

## 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)

<p><b>NRCB USE ONLY</b></p> <p> <input type="checkbox"/> Approval                    <input type="checkbox"/> Registration                    <input checked="" type="checkbox"/> Authorization  <input type="checkbox"/> Amendment             </p>	<p>Application number <b>RA24048</b></p>	<p>Legal land description <b>E 1/2 17-34-2 W4M and SW 17-34-2 W4M</b></p>
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### 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.

November 21, 2024

Date of signing  
FERENCE Land and Cattle Corp.

Corporate name (if applicable)

Digital signature: Craig Ference, Nov 22, 2024

Signature  
Craig Ference

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)
New North catch Basin      North catch basin 3 (already constructed)	50m x 50m x 2m

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

Existing facilities	Dimensions (m) (length, width, and depth)	NRCB USE ONLY
North pen area      pens 12-30	335 m x 137 m (335 m x 267 m total)	
North Catch basin	40 m x 70 m x 4m	
South Pen area      Pens 1-9	198 m x 174 m (198 m x 274 m total)	
<p><b>NRCB USE ONLY</b></p> <p>Confirmed existing CFO</p>		







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### **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 17646, 1435034, 1501879  
License 16835, License 14937

Signed this 28 day of October, 2024.

X \_\_\_\_\_  
*Signature of Applicant or Agent*



## Part 2 – Technical Requirements

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

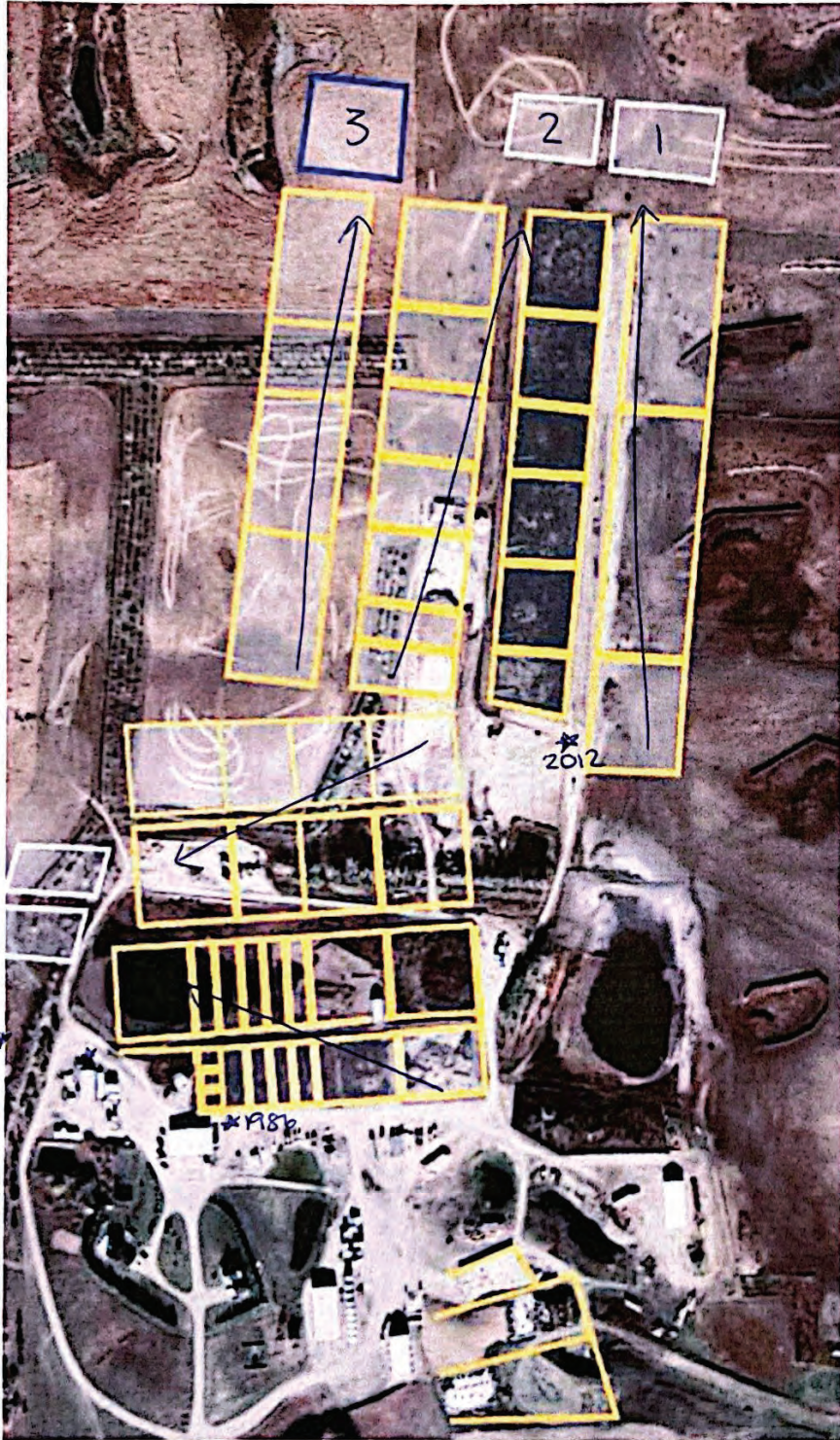
1. At this time, I (we) do not know whether a new water licence is needed from EPA under the *Water Act* for the development or activity proposed in this AOPA application.
2. If a new *Water Act* licence is needed, I (we) request that the NRCB process the AOPA application **independently** of EPA's processing 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 \_\_\_\_\_

