

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 <u>RA23024</u>	Legal land description <u>S1/2 22-54-2 W4M and NE 15-54-2 W4M</u>
<input checked="" type="checkbox"/> Approval <input type="checkbox"/> Registration <input type="checkbox"/> Authorization <input type="checkbox"/> Amendment		

APPLICATION DISCLOSURE

This information is collected under the authority of the *Agricultural Operation Practices Act (AOPA)*, and is subject to the provisions of the *Freedom of Information and Protection of Privacy Act*. This information is public unless the NRCB grants a written request that certain sections remain private.

Any construction prior to obtaining an NRCB permit is an offence and is subject to enforcement action, including prosecution.

I, the applicant, or applicant's agent, have read and understand the statements above, and I acknowledge that the information provided in this application is true to the best of my knowledge.

OCT 11 2023
Date of signing

Signature

OB HOLDINGS INC.
Corporate name (if applicable)

LEONARD HOFFER
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)
<u>BARRY BARN + CALF BARN + OFFICE</u>	<u>441.5 x 142.33 + 15.2 x 50'</u> 160' x 110' (*)
<input checked="" type="checkbox"/> <u>HEIFER SHED.</u>	<u>400.67 x 100'</u>
<u>LABORAN.</u>	<u>200' x 200' x 16 DEEP</u>

(*) Applicant updated this dimensions on a blue print submitted on May 10th

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

Existing facilities	Dimensions (m) (length, width, and depth)	NRCB USE ONLY
<ul style="list-style-type: none"> a new layer barn (61 m x 15.2 m) a manure collection shed (9.1 m x 9.1 m) 		
NRCB USE ONLY		

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)

Existing facilities continued	Dimensions (m) (length, width, and depth)	NRCB USE ONLY
<ul style="list-style-type: none"> - Dairy barn (114.3 m x 15.4 m) 		
<ul style="list-style-type: none"> - Dairy corrals (112.8 m x 61 m) 		
<ul style="list-style-type: none"> - Manure collection shed (18.3 m x 7.6 m) 		
<ul style="list-style-type: none"> - Broiler barn (48.8 m x 9.1 m) 		
<ul style="list-style-type: none"> - Ducks and geese barns 		

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)

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

DECOMMISSION OLD DAIRY BARN & CORRALS.

Construction completion date for proposed facilities 5 YEARS NOV 30 / 2028.

Additional information

IT'S A HUGE PROJECT REQUESTING MORE TIME.

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

Part 2 – Technical Requirements

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

DECLARATION AND ACKNOWLEDGMENT OF APPLICANT CONCERNING *WATER ACT LICENCE*

issued by Alberta Environment and Parks (AEP) for a confined feeding operation (CFO)

Date and sign one of the following four options

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

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

Signed this ____ day of _____, 20 ____.

Signature of Applicant or Agent

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

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

Signed this ____ day of _____, 20 ____.

Signature of Applicant or Agent

OPTION 3: Additional water licence not required

1. I (we) declare that the CFO will not need a new licence from AEP under the *Water Act* for the development or activity proposed in this AOPA application.

Signed this ____ day of _____, 20 ____.

Signature of Applicant or Agent

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

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

Signed this 11 day of OCT, 20 23.

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: LAYER BARN Proposed 1: DAIRY + CALF BARN
 Proposed 2: HEIFER SHED Proposed 3: LITBORN

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	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	0	0	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)	900'	350'	350'	600'	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> YES with exemption	
Groundwater information	What is the depth to the water table?		8m	8m	8m	<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?	750	750	750	750	<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)

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
Larry Staffor.	SW-9-54-2-W4	3 MILES					
RICK George.	N12-3-54-2-W4	3 MILES					

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)
O.B HOLDEN & S FNC	Section 17	600 AC	2-BK		
"	Section 15	295 AC	2-BK		
"	E 1/2-9-54-2-W4	300 AC	2-BK		
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)

Untitled Map

Write a description for your map.

Legend

📍 OB Holdings Corporation



Google Earth

Image © 2023 CNES/Airbus
Image © 2023 Maxar Technologies



1 km



Imagery ©2023 CNES / Airbus, Imagery ©2023 CNES / Airbus, County of Vermilion River, Maxar Technologies, Map data ©2023 50 m

Measure distance
Total area: 3,991.38 m² (42,962.84 ft²)
Total distance: 252.77 m (829.29 ft)

↑ N

Untitled Map

Write a description for your map.

Legend

📍 OB Holdings Corporation



Google Earth

Image © 2023 CNES / Airbus

300 m

↑ N

Untitled Map

Write a description for your map.

