

## 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

**LA25038**

**NW 14-10-22 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.

March 19th

Date of signing

Slingerland Cattle LTD

Corporate name (if applicable)

Signature

Ken Slingerland

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)
4 east pens expansion	235' x 300'
East catch basin (currently a dugout)	41 m x 41 m x 5.5 m deep
New proposal of 4 corrals	370 ft x 260 ft

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

Existing facilities	Dimensions (m) (length, width, and depth)	NRCB USE ONLY
Original north row of 6 corrals	710 ft x 218 ft	
Original middle row of 6 corrals	710 ft x 202 ft	
Original south row of 4 corrals	310 ft x 180 ft	

### NRCB USE ONLY

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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 Oct 15th 2025

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

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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*

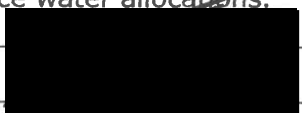
#### **OPTION 1: Applying through the NRCB for both the AOPA permit and the Water Act licence**

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

Signed this 19 day of March, 2025.

  
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 19 day of March, 2025.

  
Signature of Applicant or Agent

AO note May 13, 2025: Confirmed with applicant that they choose "Option 2" and will apply for more water for the proposed expansion from the LNID

#### **OPTION 3: Additional water licence not required**

1. I (we) declare that the CFO will not need a new licence from EPA under the *Water Act* for the development or activity proposed in this AOPA application.
2. **Provide:** Water license number(s) or water conveyance agreement details \_\_\_\_\_

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

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



## Part 2 — Technical Requirements

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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 19 day of March, 2025.

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

7:51

LTE+ 27%



Search Google Earth

R



New 4  
Pens



Catch  
basin



Water  
Storage



North



3D



## Part 2 — Technical Requirements

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

### GENERAL ENVIRONMENTAL INFORMATION

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

Facility description / name (as indicated on site plan)

Existing: \_\_\_\_\_

Proposed 1: \_\_\_\_\_

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 checked="" type="checkbox"/> > 1 m <input type="checkbox"/> ≤ 1 m	<input type="checkbox"/> > 1 m <input type="checkbox"/> ≤ 1 m	<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> YES with exemption	
Surface water information	How many springs are within 100 m of the manure storage facility or manure collection area?	none	none	none		<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> YES with exemption	
	How many water wells are within 100 m of the manure storage facility or manure collection area?	none	none	none		<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> YES with exemption	
	What is the shortest distance from the manure collection or storage facility to a surface water body? (e.g., lake, creek, slough, seasonal)	2 km Parklake				<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> YES with exemption	
Groundwater information	What is the depth to the water table?					<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> YES with exemption	
	What is the depth to the groundwater resource/aquifer you draw water from?	below 10 m	below 10m	below 10m		<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> YES with exemption	

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

-no wells in area

## Part 2 — Technical Requirements

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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)
Park Lake Feeders		470 m				
Beyer Dairy		770 m				
Jaco Beyer		310 m				
Pete Heins		850 m				

### 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)
Slingerland Cattle LTD	NW 14 10 22 w4	120 acre			
Slingerland Cattle LTD	NW 13-11-22 w4	150 acre			
Slingerland Cattle LTD	S 1/2 14-13-24 w4	320 acre			
Slingerland Cattle LTD	NE 13-12-15 w4	160 acres			
Slingerland Cattle LTD	SE 24-12-25 w4	160 acres			
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)**



## Minimum Distance Separation (MDS) Waiver (declaration)

Applicant information

NRCB application number: \_\_\_\_\_

Operator/operation name: Slingerland cattle Ltd

Address: Box 72 Diamond city Postal Code: Tokoto

Legal land location of confined feeding operation: NW 14-10-22 W4

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](http://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:

To Add 4 pens to the east of existing CFO  
To increase permits to 5000 feeders  
K.S E.B

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

Increase to 5000 Feeders  
K.S E.B

- 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):

Add 4 pens to the east

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

Permit Applicant: \_\_\_\_\_

Date: March 26

Residence owner(s) to initial: \_\_\_\_\_



## Minimum Distance Separation (MDS) Waiver (declaration)

Residence owner(s) information

ALL Names on land title: Evert BEIJER

Legal land location of residence(s): SE-15-10-22-004

Telephone number(s): [REDACTED] Email address(es): [REDACTED]

Address(es)<sup>1</sup> and Postal code(s): Box 1200 coalhurst  
TOL000

<sup>1</sup> 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: [REDACTED]

Signature: [REDACTED]

Printed names of all residence owner(s) on title

Date: April 7 2025



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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. Slingerland cattle Ltd
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.	<u>new pens</u> <u>113</u>	<u>80</u>	<u>0</u>	
2.	<u>no solid manure storage needed</u>			
	<u>235'</u>	<u>300'</u>	<b>TOTAL CAPACITY</b>	

☐ I plan to use a short-term solid manure storage (STMS) as part of my manure storage and handling plan for this CFO. (The AOPA requirements for STMS are set out in the NRCB Short-Term Solid Manure Storage Requirements Fact Sheet.)

