

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 checked="" type="checkbox"/> Approval <input type="checkbox"/> Registration <input type="checkbox"/> Authorization <input type="checkbox"/> 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
TERRY HINES LIVESTOCK LTD.
 Corporate name (if applicable)


 Signature
ANTHONY GARNIER
 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)
Pen Area 1	2,800 m ²
Pen Area 2	4,000 m ²
Pen Area 3	6,000 m ²
Pen Area 4	5,600 m ²
AO note: applicant is also applying to construct 4 catch basins and a protective berm	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

Part 2 – Technical Requirements



NRCB | Natural Resources Conservation Board

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

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

Construction completion date for proposed facilities _____

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

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 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.

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)

GENERAL ENVIRONMENTAL INFORMATION

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

Facility description / name (as indicated on site plan)

Existing: _____

Proposed 1: 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?	<input checked="" type="checkbox"/> >1 m <input type="checkbox"/> ≤ 1 m	<input checked="" type="checkbox"/> >1 m <input type="checkbox"/> ≤ 1 m	<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"/> YES <input type="checkbox"/> NO <input type="checkbox"/> YES with exemption	
	Surface water information	How many springs are within 100 m of the manure storage facility or manure collection area?	0	0		<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> YES with exemption	
	How many water wells are within 100 m of the manure storage facility or manure collection area?		0			<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> YES with exemption	
	What is the shortest distance from the manure collection or storage facility to a surface water body? (e.g., lake, creek, slough, seasonal)		30 m			<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> YES with exemption	
Groundwater information	What is the depth to the water table?		8.8 m			<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> YES with exemption	
	What is the depth to the groundwater resource/aquifer you draw water from?		10.5 m			<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> YES with exemption	

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



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:
October 18, 2024

Figure No.:

Scale:

Prepared By:
E.Low

2.0

Image Source:
Google Earth Pro (April 28, 2023)

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)

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
Not Applicable Travis and Charity Cook	S 1/2-15-53-3 W4M						
Justin and Kelsey Volz	SW-17-53-03 W4M						
Marty Hines	SW-28-53-03 W4M						
Ryan Rose	NW-22-53-03 W4M						
Ken Vivian	NW-14-53-03-W4						

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)

Name of land owner(s)*	Legal land description	Usable area** (ha)	Soil zone ***	NRCB USE ONLY	
				Usable area (ha)	Agreement attached (if required)
Gus & Yvonne Garnier	Sec-16-53-03-W4	155	brown		
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					

* 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)

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)

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.
2. _____
3. _____

Determination of runoff area

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

Catch basin capacity

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

Naturally occurring protective layer details

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

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

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. TERRY HINES LIVESTOCK LTD
2. _____

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		
2.	TOTAL	4,000 m ²		
3.	TOTAL	6,000 m ²		
4.	TOTAL	5,600 m ²		
			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 The blue berm as indicated in the site plan will separate 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	<u>3</u> (m)			Provide details (as required)
Soil texture	<u>13</u> % sand	<u>31</u> % silt	<u>55</u> % clay	
Hydraulic conductivity - naturally occurring protective layer	Depth and type of soil tested <u>6.5m clay soil</u>	Hydraulic conductivity (cm/s) <u>4.75 x 10⁻⁷</u>	Describe test standard used <u>falling head test</u>	

Additional information (attach copies of soil test reports)

NRCB USE ONLY	
Requirements met:	<input type="checkbox"/> YES <input type="checkbox"/> NO
Condition required:	<input type="checkbox"/> YES <input type="checkbox"/> NO
Report attached:	<input type="checkbox"/> YES <input type="checkbox"/> NO



SITE AND SOIL ASSESSMENT

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

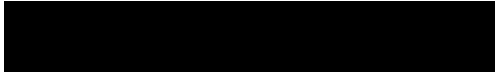
County of Vermilion River, Alberta



**Site and Soil Assessment
Proposed Solid Manure Storage and Catch Basin
NE¹/₄-16-053-03-W4M
County of Vermilion River, Alberta**

Prepared For: Anthony Garnier

Delivered via Email:



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



Table of Contents

1.0 Introduction and Scope of Work	3
2.0 Assessment Results.....	4
3.0 Liner Assessments	6
3.1 Natural Barrier Assessment (Catch Basin).....	6
3.2 Natural Barrier Assessment (Solid Manure Storage Pens).....	6
4.0 Conclusions	7
5.0 Design and Construction Considerations	8
5.1 Solid Manure Storage	8
5.2 Catch Basin Sizing.....	9
6.0 Closure.....	12
7.0 Qualifications of Assessors	13
8.0 References	14

List of Tables

Table 1: Soil Properties Results	5
--	---

Appendices

- A. Figure
- B. Borehole Logs
- C. Certificate of Analysis



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 4.75×10^{-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:

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

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

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:

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

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

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 m². The area of the roadway was then included as a conservative estimate (700 m²). The size of the catch basin is recommended to have a total storage capacity of 182 m³, based on Vermillion and Kitscoty precipitation data.

The storage capacity required for Catch Basin 1 is 182 m³ 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 m³, which accounts for the required 0.5 m of freeboard, and provides a storage capacity of 192 m³. 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 m². The area of the roadway was then included as a conservative estimate (700 m²). The size of the catch basin is recommended to have a total storage capacity of 245 m³, based on Vermillion and Kitscoty precipitation data.

The storage capacity required for Catch Basin 2 is 245 m³ 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 m³, which accounts for the required 0.5 m of freeboard, and provides a storage capacity of 259 m³. 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 m². The area of the roadway was then included as a conservative estimate (1,000 m²). The size of the catch basin is recommended to have a total storage capacity of 364 m³, based on Vermillion and Kitscoty precipitation data.

The storage capacity required for Catch Basin 3 is 364 m³ 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 m³, which accounts for the required 0.5 m of freeboard, and provides a storage capacity of 388 m³. 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 m². The area of the roadway was then included as a conservative estimate (1,000 m²). The size of the catch basin is recommended to have a total storage capacity of 344 m³, based on Vermillion and Kitscoty precipitation data.

The storage capacity required for Catch Basin 4 is 344 m³ 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 m³, which accounts for the required 0.5 m of freeboard, and provides a storage capacity of 399 m³. 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.