Legend

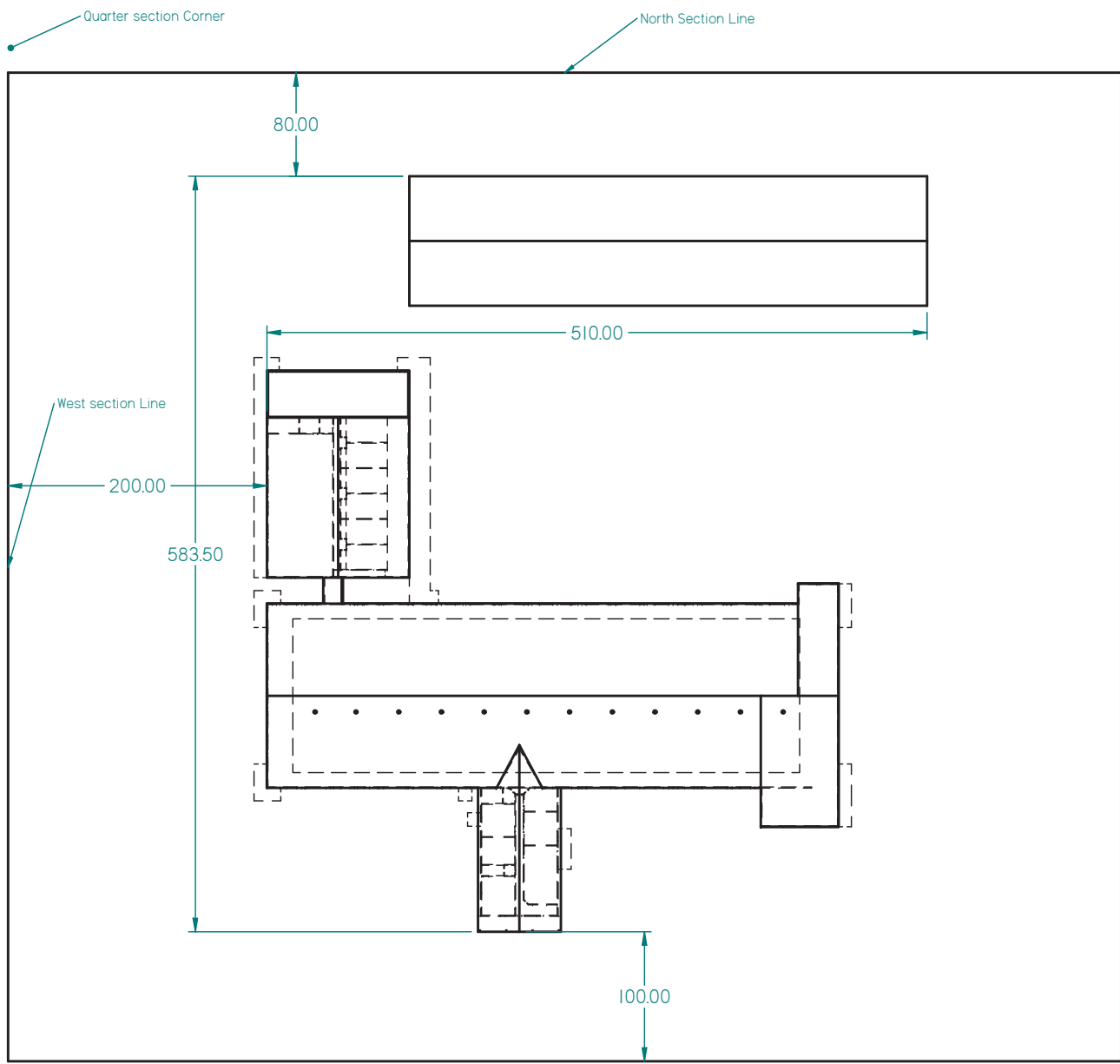
- OB Holdings Corporation



Google Earth

Image © 2023 CNES / Airbus

300 m



REVISION HISTORY			
REV	DESCRIPTION	DATE	APPROVED



	NAME	DATE
DRAWN	Ken Hofer	11/04/22
CHECKED		
ENG APPR		
MGR APPR		

O B FABRICATION

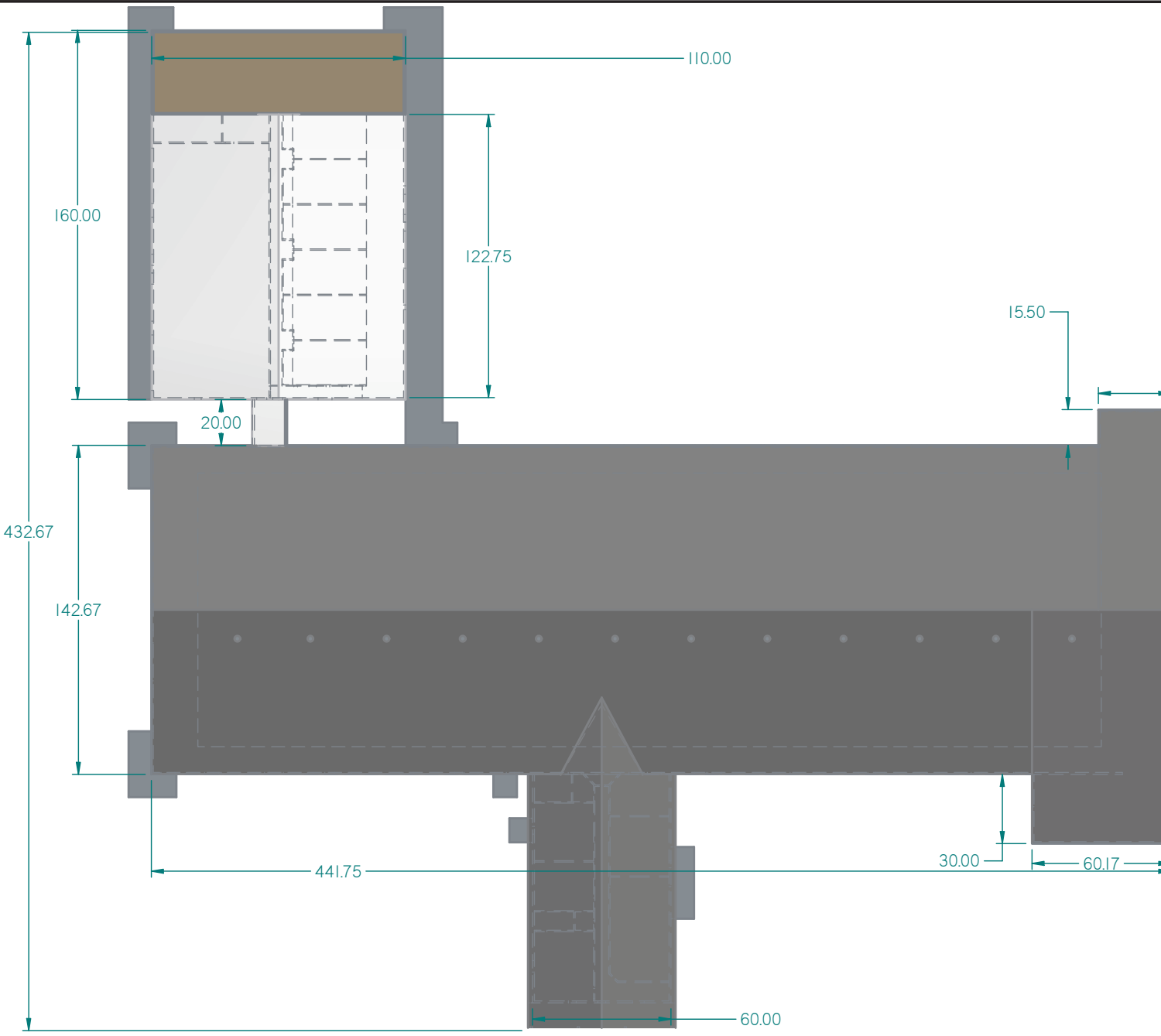
	TITLE	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
ANGLES ±XX°
2 PL ±XXX 3 PL ±XXXX