Signed this \_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_.

\_\_\_\_\_  
*Signature of Applicant or Agent*



N



Blue =  
proposed  
Catch Basin #3

50m x 50m x 2m

\* Wells.



N catch basin 3	N catch basin 2	N catch basin 1
-----------------	-----------------	-----------------



S catch basin 2
S catch basin 1

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## 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: All pens without numbers, catch basin N 1&2, S1&2 Proposed 1: North Catch basin

Proposed 2: \_\_\_\_\_ Proposed 3: \_\_\_\_\_

Facility and environmental risk information		Facilities				NRCB USE ONLY	
		Existing	Proposed 1	Proposed 2	Proposed 3	Meets requirements	Comments
Flood plain information	What is the elevation of the floor of the lowest manure storage or collection facility above the 1:25 year flood plain or the highest known flood level?	<input checked="" type="checkbox"/> >1 m <input type="checkbox"/> ≤ 1 m	<input type="checkbox"/> >1 m <input type="checkbox"/> ≤ 1 m	<input type="checkbox"/> >1 m <input type="checkbox"/> ≤ 1 m	<input type="checkbox"/> > 1 m <input type="checkbox"/> ≤ 1 m	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> YES with exemption	Not in flood plain
	How many springs are within 100 m of the manure storage facility or manure collection area?	0				<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> YES with exemption	None known
Surface water information	How many water wells are within 100 m of the manure storage facility or manure collection area?	0				<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> YES with exemption	none within 100 m of proposed, 5 within 100m of existing.
	What is the shortest distance from the manure collection or storage facility to a surface water body? (e.g., lake, creek, slough, seasonal)	76m	30m			<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> YES with exemption	75 m to slough on applicants property for common body of water
Groundwater information	What is the depth to the water table?	14m	14m			<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> YES with exemption	5 m
	What is the depth to the groundwater resource/aquifer you draw water from?	below 23	below 23			<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> YES with exemption	WW ID 1501807 41.2 m

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



**NRCB USE ONLY**  
**ENVIRONMENTAL RISK SCREENING INFORMATION**

ERST for proposed facilities

Facility	Groundwater score	Surface water score	File number
See Decision Summary	RA24048		

ERST for existing facilities

Facility	Groundwater score	Surface water score	File number
Feedlot pens 61,71,81,91	Low	Low	RA24030
Feedlot pens 12,13,20	Low	Low	RA24030
South Feedlot pens	Low	Low	RA24001
South Catch basin	Low	Low	RA24001

ERST related comments:

**NRCB USE ONLY**

**WATER WELL AND SURFACE WATER INFORMATION**

Well IDs:           ID 1435304                     ID 177646                     ID 1502898            
          ID 1501807                     ID 177647                     ID 1435344          

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

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

**Water wells**  N/A

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

**Surface water**  N/A

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

**Water Well Exemption Screening Tool**  N/A

Water Well ID	Preliminary Screening Score	Secondary Screening Score	Facility

**Groundwater or surface water related comments:**



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

Neighbour name(s)	Legal land description	Distance (m)	NRCB USE ONLY				
			Zoning (LUB) category	MDS category (1-4)	Distance (m)	Waiver attached (if required)	Meets regulations
Glen Vert	SW 7-34-02 w4	1800m	Ag	Cat 1	1780 m	N/A	Y

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

Name of land owner(s)*	Legal land description	Usable area** (ha)	Soil zone ***	NRCB USE ONLY	
				Usable area (ha)	Agreement attached (if required)
Ference Land & Cattle Corp.	see attached spreadsheet	1031.34	dark brown/brown	N/A for authorization	
Ference Farms Ltd. Edward Ferenc	see attached spreadsheet	155.7	dark brown/brown		
Karen Koch	see attached spreadsheet	261.25	dark brown/brown		
Total					

\* If you are **not** the registered landowner, you must attach copies of land use agreements signed by all landowners.

