

# Technical Document LA24030



## 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)

<b>NRCB USE ONLY</b>		Application number	Legal land description
<input checked="" type="checkbox"/> Approval	<input type="checkbox"/> Registration	<input type="checkbox"/> Authorization	
<input type="checkbox"/> Amendment		<u>LA24030</u>	SW 8-22-20 W4M, SE 12-22-21 W4 N½ 7-22-20 W4M

### APPLICATION DISCLOSURE

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

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

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

Date of signing: July 10 2024  
 Signature:   
 Corporate name (if applicable): Halterion Brethren Church of Christ  
 Print name: Joel Tschelke

### GENERAL INFORMATION REQUIREMENTS

**Proposed facilities:** list all proposed confined feeding operation facilities and their dimensions. Indicate whether any of the proposed facilities are additions to existing facilities. (attach additional pages if needed)

Proposed facilities	Dimensions (m) (length, width, and depth)
<u>6 pens <del>200'</del> (already constructed)</u>	<u>200' x 180' Each pen</u>
<u>Catch Basin #1 (partly constructed)</u>	
<b>AC comment:</b> As per text, catch basin ① : 35 x 22 x 2.5 [m] (for west pens) ② catch basin # 2 (east) 45 x 32 x 2.5 [m]	
<b>Existing facilities:</b> list ALL existing confined feeding operation facilities	
Existing facilities	
<u>See last permit</u>	
	(see page 3)

**NRCB USE ONLY**

In addition there are also 2 large pens with a total footprint of 52 m x 187 m (somewhat irregular shape)

The feedlot pens are arranged in two rows, east and west row. 3 pens in west row (each 61 m x 55 m for a total of 61 m x 182 m) and 5 pens with a total footprint of 121 m x 188 m.

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

N/A

Construction completion date for proposed facilities December 2026.

**Additional information**

**Livestock numbers:** Complete only if livestock numbers are different from what was identified in the Part 1 application. Note: if livestock numbers increase in your Part 2 application, a new Part 1 application must be submitted which may result in a loss of priority for minimum distance separation (MDS).

Livestock category and type (Available in the Schedule 2 of the Part 2 Matters Regulation)	Permitted number	Proposed increase or decrease in number (if applicable)	Total
See part 2			
<u>Final numbers</u>			
Feeder cattle: 2500			
Dairy cows (plus dries and replacements): 250			
Chicken layers: 9000			
Broiler chicken: 19200			
Ducks: 1500			
Geese: 500			
Turkey: 600			

## Existing facilities

Layer barns (4): 13.7 m x 35 m (each)

Calf shelter: 91 m x 29 m + 46 m x 54 m

Poultry barn: 63 m x 9 m

Dairy barn (L shape): Long arm: 96 m long 35 m wide, short arm: 73 m long 27 m wide

EMS: 97 m x 40 m x unknown depth

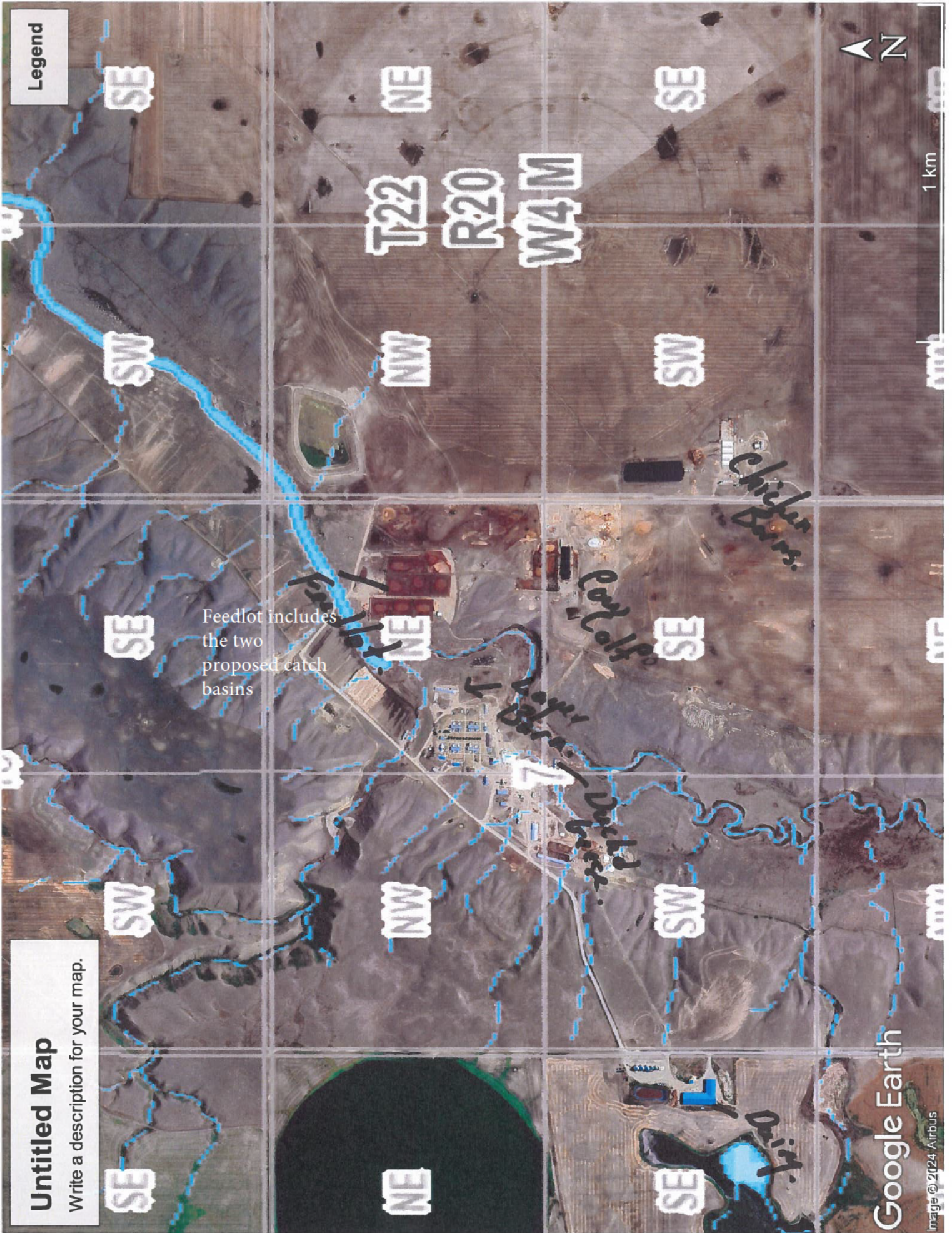
AO comment: All existing facilities have been confirmed

Legend

### Untitled Map

Write a description for your map.

