

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
<input type="checkbox"/> Approval <input type="checkbox"/> Registration <input checked="" type="checkbox"/> Authorization <input type="checkbox"/> Amendment	RA23025	E 1/2 4-45-19 W4M

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.

January 16, 2024

Date of signing

Vermeer's Dairy Ltd.

Corporate name (if applicable)

Signature

Jake Vermeer

Print name

GENERAL INFORMATION REQUIREMENTS

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

Proposed facilities	Dimensions (m) (length, width, and depth)
Addition to heifer shed with an attached manure storage pad (*)	20.12x95.1 + 12.2 m x 12.2 m
(*) Included in the blue prints	

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

Existing facilities	Dimensions (m) (length, width, and depth)	NRCB USE ONLY
Parlor barn	81.6X32	Verified
Dairy barn 2	159.4X32.3	Verified
Dairy barn 3	159.4X32.3	Verified

NRCB USE ONLY

Dairy CFO permitted under Approval RA17058X. The application is for an expansion to the heifer shed and building a manure storage pad.

Part 2 – Technical Requirements



NRCB Natural Resources
Conservation Board

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

[illegible]

Part 2 – Technical Requirements

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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 June 1 2024

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
Dairy Milking total (plus dries and replacements)	1000	0	1000

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)

DECLARATION AND ACKNOWLEDGMENT OF APPLICANT CONCERNING WATER ACT LICENCE

issued by Alberta Environment and Parks (AEP) 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 AEP 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** AEP'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 AEP 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 AEP'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 ____ day of _____, 20____.

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 AEP under the *Water Act* for the development or activity proposed in this AOPA application.

Signed this 16 day of January, 2024.

Signature of Applicant or Agent

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 AEP 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** AEP'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 AEP 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 AEP'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.

Signed this ____ day of _____, 20____.

Signature of Applicant or Agent



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)

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: Heifer Shed **Proposed 1:** Addition to Heifer Shed and solid manure pad
Proposed 2: **Proposed 3:**

Facility and environmental risk information		Facilities				NRCB USE ONLY	
		Existing	Proposed 1	Proposed 2	Proposed 3	Meets requirements	Comments
Flood plain information	What is the elevation of the floor of the lowest manure storage or collection facility above the 1:25 year flood plain or the highest known flood level?	<input checked="" type="checkbox"/> >1 m <input type="checkbox"/> 1 m	<input checked="" type="checkbox"/> >1 m <input type="checkbox"/> 1 m	<input type="checkbox"/> >1 m <input type="checkbox"/> 1 m	<input type="checkbox"/> > 1 m <input type="checkbox"/> 1 m	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> YES with exemption	>1m above the flood plain
Surface water information	How many springs are within 100 m of the manure storage facility or manure collection area?	none	none			<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> YES with exemption	None observed during a site visit
	How many water wells are within 100 m of the manure storage facility or manure collection area?	none	none			<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> YES with exemption	None observed during a site visit
	What is the shortest distance from the manure collection or storage facility to a surface water body? (e.g., lake, creek, slough, seasonal)	11m	11m			<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> YES with exemption	A slough located close to the proposed shed is located on the applicants land
Groundwater information	What is the depth to the water table?					<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> YES with exemption	5.8m from a geotechnical report
	What is the depth to the groundwater resource/aquifer you draw water from?	30m	30m			<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> YES with exemption	30 m (WW ID # 1065028)

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

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NRCB USE ONLY

ENVIRONMENTAL RISK SCREENING INFORMATION

ERST for proposed facilities

Facility	Groundwater score	Surface water score	File number
Expansion to heifer shed	Low	Low	RA23025
Manure storage pad	Low	Low	RA23025

ERST for existing facilities

Facility	Groundwater score	Surface water score	File number
EMS	Low	Low	RA17058
Dairy barn 1	Low	Low	RA17058
Dairy barn 2	Low	Low	RA17058
Heifer shed	Low	Low	RA17058
Calf barn	Low	Low	RA17058

ERST related comments:

There are several sloughs (that are not common bodies of water) surrounding the CFO. However, one of these sloughs crosses property boundaries and a road right of way. This slough is a common body of water and is approximately 30 m from the berm of the existing EMS.

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NRCB USE ONLY

WATER WELL AND SURFACE WATER INFORMATION

Well IDs: 1065028, 1064919, 1065687, old house well

Surface water related concerns from directly affected parties or referral agencies:

☐ YES ☒ NO

Groundwater related concerns from directly affected parties or referral agencies:

☐ YES ☒ NO

Water wells ☒ N/A

If applicable, exemption for 100 m distance requirements applied: ☐ YES ☐ NO

Condition required: ☐ YES ☐ NO

Surface water ☒ N/A

If applicable, exemption for 30 m distance requirements applied: ☐ YES ☐ NO

Condition required: ☐ YES ☐ NO

Water Well Exemption Screening Tool ☒ N/A

Water Well ID	Preliminary Screening Score	Secondary Screening Score	Facility

Groundwater or surface water related comments:

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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)



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
Murray Thompson	13-33-44-19	1494	Agriculture	1	1438		Yes
	12-4-45-19		Agriculture	1	1268		Yes
	13-2-45-19		Agriculture	1	1909		Yes
	16-34-44-19		Agriculture	1	1747		Yes

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)
				N/A for authorizations	
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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NRCB USE ONLY

MINIMUM DISTANCE SEPARATION

Methods used to determine distance (if applicable): Google Earth

Margin of error (if applicable): _____

Requirements (m): Category 1: 628 Category 2: 837 Category 3: 1,046 Category 4: 1,674

Technology factor: ☐ YES ☒ NO

Expansion factor: ☐ YES ☒ NO

MDS related concerns from directly affected parties or referral agencies: ☐ YES ☒ NO

LAND BASE FOR MANURE AND COMPOST APPLICATION

Land base required: Not applicable for authorizations

Land base listed: _____

Area not suitable: _____

Available area: _____

Requirement met: ☐ YES ☐ NO

Land spreading agreements required: ☐ YES ☐ NO

Manure management plan: ☐ YES ☐ NO If yes, plan is attached: ☐

PLANS

Submitted and attached construction plans: ☒ YES ☐ NO

Submitted aerial photos: ☒ YES ☐ NO

Submitted photos: ☐ YES ☒ NO

GRANDFATHERING

Already completed: ☒ YES ☐ NO ☐ N/A

If already completed, see Approval RA07026 _____

Part 2 – Technical Requirements

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NRCB USE ONLY

ALL SIGNATURES IN FILE

☒ YES ☐ NO

DATES OF APPROVAL OFFICER SITE VISITS

January 23, 2024	

CORRESPONDENCE WITH MUNICIPALITIES AND REFERRAL AGENCIES

Date deeming letters sent: ____ January 25, 2024 ____

Municipality: ____ Camrose County ____

☒ letter sent ☒ response received ☒ written/email ☐ verbal ☐ no comments received