\*\* Available manure spreading area (excluding setback areas from residences, common bodies of water, water wells, etc. as identified in Agdex 096-5 [Manure Spreading Regulations](#))

\*\*\* Brown, dark brown, black, grey wooded, or irrigated

**Additional information (attach any additional information as required)**

Last updated September 11, 2023

**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: 848 m Category 2: 1131 m Category 3: 1414 m Category 4: 2262 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: N/A not for an increase in permitted livestock  
 Land base listed: \_\_\_\_\_  
 Area not suitable: \_\_\_\_\_  
 Available area: \_\_\_\_\_ Requirement met:  YES  NO  
 Land spreading agreements required:  YES  NO  
 Manure management plan:  YES  NO If yes, plan is attached:

**PLANS**

Submitted and attached construction plans:  YES  NO  
 Submitted aerial photos:  YES  NO  
 Submitted photos:  YES  NO

**GRANDFATHERING**

Already completed:  YES  NO  N/A  
 If already completed, see \_\_\_\_\_



**NRCB USE ONLY**

**ALL SIGNATURES IN FILE**

YES  NO

**DATES OF APPROVAL OFFICER SITE VISITS**

November 5, 2024	

**CORRESPONDENCE WITH MUNICIPALITIES AND REFERRAL AGENCIES**

Date deeming letters sent: November 22, 2024

Municipality: Special Areas No. 4

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:** Telus, Dry County Gas Co-op Ltd.       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

Name of Land Owner	Legal Land Description	Usable Area **(ha)	Soil Zone ***
Ference Land and Cattle (south harry's)	SE 7-34-02 W4	60.7	Dark brown / brown
Ference Land and Cattle (south of road)	NW 8-34-02 W4	55.4	Dark brown / brown
Ference Land and Cattle (Guenthners)	SW 8-34-02 W4	55.4	Dark brown / brown
Ference Land and Cattle (Junk Pile)	SW 18-34-02 W4	46.9	Dark brown / brown
Ference Land and Cattle (west of yard)	SW 17-34-02 W4	54.6	Dark brown / brown
Ference Land and Cattle (n/e Yard)	N 17-34-02 W4	136	Dark brown / brown
Ference Land and Cattle (clarks)	16-34-02 W4	177	Dark brown / brown
Ference Land and Cattle (north hiway 2)	NE 17-34-02 W4	27.1	Dark brown / brown
Ference Land and Cattle (north hiway)	SE 20-34-02 W4	14.6	Dark brown / brown
Ference Land and Cattle (pens 11-18)	SE 17-34-02 W4	46	Dark brown / brown
Ference Land and Cattle (gloria)	SW 2-34-02 W4	48.87	Dark brown / brown
Ference Land and Cattle (gloria north)	NW 2-34-02 W4	12.14	Dark brown / brown
Ference Land and Cattle (hagen)	NE 4-34-02 W4	55.63	Dark brown / brown
Ference Land and Cattle (Randy's)	SW 20-34-3 W4	30.97	Dark brown / brown
Ference Land and Cattle (Darcy Section)	26-35-4 W4	209.73	Dark brown / brown
Ference Farms Ltd. Edward Ference	E 13-34-03 W4	68	Dark brown / brown
Ference Farms Ltd. Edward Ference	SW 13-34-03 W4	57	Dark brown / brown
Ference Farms Ltd. Edward Ference	NW 13-34-03 W4	31	Dark brown / brown
Karen Koch	NW 5-35-1 W4	53	Dark brown / brown
Karen Koch	SW 5-35-1 W4	33	Dark brown / brown
Karen Koch	SE 10-34-2 W4	49.8	Dark brown / brown
Karen Koch	NW 10-34-2 W4	43.7	Dark brown / brown
Karen Koch	SW 10-34-2 W4	81.75	Dark brown / brown
	<b>Total</b>	<b>1448.29</b>	



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## RUNOFF CONTROL CATCH BASIN: Naturally occurring protective layer

