

Technical Document LA25020

Part 2 — Technical Requirements



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

NRCB USE ONLY	Application number	Legal land description
<input type="checkbox"/> Approval <input type="checkbox"/> Registration <input checked="" type="checkbox"/> Authorization <input type="checkbox"/> Amendment	<u>LA25020</u>	<u>SW 27-8-26 W4M</u>

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.

Feb 27, 2025
Date of signing

5 star Cattle Ltd
Corporate name (if applicable)

[Redacted]
Signature
Martin Van Nigebus
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)
livestock corral (Calf pen)	AO comment: Already constructed	47 m x 70 m

Existing facilities: list ALL existing confined feeding operation facilities and their dimensions		
Existing facilities	Dimensions (m) (length, width, and depth)	NRCB USE ONLY
see next page		
NRCB USE ONLY		

Existing facilities

All facilities confirmed as permitted in Approval LA19022

Covered buildings #1 and #2: 13.7 m x 45 m (each)

Covered building #3: 45 m x 179 m

Calf hutch pad: 208 m x 83 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 Already constructed

Additional information

All Runoff Will be into field to the South
setback to property line will be met.

AO comment: The applicant also asked for a variance for the setback from the constructed calf hutch area to a water well.

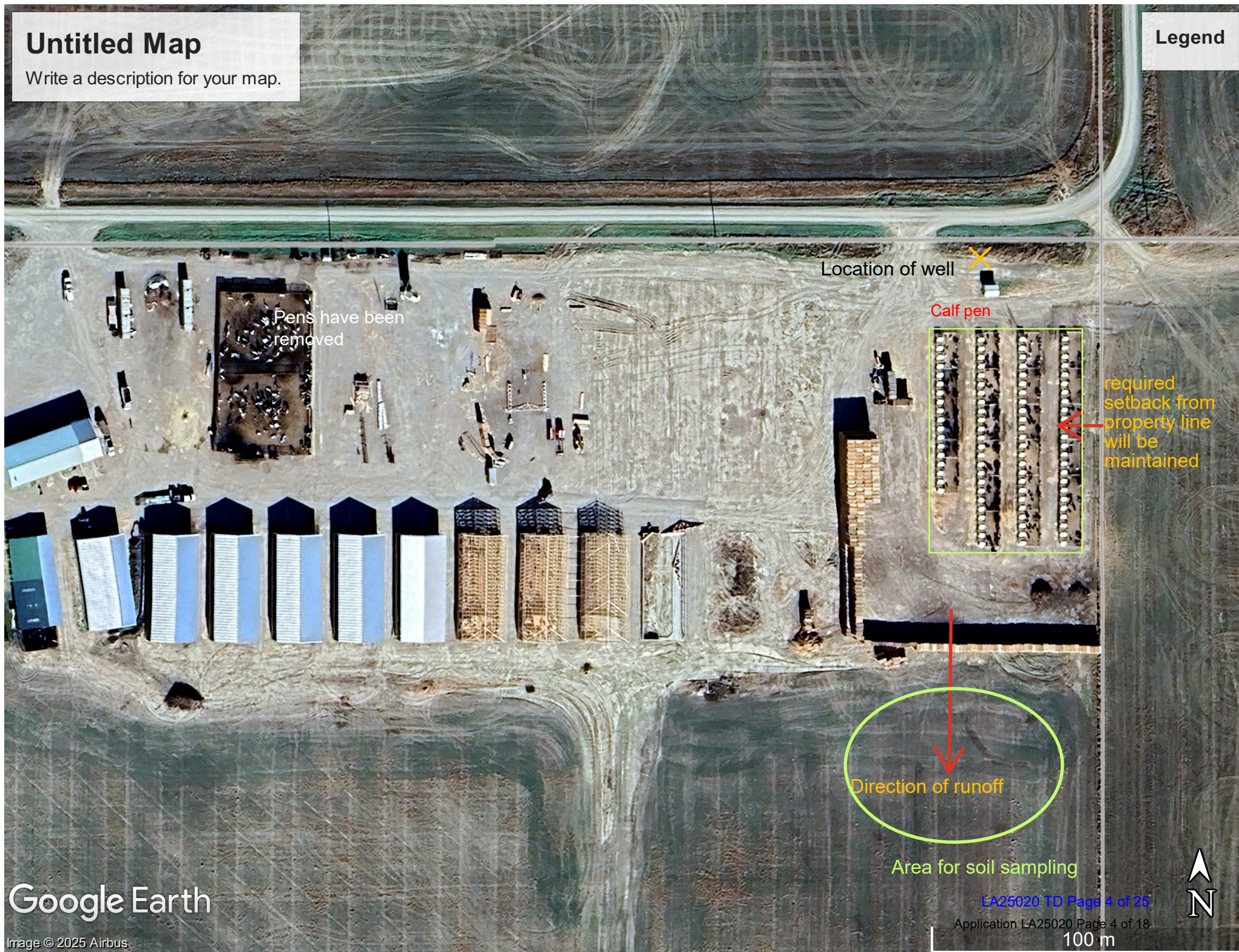
Livestock numbers: Complete only if livestock numbers are different from what was identified in the Part 1 application. Note: if livestock numbers increase in your Part 2 application, a new Part 1 application must be submitted which may result in a loss of priority for minimum distance separation (MDS).

