Part 2 — Technical Requirements

NRCB Natural Resources Conservation Board

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

NRCB USE ONLY	Application number	Legal land description
☑ Approval ☐ Registration ☐ Authorization ☐ Amendment	RA24034	NE 16-53-3 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.

Nov. 7, 2024
Date of signing

[redacted]
Signature

TERRY HINES LIVESTOCK LTD.
Corporate name (if applicable)

ANTHONY GARNIER
Print name

AO note: Anthony is the agent for Gus and Yvonne

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)
Pen Area 1 AO note: pens 1-4 are already constructed (unauthorized)	2,800 m²
Pen Area 2	4,000 m²
Pen Area 3	6,000 m²
Pen Area 4	5,600 m²
AO note: applicant is also applying to construct 4 catch basins and protective berms	27 m x 15 m x 1.5 m deep 22 m x 22 m x 1.5 m deep 41 m x 17 m x 1.5 m deep 50 m x 15m x 1.5 m deep

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

Existing facilities	Dimensions (m) (length, width, and depth)	NRCB USE ONLY

NRCB USE ONLY

No existing permitted facilities

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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 _____

Additional information

AO note: this application is a result of NRCB-issued Compliance Directive CD 23-10

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**
Beef feeders	0	1800	1800
AO note: applicant decreased the proposed animal numbers from Part 1.			

Part 2 — Technical Requirements

NRCB Natural Resources Conservation Board

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

DECLARATION AND ACKNOWLEDGMENT OF APPLICANT CONCERNING *WATER ACT* LICENCE

issued by Alberta Environment and Protected Areas (EPA) for a confined feeding operation (CFO)

Date and sign one of the following four options

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

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

Signed this ____day of _____, 20____. _____

Signature of Applicant or Agent

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

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

Signed this 7 day of November, 2024. [redacted]

Signature of Applicant or Agent

OPTION 3: Additional water licence not required

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

Signed this ____ day of _____, 20____. _____

Signature of Applicant or Agent

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 Natural Resources Conservation Board

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)

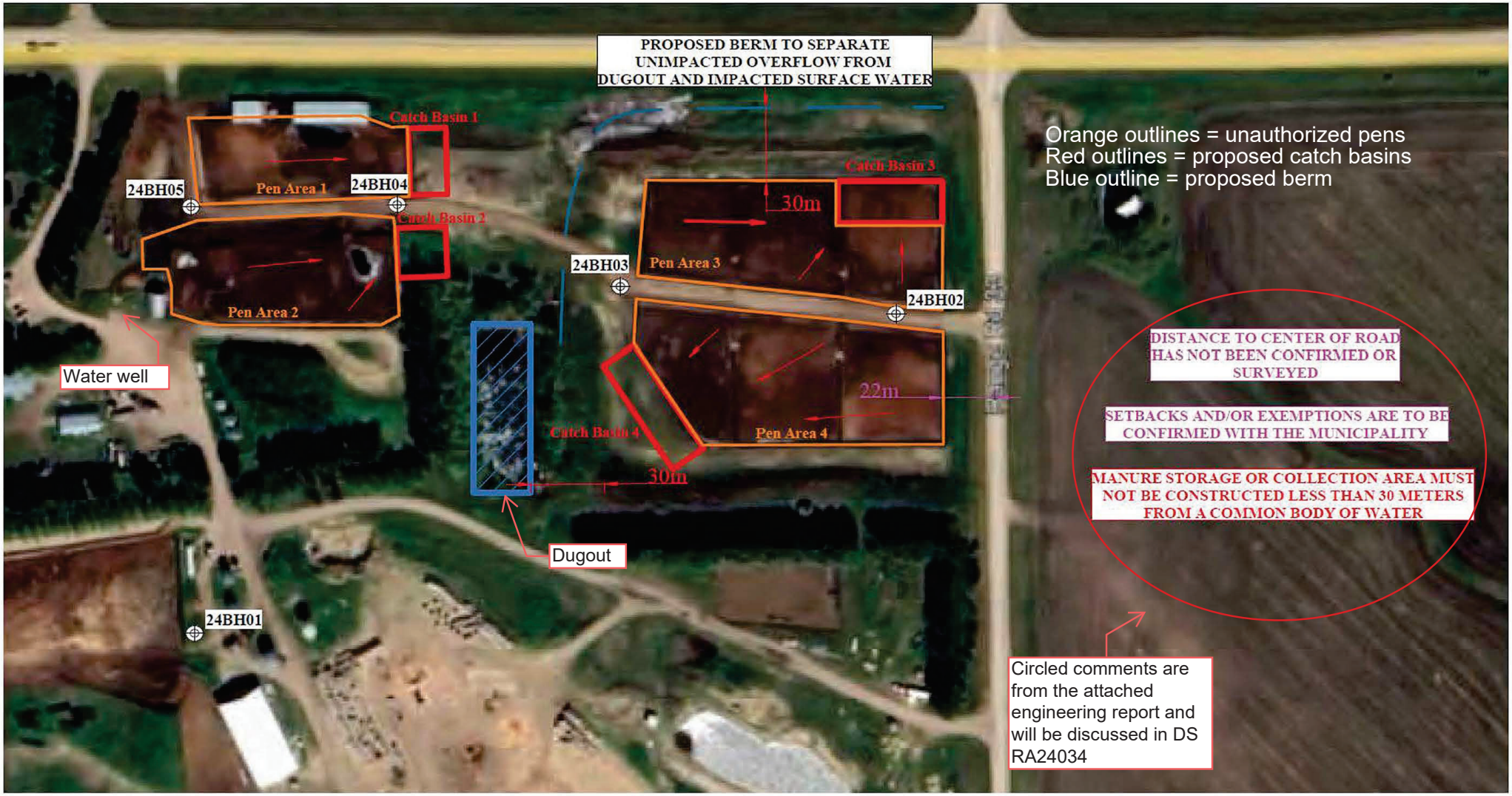
Facility description / name *(as indicated on site plan)* (catch basin 4)

Existing: _____ **Proposed 1:** TERRY HINES LIVESTOCK LTD

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?	☐ >1 m ☐ ≤ 1 m	☑ >1 m ☐ ≤ 1 m	☐ >1 m ☐ ≤ 1 m	☐ > 1 m ☐ ≤ 1 m	☒ YES ☐ NO ☐ YES with exemption	Not in known floodplain
Surface water information	How many springs are within 100 m of the manure storage facility or manure collection area?	0	0			☒ YES ☐ NO ☐ YES with exemption	None observed
	How many water wells are within 100 m of the manure storage facility or manure collection area?		0			☐ YES ☐ NO ☒ YES with exemption	1 well ~40 m west of pen 2 and ~50 m SW of pen 1
	What is the shortest distance from the manure collection or storage facility to a surface water body? (e.g., lake, creek, slough, seasonal)		30 m			☒ YES ☐ NO ☐ YES with exemption	Slough ~65 m east of pen area 3
Groundwater information	What is the depth to the water table?		8.8 m			☒ YES ☐ NO ☐ YES with exemption	>7.5 m from borehole logs
	What is the depth to the groundwater resource/aquifer you draw water from?		10.5m			☒ YES ☐ NO ☐ YES with exemption	21 m from WWID 167367

