Technical Document LA24004

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	LA24004	NW 7-11-26-4

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.

January 30 2024
Date of signing

[redacted]
Signature

Corporate name (if applicable)

John Liefting
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)
earth Lagoon	45m x 40m x 3m deep
catch basin	40 x 25 x 3 m deep

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

Existing facilities	Dimensions (m) (length, width, and depth)	NRCB USE ONLY
corrals	144 x 100 m	
Barn	48 x 34 m	

NRCB USE ONLY

All facilities and their dimensions confirmed

Last updated September 11, 2023

#9 waterbody
- unused irrigation canal (replaced by pipeline.)

#13 433 feet edge off lagoon to canal.

#10 John + harvey dekok property line.

#11 proposed dugout + runoff catch
12 basin location

#14 336.8 Feet edge of dugout to lagoon

#15 275 Feet edge of lagoon to dugout.

#16 469 feet

#17 379 feet.

#18 dairy barn total size

Barn 98 x 100 Feet
sick pen 81 x 49 Feet
parlour 66 x 39 Feet
calf barn 69 x 35 feet

#19 manure liquid storage
(turn to manure collection after larger one built)
84 feet x 56 Feet
12 Feet deep
= 4704^2
= $56\,448^3$

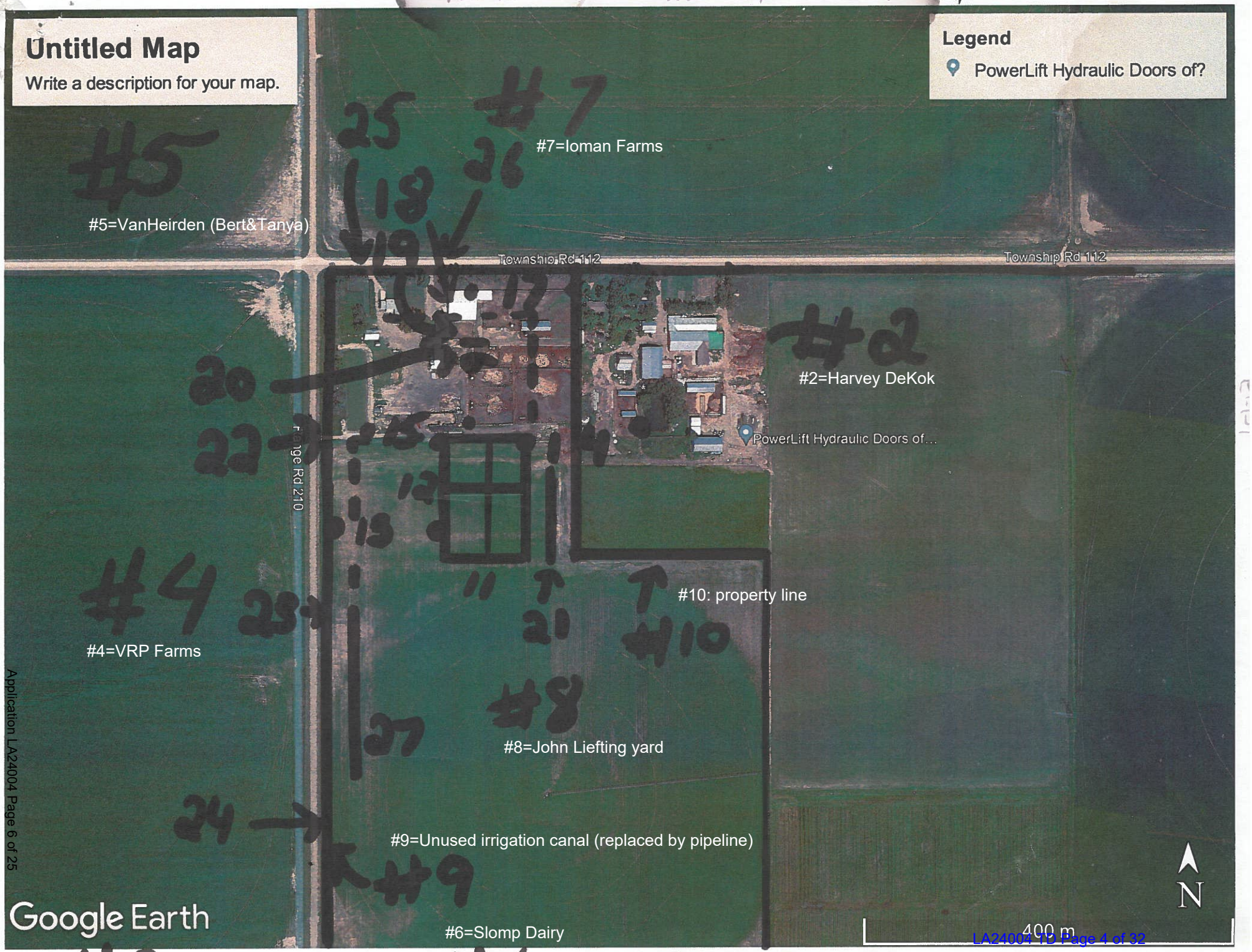
Barn	9800^2
sick pen	3969^2
parlour	2574^2
calf barn	2415^2
total	$18\,758^2$

#20 solid barn manure collection
(won't be needed after new lagoon as all manure will get pumped into lagoon)
has concrete base.
49 feet x 72 feet.
3528 $Feet^2$

#21 solid manure collection from corrals
(only use if corrals must be emptied due to sloopy weather.)

#22 - driveway yard
23 - field approach
24 - field approach
25 - driveway yard
26 - driveway yard.

27 (plus dotted line natural gas underground.


Untitled Map
Write a description for your map.
Legend
PowerLift Hydraulic Doors of?
#7=Ioman Farms
#5=VanHeirden (Bert&Tanya)
Township Rd 112
Township Rd 112
#2=Harvey DeKok
PowerLift Hydraulic Doors of...
Range Rd 210
#10: property line
#4=VRP Farms
#8=John Liefting yard
#9=Unused irrigation canal (replaced by pipeline)
#6=Slomp Dairy
#3= Bruwer (Cor&Ina)
Google Earth
400 m
N

#8 John Liefting yard
NW-07-011-20-W4

#2 Harvey dekok

#3 Cor and Ina Brouwer

#4 Vrp farms.

