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	RA24044	E1/2 and SW 17-34-2 W4M

APPLICATION DISCLOSURE

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

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

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

March 3,2025 — Date of signing

[redacted] — Signature

March 3,2025 — Corporate name (if applicable)

Craig Ference — 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)
North Catch Basin 4	50m x 50m x 2m deep
Pens 32, 33	196m x 67 m
Pens 34, 35	196m x 67 m

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

Existing facilities	Dimensions (m) (length, width, and depth)	NRCB USE ONLY
North Catch basin 3	50 x 50 x 2	
North Catch basin 2	75 x 40 x 4	
North Catch basin 1	25 x 5 x 2.5	25 m x 50 m x 2.5 m typo

NRCB USE ONLY

Existing CFO confirmed facilities, catch basins corrected to match site layout.

Last updated September 11, 2023

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)

Existing facilities continued	Dimensions (m) (length, width, and depth)	NRCB USE ONLY
South Catch basin 1	68 x 27 x 4	
South Catch basin 2	72 x 27 x 2.5	
North Pen area pens 12-30	335 x 267	
South Pen area (pens 1-9 & 62,71,81,91)	436 x 236	

Part 2 — Technical Requirements

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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)

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 Spring 2025

Additional information

Increase from 9,000 to 11,000 beef finishers

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**

Last updated September 11, 2023

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)

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 17646, 1435034, 1501879 License 16835, License 14937

Signed this 28 day of October, 2024. X [redacted]
e of Applicant or Agent

Last updated September 11, 2023

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

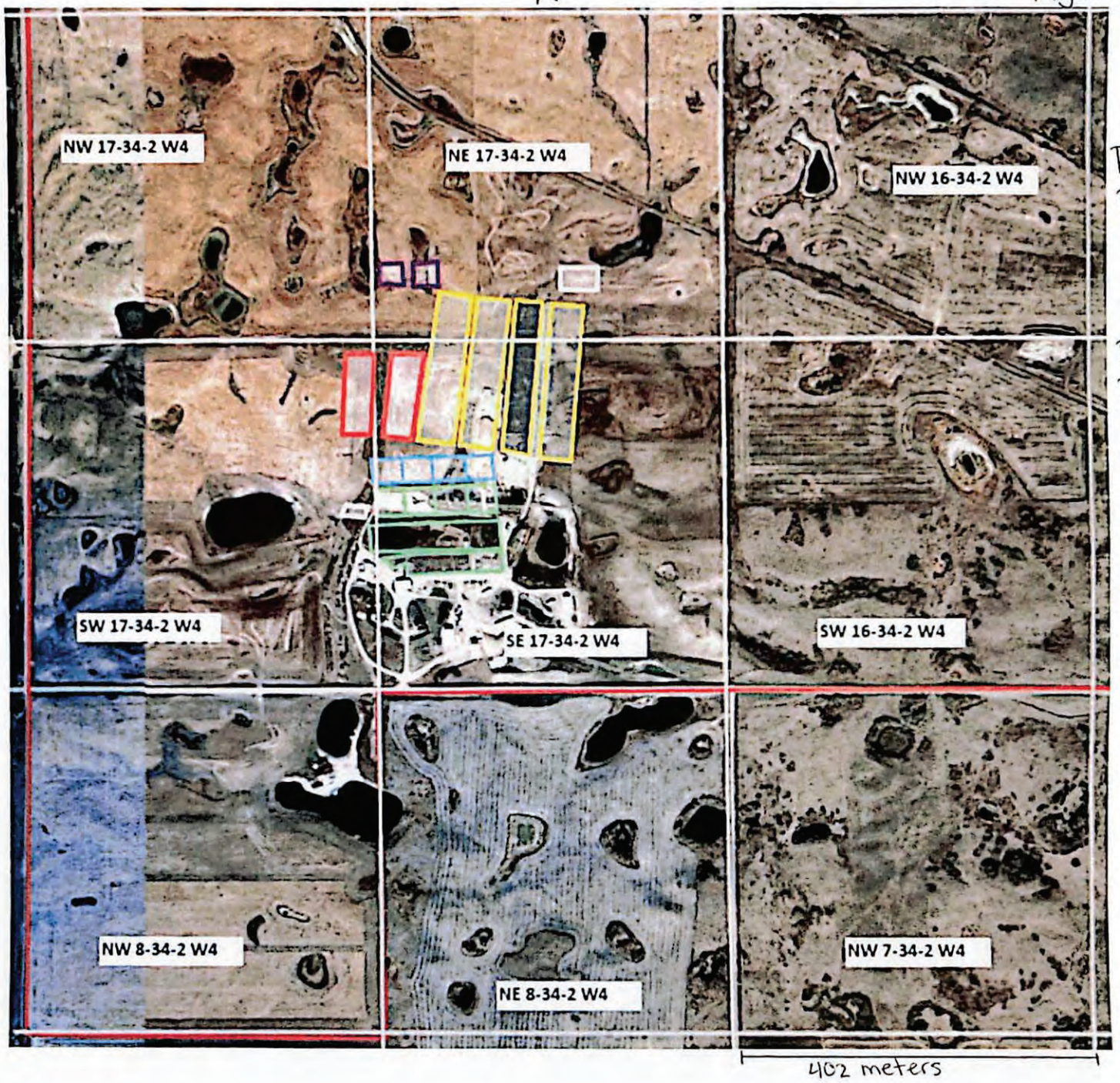
1. At this time, I (we) do not know whether a new water licence is needed from EPA under the *Water Act* for the development or activity proposed in this AOPA application.
2. If a new *Water Act* licence is needed, I (we) request that the NRCB process the AOPA application **independently of** EPA's processing 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

