Part 2 — Technical Requirements

NRCB Natural Resources Conservation Board

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

NRCB USE ONLY	Application number	Legal land description
☒ Approval ☐ Registration ☐ Authorization ☐ Amendment	BA24003	NE 14-49-2 W5M

APPLICATION DISCLOSURE

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

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

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

Date of signing

Emily Jocelyn Low -- P. Eng. - APEGA
Digitally signed by Emily Jocelyn Low -- P. Eng. - APEGA
Date: 2024.07.17 16:12:33 -06'00'

Signature

Crow Farms and Ranches Ltd.

Corporate name (if applicable)

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)
Current pens (Pens row 1)	475 m x 75 m
Proposed pens (Pens row 2)	375 m x 75 m
Catch Basin	54 m x 54 m x 7.0 m

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

Not an existing CFO. Has operated as a cow calf operation for several years.

Last updated September 11, 2023

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 Fall '2026

Additional information

Applicant has ran a predominantley cow calf operation and would like to permit existing pens and construct new pens to have the ability to run a finishing feedlot.

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 Finishers	-		3500

Last updated September 11, 2023

Part 2 — Technical Requirements

NRCB Natural Resources Conservation Board

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

DECLARATION AND ACKNOWLEDGMENT OF APPLICANT CONCERNING *WATER ACT* LICENCE
issued by Alberta Environment and Protected Areas (EPA) for a confined feeding operation (CFO)
Date and sign one of the following four options

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

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

Signed this ____day of _____, 20____. _____
Signature of Applicant or Agent

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

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

Signed this ____ 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 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

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

1. At this time, I (we) do not know whether a new water licence is needed from EPA under the *Water Act* for the development or activity proposed in this AOPA application.
2. If a new *Water Act* licence is needed, I (we) request that the NRCB process the AOPA application **independently of** EPA's processing of the CFO's application for a water licence.
3. In making this request, I (we) recognize that, if this AOPA application is granted by the NRCB, the NRCB's decision will not be considered by EPA as improving or enhancing the CFO's eligibility for a water licence under the *Water Act*.
4. I (we) acknowledge that any construction or actions to populate the CFO with additional livestock pursuant to an AOPA permit in the absence of a *Water Act* licence will **not** be relevant to EPA's consideration of whether to grant my *Water Act* licence application, if a new water licence is needed.
5. I (we) acknowledge that any such construction or livestock increase will be at the CFO's sole risk if the *Water Act* licence application is denied or if the operation of the CFO is otherwise deemed to be in violation of the *Water Act*. This risk includes being required to depopulate the CFO and/or to cease further construction, or to remove "works" or "undertakings" (as defined in the *Water Act*).
6. **AS RELEVANT:** I (we) acknowledge that the CFO is located in the South Saskatchewan River Basin and that, pursuant to the *Bow, Oldman and South Saskatchewan River Basin Water Allocation Order* [Alta. Reg. 171/2007], this basin is currently closed to new surface water allocations.
7. **Provide**: Water license number(s) or water conveyance agreement details 00177084-00-00

Signed this ____ day of _____, 20____.

Emily Jocelyn Low -- P. Eng. - APEGA

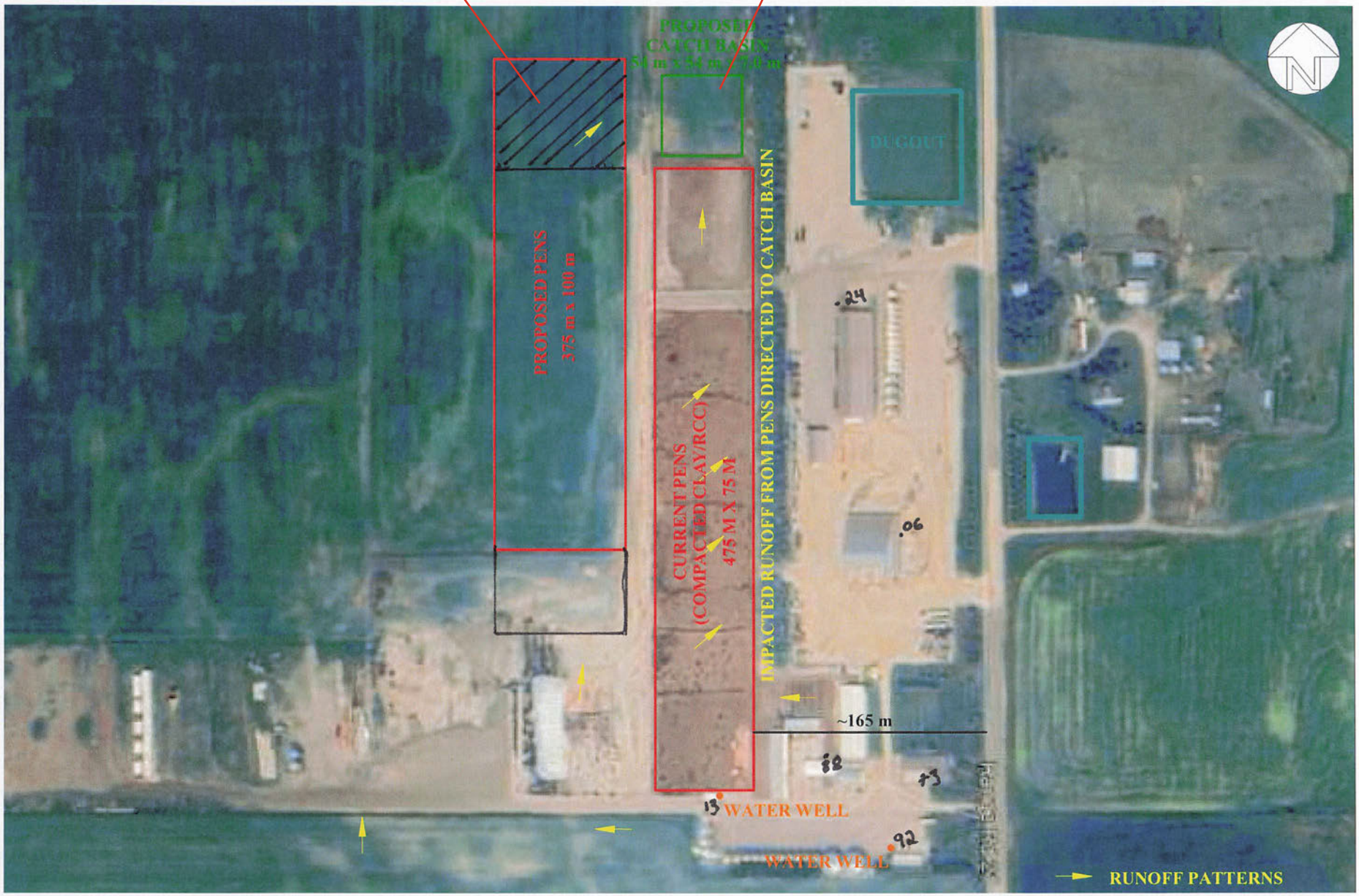
Digitally signed by Emily Jocelyn Low -- P. Eng. - APEGA
Date: 2024.07.17 16:21:47 -06'00'

Signature of Applicant or Agent

Applicant shifted pens down, this portion is not a pen

Proposed catch basin

pen



ENVIROWEST ENGINEERING	**Title:** Detailed Site Layout Plan Warren Crow NE-14-49-2-W5M Leduc County, Alberta	**Project No:** 2401-43049	**Date:** May 14, 2024	**Figure No.:** 2.0
		Scale:	**Prepared By:** L. Predy	
		Image Source: Google Earth Pro (February 22, 2024)		

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)

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: Current Pens **Proposed 1:** Proposed Pens

Proposed 2: Catch Basin **Proposed 3:**

Facility and environmental risk information		Facilities				NRCB USE ONLY	
		Existing	Proposed 1	Proposed 2	Proposed 3	Meets requirements	Comments
Flood plain information	What is the elevation of the floor of the lowest manure storage or collection facility above the 1:25 year flood plain or the highest known flood level?	☒ >1 m ☐ ≤ 1 m	☒ >1 m ☐ ≤ 1 m	☒ >1 m ☐ ≤ 1 m	☐ > 1 m ☐ ≤ 1 m	☑ YES ☐ NO ☐ YES with exemption	Not in flood plain
Surface water information	How many springs are within 100 m of the manure storage facility or manure collection area?	0	0	0		☑ YES ☐ NO ☐ YES with exemption	None known
	How many water wells are within 100 m of the manure storage facility or manure collection area?		0	0		☑ YES ☐ NO ☐ YES with exemption	3 wells within 100m of existing pens
	What is the shortest distance from the manure collection or storage facility to a surface water body? (e.g., lake, creek, slough, seasonal)	82 m	168 m	78 m		☑ YES ☐ NO ☐ YES with exemption	470 m seasonal creek
Groundwater information	What is the depth to the water table?	>4.5 m	>4.5 m	>9.0 m		☑ YES ☐ NO ☐ YES with exemption	Variable water table on site*
	What is the depth to the groundwater resource/aquifer you draw water from?					☑ YES ☐ NO ☐ YES with exemption	27.43 m sandstone ID 2070005

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

See attached Site and Soil Assessment (Envirowest, 2024).

*water table varies on site based on well logs, drilling reports, and engineering document. There was borrow pit construction occuring during my site visit and I did not observe an obvious water table on the N side of the proposed feedlot.

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

ENVIRONMENTAL RISK SCREENING INFORMATION

ERST for **proposed** facilities

Facility	Groundwater score	Surface water score	File number
Existing Pens	Low	Low	BA24003
Catch Basin	Low	Low	BA24003
Proposed Pens	Low	Low	BA24003

ERST for **existing** facilities

Facility	Groundwater score	Surface water score	File number
N/A			

ERST related comments:

Part 2 — Technical Requirements

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

NRCB USE ONLY

WATER WELL AND SURFACE WATER INFORMATION

Well IDs: ID 1576153 | ID 1451001 | _____

ID (2024 well) | _____ | _____

Surface water related concerns from directly affected parties or referral agencies: ☑ YES ☐ NO

Groundwater related concerns from directly affected parties or referral agencies: ☑ YES ☐ NO

Water wells ☐ N/A

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

Surface water ☑ N/A

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

Water Well Exemption Screening Tool ☐ N/A

Water Well ID	Preliminary Screening Score	Secondary Screening Score	Facility
ID 1576153	8	n/a	Adjacent to S end of pens
ID 1451001	16	10	Next to old barn
ID (2024 well)	8	n/a	Next to shop

Groundwater or surface water related comments:

Water wells on site indicate a shallow thinner clay layer followed by a varying layers of sandstone, shale, and coal. The engineering report boreholes indicate thicker clay especially in the area of the catch basin. At the time of my site visit the applicant had created a borrow pit for fill several metres deep. In this pit I did not observe any signs of sandstone, shale, or coal. The pit appeared as heavy clay matching the 9 m borehole conducted during drilling. Additionally, other wells to the west of site are in line with a thicker clay layer present. Although I will rely on the engineering information as it is more specific to the facilities I'm including a water well testing condition for the 2014 (ID1576153) well located adjacent to the southern most pen as this
well indicates a shallower clay layer and the boreholes on that portion were not extended as deep as the catch basin area.

Water Well Drilling Report

View in Imperial | Export to Excel

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

GOWN ID

GIC Well ID 2070005
GoA Well Tag No.
Drilling Company Well ID
Date Report Received

Well Identification and Location

Measurement in Metric

Owner Name	Address	Town	Province	Country	Postal Code
CROWE, WARREN	RR 1	THORSBY	AB	CA	T0C 2P0

Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description
	NE	14	49	2	5				

Measured from Boundary of
m from
m from

GPS Coordinates in Decimal Degrees (NAD 83)
Latitude 53.232400 Longitude -114.179000
How Location Obtained
Not Verified

Elevation m
How Elevation Obtained
Not Obtained

Drilling Information

Method of Drilling
Rotary

Proposed Well Use
Domestic

Type of Work
New Well

Formation Log

Measurement in Metric

Depth from ground level (m)	Water Bearing	Lithology Description
7.92		Clay
10.67		Sand
11.28		Hard Sandstone
14.63		Silty Sandstone
16.15		Shale
17.22		Coal
20.27		Shale
20.57		Carbonaceous Shale
20.73		Hard Sandstone
22.86		Shale
27.43		Silty Shale
35.05		Sandstone
41.45		Hard Sandstone
42.37		Coal
46.02		Shale
46.94		Sandstone
48.77		Shale

Yield Test Summary

Measurement in Metric

Recommended Pump Rate 31.82 L/min

Test Date	Water Removal Rate (L/min)	Static Water Level (m)
2006/06/24	31.82	9.14

Well Completion

Measurement in Metric

Total Depth Drilled	Finished Well Depth	Start Date	End Date
48.77 m		2006/08/24	2006/08/24

Borehole

Diameter (cm)	From (m)	To (m)
12.70	0.00	48.77

Surface Casing (if applicable)
Steel
Size OD : 14.13 cm
Wall Thickness : 0.655 cm
Bottom at : 25.30 m

Well Casing/Liner
Plastic
Size OD : 11.43 cm
Wall Thickness : 0.544 cm
Top at : 18.29 m
Bottom at : 48.77 m

Perforations

From (m)	To (m)	Diameter or Slot Width (cm)	Slot Length (cm)	Hole or Slot Interval(cm)
30.48	48.77	0.318		20.32

Perforated by Saw

Annular Seal Driven
Placed from 24.99 m to 25.30 m
Amount
Other Seals

Type	At (m)

Screen Type
Size OD : cm

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

Attachment
Top Fittings Bottom Fittings

Pack
Type Unknown Grain Size
Amount Unknown

Contractor Certification

Name of Journeyman responsible for drilling/construction of well
MARK SERVOLD

Certification No
VB4273

Company Name
CYCLONE DRILLING LTD.

Copy of Well report provided to owner *Date approval holder signed*

Water Well Drilling Report

View in Imperial | Export to Excel

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

GOWN ID

GIC Well ID 2070005
GoA Well Tag No.
Drilling Company Well ID
Date Report Received

Well Identification and Location

Measurement in Metric

Owner Name	Address	Town	Province	Country	Postal Code
CROWE, WARREN	RR 1	THORSBY	AB	CA	T0C 2P0

Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description
	NE	14	49	2	5				

Measured from Boundary of
m from
m from

GPS Coordinates in Decimal Degrees (NAD 83)
Latitude 53.232400 Longitude -114.179000
How Location Obtained
Not Verified

Elevation m
How Elevation Obtained
Not Obtained

Additional Information

Measurement in Metric

Distance From Top of Casing to Ground Level 45.72 cm
Is Artesian Flow
Rate L/min
Is Flow Control Installed
Describe

Recommended Pump Rate 31.82 L/min
Recommended Pump Intake Depth (From TOC) 45.72 m
Pump Installed
Type
Depth m
Make
H.P.
Model (Output Rating)

Did you Encounter Saline Water (>4000 ppm TDS)
Depth m
Gas
Depth m
Well Disinfected Upon Completion
Geophysical Log Taken
Remedial Action Taken
Submitted to ESRD
Sample Collected for Potability
Submitted to ESRD
Additional Comments on Well

Yield Test

Taken From Ground Level
Depth to water level

Measurement in Metric

Test Date	Start Time	Static Water Level
2006/06/24	12:00 AM	9.14 m

Method of Water Removal

Type Air
Removal Rate 31.82 L/min
Depth Withdrawn From 48.77 m

If water removal period was < 2 hours, explain why

Pumping (m)	Elapsed Time Minutes:Sec	Recovery (m)
	3:00	45.42
	4:00	41.15
	5:00	38.40
	6:00	35.97
	7:00	33.53
	8:00	32.31
	9:00	30.78
	10:00	29.57
	12:00	26.52
	14:00	23.77
	16:00	21.03
	20:00	14.63
	25:00	13.41
	30:00	12.19
	35:00	11.28
	40:00	10.67
	50:00	10.06
	60:00	9.45
	75:00	9.14

Water Diverted for Drilling

Water Source	Amount Taken	Diversion Date & Time
	L	

Contractor Certification

Name of Journeyman responsible for drilling/construction of well
MARK SERVOLD

Certification No
VB4273

Company Name
CYCLONE DRILLING LTD.