Feedlot includes the two proposed catch basins



Legend



200 m

Lynn Energy  
#1 well → South.

#1  
Cott. Basin

Drain

Drain

#2  
Cott. Basin

Crowfoot  
Creek

### Untitled Map

Write a description for your map.

Google Earth

Image © 2024 Airbus

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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 No 27633-1  
(21919)

Signed this 10 day of July, 2024.

\_\_\_\_\_  
*Applicant or Agent*

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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*

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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: \_\_\_\_\_

Proposed 1: Feedlot

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?	<input type="checkbox"/> >1 m <input type="checkbox"/> ≤ 1 m	<input checked="" type="checkbox"/> >1 m <input type="checkbox"/> ≤ 1 m	<input checked="" type="checkbox"/> >1 m <input type="checkbox"/> ≤ 1 m	<input type="checkbox"/> > 1 m <input type="checkbox"/> ≤ 1 m	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> YES with exemption	Confirmed during site visit
	How many springs are within 100 m of the manure storage facility or manure collection area?		None	None		<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> YES with exemption	None observed during site visit or reported in EPA database
Surface water information	How many water wells are within 100 m of the manure storage facility or manure collection area?		1	1		<input type="checkbox"/> YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> YES with exemption	Well 285127 is 14 m south of the west row of feedlot pens.
	What is the shortest distance from the manure collection or storage facility to a surface water body? (e.g., lake, creek, slough, seasonal)		31 m	31 m		<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> YES with exemption	33 m from feedlot pens to Crowfoot Creek
Groundwater information	What is the depth to the water table?		3 m	3 m		<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> YES with exemption	Shallowest is in the area of Borehole 1: 2.55 m blg. All other boreholes are >4.7 m blg (blg=below ground level)
	What is the depth to the groundwater resource/aquifer you draw water from?		10.97	10.97		<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> YES with exemption	10.97 m blg (well log attached below)

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

Well ID: 285127

The water table is variable in the area of catch basin #1. It is at a depth of 2.55 m in borehole 1 but below the drilling zone in borehole 2.



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

**ERST** for **proposed** facilities

Facility	Groundwater score	Surface water score	File number
Feedlot pens	low	low	LA24030
Catch basin 1	low	low	LA24030
Catch basin 2	low	low	LA24030

**ERST** for **existing** facilities

Facility	Groundwater score	Surface water score	File number
Dairy EMS	low	low	LA24030
Chicken barn	low	low	LA24030

**ERST related comments:**

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**NRCB USE ONLY**

**WATER WELL AND SURFACE WATER INFORMATION**

Well IDs:           ID 285127           \_\_\_\_\_  
 \_\_\_\_\_

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        **All proposed facilities are further away than 30 m from Crowfood Creek**

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 285127	10 (see below)	13	Feedlot pens

**Groundwater or surface water related comments:**

Explanation of score: The primary screening score evaluates the risk for contamination of groundwater considering the construction of the well, including age, bottom of seal, seal type and general information. With a score of 10 or higher, a secondary evaluation is required. This assessment considers information that relates to the water well in respect to the MSF such as direction of groundwater flow and potential run-on. The assessment found that the risk for this well to serve as a conduit to contaminate groundwater is low and monitoring is less likely. However, due to the closeness, I determined that - as a precautionary measure - water well testing is required.



# Water Well Drilling Report

[View in Imperial](#) [Export to Excel](#)

GIC Well ID 285127  
GoA Well Tag No.  
Drilling Company Well ID  
Date Report Received 1996/05/14

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

Well Identification and Location						Measurement in Metric	
Owner Name CLUNY VALLEY COLONY (DUCKWELL)	Address P.O. BOX 70 CLUNY		Town	Province	Country	Postal Code T0J 0S0	
Location 1/4 or LSD NE	SEC 7	TWP 22	RGE 20	W of MER 4	Lot	Block	Plan
Measured from Boundary of			GPS Coordinates in Decimal Degrees (NAD 83)			Elevation _____ m	
_____ m from			Latitude 50.859674 Longitude -112.757000			How Elevation Obtained	
_____ m from			How Location Obtained			Not Obtained	
Map							

Drilling Information	
Method of Drilling Rotary	Type of Work New Well
Proposed Well Use Domestic	

Formation Log		Measurement in Metric
Depth from ground level (m)	Water Bearing	Lithology Description
2.44		Brown Clay
3.05		Gravel
10.97		Blue Clay
11.58	Yes	Water Bearing Gravel
18.29		Gray Shale & Coal

Yield Test Summary			Measurement in Metric
Recommended Pump Rate		36.37 L/min	
Test Date	Water Removal Rate (L/min)	Static Water Level (m)	
1996/04/12	36.37	3.81	