Figure # 1



catch basin 4
North
proposed

purple =
purposed
North
3+4
Catch Basins

Red =
purposed
pens
32,33,34,35

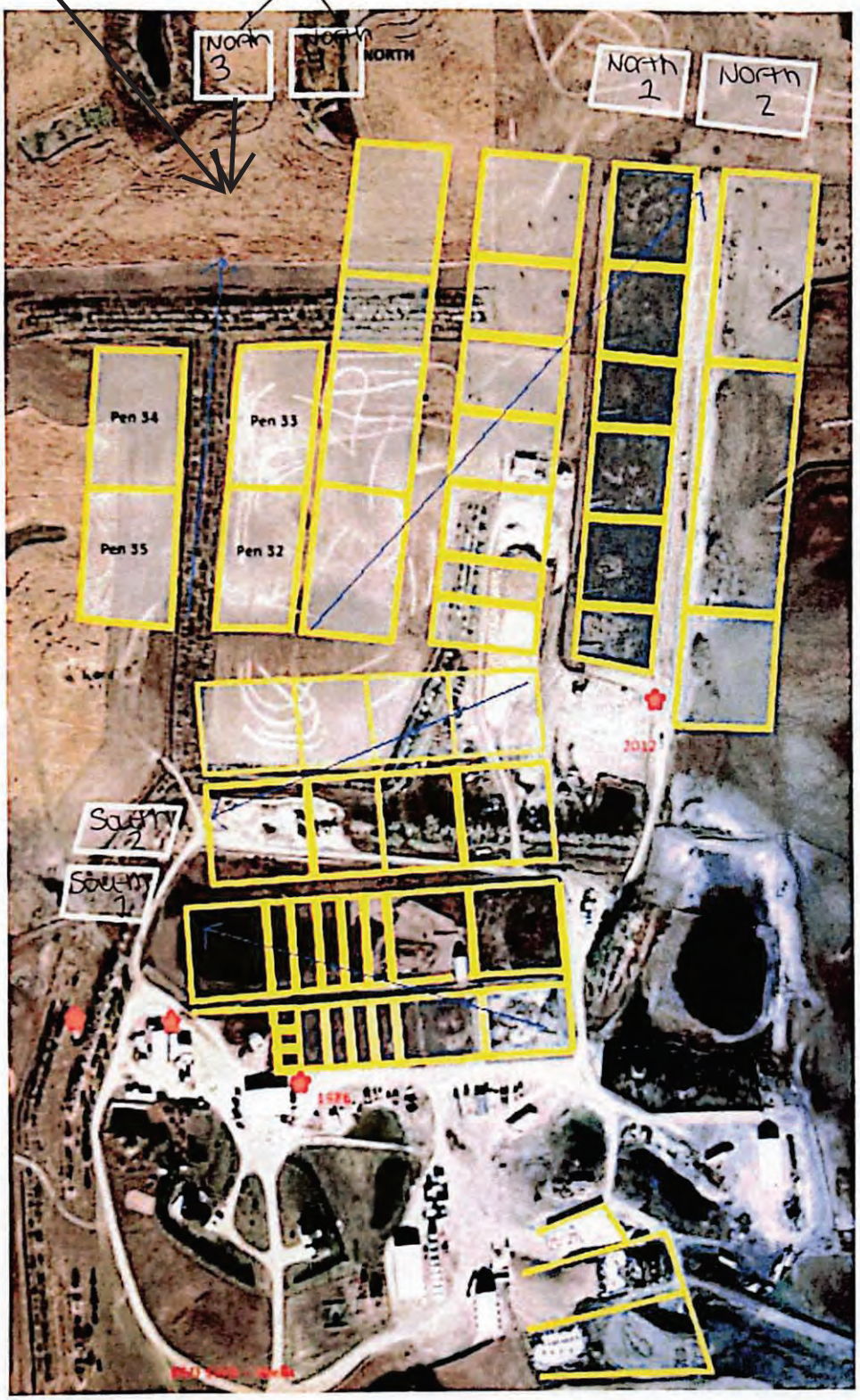
Figure # 2

proposed catch basin to be moved south

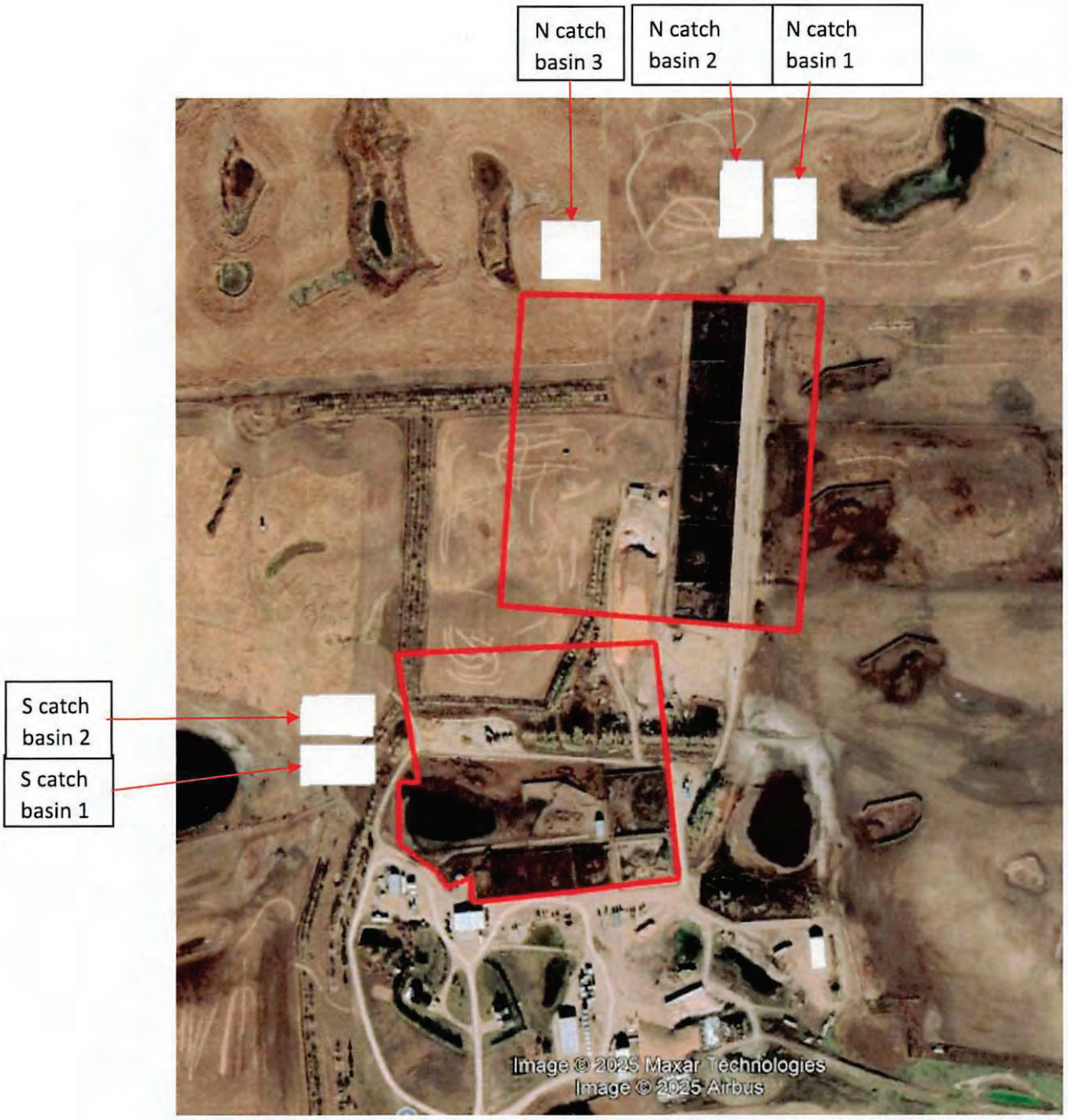
CB 3 North already permitted

Proposed catch basins

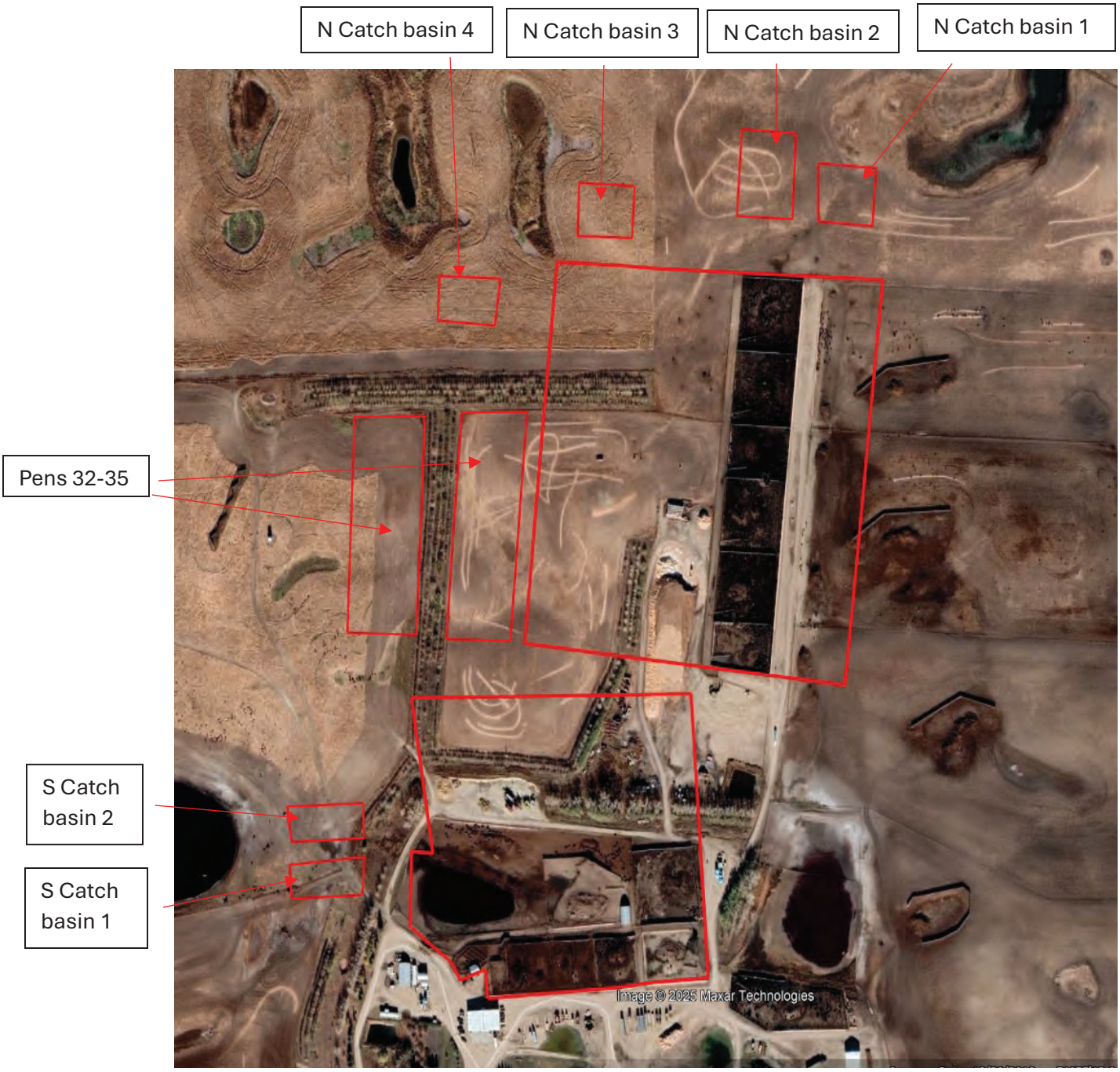
proposed pens 32-35



Permitted and constructed site map



Updated Site Drawing with new catch basin and pens.
Applicant updated catch basin from engineers drawing. Moving South.



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)

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: All pens without numbers, catch basin N 1&2, S 1&2 **Proposed 1:** North 3&4 Catch Basins

Proposed 2: Pens 32,33,34,35 **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 in flood plain
Surface water information	How many springs are within 100 m of the manure storage facility or manure collection area?	0	0			☑ YES ☐ NO ☐ YES with exemption	None known
	How many water wells are within 100 m of the manure storage facility or manure collection area?	400m	0			☑ YES ☐ NO ☐ YES with exemption	none within 100 m of proposed, 5 within 100m of existing.
	What is the shortest distance from the manure collection or storage facility to a surface water body? (e.g., lake, creek, slough, seasonal)	76m	>800 CBW			☑ YES ☐ NO ☐ YES with exemption	75 m to slough on applicants property for common body of water
Groundwater information	What is the depth to the water table?					☑ YES ☐ NO ☐ YES with exemption	5 m
	What is the depth to the groundwater resource/aquifer you draw water from?					☑ YES ☐ NO ☐ YES with exemption	WW ID 1501807 41.2 m

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

NRCB USE ONLY

ENVIRONMENTAL RISK SCREENING INFORMATION

ERST for **proposed** facilities

Facility	Groundwater score	Surface water score	File number
See Decision Summary RA24044			

ERST for **existing** facilities

Facility	Groundwater score	Surface water score	File number
South Feedlot pens	Low	Low	RA24030
South Catch basin	Low	Low	RA24030
Feedlot pens 61,71,81,91	Low	Low	RA24001
Feedlot pens 12,13,20	Low	Low	RA24001

ERST related comments:

NRCB Natural Resources Conservation Board

NRCB USE ONLY

WATER WELL AND SURFACE WATER INFORMATION

Well IDs: ID 1435304 ID 177646 ID 1502898
ID 1501807 ID 177647 ID 1435344

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:

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)

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**
Glen Vert	SW 7-34-02 w4	1800m	Ag	Cat 1	1780 m	N/A	Y

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)**
Ference Land & Cattle Corp.	see attached spreadsheet	1031.34	dark brown/brown		Owned