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


PROPOSED BERM TO SEPARATE UNIMPACTED OVERFLOW FROM DUGOUT AND IMPACTED SURFACE WATER
Catch Basin 1
Pen Area 1
24BH05
24BH04
Catch Basin 2
Pen Area 2
Water well
Catch Basin 3
30m
24BH03
Pen Area 3
24BH02
22m
Catch Basin 4
Pen Area 4
30m
Dugout
24BH01
Orange outlines = unauthorized pens
Red outlines = proposed catch basins
Blue outline = proposed berm
DISTANCE TO CENTER OF ROAD HAS NOT BEEN CONFIRMED OR SURVEYED
SETBACKS AND/OR EXEMPTIONS ARE TO BE CONFIRMED WITH THE MUNICIPALITY
MANURE STORAGE OR COLLECTION AREA MUST NOT BE CONSTRUCTED LESS THAN 30 METERS FROM A COMMON BODY OF WATER
Circled comments are from the attached engineering report and will be discussed in DS RA24034

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

WATER WELL AND SURFACE WATER INFORMATION

Well IDs: 167367 _____ _____ _____

_____ _____ _____

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
167367	18 = continue to next section	7 = exemption more likely	Pens 1 and 2 (already constructed)

Groundwater or surface water related comments:

Water Well Drilling Report

View in Imperial | Export to Excel

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

GOWN ID

GIC Well ID 167367
GoA Well Tag No.
Drilling Company Well ID
Date Report Received 1992/08/17

Well Identification and Location

Measurement in Metric

Owner Name	Address	Town	Province	Country	Postal Code
GARNIER, GUS	P.O. BOX 481 MARWAYNE				T0B 2X0

Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description
	NE	16	53	3	4				

Measured from Boundary of
m from
m from

GPS Coordinates in Decimal Degrees (NAD 83)
Latitude 53.580890 Longitude -110.380642
How Location Obtained
Not Verified

Elevation m
How Elevation Obtained
Not Obtained

Drilling Information

Method of Drilling
Rotary

Proposed Well Use
Domestic & Stock

Type of Work
New Well

Formation Log

Measurement in Metric

Depth from ground level (m)	Water Bearing	Lithology Description
0.30		Topsoil
5.18		Brown Sandy Till
6.71		Brown Sand
7.92		Brown Sandy Till
8.23		Brown Till
8.53		Black Hard Rocks
24.99		Gray Clay
25.60		Black Fractured Sandstone
40.23		Gray Clay
48.46		Gray Silty Shale
48.77		Black Hard Concretions
53.95		Gray Shale

Yield Test Summary

Measurement in Metric

Recommended Pump Rate 13.64 L/min

Test Date	Water Removal Rate (L/min)	Static Water Level (m)
1992/07/02	13.64	21.03

Well Completion

Measurement in Metric

Total Depth Drilled	Finished Well Depth	Start Date	End Date
53.95 m		1992/07/02	1992/07/02

Borehole

Diameter (cm)	From (m)	To (m)
0.00	0.00	53.95

Surface Casing (if applicable)
Plastic
Size OD : 12.70 cm
Wall Thickness : 0.739 cm
Bottom at : 24.99 m

Well Casing/Liner
Size OD : 0.00 cm
Wall Thickness : 0.000 cm
Top at : 0.00 m
Bottom at : 0.00 m

Perforations

From (m)	To (m)	Diameter or Slot Width (cm)	Slot Length (cm)	Hole or Slot Interval(cm)

Perforated by

Annular Seal Driven
Placed from 24.38 m to 24.99 m
Amount

Other Seals

Type	At (m)

Screen Type
Size OD : 0.00 cm

From (m)	To (m)	Slot Size (cm)

Attachment
Top Fittings
Bottom Fittings

Pack
Type
Grain Size
Amount

Contractor Certification

Name of Journeyman responsible for drilling/construction of well
UNKNOWN NA DRILLER

Certification No
1

Company Name
BYRT, STAN & SONS LTD.

Copy of Well report provided to owner

Date approval holder signed

Water Well Drilling Report

View in Imperial | Export to Excel

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

GOWN ID

GIC Well ID 167367
GoA Well Tag No.
Drilling Company Well ID
Date Report Received 1992/08/17

Well Identification and Location

Measurement in Metric

Owner Name	Address	Town	Province	Country	Postal Code
GARNIER, GUS	P.O. BOX 481 MARWAYNE				T0B 2X0

Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description
	NE	16	53	3	4				

Measured from Boundary of
m from
m from

GPS Coordinates in Decimal Degrees (NAD 83)
Latitude 53.580890 Longitude -110.380642
How Location Obtained
Not Verified

Elevation m
How Elevation Obtained
Not Obtained

Additional Information

Measurement in Metric

Distance From Top of Casing to Ground Level cm
Is Artesian Flow
Rate L/min
Is Flow Control Installed
Describe

Recommended Pump Rate 13.64 L/min
Recommended Pump Intake Depth (From TOC) 24.69 m
Pump Installed Yes Depth m
Type SUB Make 7603422 H.P.
Model (Output Rating)

Did you Encounter Saline Water (>4000 ppm TDS) Depth m
Gas Depth m
Remedial Action Taken
Well Disinfected Upon Completion
Geophysical Log Taken
Submitted to ESRD

Sample Collected for Potability
Submitted to ESRD

Additional Comments on Well

Yield Test

Taken From Ground Level
Measurement in Metric

Test Date	Start Time	Static Water Level
1992/07/02	12:00 AM	21.03 m

Method of Water Removal

Type Pump
Removal Rate 13.64 L/min
Depth Withdrawn From 24.99 m

If water removal period was < 2 hours, explain why

Depth to water level

Pumping (m)	Elapsed Time Minutes:Sec	Recovery (m)
8.48	0:00	
9.90	1:00	
10.69	2:00	
11.41	3:00	
11.94	4:00	
12.62	5:00	
13.14	6:00	
13.68	7:00	
14.17	8:00	
14.65	9:00	
15.05	10:00	
15.90	12:00	
16.52	14:00	
17.02	16:00	
18.04	20:00	
18.99	25:00	
19.65	30:00	13.78
20.17	35:00	
18.53	40:00	
20.15	50:00	
21.12	60:00	
21.92	75:00	
22.31	90:00	
22.62	105:00	
22.87	120:00	

Water Diverted for Drilling

Water Source	Amount Taken	Diversion Date & Time
	L	

Contractor Certification

Name of Journeyman responsible for drilling/construction of well
UNKNOWN NA DRILLER

Certification No
1

Company Name
BYRT, STAN & SONS LTD.

Copy of Well report provided to owner

Date approval holder signed

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NRCB USE ONLY

ENVIRONMENTAL RISK SCREENING INFORMATION

ERST for **proposed** facilities

Facility	Groundwater score	Surface water score	File number
Already constructed feedlot pens 1-4	Low	Low	RA24034
Proposed catch basins 1-4	Presumed to be low (see DS RA24034)		

ERST for **existing** facilities

Facility	Groundwater score	Surface water score	File number
N/A			

ERST related comments:

New CFO facilities that meet or exceed AOPA requirements are presumed to pose a low potential risk to groundwater and surface water. A variance will be required to address the proximity of a water well to the already constructed pen areas 1 and 2.