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

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

1. catch basin North catch basin 3 (already constructed)
2. \_\_\_\_\_
3. \_\_\_\_\_

### Determination of runoff area

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

### Catch basin capacity

	Length (m)	Width (m)	Total depth (m)	Depth below ground level (m)	Slope run:rise			NRCB USE ONLY Calculated storage capacity (excl. 0.5 m freeboard) (m <sup>3</sup> )
					Inside end walls	Inside side walls	Outside walls	
1.	50	50	2	2	3	3	-	2,720 m3
2.								
3.								
TOTAL CAPACITY								

### Naturally occurring protective layer details

Thickness of naturally occurring protective layer	<u>        &lt;60        </u> (m)	Provide details (as required) see attached	
Soil texture	<u>        44        </u> % sand	<u>        28        </u> % silt	<u>        28        </u> % clay
Hydraulic conductivity - naturally occurring protective layer	Depth and type of soil tested 7.5 - 9	Hydraulic conductivity (cm/s) 2.9 x 10 -8	Describe test standard used insitu

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

If soil info differs per facility include additional soils page.

**NRCB USE ONLY**

Requirements met:  YES  NO

Condition required:  YES  NO

Report attached:  YES  NO

Facility already constructed.

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

**NRCB USE ONLY**

Catch basin calculator. Total volume @ freeboard level: 2,720 m<sup>3</sup> Runoff capacity requirements met:  YES  NO

Calculation of the volume attached:  YES  NO

Depth to water table: > 5 m Requirements met:  YES  NO

Depth to uppermost groundwater resource: 41.2 m Requirements met:  YES  NO

ERST completed:  See ERST page for details

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

**See Decision Summary RA24048**

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



<b>NRCB USE ONLY</b>	
<b>RUNOFF CONTROL CATCH BASIN CAPACITY SUMMARY (if applicable)</b>	
<b>Facility 1</b>	
Name / description New North catch basin (3)	Capacity 2,720 m3
<b>Facility 2</b>	
Name / description	Capacity
<b>Facility 3</b>	
Name / description	Capacity
<b>Facility 4</b>	
Name / description	Capacity
<b>TOTAL CAPACITY</b>	<b>2,720 m3</b>
<b>RUNOFF VOLUME FROM CONTRIBUTING AREAS</b>	<b>1,217 m3</b>
<b>MEETS AOPA RUNOFF CONTROL VOLUME REQUIREMENTS</b>	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO

# Catch Basin Storage Volume Calculator

Construction Dimensions of Catch Basin	
* Only cells in blue can be changed.	
Overall Dimensions of Catch Basin	
Total Length* <sub>4</sub>	50.0 m
Total Width* <sub>4</sub>	50.0 m
Total Depth* <sub>4</sub>	2.0 m
Design Capacity Depth	1.50 m
End Slope* <sub>4</sub>	3 run:rise
Side Slope* <sub>4</sub>	3 run:rise
Length of Bottom	38.0 m
Width of Bottom	38.0 m
Capacity @ top of Bank	3,896 m <sup>3</sup>
Design Capacity of Catch Basin (freeboard level)	
Length (design capacity depth)	47.0 m
Width (design capacity depth)	47.0 m
Total Depth	2.0 m
Design Capacity Depth	1.50 m
End Slope	3 run:rise
Side Slope	3 run:rise
Design Capacity (freeboard level)	2,720 m <sup>3</sup>
level)	2,209 m <sup>2</sup>
Catch Basin Dimensions	
	164 ft
	164 ft
	7 ft
	5 ft
	3 run:rise
	3 run:rise
	125 ft
	125 ft
Capacity (@top)	137,586 ft <sup>3</sup>
	857,000 Imp. Gal.
Design Capacity (freeboard level)	
	154 ft
	154 ft
	7 ft
	5 ft
	3 run:rise
	3 run:rise
	96,038 ft <sup>3</sup>
	598,206 Imp. Gal.
	23,777 ft <sup>2</sup>