Alberta Health Services: ☒ N/A

☐ letter sent ☐ response received ☐ written/email ☐ verbal ☐ no comments received

Alberta Environment and Parks: ☐ N/A

☒ letter sent ☒ response received ☒ written/email ☐ verbal ☐ no comments received

Alberta Transportation: ☒ N/A

☐ letter sent ☐ response received ☐ written/email ☐ verbal ☐ no comments received

Alberta Regulatory Services: ☐ N/A

☒ letter sent ☒ response received ☒ written/email ☐ verbal ☐ no comments received

Other: _Akerton Gas Co-op, Atco Electric____ ☐ N/A

☒ letter sent ☐ response received ☐ written/email ☐ verbal ☒ no comments received

Other: ____ DEL Canada GP Ltd____ ☐ N/A

☒ letter sent ☐ response received ☐ written/email ☐ verbal ☒ no comments received

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)

SOLID MANURE, COMPOST, & COMPOSTING MATERIALS: Barns, feedlots, & storage facilities - Naturally occurring protective layer

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

Facility description / name (as indicated on site plan)

1. Pack Pen (expansion to heifer shed)

2. ~~Scraper Alley~~ J.V.

Manure storage capacity

	Length (m)	Width (m)	Depth below ground level (m)	NRCB USE ONLY Estimated storage capacity (m ³)
1.	30.48 95.1	11.176	at grade	6 month
2.	30.48	8.76	at grade	
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

1. Scraper alley and pack area are under the roof
2. Manure push up pad will have lego blocks to prevent manure coming off the concrete and this area is only for loading manure into the trucks. Manure brought onto this pad is solid, mixed with bedding pack straw

Naturally occurring protective layer details

Thickness of naturally occurring protective layer	4.5 (m)	Provide details (as required) See original permit from 2015	
Soil texture	42-48 % sand	29-32 % silt	20.8-26.4 % clay
Hydraulic conductivity - naturally occurring protective layer	Depth and type of soil tested 6m-9m	Hydraulic conductivity (cm/s) 3.72X10.7	Describe test standard used ASTMD8054

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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SOLID MANURE, COMPOST, & COMPOSTING MATERIALS: Barns, feedlots, & storage facilities - Naturally occurring protective layer (cont.)

NRCB USE ONLY

Nine month manure storage volume requirements met: ☒ YES ☐ YES With STMS ☐ NO

Depth to water table: _____ 5.8 m _____ Requirements met: ☒ YES ☐ NO

Depth to uppermost groundwater resource: _____ 30 m _____ Requirements met: ☒ YES ☐ NO

ERST completed: ☒ see ERST page for details

Surface water control systems

Requirements met: ☒ YES ☐ NO Details/comments:

A post construction inspection condition will be included in the authorization

Naturally occurring protective layer details

Layer specification comments (e.g. sand lenses; layering uniform or irregular; number and location of boreholes):

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)

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. Scraper alley (expansion to heifer shed)
2. Manure Collection Area (See pageA201) (Solid manure 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.	95.1	3.76	at grade	
2.	12.2m	12.2m	at grade	One year
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

1. Scraper alley and pack area are under the roof
2. Manure push up pad will have lego blocks to prevent manure coming off the concrete and this area is only for loading manure into the trucks. Manure brought onto this pad is solid, mixed with bedding pack straw

Liner protection

Describe how the physical integrity of the liner will be maintained

Concrete will be poured using rebar reinforcing

NRCB USE ONLY

Requirements met: ☒ YES ☐ NO

Part 2 — Technical Requirements

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

Concrete liner details

Concrete thickness 4" thick in the barn and 5" thick at the push up pad	Method of sulphate protection: Type 10 with 20% fly ash
Concrete strength 25 Mpa strength	Concrete reinforcement size and spacing 10 mm steel rebar, single layer spaced at 12" o.c.

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: _____ 5.8 m _____ Requirements met: ☒ YES ☐ NO

Depth to Uppermost groundwater resource: _____ 30 m _____ Requirements met: ☒ YES ☐ NO

ERST completed: ☒ see ERST page for details

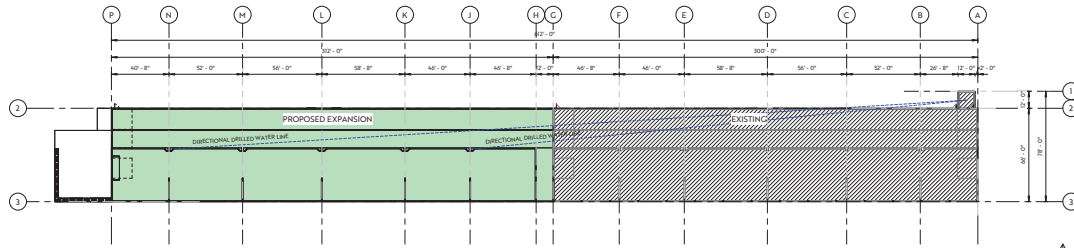
Surface water control systems

Requirements met: ☒ YES ☐ NO Details/comments:

Concrete liner details

A condition will be included in the authorization requiring the permit holder to provide written proof that the constructed concrete liner meets the Technical Guideline Agdex 096-93. The concrete liner for manure storage pad must have a strength of at least 30MPa.

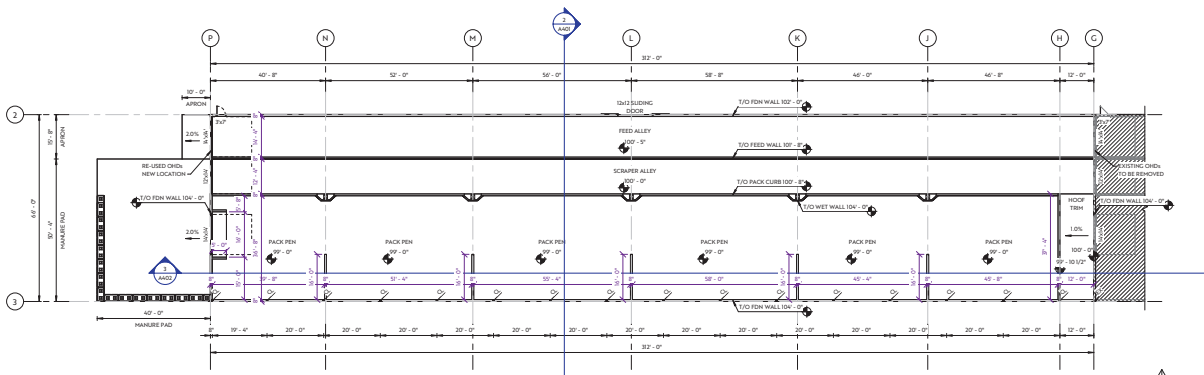
Leakage detection system required: ☐ YES ☒ NO If yes, please explain why.