Ference Farms Ltd. Edward Ferenc	see attached spreadsheet	155.7	dark brown/brown		Owned
Karen Koch	see attached spreadsheet	261.25	dark brown/brown		attached
			Total	1448 provided	

* 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)

Name of Land Owner	Legal Land Description	Usable Area **(ha)	Soil Zone ***
Ference Land and Cattle (south harry's)	SE 7-34-02 W4	60.7	Dark brown / brown
Ference Land and Cattle (south of road)	NW 8-34-02 W4	55.4	Dark brown / brown
Ference Land and Cattle (Guenthners)	SW 8-34-02 W4	55.4	Dark brown / brown
Ference Land and Cattle (Junk Pile)	SW 18-34-02 W4	46.9	Dark brown / brown
Ference Land and Cattle (west of yard)	SW 17-34-02 W4	54.6	Dark brown / brown
Ference Land and Cattle (n/e Yard)	N 17-34-02 W4	136	Dark brown / brown
Ference Land and Cattle (clarks)	16-34-02 W4	177	Dark brown / brown
Ference Land and Cattle (north hiway 2	NE 17-34-02 W4	27.1	Dark brown / brown
Ference Land and Cattle (north hiway)	SE 20-34-02 W4	14.6	Dark brown / brown
Ference Land and Cattle (pens 11-18)	SE 17-34-02 W4	46	Dark brown / brown
Ference Land and Cattle (gloria)	SW 2-34-02 W4	48.87	Dark brown / brown
Ference Land and Cattle (gloria north)	NW 2-34-02 W4	12.14	Dark brown / brown
Ference Land and Cattle (hagen)	NE 4-34-02 W4	55.63	Dark brown / brown
Ference Land and Cattle (Randy's)	SW 20-34-3 W4	30.97	Dark brown / brown
Ference Land and Cattle (Darcy Section	26-35-4 W4	209.73	Dark brown / brown
Ference Farms Ltd. Edward Ference	E 13-34-03 W4	68	Dark brown / brown
Ference Farms Ltd. Edward Ference	SW 13-34-03 W4	57	Dark brown / brown
Ference Farms Ltd. Edward Ference	NW 13-34-03 W4	31	Dark brown / brown
Karen Koch	NW 5-35-1 W4	53	Dark brown / brown
Karen Koch	SW 5-35-1 W4	33	Dark brown / brown
Karen Koch	SE 10-34-2 W4	49.8	Dark brown / brown
Karen Koch	NW 10-34-2 W4	43.7	Dark brown / brown
Karen Koch	SW 10-34-2 W4	81.75	Dark brown / brown
	Total	**1448.29**	

FERENCE
LAND & CATTLE CORP.

Harvey R. Ference
(780) 753 0353 cell
(403) 552 3753 office
(403) 552 3751 fax

Craig H. Ference, BSc.
(780) 753 1283 cell
craig@doubleffarms.ca

Box 707 Kirriemuir, AB T0C 1R0
www.doubleffarms.ca

FARM LEASE-CASH RENTAL

Between
Karen Koch (lessor)
and
Ference Land and Cattle Corp, Harvey, Craig Ference
of Box 707, Kirriemuir AB, T0C 1R0 (lessee)

Karen Koch agrees to cash rent the following parcels of land to FLCC.

Section 10-34-2-W4 (393 acres) Gansers (162 acres) and Bouchards (123acres) East (108 acres)
Section 5-35-1-W4 (212 acres) Mackranoffs (N-131 acres, S-81 acres)

The acres total 605 acres.

Yearly rent shall be [redacted]er acre payable on November 1, [redacted]

This is to include all fall grazing.