SIZE	DWG NO	REV
D		
FILE NAME:	O B Fabrication.dft	
SCALE:	WEIGHT:	SHEET 4 OF 1

REVISION HISTORY

DESCRIPTION	DATE	APPROVED



NAME	DATE
Ken Hofer	
DESIGNED	
APPROVED	
APPROVED	

TITLE	
O B FABRICATION	
SIZE	DWG NO
D	
FILE NAME	REV
O B Fabrication.dft	
SCALE	WEIGHT
	SHEET 4 OF 1

LESS OTHERWISE SPECIFIED
 DIMENSIONS ARE IN INCHES
 ANGLES ±XX°
 2 PL ±XXX 3 PL ±XXXX

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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)

LIQUID MANURE COLLECTION AND/OR STORAGE: In-barn - Concrete liner

(complete a copy of this section for EACH proposed in-barn liquid manure storage facility with a concrete liner)

Facility description / name (as indicated on site plan)

1. DAIRY BARN
2. MANURE COLLECTION PITT
3. _____

Manure storage capacity (use one row in the table for EACH in-barn storage. Attach additional pages if you require more rows)

	Length (m)	Width (m)	Total depth (m)	Depth below ground level (m)	NRCB USE ONLY
					Calculated storage capacity (m ³)
1.	441.5	142.33	0	0	
2.	10'	10'	2.4m	2m	
3.					
TOTAL CAPACITY					

Concrete liner details

Scrape alleys or unslatted portions of barn floors (if applicable)	Concrete thickness		Method of sulphate protection	
	5"		TYPE 50	
	Concrete strength		Concrete reinforcement size and spacing	
	32 MPA		10 mm 12" spacing	
In-barn manure pit floors	Concrete thickness		Method of sulphate protection	
	5"		TYPE 50	
	Concrete strength		Concrete reinforcement size and spacing	
	32 MPA		10 mm 12" spacing	
In-barn manure pit walls	Concrete thickness		Method of sulphate protection	
	8"		TYPE 50	
	Concrete strength	Horizontal reinforcement size and spacing	Vertical reinforcement size and spacing	
	32 MPA	12"	12"	

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)

LIQUID MANURE COLLECTION AND/OR STORAGE: In-barn - Concrete liner (cont.)

Describe how the joints at the junction of the pit walls, pit floors and any other joints will be sealed

Concrete Sealer.

Describe sealing practices for piping, etc. that penetrates the liner

Concrete Sealer WATER STOPPER.

Concrete requirements can be found in Technical Guideline Agdex 096-93
 Guideline minimums:
 Solid manure: 25MPa (D)
 Solid manure (wet): 30MPa (C)
 Liquid manure: 32MPa (B)
 Category A is required to be engineered
 Method of sulphate protection:
 Type 50 or Type 10 with fly ash or equivalent

NRCB USE ONLY

Requirements met: YES NO
 Condition required: YES NO

Additional information

NRCB USE ONLY

Liquid manure storage volume calculator attached: YES NO

Depth to water table: _____

Requirements met: YES NO

Depth to uppermost groundwater resource: _____

Requirements met: YES NO

ERST completed: see ERST page for details

Concrete liner requirements

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

Part 2 – Technical Requirements

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

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

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

- Facility description / name (as indicated on site plan)
1. CALF BARN
 2. HEFFER SHED.

Manure storage capacity

	Length (m)	Width (m)	Depth below grade to the bottom of the liner (m)	NRCB USE ONLY Estimated storage capacity (m ³)
1.	160 feet 90'	110 feet 150'	(*) 0	
2.	400.67'	100'	0	
TOTAL CAPACITY				

(*) Applicant changed the dimensions on a May 10th's blueprint. Confirmed by phone

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

BARN WITH ROOF & WALLS

Liner protection

Describe how the physical integrity of the liner will be maintained

INSPECT FOR CRACKS WHEN CLEANING.

NRCB USE ONLY

Requirements met: 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 - Concrete liner (cont.)

Concrete liner details

Concrete thickness 5"	Method of sulphate protection: TYPE 50
Concrete strength 32 MPa	Concrete reinforcement size and spacing 10 mm 12" spacing

Concrete requirements can be found in Technical Guideline Agdex 096-93
Guideline minimums:
Solid manure: 25MPa (D)
Solid manure (wet): 30MPa (C)
Method of sulphate protection:
Type 50 or Type 10 with fly ash or equivalent

NRCB USE ONLY

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

Additional information *(attach as required)*

NRCB USE ONLY

Nine month manure storage volume requirements met YES YES With STMS NO

Depth to water table: _____ Requirements met: YES NO

Depth to Uppermost groundwater resource: _____ Requirements met: YES NO

ERST completed: see ERST page for details

Surface water control systems

Requirements met: YES NO Details/comments:

Concrete liner details

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

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)

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

Facility description / name (as indicated on site plan)

1. Lagoon
2. _____

Manure storage capacity (complete a separate row of this table for each cell of the EMS)

	Length (m)	Width (m)	Total depth (m)	Depth below ground level (m)	Slope run:rise			NRCB USE ONLY	
					Inside end walls	Inside side walls	Outside walls	Calculated storage capacity (m ³) (excl. 0.5 m freeboard)	Filled in lower ¼? Y/N
1.	<u>200'</u>	<u>200'</u>	<u>18.0'</u>	<u>14.5'</u>	<u>3T0 </u>	<u>3T0 </u>	<u>4T0 </u>		
2.									
TOTAL CAPACITY									

Surface water control systems

Describe the run-on and runoff control system

Berm around Lagoon.