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
No increase			

Untitled Map

Write a description for your map.

Legend



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DECLARATION AND ACKNOWLEDGMENT OF APPLICANT CONCERNING *WATER ACT* LICENCE

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

Date and sign one of the following four options

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

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

Signed this ____ day of _____, 20____.

Signature of Applicant or Agent

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

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

Signed this ____ day of _____, 20____.

Signature of Applicant or Agent

OPTION 3: Additional water licence not required

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

Signed this ____ day of _____, 20____.

Signature of Applicant or Agent

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

1. At this time, I (we) do not know whether a new water licence is needed from AEP under the *Water Act* for the development or activity proposed in this AOPA application.
2. If a new *Water Act* licence is needed, I (we) request that the NRCB process the AOPA application **independently of** AEP's processing of the CFO's application for a water licence.
3. In making this request, I (we) recognize that, if this AOPA application is granted by the NRCB, the NRCB's decision will not be considered by AEP as improving or enhancing the CFO's eligibility for a water licence under the *Water Act*.
4. I (we) acknowledge that any construction or actions to populate the CFO with additional livestock pursuant to an AOPA permit in the absence of a *Water Act* licence will **not** be relevant to AEP's consideration of whether to grant my *Water Act* licence application, if a new water licence is needed.
5. I (we) acknowledge that any such construction or livestock increase will be at the CFO's sole risk if the *Water Act* licence application is denied or if the operation of the CFO is otherwise deemed to be in violation of the *Water Act*. This risk includes being required to depopulate the CFO and/or to cease further construction, or to remove "works" or "undertakings" (as defined in the *Water Act*).
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Signed this 27 day of February, 2025.

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: Calf hutch area

Proposed 1: new corral

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 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 checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> YES with exemption	not located in know flood plain
	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	No springs observed
Surface water information	How many water wells are within 100 m of the manure storage facility or manure collection area?		one			<input type="checkbox"/> YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> YES with exemption	A new water well is within 100 m. A variance is granted
	What is the shortest distance from the manure collection or storage facility to a surface water body? (e.g., lake, creek, slough, seasonal)		405 m (drain)			<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> YES with exemption	confirmed. There is also a small drain 76 m to the north
Groundwater information	What is the depth to the water table?		below 6 m			<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> YES with exemption	below 3 m from ground level
	What is the depth to the groundwater resource/aquifer you draw water from?		6.71 m below ground			<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> YES with exemption	confirmed Water well 9681624

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



Water Well Drilling Report

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

GIC Well ID 9681624

GoA Well Tag No.

Drilling Company Well ID

Date Report Received 2021/07/11

GOWN ID

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.

Well Identification and Location										Measurement in Metric	
Owner Name		Address			Town		Province		Country	Postal Code	
VANHUIGENBOS, MARTIN		P.O. BOX 1152			FORT MACLEOD		ALBERTA		CANADA	T0L 0Z0	
Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description		
6		27	8	26	4						
Measured from Boundary of					GPS Coordinates in Decimal Degrees (NAD 83)					Elevation	
_____ m from					Latitude 49.676818 Longitude -113.445634					973.00 m	
_____ m from					How Location Obtained					How Elevation Obtained	
					Differential corrected handheld GPS 5-10m					Differential corrected handheld GPS 5-10m	