Part 2 — Technical Requirements

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

			NRCB USE ONLY				
Neighbour name(s)	**Legal land description**	**Distance (m)**	**Zoning (LUB) category**	**MDS category (1-4)**	**Distance (m)**	**Waiver attached (if required)**	**Meets regulations**
~~Not Applicable~~ Travis and Charity Cook	S 1/2-15-53-3 W4M		Agriculture	1	1,925	N/A	Yes to all
Justin and Kelsey Volz	SW-17-53-03 W4M		Ag	1	3,085		
Marty Hines	SW-28-53-03 W4M		Ag	1	2,365		
Ryan Rose	NW-22-53-03 W4M		Ag	1	1,620		
Ken Vivian	NW-14-53-03-W4		Ag	1	1,767		

AO note: information in blue was added by AO. Applicant sent neighbor information on Nov. 21, 2024

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

				NRCB USE ONLY	
Name of land owner(s)*	**Legal land description**	**Usable area** (ha)**	**Soil zone *****	**Usable area (ha)**	**Agreement attached (if required)**
Gus & Yvonne Garnier	Sec-16-53-03-W4	155	brown		N/A
Gus & Yvonne Garnier	SE- 20-53-03-W4	48	brown		
Gus & Yvonne Garnier	SW-22-53-03-W4	59	brown		
Gus & Yvonne Garnier	N1/2-27-53-04-W4	125	brown		
			Total	387 ha	

* 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): +/- 3 m

Requirements (m): Category 1: 379 Category 2: 505 Category 3: 631 Category 4: 1,010

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: 144 ha

Land base listed: 387 ha

Area not suitable: N/A

Available area 387 ha 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 _____

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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)

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. ~~TERRY HINES LIVESTOCK LTD~~
2. Unauthorized livestock pens 1-4

Manure storage capacity

	Length (m)	Width (m)	Depth below ground level (m)	NRCB USE ONLY Estimated storage capacity (m^3)
1.	TOTAL	2,800 m^2	N/A	
2.	TOTAL	4,000 m^2		
3.	TOTAL	6,000 m^2	TOTAL CAPACITY	Adequate storage capacity
4.	TOTAL	5,600 m^2		

☑ 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: The Blue berm as indicated in the site plan will seperate unimpacted overflow from dugout and impacted surface water. Catch basin berms will be provided as needed.

Naturally occurring protective layer details

Thickness of naturally occurring protective layer	3 (m)	Provide details (as required)	
Soil texture	13 % sand	31 % silt	55 % clay
Hydraulic conductivity - naturally occurring protective layer	Depth and type of soil tested: 6.5m clay soil	Hydraulic conductivity (cm/s): 4.75×10^{-7}	Describe test standard used: falling head test

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

AO note: pens 1-4 are irregular shapes; total area contributing to runoff is 18,400 m^2

NRCB USE ONLY

Requirements met: ☒ YES ☐ NO
Condition required: ☒ YES ☐ NO
Report attached: ☒ YES ☐ NO

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: >7.5 m Requirements met: ☒ YES ☐ NO

Depth to uppermost groundwater resource: 21 m Requirements met: ☒ YES ☐ NO

ERST completed: ☒ see ERST page for details

Surface water control systems

Requirements met: ☒ YES ☐ NO Details/comments:

A condition will be added requiring a berm to be built as proposed in the application to ensure separation of non-impacted overflow of dugout and impacted surface runoff.

Naturally occurring protective layer details

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

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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)

RUNOFF CONTROL CATCH BASIN: Naturally occurring protective layer

*(complete a copy of this section for **EACH proposed** runoff control catch basin with a naturally occurring protective layer)*

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

1. ~~TERRY HINES LIVESTOCK LTD.~~ Proposed catch basins 1-4
2.
3.

Determination of runoff area

Provide a plan and show how you calculated the area contributing to runoff for each catch basin

Total area contributing to runoff = 18,400 m^2

Catch basin capacity

	Length (m)	Width (m)	Total depth (m)	Depth below ground level (m)	Slope run:rise			NRCB USE ONLY
					Inside end walls	Inside side walls	Outside walls	Calculated storage capacity (excl. 0.5 m freeboard) (m^3)
1.	27	15	1.5	1.5	3:1	3:1	3:1	192 m^3
2.	22	22	1.5	1.5	3:1	3:1	3:1	259 m^3
3.	41	17	1.5	1.5	3:1	3:1	3:1	388 m^3
4.	50	15	1.5	1.5	3:1	3:1	3:1	399 m^3
							TOTAL CAPACITY	Total = 1,238 m^3

Naturally occurring protective layer details

Thickness of naturally occurring protective layer	3 (m)	Provide details (as required)	
Soil texture	13 % sand	31 % silt	55 % clay
Hydraulic conductivity - naturally occurring protective layer	Depth and type of soil tested: 6.5m clay soil	Hydraulic conductivity (cm/s): 4.75×10^{-7}	Describe test standard used: falling head test

Catch Basin – Design and management requirements can be found in Technical Guideline Agdex 096-101

If soil info differs per facility include additional soils page.

NRCB USE ONLY

Requirements met:	☒ YES	☐ NO
Condition required:	☒ YES	☐ NO
Report attached:	☒ YES	☐ NO

RUNOFF CONTROL CATCH BASIN: Naturally occurring protective layer (cont.)

NRCB USE ONLY

Catch basin calculator. Total volume @ freeboard level: 1,238 m3 Runoff capacity requirements met: ☒ YES ☐ NO

Calculation of the volume attached: ☒ YES ☐ NO

Depth to water table: >7.5 m Requirements met: ☒ YES ☐ NO

Depth to uppermost groundwater resource: 21 m Requirements met: ☒ YES ☐ NO

ERST completed: ☒ See ERST page for details

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

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

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NRCB USE ONLY

RUNOFF CONTROL CATCH BASIN CAPACITY SUMMARY (if applicable)

Facility 1 Catch basin 1	
Name / description	Capacity 192 m^3
Facility 2 Catch basin 2	
Name / description	Capacity 259 m^3
Facility 3 Catch basin 3	
Name / description	Capacity 388 m^3
Facility 4 Catch basin 4	
Name / description	Capacity 399 m^3
TOTAL CAPACITY	1,238 m^3
RUNOFF VOLUME FROM CONTRIBUTING AREAS	883 m^3
MEETS AOPA RUNOFF CONTROL VOLUME REQUIREMENTS	☒ YES ☐ NO

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NRCB USE ONLY

ALL SIGNATURES IN FILE ☒ YES ☐ NO

DATES OF APPROVAL OFFICER SITE VISITS

January 29, 2025	

CORRESPONDENCE WITH MUNICIPALITIES AND REFERRAL AGENCIES

Date deeming letters sent: January 7, 2025

Municipality: Vermilion River

☒ 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: _____ ☒ N/A

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

Other: _____ ☐ N/A

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

ENVIROWEST
ENGINEERING

SITE AND SOIL ASSESSMENT

Proposed Solid Manure Storage and Catch Basin
NE¼-16-053-03-W4M

County of Vermilion River, Alberta

Site and Soil Assessment
Proposed Solid Manure Storage and Catch Basin
NE¼-16-053-03-W4M
County of Vermilion River, Alberta

Prepared For: Anthony Garnier

Delivered via Email: [redacted]

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

Report Date: November 7, 2024

Project Number: 2407-43064

Private and Confidential

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List of Tables

Appendices

1.0 Introduction and Scope of Work

Envirowest Engineering (Envirowest) was retained by Anthony Garnier to conduct a Site and Soil Assessment for the proposed construction of solid manure storage and catch basin for a beef confined feeding operation for 1,800 feeders.