1 Overall Floor Plan
1/32" = 1'-0"

CONSTRUCTION LEGEND

	NEW FRAMED WALL
	NEW PRECAST WALL
	EXISTING WALL
	DEMOLISHED WALL
	NEW DOOR
	EXISTING DOOR



2 Enlarged Floor Plan
1/32" = 1'-0"

PRELIMINARY
NOT FOR CONSTRUCTION

aggregate
design studio ltd.
EAGLE BUILDERS
4453 885 STREET P.O. BOX 1980
BLACKFALDS, AB, T0M 0J0

Vermeer Dairy
Heifer Shed Expansion
Camrose County, Alberta
08-04-45-19 W4

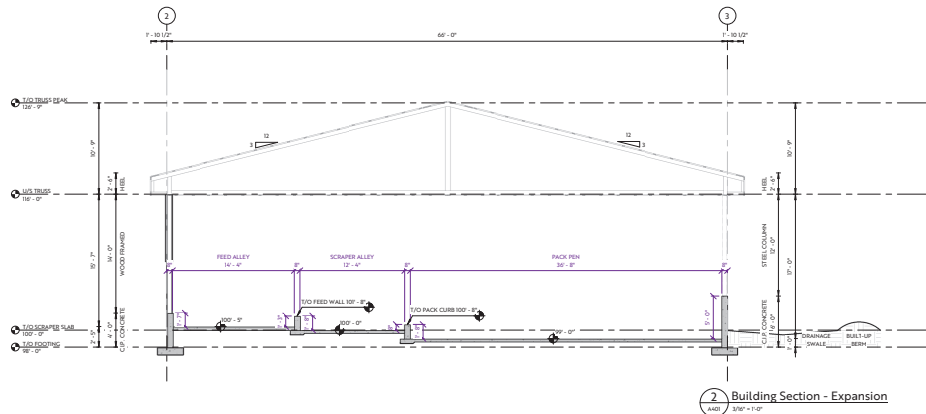
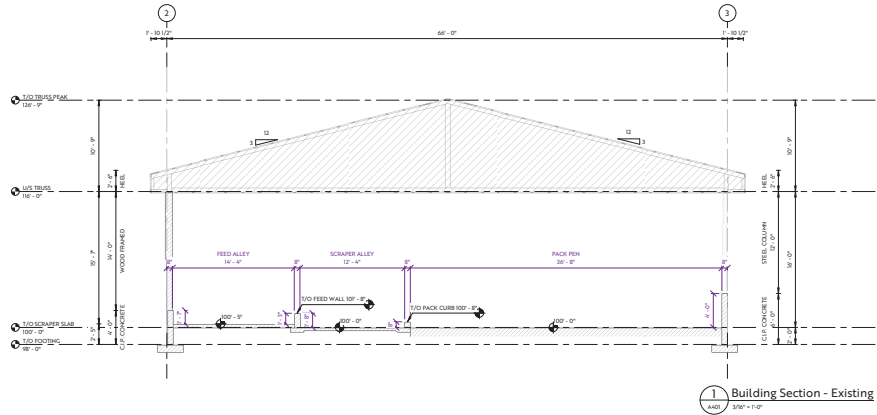
PROJECT NO.	08-04-45-19 W4
DATE	08/17/2023
DESIGNED BY	J.C.
CHECKED BY	J.C.
DATE	08/17/2023

PROJECT NO.	A201
DATE	8/17/2023
DESIGNED BY	J.C.
CHECKED BY	J.C.
DATE	08/17/2023

Floor Plans

Sheet No:

A201



PRELIMINARY
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aggregate
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EAGLE BUILDERS
4453 885 5025 P.O. BOX 1990
BLACKFALDS, AB, T0M 0J0

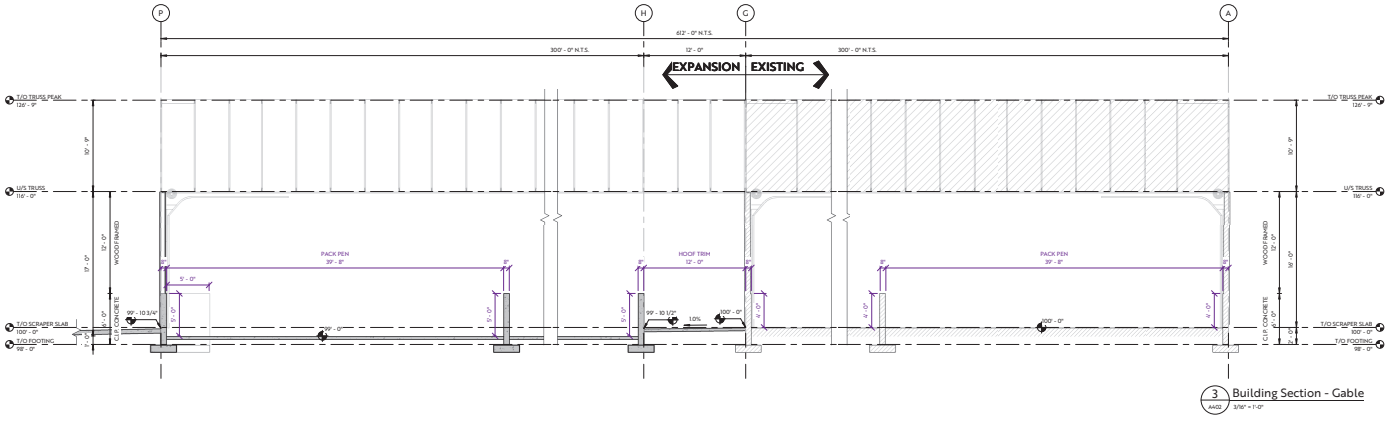
Vermeer Dairy
Heifer Shed Expansion
Camrose County, Alberta
08-04-45-19 W4

NO.	DESCRIPTION	DATE
1	ISSUED FOR PERMIT	08/11/2023
2	ISSUED FOR CONSTRUCTION	08/11/2023

Project No: A23400
Date: 8/17/2023
Drawn by: JC
Checked by: JC
Sheet Name: Building Sections

Sheet No: A401

RA23025 TD Page 18 of 51



3 Building Section - Cable
A403 3/16" = 1'-0"

PRELIMINARY
NOT FOR CONSTRUCTION

aggregate
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EAGLE BUILDERS
4453 885 5025 P.O. BOX 1990
BLACKFALDS, AB, T9M 6J0

Vermeer Dairy
Heifer Shed Expansion
Camrose County, Alberta
08-04-45-19 W4

DATE	BY
08/17/2023	JC
08/17/2023	JC
08/17/2023	JC

Project No: A23400
Date: 8/17/2023
Drawn by: JC
Checked by: JC
Sheet Name:

Building
Sections

Sheet No:
A402



PRELIMINARY
NOT FOR CONSTRUCTION

aggregate
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EAGLE BUILDERS
4453 8th Street S.E. P.O. Box 1990
Blackfoot, AB, T0K 0J0