Additional Information		Measurement in Metric	
Distance From Top of Casing to Ground Level		91.44 cm	
Is Artesian Flow		Is Flow Control Installed	
Rate _____ L/min		Describe _____	
Recommended Pump Rate		90.92 L/min	
Recommended Pump Intake Depth (From TOC)		13.72 m	
Pump Installed		Depth	
Type		Make	
		H.P.	
		Model (Output Rating)	
Did you Encounter Saline Water (>4000 ppm TDS)		Depth	
Gas		Depth	
Remedial Action Taken		Well Disinfected Upon Completion	
		Yes	
		Geophysical Log Taken	
		Submitted to ESRD	
		Sample Collected for Potability	
		Submitted to ESRD	
Additional Comments on Well			

Yield Test			Taken From Top of Casing		Measurement in Metric	
			Depth to water level			
Test Date	Start Time	Static Water Level	Pumping (m)	Elapsed Time	Recovery (m)	
2021/07/06	1:00 PM	8.05 m		Minutes:Sec		
Method of Water Removal Type Pump Removal Rate 204.57 L/min Depth Withdrawn From 10.67 m If water removal period was < 2 hours, explain why			8.05	0:00		
			8.25	1:00	8.52	
			8.28	2:00	8.50	
			8.31	3:00	8.49	
			8.32	4:00	8.48	
			8.34	5:00	8.47	
			8.36	6:00	8.46	
			8.37	7:00	8.45	
			8.39	8:00	8.44	
			8.40	9:00	8.43	
			8.41	10:00	8.42	
			8.43	12:00	8.41	
			8.47	14:00	8.39	
			8.49	16:00	8.39	
				18:00	8.38	
			8.55	20:00	8.37	
			8.65	25:00	8.35	
			8.77	30:00	8.31	
			8.96	35:00	8.29	
			8.98	40:00	8.28	
			8.98	50:00	8.26	
			8.98	60:00	8.24	
			8.98	75:00	8.20	
			8.98	90:00	8.16	
8.98	105:00	8.13				
8.98	120:00	8.10				

Water Diverted for Drilling		
Water Source	Amount Taken	Diversion Date & Time
ALDERSYDE FILL STATION	3636.87 L	2021/06/30 7:00 AM

Contractor Certification	
Name of Journeyman responsible for drilling/construction of well	Certification No
CHAD NIEMANS	46340A
Company Name	Copy of Well report provided to owner
NIEMANS DRILLING & SONS LTD.	Date approval holder signed
	Yes 2021/07/11



Water Well Drilling Report

View in Imperial **Export to Excel**

GIC Well ID 9681624
GoA Well Tag No.
Drilling Company Well ID
Date Report Received 2021/07/11

GOWN ID

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.

Well Identification and Location										Measurement in Metric	
Owner Name		Address			Town		Province		Country	Postal Code	
VANHUIGENBOS, MARTIN		P.O. BOX 1152			FORT MACLEOD		ALBERTA		CANADA	T0L 0Z0	
Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description		
	6	27	8	26	4						
Measured from Boundary of					GPS Coordinates in Decimal Degrees (NAD 83)					Elevation	
_____ m from					Latitude 49.676818 Longitude -113.445634					973.00 m	
_____ m from					How Location Obtained					How Elevation Obtained	
					Differential corrected handheld GPS 5-10m					Differential corrected handheld GPS 5-10m	

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

Formation Log			Measurement in Metric		
Depth from ground level (m)	Water Bearing	Lithology Description			
3.96		Brown Sandy Clay			
6.71		Gray Gravel			
9.75	Yes	Gray Gravel			
10.97		Red Shale			
16.76		Gray Shale			

Yield Test Summary			Measurement in Metric		
Recommended Pump Rate 90.92 L/min					
Test Date	Water Removal Rate (L/min)	Static Water Level (m)			
2021/07/06	204.57	8.05			

Well Completion				Measurement in Metric	
Total Depth Drilled	Finished Well Depth	Start Date	End Date		
16.76 m	16.76 m	2021/06/30	2021/06/30		

Borehole		
Diameter (cm)	From (m)	To (m)
20.00	0.00	10.06
15.56	10.06	10.97
13.02	10.97	16.76

Surface Casing (if applicable)		Well Casing/Liner	
Plastic		Plastic	
Size OD :	15.24 cm	Size OD :	11.43 cm
Wall Thickness :	0.991 cm	Wall Thickness :	0.544 cm
Bottom at :	10.97 m	Top at :	10.67 m
		Bottom at :	16.76 m

Perforations				
From (m)	To (m)	Diameter or Slot Width (cm)	Slot Length (cm)	Hole or Slot Interval (cm)
6.71	9.45	0.635	30.48	30.48