Copy of Well report provided to owner Date approval holder signed

Alberta Water Well Drilling Report

View in Imperial | Export to Excel

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GOWN ID

GIC Well ID 450991
GoA Well Tag No.
Drilling Company Well ID
Date Report Received 1973/06/11

Well Identification and Location

Measurement in Metric

Owner Name	Address	Town	Province	Country	Postal Code
ZUKOWSKI, ED	THORSBY				

Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description
	NE	14	49	2	5				

Measured from Boundary of
m from
m from

GPS Coordinates in Decimal Degrees (NAD 83)
Latitude 53.232360 Longitude -114.178599
How Location Obtained
Map

Elevation m
How Elevation Obtained
Not Obtained

Drilling Information

Method of Drilling
Rotary

Proposed Well Use
Stock

Type of Work
New Well

Formation Log

Measurement in Metric

Depth from ground level (m)	Water Bearing	Lithology Description
3.05		Clay
27.43		Brown Shale & Coal
30.48		Blue Shale & Sandstone
42.67		Wet Sand
44.20		Shale & Coal

Yield Test Summary

Measurement in Metric

Recommended Pump Rate 0.00 L/min

Test Date	Water Removal Rate (L/min)	Static Water Level (m)
1973/01/01	45.46	9.14

Well Completion

Measurement in Metric

Total Depth Drilled	Finished Well Depth	Start Date	End Date
44.20 m			1973/01/01

Borehole

Diameter (cm)	From (m)	To (m)
0.00	0.00	44.20

Surface Casing (if applicable)
Galvanized Steel
Size OD : 11.43 cm
Wall Thickness : 0.000 cm
Bottom at : 28.35 m

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

Perforations

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

Perforated by

Annular Seal Driven
Placed from 0.00 m to 0.00 m
Amount

Other Seals

Type	At (m)

Screen Type
Size OD : 0.00 cm

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

Attachment
Top Fittings Bottom Fittings

Pack
Type Grain Size
Amount

Contractor Certification

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

Company Name
HOSTYN DRILLING CO. LTD.

Certification No
1

Copy of Well report provided to owner *Date approval holder signed*

Alberta Water Well Drilling Report

View in Imperial | Export to Excel

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

GOWN ID

GIC Well ID 450991
GoA Well Tag No.
Drilling Company Well ID
Date Report Received 1973/06/11

Well Identification and Location

Measurement in Metric

Owner Name	Address	Town	Province	Country	Postal Code
ZUKOWSKI, ED	THORSBY				

Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description
	NE	14	49	2	5				

Measured from Boundary of
m from
m from

GPS Coordinates in Decimal Degrees (NAD 83)
Latitude 53.232360 Longitude -114.178599
How Location Obtained
Map

Elevation m
How Elevation Obtained
Not Obtained

Additional Information

Measurement in Metric

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

Recommended Pump Rate 0.00 L/min
Recommended Pump Intake Depth (From TOC) 0.00 m
Pump Installed
Depth m
Type
Make
H.P.
Model (Output Rating)

Did you Encounter Saline Water (>4000 ppm TDS)
Depth m
Gas
Depth m
Well Disinfected Upon Completion
Geophysical Log Taken
Remedial Action Taken
Submitted to ESRD
Sample Collected for Potability
Submitted to ESRD
Additional Comments on Well
WATER IS SOFT

Yield Test

Taken From Ground Level
Depth to water level

Measurement in Metric

Test Date	Start Time	Static Water Level	Pumping (m)	Elapsed Time Minutes:Sec	Recovery (m)
1973/01/01	12:00 AM	9.14 m			

Method of Water Removal
Type Pump
Removal Rate 45.46 L/min
Depth Withdrawn From 0.00 m

If water removal period was < 2 hours, explain why

Water Diverted for Drilling

Water Source	Amount Taken	Diversion Date & Time
	L	

Contractor Certification

Name of Journeyman responsible for drilling/construction of well
UNKNOWN NA DRILLER
Certification No
1
Company Name
HOSTYN DRILLING CO. LTD.
Copy of Well report provided to owner
Date approval holder signed

Water Well Drilling Report

View in Imperial | Export to Excel

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

GOWN ID

GIC Well ID 1576153
GoA Well Tag No.
Drilling Company Well ID
Date Report Received 2014/04/04

Well Identification and Location

Measurement in Metric

Owner Name	Address	Town	Province	Country	Postal Code
CROW ENTERPRISES LTD	RR 1	THORSBY	ALBERTA	CANADA	T0C 2P0

Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description
	NE	14	49	2	5				

Measured from Boundary of
m from
m from

GPS Coordinates in Decimal Degrees (NAD 83)
Latitude 53.232368 Longitude -114.178606
How Location Obtained
Not Verified

Elevation m
How Elevation Obtained
Not Obtained

Drilling Information

Method of Drilling
Combination

Proposed Well Use
Domestic & Stock

Type of Work
New Well

Formation Log

Measurement in Metric

Depth from ground level (m)	Water Bearing	Lithology Description
2.44		Clay
3.35		Coal
10.06		Shale
10.67		Coal
22.56		Shale
23.16		Coal
32.00		Shale
45.72		Sandstone
46.94		Coal
50.29		Shale
52.43		Siltstone
57.91		Shale

Yield Test Summary

Measurement in Metric

Recommended Pump Rate 45.46 L/min

Test Date	Water Removal Rate (L/min)	Static Water Level (m)
2014/03/20	40.91	19.07

Well Completion

Measurement in Metric

Total Depth Drilled	Finished Well Depth	Start Date	End Date
57.91 m	57.91 m	2013/06/19	2013/06/19

Borehole

Diameter (cm)	From (m)	To (m)
20.00	0.00	18.29
13.02	18.29	57.91

Surface Casing (if applicable)
Plastic
Size OD : 15.24 cm
Wall Thickness : 0.991 cm
Bottom at : 18.29 m

Well Casing/Liner
Plastic
Size OD : 11.43 cm
Wall Thickness : 0.737 cm
Top at : 15.24 m
Bottom at : 57.91 m

Perforations

From (m)	To (m)	Diameter or Slot Width (cm)	Slot Length (cm)	Hole or Slot Interval(cm)
33.53	51.82	0.159		15.24

Perforated by Saw

Annular Seal Bentonite Chips/Tablets
Placed from 0.00 m to 18.29 m
Amount 2.00 Bags

Other Seals

Type	At (m)
Driven	18.29
Shale Trap	18.29

Screen Type
Size OD : cm

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

Attachment
Top Fittings Bottom Fittings

Pack
Type Grain Size
Amount

Contractor Certification

Name of Journeyman responsible for drilling/construction of well
DARREN PAPLEY

Certification No
5896A

Company Name
PAPLEY DRILLING LTD.

Copy of Well report provided to owner
Yes

Date approval holder signed
2014/03/29

Alberta Water Well Drilling Report

View in Imperial | Export to Excel

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

GOWN ID

GIC Well ID 1576153
GoA Well Tag No.
Drilling Company Well ID
Date Report Received 2014/04/04

Well Identification and Location

Measurement in Metric

Owner Name	Address	Town	Province	Country	Postal Code
CROW ENTERPRISES LTD	RR 1	THORSBY	ALBERTA	CANADA	T0C 2P0

Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description
	NE	14	49	2	5				

Measured from Boundary of
m from
m from

GPS Coordinates in Decimal Degrees (NAD 83)
Latitude 53.232368 Longitude -114.178606
How Location Obtained
Not Verified

Elevation m
How Elevation Obtained
Not Obtained

Additional Information

Measurement in Metric

Distance From Top of Casing to Ground Level 45.72 cm
Is Artesian Flow
Rate L/min
Is Flow Control Installed
Describe

Recommended Pump Rate 45.46 L/min
Recommended Pump Intake Depth (From TOC) 48.77 m
Pump Installed Yes
Type Submersible
Make
Depth 48.77 m
H.P. 0.5
Model (Output Rating) 10 GPM

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

Additional Comments on Well

COMBINATION ROTARY AIR & MUD DRILLING, PROPOSED WELL USE - FARM, Adjacent to S end of pens

Yield Test

Taken From Top of Casing

Measurement in Metric

Test Date 2014/03/20
Start Time 1:00 PM
Static Water Level 19.07 m

Method of Water Removal
Type PUMP
Removal Rate 40.91 L/min
Depth Withdrawn From m

If water removal period was < 2 hours, explain why

TESTED @ 9 GPM FROM 0 TO 20 MINUTES AND THEN @ 10 GPM TO 120 MINUTES

Depth to water level Pumping (m)	Elapsed Time Minutes:Sec	Recovery (m)
19.07	0:00	38.00
20.47	1:00	35.74
21.28	2:00	34.80
22.00	3:00	34.19
22.61	4:00	33.68
23.09	5:00	33.07
23.57	6:00	32.46
23.98	7:00	31.88
24.38	8:00	31.32
24.69	9:00	30.81
24.94	10:00	30.30
25.45	12:00	29.36
25.93	14:00	28.47
26.37	16:00	27.66
26.77	18:00	26.92
27.10	20:00	26.24
30.05	25:00	24.69
31.01	30:00	23.72
32.21	35:00	22.38
33.07	40:00	21.56
34.31	50:00	20.29
35.15	60:00	19.71
35.99	75:00	19.38
36.70	90:00	19.07
37.26	105:00	
38.00	120:00	

Water Diverted for Drilling

Water Source	Amount Taken		Diversion Date & Time
TOWN	5455.31	L	2013/06/19 8:00 AM

Contractor Certification

Name of Journeyman responsible for drilling/construction of well
DARREN PAPLEY

Certification No
5896A

Company Name
PAPLEY DRILLING LTD.

Copy of Well report provided to owner
Yes

Date approval holder signed
2014/03/29

Water Well Drilling Report

View in Imperial | Export to Excel

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

GOWN ID

GIC Well ID 451001
GoA Well Tag No.
Drilling Company Well ID
Date Report Received 1989/01/19

Well Identification and Location

Measurement in Metric

Owner Name	Address	Town	Province	Country	Postal Code
ZUKOWSKI, ED	THORSBY				

Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description
	NE	14	49	2	5				

Measured from Boundary of
m from
m from

GPS Coordinates in Decimal Degrees (NAD 83)
Latitude 53.232360 Longitude -114.178599
How Location Obtained
Map

Elevation m
How Elevation Obtained
Not Obtained

Drilling Information

Method of Drilling
Rotary

Proposed Well Use
Stock

Type of Work
New Well

Formation Log

Measurement in Metric

Depth from ground level (m)	Water Bearing	Lithology Description
3.05		Clay
3.66		Coal
9.14		Brown Shale
35.05		Blue Shale
41.15		Sand & Sandstone

Yield Test Summary

Measurement in Metric

Recommended Pump Rate 36.37 L/min

Test Date	Water Removal Rate (L/min)	Static Water Level (m)
1988/08/05	45.46	11.58

Well Completion

Measurement in Metric

Total Depth Drilled	Finished Well Depth	Start Date	End Date
41.15 m		1988/08/05	1988/08/05

Borehole

Diameter (cm)	From (m)	To (m)
0.00	0.00	41.15

Surface Casing (if applicable)
Size OD : 0.00 cm
Wall Thickness : 0.000 cm
Bottom at : 0.00 m

Well Casing/Liner
Plastic
Size OD : 11.43 cm
Wall Thickness : 0.635 cm
Top at : 0.00 m
Bottom at : 41.15 m

Perforations

From (m)	To (m)	Diameter or Slot Width (cm)	Slot Length (cm)	Hole or Slot Interval(cm)
36.58	41.15	0.635		0.64

Perforated by Hand Drill

Annular Seal Other
Placed from 0.00 m to 36.58 m
Amount

Other Seals

Type	At (m)

Screen Type
Size OD : 0.00 cm

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

Attachment
Top Fittings Bottom Fittings

Pack
Type Grain Size
Amount

Contractor Certification

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

Certification No
1

Company Name
HOSTYN DRILLING CO. LTD.

Copy of Well report provided to owner *Date approval holder signed*

Water Well Drilling Report

View in Imperial | Export to Excel

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

GOWN ID

GIC Well ID 451001
GoA Well Tag No.
Drilling Company Well ID
Date Report Received 1989/01/19

Well Identification and Location

Measurement in Metric

Owner Name	Address	Town	Province	Country	Postal Code
ZUKOWSKI, ED	THORSBY				

Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description
	NE	14	49	2	5				

Measured from Boundary of
m from
m from

GPS Coordinates in Decimal Degrees (NAD 83)
Latitude 53.232360 Longitude -114.178599
How Location Obtained
Map

Elevation m
How Elevation Obtained
Not Obtained

Additional Information

Measurement in Metric

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

27.43

Is Flow Control Installed
Describe

Recommended Pump Rate 36.37 L/min
Recommended Pump Intake Depth (From TOC) 30.48 m

Pump Installed
Type
Depth m
Make
H.P.
Model (Output Rating)

Did you Encounter Saline Water (>4000 ppm TDS)
Depth m
Gas
Depth m
Remedial Action Taken

Well Disinfected Upon Completion
Geophysical Log Taken
Submitted to ESRD

Sample Collected for Potability
Submitted to ESRD

Additional Comments on Well

Yield Test

Taken From Ground Level
Measurement in Metric

Test Date	Start Time	Static Water Level	Depth to water level: Pumping (m)	Elapsed Time Minutes:Sec	Recovery (m)
1988/08/05	12:00 AM	11.58 m			

Method of Water Removal

Type Bailer
Removal Rate 45.46 L/min
Depth Withdrawn From 28.96 m

If water removal period was < 2 hours, explain why

Water Diverted for Drilling

Water Source	Amount Taken	Diversion Date & Time
	L	

Contractor Certification

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

Certification No
1

Company Name
HOSTYN DRILLING CO. LTD.

Copy of Well report provided to owner Date approval holder signed

Water Well Drilling Report

View in Imperial | Export to Excel

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

GOWN ID

GIC Well ID 364749
GoA Well Tag No.
Drilling Company Well ID
Date Report Received 1992/06/11

Well Identification and Location

Measurement in Metric

Owner Name	Address	Town	Province	Country	Postal Code
ZUKOWSKI, ED	RR1 THORSBY				T0C 2P0

Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description
	NE	14	49	2	5				

Measured from Boundary of
m from
m from

GPS Coordinates in Decimal Degrees (NAD 83)
Latitude 53.232360 Longitude -114.178599
How Location Obtained
Map

Elevation m
How Elevation Obtained
Not Obtained

Drilling Information

Method of Drilling
Rotary

Proposed Well Use
Domestic

Type of Work
New Well

Formation Log

Measurement in Metric

Depth from ground level (m)	Water Bearing	Lithology Description
3.35		Clay
5.18		Coal
7.92		Gray Shale
8.23		Coal
10.97		Brown Shale
11.89		Coal
21.64		Shale
23.16		Coal
25.60		Shale
26.21		Sandstone
31.70		Gray Shale
42.67		Sandstone

Yield Test Summary

Measurement in Metric

Recommended Pump Rate 136.38 L/min

Test Date	Water Removal Rate (L/min)	Static Water Level (m)
1992/06/02	136.38	9.14

Well Completion

Measurement in Metric

Total Depth Drilled	Finished Well Depth	Start Date	End Date
42.67 m		1992/06/02	1992/06/02

Borehole

Diameter (cm)	From (m)	To (m)
0.00	0.00	42.67

Surface Casing (if applicable)
Steel
Size OD : 14.12 cm
Wall Thickness : 0.478 cm
Bottom at : 27.13 m

Well Casing/Liner
Plastic
Size OD : 11.43 cm
Wall Thickness : 0.544 cm
Top at : 24.38 m
Bottom at : 42.67 m

Perforations

From (m)	To (m)	Diameter or Slot Width (cm)	Slot Length (cm)	Hole or Slot Interval(cm)
36.58	42.67	0.318		0.00

Perforated by Hand Drill

Annular Seal Driven
Placed from 0.00 m to 26.82 m
Amount

Other Seals

Type	At (m)

Screen Type
Size OD : 0.00 cm

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

Attachment
Top Fittings
Bottom Fittings

Pack
Type
Grain Size
Amount 0.00

Contractor Certification

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

Company Name
MID-WEST WATER WELLS LTD.