Vermeer Dairy
Heifer Shed Expansion
Camrose County, Alberta
08-04-45-19 W4

NO.	DESCRIPTION	DATE
1	ISSUED FOR PERMIT REVIEW	20/10/23

Project No: A23400
Date: 8/17/2023
Drawn by: 4:31:27 PM
Checked by: EK, JC
Sheet Name:

Building
Massing

Sheet No:
A701

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In-Situ Test Record

Client Name: VermeerClient Number: 42495Test Date: Sept 17/07

Initial Depth to Water: _____

Stand Pipe Height: 0.84 m

Time	Depth (mbgs)	Time	Depth (mbgs)
30 s	7.22 6.38	11	7.16 6.32
60 s	7.22 6.38	12	7.15 6.31
1.5	7.21 6.37	13	7.15 6.31
2.0	7.20 6.365	14	7.14 6.30
2.5	7.20 6.36	15	7.13 6.29
3.0	7.19 6.35	20	7.11 6.27
3.5	7.19 6.35	25	7.10 6.26
4.0	7.18 6.34	30	7.09 6.25
4.5	7.18 6.34	35	7.07 6.23
5.0	7.18 6.34	40	7.06 6.22
6	7.175 6.335		
7	7.17 6.33		
8	7.17 6.33		
9	7.165 6.325		
10	7.16 6.32		

AQTESOLV for Windows

Data Set: Z:\42495 Vermeer Dairy\Slug test.aqt

Date: 11/02/07

Time: 16:21:41

PROJECT INFORMATION

Company: Envirowest Eng

Client: Vermeer

Project: 42495

Test Date: Sept 17/2007

Test Well: MW-02

AQUIFER DATA

Saturated Thickness: 4.29 m

Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: : MW-02

X Location: 0. m

Y Location: 0. m

Initial Displacement: 6.38 m

Static Water Column Height: 4.29 m

Casing Radius: 0.025 m

Wellbore Radius: 0.075 m

Well Skin Radius: 0.075 m

Screen Length: 3. m

Total Well Penetration Depth: 9. m

No. of Observations: 25

Observation Data			
Time (min)	Displacement (m)	Time (min)	Displacement (m)
0.5	6.38	9.	6.325
1.	6.38	10.	6.32
1.5	6.37	11.	6.32
2.	6.365	12.	6.31
2.5	6.36	13.	6.31
3.	6.35	14.	6.3
3.5	6.35	15.	6.29
4.	6.34	20.	6.27
4.5	6.34	25.	6.26
5.	6.34	30.	6.25
6.	6.335	35.	6.23
7.	6.33	40.	6.22
8.	6.33		

SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

11/02/07

AQTESOLV for Windows

Shape Factor: 3.482

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	3.717E-7	cm/sec
y0	6.364	m



P.O. Box 4248
Ponoka, AB.
T4J 1R6
Telephone: 403-783-8229
Facsimile: 403-783-5222

October 17, 2007



NRCB
#303, 4920 51st Street
Red Deer, Alberta
T4N 6K8
Attention: Scott Cunningham, P.Eng
Approval Officer

**RE: Vermeer Dairy Ltd.
Soil Assessment and EMS Design Report**

Dear Scott,

Enclosed is a copy of the assessment and design report for Vermeer Dairy Ltd. The assessment was conducted on the proposed construction site a SE 4-45-19-W4M in Camrose County.

Please feel free to call if you have any questions.

Yours truly,



Shauna D. Low, P.Eng
Envirowest Engineering Inc.

**Site Assessment and Manure Storage Design
SE 1/4, Sec. 4, Twp. 45, Rng. 19 W4M
Camrose County, Alberta**



Professional Environmental Engineering Services



Envirowest Engineering Inc.

Professional Environmental Engineering Services

**Site Assessment and
Manure Storage Lagoon Design and Construction
SE 1/4, Sec. 4, Twp. 45, Rng. 19, W4M
Camrose County, Alberta**

Prepared for: Vermeer Dairy Ltd.

Prepared by: Envirowest Engineering Inc.
P.O. Box 4248, Ponoka, Alberta
(403) 783-8229

Report Prepared: October 17, 2007

Project Number: 0708-42495

Private and Confidential



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8.0 Closure	11

Appendices

- A. Site Location and Site Photographs**
- B. Site Map**
- C. Borehole Logs**
- D. Certificates of Analysis**



1.0 Executive Summary

Envirowest Engineering Inc. was retained by Vermeer Dairy Ltd. to complete an assessment of the soil properties for the proposed construction of a new dairy barn and the associated EMS facility. The proposed operation is for a 450 head dairy located at the SE 4-45-19-W4M in Camrose County. The soils in the areas proposed for construction of the EMS facilities and the under barn collection pits were tested as part of this assessment.

Four investigative boreholes were drilled using a truck mounted rotary auger. The boreholes were completed to depths of between 6.0 and 10.5 meters. Representative soil samples were collected and submitted for laboratory analysis. The analysis included particle size (% sand, % clay, % silt), moisture and Atterberg Limits. Two groundwater monitoring wells were installed to determine depth to groundwater. One additional well was installed to determine in-situ hydraulic conductivity.

The laboratory results indicated that the soil in the area to be utilized for the EMS was silty to sandy clay in the upper 10.5 meters. The soil was relatively consistent across the site. The in-situ hydraulic conductivity was found to be 3.72×10^{-7} cm/sec. The native soil is of suitable characteristics to meet or exceed the AOPA standards for a naturally occurring protective layer with not less than 10 meters of material with an hydraulic conductivity of not more than 1×10^{-6} cm/sec.

The area is not considered to be prone to flooding. The proposed storage area is more than 30 meters from a common body of water. Standards and regulations for the construction, maintenance and use of facilities for confined feeding operations are set out in the amended "Agricultural Operation Practices Act" (AOPA) and are summarized in this report.



2.0 Introduction and Scope of Work

Envirowest Engineering Inc. was retained by Vermeer Dairy Ltd. to conduct an assessment for the proposed construction of a new dairy operation. The proposed construction consists of a barn, an earthen manure storage facility and ancillary structures. The proposed operation is a 450 head dairy. The operation is located at SE 4-45-19 W4M in Camrose County.

Representative soil samples were collected at the site to allow for the assessment of applicable soil properties. The samples were collected by completing investigative boreholes using a truck mounted rotary auger. Soil samples were collected from selected boreholes and reserved for laboratory analysis. The soil samples were analyzed for particle size (% sand, % clay, % silt), moisture and Atterberg Limits. Two monitoring wells were installed at the site to determine depth to water table. An additional well was installed to determine in-situ hydraulic conductivity. The site assessment occurred on September 14, 2006. In-situ testing was conducted on September 17, 2007.

The assessment has been completed in accordance with the standards and regulations associated with the "Agricultural Operation Practices Act" (AOPA) which came into force January 1, 2002 and amended in June 2004 and October 2006.