The lessee shall receive all crop insurance payouts or subsidies on the above lands for grain or feed that the lessee has insured.

The lessee is entitled to any crop damages that arise from oil activity including seismic.

This shall be a three year lease beginning May 1, 2024 and ending on March 1, 2027 with the lessee having a yearly option of renewal

Land taxes will be paid by lessor.

FLCC has first right to future rent. Rent beginning in 2027 will be decided on/or before November 1, 2026.

The lessee will decide how the crop will be taken off (combine, silage, graze or swath graze) as the year progresses and is entitled to make these harvest decisions based on the unforeseen events like drought or hail throughout the growing season.

Grainery use to be included in rental rate. Graineries located at Gansers (NW 10-34-2-W4)

[redacted] [redacted] Date May 17, 2024

(Karen Koch) (Craig Ference for FLCC)

NRCB Natural Resources Conservation Board

NRCB USE ONLY

MINIMUM DISTANCE SEPARATION

Methods used to determine distance (if applicable): Google Earth

Margin of error (if applicable): N/A

Requirements (m): Category 1: 913 m Category 2: 1217 m Category 3: 1521 m Category 4: 2434 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: 1375 ha

Land base listed: 1448

Area not suitable: N/A

Available area: Applicant has provided adequate land base

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 _____

NRCB USE ONLY

ALL SIGNATURES IN FILE ☑ YES ☐ NO

DATES OF APPROVAL OFFICER SITE VISITS

November 5, 2024	

CORRESPONDENCE WITH MUNICIPALITIES AND REFERRAL AGENCIES

Date deeming letters sent: March 19, 2025

Municipality: Special Area No. 4

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

Alberta Health Services: ☑ N/A

☐ 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: Telus, Dry Country Gas Co-op ☐ N/A

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

Other: _____ ☐ N/A

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

JLECS

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

20 November 2024

JLECS File: P24074

Ference Land & Cattle Corp.
PO Box 707
Kirriemuir, Alberta T0C 1R0

Attention: Mr. Craig Ference

Re: Geotechnical Review and Evaluation
NRCB Permitting of Proposed Catch Basins
E-17-034-02-W4M, near Kirriemuir, Alberta

As requested, J Lobbezoo Engineering & Consulting Services Ltd. (JLECS) has carried out a geotechnical review and evaluation of the above-captioned site relative to the required protection of the groundwater resource, as required by the Agricultural Operation Practices Act, AB Reg. 267/2001 (hereinafter referred to as "AOPA"). This letter describes the site soil conditions to support a permit application related to proposed the construction of two new catch basins to be located north of the existing pens and farmyard at the above-captioned site (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 resource, five boreholes were advanced at the site on November 7, 2024. The boreholes were advanced at the approximate locations denoted as DF1-24 to DF5-24 on Figure 1, attached.

The boreholes were advanced by a truck-mounted drill rig owned and operated by Chilako Drilling Services and extended to depths of 9.0 m to 9.2 m below the existing grade. The boreholes were logged by Larry Delong of Chilako Drilling Services.

In general, the natural mineral soils encountered in the boreholes consisted of approximately 1.5 m to 5.6 m of lacustrine sandy loam overlying lacustrine clay and clay till to the termination depths of all five boreholes. While perched water was noted at the bottom of the sandy loam material at three of the five boreholes, a groundwater resource (as defined by the AOPA) was not encountered within the 9.2 m investigation depth at this site.

Samples of soil collected from the screened zones of boreholes DF1-24 and DF4-24 as well as samples from similar depths at the other boreholes were all subjected to grain size analyses, which was carried out by Down to Earth Laboratories in Lethbridge, Alberta. The lab report is attached, for reference. The results indicate a soil texture breakdown of:

Table 1: Soil Texture Analyses

Borehole/Depth	% Sand	% Silt	% Clay
DF1-24 / 7.5 – 9.0 m	44	28	28
DF2-24 / 6.0 – 7.5 m	18	48	34
DF3-24 / 7.5 – 9.0 m	13	47	40
DF4-24 / 7.5 – 9.0 m	46	28	26
DF5-24 / 7.5 – 9.0 m	20	24	46
Average:	30	35	35

To measure the *in situ* permeability of the subsurface soils, 50 mm diameter PVC monitoring wells were constructed in boreholes DF1-24 and DF4-24. Test well DF-24 was screened from 5.7 m to 9.0 m depth while test well DF4-24 was screened from 6.0 m to 9.2 m depth. Well saturation of the 50 mm diameter monitoring wells was carried out by filling the monitoring well to the top for several consecutive days. After several days of testing, a 24-hour water drop of 0.85 m was determined at DF1-24, and a 24-hour water drop of 0.50 m was determined at DF4-24.

To calculate the permeability of the screened portion of the clay 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 2.9×10^{-8} cm/s at DF1-24, and an *in situ* hydraulic conductivity, k_s, of 1.6×10^{-8} cm/s at DF4-24.

Using the measured permeability of the clay stratum, the 3.3 m of clay screened at DF1-24 and the 3.2 m of clay screened at DF4-24 are estimated to represent the equivalent of over 100 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).

JLECS

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 and pen expansion at this location.

While the site meets the AOPA recommendations for a naturally occurring protective layer, it is noted that the upper soils at the test hole locations included sandy loam soils, which would be expected to be present in the sideslopes of the excavated catch basin. According, it is recommended that all sandy loam soils encountered in the catch basin excavation sideslopes be subexcavated to a minimum 1 m depth, and replaced with compacted low-permeable clay.

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.

PROFESSIONAL ENGINEER ALBERTA

[redacted]

20 Nov 2024

John Lobbez[redacted]
Principal Ge[redacted] Engineer

PERMIT TO PRACTICE
J LOBB[redacted]NEERING &
CONSU[redacted]VICES LTD.
RM SIGNATURE: [redacted]
RM APEGA ID #: 110450
DATE: 20 Nov 2024.
PERMIT NUMBER: P016456
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)

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

Figure 1: Site Layout & Borehole Locations

Image Credit: Google

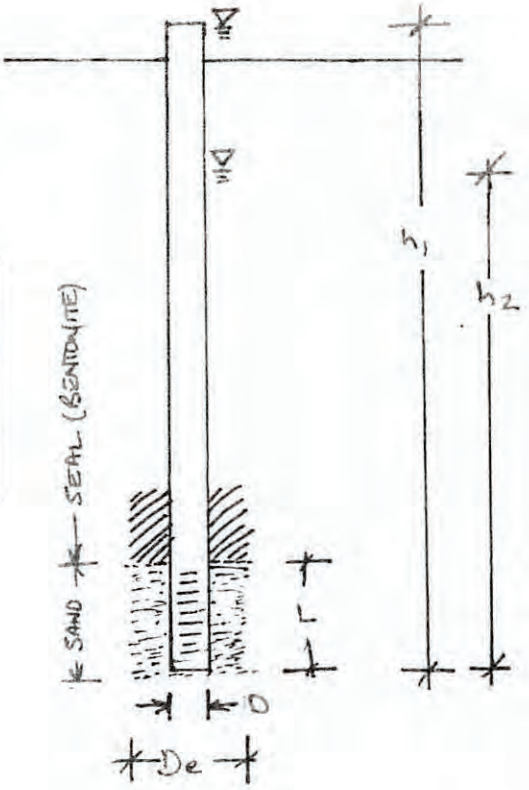
DF1-24

In Situ Permeability Test

Modified Falling Head Permeability Equation

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

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



DF1-24 - Ference Land & Cattle Corp.