Naturally occurring protective layer details

Thickness of naturally occurring protective layer	<u>7.3m</u> (m)	Provide details (as required)		
Soil texture	<u>35</u> % sand	<u>25</u> % silt	<u>39</u> % clay	
Hydraulic conductivity - naturally occurring protective layer	Depth and type of soil tested <u>5.5m to 7m</u>	Hydraulic conductivity (cm/s) <u>1.5 x 10⁻⁷ cm/sec</u>	Describe test standard used	

Additional information (attach copies of soil test reports)

see Report

NRCB USE ONLY

- Requirements met: YES NO
- Condition required: YES NO
- Report attached: YES NO



SITE AND SOIL ASSESSMENT

Proposed Dairy Operation – Manure Storage Lagoon
SW¼-22-054-02-W4M

County of Vermilion River, Alberta



**Site and Soil Assessment
Proposed Dairy Operation – Manure Storage Lagoon
SW¹/₄-22-054-02-W4M
County of Vermilion River, Alberta**

Prepared For: Leonard Hofer
OB Holdings Inc.

Delivered via Email: [REDACTED]

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

Report Date: May 3, 2024

Project Number: 2402-43058

Private and Confidential



Table of Contents

1.0 Introduction and Scope of Work	2
2.0 Assessment Results.....	3
3.0 Liner Assessments	6
3.1 Natural Barrier Assessment (Liquid Manure Storage).....	6
4.0 Conclusions	7
5.0 Design and Construction Considerations	8
5.1 Earthen Lined Lagoon	8
6.0 Closure.....	10
7.0 Qualifications of Assessors	11
8.0 References	12

List of Tables

Table 1: Soil Properties Results	4
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Appendices

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



1.0 Introduction and Scope of Work

Envirowest Engineering (Envirowest) was retained by Leonard Hofer of OB Holdings Inc. to conduct a Site and Soil Assessment for the proposed construction of an earthen manure storage (EMS) lagoon for a 240 head dairy operation.

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 SW-22-054-02-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

Three 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 March 11, 2024. The boreholes were completed in the area proposed for a manure storage lagoon. The borehole locations are shown on Figure 1.0 (attached).

One borehole was completed as a groundwater monitoring well to allow for in-situ hydraulic conductivity testing, which was completed on April 2, 2024. An uppermost groundwater resource (UGR) was conservatively determined to be below 10.5 mbgs (as measured from borehole 24BH01). No further assessment was completed to confirm the UGR.



2.0 Assessment Results

The Site is in an area of rolling topography, sloping to the north. The elevation change from the south boundary of the proposed lagoon to the north boundary of the proposed lagoon is approximately 5 meters. The Site is currently utilized as cropland. Three investigative boreholes were drilled using a truck-mounted rotary auger and completed to a maximum depth of 10.5 mbgs on March 11, 2024. The boreholes were completed in the area proposed for a manure storage lagoon.

Potential liner construction material (noted in borehole logs as clay/clay loam) was typically found beneath topsoil and dry clay loam. Saturated sand seams were noted at 9.5 mbgs (as measured at 24BH01). Bedrock was not encountered to the maximum depth of investigation.

Borehole logs are presented as relative depth due to the elevation change across the proposed construction.

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



The results of the soil analysis completed by a third-party laboratory are presented in Table 1 below. The soil sample locations are presented on Figure 1.0, and borehole logs are attached.

Table 1: Soil Properties Results

Parameter	24BH01-01	24BH01-02	24BH01-03	24BH01-04	24BH01-05	24BH01-06	24BH02-01	24BH02-02	24BH02-03	24BH03-01	24BH03-02	24BH03-03
Sample Depth (mbgs)	1.0	2.3	3.6	5.3	6.6	8.6	7.5	8.4	9.3	4.25	5.6	7.0
Particle Size (%sand)	17	11	40	26	35	16	12	11	32	11	5	5
Particle Size (%silt)	31	33	27	32	25	22	42	42	34	33	27	28
Particle Size (%clay)	51	55	32	41	39	61	45	46	34	55	67	66
Texture Class	Clay	Clay	Clay Loam	Clay	Clay Loam	Heavy Clay	Silt Clay	Silt Clay	Clay Loam	Clay	Heavy Clay	Heavy Clay
Field Hydraulic Conductivity (cm/sec)	-	-	-	1.5×10^{-7}	1.5×10^{-7}	-	-	-	-	-	-	-



The soils suspected a potential natural barrier were identified as clay, clay loam and silt clay with a clay content ranging from 32-55%. The assessed natural barrier (clay/clay loam) had an average clay content of 40%. Based on the texture analysis it is reasonable to extrapolate and include the silt clay as a natural barrier as the clay content is higher than that assessed, the clay is within the same strata as that assessed and is adjacent to the soil class of that assessed.

The monitoring well installed at borehole 24BH01 (24MW01), was screened from 5.5 to 7.0 mbgs and was sufficiently hydrated prior to completing the in-situ hydraulic conductivity testing. The in-situ hydraulic conductivity test was completed on April 2, 2024.

The initial depth to water was measured in the well. A volume of water was then added to the well and the change in depth measured over time to assess hydraulic conductivity of the clay strata. It is assumed (as per AGDEX 096-01) that all flow occurs under saturated conditions. The depth was measured every 30 seconds for 10 minutes and every 5 minutes for forty-five minutes. 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 1.5×10^{-7} cm/sec.



3.0 Liner Assessments

3.1 Natural Barrier Assessment (Liquid Manure Storage)

Based on the information obtained it was determined that the native clay within the proposed area of construction for liquid manure storage was found to have a minimum thickness of 7.3 meters. The proposed liquid manure storage area is approximately 61 meters x 61 meters, as shown on Figure 1.0.

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

$$\frac{10 \text{ m}}{1 \times 10^{-6} \text{ cm/sec}} = \frac{X \text{ m}}{1.5 \times 10^{-8} \text{ cm/sec}}$$

$$X = 1.5 \text{ m}$$

It is found that there is sufficient protection across the proposed liquid 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 for liquid manure. The north wall of the lagoon will be constructed with the material assessed for a natural barrier and compacted to that similar as the natural layer or greater.



5.0 Design and Construction Considerations

5.1 Earthen Lined Lagoon

A compacted liner thickness of 1.0 meters is recommended along the north wall which is required to be built up from grade.