#### Surface water control systems

Describe the run-on and runoff control system

The original corrals are setup that the runoff goes west to the catch basin

The new proposal, for the 4 corrals - 725 hd the run off will go directly into the catch basin east of the corrals

#### Naturally occurring protective layer details

Thickness of naturally occurring protective layer	_____ (m)	Provide details (as required) <u>see attached 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

## 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: 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. West Catch Basin (Original)

2. New Catch Basin (East)

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) ft	Width (m) ft	Total depth ft	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.	165	115	18		3:1	3:1	4:1	
2.	135	135	18		3:1	3:1	4:1	
3.								
TOTAL CAPACITY								

#### Naturally occurring protective layer details

Thickness of naturally occurring protective layer	_____ (m)	Provide details (as required) <i>see Attached report</i>	
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

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

8 May 2025

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

PO Box 96, Monarch, AB T0L1M0

JLECS File: P25035

**Slingerland Cattle Ltd**

PO Box 72

Diamond City, AB T0K 0T0

Attention: Mr. Ken Slingerland

**Re: Geotechnical Review and Evaluation  
NRCB Permitting of Proposed Pens & Catch Basin  
NW-14-010-22-W4M, near Diamond City, 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 a series of proposed pens as well as a proposed catch basin at the above captioned site (refer to Figure 1, attached). It is noted that the proposed catch basin was already present (former dugout or lagoon).

In order to demonstrate the suitability of the naturally existing soils for consideration as a naturally occurring protective layer to the groundwater resource, six boreholes were advanced at the site on April 28, 2025. The boreholes were advanced at the approximate locations denoted as BH25-01 to BH25-06 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 4.6 m to 9.2 m below the existing grade. The boreholes were logged by John Lobbezoo, P.Eng..

In general, the natural mineral soils encountered in the boreholes consisted of medium plastic clay till to the termination depths of all the boreholes. Neither groundwater, nor a groundwater resource (as defined by the AOPA) were encountered within the 9.2 m investigation depth at this site.

Samples of soil collected from the screened zones of boreholes BH25-02, BH25-04 and BH25-05, 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**

<b>Borehole/Depth</b>	<b>% Sand</b>	<b>% Silt</b>	<b>% Clay</b>
BH25-01 / 4.0 – 4.5 m	40	28	32
BH25-02 / 4.0 – 4.5 m	34	38	28
BH25-03 / 4.0 – 4.5m	24	22	54
BH25-04 / 4.0 – 4.5m	26	26	48
BH25-05 / 7.0 – 8.0m	30	29	41
BH25-06 / 7.0 – 8.0m	34	34	32
<i>Average:</i>	<i>31</i>	<i>30</i>	<i>39</i>

To measure the *in situ* permeability of the subsurface soils, 50 mm diameter PVC monitoring wells were constructed in boreholes BH25-02, BH25-04 and BH25-05. Test well BH25-02 was screened from 2.7 m to 5.0 m depth, BH25-04 was screened from 2.7 m to 4.6 m depth, and test well BH25-05 was screened from 5.8 m to 9.1 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, the following 24-hour water drops were determined: 1.05 m at BH25-02; 0.1 m at BH25-04; and 0.76 m at BH25-05.

To calculate the permeability of the screened portion of the clay strata at the test well location, 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 indicated an *in situ* hydraulic conductivity ( $k_s$ ) of  $9.1 \times 10^{-8}$  cm/s at BH25-02,  $8.7 \times 10^{-9}$  cm/s at BH25-04, and an *in situ* hydraulic conductivity ( $k_s$ ) of  $2.4 \times 10^{-8}$  cm/s at BH25-05.