#5 Vanheiden, Bert and tanya.

#6 Slomp dairy

#7 Ioman farms

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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

~~The old lagoon we hope to fill with dirt to make it small enough to farm~~

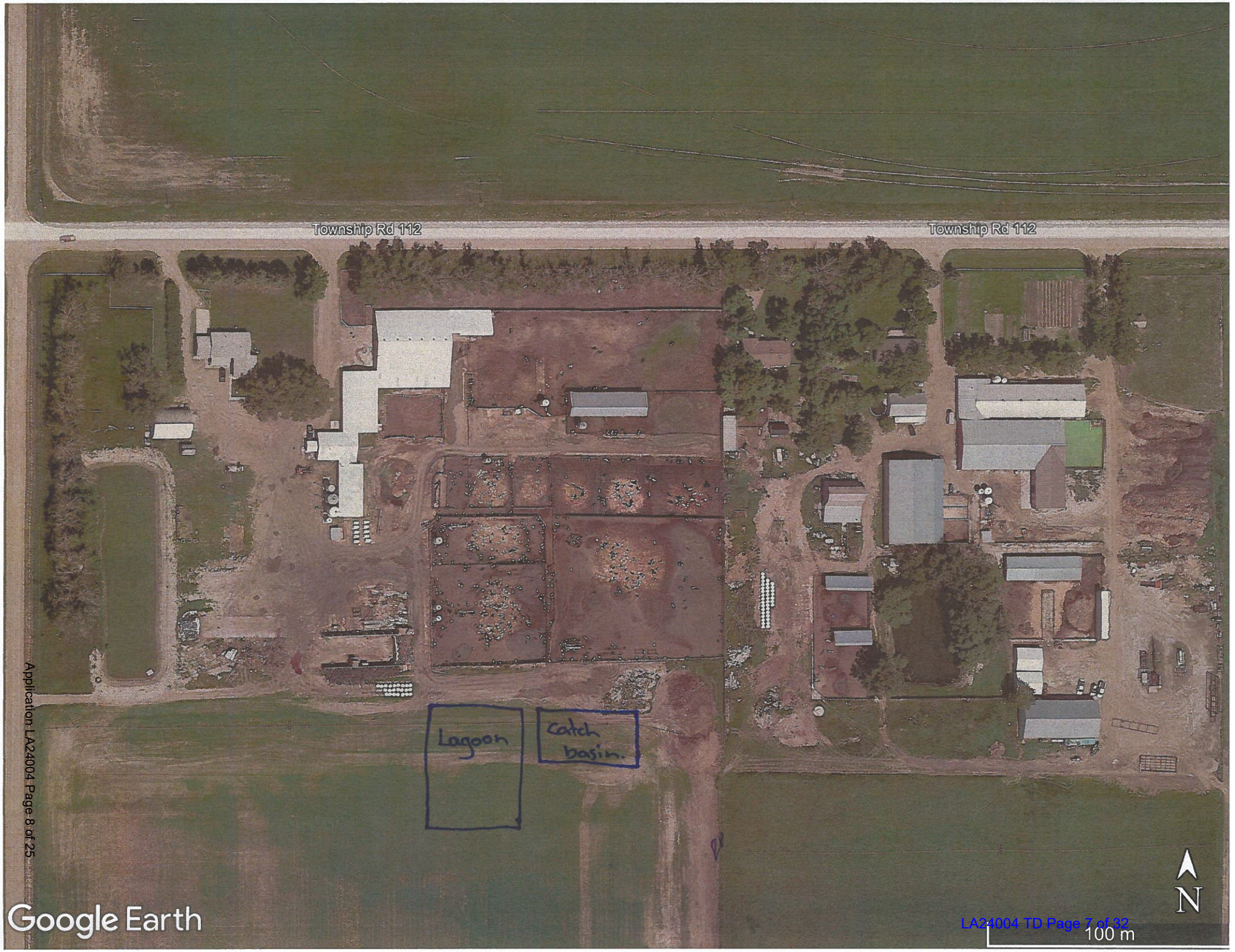
The old lagoon plans on being made small enough to still connect the 3 outlets and be used as a week or two's storage before being pumped to new lagoon

Construction completion date for proposed facilities ~~May~~ June 2024

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**
John Liefting is grandfathered for 85 dairy cows (plus associated dries and replacements) and 400 beef finishers.			


Township Rd 112
Township Rd 112
Lagoon
catch basin.
N
Google Earth
100 m

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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 _____
(AO comment: Provided copy of agreement with LNID)

Signed this 30 day of January, 2024. [redacted]
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 EPA under the *Water Act* for the development or activity proposed in this AOPA application.
2. If a new *Water Act* licence is needed, I (we) request that the NRCB process the AOPA application **independently of** EPA's processing of the CFO's application for a water licence.
3. In making this request, I (we) recognize that, if this AOPA application is granted by the NRCB, the NRCB's decision will not be considered by EPA as improving or enhancing the CFO's eligibility for a water licence under the *Water Act*.
4. I (we) acknowledge that any construction or actions to populate the CFO with additional livestock pursuant to an AOPA permit in the absence of a *Water Act* licence will **not** be relevant to EPA's consideration of whether to grant my *Water Act* licence application, if a new water licence is needed.
5. I (we) acknowledge that any such construction or livestock increase will be at the CFO's sole risk if the *Water Act* licence application is denied or if the operation of the CFO is otherwise deemed to be in violation of the *Water Act*. This risk includes being required to depopulate the CFO and/or to cease further construction, or to remove "works" or "undertakings" (as defined in the *Water Act*).
6. **AS RELEVANT:** I (we) acknowledge that the CFO is located in the South Saskatchewan River Basin and that, pursuant to the *Bow, Oldman and South Saskatchewan River Basin Water Allocation Order* [Alta. Reg. 171/2007], this basin is currently closed to new surface water allocations.
7. **Provide**: Water license number(s) or water conveyance agreement details _____

_____

Signed this _____ day of _____, 20_____. _____

Signature of Applicant or Agent

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GENERAL ENVIRONMENTAL INFORMATION