The assessment was completed to determine conditions beneath the proposed construction area and assess soil properties for construction of proposed facilities. The operation, herein referred to as "the Site," is located on NE¼-16-053-03-W4M in the County of Vermilion River.

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

Scope of Work

Five investigative boreholes were drilled using a truck-mounted rotary auger and completed to a maximum depth of 10.5 m below ground surface (mbgs) on August 6, 2024. The boreholes were completed in the areas proposed for a solid manure storage and catch basins. The borehole locations are shown on Figure 1 (attached).

One borehole was completed as a groundwater monitoring well to allow for in-situ hydraulic conductivity testing, which was completed on September 5, 2024. An uppermost groundwater resource (UGR) was conservatively determined to be below 9.0 mbgs (as measured from borehole 24BH01). No further assessment was completed to confirm the UGR.

2.0 Assessment Results

The proposed area of construction is relatively flat. The quarter section slopes steeply from the northeast to the southwest. The area surrounding the historically used pens is considered to be ditched or at a lower elevation. A dugout is present to the south and west of the historic pens.

Potential liner construction material (noted in borehole logs as clay) was typically found beneath topsoil and an inconsistent clay or clay loam. Bedrock was not encountered to the maximum depth of investigation (9.0 mbgs).

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

A saturated water table (as defined in the field by saturated soils) was noted at approximately 8.8 mbgs in borehole 24BH01. Boreholes 24BH01 and 24BH02 were advanced in an area that is no longer considered to be part of the construction area, as such a conservative extrapolation of the saturated water table depth will be used for the construction area. The maximum depth of investigation in the proposed area is 7.5 mbgs. It is assumed that the saturated water table is below 7.5 mbgs. The depth of the water table should be confirmed at the time of construction. This can be completed by digging a pit 1 meter below the bottom of the proposed facility.

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

Sample	Depth (mbgs)	Sand (%)	Silt (%)	Clay (%)	Soil Texture
24BH02-01	1.0	47	21	31	Sandy Clay Loam
24BH02-02	5.5	9	27	63	Heavy Clay
24BH02-03	9.5	32	23	44	Clay
24BH03-01	0.75	59	17	23	Sandy Clay Loam
24BH03-02	3.75	22	25	52	Clay
24BH03-03	5.25	34	21	44	Clay
24BH04-01	5.0	19	20	60	Heavy Clay
24BH04-02	*6.5*	*13*	*31*	*55*	*Clay*
24BH05-01	3.5	44	23	32	Clay Loam
24BH05-02	5.5	27	25	47	Clay

Field tested for hydraulic conductivity

The soils suspected for a potential natural barrier were identified as clay with a clay content ranging from 44-55%. The assessed natural barrier (clay) had an average clay content of 48.4%.

The monitoring well installed at borehole 24BH04 (24MW01), was screened from 5.8 to 7.3 mbgs and was sufficiently hydrated prior to completing the in-situ hydraulic conductivity testing. The in-situ hydraulic conductivity test was completed between August 15 and August 28, 2024.

The initial depth to water was measured in the well. A microdiver was installed to log to 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 minute for 2 weeks. 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 4.75 x 10^{-7}cm/sec.

3.0 Liner Assessments

3.1 Natural Barrier Assessment (Catch Basin)

Based on the information obtained it was determined that the native clay within the proposed area of construction of catch basins was found to have a minimum thickness of 3.0 meters. There are four proposed catch basins, as shown on Figure 2.0.

Minimum Required Liner Depth for a natural barrier for a catch basin:

$$\frac{5 \text{ m}}{1 \times 10^{-6} \text{ cm/sec}} = \frac{\mathbf{X} \text{ m}}{4.75 \times 10^{-8} \text{ cm/sec}}$$

AO note: should read 4.75 x 10-7

$$\mathbf{X} = 2.35 \text{ m}$$

It is found that there is sufficient protection across the area proposed for catch basins.

3.2 Natural Barrier Assessment (Solid Manure Storage Pens)

Based on the information obtained it was determined that the native clay within the proposed area of construction for solid manure storage was found to have a minimum thickness of 3.0 meters. There are four proposed liquid manure storage areas, as shown on Figure 2.0.

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

$$\frac{2 \text{ m}}{1 \times 10^{-6} \text{ cm/sec}} = \frac{\mathbf{X} \text{ m}}{4.75 \times 10^{-8} \text{ cm/sec}}$$

AO note: should read 4.75 x 10-7

$$\mathbf{X} = 0.94 \text{ m}$$

It is found that there is sufficient protection across the proposed liquid solid manure storage area.

4.0 Conclusions

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

The soils beneath the proposed area of construction were determined to be appropriate for a naturally occurring protective layer both solid manure and a catch basin. A berm constructed of fine grained material will be required to ensure that overflow from the adjacent dugout does not come within 30 meters of any manure storage or collection area.

5.0 Design and Construction Considerations

5.1 Solid Manure Storage

Area 1

This area is a former established pen. The area measures approximately x meters by x meters. Area 1 should be graded to ensure 0.5% slope towards the catch basin. Generally, the area does not have unimpacted surface water contacting the solid manure area, however, a shallow berm on the west side may be required to ensure all unimpacted surface run-off from the west portion of the property does not reach this area.

Area 2

This area is a former established pen. The area measures approximately x meters by x meters. Area 2 should also be graded to ensure 0.5% slope towards the catch basin. Redirection of surface water may be required at the west portion of the pen area.

Area 3

This area is a former established pen. The area measures approximately x meters by x meters. Area 3 should also be graded to ensure 0.5% slope towards the catch basin.

Area 4

This area is a former established pen. The area measures approximately x meters by x meters. Area 4 should also be graded to ensure 0.5% slope towards the catch basin.

Some pooling may be present within the areas, however for animal care and maintenance of the natural liner it is recommended to maintain a 0.5% slope.

5.2 Catch Basin Sizing

Catch Basin 1 - Surface Run-off Area

The proposed area of contributing run-off for Catch Basin 1 (referred to as Area 1, as shown on Figure 2.0), is conservatively 2,800 m^2. The area of the roadway was then included as a conservative estimate (700 m^2). The size of the catch basin is recommended to have a total storage capacity of 182 m^3, based on Vermillion and Kitscoty precipitation data.