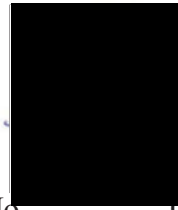
6.0 Closure

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



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

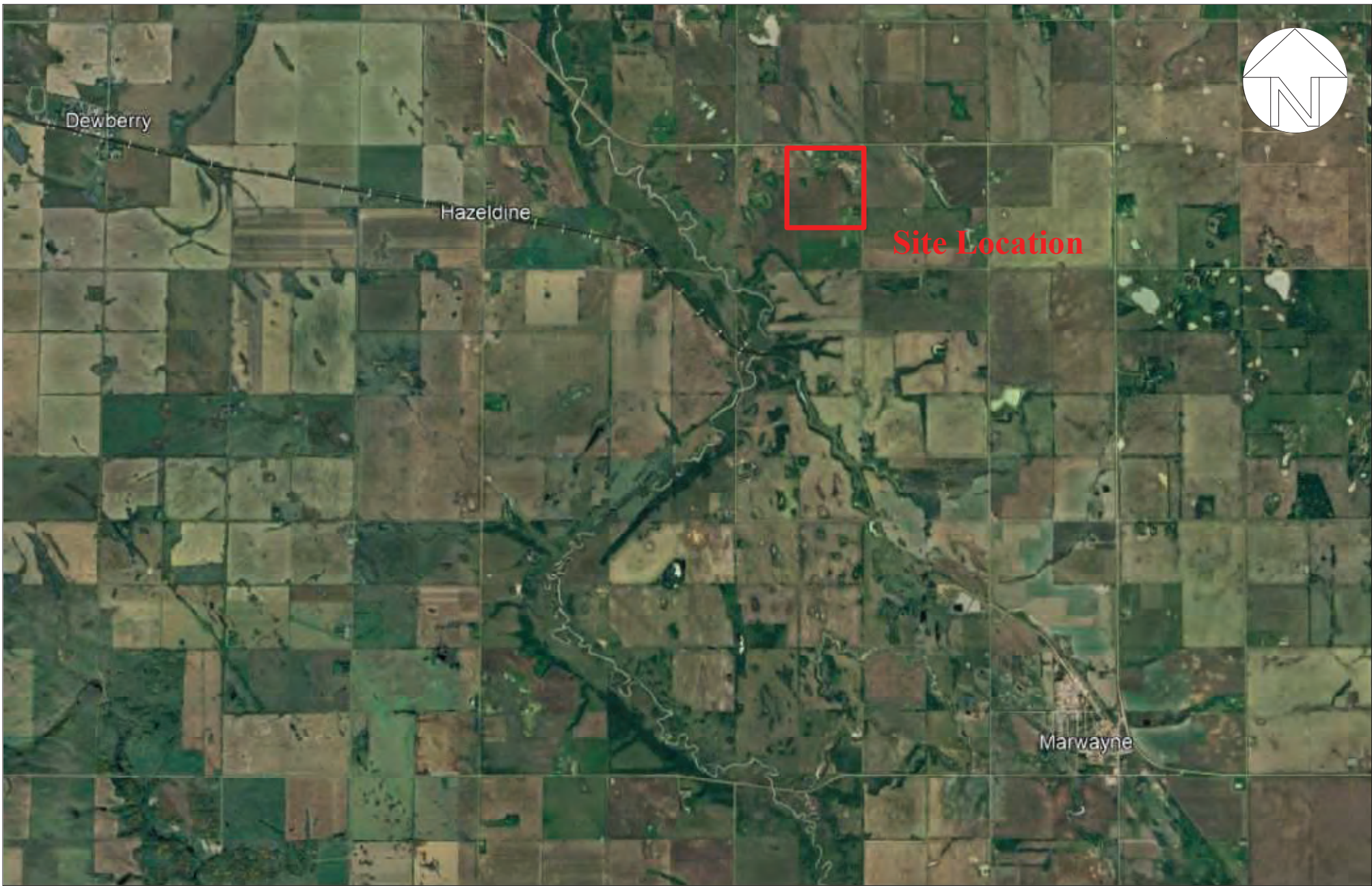
GOA (Government of Alberta). (January 2020). Agricultural Operation Practices Act and Regulations. Edmonton, AB: Author.