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

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

Existing: corrals **Proposed 1:** lagoon

Proposed 2: catch basin **Proposed 3:**

Facility and environmental risk information		Facilities				NRCB USE ONLY	
		Existing	Proposed 1	Proposed 2	Proposed 3	Meets requirements	Comments
Flood plain information	What is the elevation of the floor of the lowest manure storage or collection facility above the 1:25 year flood plain or the highest known flood level?	☑ >1 m ☐ ≤ 1 m	☑ >1 m ☐ ≤ 1 m	☑ >1 m ☐ ≤ 1 m	☐ > 1 m ☐ ≤ 1 m	☒ YES ☐ NO ☐ YES with exemption	Not located in known flood plain
Surface water information	How many springs are within 100 m of the manure storage facility or manure collection area?	0	0	0		☒ YES ☐ NO ☐ YES with exemption	None observed during site visit or EPA database
	How many water wells are within 100 m of the manure storage facility or manure collection area?	0	0	0		☒ YES ☐ NO ☐ YES with exemption	None observed during site visit or EPA database
	What is the shortest distance from the manure collection or storage facility to a surface water body? (e.g., lake, creek, slough, seasonal)	69	75m	75m		☒ YES ☐ NO ☐ YES with exemption	179 m to drain
Groundwater information	What is the depth to the water table?					☒ YES ☐ NO ☐ YES with exemption	2.3 m below ground (about 30 m south of proposed facility)
	What is the depth to the groundwater resource/aquifer you draw water from?					☒ YES ☐ NO ☐ YES with exemption	None identified. No water wells in area

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

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NRCB USE ONLY

ENVIRONMENTAL RISK SCREENING INFORMATION

ERST for **proposed** facilities

Facility	Groundwater score	Surface water score	File number
New catch basin	low	low	LA24004
New EMS	low	low	LA24004

ERST for **existing** facilities

Facility	Groundwater score	Surface water score	File number
existing lagoon	low	low	LA24004

ERST related comments:

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NRCB USE ONLY

WATER WELL AND SURFACE WATER INFORMATION

Well IDs: No water wells within 400 m of CFO

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

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

Water wells ☒ N/A

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

Surface water ☒ N/A

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

Water Well Exemption Screening Tool ☒ N/A

Water Well ID	Preliminary Screening Score	Secondary Screening Score	Facility

Groundwater or surface water related comments:

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

			NRCB USE ONLY				
Neighbour name(s)	**Legal land description**	**Distance (m)**	**Zoning (LUB) category**	**MDS category (1-4)**	**Distance (m)**	**Waiver attached (if required)**	**Meets regulations**
harvey dekok	NW-07-11-20-4	10m	RA	1	8 m		yes (*)
Bert Vanheiden	SE - 13-11-20-W4	890 m	RA	1	850 m		yes
VRP	NE -12 - 11-20-W4	900m	RA	1	890 m		yes
Cor Brouwer	SE -12 -11 -20-W4	708m	RA	1	650 m		yes

RA= Rural Agriculture

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

				NRCB USE ONLY	
Name of land owner(s)*	**Legal land description**	**Usable area** (ha)**	**Soil zone *****	**Usable area (ha)**	**Agreement attached (if required)**
X				Not required. No increase in manure production	
			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)

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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: 340 m Category 2: 453 m Category 3: 567 m Category 4: 907 m

Technology factor: ☐ YES ☒ NO

Expansion factor: ☐ YES ☒ NO

MDS related concerns from directly affected parties or referral agencies: ☐ YES ☒ NO

* The closest neighbor is deKok who is located immediately east of the CFO. The distance between the closest manure collection area and this residence does not change. The new facilities are further away.

LAND BASE FOR MANURE AND COMPOST APPLICATION

Land base required: _____

Land base listed: _____

Area not suitable: _____

Available area _____

NA: No increase in annual 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 PL21005

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NRCB USE ONLY

ALL SIGNATURES IN FILE ☒ YES ☐ NO

DATES OF APPROVAL OFFICER SITE VISITS

April 3, 2023	

CORRESPONDENCE WITH MUNICIPALITIES AND REFERRAL AGENCIES

Date deeming letters sent: January 31, 2024

Municipality: Lethbridge County

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

Alberta Health Services:

☒ 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: LNID ☐ N/A

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

Other: ATCO Gas, Lethbridge North County Potable Water Users ☐ N/A

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

Runoff Control Catch Basin

Part 2 — Technical Requirements

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LIQUID MANURE STORAGE: ~~Earthen manure storage (EMS)~~ Runoff control Basin: Naturally occurring protective layer

*(complete a copy of this section for **EACH** proposed earthen liquid manure storage facility with a naturally occurring protective layer)*

Facility description / name *(as indicated on site plan)* 1. catch basin

2.

Manure storage capacity *(complete a separate row of this table for each cell of the EMS)*

	Length (m)	Width (m)	Total depth (m)	Depth below ground level (m)	Slope run:rise			NRCB USE ONLY	
					Inside end walls	Inside side walls	Outside walls	Calculated storage capacity (m^3) (excl. 0.5 m freeboard)	Filled in lower ¼? Y/N
1.	40	25	4	3 5	3:1	3:21	N/A		yes
2.	AO comment: The top of the catch basin is 1 m below grade.						berm		
							TOTAL CAPACITY	1,195 m^3	

Surface water control systems

Describe the run-on and runoff control system

Catch basin sunken in 1 metre. Protected by berm

Naturally occurring protective layer details

Thickness of naturally occurring protective layer	13 (m)	Provide details (as required)	
Soil texture	24 % sand	49 % silt	27 % clay
Hydraulic conductivity - naturally occurring protective layer	Depth and type of soil tested: 6.2 ft/11	Hydraulic conductivity (cm/s): 5.3×10^{-8} cm/s	Describe test standard used: falling head

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

NRCB USE ONLY

Requirements met: ☒ YES ☐ NO

Condition required: ☒ YES ☐ NO

Report attached: ☒ YES ☐ NO

Catch Basin Storage Volume Calculator

Construction Dimensions of Catch Basin

* Only cells in blue can be changed.

