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	RA20032	NW 15-33-21 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.

June 11 2020
Date of signing

Henry
Signature

Hutterian Brethren Church of Starland
Corporate name (if applicable)

Henry Stahl
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)
Dairy Barn (with attached pump room)	165.4 m x 43.8 m	542'-8" x 143'-8"
Dry Cow Shed	176.8 m x 57.9 m	580 x 190
Bull pen Barn	within dimensions of dairy barn	90'8" x 61'-5"
Lagoon (synthetically lined)	96 m x 42 m x 4.9 m	96m x 42m x 4.4m Deep
AO Note: EMS (lagoon) depth is 4.9 m; 4.4 m below grade.		

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

Existing facilities	Dimensions (m) (length, width, and depth)	NRCB USE ONLY
None		New site, no existing facilities

NRCB USE ONLY

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

New Site

Construction completion date for proposed facilities Dec 2023

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**
200 milking cows (Drys, Replacement)	0	200	200

Applicant is proposing 200 milking cows (plus associated dries and replacements). Dairy bulls are included in the associated livestock

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)

DECLARATION AND ACKNOWLEDGMENT OF APPLICANT CONCERNING *WATER ACT* LICENCE

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

Date and sign one of the following four options

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

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

Signed this ____day of _____, 20____. _____

Signature of Applicant or Agent

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

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

Signed this ____ day of _____, 20____. _____

Signature of Applicant or Agent

OPTION 3: Additional water licence not required

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

Signed this ____ day of _____, 20____. _____

Signature of Applicant or Agent

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

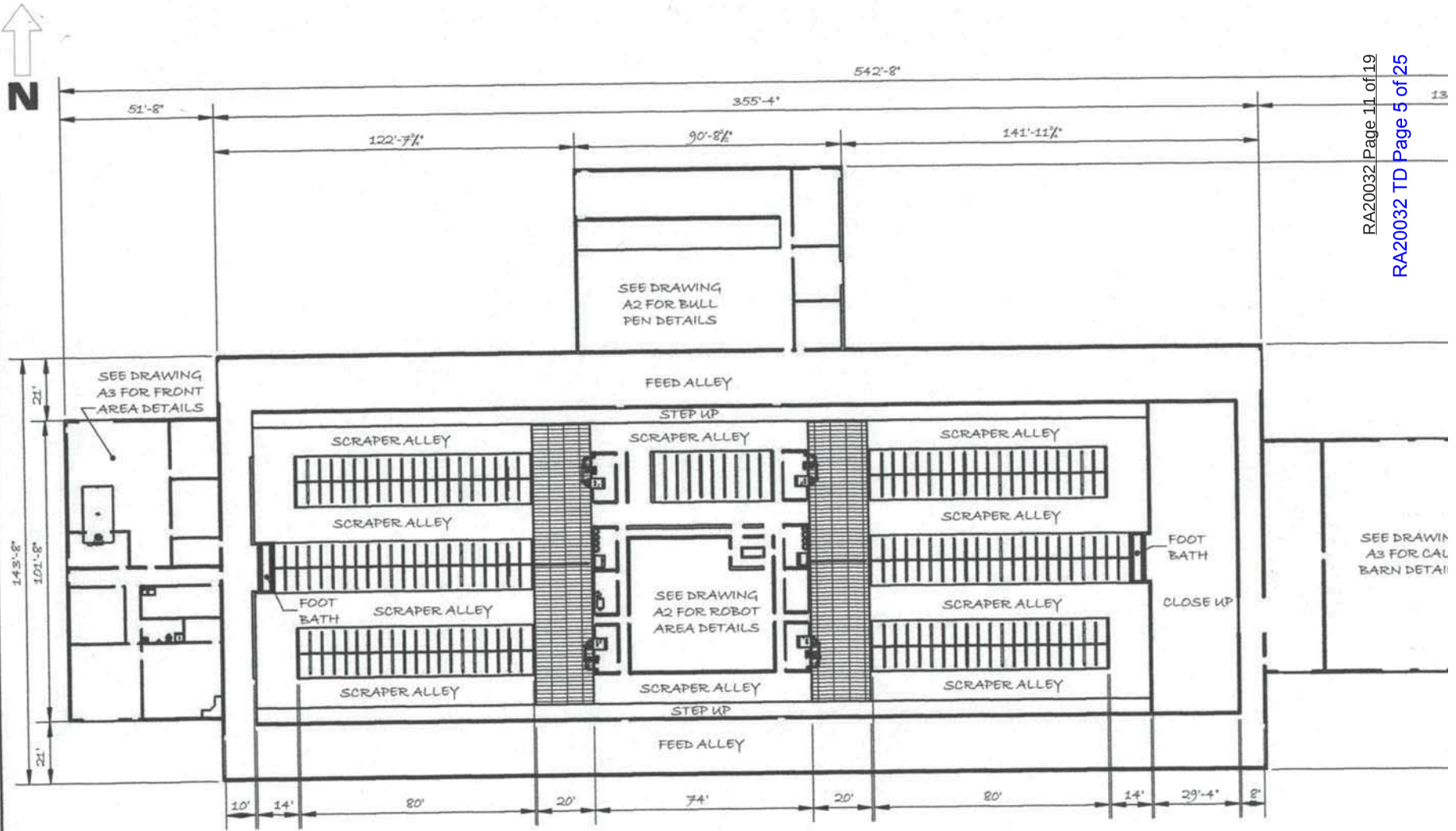
1. At this time, I (we) do not know whether a new water licence is needed from AEP under the *Water Act* for the development or activity proposed in this AOPA application.
2. If a new *Water Act* licence is needed, I (we) request that the NRCB process the AOPA application **independently of** AEP's processing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

