

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 checked="" type="checkbox"/> Approval <input type="checkbox"/> Registration <input type="checkbox"/> Authorization <input type="checkbox"/> Amendment	LA24011	NW 20-11-20-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.

12-march 2024
 Date of signing

[Redacted Signature]
 Signature

Tower Calf Ranch
 Corporate name (if applicable)

A. Tower
 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)
Catch Basin	20 x 20 + 2m Deep.
expand Hutch AREA.	260m x 35m + 60 x 52m

Existing facilities: list ALL existing confined feeding operation facilities and their dimensions		
Existing facilities	Dimensions (m) (length, width, and depth)	NRCB USE ONLY
See existing LA21066 Map for Footprint	280/300 - 157/50.	

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)

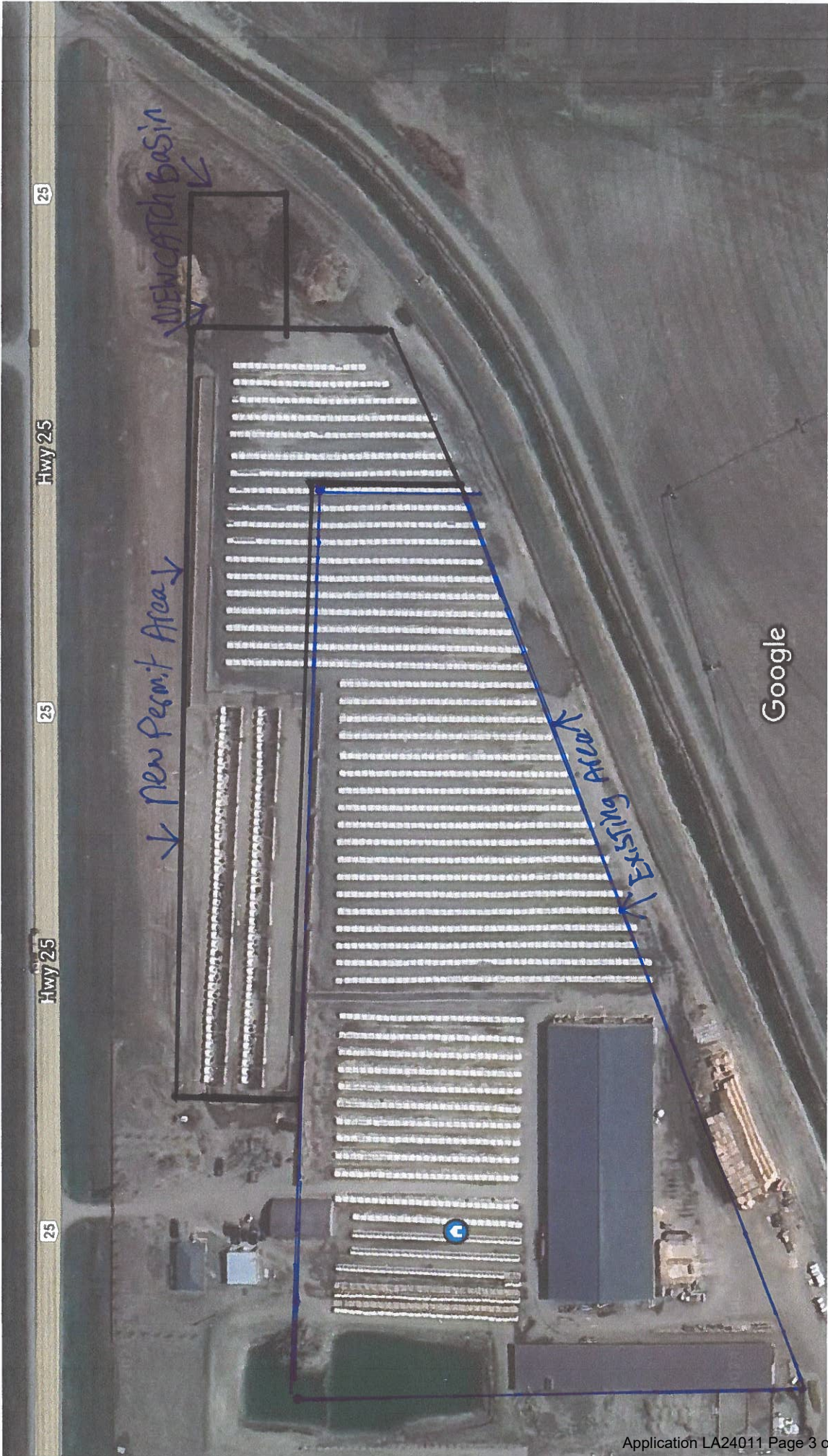
If a new facility is replacing an old facility, please explain what will happen to the old facility and when. N/A

Construction completion date for proposed facilities Dec 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
Calf feeders	2000	2000	4000



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)

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 LAIID

Signed this 12 day of March, 2024.