The storage capacity required for Catch Basin 1 is 182 m^3 and will have the following specifications:

- To provide the required capacity, the catch basin should be 27 m in length x 15 m in width. The overall depth has been designed as 1.5 m. The overall capacity of the catch basin will be 364 m^3, which accounts for the required 0.5 m of freeboard, and provides a storage capacity of 192 m^3. The sizing is based on an inside end and side wall slope of 3:1 (run/rise).
- The bottom of the liner must be not less than 1.0 m above the top of the shallow groundwater level at the time of construction.
- The overall depth of 1.5 m will be achieved through a below grade depth of 1.5 m. Above-grade dykes may be needed to redirect unimpacted surface flow. The outside dyke walls should be completed to a slope of 4:1. The crest of the dyke should be sloped slightly outward to direct rainfall away from the storage facility.

Catch Basin 2 - Surface Run-off Area

The proposed area of contributing run-off for Catch Basin 2 (referred to as Area 2, as shown on Figure 2.0), is conservatively 4,000 m^2. The area of the roadway was then included as a conservative estimate (700 m^2). The size of the catch basin is recommended to have a total storage capacity of 245 m^3, based on Vermillion and Kitscoty precipitation data.

The storage capacity required for Catch Basin 2 is 245 m^3 and will have the following specifications:

- To provide the required capacity, the catch basin should be 22 m in length x 22 m in width. The overall depth has been designed as 1.5 m. The overall capacity of the catch basin will be 469 m^3, which accounts for the required 0.5 m of freeboard, and provides a storage capacity of 259 m^3. The sizing is based on an inside end and side wall slope of 3:1 (run/rise).
- The bottom of the liner must be not less than 1.0 m above the top of the shallow groundwater level at the time of construction.
- The overall depth of 1.5 m will be achieved through a below grade depth of 1.5 m. Above-grade dykes may be needed to redirect unimpacted surface flow. The outside dyke walls should be completed to a slope of 4:1. The crest of the dyke should be sloped slightly outward to direct rainfall away from the storage facility.

Catch Basin 3 - Surface Run-off Area

The proposed area of contributing run-off for Catch Basin 3 (referred to as Area 3, as shown on Figure 2.0), is conservatively 6,000 m^2. The area of the roadway was then included as a conservative estimate (1,000 m^2). The size of the catch basin is recommended to have a total storage capacity of 364 m^3, based on Vermillion and Kitscoty precipitation data.

The storage capacity required for Catch Basin 3 is 364 m^3 and will have the following specifications:

- To provide the required capacity, the catch basin should be 41 m in length x 17 m in width. The overall depth has been designed as 1.5 m. The overall capacity of the catch basin will be 694 m^3, which accounts for the required 0.5 m of freeboard, and provides a storage capacity of 388 m^3. The sizing is based on an inside end and side wall slope of 3:1 (run/rise).
- The bottom of the liner must be not less than 1.0 m above the top of the shallow groundwater level at the time of construction.
- The overall depth of 1.5 m will be achieved through a below grade depth of 1.5 m. Above-grade dykes may be needed to redirect unimpacted surface flow. The outside dyke walls should be completed to a slope of 4:1. The crest of the dyke should be sloped slightly outward to direct rainfall away from the storage facility.

Catch Basin 4 - Surface Run-off Area

The proposed area of contributing run-off for Catch Basin 4 (referred to as Area 4, as shown on Figure 2.0), is conservatively 5,600 m^2. The area of the roadway was then included as a conservative estimate (1,000 m^2). The size of the catch basin is recommended to have a total storage capacity of 344 m^3, based on Vermillion and Kitscoty precipitation data.

The storage capacity required for Catch Basin 4 is 344 m^3 and will have the following specifications:

- To provide the required capacity, the catch basin should be 50 m in length x 15 m in width. The overall depth has been designed as 1.5 m. The overall capacity of the catch basin will be 727 m^3, which accounts for the required 0.5 m of freeboard, and provides a storage capacity of 399 m^3. The sizing is based on an inside end and side wall slope of 3:1 (run/rise).
- The bottom of the liner must be not less than 1.0 m above the top of the shallow groundwater level at the time of construction.
- The overall depth of 1.5 m will be achieved through a below grade depth of 1.5 m. Above-grade dykes may be needed to redirect unimpacted surface flow. The outside dyke walls should be completed to a slope of 4:1. The crest of the dyke should be sloped slightly outward to direct rainfall away from the storage facility.

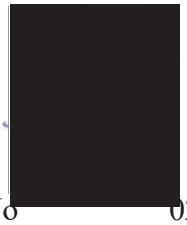
6.0 Closure

Envirowest Engineering is pleased to submit the report to Anthony Garnier. 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,



No 024

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

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

PERMIT TO PRACTICE
2206165 ALBERTA LTD.
RM SIGNATURE: _____
RM APEGA ID #: 110373
DATE: November 7, 2024
PERMIT NUMBER: P014810
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)