Certification No
1

Copy of Well report provided to owner *Date approval holder signed*

Water Well Drilling Report

View in Imperial | Export to Excel

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

GOWN ID

GIC Well ID 364749
GoA Well Tag No.
Drilling Company Well ID
Date Report Received 1992/06/11

Well Identification and Location

Measurement in Metric

Owner Name	Address	Town	Province	Country	Postal Code
ZUKOWSKI, ED	RR1 THORSBY				T0C 2P0

Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description
	NE	14	49	2	5				

Measured from Boundary of
m from
m from

GPS Coordinates in Decimal Degrees (NAD 83)
Latitude 53.232360 Longitude -114.178599
How Location Obtained
Map

Elevation m
How Elevation Obtained
Not Obtained

Additional Information

Measurement in Metric

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

Recommended Pump Rate 136.38 L/min
Recommended Pump Intake Depth (From TOC) 24.38 m
Pump Installed
Type
Depth m
Make
H.P.
Model (Output Rating)

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

Sample Collected for Potability
Submitted to ESRD

Additional Comments on Well

Yield Test

Taken From Ground Level
Depth to water level

Measurement in Metric

Test Date	Start Time	Static Water Level	Pumping (m)	Elapsed Time Minutes:Sec	Recovery (m)
1992/06/02	12:00 AM	9.14 m			

Method of Water Removal

Type Air
Removal Rate 136.38 L/min
Depth Withdrawn From 42.67 m

If water removal period was < 2 hours, explain why

Water Diverted for Drilling

Water Source	Amount Taken	Diversion Date & Time
	L	

Contractor Certification

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

Certification No
1

Company Name
MID-WEST WATER WELLS LTD.

Copy of Well report provided to owner | Date approval holder signed

Part 2 — Technical Requirements

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

NRCB Natural Resources Conservation Board

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

			NRCB USE ONLY				
Neighbour name(s)	**Legal land description**	**Distance (m)**	**Zoning (LUB) category**	**MDS category (1-4)**	**Distance (m)**	**Waiver attached (if required)**	**Meets regulations**
R. & M. Scobie	NW-13-49-2-W5	230	Ag	Cat 1	227 m	Yes	Yes with waiver
Brayden Preace	SW-24-49-2-W5	475	Ag	Cat 1	475 m	Yes	Yes with waiver
P. Tomaszewski	SE-14-49-2-W5	420	Ag	Cat 1	425 m	Yes	Yes with waiver
R., A., & D. Tomaszewski	SW-14-49-2-W5	1000	Ag	Cat 1	1000 m	N/A	Yes
M. & M. Stilet	NW-14-49-2-W5	1180	Ag	Cat 1	1200 m	N/A	Yes

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

				NRCB USE ONLY	
Name of land owner(s)*	**Legal land description**	**Usable area** (ha)**	**Soil zone *****	**Usable area (ha)**	**Agreement attached (if required)**
See attached					
			Total	See below for details	

* 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)

NRCB USE ONLY

MINIMUM DISTANCE SEPARATION

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

Margin of error (if applicable): N/A

Requirements (m): Category 1: 601 m Category 2: 801 m Category 3: 1001 m Category 4: 1602 m

Technology factor: ☐ YES ☑ NO

Expansion factor: ☐ YES ☑ NO

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

LAND BASE FOR MANURE AND COMPOST APPLICATION

Land base required: 273 ha

Land base listed: 533 ha

Area not suitable: N/A

Available area: Applicant has provided adequate land base Requirement met: ☑ YES ☐ NO

Land spreading agreements required: ☐ YES ☑ NO

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

PLANS

Submitted and attached construction plans: ☑ YES ☐ NO

Submitted aerial photos: ☑ YES ☐ NO

Submitted photos: ☐ YES ☑ NO

GRANDFATHERING

Already completed: ☐ YES ☐ NO ☑ N/A

If already completed, see _____

Land Base for Manure and Compost Application
Part II: Technical Requirements
Crow Farms and Ranches Ltd.

					NRCB USE ONLY	
Name of Landowner(s)*	Reference	Legal Land Description	Usable Area (ha)	Soil Zone	Usable Area (ha)	Agreement attached (if required)
W. Crow	*Home Farm*	NE-14-49-2-W5	160	Dark Gray Chernozemic, Dark Gray- Gray Luvisols		
W. Crow	*Home N Quarter*	SE-23-49-2-W5	160	Dark Gray Chernozemic, Dark Gray- Gray Luvisols		
W. Crow	*Bendza*	SW-24-49-2-W5	130	Dark Gray Chernozemic, Dark Gray- Gray Luvisols		
Crow		SE-24-49-2-W5	131	Dark Gray Chernozemic, Dark Gray- Gray Luvisols		
Crow		NE-24-49-2-W5	145	Dark Gray Chernozemic, Dark Gray- Gray Luvisols		
W. Crow	*Warren East*	SE-13-49-2-W5	155	Dark Gray Chernozemic, Dark Gray- Gray Luvisols		
W. Crow	*E. Zukowski*	NE-11-49-2-W5	160	Dark Gray Chernozemic, Dark Gray- Gray Luvisols		
W. Crow	*E. Zukowski*	SE-11-49-2-W5	147	Dark Gray Chernozemic, Dark Gray- Gray Luvisols		
Crow		NE-16-49-2-W5	130	Dark Gray Chernozemic, Dark Gray- Gray Luvisols		
				Total		

* Landowner names taken from 2021 Leduc County Land Ownership map. It is reported by the applicant that Warren Crow or Crow Farms and Ranches Ltd. currently owns all the properties.

Minimum Distance Separation (MDS) Waiver (declaration)

Applicant information NRCB application number: BA24003

Operator/operation name: Crow Farms and Ranches Ltd.

Address: RR# 1, 49242 Range Rd 21, Thorsby, AB Postal Code: T0C 2P0

Legal land location of confined feeding operation: NE 14 49 2 W5

I have requested the residence owner(s) named below to waive the required minimum distance separation (MDS) to their residence for the *Agricultural Operation Practices Act* (AOPA) permit application identified above. In making this request, I have provided the owner(s) with an opportunity to review my permit application and a copy of the Natural Resources Conservation Board (NRCB) Fact Sheet "Minimum Distance Separation (MDS) Waivers" available on the NRCB website at www.nrcb.ca. I have also explained:

- The MDS requirement set out in section 3 of the Standards and Administration Regulation of AOPA. I have advised the owner(s) that section 3(6)(a) of the Standards and Administration Regulation allows this requirement to be waived by the owners of residences, if they agree in writing to grant a waiver;
- That my proposed development does not meet the required MDS to the owner's residence; and,
- That this waiver applies only to this application as described. An increase in livestock capacity, annual manure production, level of odour production, change to the site plan or change to a facility that would increase the MDS would require a new waiver.

Following is a summary of the proposed development:

- The current scope of my confined feeding operation (CFO), including the type, number, and category of livestock, if any, is:
  Current scope: Cow Calf SFBS Facility
- My application for a new AOPA permit proposes the following changes to the existing livestock category, type and/or capacity at my CFO:
- The proposed new CFO facility(ies), or changes to the existing CFO facilities, including manure storage, manure storage volume and any other pertinent details, if any, are (attach a site layout plan if available):
  Propose a CFO facility to accomdate 3500 head Beef Finisher, proposed catch basin
  60m width x 50m length x 7 m deep

I the applicant understand that the waiver is not valid unless ALL registered owners of the residence sign this document.

Permit Applicant: [redacted] Date: Feb 01 - 2024

Signature

Residence owner(s) to initial: YS NH

Minimum Distance Separation (MDS) Waiver (declaration)

Residence owner(s) information

ALL Names on land title: Ray + Marie Scobie

Legal land location of residence(s): NW 13 49 2 5

Telephone number(s)[1]: [redacted] Email address(es)[1]: [redacted]

Address(es)[1] and Postal code(s)[1]: RR 1 Thorsby AB T0C 2P0

[1] ***Please note that personal contact information is for NRCB use ONLY and not publicly released***

I am/we are the legal landowner(s) of a residence(s) located at the above noted legal land location/address:

- I/we have read the NRCB Fact Sheet "Minimum Distance Separation (MDS) Waivers";
- I/we have discussed this application with the applicant and understand its potential impacts to our residence(s);
- I/we understand that the application **does not** meet the MDS requirement to my/our residence(s), under the *Agricultural Operation Practices Act* (AOPA);
- **I/we understand that this waiver is not valid unless signed by ALL parties identified on the land title as owners;**
- **I/we are not obligated to waive the MDS requirement to our residence(s);**
- I/we understand that if I/we choose to waive the MDS requirement, I/we can revoke the waiver, by providing written notice to the NRCB approval officer, as set out in the "Minimum Distance Separation (MDS) Waivers" Fact Sheet; and
- I/we understand that this waiver is a public document.

Having considered my/our rights, I/we hereby waive the MDS requirement to my/our residence, with respect to

Application number BA24003.

[redacted]

Signatures of **all** residence owner(s) on title

Raymond Scobie Marie Scobie

Printed names of **all** residence owner(s) on title

Date: FEB 1, 2024

Minimum Distance Separation (MDS) Waiver (declaration)

Applicant information NRCB application number: BA24003

Operator/operation name: Crow Farms and Ranches Ltd.

Address: RR# 1, 49242 Range Rd 21, Thorsby, AB Postal Code: T0C 2P0

Legal land location of confined feeding operation: NE 14 49 2 W5

I have requested the residence owner(s) named below to waive the required minimum distance separation (MDS) to their residence for the *Agricultural Operation Practices Act* (AOPA) permit application identified above. In making this request, I have provided the owner(s) with an opportunity to review my permit application and a copy of the Natural Resources Conservation Board (NRCB) Fact Sheet "Minimum Distance Separation (MDS) Waivers" available on the NRCB website at www.nrcb.ca. I have also explained:

- The MDS requirement set out in section 3 of the Standards and Administration Regulation of AOPA. I have advised the owner(s) that section 3(6)(a) of the Standards and Administration Regulation allows this requirement to be waived by the owners of residences, if they agree in writing to grant a waiver;
- That my proposed development does not meet the required MDS to the owner's residence; and,
- That this waiver applies only to this application as described. An increase in livestock capacity, annual manure production, level of odour production, change to the site plan or change to a facility that would increase the MDS would require a new waiver.

Following is a summary of the proposed development:

- The current scope of my confined feeding operation (CFO), including the type, number, and category of livestock, if any, is:
  Current scope: Cow Calf SFBS Facility

- My application for a new AOPA permit proposes the following changes to the existing livestock category, type and/or capacity at my CFO:

- The proposed new CFO facility(ies), or changes to the existing CFO facilities, including manure storage, manure storage volume and any other pertinent details, if any, are (attach a site layout plan if available):
  Propose a CFO facility to accomdate 3500 head Beef Finisher, proposed catch basin
  60m width x 50m length x 7 m deep

I the applicant understand that the waiver is not valid unless ALL registered owners of the residence sign this document.

Permit Applicant: [redacted] Date: Feb-01-2024

Signature

Residence owner(s) to initial: BP

Minimum Distance Separation (MDS) Waiver (declaration)

Residence owner(s) information

ALL Names on land title: Brayden Preece

Legal land location of residence(s): 49309 rg rd 21

Telephone number(s)[1]: [redacted] Email address(es)[1]: [redacted]

Address(es)[1] and Postal code(s)[1]: [redacted] TOP 2P0

RR #1

[1] ***Please note that personal contact information is for NRCB use ONLY and not publicly released***

I am/we are the legal landowner(s) of a residence(s) located at the above noted legal land location/address:

- I/we have read the NRCB Fact Sheet "Minimum Distance Separation (MDS) Waivers";
- I/we have discussed this application with the applicant and understand its potential impacts to our residence(s);
- I/we understand that the application **does not** meet the MDS requirement to my/our residence(s), under the *Agricultural Operation Practices Act* (AOPA);
- **I/we understand that this waiver is not valid unless signed by ALL parties identified on the land title as owners;**
- **I/we are not obligated to waive the MDS requirement to our residence(s);**
- I/we understand that if I/we choose to waive the MDS requirement, I/we can revoke the waiver, by providing written notice to the NRCB approval officer, as set out in the "Minimum Distance Separation (MDS) Waivers" Fact Sheet; and
- I/we understand that this waiver is a public document.

Having considered my/our rights, I/we hereby waive the MDS requirement to my/our residence, with respect to

Application number BA24003.

[redacted]

Signatures of **all** residence owner(s) on title

Brayden Preece

Printed names of **all** residence owner(s) on title

Date: Feb 1st 2024

Minimum Distance Separation (MDS) Waiver (declaration)

Applicant information NRCB application number: BA24003

Operator/operation name: Crow Farms and Ranches Ltd.

Address: RR# 1, 49242 Range Rd 21, Thorsby, AB Postal Code: T0C 2P0

Legal land location of confined feeding operation: NE 14 49 2 W5

I have requested the residence owner(s) named below to waive the required minimum distance separation (MDS) to their residence for the *Agricultural Operation Practices Act* (AOPA) permit application identified above. In making this request, I have provided the owner(s) with an opportunity to review my permit application and a copy of the Natural Resources Conservation Board (NRCB) Fact Sheet "Minimum Distance Separation (MDS) Waivers" available on the NRCB website at www.nrcb.ca. I have also explained:

- The MDS requirement set out in section 3 of the Standards and Administration Regulation of AOPA. I have advised the owner(s) that section 3(6)(a) of the Standards and Administration Regulation allows this requirement to be waived by the owners of residences, if they agree in writing to grant a waiver;
- That my proposed development does not meet the required MDS to the owner's residence; and,
- That this waiver applies only to this application as described. An increase in livestock capacity, annual manure production, level of odour production, change to the site plan or change to a facility that would increase the MDS would require a new waiver.

Following is a summary of the proposed development:

- The current scope of my confined feeding operation (CFO), including the type, number, and category of livestock, if any, is:
  Current scope: Cow Calf SFBS Facility

- My application for a new AOPA permit proposes the following changes to the existing livestock category, type and/or capacity at my CFO:

- The proposed new CFO facility(ies), or changes to the existing CFO facilities, including manure storage, manure storage volume and any other pertinent details, if any, are (attach a site layout plan if available):
  Propose a CFO facility to accomdate 3500 head Beef Finisher, proposed catch basin
  60m width x 50m length x 7 m deep

I the applicant understand that the waiver is not valid unless ALL registered owners of the residence sign this document.

Permit Applicant: [redacted] Date: Jan 30 - 2024
Signature

Residence owner(s) to initial:

Minimum Distance Separation (MDS) Waiver (declaration)

Residence owner(s) information

ALL Names on land title: PAUL TOMASZEWSKI

Legal land location of residence(s): SE 14 49 2 W5

Telephone number(s)[1] [redacted] Email address(es)[1]: n/a

Address(es)[1] and Postal code(s)[1]: RR1 Site 12 Box 8

Thorsby AB T0C 2P0

[1] ***Please note that personal contact information is for NRCB use ONLY and not publicly released***

I am/we are the legal landowner(s) of a residence(s) located at the above noted legal land location/address:

- I/we have read the NRCB Fact Sheet "Minimum Distance Separation (MDS) Waivers";
- I/we have discussed this application with the applicant and understand its potential impacts to our residence(s);
- I/we understand that the application **does not** meet the MDS requirement to my/our residence(s), under the *Agricultural Operation Practices Act* (AOPA);
- **I/we understand that this waiver is not valid unless signed by ALL parties identified on the land title as owners;**
- **I/we are not obligated to waive the MDS requirement to our residence(s)**;
- I/we understand that if I/we choose to waive the MDS requirement, I/we can revoke the waiver, by providing written notice to the NRCB approval officer, as set out in the "Minimum Distance Separation (MDS) Waivers" Fact Sheet; and
- I/we understand that this waiver is a public document.