Well Completion				Measurement in Metric
Total Depth Drilled	Finished Well Depth	Start Date	End Date	
18.29 m		1996/04/10	1996/04/11	
<b>Borehole</b>				
Diameter (cm)	From (m)	To (m)		
0.00	0.00	18.29		
<b>Surface Casing (if applicable)</b>		<b>Well Casing/Liner</b>		
		Steel		
Size OD :	0.00 cm	Size OD :	14.12 cm	
Wall Thickness :	0.000 cm	Wall Thickness :	0.478 cm	
Bottom at :	0.00 m	Top at :	0.00 m	
		Bottom at :	18.29 m	
<b>Perforations</b>				
From (m)	To (m)	Diameter or Slot Width (cm)	Slot Length (cm)	Hole or Slot Interval (cm)
10.06	11.58	0.318		25.40
Perforated by Torch				
<b>Annular Seal</b> Bentonite Chips/Tablets				
Placed from 0.00 m to 7.62 m				
Amount _____				
<b>Other Seals</b>				
Type		At (m)		
<b>Screen Type</b>				
Size OD : 0.00 cm				
From (m)	To (m)	Slot Size (cm)		
Attachment _____				
Top Fittings _____		Bottom Fittings _____		
<b>Pack</b>				
Type _____		Grain Size _____		
Amount _____				

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

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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
Aldon & Chiella Kurchu	22-20 S3 W9	2420 m	AG	1	>2 km		yes

### 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)
			Total		

As per text:  
 Section 10 - 22-20 Dry  
 8 - 22-20 irr  
 15 - 22-20 dry  
 16 - 22-20 dry  
 22-22-20 irr  
 => 1920 acres dry  
 1120 acres irr

\* If you are **not** the landowner, you must have written agreements signed by all landowners.  
 \*\* Available manure spreading capacity (ha) of the land, excluding wetlands, streams, common bodies of water, water wells, etc. as identified in Agdex 096-5 [Manure Spreading Regulations](#)  
 \*\*\* Brown, dark brown, or black soil zones

Additional information

This equals a total of 4120 acres of dryland (only of the purpose to calculate the required land base for manure spreading)

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## NRCB USE ONLY

### MINIMUM DISTANCE SEPARATION

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

Margin of error (if applicable): +/- 3 m

Requirements (m): Category 1: 546 m Category 2: 728 m Category 3: 910 m Category 4: 1457 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: 1705 acres dry land

Land base listed: equivalent of 4120 acres dry land

Area not suitable: \_\_\_\_\_

Available area > 4000 acres dryland

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 LA03021

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**NRCB USE ONLY**

**ALL SIGNATURES IN FILE**

YES  NO

**DATES OF APPROVAL OFFICER SITE VISITS**

October 4, 2024	

**CORRESPONDENCE WITH MUNICIPALITIES AND REFERRAL AGENCIES**

Date deeming letters sent: October 30, 2024

**Municipality:** Wheatland County

letter sent       response received       written/email       verbal       no comments received

**Alberta Health Services:** NA

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:** Prairie Sky Royalty Ltd; Pioneer Gas Coop Ltd; Lynx Energy ULC  N/A

letter sent       response received       written/email       verbal       no comments received

**Other:** Western Irrigation District  N/A

letter sent       response received       written/email       verbal       no comments received

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## SOLID MANURE, COMPOST, & COMPOSTING MATERIALS: Barns, feedlots, & storage facilities - Naturally occurring protective layer

*(complete a copy of this section for EACH barn, feedlot, and storage facility for solid manure, composting materials, or compost with a naturally occurring protective layer for the liner)*

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

1. West Pens
2. East Pens

### Manure storage capacity

	Length (m)	Width (m)	Depth below ground level (m)	<b>NRCB USE ONLY</b> Estimated storage capacity (m <sup>3</sup> )
1.	61	182	0	
2.	<del>XXX</del> 121 m	<del>XXXX</del> 188 m	0	
TOTAL CAPACITY				9 mth storage in place

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

Catch Basins

### Naturally occurring protective layer details

Thickness of naturally occurring protective layer	_____ (m)	Provide details (as required)		
		<u>see report</u>		
Soil texture	_____ % sand	_____ % silt	_____ % clay	
Hydraulic conductivity - naturally occurring protective layer	Depth and type of soil tested	Hydraulic conductivity (cm/s)	Describe test standard used	

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

#### NRCB USE ONLY

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

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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 East
2. West
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.	45	32	2.5	2.5	3:1	3:1		1680 m <sup>3</sup>
2.	35	22	2.5	2.5	3:1	3:1		700 m <sup>3</sup>
3.								
TOTAL CAPACITY								2380 m <sup>3</sup>

### Naturally occurring protective layer details

Thickness of naturally occurring protective layer	_____ (m)	Provide details (as required) <b>Soil texture varies strongly between samples</b>	
Soil texture	<b>14.1-55.9</b> % sand	<b>13.1-39.2</b> % silt	<b>31-55</b> % clay
Hydraulic conductivity - naturally occurring protective layer	Depth and type of soil tested	Hydraulic conductivity (cm/s) <b>East: 9.9E-09</b> <b>West: 5.3E-09</b>	Describe test standard used <b>Modified falling head test</b>

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



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

#### NRCB USE ONLY

Catch basin calculator. Total volume @ freeboard level: 2380 m<sup>3</sup> Runoff capacity requirements met:  YES  NO

Calculation of the volume attached:  YES  NO

Depth to water table: 2.55 m blg Requirements met:  YES  NO

Depth to uppermost groundwater resource: 10.97 m blg Requirements met:  YES  NO

ERST completed:  See ERST page for details [blg=below ground level]

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

Generally clay loam with some gravel overlaying shallow bedrock (mainly mudstone) at a depth between 1.2 - 2.7 m in most areas.

Perched water in borehole 1 (in the area of catch basin east) at a depth of 2.55 m. A condition will be added.