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

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

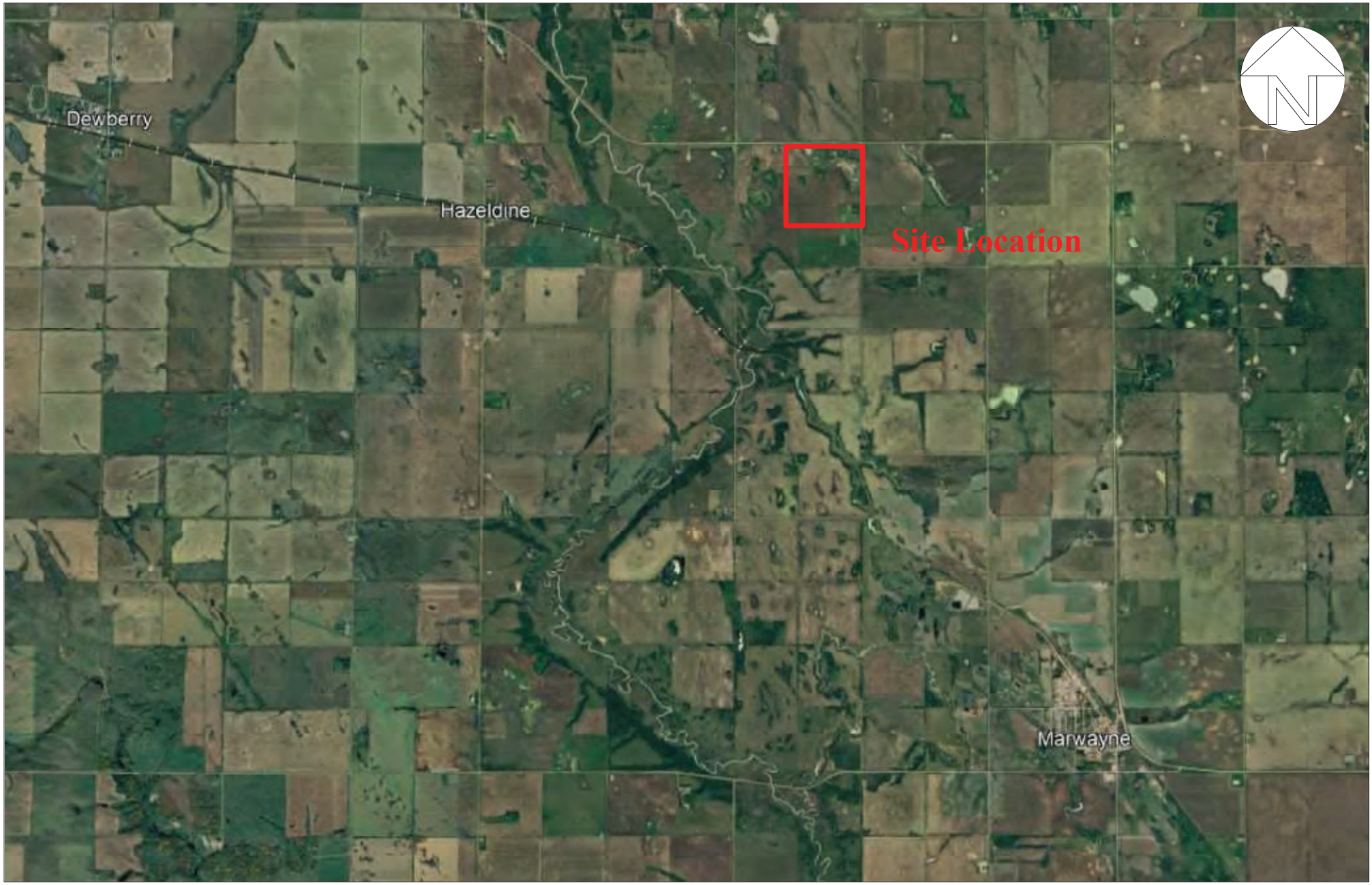
8.0 References

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

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

Appendix A

Figures

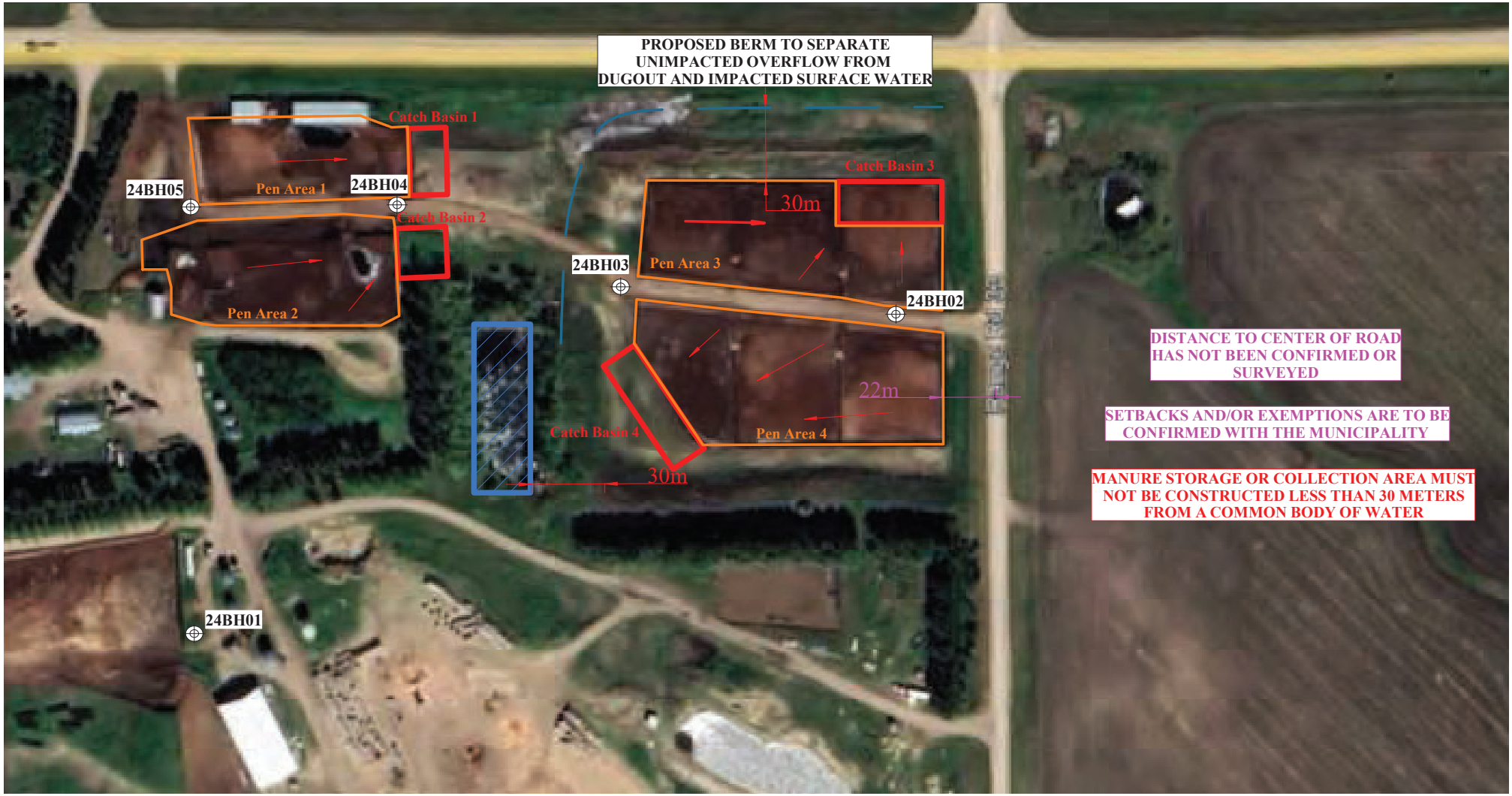


ENVIROWEST ENGINEERING

Title:

Site Location
Site and Soil Assessment
NE¼-Sec.16-Twp.053-Rge.03-W4M
County of Vermilion River, Alberta

Project No: 2407-43064	**Date:** November 7, 2024	**Figure No.:** 1.0
Scale:	**Prepared By:** E.Low	
Image Source: Google Earth Pro (April 28, 2023)		



ENVIROWEST ENGINEERING

Title:

Borehole Locations
Site and Soil Assessment
NE¼-Sec.16-Twp.053-Rge.03-W4M
County of Vermilion River, Alberta

Project No: 2407-43064	**Date:** November 7, 2024	**Figure No.:** 2.0
Scale:	**Prepared By:** E.Low	
Image Source: Google Earth Pro (April 28, 2023)		

Appendix B

Borehole Logs

ENVIROWEST ENGINEERING

B R N 4B 01

Site and Soil Assessment
NE-16-53-3-W4M
Pro ect Number 40 -43064

riller Ever reen rilling
rilling Method rac Mounted Auger
rill ate August 6, 0 4
ogged By Emily o P Eng

epth in Meters	astech Reading ppm (0 100 00 300 400 500)	V C Reading	RAP C	ESCR P N	Well Elev	Water evel
0 0 – 0 3 – 0 5 – 0 – 1 0 – 1 3 – 1 5 – 1 – 0 – 3 – 5				C A E SAN , mottled, bro n, loose, damp		
3 0 – 3 3 – 3 5 – 3 – 4 0 – 4 3 – 4 5 – 4 – 5 0 – 5 3 – 5 5 – 5 – 6 0 – 6 3 – 6 5 – 6 – 0 – 3 – 5 – 0 – 3 – 5 – 0				SAN , yello ish bro n, loose, dry		
				C A E SAN SAN C A , bro n, loose, damp saturated		