Perforated by Saw

Annular Seal Bentonite Chips
Placed from 0.00 m to 6.71 m
Amount 5.00 Bags

Other Seals

Type	At (m)
Shale Trap	6.71

Screen Type

Size OD : _____ cm

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

Attachment _____
Top Fittings _____ Bottom Fittings _____

Pack

Type _____ Grain Size _____
Amount _____

Contractor Certification	
Name of Journeyman responsible for drilling/construction of well CHAD NIEMANS	Certification No 46340A
Company Name NIEMANS DRILLING & SONS LTD.	Copy of Well report provided to owner Yes
	Date approval holder signed 2021/07/11

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ENVIRONMENTAL RISK SCREENING INFORMATION

ERST for proposed facilities

See Decision Summary LA25020 for detail

Facility	Groundwater score	Surface water score	File number

ERST for existing facilities

The facilities were assessed in 2020 and scored low for risk to groundwater and surface water

Facility	Groundwater score	Surface water score	File number

ERST related comments:

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WATER WELL AND SURFACE WATER INFORMATION

Well IDs: Water Well 9681624 _____

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
9681624	11	12	calf pen area

Groundwater or surface water related comments:

The water well is 24 m north of the calf pen and therefore within the 100 m setback. 5 Star applied for a variance from this setback. The reason for granting the variance is explained in Appendix B of Decision Summary LA25020.

The preliminary assessment looks at the construction at the well itself. Because the well is shallow, a further assessment is required. The secondary assessment looks at the well in respect to the CFO facility and considers the likelihood of manure reaching the well. Because the landscaping at this site that leads runoff away from the well, an exemption (or in this case a variance) from the 100 m setback can be granted.

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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
(now owned by Greenwood Colony) Wansteeker	NE 27-8-26	323 m	RG	1	260 m	yes	yes
Gatto	SE 28-8-26	517	RG	1	517 m		yes
Cox	NW 28-8-26	727	RG	1	727 m		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					

* 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 February 26, 2021

Minimum Distance Separation (MDS) Waiver (declaration)

Applicant information

NRCB application number: La 25020

Operator/operation name: 5 Star Cattle Ltd

Address: TWP RD 84A 262 063 Postal Code: T0L 0Z0

Legal land location of confined feeding operation: SW 27-8-26 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. 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:

2000 beef feeder calves

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

no change in numbers. permit area at east end of feedlot for group pens

- 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):

Group pen pad

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

Permit Applicant: Martin VanMorganbos Date: June 06, 2025
Signature

Residence owner(s) to initial: [Redacted]

Minimum Distance Separation (MDS) Waiver (declaration)

Residence owner(s) information

ALL Names on land title: Hutterian Brethren of Greenwood

Legal land location of residence(s): NE -27-08-26-4

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

Address(es)¹ and Postal code(s)¹: Box 1510 Fort Macleod Alberta T0H-0Z0

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

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

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

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

Application number _____

AO comment: I confirmed with Greenwood Colony that they know what this application is about.

Signatures of all residence owner(s) on title

Printed names of all residence owner(s) on title

Date: June 10-2025

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NRCB USE ONLY

MINIMUM DISTANCE SEPARATION

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

Margin of error (if applicable): +/- 2 m

Requirements (m): Category 1: 316 m Category 2: 422m Category 3: 527 m Category 4: 844 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: _____

Land base listed: _____

Area not suitable: _____

Available area: _____

No increase in manure production

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 _____

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NRCB USE ONLY

ALL SIGNATURES IN FILE

☒ YES ☐ NO

DATES OF APPROVAL OFFICER SITE VISITS

March 4, 2025	

CORRESPONDENCE WITH MUNICIPALITIES AND REFERRAL AGENCIES

Date deeming letters sent: April 10, 2025

Municipality: MD of Willow Creek

☒ 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: Town of Fort MacLeod ☐ N/A

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

Other: Telus, Alta Link Management Ltd. ☐ 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. Liverlock Pen
2. (Calf pen)

Manure storage capacity

	Length (m)	Width (m)	Depth below ground level (m)	NRCB USE ONLY Estimated storage capacity (m ³)
1.	<u>47 m</u>	<u>70 m</u>	<u>0 m</u>	
2.				
TOTAL CAPACITY				

☒ 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

AO comment: Runoff from the pens will be captured in the adjacent field to the south. In order to stay within the nutrient limits as set out in Schedule 3 of the Standard and Administration Regulation, annual soil testing, conducted by an agrologist, will be required.