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

Appendix A

Figures





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

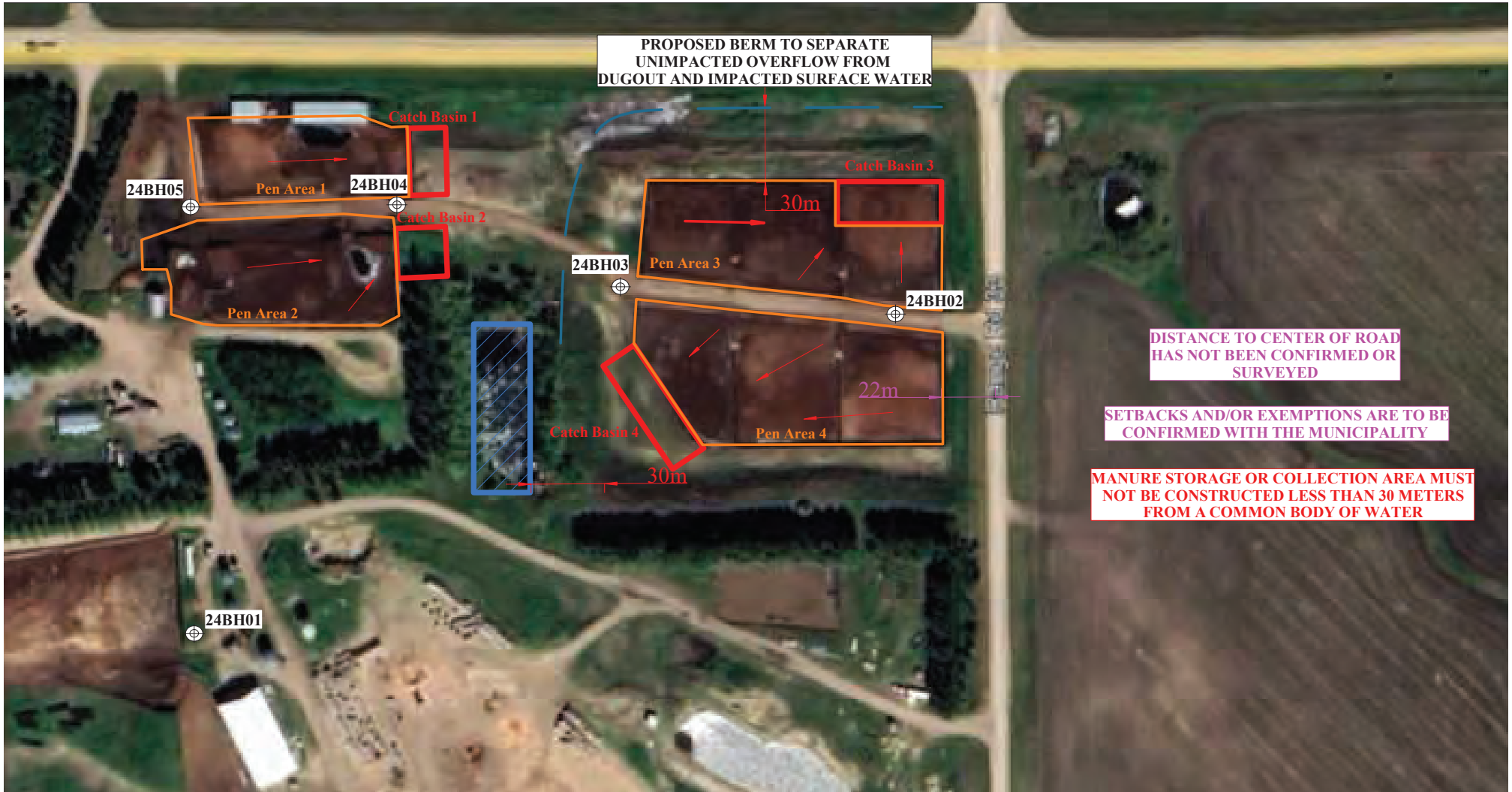
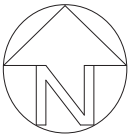
Figure No.:

Scale:

Prepared By:
 E.Low

1.0

Image Source:
 Google Earth Pro (April 28, 2023) Page 24 of 40



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

Project No:
 2407-43064

Scale:

Image Source:
 Google Earth Pro (April 28, 2023)

Date:
 November 7, 2024

Prepared By:
 E.Low

Figure No.:
 2.0

Appendix B

Borehole Logs



LOG OF BORING 24BH01

(Page 1 of 1)

Site and Soil Assessment
 NE-16-53-3-W4M
 Project Number: 2407-43064

Driller: : Ever Green Drilling
 Drilling Method: : Track Mounted Auger
 Drill Date : August 6, 2024
 Logged By: : Emily Low P.Eng.

Depth in Meters	Gastech Reading (ppm)	VOC Reading	GRAPHIC	DESCRIPTION	Well Elev.:	Water Level
0.0				CLAYEY SAND, mottled, brown, loose, damp		
0.3						
0.5						
0.8						
1.0						
1.3						
1.5						
1.8						
2.0						
2.3						
2.5						
2.8						
3.0						
3.3				SAND, yellowish brown, loose, dry		
3.5						
3.8						
4.0						
4.3						
4.5						
4.8				CLAYEY SAND/SANDY CLAY, brown, loose, damp		
5.0						
5.3						
5.5						
5.8						
6.0						
6.3						
6.5						
6.8						
7.0						
7.3						
7.5						
7.8						
8.0						
8.3						
8.5						
8.8				saturated		
9.0						

11-07-2024 Y:\Operations\Client Data\43064 Anthony Garnier\24BH01.bor



LOG OF BORING 24BH02

(Page 1 of 1)

Site and Soil Assessment
 NE-16-53-3-W4M
 Project Number: 2407-43064

Driller: : Ever Green Drilling
 Drilling Method: : Track Mounted Auger
 Drill Date : August 6, 2024
 Logged By: : Emily Low P.Eng.