Having considered my/our rights, I/we hereby waive the MDS requirement to my/our residence, with respect to

Application number BA24003.

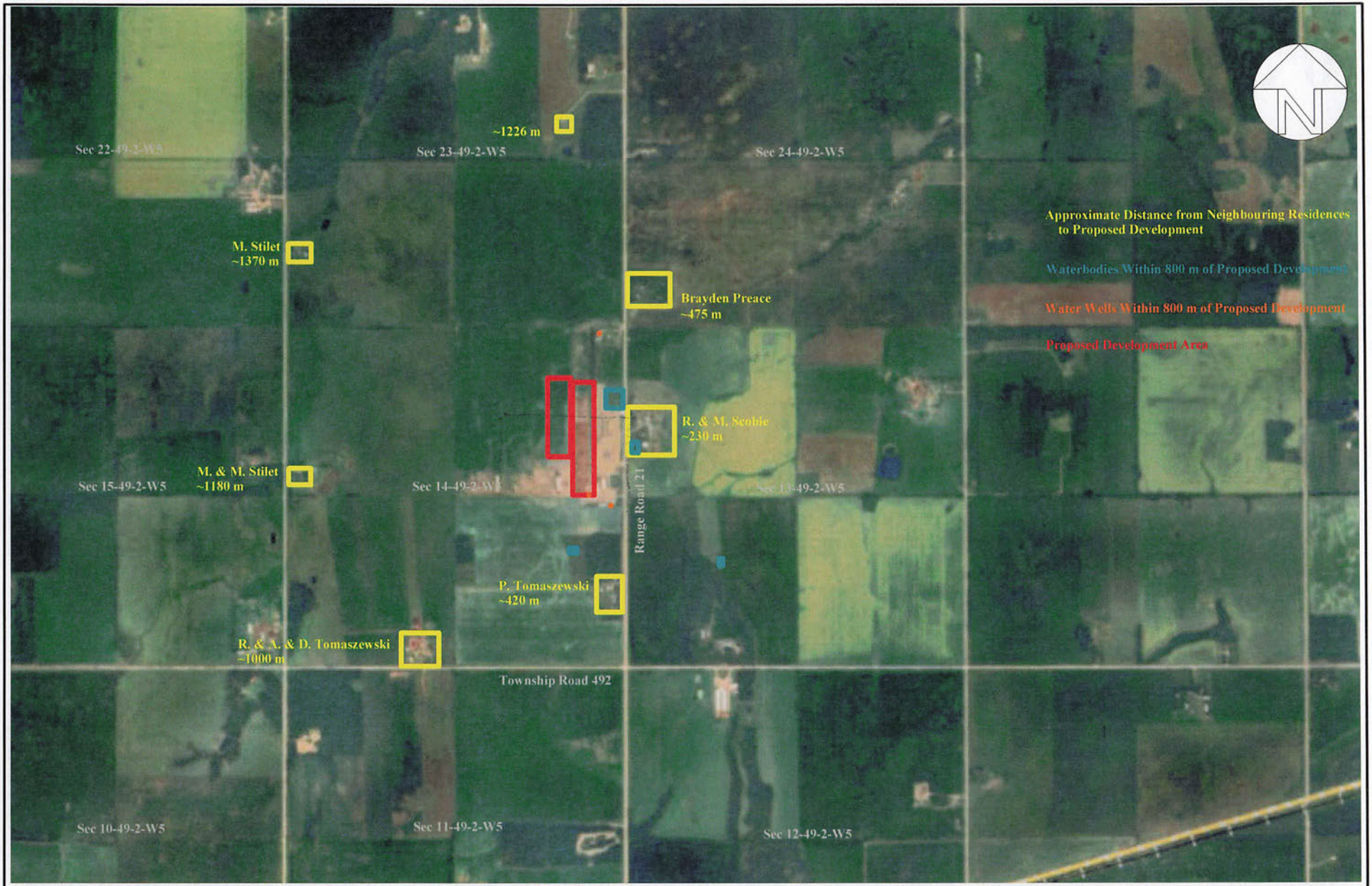
[redacted]

Signatures of ~~all~~ residence owner(s) on title

PAUL TOMASZEWSKI

Printed names of **all** residence owner(s) on title

Date: JAN 30 2024



ENVIROWEST ENGINEERING

Title:

Area/Large Scale Plan
Part II Technical Requirements
Warren Crow
NE-14-49-2-W5M
Leduc County, Alberta

Project No: 2401-43049	**Date:** May 14, 2024	**Figure No.:** 1.0
Scale:	**Prepared By:** L. Predy	
Image Source: Google Earth Pro (2024)		

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

ALL SIGNATURES IN FILE ☑ YES ☐ NO

DATES OF APPROVAL OFFICER SITE VISITS

Sept. 17, 2024	
Jan. 9, 2025	

CORRESPONDENCE WITH MUNICIPALITIES AND REFERRAL AGENCIES

Date deeming letters sent: October 11, 2024

Municipality: Leduc County

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

Alberta Health Services: N/A

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

Alberta Environment and Parks: ☐ N/A

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

Alberta Transportation: ☑ N/A

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

Alberta Regulatory Services: ☑ N/A

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

Other: _____ ☐ N/A

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

Other: _____ ☐ N/A

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

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)

RUNOFF CONTROL CATCH BASIN: Compacted soil liner

*(complete a copy of this section for **EACH proposed** runoff control catch basin with a compacted soil liner)*

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

1. Proposed Catch Basin
2. _____
3. _____

Determination of runoff area

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

Please see attached Site and Soil Assessment, Section 5.2 (Envirowest, 2024).

Catch basin capacity

	Length (m)	Width (m)	Depth (m)	Depth below ground level (m)	Slope run:rise			NRCB USE ONLY
					Inside end walls	Inside side walls	Outside walls	Calculated storage capacity (excl. 0.5 m freeboard) (m^3)
1.	54	54	7	7	3:1	3:1	4:1	
2.								
3.								
							TOTAL CAPACITY	7,274 m3

Compacted soil liner details

Thickness of compacted soil liner	0.6 (m)	Provide details (as required): Native clay beneath topsoil to a depth of 3.0 was deemed suitable for a compacted liner.	
Soil texture	33 % sand	28 % silt	38 % clay
Atterberg limits	Plastic limit 13.21%	Liquid limit 44.21%	Plasticity index 31.00%
Hydraulic conductivity	Hydraulic conductivity (cm/s): 3.2x10^-8		
	Describe test standard used: Flexible Wall Permeameter (ASTM D5084-10)		

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

NRCB USE ONLY

Requirements met: ☑ YES ☐ NO

Condition required: ☑ YES ☐ NO

Report attached: ☑ YES ☐ NO

RUNOFF CONTROL CATCH BASIN: Compacted soil liner (cont.)

NRCB USE ONLY

Catch basin calculator (calculation attached). Total volume @ freeboard: 7274 m3

Runoff capacity requirements met: ☑ YES ☐ NO

Calculation of the volume attached: ☑ YES ☐ NO

Depth to water table: 4.5 m - >9 m Requirements met: ☑ YES ☐ NO

Depth to Uppermost Groundwater Resource: 27.43 m Requirements met: ☑ YES ☐ NO

ERST completed: ☑ see ERST page for details

Liner specification comments (e.g. compaction required, moisture content, thickness):

Construction completion report for catch basin to be submitted.
During my site visit on September 19, 2024 a borrow pit had been dug approximately 7-8 m deep and I didn't observe any obvious signs of a water table, however, a water table condition will be included as the watertable can vary over time.

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)

NRCB USE ONLY **RUNOFF CONTROL CATCH BASIN CAPACITY SUMMARY (if applicable)**	
Facility 1	
Name / description Catch basin	Capacity 7,274 m3
Facility 2	
Name / description	Capacity
Facility 3	
Name / description	Capacity
Facility 4	
Name / description	Capacity
TOTAL CAPACITY	7, 274 m3
RUNOFF VOLUME FROM CONTRIBUTING AREAS	6,769 m3
MEETS AOPA RUNOFF CONTROL VOLUME REQUIREMENTS	☑ YES ☐ NO

Catch Basin Storage Volume Calculator

Construction Dimensions of Catch Basin

*** Only cells in blue can be changed.**

Overall Dimensions of Catch Basin			Catch Basin Dimensions	
Total Length*[4]	54.0	m	177	ft
Total Width*[4]	54.0	m	177	ft
Total Depth*[4]	7.0	m	23	ft
Design Capacity Depth	*6.50*	m	21	ft
End Slope*[4]	3	run:rise	3	run:rise
Side Slope*[4]	3	run:rise	3	run:rise
Length of Bottom	12.0	m	39	ft
Width of Bottom	12.0	m	39	ft
Capacity @ top of Bank	*8,652*	m^3	*Capacity (@tob)* *305,542*	ft^3
			1,903,173	*Imp. Gal.*

Design Capacity of Catch Basin (freeboard level)			Design Capacity (freeboard level)	
Length (design capacity depth)	51.0	m	167	ft
Width (design capacity depth)	51.0	m	167	ft
Total Depth	*7.0*	m	23	ft
Design Capacity Depth	6.50	m	21	ft
End Slope	3	run:rise	3	run:rise
Side Slope	3	run:rise	3	run:rise
Design Capacity (freeboard level)	**7,274**	m^3	**256,861**	ft^3
			1,599,946	**Imp. Gal.**
level)	*2,601*	m^2	*27,997*	ft^2

CFO Name [1]	Crow
Land Location [1]	NE 14-49-2 W5

Paved Runoff Catchment Area(s)

Area [2]	Length (m)	Width (m)	Area (m^2)
1	475	75	35,625.0
2	475	75	35,625.0
3			0.0
4			0.0
5			0.0
		Total Area (m^2)	**71,250**

Unpaved Runoff Catchment Area(s)

Area [2]	Length (m)	Width (m)	Area (m^2)
6			0.0
7			0.0
8			0.0
9			0.0
10			0.0
		Total Area (m^2)	**0**

Rainfall (Select Town [3])

Calmar 95

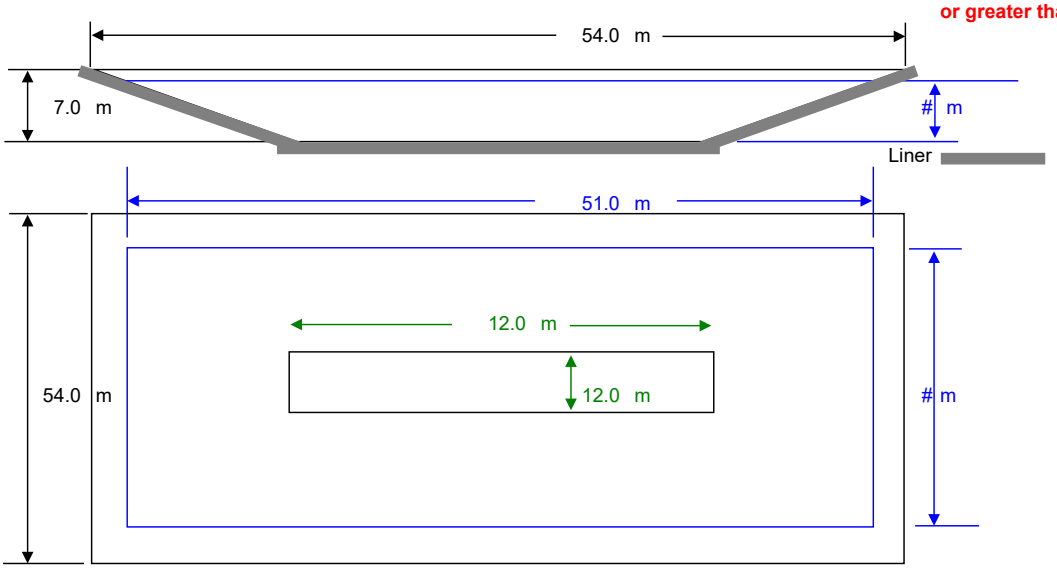
AOPA Design Rainfall **95 mm**

Minimum Catchbasin Storage Volume Required

6,769 m^3 ** **239036.15 ft^3**

1488916.3 Imp. Gal.

**** Design capacity of catch basin should be equal to or greater than, minimum storage volume required.**



Lines in Black - Overall catch basin dimensions

Lines in Blue - Design capacity depth dimensions (excludes freeboard)

NTS - Not To Scale

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

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

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

1. Current Pens (Row 1)
2. Proposed Pens (Row 2)

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.	475	75	0.3	
2.	375	75	0.3	
			TOTAL CAPACITY	

Adequate storage for solid manure on site

☐ 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

Impacted run-off from the current pens will be directed to an alley to the east, which will direct the run-off toward the proposed catch basin. The proposed pens will be contoured with a minimum 1% slope to direct impacted runoff towards the proposed catch basin.

Unimpacted run-on and run-off onto the east side of the property (graveled area) will be directed north, to the dugout.

Construction of berms around the catch basin will prevent unimpacted run-off from entering.

Liner protection

Describe how the physical integrity of the liner will be maintained

The current pens have a roller compacted concrete cap above the compacted clay liner, which ensures that the integrity of the clay liner is maintained.

NRCB USE ONLY

Requirements met: ☑ YES ☐ NO

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

Compacted soil liner details

Thickness of compacted liner	0.5 m thick pen liner 0.3 (or 0.5) (m)	Provide compacted liner details (as required) Native clay beneath topsoil to a depth of 3.0 m was deemed suitable for a compacted liner. This material (clay loam) had an average clay content of 33.6% (31-38% range).	
Soil texture	33 % sand	28 % silt	38 % clay
Atterberg limits	Plastic limit 13.21%	Liquid limit 44.21%	Plasticity index 31.00%
Hydraulic conductivity	Hydraulic conductivity (cm/s) 3.2x10^-8		
	Describe test standard used Flexible Wall Permeameter (ASTM D5084-10)		

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

NRCB USE ONLY

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

NRCB USE ONLY

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

Depth to water table: 4.5 m - >9 m — Requirements met: ☑ YES ☐ NO

Depth to uppermost groundwater resource: 27.43 m — Requirements met: ☑ YES ☐ NO

ERST completed: ☑ see ERST page for details

Surface water control systems

Requirements met: ☑ YES ☐ NO Details/comments:

Catch basin used to control all runoff from faciltiies.

Compacted soil liner details

Hydraulic conductivity after adjustment: 3.2 x 10-7 cm/sec

Liner specification comments (e.g. compaction, moisture content, thickness):

Compacted liner. Condition for construction completion report and water table condition will be included.
Source clay is on site and will be recompacted for both the catch basin and pens. Borehole logs indicate consistent clay found over area adequate volume to recompact for facilties.
Applicant will be installing RCC on top of pens adding a degree of protection and integrity to pen liner. Existing row 1 was constructed with proper construction practices and an RCC liner has been installed. I did not see any visual integrity issues during site visits.

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

ENVIROWEST
ENGINEERING

SITE AND SOIL ASSESSMENT

Proposed Pens (Solid Manure Storage) and Catch Basin
NE¼-14-049-02-W5M

Leduc County, Alberta

Site and Soil Assessment
Proposed Pens (Solid Manure Storage) and Catch Basin
NE¼-14-049-02-W5M
Leduc County, Alberta

Prepared For: Warren Crow
Crow Farms and Ranches Ltd.

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

Report Date: July 17, 2024

Project Number: 2401-43049

Private and Confidential

Table of Contents

List of Tables

Appendices

1.0 Introduction and Scope of Work

Envirowest Engineering (Envirowest) was retained by Warren Crow of Crow Farms and Ranches Ltd. to conduct a Site and Soil Assessment for the proposed construction of pens for 3600 finishers. The assessment included proposed solid manure storage and a catch basin.

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 NE-14-049-02-W5M in Leduc County, as shown on Figure 1.0.