Naturally occurring protective layer details

Thickness of naturally occurring protective layer	_____ (m)	Provide details (as required) AO comment: See report below	
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

Last updated: 31 Mar 2020

Page ____ of ____

NRCB USE ONLY

Part 2 — Technical Requirements

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

SOLID MANURE, COMPOST, & COMPOSTING MATERIALS: Barns, feedlots, & storage facilities - Naturally occurring protective layer (cont.)

NRCB USE ONLY

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

Depth to water table: > 2 m Requirements met: ☒ YES ☐ NO

Depth to uppermost groundwater resource: 6.71 m Requirements met: ☒ YES ☐ NO

ERST completed: ☒ see ERST page for details

Surface water control systems

Requirements met: ☒ YES ☐ NO Details/comments:

The runoff is proposed to be led into the adjacent field to the south. Annual soil testing is required to prove that nutrient limits as set out in AOPA and its regulations are not exceeded.

Naturally occurring protective layer details

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

Fairly uniform layer of clay loam overlaying silty clay loam to a depth of more than 3 m. Gravel seams in some areas at a depth of 4.2 m



August 9, 2019
Wood File: BX30609

Martin Van Huigenbos
5 Star Cattle Ltd.
Box 1152
Fort Macleod, AB T0L 0Z0

469 – 40 Street S
Lethbridge, Alberta T1J 4M1
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www.woodplc.com

Attention: Mr. Van Huigenbos:

**Re: Geotechnical Review and Evaluation
 Proposed Solid Manure Storage Pad (Calf Hutches)
 SW-27-008-26-W4M, near Fort Macleod, AB**

As requested, Wood Environment & Infrastructure Solutions (Wood) 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 encompasses the soil conditions associated with proposed solid manure storage pad for the purpose of calf hutch placement (see Figure 1).

In order to demonstrate the suitability of the natural soils for consideration as a naturally occurring protective layer, seven boreholes were advanced at the site in November, 2018. The boreholes were advanced at the approximate locations illustrated on Figure 1.

The boreholes were advanced by a truck-mounted drill rig owned and operated by Chilako Drilling Services and extended to depths of 3.0 m to 7.4 m below existing grades. The boreholes were logged by Larry Delong of Chilako Drilling Services Ltd. (see attachments).

In general, the natural mineral soils encountered within the boreholes were lacustrine silty clay with areas of clay till. Sand and gravel was contacted at two boreholes below about 4.2 m depth. No groundwater resource (as defined by the AOPA) was identified within the 7.4 m drilling depth at the site.

In order to demonstrate the permeability of the subsurface soils, 50 mm diameter PVC monitoring wells were constructed in boreholes 5S2-18 and 5S5-18. Test well 5S2-18 was screened from 2.1 m to 4.2 m depth, while 5S5-18 was screened from 1.4 m to 3.0 m depth. 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, the average 24-hour water drop was measured to be about 0.28 m in 5S2-18, and the average 24-hour water drop was measured to be about 0.34 m in 5S5-18.

In order to calculate the permeability of the screened portion of the clay and 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 In Situ Permeability Test reports, attached. As outlined on the report, the results of the *in situ* permeability testing indicate a hydraulic conductivity, k_s , of 2.6×10^{-8} cm/s at 5S2-18 and 5.2×10^{-8} cm/s at 5S5-18.

Page 16 of 22

Using the measured permeability of the clay stratum, the 2.1 metres of clay screened at 5S2-18 have been estimated to represent about 80 m of naturally occurring materials having a hydraulic conductivity of 1×10^{-6} cm/s. The 1.6 metres of clay screened at 5S5-18 have been estimated to represent about 30 m of naturally occurring materials having a hydraulic conductivity of 1×10^{-6} cm/s. This represents natural material protection in excess of the minimum requirements outlined by the AOPA for solid manure storage (minimum 2 m, Section 9.5-c).

Conclusion

Based on the results of the current investigation and permeability testing, and our understanding of the site and proposed development at the site, it is Wood's opinion that the naturally occurring materials at the site satisfy the AOPA requirements for a naturally occurring 'protective layer' for the proposed solid manure storage pad.

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

Yours truly,

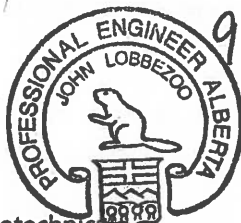
**Wood Environment and Infrastructure Solutions,
A Division of Wood Canada Limited**



John Lobbezoo, P.Eng.