CFO Name <sub>1</sub>	New N catch basin
Land Location <sub>1</sub>	NE 17-34-2 W4

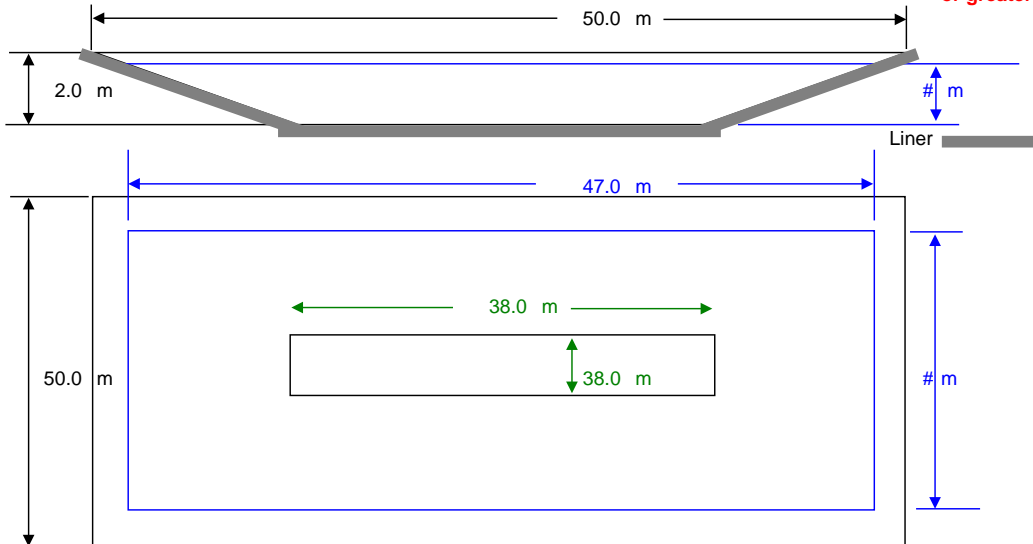
Paved Runoff Catchment Area(s)			
Area <sub>2</sub>	Length (m)	Width (m)	Area (m <sup>2</sup> )
1			0.0
2			0.0
3			0.0
4			0.0
5			0.0
Total Area (m <sup>2</sup> )			0

Unpaved Runoff Catchment Area(s)			
Area <sub>2</sub>	Length (m)	Width (m)	Area (m <sup>2</sup> )
6	367	65	23,855.0
7			0.0
8			0.0
9			0.0
10			0.0
Total Area (m <sup>2</sup> )			23,855

Rainfall (Select Town <sub>3</sub> )	
Castor 85	
AOPA Design Rainfall	85 mm

Minimum Catchbasin Storage Volume Required	
1,217 m <sup>3</sup> **	42964 ft <sup>3</sup>
	267615.58 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

20 November 2024

**J Lobbezoo Engineering & Consulting Services Ltd.**  
PO Box 96, Monarch, AB T0L1M0

JLECS File: P24074

**Ference Land & Cattle Corp.**  
PO Box 707  
Kirriemuir, Alberta T0C 1R0

Attention: Mr. Craig Ference

**Re: Geotechnical Review and Evaluation  
NRCB Permitting of Proposed Catch Basins  
E-17-034-02-W4M, near Kirriemuir, Alberta**

As requested, J Lobbezoo Engineering & Consulting Services Ltd. (JLECS) has carried out a geotechnical review and evaluation of the above-captioned site relative to the required protection of the groundwater resource, as required by the Agricultural Operation Practices Act, AB Reg. 267/2001 (hereinafter referred to as "AOPA"). This letter describes the site soil conditions to support a permit application related to proposed the construction of two new catch basins to be located north of the existing pens and farmyard at the above-captioned site (refer to Figure 1, attached).

In order to demonstrate the suitability of the naturally existing soils for consideration as a naturally occurring protective layer to the groundwater resource, five boreholes were advanced at the site on November 7, 2024. The boreholes were advanced at the approximate locations denoted as DF1-24 to DF5-24 on Figure 1, attached.

The boreholes were advanced by a truck-mounted drill rig owned and operated by Chilako Drilling Services and extended to depths of 9.0 m to 9.2 m below the existing grade. The boreholes were logged by Larry Delong of Chilako Drilling Services.

In general, the natural mineral soils encountered in the boreholes consisted of approximately 1.5 m to 5.6 m of lacustrine sandy loam overlying lacustrine clay and clay till to the termination depths of all five boreholes. While perched water was noted at the bottom of the sandy loam material at three of the five boreholes, a groundwater resource (as defined by the AOPA) was not encountered within the 9.2 m investigation depth at this site.