CFO Name [1]	(Enter CFO Name Here)
Land Location [1]	1-1-4-W5

Overall Dimensions of Catch Basin			Catch Basin Dimensions
Total Length*[4]	40.0	m	131 ft
Total Width*[4]	25.0	m	82 ft
Total Depth*[4]	4.0	m	13 ft
Design Capacity Depth	*3.50*	m	11 ft
End Slope*[4]	3	run:rise	3 run:rise
Side Slope*[4]	3	run:rise	3 run:rise
Length of Bottom	16.0	m	52 ft
Width of Bottom	1.0	m	3 ft
Capacity @ top of Bank	*1,648*	m^3	*Capacity (@tob)* *58,199* ft^3 *362,509 Imp. Gal*

Design Capacity of Catch Basin (freeboard level)			Design Capacity (freeboard level)
Length (design capacity depth)	37.0	m	121 ft
Width (design capacity depth)	22.0	m	72 ft
Total Depth	*4.0*	m	*13 ft*
Design Capacity Depth	3.50	m	11 ft
End Slope	3	run:rise	3 run:rise
Side Slope	3	run:rise	3 run:rise
Design Capacity (freeboard level)	**1,195**	m^3	42,210 ft^3
			262,918 Imp. Gal.
level)	*814*	m^2	*8,762* ft^2

Paved Runoff Catchment Area(s)

Area [2]	Length (m)	Width (m)	Area (m^2)
1			0.0
2			0.0
3			0.0
4			0.0
5			0.0
		Total Area (m^2)	**0**

Unpaved Runoff Catchment Area(s)

Area [2]	Length (m)	Width (m)	Area (m^2)
6	113	85	9,605.0
7			4,725.0
8			0.0
9			0.0
10			0.0
		Total Area (m^2)	**14,330**

Rainfall (Select Town [3])

Lethbridge 90

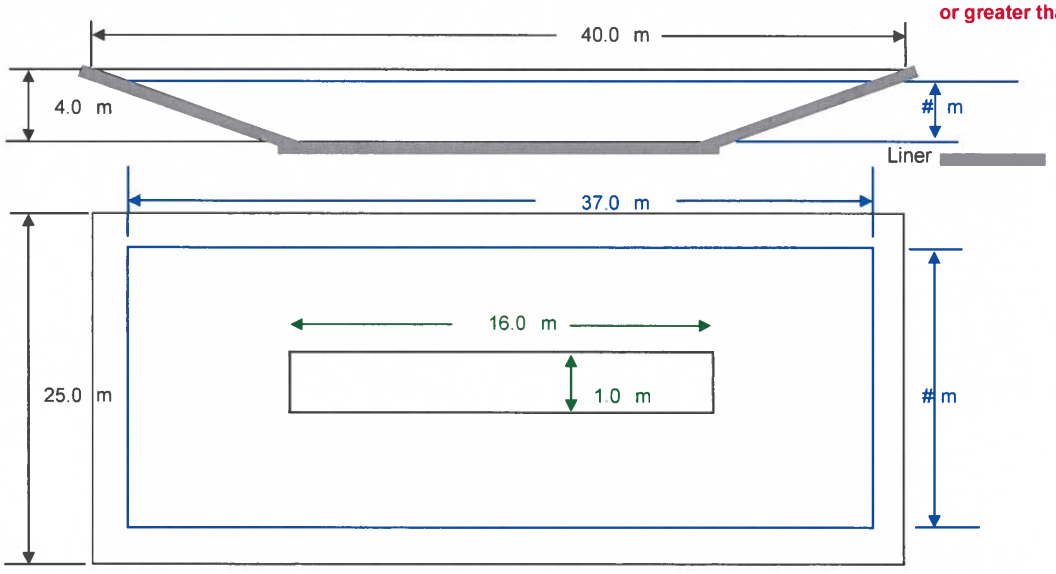
AOPA Design Rainfall **90 mm**

Minimum Catchbasin Storage Volume Required

838 m^3 ** **29604.462 ft^3**

184401.25 Imp. Gal.

**** Design capacity of catch basin should be equal to or greater than, minimum storage volume required.**



Lines in Black - Overall catch basin dimensions

Lines in Blue - Design capacity depth dimensions (excludes freeboard)

NTS - Not To Scale

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

NRCB USE ONLY

Catch basin calculator. Total volume @ freeboard level: 1,195 m^3 Runoff capacity requirements met: ☒ YES ☐ NO

Calculation of the volume attached: ☒ YES ☐ NO

Depth to water table: Borehole 5: 2.3 m, Borhole 1: 11m Requirements met: ☒ YES ☐ NO

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

Unknown. No water wells within 400 m of the CFO

ERST completed: ☒ See ERST page for details

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

Till material, Silty clay loam to clay loam, soft to stiff with medium plasticity. Fluctuating water table (brown iron staining found to a depth of 13.5 m)

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

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NRCB USE ONLY **RUNOFF CONTROL CATCH BASIN CAPACITY SUMMARY (if applicable)**	
Facility 1	
Name / description New catch basin	Capacity 1,195 m^3
Facility 2	
Name / description	Capacity
Facility 3	
Name / description	Capacity
Facility 4	
Name / description	Capacity
TOTAL CAPACITY	1,195 m3
RUNOFF VOLUME FROM CONTRIBUTING AREAS	838 m^3
MEETS AOPA RUNOFF CONTROL VOLUME REQUIREMENTS	☒ YES ☐ NO

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~~RUNOFF CONTROL CATCH BASIN~~ Liquid storage and/or 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. Lagoon
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
					Inside end walls	Inside side walls	Outside walls	Calculated storage capacity (excl. 0.5 m freeboard) (m^3)
1.	45	40	5	5	~~3:1~~	3:1	0	
2.								
3.								
							TOTAL CAPACITY	

Naturally occurring protective layer details

Thickness of naturally occurring protective layer	13 (m)	Provide details (as required) drilling	
Soil texture CL	24 % sand	49 % silt	27 % clay
Hydraulic conductivity - naturally occurring protective layer	Depth and type of soil tested 6.2 till	Hydraulic conductivity (cm/s) 5.3×10^{-8} cm/s	Describe test standard used falling head

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

Liquid Manure Storage Volume Calculator

Construction Dimensions of Liquid Manure Storage

* Only cells in blue can be changed.

Size of Liquid Manure Storage	Metric		Imperial Units	Size of Liquid MS
Total Length*4	45.0	m	148	ft
Total Width*4	40.0	m	131	ft
Total Depth*4	5.0	m	16	ft
Design Capacity Depth	*4.50*	m	15	ft
End Slope*4	3	run:rise	3	run:rise
Side Slope*4	3	run:rise	3	run:rise
Length of Bottom	15.0			
Width of Bottom	10.0			
Total Capacity @ top of Bank	**4,125**	**m^3**	Total Capacity (@tob)	145,673 ft^3
				907,373 Imp. Gal.