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 9.0 m below ground surface (mbgs) on January 23, 2024. The boreholes were completed in the area proposed for manure storage (solid) and the catch basin. Boreholes were also completed along the south and west portion of the current pens. The current pens were reportedly constructed with a compacted clay base and surfaced with roller compacted concrete. The borehole locations are shown on Figure 2.0 (attached).

2.0 Assessment Results

The Site is generally level, but slopes slightly to the north. The Site is currently in pasture or utilized as pens. The current pens are constructed with a compacted clay base and a surfaced with roller compacted concrete (RCC). Envirowest is not considering the RCC to be utilized as the protective barrier at this time. Assessment of the surfacing was not completed.

Five investigative boreholes were drilled using a truck-mounted rotary auger and completed to a maximum depth of 9.0 mbgs on January 23, 2024. Potential liner material (clay loam) was found beneath topsoil at depths between 2.5 and 9.0 mbgs (depth of investigation). Bedrock was not encountered to the maximum depth of investigation.

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 2.0, and borehole logs are attached.

Table 1: Soil Properties Results

Parameter	Sand (%)	Silt (%)	Clay (%)	Soil Texture	Laboratory Hydraulic Conductivity (cm/sec)
24BH01-01	27	26	47	Clay	-
24BH01-02	3	30	67	Heavy Clay	-
24BH01-03	13	26	61	Heavy Clay	-
24BH02-01	41	26	33	Clay Loam	-
24BH02-02	41	26	33	Clay Loam	-
24BH02-03	42	27	31	Clay Loam	-
24BH03	33	28	38	Clay Loam	3.2×10^{-8}
24BH04-01	3	32	65	Heavy Clay	-
24BH05-01	39	28	33	Clay Loam	-

The soils were identified as clay loam and heavy clay. The suspected compacted liner material (clay loam) had an average clay content of 33.6% ranging from 31-38%.

The soils identified as a clay loam with a clay content of 38%. The hydraulic conductivity was determined to be 3.2×10^{-8} cm/sec at 98% compaction. The maximum dry density was found to be 1,820 kg/m^3 with an optimum moisture content of 15%.

Conservatively a safety factor of 10 is to be applied to the hydraulic conductivity based on the NRCB Approvals Policy (2016-7), Section 8.7.2, stating "lab measurements of a sample of material taken from the field are not considered an accurate representation of the actual field hydraulic conductivity values. This is because of the potential variability of soils, differences in compaction methods and variances in compaction." The field hydraulic conductivity of the composite material tested is 3.2×10^{-7} cm/sec.

3.0 Liner Assessments

3.1 Compacted Earthen Liner Assessment (Solid Manure Storage)

Based on the information obtained it was determined that the native clay beneath topsoil, found to a depth of 3.0 meters, is suitable for a compacted liner.

Minimum Required Liner Thickness for Solid Manure Storage:

$$\frac{0.5 \text{ m}}{5 \times 10^{-7} \text{ cm/sec}} = \frac{\mathbf{X} \text{ m}}{3.2 \times 10^{-7} \text{ cm/sec}}$$

$$\mathbf{X} = 0.32 \text{ m}$$

A minimum compacted liner thickness of 0.3 meters is required to provide protection. However, if RCC is not used as a surface, a compacted liner thickness of 0.5 meters is required.

3.2 Compacted Earthen Liner Assessment (Catch Basin)

Based on the information obtained it was determined that the native clay beneath topsoil, found to a depth of 3.0 meters is suitable for a compacted liner.

Minimum Required Liner Thickness for Catch Basin:

$$\frac{1 \text{ m}}{5 \times 10^{-7} \text{ cm/sec}} = \frac{\mathbf{X} \text{ m}}{3.2 \times 10^{-7} \text{ cm/sec}}$$

$$\mathbf{X} = 0.62 \text{ m}$$

A compacted liner thickness of 0.6 meters is required within the catch basin.

4.0 Conclusions

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

The soils found below topsoil, clay loam, were found to be suitable for a compacted clay liner for solid manure storage and as a catch basin.

5.0 Design and Construction Considerations

5.1 Solid Manure Storage

Pens that are currently in place are reportedly a compacted clay subgrade with a surface of roller compacted concrete. The compaction results for the clay subgrade are attached. The field density results indicate a minimum 98% compaction based on the original proctor. The results also meet a 97 to 98% compaction based on the proctor analysis for the material analyzed within this assessment.

The proposed pen areas will require a minimum 0.5 meter liner if RCC is not used. The proposed pens should slope at a minimum 1.0% towards the catch basin.

5.2 Catch Basin Sizing

Surface Run-off Area

The proposed area of contributing run-off, as shown on Figure 2.0, is 70,125 m^2. The runoff coefficient for the contributing area will be calculated assuming that RCC is in place.

The volume of the catch basin is recommended to have a total storage capacity of 7,015 m^3, based on Calmar precipitation data.

- To provide the required capacity the catch basin should be 54 m in length x 54 m in width. The overall depth has been designed as 7.0 m. The overall capacity will be 8,652 cubic metres (1.9 million imperial gallons) which accounts for the required 0.5 m of freeboard, a storage capacity of 7,273 cubic metres. The sizing is based on an inside end and side wall slope of 3:1 (run/rise).
- The overall depth of 7.0 m will be achieved through a below grade depth of 7.0 m. Above-grade dykes will be required on the north portion of the catch basin to ensure unimpacted runoff does not enter the catch basin.
- The below-grade depth of the catch basin must maintain a minimum of a 1.0 m separation above the water table at the time of construction, should one be encountered

6.0 Earthen Liner Construction

- Construction of the clay liner should be completed in approximately 0.15 m lifts. Preferably, compaction of each lift will be undertaken with a padfoot roller, or the like. The equipment being used for soil compaction must fully penetrate each lift. Each lift should be compacted to not less than 97 percent Standard Proctor Dry Density prior to addition of the subsequent lift
- The soil should be within 2 percent of the optimum moisture (15%) as determined by a Standard Proctor Maximum Dry Density to ensure the lowest possible hydraulic conductivity for the completed liner
- 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
- 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 outside dyke walls should be covered with 0.1-0.2 m of topsoil and seeded to prevent soil erosion.

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

- The topsoil 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.
- If a sand or gravel seam is encountered that is large enough to alter the location of the facility, the NRCB approval officer and engineer should be contacted.
- Construction 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 on or near the walls of the facility.

7.0 Closure

Envirowest Engineering is pleased to submit the report to Warren Crow of Crow Farms and Ranches Ltd. 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,

PROFESSIONAL ENGINEER ALBERTA
EMILY J. LOW

2024-07-17

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

July 17, 2024

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

PERMIT TO PRACTICE
2206165 ALBERTA LTD.
RM SIGNATURE:
RM APEGA ID #: 110373
DATE: July 17, 2024
PERMIT NUMBER: P014810
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)

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

8.0 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).

9.0 References

GOA (Government of Alberta). (November 2022). Agricultural Operation Practices Act and Regulations. Edmonton, AB: Author.

GOA (Government of Alberta). (December 2020). Agricultural Operation Practices Act: Standards and Administration Regulation. Edmonton, AB: Author.

Appendix A

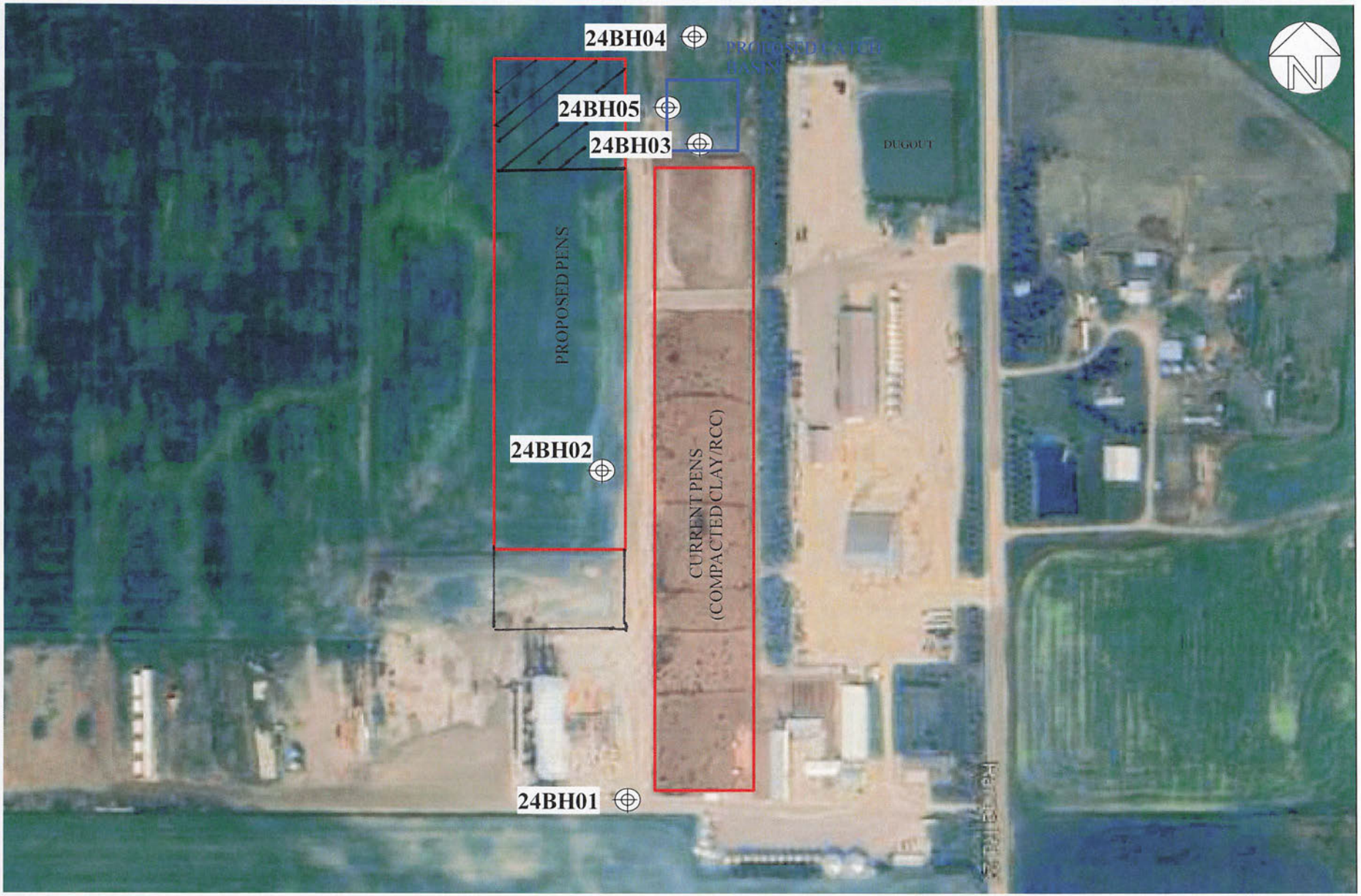
Figures

ENVIROWEST ENGINEERING

Title:

Site Location
Site and Soil Assessment
NE¼-Sec.14-Twp.049-Rge.02-W5M
Leduc County, Alberta

Project No: 2401-43049	**Date:** May 7, 2024	**Figure No.:** 1.0
Scale:	**Prepared By:** L. Predy	
Image Source: Google Earth Pro (February 22, 2024)		



ENVIROWEST ENGINEERING

Title:

Borehole Locations
Site and Soil Assessment
NE¼-Sec.14-Twp.049-Rge.02-W5M
Leduc County, Alberta

Project No: 2401-43049	**Date:** May 7, 2024
Scale:	**Prepared By:** L. Predy
Image Source: Google Earth Pro (February 22, 2024)	

Figure No.: **2.0**

Appendix B

Borehole Logs

ENVIROWEST ENGINEERING

LOG OF BORING 24BH01

Site and Soil Assessment
NE1/2-Sec.14-Twp.049-Rng.02-W5M
Leduc County, Alberta

Project Number: 2401-43049

Driller: : Evergreen Drilling
Drilling Method: : Truck Mounted Auger
Drill Date : January 23, 2024
Logged By: : Emily Low P.Eng.

Well:
Elev.:

Depth in Meters	Gastech Reading (ppm) 0 100 200 300 400 500	VOC Reading	GRAPHIC	DESCRIPTION	Water Level
0.0				SANDY CLAY (CLAY), coal inclusions, olive brown, mottling, crumbly, medium plasticity, damp	
0.3					
0.5					
0.8					
1.0					
1.3				24BH01-01	
1.5					
1.8					
2.0					
2.3					
2.5					
2.8				SILTY CLAY (HEAVY CLAY), light brown, firm, damp	
3.0				24BH01-02	
3.3					
3.5				very hard	
3.8				24BH02-03	
4.0					
4.3					
4.5					

07-17-2024 Z:\Operations\Client Data\43049 Warren Crow\Site and Soil Assessment\24BH01.bor

ENVIROWEST ENGINEERING

LOG OF BORING 24BH02

(Page 1 of 1)

Site and Soil Assessment
NE1/2-Sec.14-Twp.049-Rng.02-W5M
Leduc County, Alberta

Project Number: 2401-43049

Driller: : Evergreen Drilling
Drilling Method: : Truck Mounted Auger
Drill Date : January 23, 2024
Logged By: : Emily Low P.Eng.

Depth in Meters	Gastech Reading (ppm) 0 100 200 300 400 500	VOC Reading	GRAPHIC	DESCRIPTION	Well: Elev.:	Water Level
0.0				SANDY CLAY (CLAY LOAM), coal inclusions, olive brown, mottling, medium plasticity, damp		
0.3				24BH02-01		
0.5						
0.8						
1.0						
1.3						
1.5						
1.8				24BH02-02		
2.0						
2.3						
2.5						
2.8						
3.0						
3.3				24BH02-03		
3.5						
3.8						
4.0						
4.3						
4.5						

07-17-2024 Z:\Operations\Client Data\43049 Warren Crow\Site and Soil Assessment\24BH02 bor

ENVIROWEST ENGINEERING

LOG OF BORING 24BH03

(Page 1 of 1)

Site and Soil Assessment
NE1/2-Sec.14-Twp.049-Rng.02-W5M
Leduc County, Alberta

Project Number: 2401-43049

Driller: : Evergreen Drilling
Drilling Method: : Truck Mounted Auger
Drill Date : January 23, 2024
Logged By: : Emily Low P.Eng.

Well:
Elev.:

Depth in Meters	Gastech Reading (ppm) 0 100 200 300 400 500	VOC Reading	GRAPHIC	DESCRIPTION	Water Level
0.0				SANDY CLAY (CLAY LOAM), olive brown, firm, damp	
0.3					
0.5				24BH03 (0.25 to 2.5m)	
0.8					
1.0					
1.3					
1.5					
1.8					
2.0					
2.3					
2.5					
2.8				wet pockets	
3.0					
3.3					
3.5					
3.8					
4.0					
4.3					
4.5					
4.8					
5.0					
5.3					
5.5					
5.8					
6.0					
6.3					
6.5					
6.8					
7.0					
7.3					
7.5					
7.8					
8.0					
8.3					
8.5					
8.8					
9.0					

07-17-2024 Z:\Operations\Client Data\43049 Warren Crow\Site and Soil Assessment\24BH03.bor

ENVIROWEST ENGINEERING

LOG OF BORING 24BH04

(Page 1 of 1)

Site and Soil Assessment
NE1/2-Sec.14-Twp.049-Rng.02-W5M
Leduc County, Alberta

Project Number: 2401-43049

Driller: : Evergreen Drilling
Drilling Method: : Truck Mounted Auger
Drill Date : January 23, 2024
Logged By: : Emily Low P.Eng.