J1 Type 3 9acre FT water

Signature of Applicant or Agent

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)

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

APPLICATION TO CONVERT IRRIGATION ACRES

File Number
2023-CT-008

Section 28 Irrigation District Act

	TRANSFEROR (FROM)	Acres	TRANSFeree (TO)
Landowner:	TROWER, ANTHONY & COUTURE, HEIDI	9.0	TROWER, ANTHONY & COUTURE, HEIDI
Mailing Address:	BOX 58 IRON SPRINGS, AB		BOX 58 IRON SPRINGS, AB
Postal Code:	T0K 1G0		T0K 1G0
Roll Number:	IR-20-11-20-62-NW		C3-20-11-20-62-NW
Land Description:	PT. NW 20-11-20-4 (62) PLAN 9512949, BLOCK 1, LOT 1		PT. NW 20-11-20-4 (62) PLAN 9512949, BLOCK 1, LOT 1
Lateral/Canal:	J1 Pipeline		J1 Pipeline
Schedule:	"A"		"B"
LINC:	0026 612 812		0026 612 812
Receipt Roll:	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>		Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Date Completed _____ Initials _____
Receipt No.	LA21046	Amount:	N/A
		Conversion of Acres	JB

NOTE:

- Fees:
 - Application fee \$750 plus G.S.T. Non-refundable and must accompany application. For one parcel to one parcel.
 - For One parcel to Multiple parcels or vice-versa, ADD \$750/parcel +GST for the 3rd and subsequent parcel/s.

Must accompany application and is non-refundable.

 - Plus any additional fees or charges as set by the Board.
- Suitable land classifications will be required for all parcels involved.
- Notification of the Districts decision will be no later than ninety days from the date of application

ENDORSEMENT OF APPLICATION BY MORTGAGEES (Transferor's land)

This section to be completed prior to submitting the application to the LNID

Legal Description	Instrument Number	Name of Mortgage	Authorized Signature	Name (Print)	Date
PT. NW 20-11-20-4 PLAN 9512949, BLOCK 1, LOT 1	221 195 016	AG Financial Services Corporation	<i>Michelle Denton</i>	Michelle Denton Legal Asst. II	Apr 28/23

Conditions: Water Conveyance Type 3 Agreement for 9.0 acre-feet - Livestock Purposes - 2000 Feeder Calves

CC not required as this is a Conversion Application, converting 9.0 Irrigation acres to 9.0 ac-ft on a 1:1 conversion basis

Comments: Converting 9.0 acres of the total 14.4 Irrigation acres within Pt. NW 20-11-20-4, due to NRCB Application LA21046 condition. Titled parcel is 18.36 acres with 14.4 Irrigation acres, that were grandfathered, noting that this is below the LNID 50.0 acre minimum parcel for Irr. Pt. NW 20-11-20-4, is included in the District, referencing a 74 registration on title. Parcel is part of the Lateral J1 Pipeline project and the 9.0 ac conversion does not impact CC, as there is a minimum \$7,500.00 plus GST requirement (14.4 x \$330.00 = \$4,752.00 +GST). 2022 Water Rates are paid -Future 65.0 PSI loss on the 9.0 ac-ft as this would have been Irrigation acres off the Lateral J1 Pipeline. The 18.36 acres contain a large area of calving pens, the 9.0 Irr ac being converted to ac-ft. are not being used for Irrigation, there is 5.4 remaining Irrigation acres.



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: Footprint of operation 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 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 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?		0			<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> YES with exemption	
Surface water information How many water wells are within 100 m of the manure storage facility or manure collection area?		0			<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> YES with exemption	
Surface water information What is the shortest distance from the manure collection or storage facility to a surface water body? (e.g., lake, creek, slough, seasonal)		120 FT.			<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> YES with exemption	
Groundwater information What is the depth to the water table?		> 25 FT.			<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> YES with exemption	
Groundwater information What is the depth to the groundwater resource/aquifer you draw water from?		> 25 FT.			<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)

25ft is based on dugout diggery.