Depth in Meters	Gastech Reading (ppm)	VOC Reading	GRAPHIC	DESCRIPTION	Well Elev.:	Water Level
0.0				CLAYEY SAND, yellowish brown to brown, loose, damp to dry		
0.3						
0.5						
0.8						
1.0				SANDY CLAY, brown, firm, damp		
1.3						
1.5						
1.8						
2.0						
2.3						
2.5						
2.8						
3.0						
3.3						
3.5						
3.8						
4.0						
4.3						
4.5						
4.8						
5.0						
5.3				CLAY, grey, firm, compact		
5.5						
5.8						
6.0						
6.3						
6.5						
6.8						
7.0						
7.3						
7.5						
7.8						
8.0						
8.3						
8.5						
8.8						
9.0						
9.3						
9.5						
9.8						
10.0						
10.3						
10.5						

11-07-2024 Y:\Operations\Client Data\43064 Anthony Garnier\24BH02.bor



LOG OF BORING 24BH03

(Page 1 of 1)

Site and Soil Assessment
 NE-16-53-3-W4M
 Project Number: 2407-43064

Driller: : Ever Green Drilling
 Drilling Method: : Track Mounted Auger
 Drill Date : August 6, 2024
 Logged By: : Emily Low P.Eng.

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

11-07-2024 Y:\Operations\Client Data\43064 Anthony Garnier\24BH03.bor



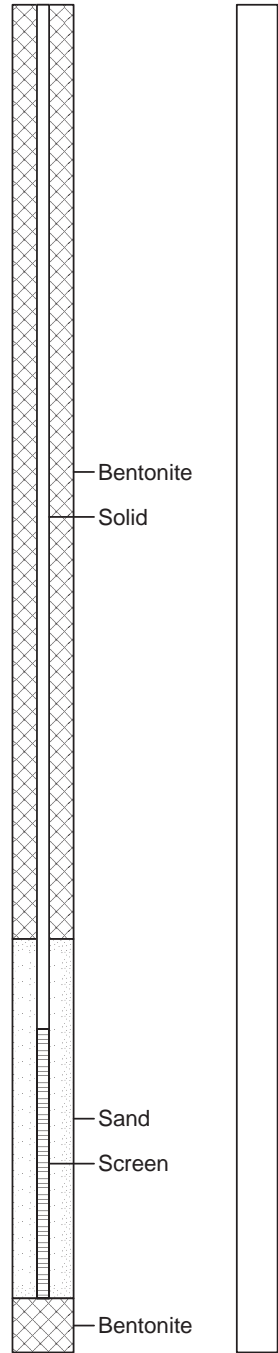
LOG OF BORING 24BH04

(Page 1 of 1)

Site and Soil Assessment
 NE-16-53-3-W4M
 Project Number: 2407-43064

Driller: : Ever Green Drilling
 Drilling Method: : Track Mounted Auger
 Drill Date : August 6, 2024
 Logged By: : Emily Low P.Eng.

Depth in Meters	Gastech Reading (ppm)	VOC Reading	GRAPHIC	DESCRIPTION	Well: 24MW01 Elev.:	Water Level
0.0				SANDY CLAY, brown, firm, medium plasticity, damp		
0.3						
0.5						
0.8						
1.0						
1.3						
1.5						
1.8						
2.0						
2.3						
2.5						
2.8						
3.0				CLAY, brown-red mottling, firm, damp		
3.3						
3.5						
3.8						
4.0						
4.3				grey		
4.5						
4.8						
5.0						
5.3						
5.5						
5.8						
6.0						
6.3						
6.5						
6.8						
7.0						
7.3						
7.5						



11-07-2024 Y:\Operations\Client Data\43064 Anthony Garnier\24BH04.bor



LOG OF BORING 24BH05

(Page 1 of 1)

Site and Soil Assessment
 NE-16-53-3-W4M
 Project Number: 2407-43064

Driller: : Ever Green Drilling
 Drilling Method: : Track Mounted Auger
 Drill Date : August 6, 2024
 Logged By: : Emily Low P.Eng.