Well:
Elev.:

Depth in Meters	Gastech Reading (ppm) 0 100 200 300 400 500	VOC Reading	GRAPHIC	DESCRIPTION	Water Level
0.0				SILTY CLAY (HEAVY CLAY), firm, damp	
0.3				24BH04-01	
0.5				SANDY CLAY (CLAY LOAM), firm, damp, olive brown	
0.8					
1.0					
1.3					
1.5					
1.8					
2.0					
2.3					
2.5					
2.8					
3.0					

07-17-2024 Z:\Operations\Client Data\43049 Warren Crow\Site and Soil Assessment\24BH04.bor

ENVIROWEST ENGINEERING

LOG OF BORING 24BH05

Site and Soil Assessment
NE1/2-Sec.14-Twp.049-Rng.02-W5M
Leduc County, Alberta

Project Number: 2401-43049

Driller: : Evergreen Drilling
Drilling Method: : Truck Mounted Auger
Drill Date : January 23, 2024
Logged By: : Emily Low P.Eng.

Depth in Meters	Gastech Reading (ppm) 0 100 200 300 400 500	VOC Reading	GRAPHIC	DESCRIPTION	Well: Elev.:	Water Level
0.0				SANDY CLAY (CLAY LOAM), firm, damp		
0.3						
0.5				24BH05-01		
0.8						
1.0						
1.3						
1.5						
1.8						
2.0						
2.3				sand pocket for 0.7 m		
2.5						
2.8						
3.0						

07-17-2024 Z:\Operations\Client Data\43049 Warren Crow\Site and Soil Assessment\24BH05.bor

Appendix C

Certificate of Analysis

AGAT Laboratories

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

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

ATTENTION TO: Emily Low

PROJECT: 43039

AGAT WORK ORDER: 24R117596

SOIL ANALYSIS REVIEWED BY: Max Dou, Report Writer

DATE REPORTED: Feb 11, 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 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

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http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 24R117596

PROJECT: 43039

CLIENT NAME: ENVIROWEST

ATTENTION TO: Emily Low

SAMPLING SITE:

SAMPLED BY:

Particle Size - Texture

DATE RECEIVED: 2024-02-03 **DATE REPORTED: 2024-02-11**

		SAMPLE DESCRIPTION:		24BH01- 01	24BH01- 02	24BH01- 03	24BH02- 01	24BH02- 02	24BH02- 03	24BH04- 01	24BH05- 01
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:									
Parameter	Unit	G / S	RDL	5625379	5625380	5625381	5625382	5625383	5625384	5625385	5625386
Particle Size Distribution (Sand)	%		2	27	3	13	41	41	42	3	39
Particle Size Distribution (Silt)	%		2	26	30	26	26	26	27	32	28
Particle Size Distribution (Clay)	%		2	47	67	61	33	33	31	65	33
Soil Texture				Clay	Heavy Clay	Heavy Clay	Clay Loam	Clay Loam	Clay Loam	Heavy Clay	Clay Loam

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

5625379-5625386 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:

AGAT Laboratories

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

Quality Assurance

CLIENT NAME: ENVIROWEST

PROJECT: 43039

SAMPLING SITE:

AGAT WORK ORDER: 24R117596

ATTENTION TO: Emily Low

SAMPLED BY:

Soil Analysis

RPT Date:			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)	5625383	5625383	41	40	2.5%	< 2	113%	80%	120%						
Particle Size Distribution (Silt)	5625383	5625383	26	26	0.0%	< 2	93%	80%	120%						
Particle Size Distribution (Clay)	5625383	5625383	33	34	3.0%	< 2	89%	80%	120%						

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

Certified By:

AGAT Laboratories

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

Method Summary

CLIENT NAME: ENVIROWEST

AGAT WORK ORDER: 24R117596

PROJECT: 43039

ATTENTION TO: Emily Low

SAMPLING SITE:

SAMPLED BY:

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

AGAT Laboratories
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: 24B117596

Chain of Custody Record

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

Report Information
Company: Enviroest Engineering
Contact: Emily Low
Address:
Phone:

Project Information
Client Project #: 43039
Site Location:
Sample By:
AGAT Quote #:
If a quotation number is not provided, client will be billed at standard rates. See terms and conditions of quote for full details.

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

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

Requirements *(Selection may impact detection limits)*

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

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

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

LAB USE (LAB ID #)	SAMPLE IDENTIFICATION	DEPTH	DATE/TIME SAMPLED	SAMPLE MATRIX	COMMENTS	# OF CONTAINERS: VIALS / JARS	BAGS	BOTTLES
1	24BH01-01			Soil			1	
2	24BH01-02						1	
3	24BH01-03						1	
4	24BH02-01						1	
5	24BH02-02						1	
6	24BH02-03						1	
7	24BH04-01						1	
8	24BH05-01						1	
9								
10								

Field Filtered (Y/N)	Preserved (Y/N)	Detailed Salinity: ☐ AB ☐ SK ☐ BC ☐ D50	☐ CCME/AB : BTEX/F1-F4 ☐ CCME/AB : BTEX /F1-F2	☐ BC: BTEX/VPH/EPH ☐ BC: LEPH/HEPH	SK: BTEX/TVH/C11-C22, C23-C60	Soil Metals: ☐ HWS-B ☐ SP-B ☐ Hg ☐ Cr^{6+}	Water Metals: ☐ Dissolved ☐ Total ☐ Hg ☐ Cr^{6+}	Routine Water Chemistry	Landfill: ☐ AB Class 2 ☐ BC ☐ SK	Coliforms: ☐ Total ☐ Fecal ☐ E.coli	Particle Size: ☐ Sieve (75µm) ☒ Texture			Hold For 30 Days No Analysis (Additional Fee)	Long Term Storage - 6 Months	Long Term Storage - 1 Year	Hazardous (Y/N)
											X						
											X						
											X						
											X						
											X						
											X						
											X						
											X						

Samples Relinquished By (Print Name and Sign): Emily Low — Date/Time: Feb 2/24 12:00 — Samples Received By (Print Name and Sign): M Larson — Date/Time: Feb 2/24
Samples Relinquished By (Print Name and Sign): — Date/Time: — Samples Received By (Print Name and Sign): John Capam — Date/Time: Feb 3, 2024 15:
Samples Relinquished By (Print Name and Sign): — Date/Time: — Samples Received By (Print Name and Sign): — Date/Time:

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

Page 1 of 1
N°: AB 180817

Document ID: DIV-50-3507-007
Date Revised: Oct 14, 2021

AGAT Laboratories

SAMPLE INTEGRITY RECEIPT FORM

RECEIVING BASICS - Shipping

Company/Consultant: Enviro West

Courier: Jazoo 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)___+___+___=____°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: 24R117596

Samples Damaged: Yes No If YES why?

No Bubble Wrap Frozen Courier

Other:

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

Whom spoken to: Date/Time:

CPM Initial

General Comments:

* Subcontracted Analysis (See CPM)

Date issued: March 11, 2020

JAZOO EXPRESS COURIER Ltd.

CLIENT USE ONLY

Contact Name:	melissa	Contact Location:	AGAT RED DEER	Billed to:	AGAT
Date:	Feb 2/24	Delivery From:	Agat,#12-7471 Edgar Industrial Bend		
		Delivery To:	AGAT, 2910 12TH ST. NE CALGARY		
Total Items:	3+1	Item Description: envelope, sm/med/lg box, cooler, etc.	EnviroWest. 3 coolers 1 LG COOLER		
			Job/PO/Reference #:		
Authorized Shipper Signature:			M Larson		

DRIVER USE ONLY

J Driver lame:	[illegible]	P/U Time:	am	D/O Time:	5-30 am
Items P/U:	4		11:55 pm		pm
	Overweight		TDG		

Total # items dropped Off:	4	D/O Driver Name:	[illegible]
Authorized Receiver Signature:			

HOTSHOT DETAILS

al Km:		Or Total Charge ($):	

OFFICE USE ONLY

rified By:		Invoiced By:	

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

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

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

Page 7 of 7

Laboratory Proctor — Sample No.: W381

Sample Information

Date:	02-Feb-24	**By:**	E.L.	**of:**	Envirowest	**Type:**	Pail
Location:	Warren Crow					**Natural Moisture:**	18.7 %
Description:	Clay						

Specfication: ASTM D 698 - Method A

Comments: Project No. 43049

Proctor Results:

Test Number	1	2	3	4	5
Dry Density (Kg/m^3)	**1740**	**1811**	**1812**	**1758**	**1695**
Moisture Content (%)	**11.8**	**13.7**	**15.8**	**18.0**	**19.5**

Oversize Correction (Calculated using assumed Specific Gravity of 2.40)

Oversize (%)	5	10	15	20	25
Density	**1847**	**1875**	**1902**	**1929**	**1957**

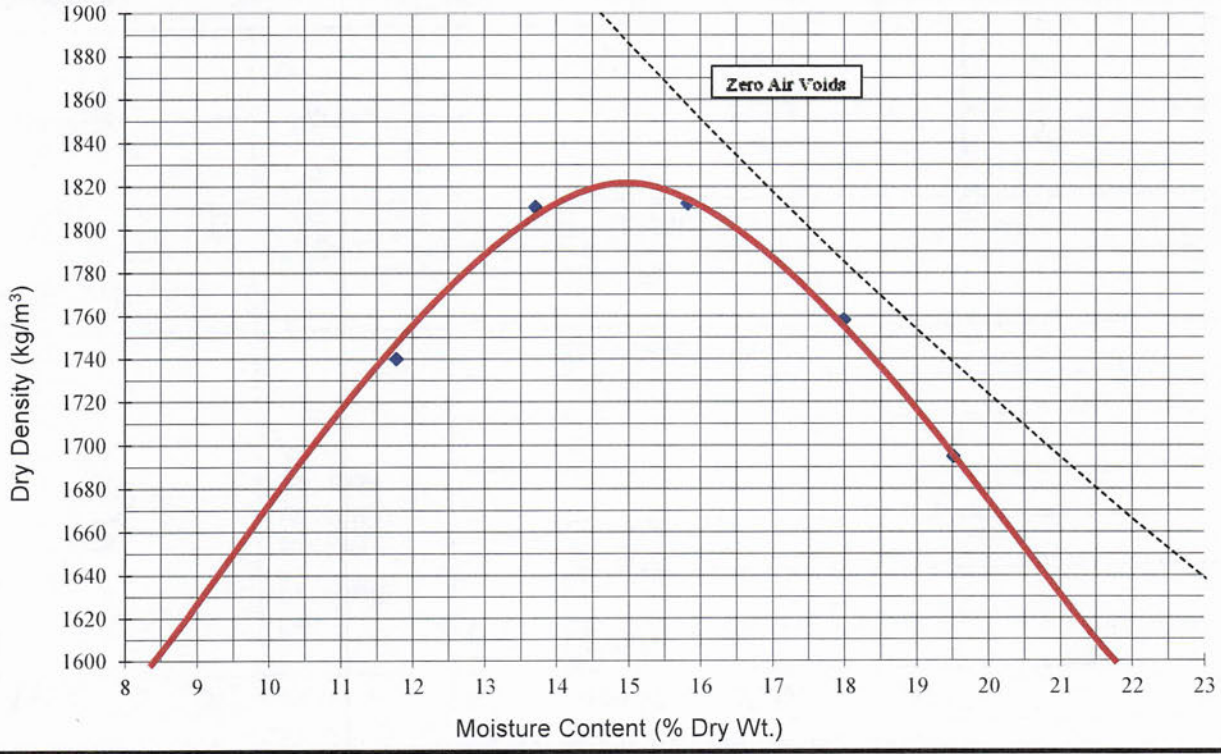
Optimum Results:

Moisture Content = **15.0** %

Dry Density = **1820** Kg/m^3

Corrected Density = **1823** Kg/m^3

Oversize Material = **0.6** %



Union Street Geotechnical

CLIENT:	Envirowest	**FILE No.:**	USG1826
PROJECT:	Geotech. Inv.	**DATE:**	07-Feb-24
LOCATION:	Red Deer, Alberta	**TECH:**	D.J.W.

Laboratory Hydrometer — Sample No.: W381

Sample Information

Date: 02-Feb-24 **By:** E.L. **of:** Envirowest **Type:** Pail / Bag

Location: Warren Crow **Specification:** ASTM D 422

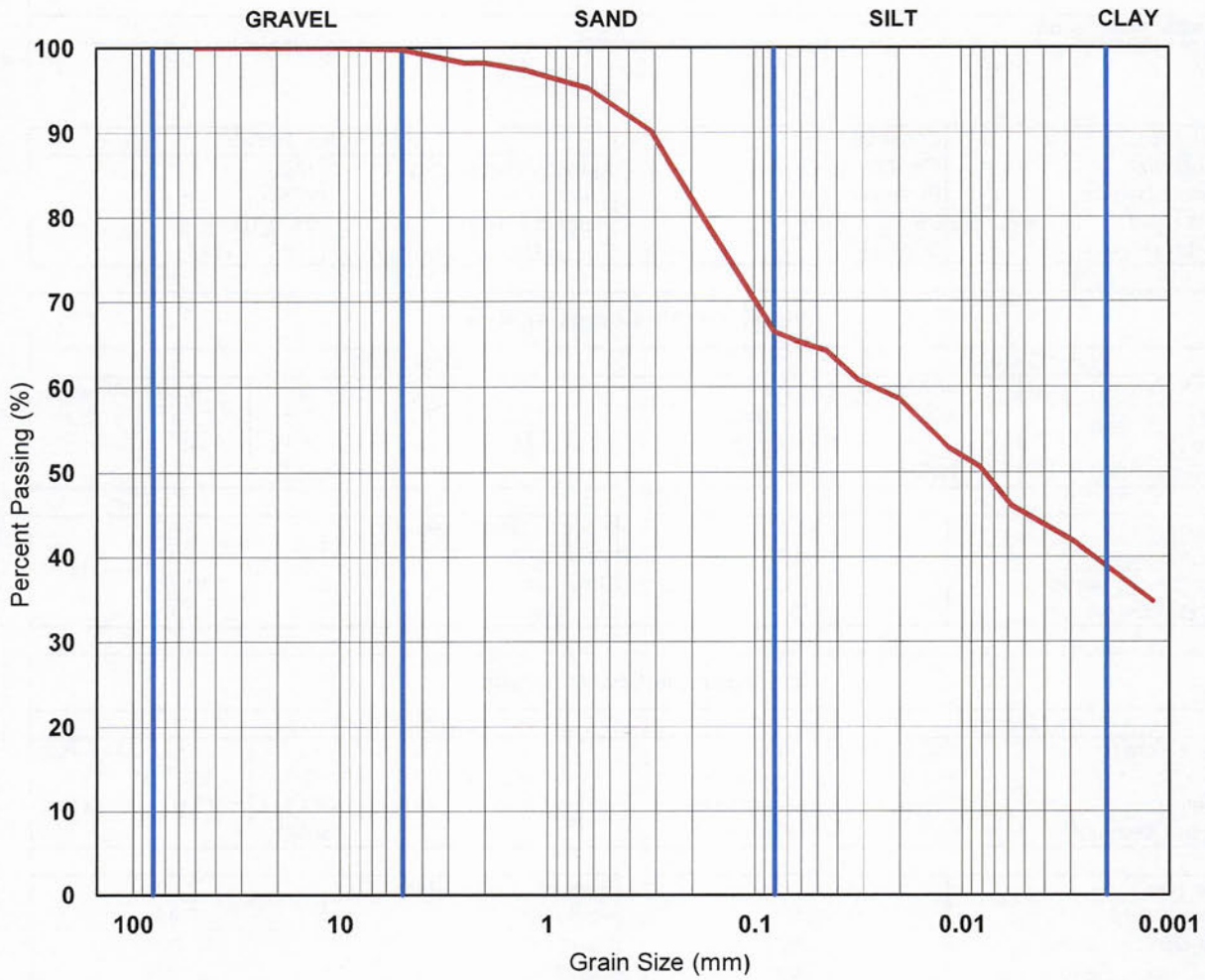
Description: Clay, Sandy, Silty, Gravel inclusions

Specifications: Laboratory Specifications as per ASTM D 422.