Signed this 11 day of June, 2020. Henry Stahl

Signature of Applicant or Agent

AO Note: Response from AEP indicates that additional licensing and the supporting groundwater evaluation report are required.

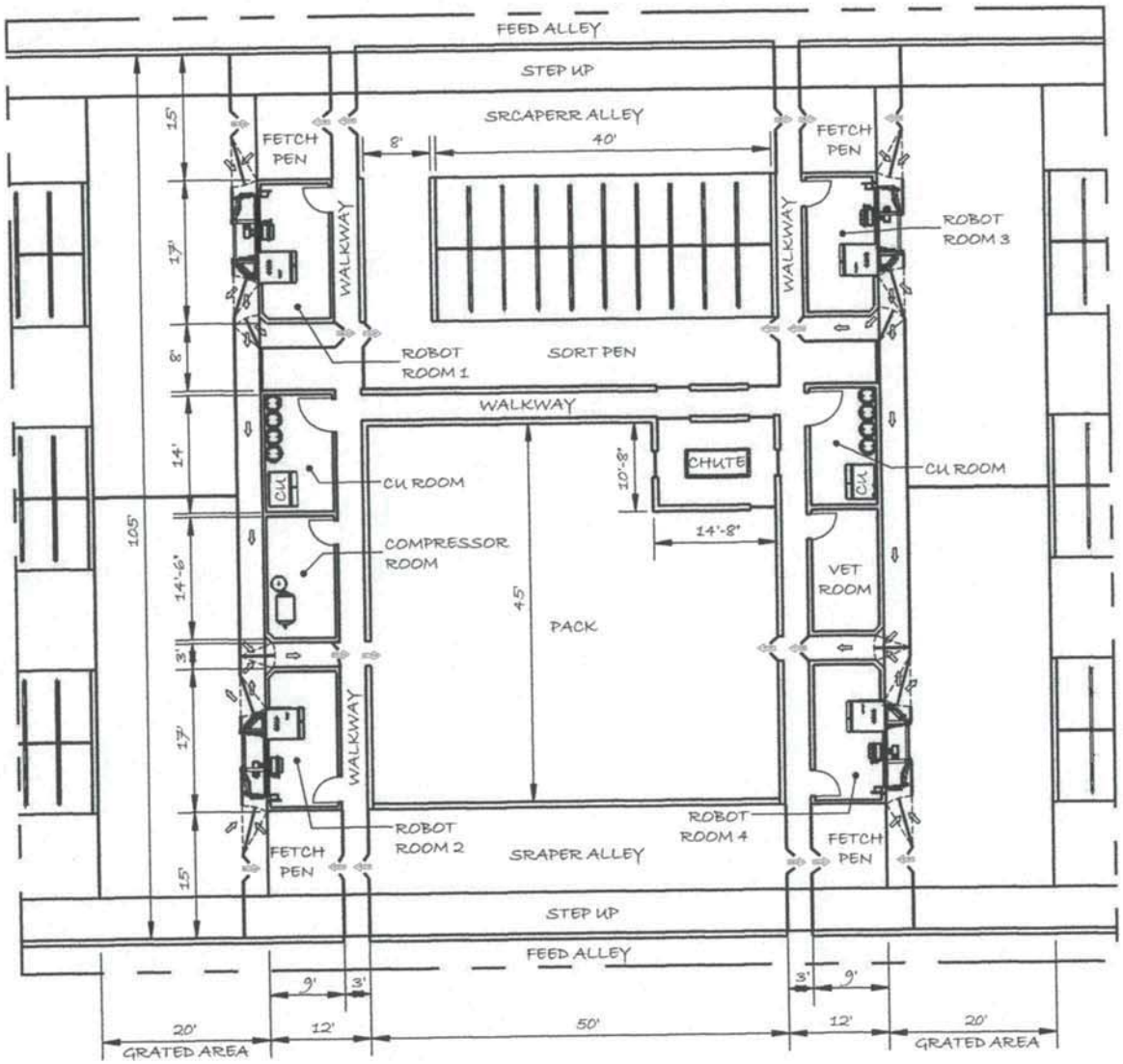

N
Township Road 333