JLECS File: P24074

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	9.30	initial height of water above base of hole (m)
h2	8.45	final height of water above base of hole (m)
t	24.0	time of test (h)

k_s = 2.9E-08 cm/sec

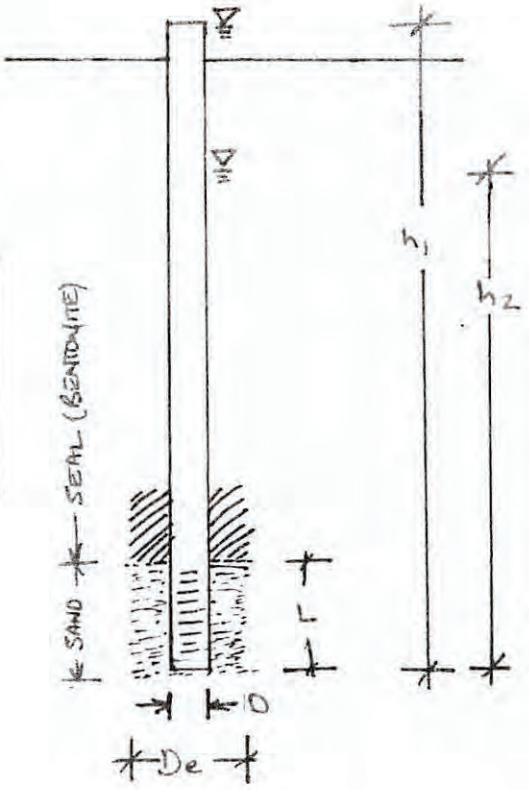
DF4-24

In Situ Permeability Test

Modified Falling Head Permeability Equation

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

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



DF4-24 - Ference Land & Cattle Corp.

JLECS File: P24074

INPUT VARIABLES

Terms	Value	Definition
D	0.0520	diameter of standpipe (m)
De	0.1500	diameter of borehole (m)
L	3.20	length of sand section (m)
h1	9.80	initial height of water above base of hole (m)
h2	9.30	final height of water above base of hole (m)
t	24.0	time of test (h)

k_s = 1.6E-08 cm/sec

Down To Earth Labs Inc.

The Science of Higher Yields

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

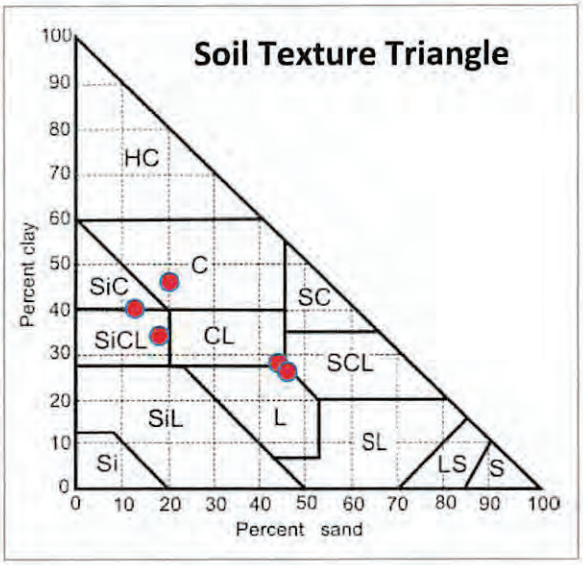
Report #: 198876
Report Date: 2024-11-19
Received: 2024-11-15
Completed: 2024-11-19
Test Done: ST

Project : Ference Cattle

PO:

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

		Sample ID:	241115N008	241115N009	241115N010	241115N011	241115N012
		Cust. Sample ID:	DF1-24	DF2-24	DF3-24	DF4-24	DF5-24
Analyte	Units		7.5-9.0	6.0-7.5	7.5-9.0	7.5-9.0	7.5-9.0
Sand	%		44.2	18.2	12.9	46.2	20.4
Silt	%		27.8	47.8	47.1	27.8	33.6
Clay	%		28.0	34.0	40.0	26.0	46.0
Soil Texture	-		Clay Loam	Silty Clay Loam	Silty Clay	Sandy Clay Loam	Clay



CHILAKO DRILLING SERVICES LTD

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

SOIL PROFILE AND PARENT MATERIAL DESCRIPTION

Site Location: SE17-34-2W4, Ference Cattle (Double F) Date: 07-Nov-24

Hole #	Location	Depth	Texture	Moisture	Geological	Sample	Remarks
DF1-24	0551525	0-1.5	FSL	SM	Lac	0-1.5	
	5752376	1.5-4.3	SiCL	M	Lac		Stiff, med plastic, olive brown
		4.3-4.5	CL	VM	Lac		Stiff, med plastic, olive brown
		4.5-9.0	C	M	Till	7.5-9.0	Stiff, med plastic, dark gray
							50mm H.C. Well installed to 9.0m BGS
							Screen: 9.0-6.0m
							Sand: 9.0-5.7m
							Bentonite: 5.7-0.0m
							Stickup: 0.3m
							Hole Diameter: 0.15m
DF2-24	0551560	0-0.6	FSL	SM	Fill		
	5752368	0.6-4.2	FSL	SM	Lac		
	mid slope	4.2-5.6	FSL	Sat	Lac		Free water, some silt
	of hill	5.6-9.2	C	M	Lac	6.0-7.5	Stiff, high plastic. Gray
DF3-24	0551415	0-0.15	FSL	SM	Topsoil		
	5752400	0.15-1.5	FSL-FSCL	SM	Lac		
		1.5-2.2	FSL	M	Lac		
		2.2-3.0	FSL	M-VM	Lac		
		3.0-4.2	C.SL	Sat	Lac		Free water
		4.2-9.2	C	M	Lac	7.5-9.0	Stiff, high plastic, gray
DF4-24	0551405	0-1.0	FSL	SM	Lac		
	5752320	1.0-1.5	C.SCL	SM	Lac		
		1.5-2.1	FSL	VM	Lac		Sat @ 2.1m
		2.1-3.2	SiCL	M	Lac		V. Firm, med plastic. Gleyed
		3.2-9.2	C	M	Lac		Stiff, high plastic, gray
							50mm H.C. Well installed to 9.2m BGS
							Screen: 9.2-6.2m
							Sand: 9.2-6.0m
							Bentonite: 6.0-0.0m
							Stickup: 0.6m
							Hole Diameter: 0.15m
DF5-24	0551537	0-1.5	SCL	SM	Fill		
	5752311	1.5-2.7	SL	M	Lac		
		2.7-3.9	SiCL	VM	Lac		V. Firm, med plastic, olive brown
		3.9-9.2	C	M	Lac	7.5-9.0	Stiff, high plastic, gray

Legend:

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

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)

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. Pens 32 - 33
2. Pens 34 - 35

Manure storage capacity

	Length (m)	Width (m)	Depth below ground level (m)	NRCB USE ONLY Estimated storage capacity (m^3)
1.	196	67	0	
2.	196	67		
			TOTAL CAPACITY	Adequate storage for solid manure on site

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

Surface water control systems

Describe the run-on and runoff control system

catch basin

Naturally occurring protective layer details

Thickness of naturally occurring protective layer	<60 (m)	Provide details (as required)	
Soil texture	44 % sand	28 % silt	28 % clay
Hydraulic conductivity - naturally occurring protective layer	Depth and type of soil tested: 7.5 - 9	Hydraulic conductivity (cm/s): 2.9 x 10 - 8	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 February 26, 2021

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: >5 m _____ Requirements met: ☑ YES ☐ NO

Depth to uppermost groundwater resource: 41.2 m _____ Requirements met: ☑ YES ☐ NO

ERST completed: ☑ see ERST page for details

See Decision Summary RA24044

Surface water control systems

Requirements met: ☑ YES ☐ NO Details/comments:

Catch basins sized correctly for all pens.

Naturally occurring protective layer details

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

Engineering reports indicate presence of naturally occuring protective layer.