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)

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

Neighbour name(s)	Legal land description	Distance (m)	Zoning (LUB) category	MDS category (1-4)	NRCB USE ONLY		
					Distance (m)	Waiver attached (if required)	Meets regulations
Dorsten Van Raay	SW 29-11-20 ^{MC} 10429-11-20		RTG				
	NE 20-11-20 Wk 204007 H94002	179M	H-res				

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)
Dorsten Van Raay	SW 29-11-20	64	Brown.		
Peter Van den Boel	NE 2-12-21 Wk	64	Brown.		
				Total	

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

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

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

Additional information (attach any additional information as required)

Minimum Distance Separation (MDS) Waiver (declaration)

Applicant information

NRCB application number: _____

Operator/operation name: Anthony Trower T/A - Trower Calf ranch

Address: [Redacted] Iron Springs Postal Code: T0k 1g0

Legal land location of confined feeding operation: NW 20-11-20 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 Head milk calves from 3 weeks of age TO 14 weeks of age /
300 lbs in Hatches and grow housing
- My application for a new AOPA permit proposes the following changes to the existing livestock category, type and/or capacity at my CFO:
TO Increase permitted Head numbers by 2000.
- 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 a run off lagoon at the SE east end

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

Permit Applicant: _____

Signature

Date: 30-March 2024

Residence owner(s) to initial: A.T.

Minimum Distance Separation (MDS) Waiver (declaration)

Residence owner(s) information

ALL Names on land title: Darren Van Raay

Legal land location of residence(s): SW 2911-20

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

Address(es)¹ and Postal code(s)¹: Box 327 Picture Butte Tok WA

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 LA24011

[REDACTED]

Signatures of all residence owner(s) on title
Darren Van Raay

Printed names of all residence owner(s) on title

Date: May 15/24

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)

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. _____
2. _____
3. _____

Determination of runoff area

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

Catch basin capacity

	Length (m)	Width (m)	Total depth (m)	Depth below ground level (m)	Slope run:rise			NRCB USE ONLY Calculated storage capacity (excl. 0.5 m freeboard) (m ³)
					Inside end walls	Inside side walls	Outside walls	
1.	20	20	2	2	3:1	3:1	N/A	
2.								
3.								
TOTAL CAPACITY								

Naturally occurring protective layer details

Thickness of naturally occurring protective layer	_____ (m)	Provide details (as required)	
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

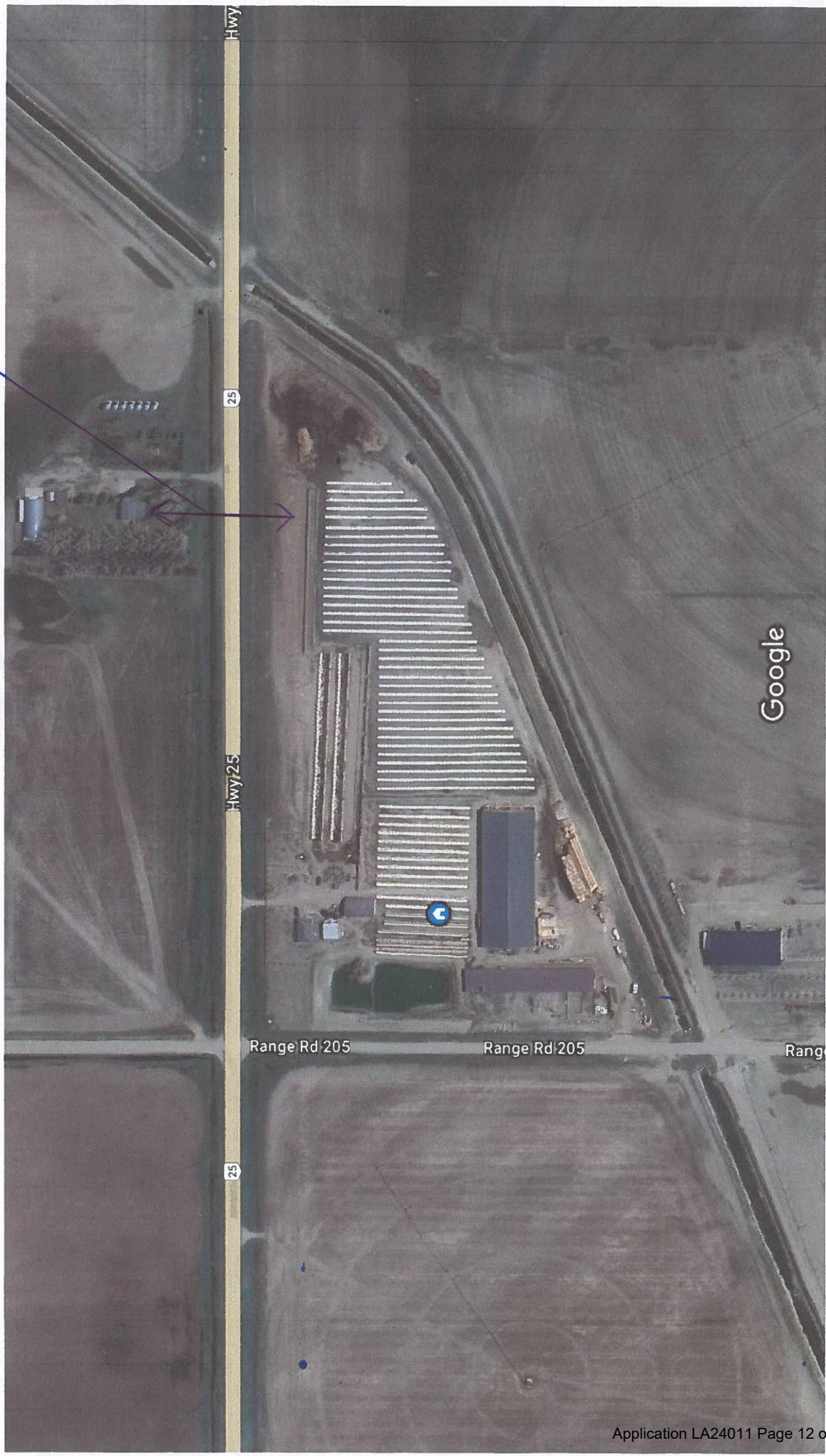
If soil info differs per facility include additional soils page.