Earthen Lagoon Storage Sizing

The new liquid EMS facility was designed for 240 head, including dries and replacements, for a minimum of 9 months of storage. The manure storage lagoon is recommended to have the following specifications:

- To provide the required capacity the new EMS should be 61 m in length x 61 m in width. The overall depth has been designed as 5.0 m. The overall capacity of the new EMS will be 10,955 cubic metres (2.4 million imperial gallons) which accounts for the required 0.5 m of freeboard, a storage capacity of 9,184 cubic metres. The sizing is based on an inside end and side wall slope of 3:1 (run/rise)
- The overall depth of 5.0 m will be achieved through a below grade depth of 1.0 m as measured from borehole 24BH01. The above-grade dykes of 4.0 m will be constructed on the north wall. 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
- Runoff from the south and east sides of the lagoon will need to be redirected either through extension of the dyke walls or regrading
- The below-grade depth of the EMS must maintain a minimum of a 1.0 m separation above the water table at the time of construction, should one be encountered
- Construction of the clay liner on the north wall should be completed in approximately 0.15 m lifts. Preferably, compaction of each lift will be undertaken with a padfoot roller, or the like. The equipment being used for soil compaction must fully penetrate each lift.
- Lifts should continue to be added until the recommended liner thickness is achieved. Particular attention should be paid to ensuring that the liner is integrally connected to the lower soil strata and that the soil around the inlet pipe is compacted to the same standard as the remainder of the liner
- Sand pockets that may be encountered during construction should be removed prior to liner installation
- If any significant amount of coarse-grained material is encountered, the NRCB or the engineer should be contacted prior to proceeding
- Control of liner moisture content is critical during the construction process. Liner material should not be allowed to become saturated or to become dry. Should a lift surface become



dry, the lift should be scarified prior to the placement of the next lift. Lifts which are above the required moisture content due to precipitation etc. should be removed or allowed to dry and re-compacted. The liner should not be allowed to freeze during construction

- Topsoil, frozen soil, or rocks larger than 6 inches should not be included in the liner material
- Construction of the lagoon should be supervised by a professional engineer
- The freeboard depth of 0.5 m and outside dyke walls should be covered with 0.1-0.2 m of topsoil and seeded to prevent soil erosion.
- The inlet pipe to the EMS should be located in the bottom 1/4 of the lagoon. The annulus around the inlet pipe should be sealed with a bentonite sealer.

Earthen Manure Storage Construction

The following general construction procedures are recommended, though some modifications may be required based on actual site conditions encountered during construction:

- The topsoil and overburden should be stripped from the area for construction. The topsoil can be reused on the freeboard area after construction completion
- Sand and gravel seams, if encountered, should be excavated during construction and should be removed
- Construction of the lagoon should be supervised by a professional engineer

Following completion of the lagoon the operator should:

- Ensure that shrubs, trees, and deep-rooted plants are not allowed to grow within 10 meters of the facility



6.0 Closure

Envirowest Engineering is pleased to submit the report Leonard Hofer of OB Holdings Inc. 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,

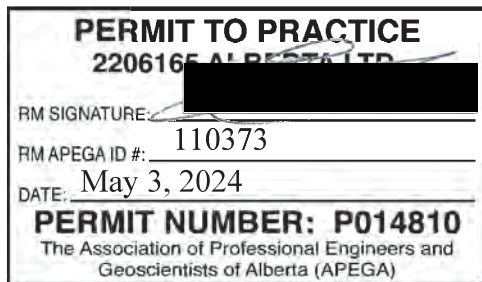


Prepared by:
Emily J. Low, P.Eng.
Envirowest Engineering



May 3, 2024

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

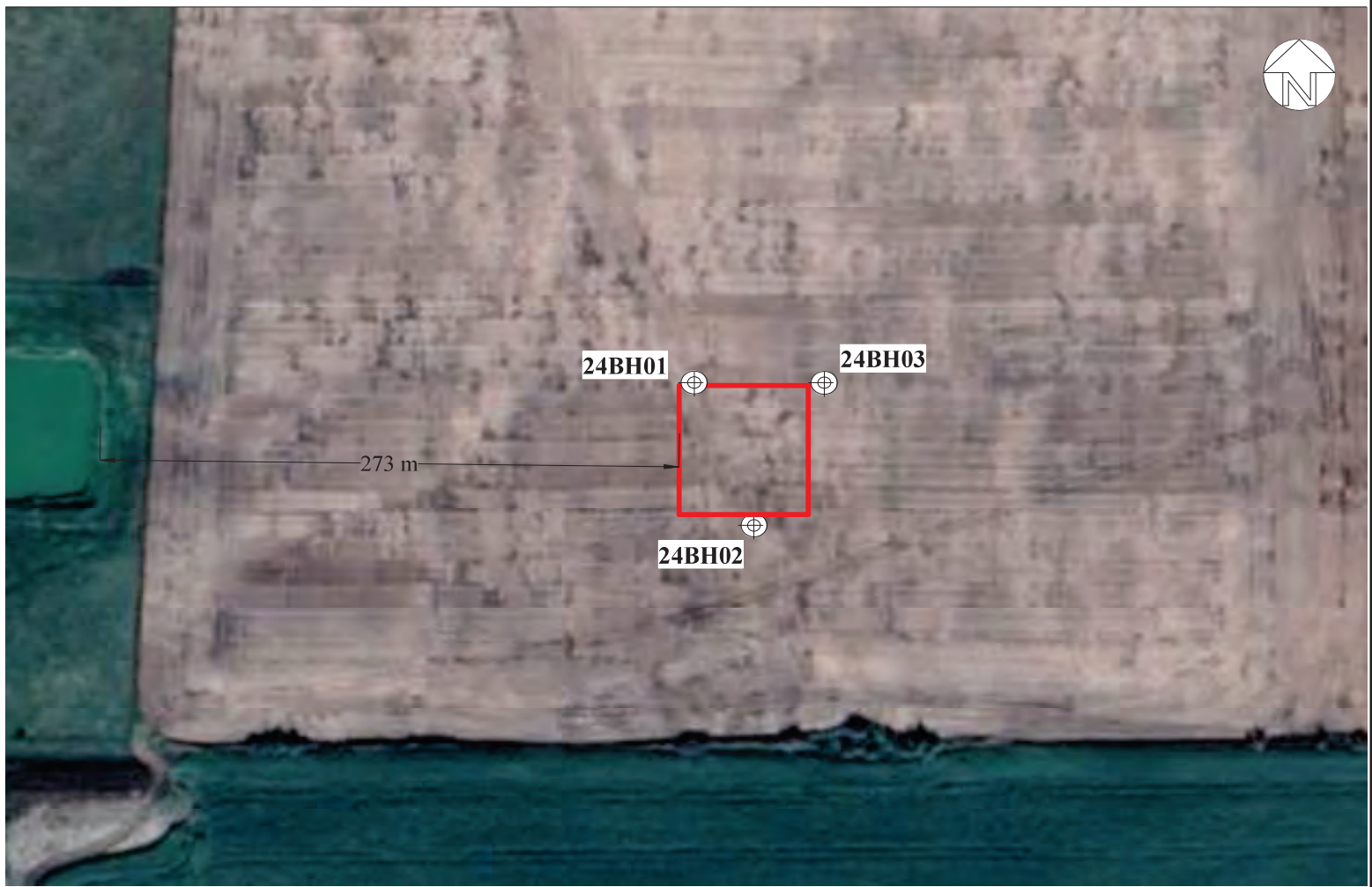
GOA (Government of Alberta). (January 2020). Agricultural Operation Practices Act and Regulations. Edmonton, AB: Author.