Design Capacity of Liquid Manure Storage (freeboard level)			Design Capacity (freeboard level)	
Length (design capacity depth)	42.0	m	138	ft
Width (design capacity depth)	37.0	m	121	ft
Total Depth	*5.0*	m	*16*	ft
Design Capacity Depth	4.50	m	15	ft
End Slope	3	run:rise	3	run:rise
Side Slope	3	run:rise	3	run:rise
Design Capacity (freeboard level)	**3,287**	**m^3**	116,088	ft^3
			723,094	Imp. Gal.
Surface Area of Liquid Manure	*1,554*	m^2	*16,727*	ft^2

CFO Name 1: (Enter CFO Name Here)
Land Location 1: 1-1-4-W5

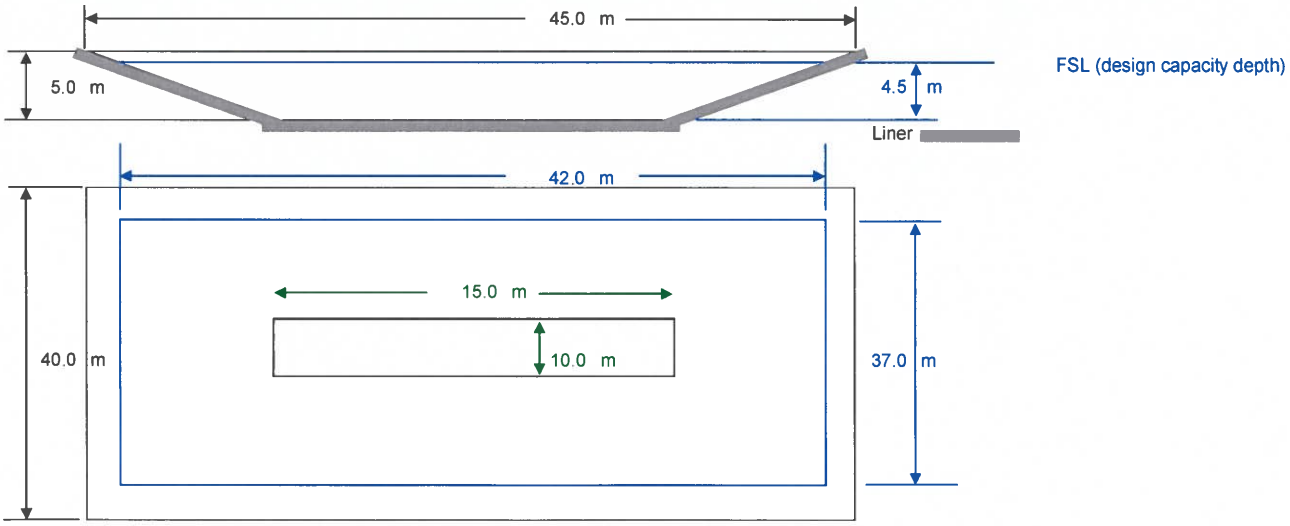
Type of Livestock 2
Free Stall: Lactating Cow Only
Annual manure production / hd: 36.0 m^3/hd
9 month manure production / hd: 27.00 m^3/hd

Number of Livestock 3: 500 head

Minimum Liquid Manure Storage Volume Required
~~XXXXXX~~ 476,748 ft^3
84,089 Imp. Gal.

The required volume is 2,295 m^3

** Design capacity of liquid manure storage should be equal to, or greater than, minimum storage volume required.



Lines in Black - Overall liquid manure storage dimensions
Lines in Blue - Design capacity depth dimensions (excludes freeboard)

NTS - Not To Scale

NRCB USE ONLY

Liquid manure storage volume calculator attached: ☒ YES ☐ NO

Yes with a condition

Depth to water table: 2.5 m below ground (worst case) Requirements met: ☒ YES ☐ NO

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

Comments: No water wells in area. Below drilling zone (13 m)

ERST completed: ☒ see ERST page for details

Surface water control systems

Requirements met: ☒ YES ☐ NO Details/comments:

Naturally occurring protective layer details

Layer specification comments (e.g. description of the layer texture, layer thickness/depth and the methodology used to collect this information such as sand lenses, number, and location of boreholes):

Till material, Silty clay loam to clay loam, soft to stiff with medium plasticity. Fluctuating water table (brown iron staining found to a depth of 13.5 m)

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

NRCB USE ONLY **LIQUID MANURE STORAGE VOLUME CALCULATOR (if applicable)**	
Facility 1	
Name / description: Old pit	Capacity: 283 m^3
Facility 2	
Name / description: New EMS	Capacity: 3,287 m^3
Facility 3	
Name / description	Capacity
Facility 4	
Name / description	Capacity
TOTAL CAPACITY	3,550 m^3
REQUIRED 9 MONTH STORAGE CAPACITY	2,295 m^3
MEETS THE REQUIREMENTS FOR A MINIMUM OF 9 MONTHS STORAGE	☒ YES ☐ NO

3 October 2023

WSP File: BX11613

3102 – 12 Avenue North
Lethbridge, Alberta T1H 5V1
T: +1 403 327-7474
www.wsp.com

John Liefting Farming
Box 1116
Picture Butte, Alberta T1M 1M9

Attention: Mr. John Liefting:

Re: Geotechnical Review and Evaluation
NRCB Permitting of Proposed Pen and Lagoon
NW-07-011-20-W4M, near Picture Butte, Alberta

As requested, WSP E&I Canada Limited (WSP) 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 an area of proposed pen and a proposed lagoon within NW-07-011-20-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, seven (7) boreholes were advanced at the site on April 25, 2023. The boreholes were advanced at the approximate locations denoted as JL1-23 to JL7-23 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 ranging between 3.0 m and 13.5 m below existing grades. The boreholes were logged by Larry Delong of Chilako Drilling Services.

In general, the natural mineral soils encountered within the boreholes comprised of a lacustrine deposit of silty clay loam to depths ranging between 0.4 m and 1.3 m below existing grade. The upper lacustrine layer was underlain by medium plastic clay till to the termination depth of all the boreholes. It was noted that saturated sand lenses and perched water was encountered in borehole JL1-23 at 11.0 m depth.