NRCB USE ONLY

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



115m Span House To Permit Area



Hwy 25

25

Hwy 25

25

Range Rd 205

Range Rd 205

Rang

Google

Manure spreading agreement

Manure producer - Trower calf ranch
land location nw20-11-20w4

manure receiver - *Tony Ankermann*

Legal land location - *SW 28-11-20*
NE 21-11-20

soil type - *Brown*

acres - 160 irrigated

Signed land owner

Date may 15th 2024

signed producer

date may 15th 2024

land owner agrees to receive and spread solid manure
produced by Trower calf ranch on a term of 10 years

Manure Spreading Agreement

This agreement is between Anthony Traver, manure producer, and

Darren Van Raay Manure receiver.

Length of agreement: This agreement is valid for a time period of 10 years
(minimum of one year)


Legal land location	Soil type ¹	Acres suitable for manure spreading ²
<u>SW-21-11-70</u> <u>South 1/2 NW 24-11-70</u>	<u>Brown/Irrigated</u>	<u>200 acres</u>

¹ Soil type choices: Dark brown and brown, Grey wooded, Black, Irrigated.

² Land within required setbacks from water bodies, water wells, residences, etc. is not to be included.

Other comments:

Manure producer (confined Feeding Operation) Legal Land Location NW 20-11-70 Wk.

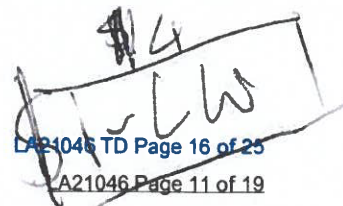
17-Sep-21  A. Traver Traver Calf Pk.
 Date of signing Signature Print name Corporate name(if appl)

Manure Receiver – Landowner(s)³

6-Nov-2021  DARREN VAN RAAY _____
 Date of signing Signature Print name Corporate name(if appl)

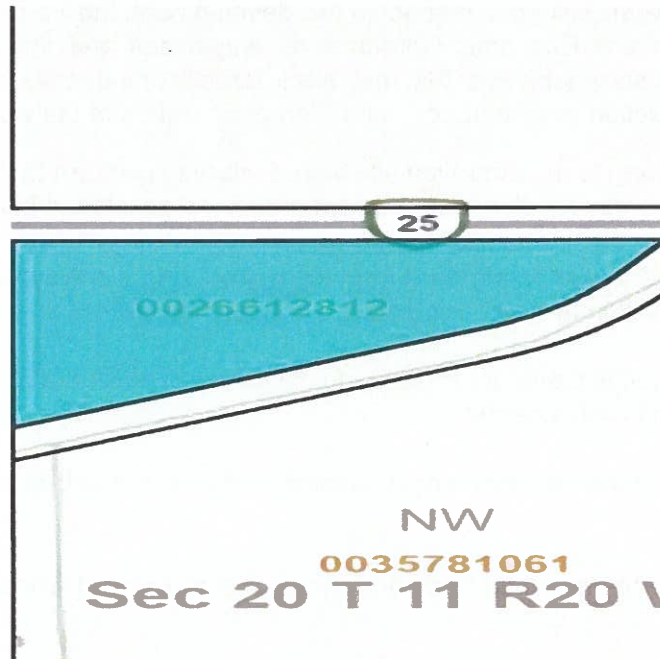
_____ _____ _____ _____
 Date of signing Signature Print name Corporate name(if appl)

³ All registered owners of land, or authorized signing authorities must sign.