Using the measured permeability of the clay at this site, the 2 m of clay screened at test hole BH25-02 is estimated to represent the equivalent of about 22 m of naturally occurring materials having a hydraulic conductivity of  $1 \times 10^{-6}$  cm/s (the reference standard in AOPA). At the other test holes, the 1.9 m of screened clay at BH25-04 and the 3.3 m of screened clay at BH25-05 are both estimated to represent the equivalent of over 100 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 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

### **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


<b>PERMIT TO PRACTICE</b> <b>J LOBBEZOO ENGINEERING &amp; CONSULTING SERVICES LTD.</b>	
RM SIGNATURE:	
RM APEGA ID #:	110450
DATE:	8 May 2025
<b>PERMIT NUMBER: P016456</b> The Association of Professional Engineers and Geoscientists of Alberta (APEGA)	





Figure 1: Site Layout & Borehole Locations

BH25-02

## In Situ Permeability Test

Modified Falling Head Permeability Equation

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

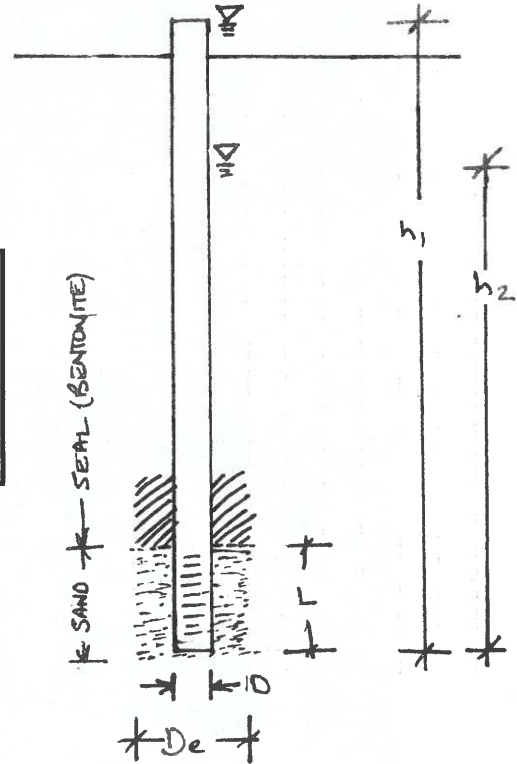
taken from USBR Engineering Geology Field Manual Volume 2 (2001)

BH25-02 - Slingerland Cattle Ltd.

JLECS File: P25035

INPUT VARIABLES	Terms	Value	Definition
	D	0.0520	diameter of standpipe (m)
	De	0.1500	diameter of borehole (m)
	L	2.00	length of sand section (m)
	h1	5.60	initial height of water above base of hole (m)
	h2	4.55	final height of water above base of hole (m)
	t	24.0	time of test (h)

$$k_s = 9.1E-08 \text{ cm/sec}$$



BH25-04

## In Situ Permeability Test

Modified Falling Head Permeability Equation

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

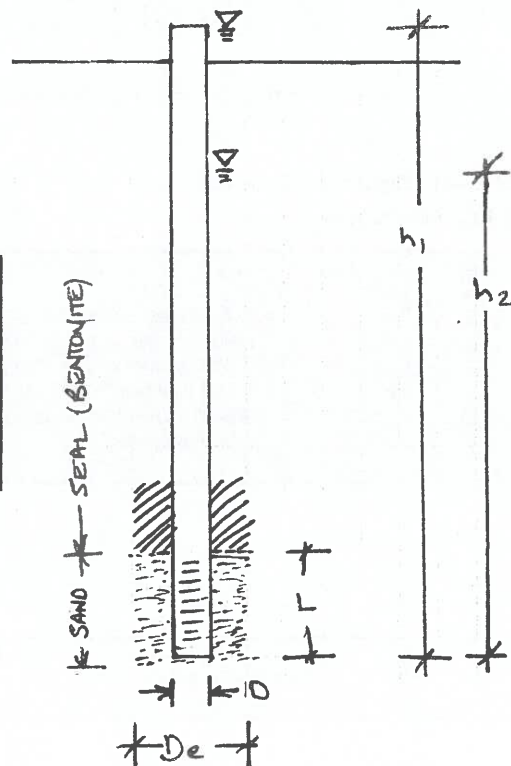
taken from USBR Engineering Geology Field Manual Volume 2 (2001)

BH25-04 - Slingerland Cattle Ltd.

JLECS File: P25035

INPUT VARIABLES	Terms	Value	Definition
	D	0.0520	diameter of standpipe (m)
	De	0.1500	diameter of borehole (m)
	L	1.90	length of sand section (m)
	h1	5.20	initial height of water above base of hole (m)
	h2	5.10	final height of water above base of hole (m)
	t	24.0	time of test (h)