Associate Engineer, Geotechnical

Branch Manager, Lethbridge & Medicine Hat



9 August 2019

Permit to Practice No. P-4546

Attachments

Figure 1 Borehole Locations

In Situ Permeability Test Calculations (5S2-18 and 5S5-18)

Soil Profile and Parent Material Description, Chilako Drilling Services

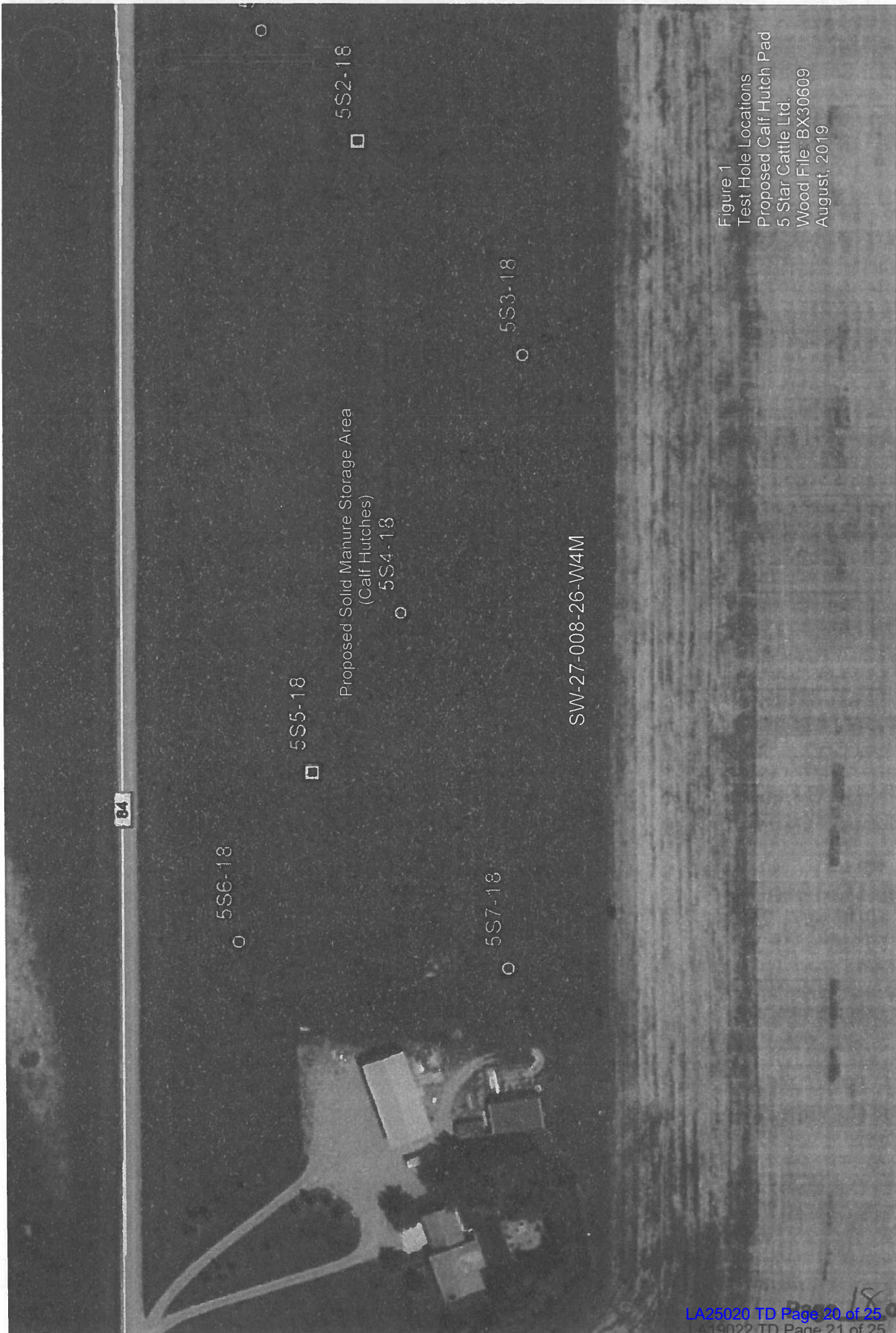


Figure 1
 Test Hole Locations
 Proposed Calf Hutch Pad
 5 Star Cattle Ltd.
 Wood File: BX30609
 August, 2019

18022

5S2-18

wood.