Comments: Project No. 43049

Sieve Results:

By Type (%): Gravel = **0.2** Sand = **33.4** Silt = **28.3** Clay = **38.1**



Union Street Geotechnical

CLIENT:	Envirowest	**FILE No.:**	USG1826
PROJECT:	Geotech. Inv.	**DATE:**	09-Feb-24
LOCATION:	Red Deer, Alberta	**TECH:**	G.S.

Project Name:	2024 Geotechnical Inv.	Depth:	
Project Number:	USG1826	Testing Company:	Union Street Geo.
Client:	Envirowest	Field Technician:	E.L0
Testhole:		Sample Date:	2nd February, 2024
Location:	Warren Crow	Lab Technician:	B.B.
Sample Number:	W381	Date Tested:	16th February, 2024

Flexible Wall Permeameter (ASTM D5084-10)

Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

Material and Test Description

Material Description:

Clay

Test Type:	Constant Head
Mould Size:	Flexible Wall
Sample Source:	Re-moulded
Fluid Used:	Deaired Water
Fluid Reservoir:	Burrettes

Remoulding Details	
Max Dry Density (kg/m^3):	1820
Proctor ID:	W381
Percent Max (%):	98 to 100%
Target Dry Density (kg/m^3):	1786 to 1823

Initial Sample Characteristics

Water Content	
Wet + Tare (g):	467.3
Dry + Tare (g):	403.4
Tare (g):	12.0
Water Content (%):	16.3%

Sample Size					
Trial	1	2	3	4	Average
Diameter (mm):	72.8	73.2	73.4	73.1	73.1
Length (mm):	74	74.1	74.1	74	74.1
Weight (g)			646.2		

Area (cm^2):	42.0
Volume (cm^3):	311.0
Wet Density (kg/m^3):	2078
Dry Density (kg/m^3):	1786

Specific Gravity (Note 2):	2.62
Void Ratio:	0.47
Saturation:	91.6%
Porosity:	31.8%

Final Sample Characteristics

Water Content	
Wet + Tare (g):	663.6
Dry + Tare (g):	562.0
Tare (g):	12.3
Water Content (%):	18.5%

Sample Size					
Trial	1	2	3	4	Average
Diameter (mm):	73.3	73.2	73.7	73.1	73.3
Length (mm):	73.8	73.6	73.8	73.9	73.8
Weight (g)			651.6		

Area (cm^2):	42.2
Volume (cm^3):	311.5
Wet Density (kg/m^3):	2092
Dry Density (kg/m^3):	1765

Specific Gravity (Note 1):	2.62
Void Ratio:	0.48
Saturation:	100.0%
Porosity:	32.6%

Note 1: Specific gravity for final sample characteristics calculation adjusted to result in 100.0% saturation.
Note 2: Specific gravity for initial sample characteristics calculation set equal to that of the final.

Project Name:	2024 Geotechnical Inv.	Depth:	
Project Number:	USG1826	Testing Company:	Union Street Geo.
Client:	Envirowest	Field Technician:	E.L.
Testhole:		Sample Date:	2nd February, 2024
Location:	Warren Crow	Lab Technician:	B.B.
Sample Number:	W381	Date Tested:	16th February, 2024

Flexible Wall Permeameter (ASTM D5084-10)

Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

Saturation Data

Cell Pressure (kPa):	160.0	Top Pressure (kPa):	130.0
Bottom Pressure (kPa):	130.0	Pressure Difference (kPa):	-

Date & Time	Elapsed Time (Days)	Room Temp (°C)	Top Burret (mL)	Bottom Burret (mL)	Cell (mL)	Total Vol. Change (mL)	Volume Strain (%)
2/16/24 12:53	0.00	20.0	4.2	3.8	18.4	0	0.00%
2/17/24 7:40	0.78	20.0	4.2	3.7	19.2	-0.67	-0.22%
2/18/24 7:15	1.77	20.0	4.2	3.7	19.4	-0.83	-0.27%
2/19/24 7:43	2.78	20.0	4.2	3.7	19.7	-1.14	-0.37%
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
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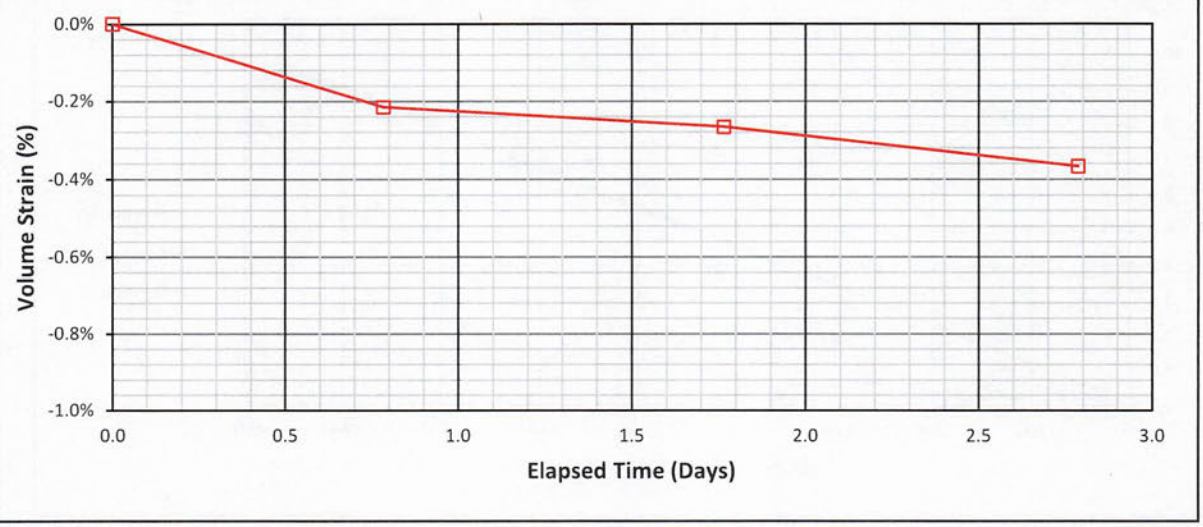

Project Name:	2024 Geotechnical Inv.	Depth:	
Project Number:	USG1826	Testing Company:	Union Street Geo.
Client:	Envirowest	Field Technician:	E.L.
Testhole:		Sample Date:	2nd February, 2024
Location:	Warren Crow	Lab Technician:	B.B.
Sample Number:	W381	Date Tested:	16th February, 2024

Flexible Wall Permeameter (ASTM D5084-10)

Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

Permeation Data

Cell Pressure (kPa):	160.0	Top Pressure (kPa):	120.0
Bottom Pressure (kPa):	140.0	Pressure Difference (kPa):	20.0

Date & Time	Elapsed Time (Minutes)	Room Temp (°C)	Top Burret (mL)	Bottom Burret (mL)	Top Vol. Change (mL)	Bottom Vol. Change (mL)	Average Vol. Change (mL)
2/19/24 7:45	0	20.0	9.82	0.12	0.00	0.00	0.00
2/19/24 13:22	337	20.0	9.43	0.56	0.39	0.44	0.42
2/22/24 7:24	4299	20.0	0.64	9.45	9.18	9.33	9.26
2/22/24 8:26	4361	20.0	0.47	9.54	9.35	9.42	9.39
2/22/24 9:59	4454	20.0	0.29	9.76	9.53	9.64	9.59
2/22/24 10:45	4500	20.0	0.20	9.87	9.62	9.75	9.69
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
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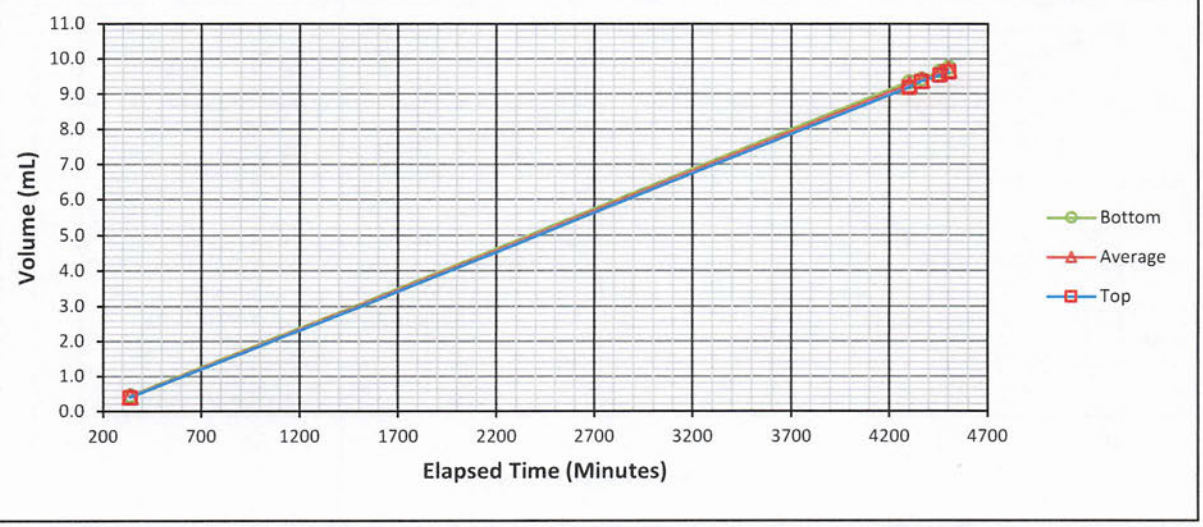


Project Name:	2024 Geotechnical Inv.	Depth:	
Project Number:	USG1826	Testing Company:	Union Street Geo.
Client:	Envirowest	Field Technician:	E.L.
Testhole:		Sample Date:	2nd February, 2024
Location:	Warren Crow	Lab Technician:	BB
Sample Number:	W381	Date Tested:	16th February, 2024

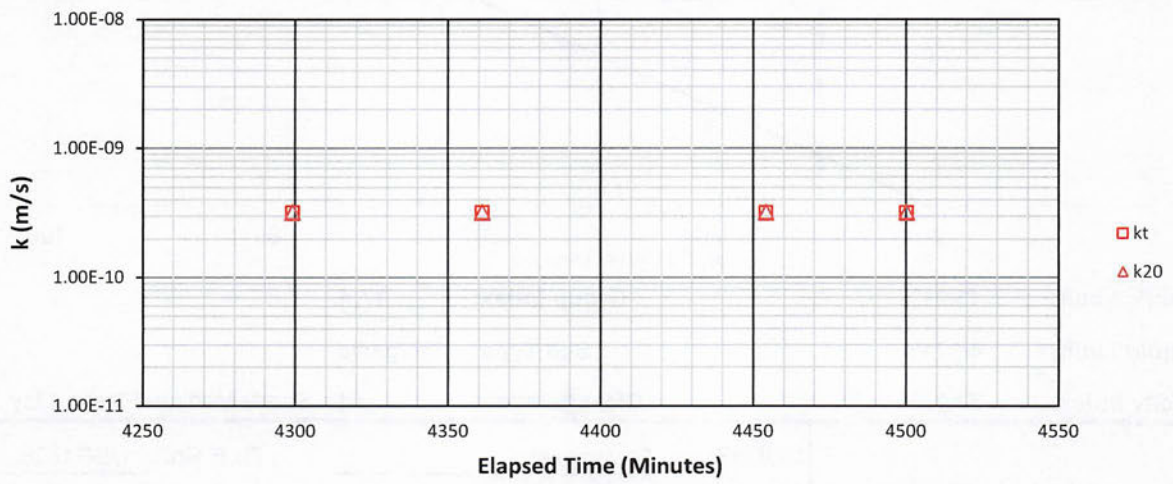
Flexible Wall Permeameter (ASTM D5084-10)

Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

Permeation Data

Head Difference (m):	2.0	Area of Sample (m^2)	4.211E-03
Length of Sample (m):	7.391E-02	Gradient, i	2.759E+01

Elapsed Time (Minutes)	Average Volume Change (mL)	Average Temperature (°C)	k_t (m/s)	R_T	k_{20} (m/s)
4299	9.26	20.0	3.201E-10	1.000	3.201E-10
4361	9.39	20.0	3.198E-10	1.000	3.198E-10
4454	9.59	20.0	3.196E-10	1.000	3.196E-10
4500	9.69	20.0	3.195E-10	1.000	3.195E-10
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	AVERAGE	3.197E-10		3.197E-10

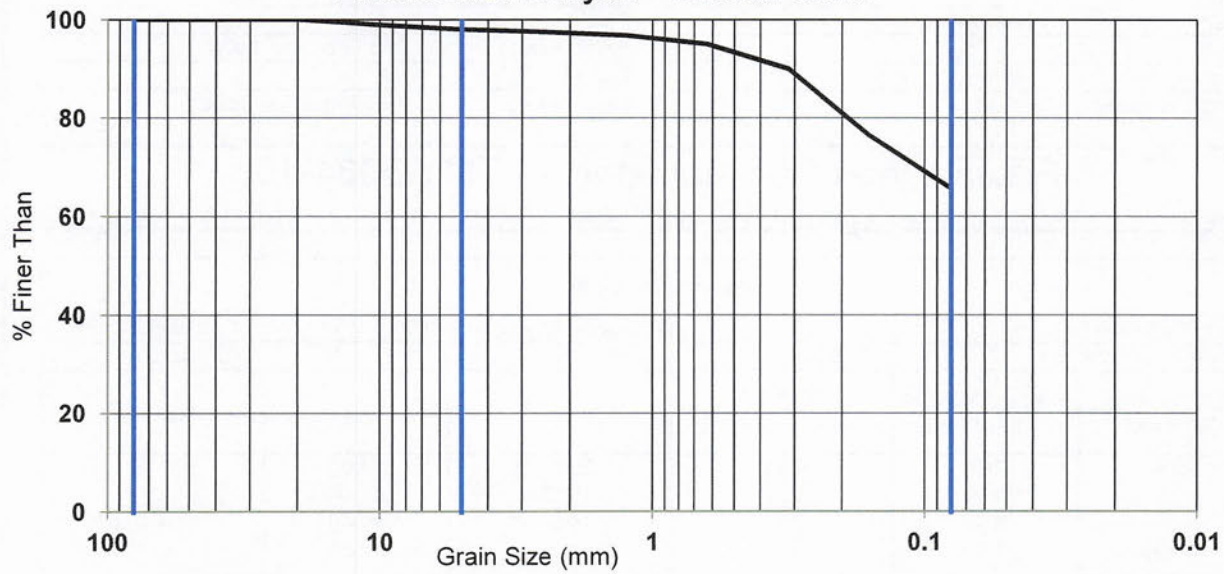


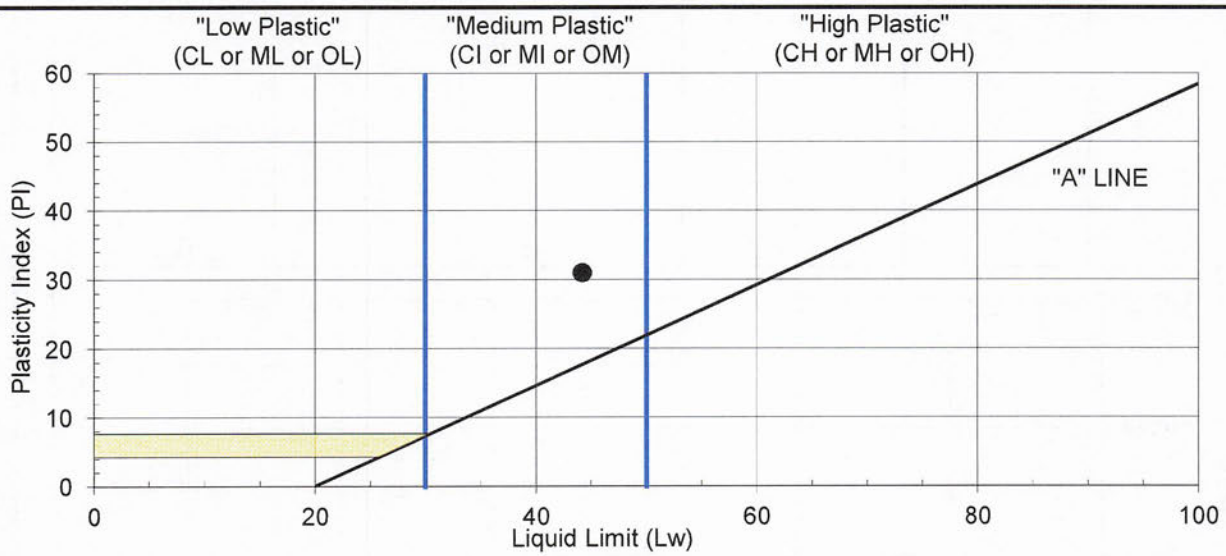
Lab Unified Soils Classification — Sample No.: W381

Sample Information

Classification: Silt and clay, sandy, trace gravel	**Particle Size:**	Gravel =	2.0%	**Borehole No.:**	Warren Crow
		Sand =	32.3%	**Sample No.:**	-
		Silt & Clay =	65.6%	**Depth (m):**	-

Particle Size Analysis - Washed Sieve





Plastic Limit:	13.21%	**Group Index:**	17.4
Liquid Limit:	44.21%	**Soil Type:**	Inorganic
Plasticity Index:	31.00%	**Classification:**	CI : Sandy Medium Plastic Clay

Union Street Geotechnical

CLIENT:	Envirowest	**FILE No.:**	USG1826
PROJECT:	Geotech. Inv.	**DATE:**	07-Feb-24
LOCATION:	Red Deer, Alberta	**TECH:**	G.S.