Part 2 – Technical Requirements

NRCB Natural Resources Conservation Board

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

RUNOFF CONTROL CATCH BASIN: Naturally occurring protective layer

*(complete a copy of this section for **EACH proposed** runoff control catch basin with a naturally occurring protective layer)*

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

1. North Catch basin 4
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.	50	50	2	2	3	3	-	2720 m3
2.								
3.								
							TOTAL CAPACITY	

Naturally occurring protective layer details

Thickness of naturally occurring protective layer	<60 (m)	Provide details (as required)	
Soil texture	44 % sand	28 % silt	28 % clay
Hydraulic conductivity - naturally occurring protective layer	Depth and type of soil tested: 7.5-9	Hydraulic conductivity (cm/s): 2.9 x 10-8	Describe test standard used: insitu

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

Last updated February 26, 2021

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

NRCB USE ONLY

Catch basin calculator. Total volume @ freeboard level: 2720 m3 Runoff capacity requirements met: ☑ YES ☐ NO

Calculation of the volume attached: ☑ YES ☐ NO

Depth to water table: >5 m Requirements met: ☑ YES ☐ NO

Depth to uppermost groundwater resource: 41.2 m Requirements met: ☑ YES ☐ NO

ERST completed: ☑ See ERST page for details

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

See Decision Summary RA24044

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

Catch Basin Storage Volume Calculator

Construction Dimensions of Catch Basin

*** Only cells in blue can be changed.**

Overall Dimensions of Catch Basin			Catch Basin Dimensions
Total Length*[4]	50.0	m	164 ft
Total Width*[4]	50.0	m	164 ft
Total Depth*[4]	2.0	m	7 ft
Design Capacity Depth	*1.50*	m	5 ft
End Slope*[4]	3	run:rise	3 run:rise
Side Slope*[4]	3	run:rise	3 run:rise
Length of Bottom	38.0	m	125 ft
Width of Bottom	38.0	m	125 ft
Capacity @ top of Bank	*3,896*	m^3	*Capacity (@tob) 137,586* ft^3 *857,000 Imp. Gal.*

Design Capacity of Catch Basin (freeboard level)			Design Capacity (freeboard level)
Length (design capacity depth)	47.0	m	154 ft
Width (design capacity depth)	47.0	m	154 ft
Total Depth	*2.0*	m	7 ft
Design Capacity Depth	1.50	m	5 ft
End Slope	3	run:rise	3 run:rise
Side Slope	3	run:rise	3 run:rise
Design Capacity (freeboard level)	**2,720**	m^3	**96,038** ft^3
			598,206 Imp. Gal.
level)	*2,209*	m^2	*23,777* ft^2

CFO Name [1]	N catch basin 4
Land Location [1]	NE 17-34-2 W4

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	360	160	57,600.0
7			0.0
8			0.0
9			0.0
10			0.0
		Total Area (m^2)	**57,600**

Rainfall (Select Town [3])

Provost 80

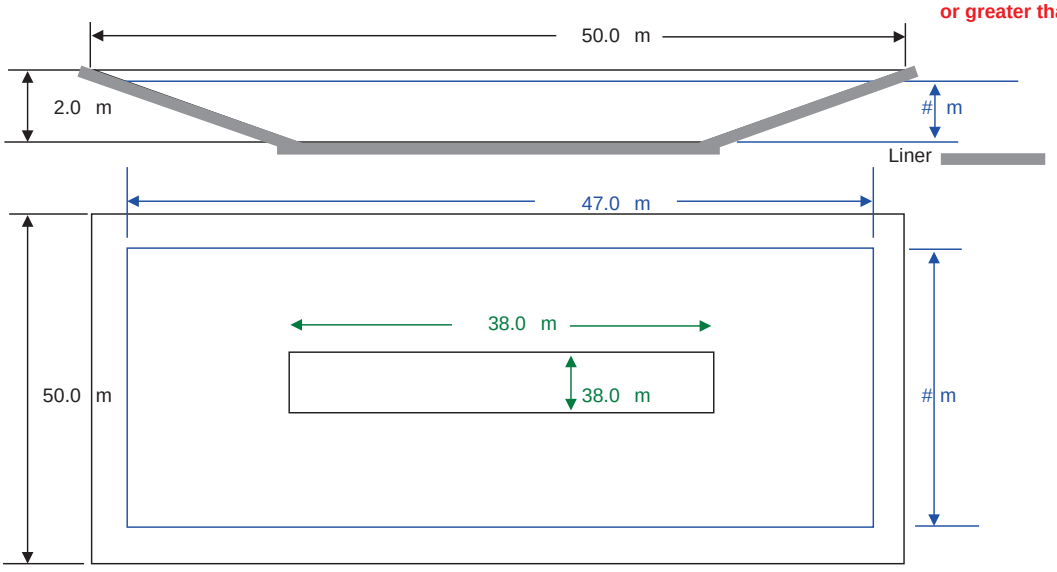
AOPA Design Rainfall **80 mm**

Minimum Catchbasin Storage Volume Required

2,765 m^3 ** **97637.991 ft^3**

608170.74 Imp. Gal.

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



Lines in Black - Overall catch basin dimensions

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

NTS - Not To Scale

Catch Basin Storage Volume Calculator

CFO Name [1]	N catch basin 1
Land Location [1]	NE 17-34-2 W4

Construction Dimensions of Catch Basin

*** Only cells in blue can be changed.**

Overall Dimensions of Catch Basin			Catch Basin Dimensions	
Total Length*[4]	50.0	m	164	ft
Total Width*[4]	25.0	m	82	ft
Total Depth*[4]	2.0	m	7	ft
Design Capacity Depth	*1.50*	m	5	ft
End Slope*[4]	3	run:rise	3	run:rise
Side Slope*[4]	3	run:rise	3	run:rise
Length of Bottom	38.0	m	125	ft
Width of Bottom	13.0	m	43	ft
Capacity @ top of Bank	*1,696*	m^3	*Capacity (@tob)* *59,894* *373,068*	ft^3 *Imp. Gal.*

Design Capacity of Catch Basin (freeboard level)			Design Capacity (freeboard level)	
Length (design capacity depth)	47.0	m	154	ft
Width (design capacity depth)	22.0	m	72	ft
Total Depth	*2.0*	m	7	ft
Design Capacity Depth	1.50	m	5	ft
End Slope	3	run:rise	3	run:rise
Side Slope	3	run:rise	3	run:rise
Design Capacity (freeboard level)	**1,126**	m^3	39,755	ft^3
			247,630	**Imp. Gal.**
level)	*1,034*	m^2	*11,130*	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	360	55	19,800.0
7			0.0
8			0.0
9			0.0
10			0.0
		Total Area (m^2)	**19,800**

Rainfall (Select Town [3])