NW 15 33 21 4
Range Road 213
Dairy Barn
Dry Cow
Lagoon
18°C
Range Road 213
S



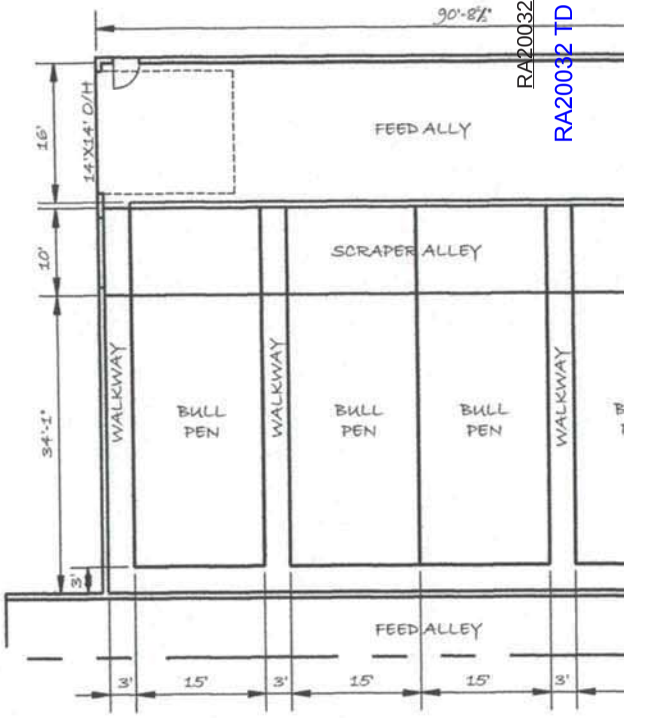
NO	DATE	REVISION	BY
-	-	-	-
-	-	-	-
-	-	-	-
B	02-25-2020	REVISED AS PER CLIENT CHANGES, RE-ISSUED FOR REVIEW	DJB
A	02-14-2020	ISSUED FOR REVIEW	DJB