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

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<b>NRCB USE ONLY</b>	
<b>RUNOFF CONTROL CATCH BASIN CAPACITY SUMMARY (if applicable)</b>	
<b>Facility 1</b>	
Name / description	catch basin west
Capacity	700 m <sup>3</sup>
<b>Facility 2</b>	
Name / description	catch basin east
Capacity	1680 m <sup>3</sup>
<b>Facility 3</b>	
Name / description	
Capacity	
<b>Facility 4</b>	
Name / description	
Capacity	
<b>TOTAL CAPACITY</b>	<b>2380 m<sup>3</sup></b>
<b>RUNOFF VOLUME FROM CONTRIBUTING AREAS</b>	<b>2347 m<sup>3</sup></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*	45.0 m
Total Width*	32.0 m
Total Depth*	2.5 m
Design Capacity Depth	2.00 m
End Slope*	run:rise
Side Slope*	run:rise
Length of Bottom	30.0 m
Width of Bottom	17.0 m

Capacity @ top of Bank 2,344 m<sup>3</sup>

### Catch Basin Dimensions

148 ft
106 ft
8 ft
7 ft
3 run:rise
3 run:rise
3 run:rise
98 ft
56 ft

Capacity (@top)

62,769 ft<sup>3</sup>  
515,563 Imp. Gal.

### Design Capacity of Catch Basin (freeboard level)

Length (design capacity depth)	42.0 m
Width (design capacity depth)	29.0 m
Total Depth	2.5 m
Design Capacity Depth	2.00 m
End Slope	3 run:rise
Side Slope	3 run:rise

Design Capacity (freeboard level) 1,680 m<sup>3</sup>

level) 1,218 m<sup>3</sup>

### Design Capacity (freeboard level)

138 ft
95 ft
8 ft
7 ft
3 run:rise
3 run:rise
3 run:rise

59,329 ft<sup>3</sup>

369,548 Imp. Gal.

13,110 ft<sup>3</sup>

CFO Name : Colony Colony - East Park  
Land Location : NB-732-20-014

East Row (121 m x 188 m)

### Paved Runoff Catchment Area(s)

Area #	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 #	Length (m)	Width (m)	Area (m <sup>2</sup> )
6	235	125	32,375.0
7			0.0
8			0.0
9			0.0
10			0.0
Total Area (m <sup>2</sup> )			32,375

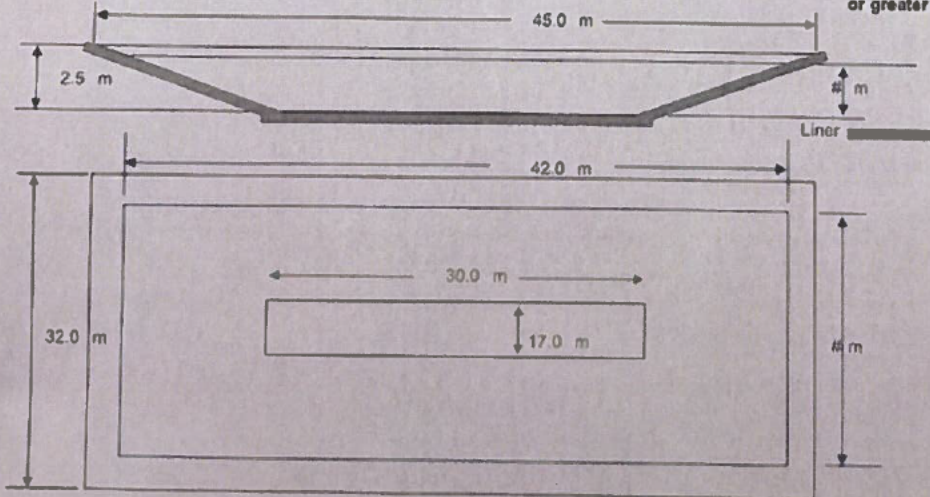
### Rainfall (Select Town)

AOPA Design Rainfall 85 mm

### Minimum Catchbasin Storage Volume Required

1,651 m<sup>3</sup>\*\* 58308.929 ft<sup>3</sup>  
363196.58 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

# Catch Basin Storage Volume Calculator

Construction Dimensions of Catch Basin	
Only cells in blue can be changed.	
Overall Dimensions of Catch Basin	
Total Length*	33.0 m
Total Width*	22.0 m
Total Depth*	2.5 m
Design Capacity Depth	2.00 m
End Slope*	run:rise
Side Slope*	run:rise
Length of Bottom	20.0 m
Width of Bottom	7.0 m
Capacity @ top of Bank	1,044 m <sup>3</sup>
Design Capacity of Catch Basin (freeboard level)	
Length (design capacity depth)	32.0 m
Width (design capacity depth)	19.0 m
Total Depth	2.5 m
Design Capacity Depth	2.00 m
End Slope	3 run:rise
Side Slope	3 run:rise
Design Capacity (freeboard level)	700 m <sup>3</sup>
Level	608 m <sup>2</sup>

CFO Name : Cherry Colony - West Point  
 Land Location : NE-4230 Ave

West Row (55 m x 183 m)

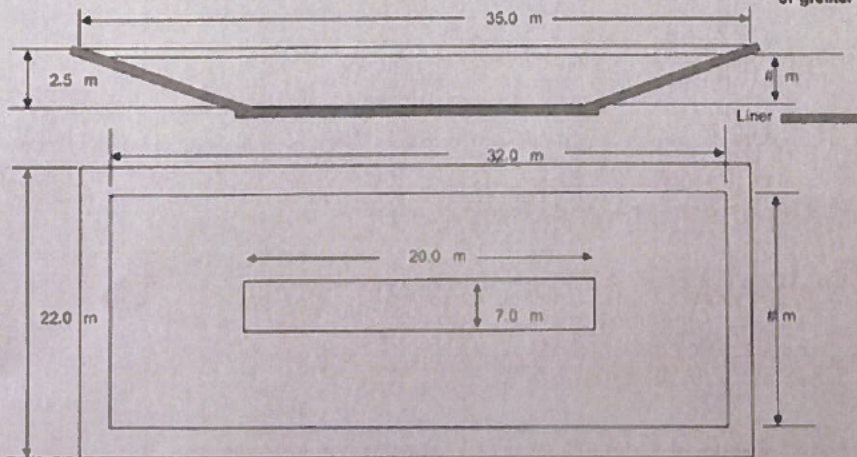
Paved Runoff Catchment Area(s)			
Area #	Length (m)	Width (m)	Area (m <sup>2</sup> )
1			0.0
2			0.0
3			0.0
4			0.0
5			0.0
Total Area (m <sup>2</sup> )			0