$k_s = 8.7E-09$  cm/sec



BH25-05

## In Situ Permeability Test

Modified Falling Head Permeability Equation

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

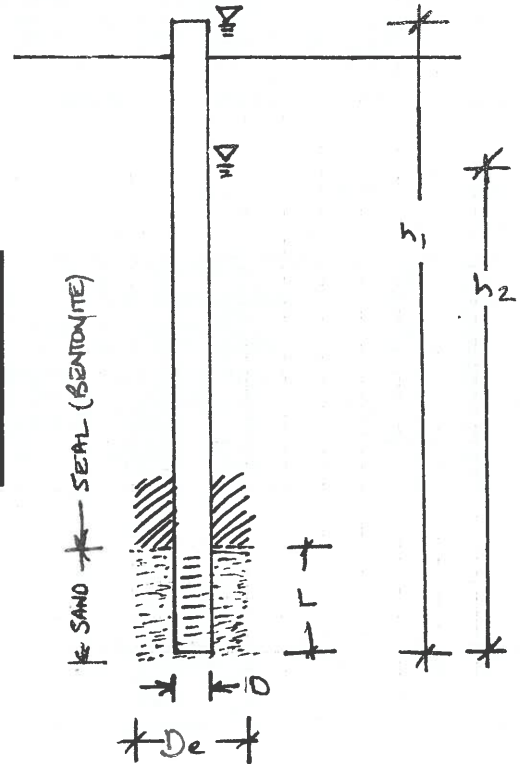
taken from USBR Engineering Geology Field Manual Volume 2 (2001)

BH25-05 - Slingerland Cattle Ltd.

JLECS File: P25035

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	9.70	initial height of water above base of hole (m)
	h2	8.94	final height of water above base of hole (m)
	t	24.0	time of test (h)

$k_s = 2.4E-08$  cm/sec







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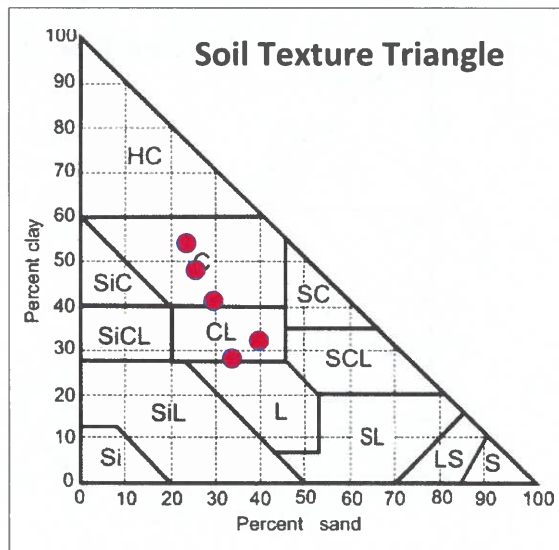
J. Lobbezoo Engineering +  
Consulting Services  
Box 96  
Monarch, Alberta T0L 1M0

**Report #:** 205587  
**Report Date:** 2025-05-06  
**Received:** 2025-05-02  
**Completed:** 2025-05-06  
**Test Done:** ST

**Project :** Slingerland Cattle  
Co.  
**PO:**

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

		Sample ID:	250502L056	250502L057	250502L058	250502L059	250502L060
		Cust. Sample ID:	BH25-01	BH25-02	BH25-03	BH25-04	BH25-05
Analyte	Units		4-4.5	4-4.5	4-4.5	4-4.5	7-8
Sand	%		40.0	34.0	23.9	25.9	29.9
Silt	%		28.0	38.0	22.1	26.1	29.1
Clay	%		32.0	28.0	54.0	48.0	41.0
Soil Texture	-		Clay Loam	Clay Loam	Clay	Clay	Clay







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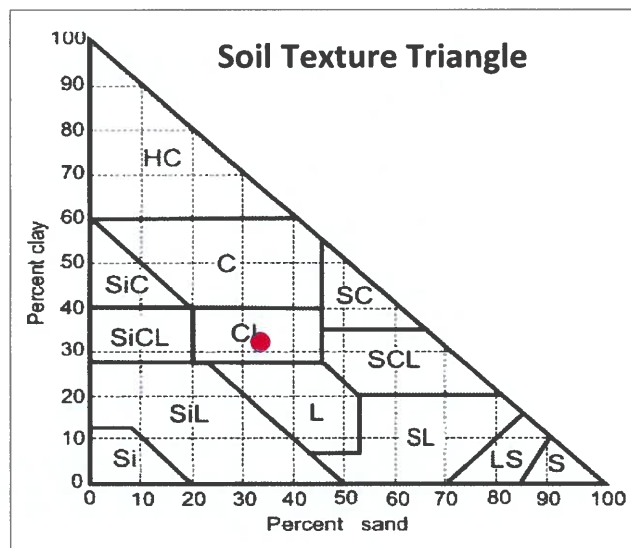
**Report #:** 205587  
**Report Date:** 2025-05-06  
**Received:** 2025-05-02  
**Completed:** 2025-05-06  
**Test Done:** ST