This report will summarize the findings of the soil assessment.



3.0 Site Description

The subject site is located approximately 16 km east of New Norway, Alberta. The quarter section is currently developed with a residence, grain storage facilities and ancillary structures.

The topography of the property and surrounding area is generally level to gently undulating. The proposed EMS is to be located west of a low lying treed area populated with willows and other native species. A slough area is located immediately to the north of the proposed construction site. The elevation increases gently to the west from the EMS site and to the east from the center of the EMS site. Surface runoff in the area of the EMS will generally collect in the slough. The area surrounding both the barn and EMS sites is currently in cropland. The nearest major surface water feature is Driedmeat Lake approximately 3 km to the west of the site. The county map indicates a seasonal drainage channel flowing across the quarter section to the east of the site.

The upper most bedrock is the Horseshoe Canyon formation which consists of grey, feldspathic, clayey sandstone; grey bentonitic mudstone and carbonaceous shale; concretionary ironstone beds; scattered coal and bentonitic beds of variable thickness with minor limestone beds. The formation is mainly non marine.

The quaternary geology for the general area is indicated to be stagnation moraine with till of uneven thickness; local water sorted material up to 30 meters thick. The topography is undulating with local relief less than 3 meters.

The site is located in an area where groundwater resources are reported to be between 5 and 25 gpm. Three well logs were available for the quarter. None of the logs provided detailed soil lithology. A new well has been completed to the east of the proposed construction site. The driller logs for this well were not yet available for review.



4.0 Standards and Guidelines

The amended “Agricultural Operation Practices Act” and associated regulations governs all new and modified confined feeding operations. The soil assessment for the earthen manure lagoons were reviewed with respect to the following standards and guidelines.

- a manure storage facility and a manure collection area must have either a protective layer or a liner that meets the requirements of the regulations between the facility or area and the uppermost groundwater resource below the site
- the bottom of a liner of a manure storage facility and of a manure collection area must be not less than 1 meter above the water table of the site at the time of construction
- the bottom of a liner or the base of the protective layer must be not less than 1 meter above the top of the groundwater resource
- if the liner of a liquid manure storage facility is made of compacted soil or manufactured materials it must provide equal or greater protection than that provided by 1 meter in depth with a hydraulic conductivity of not more than 1×10^{-7} cm/sec
- a natural protective layer must provide the equivalent protection to 10 meters of material with a hydraulic conductivity of 10^{-6} cm/sec
- the owner or operator of a confined feeding operation must construct manure storage facilities that are sufficient to store all the manure produced by the operation over a period of at least 9 consecutive months
- an open liquid manure storage facility must have a freeboard of not less than 0.5 meters when the facility is full

Other portions of the regulations may also be found to apply to the site.



5.0 Site Assessment Methodology

Four investigative boreholes were drilled using a truck mounted rotary auger and completed to depths of between 6.0 and 10.5 meters. The boreholes were completed in the areas proposed for construction of the barn and earthen manure storage facility. Two of the boreholes were completed as groundwater monitoring wells to determine depth to groundwater. One of the boreholes was completed to determine in-situ hydraulic conductivity. Borehole drilling and soil sampling was completed during a site visit on September 14, 2007. Groundwater levels were measured and in-situ testing was completed on September 17, 2007.

Samples from boreholes 2 , 3 and 4 were selected for laboratory analysis. The samples were collected from a depths of between 2.2 and 7.7 meters. The analysis included particle size distribution, moisture and Atterberg Limits.

The soil from the site was assessed based on the requirements specified in the "Agricultural Operation Practices Act" and associated regulations. One of the critical aspects of meeting these requirements is the assessment of native soil properties to facilitate manure storage facility construction. It is recommended that the earthen manure storage lagoons be constructed in such a way and of appropriate material to provide the equivalent protection of 10 meters of non-compacted native material with an hydraulic conductivity of 1×10^{-6} cm/sec. It is also important to construct such storage facilities in an area where the water table is at least 1 meter below the bottom of the facility and in an area not prone to flooding. Depth to groundwater will be confirmed prior to start of construction.

6.0 Site Assessment Results

The results of the laboratory analysis are contained in Table 1.

Table 1: Soil Analysis Results

Parameter/ Sample Location	42495 BH-2	42495 BH-2	42495 BH-3	42495 BH-3	42495 BH-4
Sample Depth (m)	5.2	7.7	5.0	7.7	2.2
Particle Size (%sand)	44.0	46.0	42.0	48.0	44.4
Particle Size (%silt)	29.6	30.0	32.0	31.2	30.2
Particle Size (%clay)	26.4	24.0	26.0	20.8	25.4
Texture Class	Loam	Loam	Loam	Loam	Loam
Moisture (%)	16.3	16.5	17.8	16.4	
Liquid Limit	29	33	34	30	
Plastic Limit	17	16	19	16	
Plasticity Index	13	16	15	16.4	

Boreholes 1,2 and 3 were completed in the area for the EMS. Borehole 4 was completed in the area of the barn underfloor collection pit. Borehole locations are indicated on a map contained in the appendices.

The soils across the investigation area were loam with a clay content ranging from 20.8 to 26.4%.

Borehole 1 was completed to a depth of 10.5 meters. The soils are noted primarily as silty and sandy clay with sand lenses occurring at 3.7 meters, 7.4 meters and 9.4 meters. The lenses at 7.4 and 9.4 were found to be saturated. The depth to water table in the well was recorded on September 17 as 5.76 meters below surface.

Borehole 2 was drilled to a depth of 9 meters and was completed to allow for testing of in-situ hydraulic conductivity. The strata tested was from 6 to 9 meters in depth and included a wet sand lense at 6.5 meters. Samples were collected at depths of 5.2 and 7.7 meters to determine the quality and consistency of material underlying the proposed construction site.



Borehole 3 was completed to a depth of 9 meters. Consistent with the remainder of the site, the soils were noted primarily as silty and sandy clay tills. A sand lense was encountered at 5.3 meters and at 7.2 meters. The sand lense at 7.2 meters was noted as saturated. The 6 meters deep monitoring well was dry when tested on September 17, 2007. Samples were tested from depths of 5.0 meters and 7.7 meters.

Borehole 4 was completed to a depth of 6 meters in the area of the barn pit. The soils were noted as silty clay. A samples from a depth of 2.2 meters was tested for soil properties.

Bedrock was not intersected to the depths of the boreholes.

Groundwater monitoring wells were installed at boreholes 1 and 3. The monitoring wells were constructed of 25 mm PVC piping. The bottom 3 meters of the well were slotted. The well annulus was filled with native material. The well were completed above grade.