 LA21046 TD Page 16 of 25
 LA21046 Page 11 of 19

Transportation and Economic Corridors Permit
Request for Development Permit - On Private Property
in Proximity of a Provincial Highway - Approved

Permit Number:	2024-0041444	Highway(s):	25
Issued to (Permittee):	Anthony Trower anthonyt1987@gmail.com		
Legal Land Location:	QS-NW SEC-20 TWP-011 RGE-20 MER-4	Municipality:	Lethbridge County
Approved By:	Leah Olsen	Issuing Office:	Southern Region / Lethbridge
Issued Date:	2024-03-21 09:28:54		
Description of Development:	To ask for a waiver To permit a piece of land with NRCB closer to highway 25 For the use of movable plastic calf hutches closer to the road, we are not building on this just wanting to be able to use my land to the best of my abilities while making sure not to upset anyone in the process		



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

(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. Hutch area
2. Hutch area.

Manure storage capacity

	Length (m)	Width (m)	Depth below ground level (m)	NRCB USE ONLY Estimated storage capacity (m ³)
1.	260	35	0	
2.	60	52	0	
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

Naturally occurring protective layer details

Thickness of naturally occurring protective layer	Provide details (as required)		
	2 (m)		
Soil texture	13 % sand	48 % silt	39 % clay
Hydraulic conductivity - naturally occurring protective layer	Depth and type of soil tested Clay loam	Hydraulic conductivity (cm/s) 7.3E-08cm/sec	Describe test standard used Salling Head.

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

10 May 2024

J Lobbezoo Engineering & Consulting Services Ltd.

PO Box 96, Monarch, AB T0L1M0

JLECS File: P24015

Trower Calf Ranch
PO Box 58
Iron Springs, Alberta T0L1G0

Attention: Mr. Anthony Trower

**Re: Geotechnical Review and Evaluation
NRCB Permitting of Proposed Catch Basin
NW-20-011-20-W4M, near Iron Springs, 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 proposed catch basin to be located near the east side of the calf ranch property located within the northwest corner area of NW-20-011-20-W4M (refer to Figure 1, attached).

In order to demonstrate the suitability of the naturally existing soils for consideration as a naturally occurring protective layer to the groundwater, two boreholes were advanced at the site on May 6, 2024. The boreholes were advanced at the approximate locations denoted as BH24-01 and BH24-02 on Figure 1, attached.

The boreholes were advanced by a truck-mounted drill rig owned and operated by Chilako Drilling Services and extended to a depth of 6.1 m below the existing grade. The boreholes were logged by JLECS.

In general, the natural mineral soils encountered in the boreholes consisted of a layer of low to medium plastic lacustrine clay (to approximately 1.5 m depth) which was underlain by stiff medium plastic clay till to the termination depth of the two boreholes. No evidence of free groundwater or a groundwater resource (as defined by the AOPA) was identified within the 6.1 m investigation depth at the proposed catch basin site.

A sample of soil collected from the screened zone of borehole BH24-01 as well as a sample from the same depth at borehole BH24-02 were 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
BH24-01 / 5.5 m	27	25	48
BH24-02 / 5.5 m	33	29	38

To measure the *in situ* permeability of the subsurface soils, a 50 mm diameter PVC monitoring well was constructed in borehole BH24-01. The test well was screened from 4.5 m to 6.1 m depth. Well saturation of the 50 mm diameter monitoring well was carried out by filling the monitoring well to the top for

several consecutive days. After several days of testing, a 48-hour water drop of 0.58 m was determined at BH24-01.

To calculate the permeability of the screened portion of the clay till 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 report. The results of the permeability testing indicate an *in situ* hydraulic conductivity, k_s , of 2.2×10^{-8} cm/s at BH24-01.