PENNER FARM SERVICES
WE BUILD FARMS
64-27211 HWY. 12 LACOMBE, AB T4L 0B3
TEL: 403-782-0675

DESIGNER:	D NUMAN
DRAWN BY:	D BAJEMA
CHECKED BY:	D NUMAN
DATE:	2020-01-07
SCALE:	1:450
REV:	B
PROJECT NO.:	TBD
WEIGHT:	N/A lbs



ROBOT AREA FLOOR PLAN

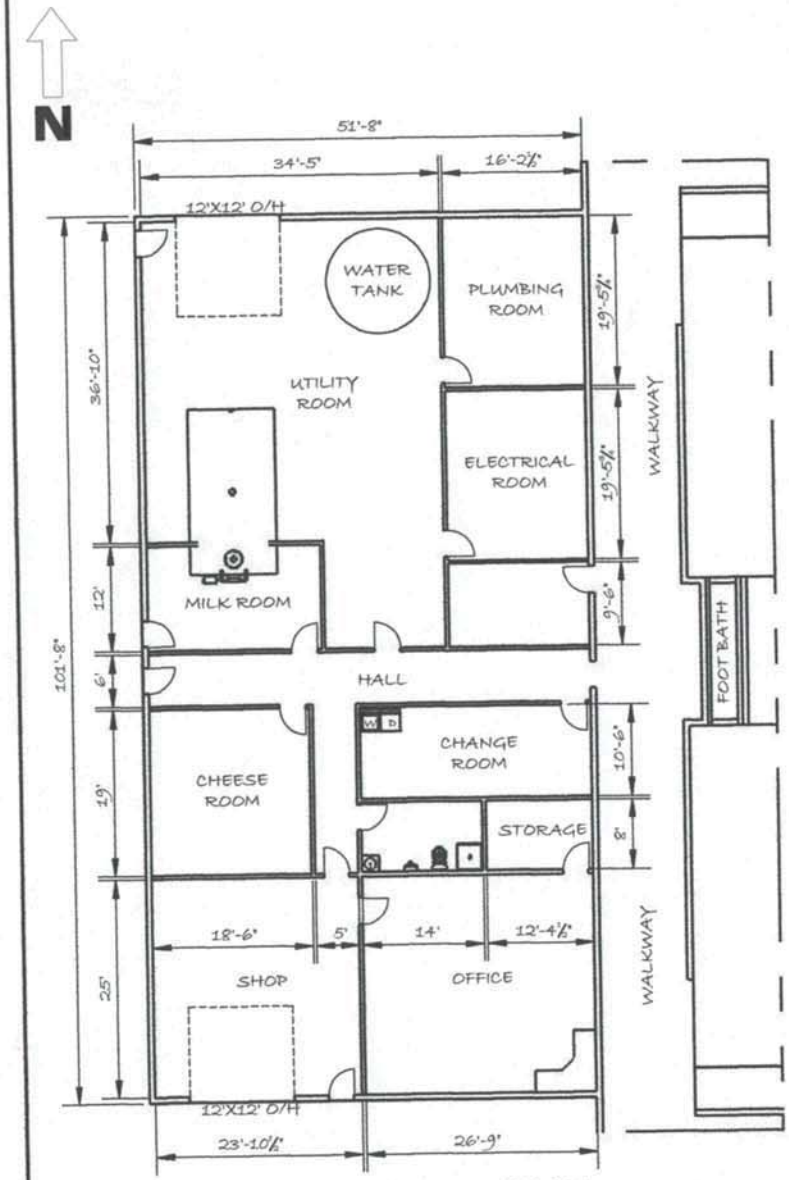


BULL PEN FLOOR PLAN

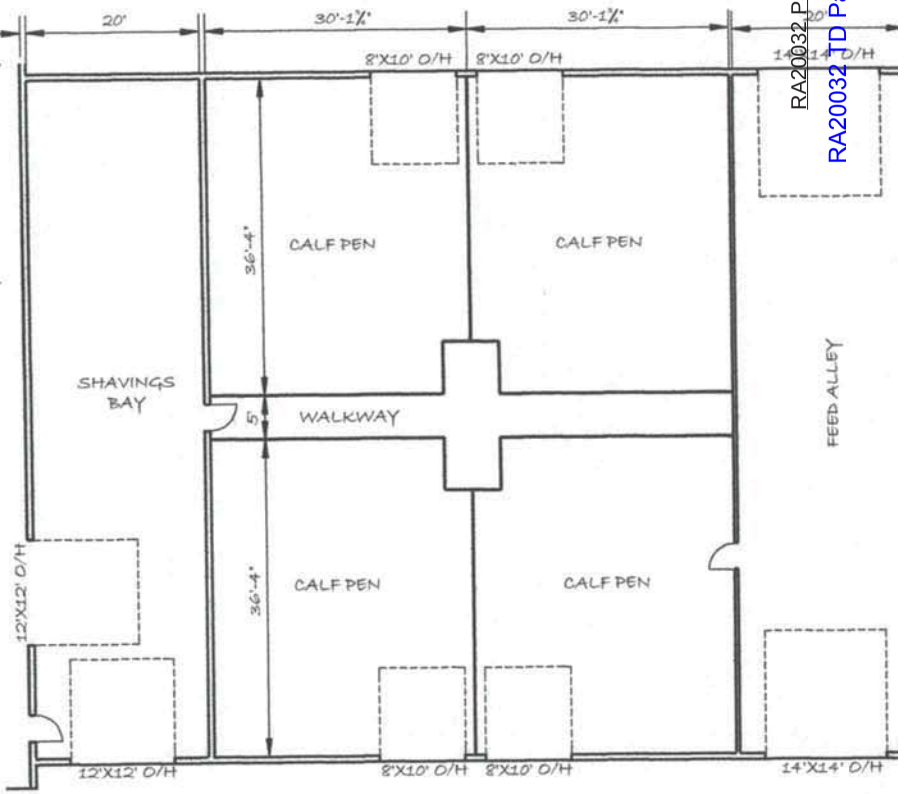
NO	DATE	REVISION	BY
-	-	-	-
-	-	-	-
-	-	-	-
B	02-25-2020	REVISED AS PER CLIENT CHANGES, RE-ISSUED FOR REVIEW	DJB
A	02-14-2020	ISSUED FOR REVIEW	DJB

PENNER FARM SERVICES
WE BUILD FARMS
64-27211 HYW. 12 LACOMBE, AB T4L 0E3
TEL: 403-782-0675

DESIGNER:	D NUMAN
DRAWN BY:	D BAJEMA
CHECKED BY:	D NUMAN
DATE:	2020-01-07
SCALE:	1:192
REV:	B
PROJECT NO.:	TBD
WEIGHT:	N/A lbs



FRONT AREA FLOOR PLAN



CALF BARN FLOOR PLAN

NO	DATE	REVISION	BY
-	-	-	-
-	-	-	-
-	-	-	-
B	02-25-2020	REVISED AS PER CLIENT CHANGES, RE-ISSUED FOR REVIEW	DJB
A	02-14-2020	ISSUED FOR REVIEW	DJB

PENNER FARM SERVICES
WE BUILD FARMS
64-27211 HYW. 12 LACOMBE, AB T4L 0E3
TEL: 403-782-0675

DESIGNER:	D NUMAN
DRAWN BY:	D BAJEMA
CHECKED BY:	D NUMAN
DATE:	2020-01-07
SCALE:	1:192
REV:	B
PROJECT NO.:	TBD
WEIGHT:	N/A lbs

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: _____ **Proposed 1:** Dairy Barn, Dry Cow Shed, Lagoon