The monitoring well at BH-2, MW-02, was completed to allow for in-situ hydraulic conductivity testing. The well was constructed of 50mm PVC piping with the bottom 3 meters slotted. The well annulus was filled with clean filter sand to a depth above the slotted material. The remainder of the annulus was filled with bentonite. The in-situ slug testing was conducted utilizing ASTM standard procedure D4044-96 for Instantaneous Change in Head (Slug) Test for Determining Hydraulic Properties. The levels in MW-02 were recorded every 30 seconds for the first 5 minutes, every minute for an additional 10 minutes then every 5 minutes thereafter. The analytical procedure consisted of analyzing the water level in the well according to Bouwer and Rice (Bouwer, H., and Rice, R.C. " A Slug Test for Determining Hydraulic Conductivity of Unconfined Aquifers With Completely or Partially Penetrating Wells"). The hydraulic conductivity of the native soils in this area were found to be 3.72×10^{-7} cm/sec.



7.0 Design and Construction Considerations

Based on the findings of the soil assessment the soils tested are suitable for use as a naturally occurring protective layer. The hydraulic conductivity was found to be 3.72×10^{-7} cm/sec (in-situ).

Darcy's Law determines the specific discharge or unit seepage for a unit cross-sectional area of a EMS.

$$Q = k (H+d)/d A$$

Where:

- Q: total seepage through area A
- k: coefficient of permeability
- (H+d)/d: hydraulic gradient
- H: vertical distance measured between the top of the liner and required volume of the waste storage
- d: thickness of the soil liner
- A: cross sectional area of flow

The unit seepage or specific discharge ,v, is Q/A and therefore

$d = k \times H/v - k$ where v is the specific discharge required by regulation

$$d = k \times H/v - k$$

$$d = \frac{3.72 \times 10^{-7} \text{ cm/s} \times 4.5 \text{ m}}{1 \times 10^{-6} \text{ cm/s} - 3.72 \times 10^{-7} \text{ cm/s}}$$

$$d = 2.49 \text{ m}$$

Alternatively, a direct depth equivalency can be determined as follows:

$$K(\text{in situ}) = 3.72 \times 10^{-7} \text{ cm/sec}$$

AOPA requirement is 10 meters @ 10^{-6} cm/sec

$$\frac{10 \text{ meters}}{10^{-6} \text{ cm/s}} = \frac{\text{required thickness (m)}}{3.72 \times 10^{-7} \text{ cm/s}}$$

Required thickness= 3.72 meters



At a sizing depth of 4.5 meters, in excess of 4.5 meters of suitable liner material is available to provide a natural protective layer beneath maximum invert depth of the EMS and the a groundwater resource. This exceeds the maximum required depth of 3.72 meters.

Lagoon Sizing

The annual volume of liquid manure produced by the proposed operation will be 16 200 cubic meters (3.57 million gallons) based on lactating animals. Vermeer Dairy Ltd. has chosen to provide for the annual volume of manure production instead of the nine months as required by AOPA.

- The EMS facility is to be constructed in the area of boreholes 1, 2 and 3. Based on the site conditions encountered in this area, the facility has been designed with a below grade depth of 4.5 meters. Therefore, the overall sizing of the EMS will be 90 meters in length and 70 meters in width. The overall capacity of the EMS would be 19 700 cubic meters (4.3 million gallons) which includes 0.5 meters for freeboard. The capacity for manure storage would be 16 700 cubic meters (3.7 million gallons). This will provide storage capacity for 12 consecutive months. The sizing is based on an inside end and side wall slope of 3:1 (run/rise).
- With a protective layer, the bottom of the manure storage facility must be not less than 1 meter above the water table or the groundwater resource at the time of construction. Water table at the site was found to be at a minimum depth of 5.76 meters. With the maximum invert depth of 4.5 meters, a separation of more than 1 meter is provided. The depth to water table should be confirmed at the time of construction.
- It is recommended that the area around the EMS be completed to ensure that no surface runoff enters the EMS.
- The 0.5 meter freeboard depth should be covered with 10 to 20 cm of topsoil and seeded to prevent soil erosion.
- The inlet pipe to the lagoon should be located in the bottom 1/4 of the lagoon. There should be a concrete pad located at the base of the pipe to mitigate possible soil erosion. The area around the inlet pipe should be sealed with bentonite.



The following general construction procedures are recommended. Some modification may be required based on actual site conditions encountered during construction.

- The area for lagoon construction will be located in the area of boreholes 1, 2 and 3. The topsoil should be stripped from the area for construction. The topsoil can be reused on the freeboard area after lagoon completion.
- The facility design at this time is for a below grade depth of 4.5 meters. This allows for at least a 4.5 meter protective layer which exceeds the AOPA requirements.
- Construction of the lagoon should be supervised by a professional engineer.
- Following completion of the lagoon the operator should:
 - ensure that the facility is secure from unauthorized access
 - ensure that shrubs, trees and deep rooted plants are not allowed to grow on or near the walls of the facility



8.0 Closure

Envirowest Engineering Inc. is pleased to submit the report on the soil assessment to Vermeer Dairy Ltd.. The information and conclusions contained in this report are for his sole use and such parties as may be normally involved in the approval or construction process for such a facility. No other party is expected to rely upon the information contained within the report without the express written authorization of Envirowest Engineering Inc..

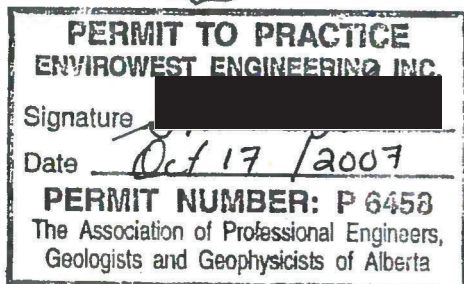
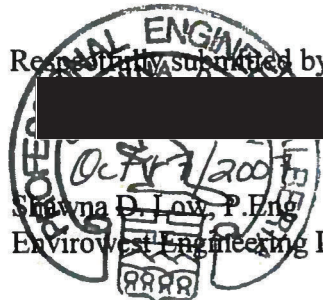
The review has been conducted in accordance with generally accepted environmental engineering practices. No other warranty is expressed or implied.