Unpaved Runoff Catchment Area(s)			
Area #	Length (m)	Width (m)	Area (m <sup>2</sup> )
6			11,700.0
7			1,950.0
8			0.0
9			0.0
10			0.0
Total Area (m <sup>2</sup> )			13,650

Rainfall (Select Town...)  
 AOPA Design Rainfall 85 mm

Minimum Catchbasin Storage Volume Required		
696 m <sup>3</sup> **	24584.305 ft <sup>3</sup>	
	153131.53 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

18 October 2024

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

JLECS File: P24037

**Hutterian Brethren Church of Cluny**

PO Box 70  
Cluny, Alberta T0J 0S0

Attention: Mr. Joel Tschetter

**Re:                   Geotechnical Review and Evaluation  
                      NRCB Permitting of Pens and Catch Basins  
                      NE-07-022-20-W4M, near Cluny, 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 site soil conditions to support a permit application related to a series of existing pens and a catch basin within NE-07-022-20-W4M, located along the east side of Crowfoot Creek (refer to Figure 1, attached). The letter also encompasses a proposed catch basin to be located near the northwest corner of the pens, which would capture surface runoff from the west three pens.

In order to demonstrate the suitability of the naturally existing soils for consideration as a naturally occurring protective layer to the groundwater, eleven boreholes were advanced at the site on July 30, 2024. The boreholes were advanced at the approximate locations denoted as CC1-24 to CC11-24 on Figure 1, attached. Borehole CC2-24 was redrilled on September 23, 2024, at which time a permeability test well was installed.

The boreholes were advanced by a truck-mounted drill rig owned and operated by Chilako Drilling Services and extended to depths of 3.9 m to 6.0 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 a layer of minor clay fill (with localized gravel fill), overlying clay till, with bedrock (predominately mudstone) below 1.5 m to 2.7 m below existing grades. While perched water was noted in gravelly clay till at about 2.5 depth at borehole CC1-24, no groundwater resource (as defined by the AOPA) was identified within the 6.0 m investigation depth at the feedlot site.

Samples of soil collected from the screened zones of boreholes CC3-24, CC7-24, and CC10-24 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 results indicate a soil texture breakdown of:

**Table 1: Soil Texture Analyses**

Borehole/Depth	% Sand	% Silt	% Clay
CC1-24 / 3.0 – 4.5 m	34	26	40
CC2-24 / 2.0 – 2.5 m	29	32	39
CC3-24 / 1.5 – 3.0 m	56	13	31
CC3-24 / 4.5 – 6.0 m	16	32	52
CC5-24 / 4.5 – 5.5 m	42	19	39
CC6-24 / 1.7 – 2.2 m	42	20	38
CC7-24 / 1.5 – 2.0 m	27	32	41
CC8-24 / 1.5 – 2.0 m	28	39	33
CC9-24 / 1.5 – 2.0 m	14	31	55
CC10-24 / 1.5 – 2.0 m	39	26	35
Average:	33	27	40

To measure the *in situ* permeability of the subsurface soils, 50 mm diameter PVC monitoring wells were constructed in boreholes CC2-23, CC3-24, CC7-24 and CC10-24. Test well CC2-24 (existing north catch basin) was screened from 2.9 m to 4.9 m depth, CC3-24 (proposed NW catch basin) was screened from 2.8 m to 6.0 m depth, and test wells CC7-24 and CC10-24 (pen area) were screened from 0.9 m to 2.0 m (CC7-24) and 1.4 m to 3.0 m (CC10-24). Well saturation of the 50 mm diameter monitoring wells was carried out by filling the monitoring wells to the top for several consecutive days. After several days of testing, 24-hour water drops of 0.10 m was determined at CC2-24 and CC3-24, 0.43 m at CC7-24, and a 24-hr drop of 0.91 at CC10-24.

To calculate the permeability of the screened portion of the clay till 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  $9.9 \times 10^{-9}$  cm/s at CC2-24,  $5.3 \times 10^{-9}$  cm/s at CC3-24,  $1.6 \times 10^{-7}$  cm/s at CC7-24, and  $1.9 \times 10^{-7}$  cm/s at CC10-24.

Using the measured permeability of the clay stratum, the 1.6 m of clay screened at CC2-24 and the 3.2 m of clay screened at CC3-24 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). At CC7-10, the 1.1 m of clay screened is estimated to represent the equivalent of about 7 m of naturally occurring materials having a hydraulic conductivity of  $1 \times 10^{-6}$  cm/s, and at CC10-24, the 1.6 m of clay screened estimated to represent the equivalent of about 8 m of naturally occurring materials having a hydraulic conductivity of  $1 \times 10^{-6}$  cm/s. 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) and solid manure storage (minimum 2 m, Section 9.5-c).

**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 pens and catch basin at this location.

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, P.Eng.  
Principal Geotechnical Engineer

<b>PERMIT TO PRACTICE</b>	
<b>J LOBBEZOO ENGINEERING &amp; CONSULTING SERVICES LTD.</b>	
RM SIGNATURE:	
RM APEGA ID #:	110150
DATE:	18 Oct 2024
<b>PERMIT NUMBER: P016456</b>	
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)	

**Attachments**

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



Figure 1: Site Layout & Borehole Locations

Image Credit: Google



CC2-24

### In Situ Permeability Test

Modified Falling Head Permeability Equation

$$K_s = \frac{r^2}{2\ell\Delta t} \left[ \frac{\sinh^{-1} \frac{\ell}{r_e}}{2} \ln \left[ \frac{2H_1 - \ell}{2H_2 - \ell} \right] - \ln \left[ \frac{2H_1H_2 - \ell H_2}{2H_1H_2 - \ell H_1} \right] \right]$$