Provost 80

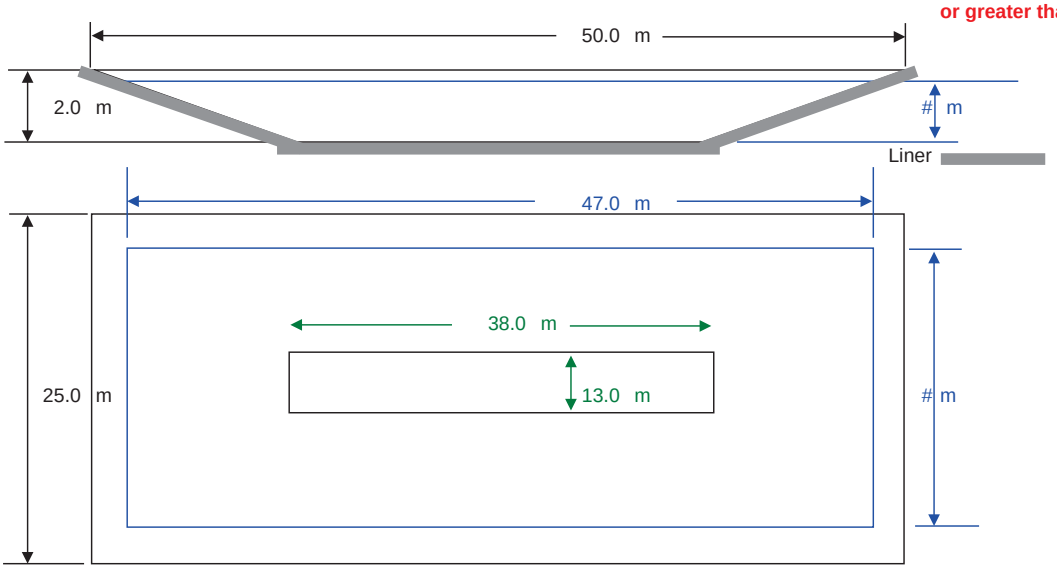
AOPA Design Rainfall **80 mm**

Minimum Catchbasin Storage Volume Required

950 m^3 ** **33563.059 ft^3**

209058.69 Imp. Gal.

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



Lines in Black - Overall catch basin dimensions

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

NTS - Not To Scale

Catch Basin Storage Volume Calculator

Construction Dimensions of Catch Basin

*** Only cells in blue can be changed.**

Overall Dimensions of Catch Basin			Catch Basin Dimensions	
Total Length*[4]	75.0	m	246	ft
Total Width*[4]	40.0	m	131	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	51.0	m	167	ft
Width of Bottom	16.0	m	52	ft
Capacity @ top of Bank	*7,248*	m^3	*Capacity (@tob)* *255,961*	ft^3
			1,594,336	*Imp. Gal.*

Design Capacity of Catch Basin (freeboard level)			Design Capacity (freeboard level)	
Length (design capacity depth)	72.0	m	236	ft
Width (design capacity depth)	37.0	m	121	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)	**5,833**	m^3	205,982	ft^3
			1,283,025	Imp. Gal.
level)	*2,664*	m^2	*28,675*	ft^2

CFO Name [1]	N catch basin 2
Land Location [1]	NE 17-34-2 W4

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	360	152	54,720.0
7			0.0
8			0.0
9			0.0
10			0.0
		Total Area (m^2)	**54,720**

Rainfall (Select Town [3])

Provost 80

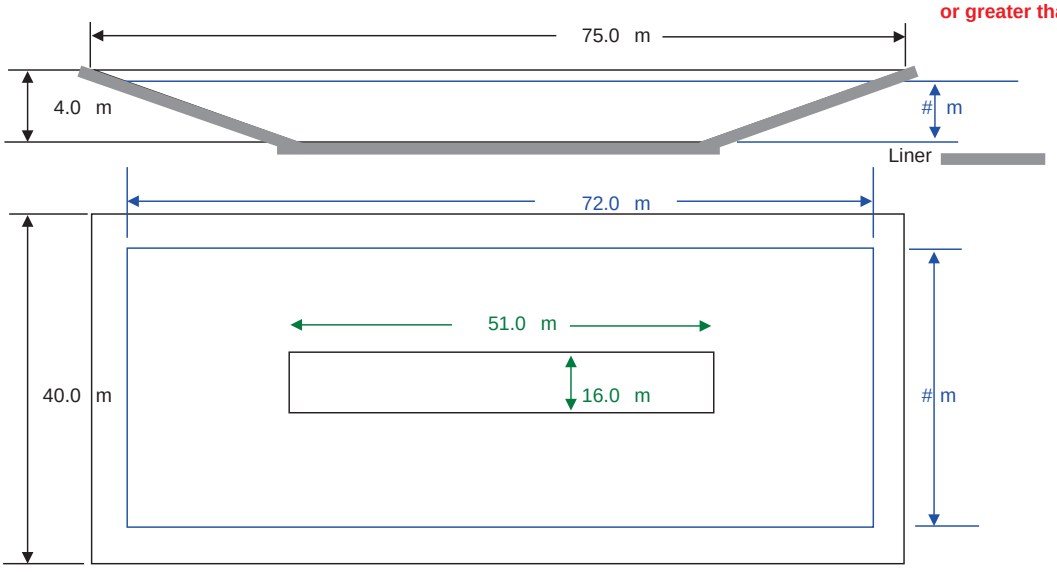
AOPA Design Rainfall **80 mm**

Minimum Catchbasin Storage Volume Required

2,627 m^3 ** **92756.091 ft^3**

577762.2 Imp. Gal.

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



Lines in Black - Overall catch basin dimensions

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

NTS - Not To Scale

Catch Basin Storage Volume Calculator

Construction Dimensions of Catch Basin

*** Only cells in blue can be changed.**

Overall Dimensions of Catch Basin			Catch Basin Dimensions
Total Length*[4]	50.0	m	164 ft
Total Width*[4]	50.0	m	164 ft
Total Depth*[4]	2.0	m	7 ft
Design Capacity Depth	*1.50*	m	5 ft
End Slope*[4]	3	run:rise	3 run:rise
Side Slope*[4]	3	run:rise	3 run:rise
Length of Bottom	38.0	m	125 ft
Width of Bottom	38.0	m	125 ft
Capacity @ top of Bank	*3,896*	m^3	*Capacity (@tob)* *137,586* ft^3 *857,000 Imp. Gal.*

Design Capacity of Catch Basin (freeboard level)			Design Capacity (freeboard level)
Length (design capacity depth)	47.0	m	154 ft
Width (design capacity depth)	47.0	m	154 ft
Total Depth	*2.0*	m	7 ft
Design Capacity Depth	1.50	m	5 ft
End Slope	3	run:rise	3 run:rise
Side Slope	3	run:rise	3 run:rise
Design Capacity (freeboard level)	**2,720**	m^3	**96,038** ft^3
			598,206 Imp. Gal.
level)	*2,209*	m^2	*23,777* ft^2

CFO Name [1]	N catch basin 3
Land Location [1]	NE 17-34-2 W4

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	360	90	32,400.0
7			0.0
8			0.0
9			0.0
10			0.0
		Total Area (m^2)	**32,400**

Rainfall (Select Town [3])

Provost 80

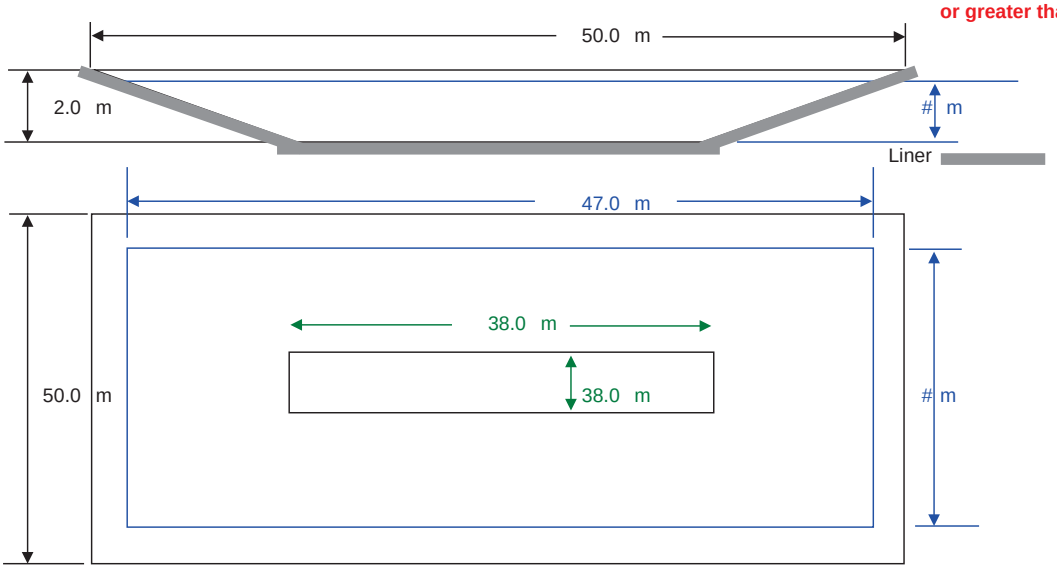
AOPA Design Rainfall **80 mm**

Minimum Catchbasin Storage Volume Required

1,555 m^3 ** **54921.37 ft^3**

342096.04 Imp. Gal.

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



Lines in Black - Overall catch basin dimensions

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

NTS - Not To Scale

Catch Basin Storage Volume Calculator

Construction Dimensions of Catch Basin

*** Only cells in blue can be changed.**

Overall Dimensions of Catch Basin			Catch Basin Dimensions	
Total Length*[4]	68.0	m	223	ft
Total Width*[4]	27.0	m	89	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	44.0	m	144	ft
Width of Bottom	3.0	m	10	ft
Capacity @ top of Bank	*3,552*	m^3	*Capacity (@tob)* *125,438*	ft^3
			781,330	*Imp. Gal.*