Samples of soil collected from the screened zone of the boreholes JL5-23 and JL7-23 were subjected to laboratory grain size (i.e., hydrometer) analyses. The results (attached) indicate a textural breakdown of approximately:

Table 1: Soil Textural Analyses

Borehole/Depth	% Sand	% Silt	% Clay
JL5-23 / 5.9-9.2m	19	48	33
JL7-23 / 1.4-3.0m	24	49	27

To measure the *in situ* permeability of the subsurface soils, 50 mm diameter PVC monitoring wells were constructed in boreholes JL5-23 and JL7-23. Test well JL5-23 (proposed lagoon) was screened from 5.9 m to 9.2 m depth, and test well JL7-23 (proposed pen area) was screened from 1.4 m and 3.0 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, the average 24-hour water drop at JL5-23 was 1.6 m and the average 24-hour water drop at JL7-23 was 2.3 m.

To calculate the permeability of the screened portion of the clay till strata at the test well locations, a modified falling head test (as outlined in the USBR Engineering Geology Field Manual Volume 2 [2001]) was used. The input variables and output data are outlined on the attached In Situ Permeability Test reports. The results of the permeability testing indicate an *in situ* hydraulic conductivity, k_s, of 5.3×10^{-8} cm/s at JL5-23 and a hydraulic conductivity, k_s, 6.2×10^{-7} cm/s at JL7-23.

Using the measured permeability of the clay stratum, the 3.3 m of clay screened at JL5-23 is estimated to represent the equivalent of approximately 62 m of naturally occurring materials having a hydraulic conductivity of 1×10^{-6} cm/s (the reference standard in AOPA). At JL7-23, the 1.6 m of clay that was screened is estimated to represent the equivalent of approximately 2.58 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) and for liquid manure storage (minimum 10 m, Section 9.5-a).

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 WSP's opinion that the naturally occurring materials at the site satisfy the AOPA requirements for permitting the proposed pens and 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,

WSP E&I Canada Limited

17 Oct 2023

John Lobbezoo, P.Eng.
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Geotechnical Services

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Senior. Associate, Geotechnical Engineer

PERMIT TO PRACTICE
WSP E&I CANADA LIMITED
RM SIGNATURE:
RM APEGA ID #: 110450
DATE: 17 Oct 2023
PERMIT NUMBER: P004546
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)

Attachments
- Figure 1 Borehole Locations
- In Situ Permeability Test Calculations
- Hydrometer Test
- Soil Profile and Parent Material Description, Chilako Drilling Services

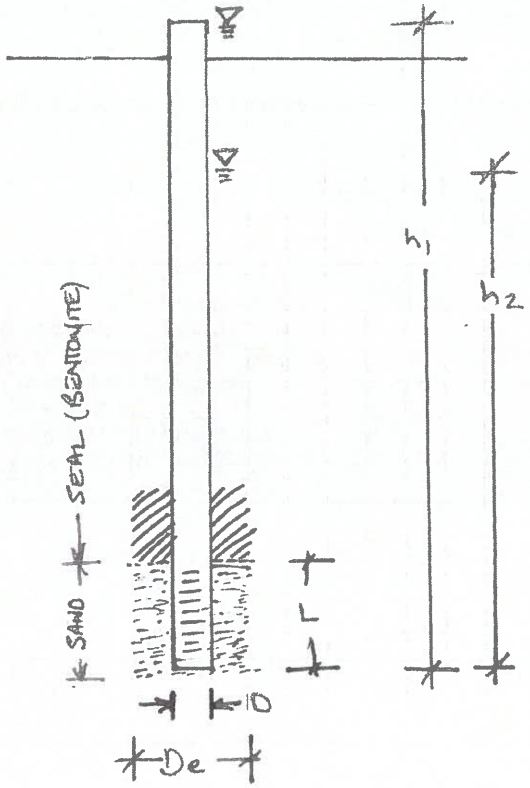
JL5-23

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)



JL5-23 - Liefting Farms

WSP File: BX30761

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	9.80	initial height of water above base of hole (m)
	h2	8.20	final height of water above base of hole (m)
	t	24.0	time of test (h)

k_s =	5.3E-08	cm/sec

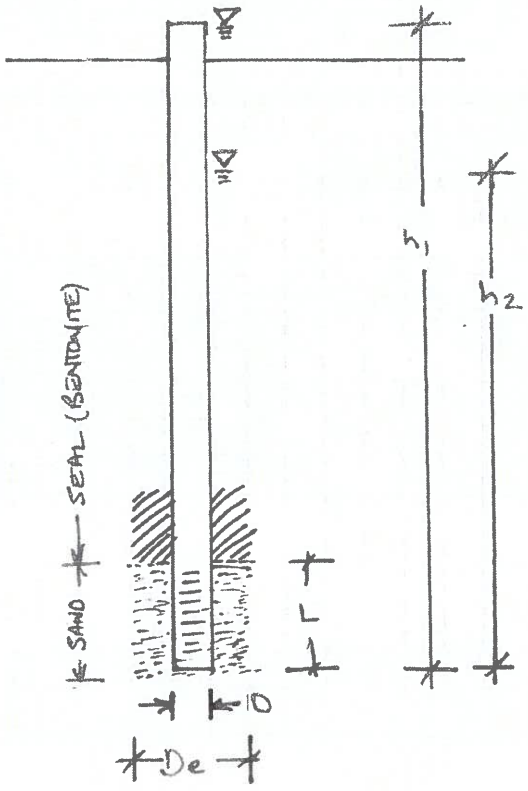
JL7-23

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)