Samples of soil collected from the screened zones of boreholes DF1-24 and DF4-24 as well as samples from similar depths at the other boreholes were all subjected to grain size analyses, which was carried out by Down to Earth Laboratories in Lethbridge, Alberta. The lab report is attached, for reference. The results indicate a soil texture breakdown of:



**Table 1: Soil Texture Analyses**

Borehole/Depth	% Sand	% Silt	% Clay
DF1-24 / 7.5 – 9.0 m	44	28	28
DF2-24 / 6.0 – 7.5 m	18	48	34
DF3-24 / 7.5 – 9.0 m	13	47	40
DF4-24 / 7.5 – 9.0 m	46	28	26
DF5-24 / 7.5 – 9.0 m	20	24	46
Average:	30	35	35

To measure the *in situ* permeability of the subsurface soils, 50 mm diameter PVC monitoring wells were constructed in boreholes DF1-24 and DF4-24. Test well DF-24 was screened from 5.7 m to 9.0 m depth while test well DF4-24 was screened from 6.0 m to 9.2 m depth. Well saturation of the 50 mm diameter monitoring wells was carried out by filling the monitoring well to the top for several consecutive days. After several days of testing, a 24-hour water drop of 0.85 m was determined at DF1-24, and a 24-hour water drop of 0.50 m was determined at DF4-24.

To calculate the permeability of the screened portion of the clay strata at the test well locations, a modified falling head test (as outlined in the USBR Engineering Geology Field Manual Volume 2 [2001]) was used. The input variables and output data are outlined on the attached In Situ Permeability Test reports. The results of the permeability testing indicate an *in situ* hydraulic conductivity,  $k_s$ , of  $2.9 \times 10^{-8}$  cm/s at DF1-24, and an *in situ* hydraulic conductivity,  $k_s$ , of  $1.6 \times 10^{-8}$  cm/s at DF4-24.

Using the measured permeability of the clay stratum, the 3.3 m of clay screened at DF1-24 and the 3.2 m of clay screened at DF4-24 are estimated to represent the equivalent of over 100 m of naturally occurring materials having a hydraulic conductivity of  $1 \times 10^{-6}$  cm/s (the reference standard in AOPA). This represents natural material protection in excess of the minimum requirements outlined by the AOPA for catch basins (minimum 5 m, Section 9.5-b).

**Conclusion**

Based on the results of the current investigation, permeability testing, and our understanding of the site and proposed development at the site, it is JLECS’s opinion that the naturally occurring materials at the site satisfy the AOPA requirements for permitting the proposed catch basin and pen expansion at this location.

While the site meets the AOPA recommendations for a naturally occurring protective layer, it is noted that the upper soils at the test hole locations included sandy loam soils, which would be expected to be present in the sideslopes of the excavated catch basin. According, it is recommended that all sandy loam soils encountered in the catch basin excavation sideslopes be subexcavated to a minimum 1 m depth, and replaced with compacted low-permeable clay.

We trust that this report satisfies your present requirements. Should you have any questions, please contact the undersigned at your convenience.

Yours truly,

**J Lobbezoo Engineering & Consulting Services Ltd.**



John Lobbezoo, Eng.  
Principal Geotechnical Engineer

**Attachments**

- Figure 1 Borehole Locations
- In Situ Permeability Test Calculations
- Down to Earth Soil Texture Results
- Soil Profile and Parent Material Description, Chillako Drilling Services

<b>PERMIT TO PRACTICE</b>	
J LOBBEZOO ENGINEERING & CONSULTING SERVICES LTD.	
RM SIGNATURE:	
RM APEGA ID #:	110450
DATE:	20 Nov 2024
<b>PERMIT NUMBER: P016456</b>	
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)	



Figure 1: Site Layout & Borehole Locations

Image Credit: Google



DF1-24

### In Situ Permeability Test

Modified Falling Head Permeability Equation

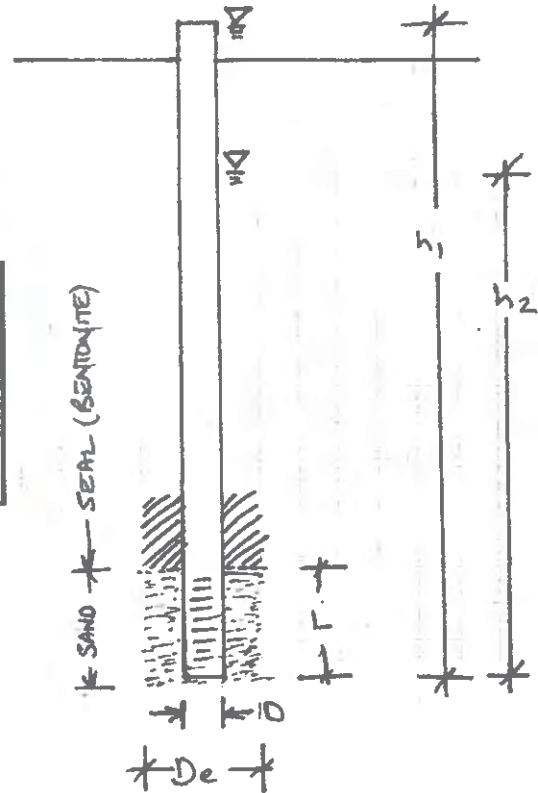
$$K_s = \frac{r^2}{2\ell\Delta t} \left[ \frac{\sinh^{-1} \frac{\ell}{r_e}}{2} \ln \left[ \frac{2H_1 - \ell}{2H_2 - \ell} \right] - \ln \left[ \frac{2H_1 H_2 - \ell H_2}{2H_1 H_2 - \ell H_1} \right] \right]$$

