + _____ + _____ = _____ °C 6 (Bottle/Jar) _____ + _____ + _____ = _____ °C

7 (Bottle/Jar) _____ + _____ + _____ = _____ °C 8 (Bottle/Jar) _____ + _____ + _____ = _____ °C

9 (Bottle/Jar) _____ + _____ + _____ = _____ °C 10 (Bottle/Jar) _____ + _____ + _____ = _____ °C

(If more than 10 coolers are received use another sheet of paper and attach)

LOGISTICS USE ONLY

Workorder No: 25R330959

Samples Damaged: YES ☐ NO ☒

If YES, why? No Bubble Wrap Frozen Courier

Other: _____

General Comments: _____

Company/Consultant: <u>EnviroWest</u> Courier: <u>Jorge</u> Prepaid Collect Waybill# <u> </u> Branch: CGY EDM EST FM FN FSJ GP LYD <u>RD</u> TCE VAN WH AZ Multiple sites (LSDs) submitted at once: YES <u>NO</u> Custody Seal Intact: YES NO <u>N/A</u> COC submitted with samples: <u>YES</u> NO <u>ECOC to follow</u> ➔ If NO: PROJECT #/LSD: <u>4309.2</u> TAT: <24HR 24-48HR 48-72HR 72-96HR 5 DAY REG OTHER <u> </u> Cooler Quantity: <u>1 am</u> Quantity Coolers with Weight >50 lbs: <u> </u>	TIME SENSITIVE ALREADY EXCEEDED HOLD TIME? YES <u>NO</u> Common Tests (Please Circle): Aldehydes, BOD, Color, Chlorine, Chloramines*, Chlorophyll*, Ferric/Ferrous Iron, MiBi, Microtox, Nitrate/Nitrite, O-PO4, Solids (Fixed/Total/Volatile), Toxicity/LC50, Turbidity, Tedlar Bag – Breathing Air Earliest Expiry: <u> </u> Hydrocarbons: Earliest Expiry: <u> </u>
SAMPLE INTEGRITY Hazardous Samples: YES <u>NO</u> Legal Samples: YES <u>NO</u> International Samples: YES <u>NO</u> Preservation Check (if applicable): YES NO Are Containers Tape Sealed? YES <u>NO</u> If yes: What kind? <u> </u> Coolant Used: Icepack Bagged Ice Free Ice Free Water/Melted Ice After Hours Fridge Snow <u>None</u> Other: <u> </u> ➔ Free Water/Melted Ice – samples submerged in water? YES NO <u>N/A</u> Coolant added by client upon submission: YES NO <u>N/A</u> Tedlar Bags – bags rec'd intact (full): YES NO <u>N/A</u> Are MeOH vials packed separately from jars? YES NO <u>N/A</u> ➔ Are Alcohols requested on COC? YES NO <u>N/A</u> ➔ <u> </u>	TEMPERATURE (Bottles/Jars only) – N/A (Only Soil Bags Received) IR Gun #: <u> </u> FROZEN (Please Circle if samples received Frozen) 1 (Bottle/Jar) <u>✓</u> + <u>✓</u> + <u>✓</u> = <u>N/A</u> °C 2 (Bottle/Jar) <u> </u> + <u> </u> + <u> </u> = <u> </u> °C 3 (Bottle/Jar) <u> </u> + <u> </u> + <u> </u> = <u> </u> °C 4 (Bottle/Jar) <u> </u> + <u> </u> + <u> </u> = <u> </u> °C 5 (Bottle/Jar) <u> </u> + <u> </u> + <u> </u> = <u> </u> °C 6 (Bottle/Jar) <u> </u> + <u> </u> + <u> </u> = <u> </u> °C 7 (Bottle/Jar) <u> </u> + <u> </u> + <u> </u> = <u> </u> °C 8 (Bottle/Jar) <u> </u> + <u> </u> + <u> </u> = <u> </u> °C 9 (Bottle/Jar) <u> </u> + <u> </u> + <u> </u> = <u> </u> °C 10 (Bottle/Jar) <u> </u> + <u> </u> + <u> </u> = <u> </u> °C (If more than 10 coolers are received use another sheet of paper and attach)
LOGISTICS USE ONLY Workorder No: <u>252330969</u> Samples Damaged: YES NO If YES, why? No Bubble Wrap Frozen Courier Other: <u> </u> General Comments: <u> </u> <u> </u> <u> </u>	

WD# 252330959

Kiara Gnam

From: Isabella Magnani
Sent: August 6, 2025 5:44 PM
To: Kiara Gnam
Cc: AGAT Calgary Env Logistics
Subject: RE: No COC - Envirowest Engineering

Hi Kiara,

As per client, please analyze all bags for texture.
Reg. TAT.

Thank you,

Isabella Magnani, B.Sc.

Client Services Representative – AB/BC Environmental

2910 12 St NE, Calgary, AB T2E 7P7

Direct: 403.735.2012

Cell: 403.870.9229

AGAT Laboratories

From: Kiara Gnam <Gnam@agatlabs.com>
Sent: Wednesday, August 6, 2025 4:58 PM
To: Isabella Magnani <imagnani@agatlabs.com>
Cc: AGAT Calgary Env Logistics <AGATCalgaryEnvLogistics@agatlabs.com>
Subject: No COC - Envirowest Engineering

Hi Isabella,

We received soil samples from Envirowest Engineering with no COC. We received 6 soil bags labeled with project number: 43092. I have included the SIRF.

Please advise when you have the COC.

Thank you,

Kiara Gnam, B.Sc.

Sample Receipt Technician

2910 12 St NE, Calgary, AB T2E 7P7

AGAT Laboratories

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Data Set: C:\Users\elow\OneDrive - Envirowest\Envirowest - Documents\General\Envirowest\Operations\Client Data
Date: 11/20/25
Time: 12:07:01

PROJECT INFORMATION

Company: Envirowest Engineering
Client: Vaessen
Project: 43092
Test Well: 25MW01

AQUIFER DATA

Saturated Thickness: 7.6 m
Anisotropy Ratio (Kz/Kr): 1.

SOLUTION

Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 4.126

VISUAL ESTIMATION RESULTS

Estimated Parameters

<u>Parameter</u>	<u>Estimate</u>	
K	2.781E-7	cm/sec
y0	1.092	m

$T = K \cdot b = 0.0002113 \text{ cm}^2/\text{sec}$