Depth in Meters	Gastech Reading (ppm)	VOC Reading	GRAPHIC	DESCRIPTION	Well Elev.:	Water Level
0.0				CLAYEY SAND, light brown, loose, damp		
0.3						
0.5						
0.8						
1.0						
1.3						
1.5						
1.8						
2.0				SAND, light brown, loose, damp		
2.3						
2.5						
2.8						
3.0						
3.3				CLAY, firm, medium plasticity, brown		
3.5						
3.8						
4.0				grey		
4.3						
4.5						
4.8						
5.0						
5.3						
5.5						
5.8						
6.0						
6.3						
6.5						
6.8						
7.0						
7.3						
7.5						

11-07-2024 Y:\Operations\Client Data\43064 Anthony Garnier\24BH05.bor

Appendix C
Certificate of Analysis

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



Certificate of Analysis

AGAT WORK ORDER: 24R185785

PROJECT:

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

CLIENT NAME: ENVIROWEST

ATTENTION TO: Emily Low

SAMPLING SITE:

SAMPLED BY:

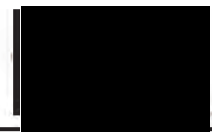
Particle Size - Texture											
DATE RECEIVED: 2024-08-14					DATE REPORTED: 2024-08-26						
		SAMPLE DESCRIPTION:		24BH02-01	24BH02-02	24BH02-03	24BH03-01	24BH03-02	24BH03-03	24BH04-01	24BH04-02
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2024-08-09	2024-08-09	2024-08-09	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:



Quality Assurance

CLIENT NAME: ENVIROWEST
 PROJECT:
 SAMPLING SITE:

AGAT WORK ORDER: 24R185785
 ATTENTION TO: Emily Low
 SAMPLED BY:

Soil Analysis															
RPT Date: Aug 26, 2024			DUPLICATE				Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE		MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Measured Value		Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

Particle Size - Texture

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: 

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

**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: Environest Engineering
Contact: ELOW
Address: _____
Phone: 403-783-8229**Report Information**1. Name: Emily Low
Email: elow@environestengineering.ca
2. Name: _____
Email: _____
3. Name: _____
Email: _____**Turnaround Time Required (TAT)**Regular TAT 5 to 7 Business Days
 <24 Hours (200%)
 Next Business Day (100%)
Rush TAT 2 Business Days (50%)
 3 Business Days (25%)Date Required: 2**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 #: _____**Requirements** (Selection may impact detection limits)

CCME	AB Tier 1	Alberta Surface Water
<input type="checkbox"/> Agricultural	<input type="checkbox"/> Agricultural	<input type="checkbox"/> Chronic
<input type="checkbox"/> Industrial	<input type="checkbox"/> Industrial	<input type="checkbox"/> Acute
<input type="checkbox"/> Residential/Park	<input type="checkbox"/> Residential/Park	<input type="checkbox"/> SK Notice of Site Cond.
<input type="checkbox"/> Commercial	<input type="checkbox"/> Commercial	<input type="checkbox"/> Drinking Water
<input type="checkbox"/> FWAL	<input type="checkbox"/> Natural Area	<input type="checkbox"/> 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: _____

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

Samples Relinquished By (Print Name and Sign): Emily Low
Date/Time: Aug 14/24Samples 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: Aug 14/24 9:40Pink Copy - Client
Yellow Copy - AGAT
White Copy - AGATPage 1 of 1
N^o: AB **172819**



AGAT Laboratories

SAMPLE INTEGRITY RECEIPT FORM

RECEIVING BASICS - Shipping

Company/Consultant: Environwest

Courier: K200 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) 10 + 10 + 10 = 30 °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: 24R185985

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)



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:	Envirowest	1 cooler	
			Town of Sylvan	1 cooler	
Authorized Shipper Signature:					

DRIVER USE ONLY

U Driver Name:	BOWIN	P/U Time:		am	D/O Time:		am
# Items P/U:	2		12:00	pm		3:55	pm
Overweight		TDG					

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

HOTSHOT DETAILS

Total Km:		Or Total Charge (\$):	
-----------	--	-----------------------	--

OFFICE USE ONLY

Verified By:		Invoiced By:	
--------------	--	--------------	--

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

- Calgary 403-660-5504
- Edmonton 780-903-3628
- Fort McMurray 587-645-6364
- 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

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

$T = K*b = 7.126E-5 \text{ cm}^2/\text{sec}$