Using the measured permeability of the clay stratum, the 1.6 m of clay screened at BH24-01 is estimated to represent the equivalent of approximately 73 m of naturally occurring materials having a hydraulic conductivity of 1×10^{-6} cm/s (the reference standard in AOPA). This represents natural material protection in excess of the minimum requirements outlined by the AOPA for catch basins (minimum 5 m, Section 9.5-b).

Conclusion

Based on the results of the current investigation, permeability testing, and our understanding of the site and proposed development at the site, it is JLECS's opinion that the naturally occurring materials at the site satisfy the AOPA requirements for permitting the proposed catch basin 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
- Borehole Summary Table

PERMIT TO PRACTICE	
J LOBBEZOO ENGINEERING & CONSULTING SERVICES LTD.	
RM SIGNATURE:	<u>[Signature]</u>
RM APEGA ID #:	<u>110450</u>
DATE:	<u>10 May 2024</u>
PERMIT NUMBER: P016456	
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)	



Credit: Google Image (2024)

Figure 1: Borehole Locations

Proposed Catch Basin

BH24-01

In Situ Permeability Test

Modified Falling Head Permeability Equation

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

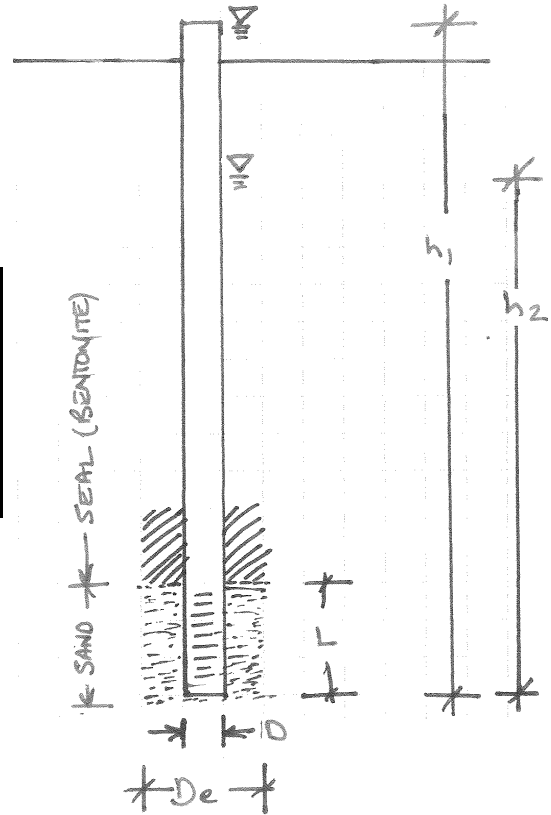
taken from USBR Engineering Geology Field Manual Volume 2 (2001)

BH24-01 - Trower Calf Ranch

JLECS File: P24015

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	6.70	initial height of water above base of hole (m)
	h2	6.12	final height of water above base of hole (m)
t	48.0	time of test (h)	

$k_s = 2.2E-08 \text{ cm/sec}$



Borehole Summary Table

JLECS File: P24015

Project: Trower Calf Ranch, Proposed Catch Basin, NW-20-011-20-W4M

Date of Drilling: May 6, 2024

BH24-01		
<i>Depth (m):</i> 0.0 – 1.6	CLAY – lacustrine, low to medium plastic, silty, trace sand, brown, moist, firm to stiff	<u>Test Well Details</u> 50mm diameter <u>Screen:</u> 4.6 to 6.1m <u>Backfill</u> Sand: 4.5 to 6.1m Bentonite: 1.5 to 4.5m Drill Cuttings: 0 to 1.5m <u>Stickup:</u> 0.6m
1.6	CLAY TILL – medium plastic, trace sand, trace gravel, coal & oxide inclusions, stiff to very stiff, moist, brown	
6.1	End of Borehole at 6.1 m depth <i>-borehole open and dry upon completion</i>	

BH24-02		
<i>Depth (m):</i> 0.0 – 1.4	CLAY – lacustrine, low to medium plastic, silty, trace sand, light brown, damp, stiff	
1.4	CLAY TILL – medium plastic, trace sand, trace gravel, coal & oxide inclusions, stiff to very stiff, moist, brown	
6.1	End of Borehole at 6.1 m depth <i>-borehole open and dry upon completion</i> <i>-borehole backfilled with drill cuttings upon completion</i>	

Table Notes:

- borehole information to be read in conjunction with JLECS report P24015.
- boreholes drilled on May 6, 2024, using a truck-mounted drill operated by Chilako Drilling Services Ltd.
- see Figure 1 for borehole locations