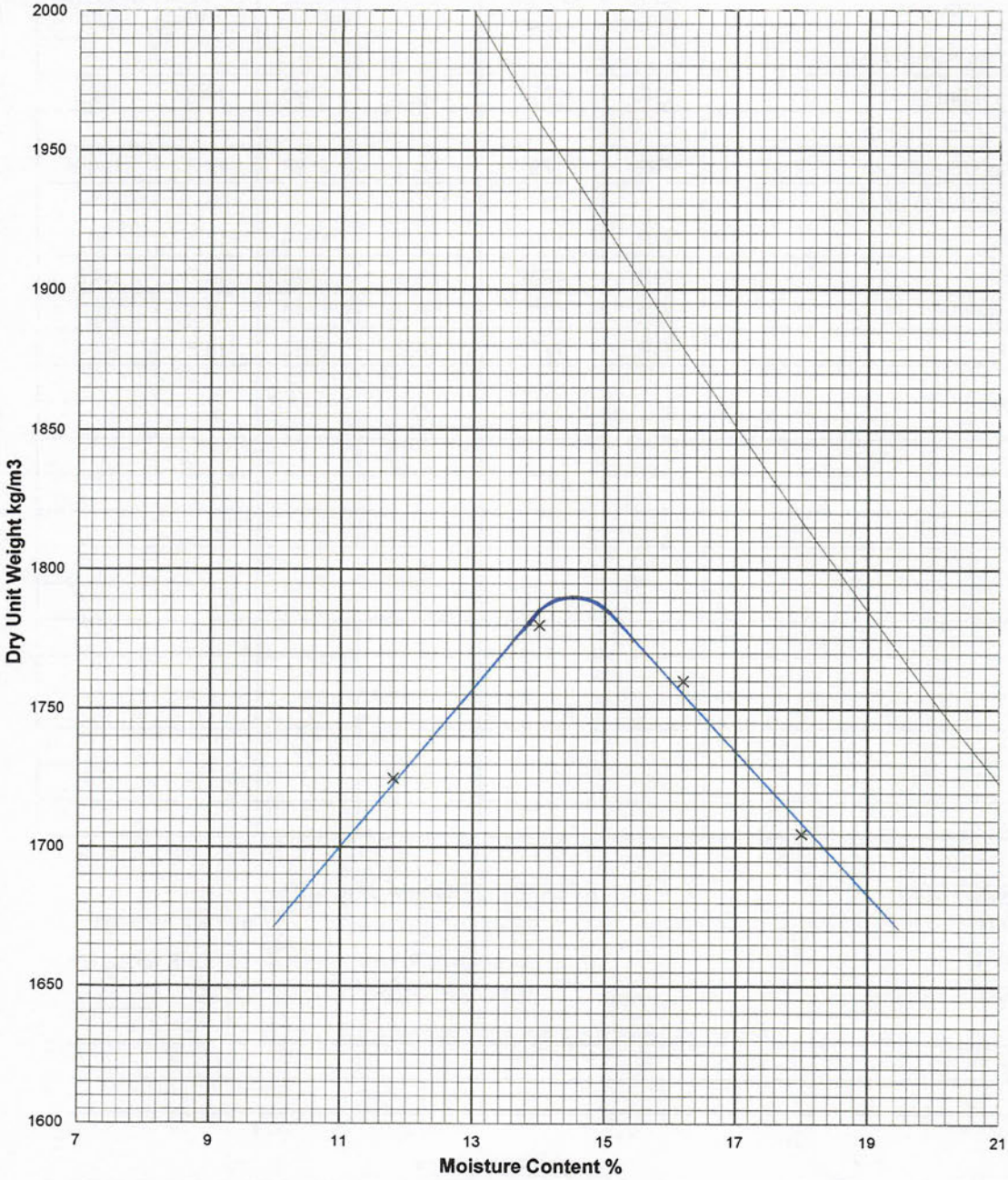
J.R. Paine & Associates Ltd.

CONSULTING AND TESTING ENGINEERS
EDMONTON - GRANDE PRAIRIE - PEACE RIVER

MOISTURE - DENSITY RELATIONSHIP

Sample: SP735 Depth: _____ Client: Crow Enterprises Ltd.
Location: Feeding Pen #2 Project: 2022 Silage Bin and Feed Lot Upgrades
Made By: _____ File: 4710-1
Ck'd By: _____ Date: August 25, 2022

TRIAL NUMBER	1	2	3	4	5
Dry Unit Weight (kg/m3)	1725	1780	1760	1705	
Moisture Content (%)	11.8	14.0	16.2	18.0	



MAXIMUM UNIT WEIGHT kg/m^3 = 1790

OPTIMUM MOISTURE CONTENT = 14.5 %

METHOD OF COMPACTION
STANDARD ☑
MODIFIED ☐

SAMPLE DESCRIPTION
Light Brown Silty Sand Mix of gravel

REMARKS
Sampled By FM

APPROVED BY

J.R. Paine & Associates Ltd.

CONSULTING AND TESTING ENGINEERS
EDMONTON - GRANDE PRAIRIE - PEACE RIVER

SUMMARY OF FIELD DENSITY TESTS

CLIENT Crow Enterprises Ltd. JOB NO 4710-1

DATE TESTED 25-Aug-22

PROJECT 2022 Silage Bin and Feed Lot Upgrades DATE REPORTED

TEST NO.	LOCATION	DEPTH (m)	DRY UNIT WT. kg/m^3	FIELD MOIST.%	PROCTOR DENSITY	OPTIMUM MOISTURE	PROCTOR DENSITY %
	Clay Subgrade						
1	East Silage Bin, 20m North	GR	1777	15.5	1790	14.5	99.3
	and 10m West of SE Corner						
2	West Silage Bin, 15m South	GR	1797	14.9	1790	14.5	100.4
	and 15m East of NW Corner						
3	Feeding Pen #1	GR	1792	15.0	1790	14.5	100.1
4	Feeding Pen #2	GR	1786	15.3	1790	14.5	99.8
5	Feeding Pen #3	GR	1767	15.0	1790	14.5	98.7
6	Feeding Pen #4	GR	1779	14.8	1790	14.5	99.4

CONTROL PROCTOR
- ☐ ONE POINT
- ☑ STANDARD
- ☐ MODIFIED

REQUIRED COMPACTION (%)
- ☐ 95 STANDARD
- ☑ 98 STANDARD
- ☐ 100 STANDARD
- ☐ 97 ONE-MOULD
- ☐ 100 ONE-MOULD
- ☐ OTHER

REMARKS Depth and locations are approximate

TESTED BY FM APPROVED BY FM

J.R. Paine & Associates Ltd.

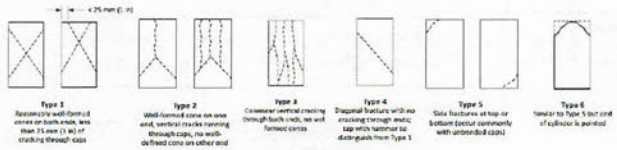
CONSULTING AND TESTING ENGINEERS
2304 - 119 Avenue NE, Edmonton, AB, T6S 1B3

CONCRETE COMPRESSIVE STRENGTH REPORT

CLIENT: Crow Enterprises Ltd.
FILE NO.: 4710-1
Date Cast: August 31, 2022
Date Tested:
TEST LOCATION: Feeding Pens, 60m East of Silage Bin, 20m North of Access Road
PROJECT: 2022 Feedlot and Silage Expansion
CURING LOCATION: J.R. Paine & Associates Ltd. Lab
Supplier:
Truck No.:
Batch Time: a.m. 3:30 p.m.
Test Time: a.m. 3:50 p.m.
Load Amount m^3 Cumulative m^3
Ticket No.:
Temp.: Air 30 °C Conc. °C
Product Code: RCC
Specified Strength 28 Days: 30 MPa
Admixtures:
Max. Aggregate Size: 20 mm
Initial Curing Temp.: Min. 19 °C Max. 23 °C
Slump Design: mm Actual: mm
Air Content Design: % Actual: %
Cylinder Type: Steel
Cylinder Size: 150x300mm X 100x200mm
Cast by: G.S. Tested by: Date Transported: 31-Aug-22 Time: 5:20 PM By: G.S.
Concrete samples cast by others? No Date Received: 1-Sep-22 Time: 3:45 PM By: G.S.
(If YES see Remarks Below)

SAMPLE NUMBER	TEST DATE	AGE DAYS	COMPRESSIVE STRENGTH (MPa)	TYPE OF FAILURE	TESTED BY	CYLINDER MASS (kgs)	CYLINDER DIA. (mm)	COMMENTS
1367	7-Sep-22	7	28.4	1	G.S.	13.482	152.0	
1368	28-Sep-22	28	33.4	1	J.M.H.	13.392	152.0	
1369	28-Sep-22	28	33.2	1	J.M.H.	13.464	152.0	

Remarks/Exceptions to Standard Procedures:



TYPES OF FRACTURE

CERTIFIED BY CCIL Canadian Council of Independent Laboratories For specific tests as listed on www.ccil.com

**Note: As Per CSA A23.1-19 4.4.1.8 Storage and Curing Facilities to be Provided by Contractor.

Facility Provided: Yes No

APPROVED BY (NAME): Kevin Seifert APPROVED BY (SIGNED):

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Dec 05,2023
FM

J.R. Paine & Associates Ltd.

CONSULTING AND TESTING ENGINEERS
2304 - 119 Avenue NE, Edmonton, AB, T6S 1B3

CONCRETE COMPRESSIVE STRENGTH REPORT

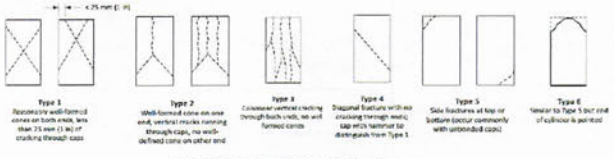
CLIENT: Crow Enterprises Ltd.
PROJECT: 2022 Feedlot and Silage Expansion

FILE NO.: 4710-1
Date Cast: September 2, 2022
Date Tested:
TEST LOCATION: Feeding Pens, 20m East of Silage Bin, 15m North of South Access Road
CURING LOCATION: J.R. Paine & Associates Ltd. Lab

Supplier:
Truck No.:
Batch Time: 10:00 a.m. ____ p.m.
Test Time: 11:30 a.m. ____ p.m.
Load Amount ____ m^3 Cumulative ____ m^3
Ticket No.:
Temp.: Air ____ °C Conc. ____ °C
Product Code: RCC
Specified Strength 28 Days: 30 MPa
Admixtures:
Max. Aggregate Size: 20 mm
Initial Curing Temp.: Min. 19 °C Max. 23 °C
Slump Design: ____ mm Actual: ____ mm
Air Content Design: ____ % Actual: ____ %
Cylinder Type: Steel
Cylinder Size: 150x300mm X 100x200mm ____
Cast by: G.S. Tested by: ____ Date Transported: 3-Sep-22 Time: 12:55 PM By: G.S.
Concrete samples cast by others? No Date Received: 3-Sep-22 Time: 1:00 PM By: G.S.
(If YES see Remarks Below)

SAMPLE NUMBER	TEST DATE	AGE DAYS	COMPRESSIVE STRENGTH (MPa)	TYPE OF FAILURE	TESTED BY	CYLINDER MASS (kgs)	CYLINDER DIA. (mm)	COMMENTS
1629	9-Sep-22	7	20.3	1	G.S.	13.540	152.0	
1630	30-Sep-22	28	29.8	1	J.M.H.	13.232	152.0	
1631	30-Sep-22	28	28.9	1	J.M.H.	13.270	152.0	

Remarks/Exceptions to Standard Procedures:



TYPES OF FRACTURE

CERTIFIED BY CCIL Canadian Council of Independent Laboratories

**Note: As Per CSA A23.1-19 4.4.1.8 Storage and Curing Facilities to be Provided by Contractor.

Facility Provided: Yes ____ No ____

APPROVED BY (NAME): Kevin Seifert APPROVED BY (SIGNED):

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Dec 05,2023
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J.R. Paine & Associates Ltd.

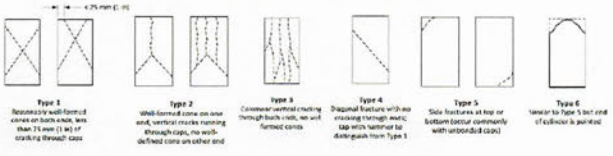
CONSULTING AND TESTING ENGINEERS
2304 - 119 Avenue NE, Edmonton, AB, T6S 1B3

CONCRETE COMPRESSIVE STRENGTH REPORT

CLIENT: Crow Enterprises Ltd.
FILE NO.: 4710-1
Date Cast: September 8, 2022
Date Tested:
TEST LOCATION: North Edge of Feeding Pen 3
PROJECT: 2022 Feedlot and Silage Expansion
CURING LOCATION: J.R. Paine Associates Ltd. Lab
Supplier: Rock Solid Concrete
Truck No.:
Batch Time: a.m. 12:20 p.m.
Test Time: a.m. 1:15 p.m.
Load Amount m^3 Cumulative m^3
Ticket No.:
Temp.: Air °C Conc. °C
Product Code:
Specified Strength 28 Days: 30 MPa
Admixtures:
Max. Aggregate Size: 20 mm
Initial Curing Temp.: Min. °C Max. °C
Slump Design: mm Actual: mm
Air Content Design: % Actual: %
Cylinder Type: Steel
Cylinder Size: 150x300mm X 100x200mm
Cast by: A.M./C.R. Tested by: Date Transported: 9-Sep-22 Time: 3:40 PM By: G.S.
Concrete samples cast by others? No Date Received: 9-Sep-22 Time: 3:50 PM By: G.S.
(If YES see Remarks Below)

SAMPLE NUMBER	TEST DATE	AGE DAYS	COMPRESSIVE STRENGTH (MPa)	TYPE OF FAILURE	TESTED BY	CYLINDER MASS (kgs)	CYLINDER DIA. (mm)	COMMENTS
1857	15-Sep-22	7	24.8	1	G.S.	13.420	152.0	
1858	6-Oct-22	28	30.2	1	G.S.	13.490	152.0	
1859	6-Oct-22	28	30.6	1	G.S.	13.442	152.0	

Remarks/Exceptions to Standard Procedures:



TYPES OF FRACTURE

CERTIFIED BY CCIL Canadian Council of Independent Laboratories For specific tests as listed on www.ccil.com

**Note: As Per CSA A23.1-19 4.4.1.8 Storage and Curing Facilities to be Provided by Contractor.

Facility Provided: Yes No X

APPROVED BY (NAME): Kevin Seifert APPROVED BY (SIGNED):

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