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

Appendix A

Figure





Title:
 Borehole Locations
 Site and Soil Assessment
 SW¼-Sec.22-Twp.054-Rge.02-W4M
 County of Vermilion River, Alberta

Project No:
 2402-43058

Date:
 May 3, 2024

Scale:

Prepared By:
 E.Low

Image Source:
 Google Earth Pro (February 22, 2024)

Figure No.:
1.0

Appendix B

Borehole Logs



LOG OF BORING 24BH01

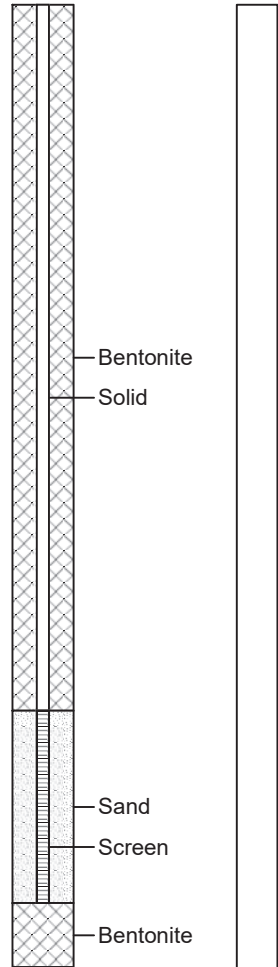
(Page 1 of 1)

Site and Soil Assessment
 SW-22-054-02-W4M
 County of Vermilion River, Alberta

Driller: : Ever Green Drilling
 Drilling Method: : Truck Mounted Auger
 Drill Date : March 11, 2024
 Logged By: : Emily Low P.Eng.

Project Number: 2402-43058

Depth in Meters	Gastech Reading (ppm)	VOC Reading	GRAPHIC	DESCRIPTION	Well Elev.:	Water Level
0.0				CLAY/CLAY LOAM, loose, dry, brown		
0.3						
0.5						
0.8						
1.0				firm, damp, medium plasticity		
1.3				24BH01-01		
1.5						
1.8						
2.0						
2.3				24BH01-02		
2.5						
2.8						
3.0						
3.3						
3.5				24BH01-03		
3.8						
4.0						
4.3						
4.5				grey		
4.8						
5.0						
5.3				24BH01-04		
5.5						
5.8						
6.0						
6.3						
6.5				24BH01-05		
6.8						
7.0				wet		
7.3						
7.5						
7.8						
8.0						
8.3						
8.5				HEAVY CLAY, firm/hard , compact,		
8.8				medium plasticity, damp		
9.0				24BH01-06		
9.3						
9.5						
9.8				saturated sand seams		
10.0						
10.3						
10.5						



05-02-2024 Z:\Operations\Client Data\43058 OB Holdings Inc. (Leonard Hofer)\24BH01.bor



LOG OF BORING 24BH02

(Page 1 of 1)

Site and Soil Assessment
 SW-22-054-02-W4M
 County of Vermilion River, Alberta

Driller: : Ever Green Drilling
 Drilling Method: : Truck Mounted Auger
 Drill Date : March 11, 2024
 Logged By: : Emily Low P.Eng.

Project Number: 2402-43058

Depth in Meters	Gastech Reading (ppm)	VOC Reading	GRAPHIC	DESCRIPTION	Well Elev.:	Water Level
0.0				CLAY/CLAY LOAM, loose, dry, brown		
0.3						
0.5						
0.8						
1.0						
1.3						
1.5				firm, damp, medium plasticity		
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				Approximate elevation of 24BH01		
5.3						
5.5						
5.8						
6.0						
6.3						
6.5						
6.8						
7.0				grey		
7.3						
7.5				24BH02-01		
7.8						
8.0						
8.3				24BH02-02		
8.5						
8.8						
9.0						
9.3				24BH02-03		
9.5						
9.8						
10.0						
10.3						
10.5						

05-02-2024 Z:\Operations\Client Data\43058 OB Holdings Inc. (Leonard Hofer)\24BH02.bor



LOG OF BORING 24BH03

(Page 1 of 1)

Site and Soil Assessment
 SW-22-054-02-W4M
 County of Vermilion River, Alberta

Driller: : Ever Green Drilling
 Drilling Method: : Truck Mounted Auger
 Drill Date : March 11, 2024
 Logged By: : Emily Low P.Eng.