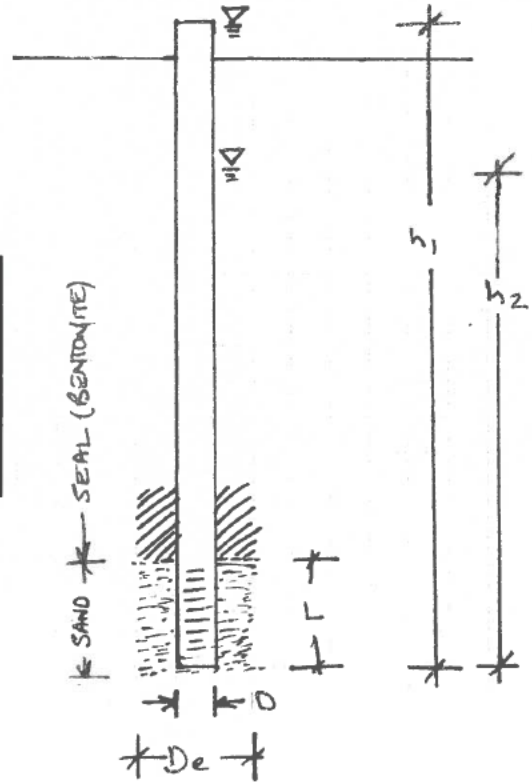
taken from USBR Engineering Geology Field Manual Volume 2 (2001)

CC2-24 - Cluny Colony

JLECS File: P24037

INPUT VARIABLES	Terms	Value	Definition
	D	0.0520	diameter of standpipe (m)
	De	0.1500	diameter of borehole (m)
	L	1.60	length of sand section (m)
	h1	5.10	initial height of water above base of hole (m)
	h2	5.00	final height of water above base of hole (m)
t	24.0	time of test (h)	

$k_s = 9.9E-09$  cm/sec



CC3-24

### In Situ Permeability Test

Modified Falling Head Permeability Equation

$$K_s = \frac{r^2}{2\ell\Delta t} \left[ \frac{\sinh^{-1} \frac{\ell}{r_e}}{2} \ln \left[ \frac{2H_1 - \ell}{2H_2 - \ell} \right] - \ln \left[ \frac{2H_1H_2 - \ell H_2}{2H_1H_2 - \ell H_1} \right] \right]$$

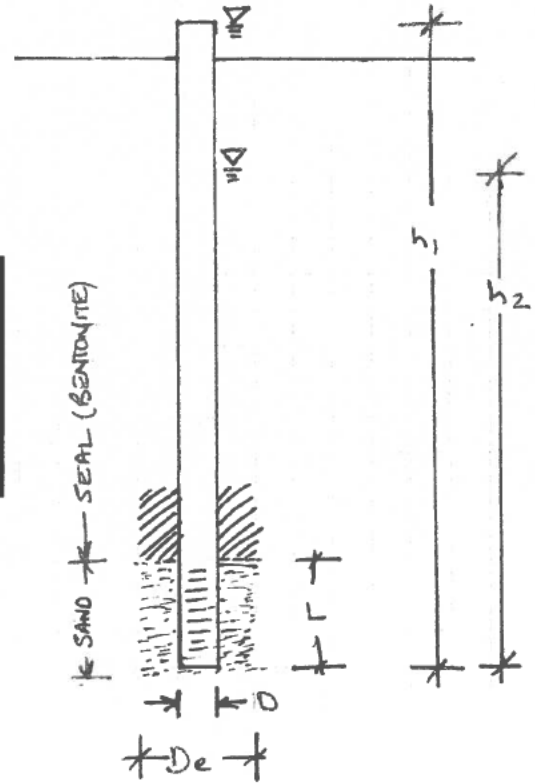
taken from USBR Engineering Geology Field Manual Volume 2 (2001)

CC3-24 - Cluny Colony

JLECS File: P24037

INPUT VARIABLES	Terms	Value	Definition
	D	0.0520	diameter of standpipe (m)
	De	0.1500	diameter of borehole (m)
	L	3.20	length of sand section (m)
	h1	6.15	initial height of water above base of hole (m)
	h2	6.05	final height of water above base of hole (m)
	t	24.0	time of test (h)

$k_s = 5.3E-09 \text{ cm/sec}$
--------------------------------



CC7-24

### In Situ Permeability Test

Modified Falling Head Permeability Equation

$$K_s = \frac{r^2}{2\ell\Delta t} \left[ \frac{\sinh^{-1} \frac{\ell}{r_e}}{2} \ln \left[ \frac{2H_1 - \ell}{2H_2 - \ell} \right] - \ln \left[ \frac{2H_1H_2 - \ell H_2}{2H_1H_2 - \ell H_1} \right] \right]$$

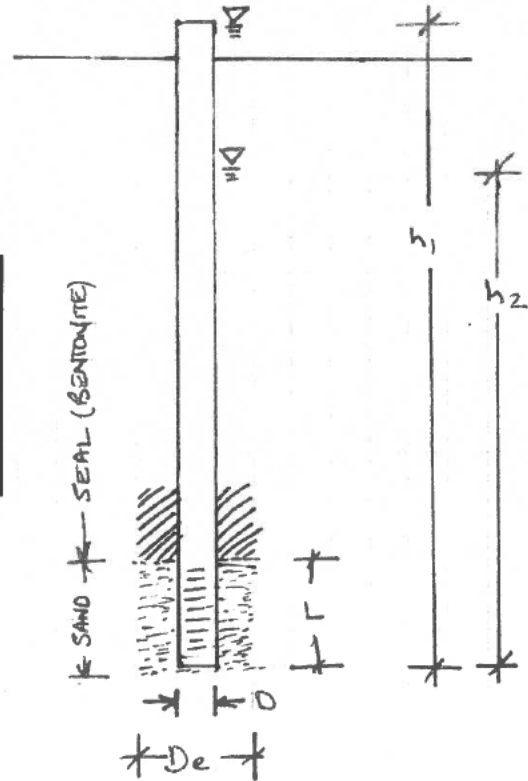
taken from USBR Engineering Geology Field Manual Volume 2 (2001)