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 by,

[Redacted Signature]

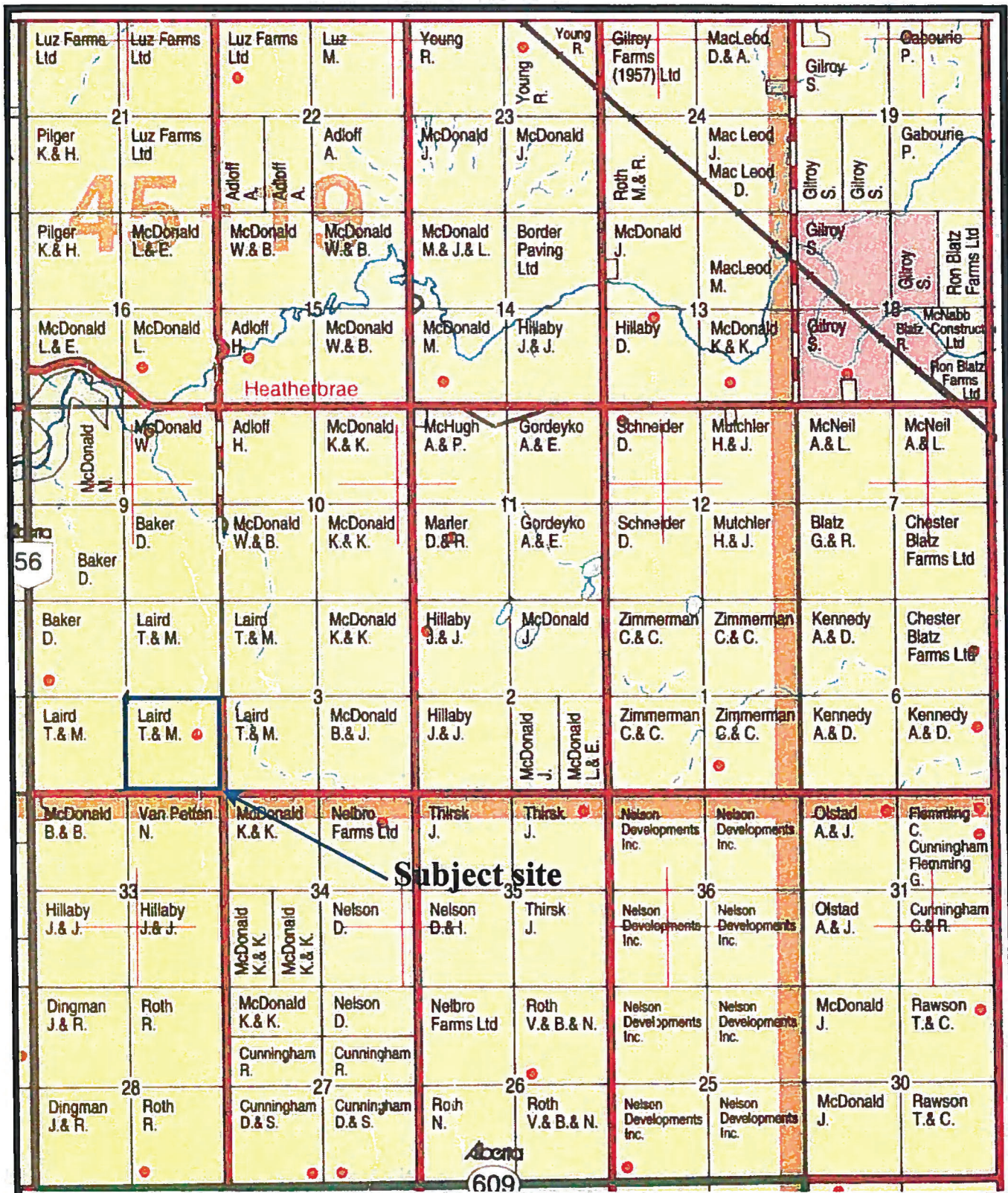
Shawna D. Low, P.Eng.
Envirowest Engineering Inc.





Appendix A

Site Location and Site Photographs



**Envirowest
Engineering Inc.**

Professional Environmental Engineering
Services

Location of Subject Site

Scale: nts

Date: 07/10/17

Figure: A1



Photo #1: Proposed EMS site, looking east



Photo #2: Subject site



C

Appendix B

Site Map



**Envirowest
Engineering Inc.**

Professional Environmental Engineering
Services

Borehole Locations (Map by DJS Drafting)

Scale: nts

Date: 07/10/17

Figure:



Appendix C

Borehole Logs

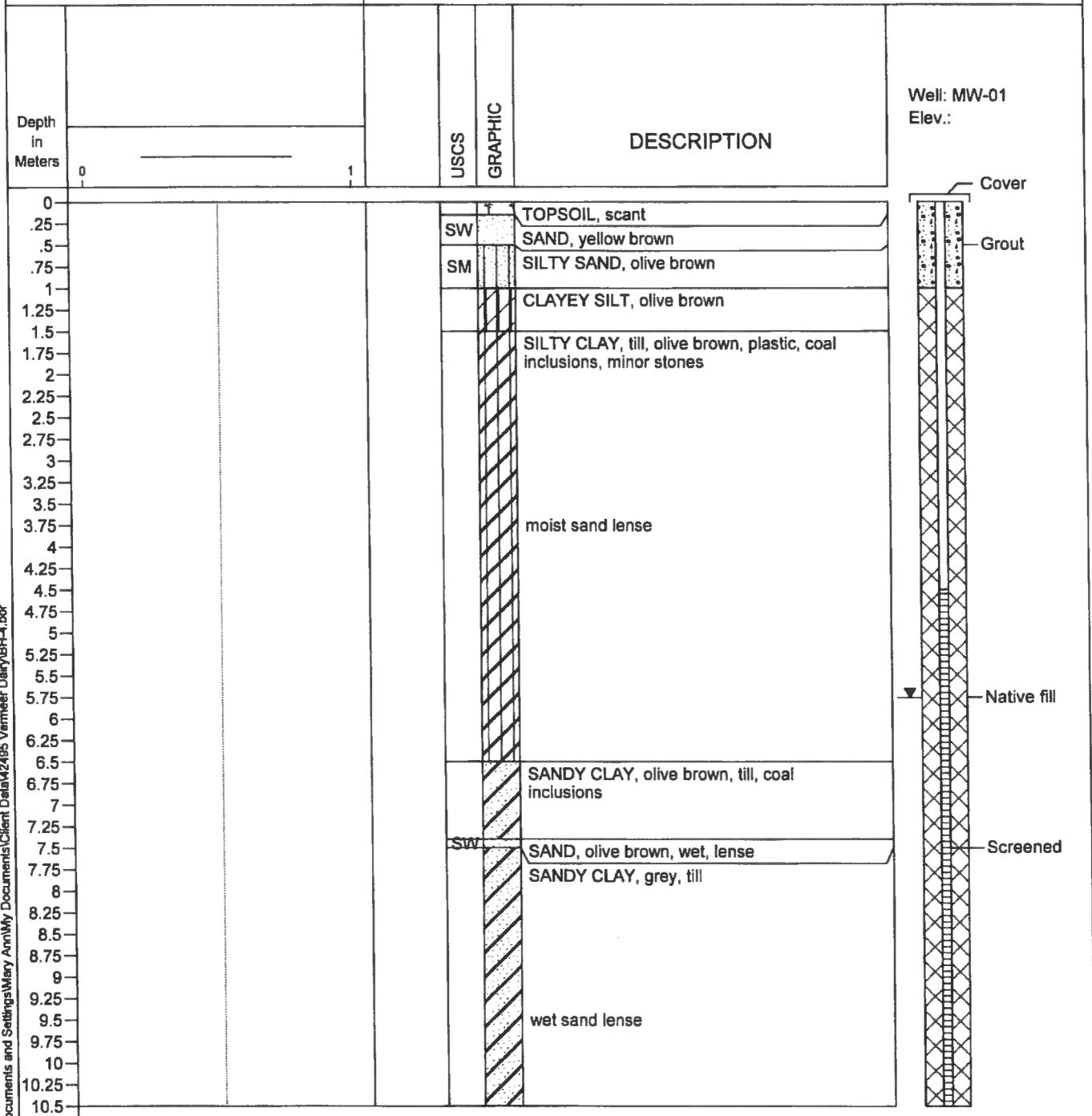
Envirowest Engineering Inc.
Professional Engineering Services