Project Number: 2402-43058

Depth in Meters	Gastech Reading (ppm)	VOC Reading	GRAPHIC	DESCRIPTION	Well Elev.:	Water Level
0.0				CLAY/CLAY LOAM, loose, dry, brown		
0.3						
0.5						
0.8						
1.0				firm, damp, medium plasticity		
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				24BH03-01		
4.5				Approximate elevation of 24BH01		
4.8						
5.0						
5.3						
5.5				HEAVY CLAY, hard, damp, mottled brown		
5.8				24BH03-02		
6.0						
6.3						
6.5						
6.8						
7.0				24BH03-03		
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						

05-02-2024 Z:\Operations\Client Data\43058 OB Holdings Inc. (Leonard Hofer)\24BH03.bor

Appendix C
Certificate of Analysis

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

ATTENTION TO: SHAWNA LOW

PROJECT: Hofer

AGAT WORK ORDER: 24R135955

SOIL ANALYSIS REVIEWED BY: Max Dou, Report Writer

DATE REPORTED: Apr 11, 2024

PAGES (INCLUDING COVER): 8

VERSION*: 1

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

*Notes

Disclaimer:

- All work conducted herein has been done using accepted standard protocols, and generally accepted practices and methods. AGAT test methods may incorporate modifications from the specified reference methods to improve performance.
- All samples will be disposed of within 30 days after receipt unless a Long Term Storage Agreement is signed and returned. Some specialty analysis may be exempt, please contact your Client Project Manager for details.
- AGAT's liability in connection with any delay, performance or non-performance of these services is only to the Client and does not extend to any other third party. Unless expressly agreed otherwise in writing, AGAT's liability is limited to the actual cost of the specific analysis or analyses included in the services.
- This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
- The test results reported herewith relate only to the samples as received by the laboratory.
- Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, or non-infringement. AGAT assumes no responsibility for any errors or omissions in the guidelines contained in this document.
- All reportable information as specified by ISO/IEC 17025:2017 is available from AGAT Laboratories upon request.
- 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

Certificate of Analysis

AGAT WORK ORDER: 24R135955

PROJECT: Hofer

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

CLIENT NAME: ENVIROWEST

SAMPLING SITE:

ATTENTION TO: SHAWNA LOW

SAMPLED BY:Elow

Particle Size - Texture

DATE RECEIVED: 2024-04-02

DATE REPORTED: 2024-04-11

		SAMPLE DESCRIPTION: 24BH01-01		24BH01-02		24BH01-03		24BH01-04		24BH01-05		24BH01-06		24BH02-01		24BH02-02	
		SAMPLE TYPE: Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil	
		DATE SAMPLED: 2024-03-11		2024-03-11		2024-03-11		2024-03-11		2024-03-11		2024-03-11		2024-03-11		2024-03-11	
		12:00		12:00		12:00		12:00		12:00		12:00		12:00		12:00	
Parameter	Unit	G / S	RDL	5780021	5780023	5780024	5780025	5780026	5780026	5780027	5780027	5780028	5780028	5780029	5780029	5780029	5780029
Particle Size Distribution (Sand)	%	2	17	11	40	26	35	16	12	11							
Particle Size Distribution (Silt)	%	2	31	33	27	32	25	22	42	42							
Particle Size Distribution (Clay)	%	2	51	55	32	41	39	61	45	46							
Soil Texture			Clay	Clay	Clay Loam	Clay	Clay Loam	Heavy Clay	Silt Clay	Silt Clay							
		SAMPLE DESCRIPTION: 24BH02-03		24BH03-01		24BH03-02		24BH03-03									
		SAMPLE TYPE: Soil		Soil		Soil		Soil									
		DATE SAMPLED: 2024-03-11		2024-03-11		2024-03-11		2024-03-11									
		12:00		12:00		12:00		12:00									
Parameter	Unit	G / S	RDL	5780030	5780031	5780032	5780033										
Particle Size Distribution (Sand)	%	2	32	11	5	5											
Particle Size Distribution (Silt)	%	2	34	33	27	28											
Particle Size Distribution (Clay)	%	2	34	55	67	66											
Soil Texture			Clay Loam	Clay	Heavy Clay	Heavy Clay											

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

5780021-5780033 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: Hofer
 SAMPLING SITE:

AGAT WORK ORDER: 24R135955
 ATTENTION TO: SHAWNA LOW
 SAMPLED BY: Elow

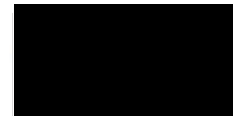
Soil Analysis															
RPT Date: Apr 11, 2024			DUPLICATE				Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE		MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Measured Value		Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

Particle Size - Texture

Particle Size Distribution (Sand)	5780028	5780028	12	11	8.4%	< 2	114%	80%	120%
Particle Size Distribution (Silt)	5780028	5780028	42	44	4.6%	< 2	85%	80%	120%
Particle Size Distribution (Clay)	5780028	5780028	45	44	2.2%	< 2	95%	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

PROJECT: Hofer

SAMPLING SITE:

AGAT WORK ORDER: 24R135955

ATTENTION TO: SHAWNA LOW

SAMPLED BY: Elow

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

2-APR '24 PM:4:42

2910 12 Street NE
Calgary, Alberta T2E 7P7
P: 403-735-2005 • F: 403-735-2771
webearth.agatlabs.com

Laboratory Use Only

Arrival Temperature:
Cooler Quantity:
Custody Seal Intact: [] Yes [] No [] N/A
AGAT Job Number: 24R135955

Chain of Custody Record

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

Report Information

Company: Envrwest Engineering
Contact: Emily Low
Address:
Phone: 403-785-8229

Report Information

1. Name: Emily Low
Email: elow@envrwestengineering.ca
2. Name:
Email:
3. Name:
Email:

Turnaround Time Required (TAT)

Regular TAT [x] 5 to 7 Business Days
[] <24 Hours (200%)
[] Next Business Day (100%)
Rush TAT [] 2 Business Days (50%)
[] 3 Business Days (25%)

Project Information

Client Project #: Hofer
Site Location:
Sample By: Flow
AGAT Quote #:

Requirements (Selection may impact detection limits)

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

Date Required:

Invoice To

Same as Report to

Company:
Contact:
Email:
Address:
Phone:
PO/CC #:

Is this part of the Alberta SRP program? [] YES [] NO
Application Number:
Grant Amount:
Well/Facility/Location ID:
UWI:

Table with columns for various testing parameters: Field Filtered (V/N), Preserved (V/N), Detailed Salinity, CCME/AB, BC, SK, D50, CCME/AB, BTEX/F1-F4, BTEX/AB, BTEX/F1-F2, BC, BTEX/APH/EPH, BC, LEPH/HEPH, SK, BTEX/TWH/C11-C22, C23-C60, Soil Metals, HWS-B, SPB, Hg, Cr, Water Metals, Dissolved Total, Hg, Cr, Routine Water Chemistry, Landfill, AB Class 2, BC, SK, Coliforms, Total, Fecal, E.coli, Particle Size, Sieve (75um), and others.