taken from USBR Engineering Geology Field Manual Volume 2 (2001)

DF1-24 - Ference Land & Cattle Corp.  
 JLECS File: P24074

INPUT VARIABLES	Terms	Value	Definition
	D	0.0520	diameter of standpipe (m)
	De	0.1500	diameter of borehole (m)
	L	3.30	length of sand section (m)
	h1	9.30	initial height of water above base of hole (m)
	h2	8.45	final height of water above base of hole (m)
t	24.0	time of test (h)	

$k_s = 2.9E-08$  cm/sec



DF4-24

### In Situ Permeability Test

Modified Falling Head Permeability Equation

$$K_s = \frac{r^2}{2\ell\Delta t} \left[ \frac{\sinh^{-1} \frac{\ell}{r_e}}{2} \ln \left[ \frac{2H_1 - \ell}{2H_2 - \ell} \right] - \ln \left[ \frac{2H_1 H_2 - \ell H_2}{2H_1 H_2 - \ell H_1} \right] \right]$$

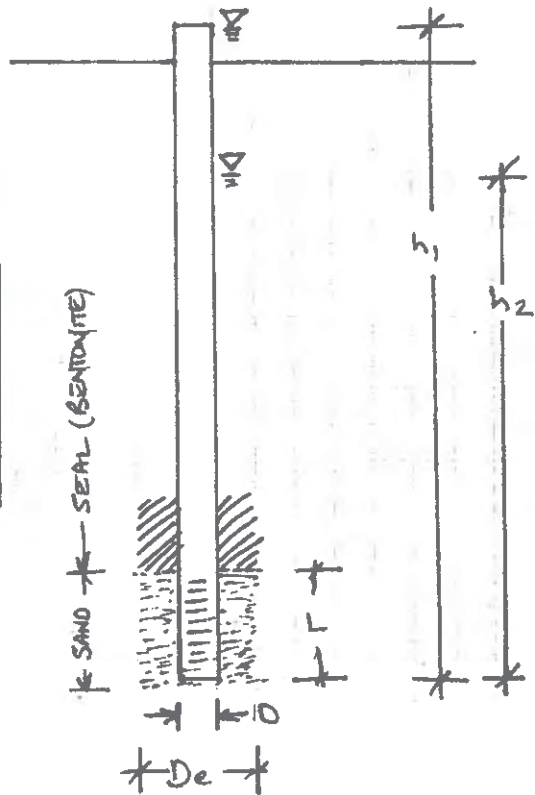
taken from USBR Engineering Geology Field Manual Volume 2 (2001)

DF4-24 - Ference Land & Cattle Corp.

JLECS File: P24074

INPUT VARIABLES	Terms	Value	Definition
	D		0.0520
De		0.1500	diameter of borehole (m)
L		3.20	length of sand section (m)
h1		9.80	initial height of water above base of hole (m)
h2		9.30	final height of water above base of hole (m)
t		24.0	time of test (h)