ENVIROWEST ENGINEERING

B R N 4B 0

Site and Soil Assessment
NE-16-53-3-W4M
Pro ect Number 40 -43064

riller Ever reen rilling
rilling Method rac Mounted Auger
rill ate August 6, 0 4
ogged By Emily o P Eng

epth in Meters	astech Reading ppm (0 100 00 300 400 500)	V C Reading	RAP C	ESCR P N	Well Elev	Water evel
0 0 – 0 3 – 0 5 – 0 – 1 0 – 1 3 – 1 5 – 1 – 0 – 3 – 5 – 3 0 – 3 3 – 3 5 – 3 – 4 0 – 4 3 – 4 5 – 4 – 5 0 – 5 3 – 5 5 – 5 – 6 0 – 6 3 – 6 5 – 6 – 0 – 3 – 5 – 0 – 3 – 5 – 0 – 3 – 5 – 10 0 – 10 3 – 10 5			C A E SAN , yello ish bro n to bro n, loose, damp to dry			
			SAN C A , bro n, firm, damp			
			C A , grey, firm, compact			

11-0 - 0 4 perations Client ata 43064 Anthony arnier 4B 0 bor

ENVIROWEST ENGINEERING

B R N 4B 03

Site and Soil Assessment
NE-16-53-3-W4M
Pro ect Number 40 -43064

riller Ever reen rilling
rilling Method rac Mounted Auger
rill ate August 6, 0 4
ogged By Emily o P Eng

epth in Meters	astech Reading ppm (0 100 00 300 400 500)	V C Reading	RAP C	ESCR P N	Well Elev	Water evel
0 0				SAN C A , bro n, firm, medium plasticity, damp		
0 3						
0 5						
0						
1 0						
1 3						
1 5						
1						
0						
3						
5				soft		
3 0				C A , bro n-red mottling, firm, damp		
3 3						
3 5						
3						
4 0						
4 3						
4 5				grey		
4						
5 0						
5 3						
5 5						
5						
6 0						

11-0 - 0 4 perations Client ata 43064 Anthony arnier 4B 03 bor

ENVIROWEST ENGINEERING

B R N 4B 04

Site and Soil Assessment
NE-16-53-3-W4M
Pro ect Number 40 -43064

riller Ever reen rilling
rilling Method rac Mounted Auger
rill ate August 6, 0 4
ogged By Emily o P Eng

epth in Meters	astech Reading ppm (0 100 00 300 400 500)	V C Reading	RAP C	ESCR P N	Well 4MW01 Elev	Water evel
0 0 – 0 3 – 0 5 – 0 – 1 0 – 1 3 – 1 5 – 1 – 0 – 3 – 5				SAN C A , bro n, firm, medium plasticity, damp	Bentonite; Solid	
3 0 – 3 3 – 3 5 – 3 – 4 0 – 4 3 – 4 5 – 4 – 5 0 – 5 3 – 5 5 – 5 – 6 0 – 6 3 – 6 5 – 6 – 0 – 3 – 5				C A , bro n-red mottling, firm, damp grey	Sand; Screen; Bentonite	

ENVIROWEST ENGINEERING

B R N 4B 05

Site and Soil Assessment
NE-16-53-3-W4M
Pro ect Number 40 -43064

riller Ever reen rilling
rilling Method rac Mounted Auger
rill ate August 6, 0 4
ogged By Emily o P Eng

epth in Meters	astech Reading ppm (0 100 00 300 400 500)	V C Reading	RAP C	ESCR P N	Well Elev	Water evel
0 0 – 0 3 – 0 5 – 0 – 1 0 – 1 3 – 1 5 – 1				C A E SAN , light bro n, loose, damp		
0 – 3 – 5				SAN , light bro n, loose, damp		
3 0 – 3 3 – 3 5 – 3 – 4 0 – 4 3 – 4 5 – 4 – 5 0 – 5 3 – 5 5 – 5 – 6 0 – 6 3 – 6 5 – 6 – 0 – 3 – 5				C A , firm, medium plasticity, bro n grey		

11-0 - 0 4 perations Client ata 43064 Anthony arnier 4B 05 bor

Appendix C

Certificate of Analysis

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

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

ATTENTION TO: Emily Low

PROJECT:

AGAT WORK ORDER: 24R185785

SOIL ANALYSIS REVIEWED BY: Max Dou, Report Writer

DATE REPORTED: Aug 26, 2024

PAGES (INCLUDING COVER): 7

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.*
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- *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.*

AGAT Laboratories

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

Certificate of Analysis

AGAT WORK ORDER: 24R185785

PROJECT:

CLIENT NAME: ENVIROWEST

ATTENTION TO: Emily Low

SAMPLING SITE:

SAMPLED BY:

Particle Size - Texture

DATE RECEIVED: 2024-08-14

DATE REPORTED: 2024-08-26

		SAMPLE DESCRIPTION:		24BH02-01	24BH02-02	24BH02-03	24BH03-01	24BH03-02	24BH03-03	24BH04-01	24BH04-02
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2024-08-09	2024-08-09	2024-08-09	2024-08-09	2024-08-09	2024-08-09	2024-08-09	2024-08-09
Parameter	Unit	G / S	RDL	6078776	6078784	6078786	6078787	6078788	6078789	6078790	6078791
Particle Size Distribution (Sand)	%		2	47	9	32	59	22	34	19	13
Particle Size Distribution (Silt)	%		2	21	27	23	17	25	21	20	31
Particle Size Distribution (Clay)	%		2	31	63	44	23	52	44	60	55
Soil Texture				Sandy Clay Loam	Heavy Clay	Clay	Sandy Clay Loam	Clay	Clay	Heavy Clay	Clay

		SAMPLE DESCRIPTION:		24BH05-01	24BH05-01
		SAMPLE TYPE:		Soil	Soil
		DATE SAMPLED:		2024-08-09	2024-08-09
Parameter	Unit	G / S	RDL	6078792	6078793
Particle Size Distribution (Sand)	%		2	44	27
Particle Size Distribution (Silt)	%		2	23	25
Particle Size Distribution (Clay)	%		2	32	47
Soil Texture				Clay Loam	Clay

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

6078776-6078793 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:

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

Quality Assurance

CLIENT NAME: ENVIROWEST

AGAT WORK ORDER: 24R185785

PROJECT:

ATTENTION TO: Emily Low

SAMPLING SITE:

SAMPLED BY:

Soil Analysis

RPT Date: Aug 26, 2024			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Particle Size - Texture															
Particle Size Distribution (Sand)	6078776	6078776	47	47	0.4%	< 2	111%	80%	120%						
Particle Size Distribution (Silt)	6078776	6078776	21	20	4.0%	< 2	86%	80%	120%						
Particle Size Distribution (Clay)	6078776	6078776	31	32	3.3%	< 2	98%	80%	120%						

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

Certified By:

AGAT Laboratories

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

Method Summary

CLIENT NAME: ENVIROWEST

AGAT WORK ORDER: 24R185785

PROJECT:

ATTENTION TO: Emily Low

SAMPLING SITE:

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

AGAT Laboratories

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webearth.agatlabs.com

Laboratory Use Only
Arrival Temperature:
Cooler Quantity:
Custody Seal Intact: ☐ Yes ☐ No ☐ N/A
AGAT Job Number: 24R185785

Chain of Custody Record

Emergency Support Services Hotline 1-855-AGAT 245 (1-855-242-8245)

Report Information
Company: Enviroest Engineering
Contact: ELow
Address:
Phone: 403-783-8229

Project Information
Client Project #: 43064
Site Location:
Sample By:
AGAT Quote #:
If a quotation number is not provided, client will be billed at standard rates. See terms and conditions of quote for full details.