JL7-23 - Liefting Farms

WSP File: BX30761

INPUT VARIABLES

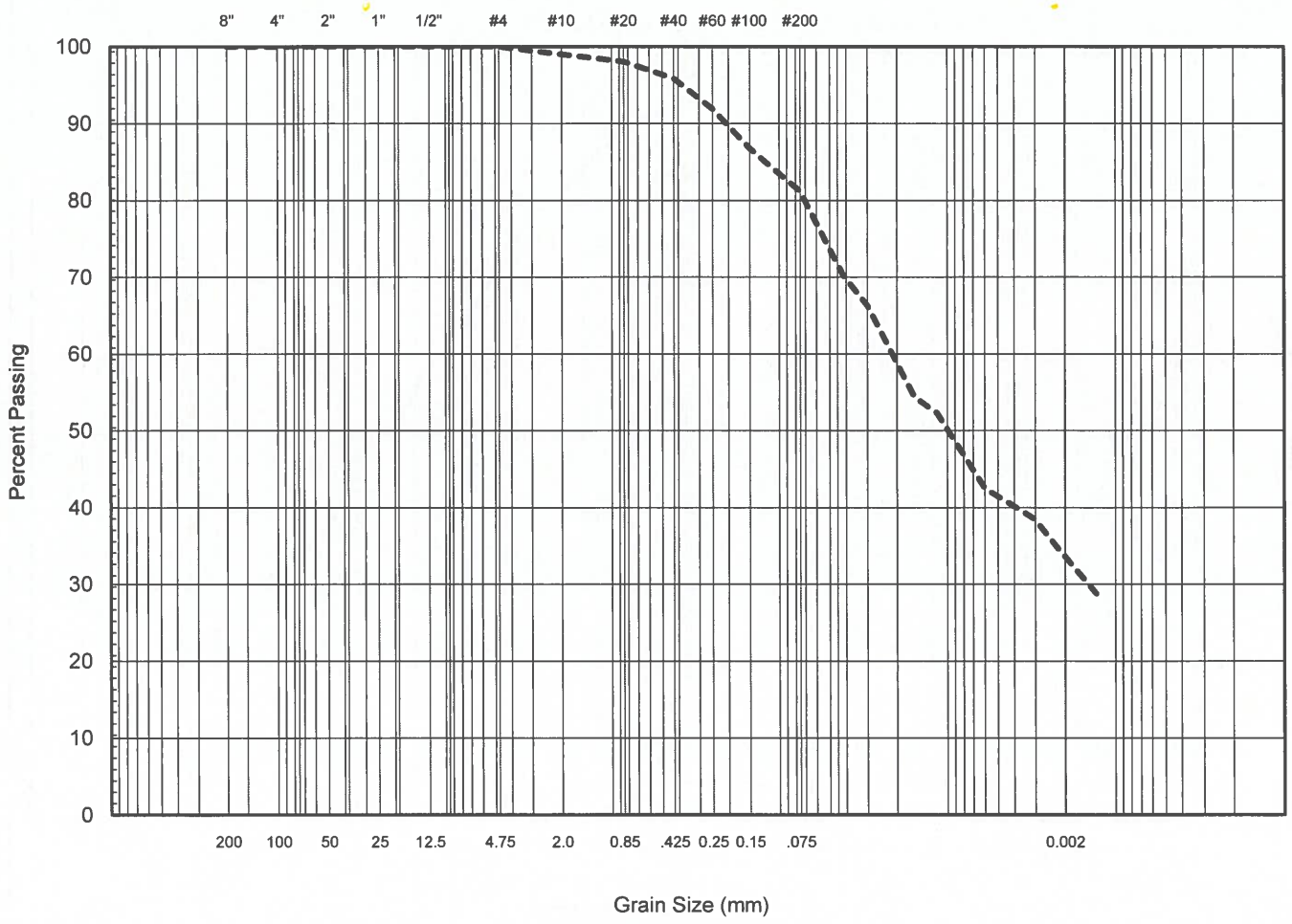
Terms	Value	Definition
D	0.0520	diameter of standpipe (m)
De	0.1500	diameter of borehole (m)
L	1.60	length of sand section (m)
h1	3.60	initial height of water above base of hole (m)
h2	1.29	final height of water above base of hole (m)
t	24.0	time of test (h)

k_s = 6.2E-07 cm/sec

HYDROMETER TEST

WSP E&I Canada Limited

COBBLES	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	C	M	F		



Remarks:

Summary					
D10 =	#N/A	mm	**Gravel**	0	%
D30 =	0.0015	mm	**Sand**	19	%
D60 =	0.0214	mm	**Silt**	48	%
Cu =	#N/A		**Clay**	33	%
Cc =	#N/A				