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 height 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	Confirmed on site visit
Surface water information	How many springs are within 100 m of the manure storage facility or manure collection area?		0			☒ YES ☐ NO ☐ YES with exemption	Confirmed no springs during site visit
	How many water wells are within 100 m of the manure storage facility or manure collection area?		0			☒ YES ☐ NO ☐ YES with exemption	Confirmed on site visit
	What is the shortest distance from the manure collection or storage facility to a surface water body? (e.g., lake, creek, slough, seasonal)		192m			☒ YES ☐ NO ☐ YES with exemption	Shortest distance: Dry cow to slough "F": 65 m Dairy barn to slough "D": 9 m EMS to slough "E": 19 m See ERST documents. These water bodies are not common
Groundwater information	What is the depth to the water table?		See Note 4 mm			☒ YES ☐ NO ☐ YES with exemption	Estimated to be 4 m below grade, see note below
	What is the depth to the groundwater resource/aquifer you draw water from?		300'			☒ YES ☐ NO ☐ YES with exemption	UGR determined to be 25 m, using ww 240385 Since no WW found on subject property, the UGR was found on neighbouring land within 1 mile. The most conservative UGR estimate was used.

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

see borehole logs done in March

Last updated: 31 Mar 2020 Page ____ of ____

NRCB USE ONLY

AO Note: Borehole logs were done in close proximity (approx 1.1 km away) on a different quarter in March 2020. The results indicated that groundwater table was encountered at an average of approximately 4 m below grade.

AO Note: See the AO's attached map regarding distances to water bodies.

RA20032
Starland Colony

Legend
Feature 1

WP25
C
Twp Rd 333
I
H
WP24
B
D
WP26
WP 27
Approx. Milk Barn
Approx. Dry Barn
WP28
G
WP32
WP30
WP 29
Approx EMS
E
F
WP31
WP23
A
RR 213

AO Submission: GPS coordinates and surface water assessment map.
Feature A was identified to be a common body of water.

Features A, B, C, D, E, F, H, and I were found to be water bodies.

Google Earth
©2020 Google
Image © 2020 Maxar Technologies

N
400 m

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

ENVIRONMENTAL RISK SCREENING INFORMATION

Well IDs: No current water wells identified within 400 m of the CFO facilities during site visits or in the application. A future water well has been added as a proxy of a reasonable, worst case scenario after a water well(s) is/are drilled at the CFO site. The ERST score reflects this well.

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

See note next page

ERST for **proposed** facilities

Facility	Groundwater score	Surface water score	File number
Dry cow shed	Low	Low	RA20032
Dairy barn	Low	Low	RA20032
Synthetically lined liquid manure storage	Low	Low	RA20032

ERST for **existing** facilities

Facility	Groundwater score	Surface water score	File number
No existing facilities			

NRCB USE ONLY

Groundwater or surface water related comments:

On August 7, 2020 Approval Officer Lynn Stone and Environmental Specialist Scott Cunningham attended the site to view potential surface water features on NW 15-33-21 W4M. We accessed the NW15 by foot, and accessed roads and road ditches along the north and west sides of NW15.

We plotted the approximate location of the proposed facilities (according to the application).
We reviewed the topography and approximate elevations of the proposed CFO site and the quarter section, potential surface water features, proposed CFO facilities location, and the vegetation crop health at edges of the potential surface water feature.

Our assessment found that Feature "A" (in SW corner of NW15) was an open water body. It was observed to cross property lines, so is therefore a common body of water.

The remaining surface water bodies (Features "B" to "I") are found to be water bodies, ranging from wetlands to open water. They were not found to be common bodies of water (as defined in the Standards and Admin Regulation).

Scott Cunningham completed a surface water report, and completed an Environmental Risk Screening Tool assessment.