LOG OF BORING BH-01

(Page 1 of 1)

Vermeer Dairy Ltd.
Site Assessment
Project No. : 0709-42495

Driller: : Ever Green Drilling
Drilling Method: : Truck Mounted Auger
Drill Date : 07/09/14
Logged By: : S. Low, P.Eng



10-17-2007 C:\Documents and Settings\Mary Ann\My Documents\Client Data\42495 Vermeer Dairy\BH-4.bor

Envirowest Engineering Inc.
Professional Engineering Services

LOG OF BORING BH-02

(Page 1 of 1)

Vermeer Dairy Ltd.
Site Assessment
Project No. : 0709-42495

Driller: : Ever Green Drilling
Drilling Method: : Truck Mounted Auger
Drill Date : 07/09/14
Logged By: : S. Low, P.Eng

Depth
in
Meters

0

1

USCS

GRAPHIC

DESCRIPTION

Well: MW-02
Elev.:

Water Level

Cover

Grout

Sand Pack

Screened

TOPSOIL, black, organic

SC

CLAYEY SAND, grey

SC

CLAYEY SAND, olive brown, dark orange
pockets

SILTY CLAY, till, olive brown, orange pockets

SW

SAND, olive brown, wet, lense

SANDY CLAY, olive brown, till

SANDY CLAY, grey, till

Envirowest Engineering Inc.
Professional Engineering Services

LOG OF BORING BH-03

(Page 1 of 1)

Vermeer Dairy Ltd.
Site Assessment
Project No. : 0709-42495

Driller: : Ever Green Drilling
Drilling Method: : Truck Mounted Auger
Drill Date : 07/09/14
Logged By: : S. Low, P.Eng

Depth
in
Meters

0

1

USCS

GRAPHIC

DESCRIPTION

Well: MW-03
Elev.:

Water Level

Cover

Native fill

Screened

SC

SW

SW

TOPSOIL, black, organic
CLAYEY SAND, olive brown, orange pockets

SILTY CLAY, olive brown, till

SAND, olive brown, lense
SILTY CLAY, till, olive brown,
SANDY CLAY, grey, till coal pockets

SAND, olive brown, wet, lense
SANDY CLAY, grey, till



Envirowest Engineering Inc.
Professional Engineering Services

LOG OF BORING BH-04

(Page 1 of 1)

Vermeer Dairy Ltd.
Site Assessment
Project No. : 0709-42495

Driller: : Ever Green Drilling
Drilling Method: : Truck Mounted Auger
Drill Date : 07/09/14
Logged By: : S. Low, P.Eng

Depth in Meters	USCS	GRAPHIC	DESCRIPTION	Well: Elev.:	Water Level
0			TOPSOIL, black,		
.25	SC		CLAYEY SAND, olive brown		
.5			SILTY CLAY, olive brown		
.75					
1					
1.25					
1.5					
1.75					
2					
2.25					
2.5					
2.75					
3					
3.25					
3.5					
3.75					
4					
4.25					
4.5					
4.75					
5					
5.25					
5.5					
5.75					
6					

10-17-2007 C:\Documents and Settings\Mary Ann\My Documents\Client Data\42495 Vermeer Dairy\BH-1.bor



Envirowest Engineering Inc.

Professional Environmental Engineering Services

Appendix D

Certificates of Analysis

Analytical Report

Bill To: Envirowest Engineering Ltd.
 Report To: Envirowest Engineering Ltd.
 Box 4248
 5118 - 50th Street
 Ponoka, AB, Canada
 T4J 1R6
 Attn: Shawna Low
 Sampled By: Shawna Low
 Company: Envirowest

Project:
 ID: 42495
 Name: Vermeer
 Location:
 LSD: SE 4-45-19 W4M
 P.O.:
 Acct code:

Lot ID: **574651**
 Control Number: E 276836
 Date Received: Sep 20, 2007
 Date Reported: Sep 27, 2007
 Report Number: 1049712

		Reference Number	574651-1	574651-2	574651-3	Detection Limit
		Sample Date	Sep 14, 2007	Sep 14, 2007	Sep 14, 2007	
		Sample Location				
		Sample Description	BH2 / 42495-2-2 / 5.2 / m	BH2 / 42495-2-4 / 7.7 / m	BH3 / 42495-3-1 / 5.0 / m	
		Matrix	Soil	Soil	Soil	
Analyte		Units	Results	Results	Results	
Physical and Aggregate Properties						
Liquid Limit			29	33	34	
Plastic Limit			17	16	19	
Plasticity Index			13	16	15	
Moisture	Wet Weight	%	16.3	16.5	17.8	0.1
Texture			Loam	Loam	Loam	
Sand	Soil Texture	% by weight	44.0	46.0	42.0	
Silt	Soil Texture	% by weight	29.6	30.0	32.0	
Clay	Soil Texture	% by weight	26.4	24.0	26.0	

Analytical Report

Bill To: Envirowest Engineering Ltd.
 Report To: Envirowest Engineering Ltd.
 Box 4248
 5118 - 50th Street
 Ponoka, AB, Canada
 T4J 1R6
 Attn: Shawna Low
 Sampled By: Shawna Low
 Company: Envirowest

Project:
 ID: 42495
 Name: Vermeer
 Location:
 LSD: SE 4-45-19 W4M
 P.O.:
 Acct code:

Lot ID: **574651**
 Control Number: E 276836
 Date Received: Sep 20, 2007
 Date Reported: Sep 27, 2007
 Report Number: 1049712

		Reference Number	574651-4	574651-5		
		Sample Date	Sep 14, 2007	Sep 14, 2007		
		Sample Location				
		Sample Description	BH3 / 42495-3-2 / 7.7 / m	BH4 / 42495-4 / 2.2 / m		
		Matrix	Soil	Soil		
Analyte		Units	Results	Results	Results	Detection Limit
Physical and Aggregate Properties						
Liquid Limit			30			
Plastic Limit			16			
Plasticity Index			14			
Moisture	Wet Weight	%	16.4			0.1
Texture			Loam	Loam		
Sand	Soil Texture	% by weight	48.0	44.4		
Silt	Soil Texture	% by weight	31.2	30.2		
Clay	Soil Texture	% by weight	20.8	25.4		

Approved by:

Anthony Neumann, MSc
 Laboratory Operations Manager