Project No: BX30761
Hole No: JL5-23
Depth (m): 7.0-8.5

Client: John Liefting
Sample: --
Date: June 29, 2023

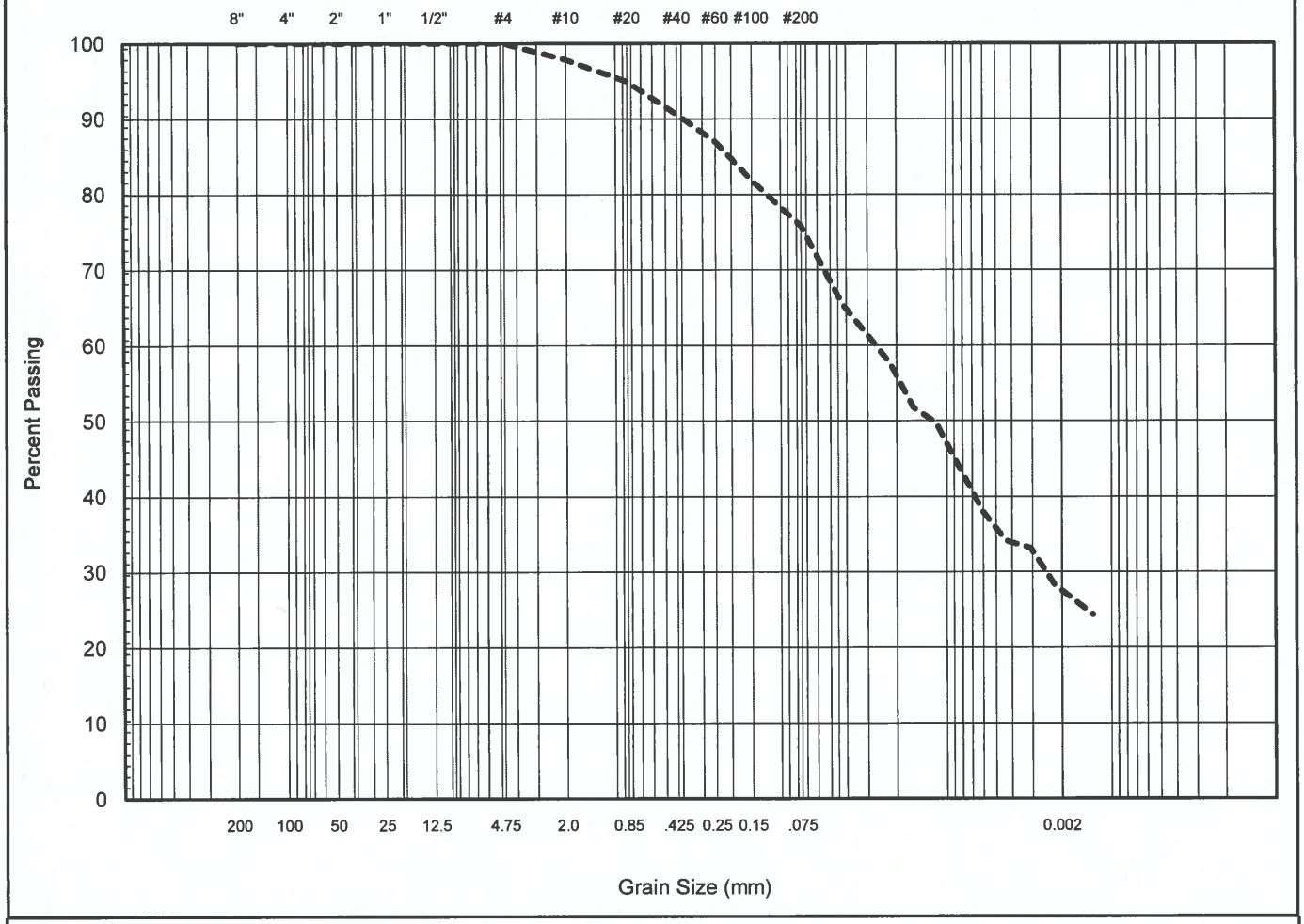
Tech: TMW

JL5-23 hydrometer

HYDROMETER TEST

WSP E&I Canada Limited

COBBLES	GRAVEL		SAND			SILT	CLAY
	Coarse	Fine	C	M	F		



Remarks:

Summary

D10 =	#N/A	mm	**Gravel**	0	%
D30 =	0.0025	mm	**Sand**	24	%
D60 =	0.0270	mm	**Silt**	49	%
Cu =	#N/A		**Clay**	27	%
Cc =	#N/A				

Project No: BX30761
Hole No: JL7-23
Depth (m): 2.0-3.0

Client: John Liefting
Sample: --
Date: June 29, 2023

Tech: TMW

JL7-23 hydrometer

CHILAKO DRILLING SERVICES LTD

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

SOIL PROFILE AND PARENT MATERIAL DESCRIPTION

Site Location: NW7-11-20W4, John Liefting Date: 25-Apr-23

Hole #	Location	Depth	Texture	Moisture	Geological	Sample	Remarks
JL1-23	0375723	0-0.15	CL	M	Topsoil		
	5528983	0.15-1.3	CL	M	Lac		Stiff, med plastic, brown
		1.3-3.1	C	M	Till		Stiff, med-high plastic, dark brown
		3.1-4.5	CL	M	Till		Stiff, med plastic, brown, trace gravel
		4.5-13.5	CL-C	M	Till		Stiff, med plastic, dark brown, a few minor sand lenses (sat). Free water @ 11.0m
JL2-23	0375713	0-0.15	CL	M	Topsoil		
	5528917	0.15-0.6	SiCL	VM	Lac		Soft, med plastic, olive gray
		0.6-1.0	CL	VM	Lac		Soft, med plastic, olive gray
		1.0-4.4	CL-C	M	Till		Stiff, med plastic, brown
		4.4-9.5	CL	M	Till		Stiff, med plastic, brown, oxidized
		9.5-13.5	CL	M	Till		Stiff, med plastic, brown
							No free water
JL3-23	0375662	0-0.15	CL	M	Topsoil		
	5528918	0.15-0.35	SiCL	VM	Lac		Soft, med plastic, olive gray
		0.35-1.0	SiCL	VM	Lac		Soft, med plastic, olive gray
		1.0-2.0	CL	M	Till		Stiff, med plastic, brown
		2.0-3.6	CL	M	Till		Stiff, med plastic, brown, trace gravel
		3.6-6.1	C	M	Till		Stiff, med plastic, brown, trace gravel
		6.1-13.5	CL	M	Till		Stiff, med plastic, brown
							No free water
JL4-23	0375663	0-0.15	CL	M	Topsoil		
	5528985	0.15-0.3	SiCL	M	Lac		V. Firm, med plastic, olive brown
		0.3-1.1	C	M	Lac		Stiff, med plastic, brown
		1.1-3.9	C	M	Till		Stiff, med-high plastic, yellow brown
		3.9-5.6	C	M	Till		Stiff, med-high plastic, brown
		5.6-13.5	CL-C	M	Till		Stiff, med plastic, brown, iron staining
							No free water
JL5-23	0375689	0-0.15	CL	M	Topsoil		
	5528955	0.15-0.3	CL	M	Lac		
		0.3-0.7	SiCL	M	Lac		Stiff, med plastic, olive brown
		0.7-2.3	CL-C	M	Till		Stiff, med plastic, brown
		2.3-2.5	SCL	VM-Sat	Till		Soft, mixed with gravel
		2.5-6.0	CL-C	M	Till		Stiff, med plastic, brown
		6.0-9.2	CL	M	Till	7.0-8.5	Stiff, med plastic, brown
							50mm H.C. Well installed ot 9.2m BGS
							Screen: 9.2-6.2m
							Sand: 9.2-5.9m
							Bentonite: 5.9-0.0m
							Stickup: 0.6m
							Hole Diameter: 0.15m
JL6-23	0375630	0-0.15	CL	M	Topsoil		
	5528910	0.15-0.4	SiCL	M	Lac		
		0.4-3.0	CL	M	Till		Firm, med plastic, brown,
							VM-Sat sand lensing @ 1.4m
JL7-23	0375631	0-0.15	CL	M	Topsoil		
	5528980	0.15-0.75	SiCL	M	Lac		Stiff, med plastic, olive brown
		0.75-3.0	CL	M	Till	2.0-3.0	Stiff, med plastic, brown, sand streaks
							50mm H.C. Well installed to 3.0m BGS
							Screen: 3.0-1.5m
							Sand: 3.0-1.4m
							Bentonite: 1.4-0.0m
							Stickup: 0.6m
							Hole Diameter: 0.15m

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