CC7-24 - Cluny Colony

JLECS File: P24037

INPUT VARIABLES	Terms	Value	Definition
	D	0.0520	diameter of standpipe (m)
	De	0.1500	diameter of borehole (m)
	L	1.10	length of sand section (m)
	h1	2.15	initial height of water above base of hole (m)
	h2	1.72	final height of water above base of hole (m)
t	24.0	time of test (h)	

$k_s = 1.6E-07$  cm/sec



CC10-24

### In Situ Permeability Test

Modified Falling Head Permeability Equation

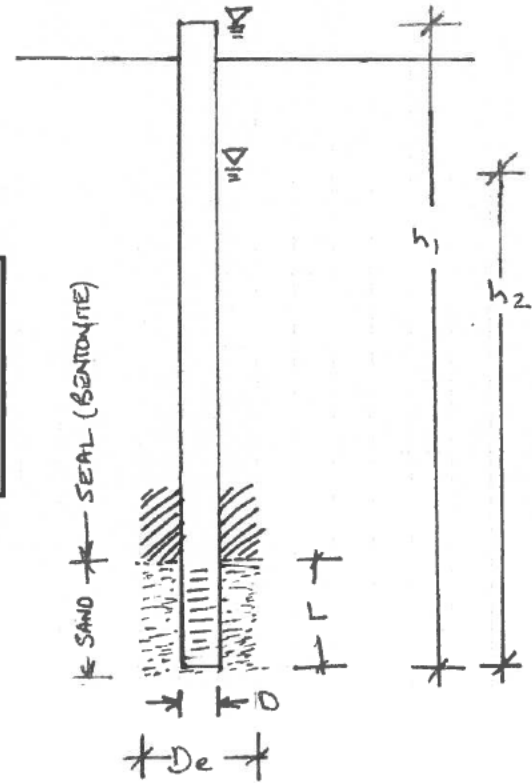
$$K_s = \frac{r^2}{2\ell\Delta t} \left[ \frac{\sinh^{-1} \frac{\ell}{r_e}}{2} \ln \left[ \frac{2H_1 - \ell}{2H_2 - \ell} \right] - \ln \left[ \frac{2H_1H_2 - \ell H_2}{2H_1H_2 - \ell H_1} \right] \right]$$

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

CC10-24 - Cluny Colony  
JLECS File: P24037

INPUT VARIABLES	Terms	Value	Definition
	D	0.0520	diameter of standpipe (m)
	De	0.1500	diameter of borehole (m)
	L	1.60	length of sand section (m)
	h1	3.15	initial height of water above base of hole (m)
	h2	2.24	final height of water above base of hole (m)
t	24.0	time of test (h)	

$k_s = 1.9E-07$  cm/sec





# Down To Earth Labs Inc.

The Science of Higher Yields

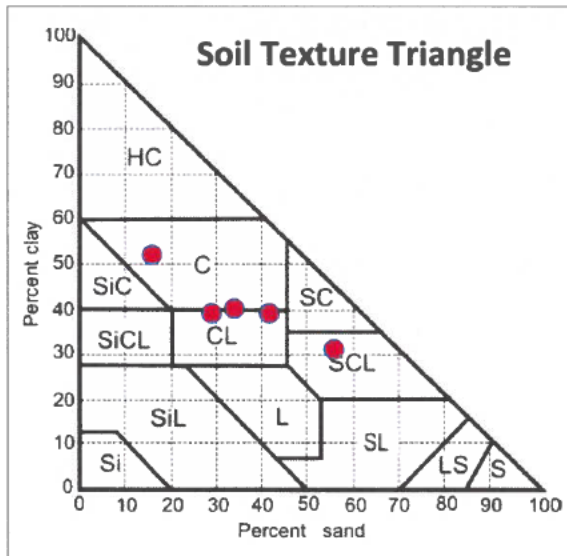
J. Lobbezo Engineering +  
Consulting Services  
Box 96  
Monarch, Alberta T0L 1M0

**Report #:** 184775  
**Report Date:** 2024-08-13  
**Received:** 2024-08-09  
**Completed:** 2024-08-13  
**Test Done:** ST

**Project :**  
Cluny Colony  
  
**PO:**

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

		Sample ID: 240809I017	240809I018	240809I019	240809I020	240809I021
	Cust. Sample ID:	CC1	CC2	CC3	CC3	CC5
Analyte	Units	3-3.6m	2-2.5m	4.5-6m	1.5-3m	4.5-5.5m
Sand	%	34.1	29.1	55.9	16.0	41.8
Silt	%	25.9	31.9	13.1	32.0	19.2
Clay	%	40.0	39.0	31.0	52.0	39.0
Soil Texture	-	Clay	Clay Loam	Sandy Clay Loam	Clay	Clay Loam





# Down To Earth Labs Inc.

The Science of Higher Yields

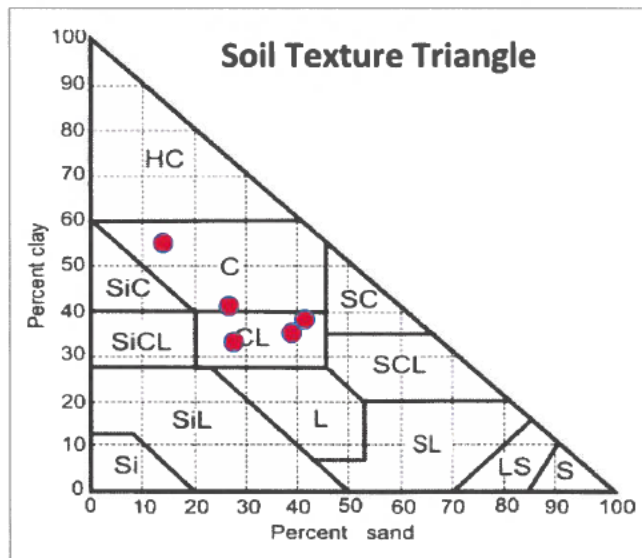
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403-328-1133  
www.downtoearthlabs.com  
info@downtoearthlabs.com