Invoice To Same as Report to ☑
Company:
Contact:
Email:
Address
Phone:
PO/CC #:

Report Information
1. Name: Emily Low
Email: elow@enviroestengineering.ca
2. Name:
Email:
3. Name:
Email:

Requirements (Selection may impact detection limits)

CCME	AB Tier 1	Alberta Surface Water
☐ Agricultural	☐ Agricultural	☐ Chronic
☐ Industrial	☐ Industrial	☐ Acute
☐ Residential/Park	☐ Residential/Park	☐ SK Notice of Site Cond.
☐ Commercial	☐ Commercial	☐ Drinking Water
☐ FWAL	☐ Natural Area	☐ Other:

Is this part of the Alberta SRP program? ☐ YES ☐ NO (If yes, please fill below)
Application Number:
Grant Amount:
Well/Facility/Location ID:
UWI:

Turnaround Time Required (TAT)
Regular TAT ☑ 5 to 7 Business Days
Rush TAT ☐ <24 Hours (200%) ☐ Next Business Day (100%) ☐ 2 Business Days (50%) ☐ 3 Business Days(25%)
Date Required: 2

LABORATORY USE (LAB ID #)	SAMPLE IDENTIFICATION	DEPTH	DATE/TIME SAMPLED	SAMPLE MATRIX	COMMENTS	# OF CONTAINERS: VIALS / JARS	# OF CONTAINERS: BAGS	# OF CONTAINERS: BOTTLES	Field Filtered (Y/N)	Preserved (Y/N)	Detailed Salinity: ☐ AB ☐ SK ☐ BC ☐ D50	☐ CCME/AB : BTEX/F1-F4 ☐ CCME/AB : BTEX/F1-F2	☐ BC: BTEXS/VPH/EPH ☐ BC: LEPH/HEPH	SK: BTEX/TVH/C11-C22, C23-C60	Soil Metals: ☐ HWS-B ☐ SP-B ☐ Hg ☐ Cr^{6+}	Water Metals: ☐ Dissolved ☐ Total ☐ Hg ☐ Cr^{6+}	Routine Water Chemistry	Landfill: ☐ AB Class 2 ☐ BC ☐ SK	Coliforms: ☐ Total ☐ Fecal ☐ E.coli	Particle Size: ☐ Sieve (75µm) ☑ Texture			Hold For 30 Days No Analysis (Additional Fee)	Long Term Storage - 6 Months	Long Term Storage - 1 Year	Hazardous (Y/N)
1	24BH02-01		Aug 9/24	Sol			1													X						
2	24BH02-02						1													X						
3	24BH02-03						1													X						
4	24BH03-01						1													X						
5	24BH03-02						1													X						
6	24BH03-03						1													X						
7	24BH04-01						1													X						
8	24BH04-02						1													X						
9	24BH05-01						1													X						
10	24BH05-02						1													X						

Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Emily Low [redacted]	Aug 14/24	[redacted]	Aug 14/24 9:40
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time

Pink Copy - Client
Yellow Copy - AGAT
White Copy - AGAT

Page 1 of 1
N°: AB 172819

AGAT Laboratories

SAMPLE INTEGRITY RECEIPT FORM

RECEIVING BASICS - Shipping

Company/Consultant: Enviroweb

Courier: Icon Prepaid Collect

Waybill#

Branch: EDM GP FN FM (RD) VAN LYD FSJ EST SASK Other:

If multiple sites were submitted at once: (Yes) No

Custody Seal Intact: Yes No (NA)

TAT: <24hr 24-48hr 48-72hr (Reg) Other

Cooler Quantity: 1

TIME SENSITIVE ISSUES - Shipping

ALREADY EXCEEDED HOLD TIME? Yes (No)

Inorganic Tests (Please Circle): Mibi , BOD , Nitrate/Nitrite , Turbidity , Color , Microtox , Ortho PO4 , Tedlar Bag , Residual Chlorine , Chlorophyll* , Chloroamines*

Earliest Expiry:

Hydrocarbons: Earliest Expiry

SAMPLE INTEGRITY - Shipping

Hazardous Samples: YES (NO) Precaution Taken:

Legal Samples: Yes (No)

International Samples: Yes (No)

Tape Sealed: Yes (No)

Coolant Used: Icepack Bagged Ice Free Ice Free Water None

Temperature (Bottles/Jars only) N/A if only Soil Bags Received

FROZEN (Please Circle if samples received Frozen)

1 (Bottle/Jar) 0+0+0=0 °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: 24R185785

Samples Damaged: Yes No If YES why?

No Bubble Wrap Frozen Courier

Other:

Account Project Manager: have they been notified of the above issues: Yes No

Whom spoken to: Date/Time:

CPM Initial

General Comments:

* Subcontracted Analysis (See CPM)

Date issued: March 11, 2020

JAZOO EXPRESS COURIER Ltd.

CLIENT USE ONLY

Contact Name:	melissa	Contact Location:	AGAT RED DEER	Billed to:	AGAT
Date:	Aug 14/24	Delivery From:	Agat,#12-7471 Edgar Industrial Bend		
		Delivery To:	2910 21 STREET NE CALGARY, AB T2E 7P7		
Total # Items:	2	Item Description: envelope, sm/med/lg box, cooler, etc.	EnviroWest 1 cooler Town of Sylvan 1 cooler		
			Job/PO/Reference #:		
Authorized Shipper Signature:	[redacted]				

DRIVER USE ONLY

P/U Driver Name:	EDWIN	P/U Time:	am	D/O Time:	am
# Items P/U:	2		120 pm		3:55 pm
	Overweight	TDG			

Total # items dropped Off:	2	D/O Driver Name:	Done
Authorized Receiver Signature:			

HOTSHOT DETAILS

tal Km:		Or Total Charge ($):	

OFFICE USE ONLY

erified By:		Invoiced By:	

To request a hot shot please contact dispatch at the city nearest you:

Calgary	403-660-5504	Fort McMurray	587-645-6364
Edmonton	780-903-3628	Grande Prairie	587-297-8406

THANK YOU FOR SUPPORTING LOCAL AND CHOOSING JAZOO EXPRESS COURIER LTD.

Data Set: Z:\Operations\Client Data\43064 Anthony Garnier\24MW01.aqt
Date: 10/11/24
Time: 11:38:21

PROJECT INFORMATION

Company: Envirowest Engineering
Client: Anthony Garnier
Project: 2407-43064
Test Date: Aug 15 - 22, 2024
Test Well: 24MW01

AQUIFER DATA

Saturated Thickness: 1.5 m
Anisotropy Ratio (Kz/Kr): 1.

SOLUTION

Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 3.962

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	4.75E-7	cm/sec
y0	2.505	m

T = K*b = 7.126E-5 cm²/sec