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)

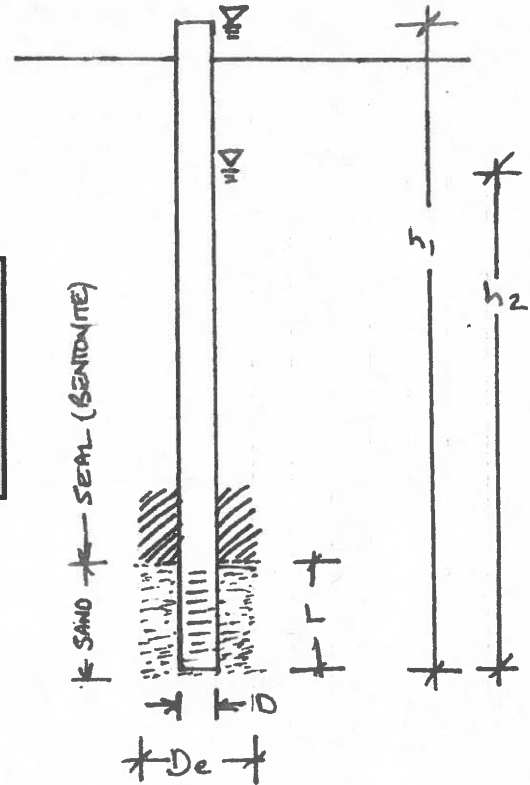
5S2-18 - 5 Star Cattle - SW-27-8-26-W4

Wood File: BX30609

INPUT VARIABLES

Terms	Value	Definition
D	0.0520	diameter of standpipe (m)
De	0.1500	diameter of borehole (m)
L	2.10	length of sand section (m)
h1	4.80	initial height of water above base of hole (m)
h2	4.52	final height of water above base of hole (m)
t	24.0	time of test (h)

Ks = 2.6E-08 cm/sec



In Situ Permeability Test

Modified Falling Head Permeability Equation

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

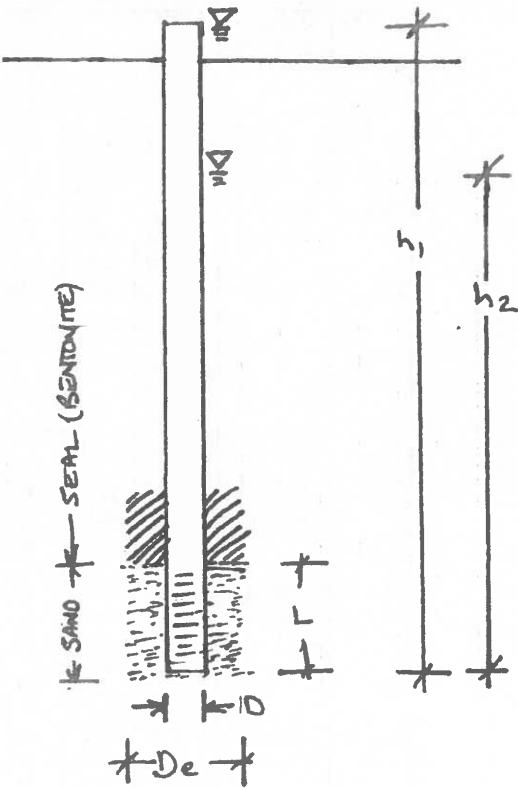
taken from USBR Engineering Geology Field Manual Volume 2 (2001)

5S5-18 - 5 Star Cattle - SW-27-8-26-W4

Wood File: BX30609

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	3.60	initial height of water above base of hole (m)
	h2	3.26	final height of water above base of hole (m)
	t	24.0	time of test (h)