Table with columns: LABORATORY USE (LAB ID #), SAMPLE IDENTIFICATION, DEPTH, DATE/TIME SAMPLED, SAMPLE MATRIX, COMMENTS, # OF CONTAINERS (VIALS/JARS, BAGS, BOTTLES).

Table for sample receipt and return: Samples Released By (Emily Low), Samples Received By (Redacted), Date/Time (April 24/2024), Samples Returned By (Redacted), Date/Time (April 24/2024), 1:00pm.



AGAT Laboratories

2910 12 Street NE
 Calgary, Alberta T2E 7P7
 P: 403-735-2005 • F: 403-735-2771
 webearth.agatlabs.com

Laboratory Use Only

Arrival Temperature: _____

Cooler Quantity: _____

Custody Seal Intact: Yes No N/A

AGAT Job Number: _____

Chain of Custody Record

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

Report Information

Company: Environwest Engineering

Contact: Emily Low

Address: _____

Phone: 403-783-8229

Project Information

Client Project #: Hofer

Site Location: _____

Sample By: ELow

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@environwestengineering.ca

2. Name: _____
 Email: _____

3. Name: _____
 Email: _____

Requirements (Selection may impact detection limits)

CCME	AB Tier 1	Alberta Surface Water
<input type="checkbox"/> Agricultural	<input checked="" 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: _____

Turnaround Time Required (TAT)

Regular TAT 5 to 7 Business Days
 <24 Hours (200%)

Rush TAT
 Next Business Day (100%)
 2 Business Days (50%)
 3 Business Days (25%)

Date Required: _____

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/FL/F4 <input type="checkbox"/> CCME/AB: BTEX/FL/F2	<input type="checkbox"/> BC: BTEX/OPH/EPH <input type="checkbox"/> BC: LEPH/HEPH	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)	
						VALS / JARS	BAGS	BOTTLES																
1	<u>24BHC03-02</u>			<u>Soil</u>																				
2	<u>24BHC03-03</u>			<u>Soil</u>																				
3																								
4																								
5																								
6																								
7																								
8																								
9																								
10																								

Samples Relinquished By (Print Name and Sign): <u>Emily Low</u>	Date/Time: <u>April 2/24/2021</u>	Samples Received By (Print Name and Sign): _____	Date/Time: _____	Pink Copy - Client	Page <u>2</u> of <u>2</u>
Samples Relinquished By (Print Name and Sign): _____	Date/Time: _____	Samples Received By (Print Name and Sign): _____	Date/Time: <u>April 2/24/2021</u>	Yellow Copy - AGAT	Nº: AB <u>172624</u>
Samples Relinquished By (Print Name and Sign): _____	Date/Time: _____	Samples Received By (Print Name and Sign): _____	Date/Time: <u>1:00pm</u>	White Copy - AGAT	

RECEIVING BASICS - Shipping

Company/Consultant: Environment Eng.

Courier: Jazz 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 med.

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) ___ + ___ = ___ °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: _____

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)



JAZOO EXPRESS COURIER Ltd.

CLIENT USE ONLY

Contact Name:	melissa	Contact Location:	AGAT RED DEER	Billed to:	AGAT
Date:	April 24	Delivery From:	Agat, #12-7471 Edgar Industrial Bend		
		Delivery To:	AGAT, 2910 12TH ST. NE CALGARY		
Quantity:	3	Item Description:	Enviro West 3 coolers		
			Job/PO/Reference #:		

Authorized Shipper Signature: 

DRIVER USE ONLY

Driver Name:	EDWIN	P/U Time:		D/O Time:	
Quantity:	3		1:20 pm		3:25 pm
Overweight		TDG			

Total # items dropped Off:	3	D/O Driver Name:	EDWIN
Authorized Receiver Signature:			

HOTSHOT DETAILS

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

OFFICE USE ONLY

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

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Data Set: Z:\Operations\Client Data\43058 OB Holdings Inc. (Leonard Hofer)\SlugTest.aqt
 Date: 05/02/24
 Time: 16:49:58

PROJECT INFORMATION

Company: Envirowest Engineering
 Client: OB Holdings
 Project: 2402-43058
 Test Date: April 2, 2024
 Test Well: 24MW01

AQUIFER DATA

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

SLUG TEST WELL DATA

Test Well: New Well

X Location: 0. m
 Y Location: 0. m

Initial Displacement: 0.485 m
 Static Water Column Height: 4.765 m
 Casing Radius: 0.0255 m
 Well Radius: 0.075 m
 Well Skin Radius: 0.075 m
 Screen Length: 1.5 m
 Total Well Penetration Depth: 7. m

No. of Observations: 25

Observation Data			
Time (min)	Displacement (m)	Time (min)	Displacement (m)
0.	0.485	6.5	0.485
0.5	0.485	7.	0.485
1.	0.485	7.5	0.485
1.5	0.485	8.	0.485
2.	0.485	8.5	0.485
2.5	0.485	9.	0.485
3.	0.485	9.5	0.485
3.5	0.485	10.	0.485
4.	0.485	15.	0.485
4.5	0.485	20.	0.485
5.	0.485	25.	0.485
5.5	0.485	30.	0.485
6.	0.485		

SOLUTION

Slug Test
 Aquifer Model: Unconfined
 Solution Method: Bouwer-Rice
 ln(Re/rw): 3.072

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	1.51E-7	cm/sec
y0	0.4885	m

$T = K \cdot b = 2.266E-5 \text{ cm}^2/\text{sec}$