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**Sample ID:** 250502L061  
**Cust. Sample ID:** BH25-06  
**Analyte Units** 7-8

Sand	%	33.9
Silt	%	34.1
Clay	%	32.0
Soil Texture	-	Clay Loam



Raygan Boyce - Chemist

## Borehole Summary Table

JLECS File: P25035

Project: Slingerland Cattle Ltd., Proposed Pens & Catch Basin, NW-14-10-22-W4M

Date of Drilling: 28 April, 2025

BH25-01		
Depth (m): 0 – 4.6	<b>CLAY TILL</b> – medium plastic, trace sand, coal & oxide inclusions, stiff to very stiff, damp to moist, light brown -moist below 1.2m depth -moist to very moist below 2m depth	<u>Samples</u> S1: 2-2.5m S2: 4-4.5m
4.6	<b>End of Borehole at 4.6 m depth</b> -borehole open and dry upon completion -borehole backfilled with drill cuttings upon completion	

BH25-02		
Depth (m): 0 – 1.5	<b>CLAY FILL</b> – medium plastic, silty, trace sand, light brown, damp, stiff	<u>Samples</u> S1: 2-2.5m S2: 4-4.5m
1.5 – 5.0	<b>CLAY TILL</b> – medium plastic, trace sand, firm to stiff, very moist, grey	
5.0	<b>End of Borehole at 5.0 m depth</b> -borehole open and dry upon completion -50mm diameter permeability test well installed at completion	<u>Test Well Details</u> 50mm diameter <u>Screen</u> : 3.2 to 4.7m <u>Backfill</u> Sand: 2.7 to 5.0m Bentonite: 0 to 2.7m <u>Stickup</u> : 0.6m

BH25-03		
Depth (m): 0 – 0.15	<b>TOPSOIL</b>	
0.15 – 4.6	<b>CLAY TILL</b> – medium plastic, trace sand, trace gravel, coal & oxide inclusions, very stiff, damp to moist, brown	<u>Samples</u> S1: 2-2.5m S2: 4-4.5m
4.6	<b>End of Borehole at 4.6 m depth</b> -borehole open and dry upon completion -borehole backfilled with drill cuttings upon completion	

**Borehole Summary Table**  
(continued)



BH25-04		
Depth (m): 0 – 0.15	<b>TOPSOIL</b>	<u>Samples</u> S1: 2-2.5m S2: 4-4.5m
0.15 – 4.6	<b>CLAY TILL</b> – medium plastic, trace sand, trace gravel, very stiff, damp to moist, brown -moist below 1.5m	<u>Test Well Details</u> 50mm diameter <u>Screen</u> : 3.1 to 4.6m <u>Backfill</u>
4.6	<b>End of Borehole at 4.6 m depth</b> -borehole open and dry upon completion -50mm diameter permeability test well installed at completion	Sand: 2.7 to 4.6m Bentonite: 0 to 2.7m <u>Stickup</u> : 0.6m

BH25-05 – NW of Catch Basin		
Depth (m): 0 – 0.3	<b>TOPSOIL</b>	<u>Samples</u> S1: 2-2.5m   S2: 4-4.5m S3: 5-6m   S4: 7-8m
0.3 – 9.1	<b>CLAY TILL</b> – medium plastic, trace sand, trace gravel, very stiff, moist, brown -very moist, grey, firm to stiff below 2m -moist, brown, very stiff below 4.5m	<u>Test Well Details</u> 50mm diameter <u>Screen</u> : 6.1 to 9.1m <u>Backfill</u>
9.1	<b>End of Borehole at 9.1 m depth</b> -borehole open and dry upon completion -50mm diameter permeability test well installed at completion	Sand: 5.8 to 9.1m Bentonite: 0 to 5.8m <u>Stickup</u> : 0.6m

BH25-05 – SE of Catch Basin		
Depth (m): 0 – 0.3	<b>TOPSOIL</b>	<u>Samples</u> S1 2-2.5m S2: 4-4.5m S3: 5-6m S4: 7-8m
0.3 – 9.1	<b>CLAY TILL</b> – medium plastic, trace sand, trace gravel, very stiff, moist, brown -very moist, firm to stiff below 2m -moist, very stiff below 4.5m	
9.2	<b>End of Borehole at 9.2 m depth</b> -borehole open and dry upon completion -borehole backfilled with drill cuttings upon completion	

Table Notes:

- borehole information to be read in conjunction with JLECS report P25035.
- boreholes drilled on April 28, 2025, using a truck-mounted drill operated by Chilako Drilling Services Ltd.
- see Figure 1 for borehole locations