Ks = 5.2E-08 cm/sec



CHILAKO DRILLING SERVICES LTD

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

SOIL PROFILE AND PARENT MATERIAL DESCRIPTION

Site Location: 5 Star Cattle Ltd. SW27-8-26W4

Date: 1-Nov-18

Hole #	Location	Depth	Texture	Moisture	Geological	Sample	Remarks
5S1-18	0323545 5505551	0-0.2	CL	D	Topsoil		
		0.2-1.6	CL	SM	Lac		Stiff, med plastic, brown, some silt
		1.6-2.7	SiCL	SM	Lac		Stiff, med plastic, brown, trace gravel
		2.7-4.1	CL	M	Lac		Stiff, med plastic
		4.1-4.7	CL*	M	Till		Stiff, low plastic, gravelly
		4.7-7.4	S+Gr*	SM	Till		Some clay Auger Refusal @7.4m
5S2-18	0323514 5505525	0-0.2	CL	D	Topsoil		
		0.2-2.4	SiCL	D	Till		Stiff, med plastic, brown
		2.4-4.2	SiC	SM	Till		Stiff, med plastic, silt layers
		4.2-6.2	S+Gr	SM	Till		50mm H.C. well installed to 4.2m Bentonite: 6.2-4.2m Screen: 4.2-2.2m Sand: 4.2-2.1m Bentonite: 2.1-0.4m Stickup: 0.6m Hole Diameter: 0.15m
5S3-18	0323451 5505482	0-0.2	SiCL	D	Lac		
		0.2-1.6	SiCL	D	Lac		Low plastic, large silt lenses
		1.6-3.0	SiCL-CL	M	Lac		Stiff, med plastic
5S4-18	0323381 5505518	0-0.2	SiCL	D	Lac		
		0.2-0.9	SiCL	D	Lac		V. firm, low-med plastic
		0.9-1.2	CL	M	Lac		Stiff, med plastic, brown
		1.2-2.0	SiCL	M	Lac		V. firm, low-med plastic
		2.0-3.0	FSCL	M	Lac		V. firm, low plastic, some silt
5S5-18	0323336 5505545	0-0.2	SiCL	M	Lac		
		0.2-1.5	SiCL	M	Lac		Firm, low-med plastic
		1.5-3.0	SiCL	M	Lac		V. firm, med plastic, yellow brown 50mm H.C. well installed to 3.0m Screen: 3.0-1.5m Sand: 3.0-1.4m Bentonite: 1.4-0.0m Stickup: 0.6m Hole Diameter: 0.15m
5S6-18	0323289 5505568	0-1.0	SiL	D	Lac		
		1.0-3.0	SiCL	D	Lac		Firm, low plastic, yellow brown, large silt lenses
5S7-18	0323279 5505492	0-1.1	SiCL	SM	Lac		Firm, low-med plastic, yellow brown
		1.1-3.0	SiCL	M	Lac		Firm, low-med plastic, silt lenses

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

Page 21 of 22

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Date: 1-Nov-18

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		1.6-2.7	SiCL	SM	Lac		Stiff, med plastic, brown, trace gravel
		2.7-4.1	CL	M	Lac		Stiff, med plastic
		4.1-4.7	CL*	M	Till		Stiff, low plastic, gravelly
		4.7-7.4	S+Gr*	SM	Till		Some clay
							Auger Refusal @7.4m
5S2-18	0323514 5505525	0-0.2	CL	D	Topsoil		
		0.2-2.4	SiCL	D	Till		Stiff, med plastic, brown
		2.4-4.2	SiC	SM	Till		Stiff, med plastic, silt layers
		4.2-6.2	S+Gr	SM	Till		
5S3-18	0323451 5505482	0-0.2	SiCL	D	Lac		
		0.2-1.6	SiCL	D	Lac		Low plastic, large silt lenses
		1.6-3.0	SiCL-CL	M	Lac		Stiff, med plastic
5S4-18	0323381 5505518	0-0.2	SiCL	D	Lac		
		0.2-0.9	SiCL	D	Lac		V. firm, low-med plastic
		0.9-1.2	CL	M	Lac		Stiff, med plastic, brown
		1.2-2.0	SiCL	M	Lac		V. firm, low-med plastic
		2.0-3.0	FSCL	M	Lac		V. firm, low plastic, some silt
5S5-18	0323336 5505545	0-0.2	SiCL	M	Lac		
		0.2-1.5	SiCL	M	Lac		Firm, low-med plastic
		1.5-3.0	SiCL	M	Lac		V. firm, med plastic, yellow brown
5S6-18	0323289 5505568	0-1.0	SiL	D	Lac		
		1.0-3.0	SiCL	D	Lac		50mm H.C. well installed to 3.0m
							Screen: 3.0-1.5m
5S7-18	0323279 5505492	0-1.1	SiCL	SM	Lac		Sand: 3.0-1.4m
		1.1-3.0	SiCL	M	Lac		Bentonite: 1.4-0.0m

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

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5S5-18

wood.

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

5S5-18 - 5 Star Cattle - SW-27-8-26-W4

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