Sample ID:	2408091022	2408091023	2408091024	2408091025	2408091026
Cust. Sample ID:	CC6	CC7	CC8	CC9	CC10
Analyte Units	1.7-2.2m	1.5-2.0	1.5-2.0	1.5-2.0	1.5-2.0
Sand %	41.6	26.9	27.8	14.1	39.1
Silt %	20.4	32.1	39.2	30.9	25.9
Clay %	38.0	41.0	33.0	55.0	35.0
Soil Texture	Clay Loam	Clay	Clay Loam	Clay	Clay Loam



Raygan Boyce - Chemist

# CHILAKO DRILLING SERVICES LTD

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

## SOIL PROFILE AND PARENT MATERIAL DESCRIPTION

Site Location: NE7-22-20W4, Cluny Colony

Date: 30-Jul-24

Hole #	Location	Depth	Texture	Moisture	Geological	Sample	Remarks
CC1-24	0376564 5635809	0-0.9	CL	SM	Till		
		0.9-1.5	CL	M	Till		
		1.5-2.1	CL+Gr	M	Till		Clay mixed with gravel
		2.1-2.7	CL+Gr	Sat	Till		Clay mixed with gravel
		2.7-3.0	Sandstone	D	Bedrock		Soft bedrock, light gray
		3.0-3.6	Mudstone	SM	Bedrock		Soft bedrock, dark gray
		3.6-3.9	Siltstone	D	Bedrock		Hard bedrock, gray Auger refusal, free water @ 2.55m
CC2-24	0376506 5635825	0-1.2	CL-SCL	D	Fill		
		1.2-1.9	CL	SM	Till		
		1.9-4.5	Mudstone	SM	Bedrock	2.0-2.5	Layers of siltstone, mudstone, and sandstone, hard drilling
		4.5-4.7	Siltstone	D	Bedrock		<b>Well Installed 23-Sep-24</b>
		4.7-6.0	Coal	Sat	Bedrock		50mm H.C. Well installed to 4.5m BGS Screen: 4.5-3.0m Sand: 4.5-2.9m Bentonite: 2.0-0.0m Stickup: 0.6m Hole Diameter: 0.15m
CC3-24	0376376 5635793	0-0.8	CL	D	Till		
		0.8-1.0	CL+Gr	SM	Till		
		1.0-1.2	CL	SM	Till		
		1.2-3.0	Mudstone	SM	Bedrock	1.5-3.0	Soft bedrock, dark brown
		3.0-4.6	Mudstone	M	Bedrock		Soft bedrock, layers of siltstone, and mustone, olive brown
		4.6-6.0	Siltstone	M	Bedrock	4.5-6.0	Hard bedrock @ 6.0m, bentonite layers 50mm H.C. Well installed to 6.0m BGS Screen: 6.0-3.0m Sand: 6.0-2.8m Bentonite: 2.8-0.0m Stickup: 0.6m Hole Diameter: 0.15m
CC4-24	0376385 5635749	0-1.0	Gravel	D	Fill		Gravel and rock backfill Auger refusal @ 1.0m
CC5-24	0376389 5635757	0-0.7	CL-SiCL	SM	Till		V. Firm, med plastic
		0.7-1.5	CL	M	Till		V. Firm, med plastic, some gravel
		1.5-6.0	Mudstone	M	Bedrock	4.5-5.5	Soft, bedrock, dark brown, layered mudstone, siltstone, bentonitic layers No free water

**SOIL PROFILE AND PARENT MATERIAL DESCRIPTION (Continued)**

Hole #	Location	Depth	Texture	Moisture	Geological	Sample	Remarks
CC6-24	0376385 5635651	0-1.2	CL	M	Fill	1.7-2.2	Very oxidized
		1.2-1.6	CL	M	Till		
		1.6-2.5	Mudstone	M	Bedrock		
		2.5-3.3	Mudstone	VM-Sat	Bedrock		
		3.3-4.0	Coal	D	Bedrock		
CC7-24	0376445 5635608	0-1.0	CL	M	Till	1.5-2.0	Stiff, med plastic, grayish brown Stiff, med plastic, dark brown 50mm H.C. Well installed to 2.0m BGS Screen: 2.0-1.0m Sand: 2.0-0.9m Bentonite: 0.9-0.0m Stickup: 0.6m Hole Diameter: 0.15m
		1.0-2.0	CL-C	M	Till		
CC8-24	0376451 5635821	0-2.1	CL	SM	Till	1.5-2.0	Stiff, med plastic, brown Stiff, med plastic, dark brown, trace coal
		2.1-3.0	Mudstone	SM	Till		
CC9-24	0376504 5635774	0-0.7	CL	D	Till	1.5-2.0	Stiff, med plastic, dark brown Soft bedrock, dark brown Soft bedrock, olive brown
		0.7-2.3	CL-C	SM	Till		
		2.3-2.6	Mudstone	SM	Bedrock		
		2.6-3.0	Siltstone	SM	Bedrock		
CC10-24	0376588 5635684	0-0.3	CL	SM	Fill	1.5-2.0	V. Firm-stiff, med plastic, sand streaks 50mm H.C. Well installed to 3.0m BGS Screen: 3.0-1.5m Sand: 3.0-1.4m Bentonite: 1.4-0.0m Stickup: 0.6m Hole Diameter: 0.15m
		0.3-3.0	CL	M-VM	Till		
CC11-24	0376587 5635596 On hill	0-1.2	CL	D	Till		Stiff, med plastic, brown Stiff, med plastic, dark brown
		1.2-1.6	CL-SiCL	D	Till		
		1.6-4.5	CL-C	SM	Till		

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

Eg. VFSCl = Very Fine Sandy Clay Loam