$k_s = 1.6E-08$  cm/sec





# Down To Earth Labs Inc.

The Science of Higher Yields

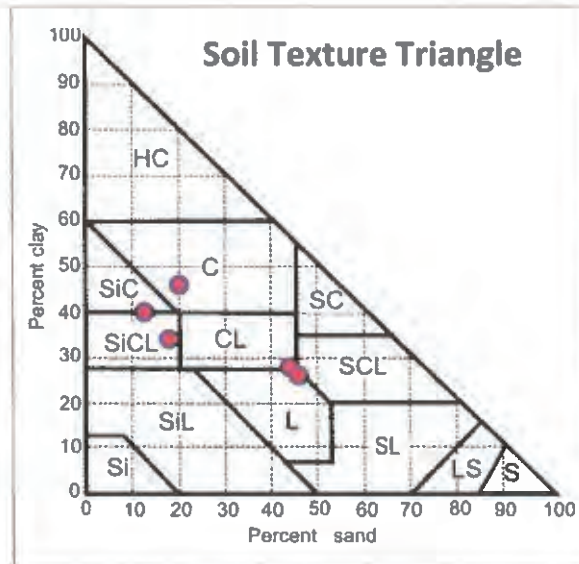
J. Lobbezoo Engineering +  
Consulting Services  
Box 96  
Monarch, Alberta T0L 1M0

Report #: 198876  
Report Date: 2024-11-19  
Received: 2024-11-15  
Completed: 2024-11-19  
Test Done: ST

Project :  
FERENCE CATTLE  
PO:

3510 6th Ave North  
Lethbridge, AB T1H 5C3  
403-328-1133  
www.downtoearthlabs.com  
info@downtoearthlabs.com

		Sample ID: 241115N008	241115N009	241115N010	241115N011	241115N012
	Cust. Sample ID:	DF1-24	DF2-24	DF3-24	DF4-24	DF5-24
Analyte	Units	7.5-9.0	6.0-7.5	7.5-9.0	7.5-9.0	7.5-9.0
Sand	%	44.2	18.2	12.9	46.2	20.4
Silt	%	27.8	47.8	47.1	27.8	33.6
Clay	%	28.0	34.0	40.0	26.0	46.0
Soil Texture	-	Clay Loam	Silty Clay Loam	Silty Clay	Sandy Clay Loam	Clay





# CHILAKO DRILLING SERVICES LTD

Box 942 Coaldale, Alberta, T1M 1M8  
(403) 345-3710

## SOIL PROFILE AND PARENT MATERIAL DESCRIPTION

Site Location: SE17-34-2W4, Ference Cattle (Double F)

Date: 07-Nov-24

Hole #	Location	Depth	Texture	Moisture	Geological	Sample	Remarks
DF1-24	0551525 5752376	0-1.5	FSL	SM	Lac	0-1.5	
		1.5-4.3	SiCL	M	Lac		Stiff, med plastic, olive brown
		4.3-4.5	CL	VM	Lac		Stiff, med plastic, olive brown
		4.5-9.0	C	M	Till	7.5-9.0	Stiff, med plastic, dark gray 50mm H.C. Well installed to 9.0m BGS Screen: 9.0-6.0m Sand: 9.0-5.7m Bentonite: 5.7-0.0m Stickup: 0.3m Hole Diameter: 0.15m
DF2-24	0551560 5752368 mid slope of hill	0-0.6	FSL	SM	Fill		
		0.6-4.2	FSL	SM	Lac		
		4.2-5.6	FSL	Sat	Lac		Free water, some silt
		5.6-9.2	C	M	Lac	6.0-7.5	Stiff, high plastic. Gray
DF3-24	0551415 5752400	0-0.15	FSL	SM	Topsoil		
		0.15-1.5	FSL-FSCL	SM	Lac		
		1.5-2.2	FSL	M	Lac		
		2.2-3.0	FSL	M-VM	Lac		
		3.0-4.2	C.SL	Sat	Lac		Free water
4.2-9.2	C	M	Lac	7.5-9.0	Stiff, high plastic, gray		
DF4-24	0551405 5752320	0-1.0	FSL	SM	Lac		
		1.0-1.5	C.SCL	SM	Lac		
		1.5-2.1	FSL	VM	Lac		Sat @ 2.1m
		2.1-3.2	SiCL	M	Lac		V. Firm, med plastic. Gleyed
		3.2-9.2	C	M	Lac		Stiff, high plastic, gray 50mm H.C. Well installed to 9.2m BGS Screen: 9.2-6.2m Sand: 9.2-6.0m Bentonite: 6.0-0.0m Stickup: 0.6m Hole Diameter: 0.15m
DF5-24	0551537 5752311	0-1.5	SCL	SM	Fill		
		1.5-2.7	SL	M	Lac		
		2.7-3.9	SiCL	VM	Lac		V. Firm, med plastic, olive brown
		3.9-9.2	C	M	Lac	7.5-9.0	Stiff, high plastic, gray

Legend: L Loam  
C Clay  
S Sand  
Gr. Gravel  
Si Silt  
F Fine (sand)  
VF Very Fine (sand)