Design Capacity of Catch Basin (freeboard level)			Design Capacity (freeboard level)	
Length (design capacity depth)	65.0	m	213	ft
Width (design capacity depth)	24.0	m	79	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)	**2,704**	m^3	95,482	ft^3
			594,742	Imp. Gal.
level)	*1,560*	m^2	*16,792*	ft^2

CFO Name [1]	S catch basin 1
Land Location [1]	SW 17-34-2 W4

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	300	270	81,000.0
7			0.0
8			0.0
9			0.0
10			0.0
		Total Area (m^2)	**81,000**

Rainfall (Select Town [3])

Provost 80

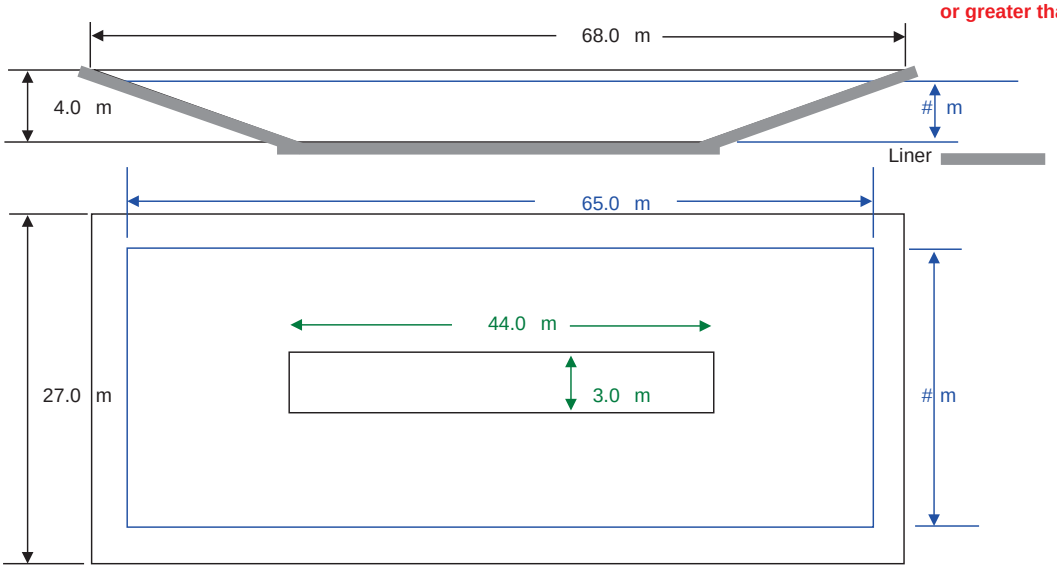
AOPA Design Rainfall **80 mm**

Minimum Catchbasin Storage Volume Required

3,888 m^3 ** **137303.42 ft^3**

855240.1 Imp. Gal.

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



Lines in Black - Overall catch basin dimensions

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

NTS - Not To Scale

Catch Basin Storage Volume Calculator

Construction Dimensions of Catch Basin

*** Only cells in blue can be changed.**

Overall Dimensions of Catch Basin			Catch Basin Dimensions	
Total Length*[4]	72.0	m	236	ft
Total Width*[4]	27.0	m	89	ft
Total Depth*[4]	2.5	m	8	ft
Design Capacity Depth	*2.00*	m	7	ft
End Slope*[4]	3	run:rise	3	run:rise
Side Slope*[4]	3	run:rise	3	run:rise
Length of Bottom	57.0	m	187	ft
Width of Bottom	12.0	m	39	ft
Capacity @ top of Bank	*3,191*	m^3	*Capacity (@tob) 112,698*	ft^3
			701,977	*Imp. Gal.*

Design Capacity of Catch Basin (freeboard level)			Design Capacity (freeboard level)	
Length (design capacity depth)	69.0	m	226	ft
Width (design capacity depth)	24.0	m	79	ft
Total Depth	*2.5*	m	*8*	ft
Design Capacity Depth	2.00	m	7	ft
End Slope	3	run:rise	3	run:rise
Side Slope	3	run:rise	3	run:rise
Design Capacity (freeboard level)	**2,292**	m^3	80,941	ft^3
			504,169	Imp. Gal.
level)	*1,656*	m^2	*17,825*	ft^2

CFO Name [1]	S catch basin 2
Land Location [1]	SW 17-34-2 W4

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	300	270	81,000.0
7			0.0
8			0.0
9			0.0
10			0.0
		Total Area (m^2)	**81,000**

Rainfall (Select Town [3])

Provost 80

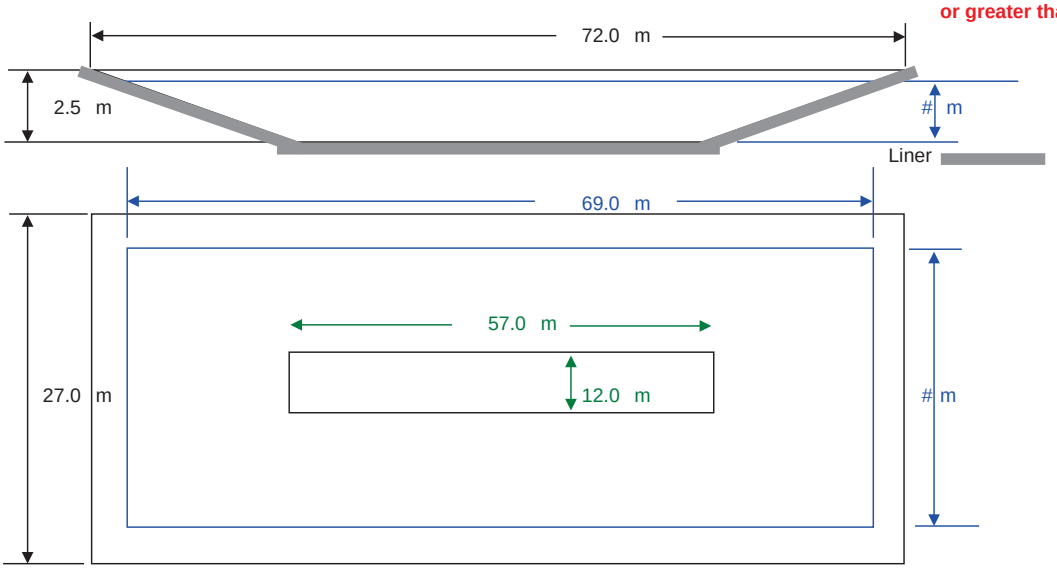
AOPA Design Rainfall **80 mm**

Minimum Catchbasin Storage Volume Required

3,888 m^3 ** **137303.42 ft^3**

855240.1 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