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

Neighbour name(s)	Legal land description	Distance (m)	NRCB USE ONLY: Zoning (LUB) category	MDS category (1-4)	Distance (m)	Waiver attached (if required)	Meets regulations
Jeanette Kowalchuk	SW 15-33-21-W4	1048m	Ag*	1	1031 m	no	Yes

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

Name of land owner(s)*	Legal land description	Usable area** (ha)	Soil zone ***	NRCB USE ONLY: Usable area (ha)	Agreement attached (if required)
See Att					
			Total		

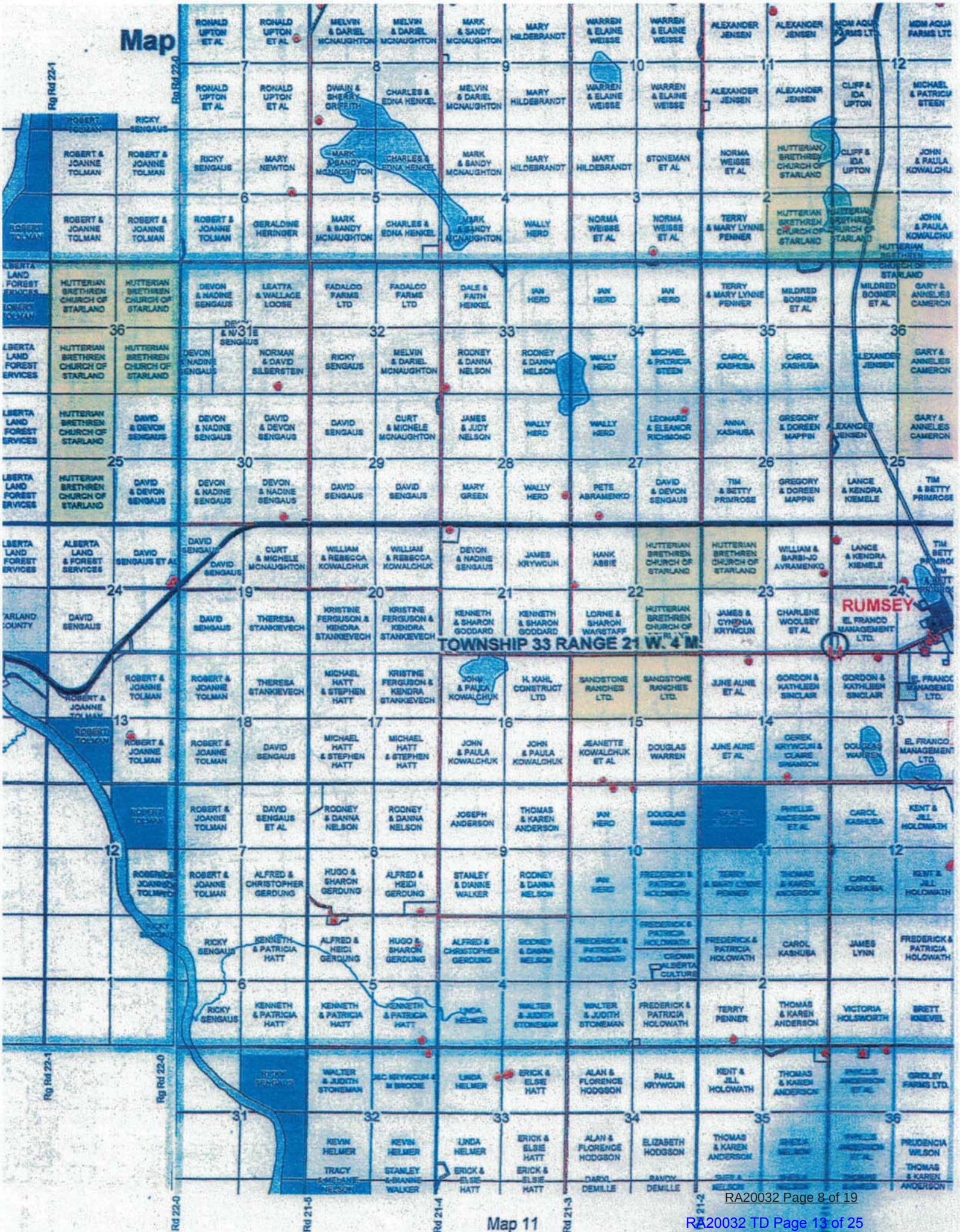
* If you are **not** the registered landowner, you must attach copies of land use agreements signed by all landowners.

** 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)

* AO Note: The response from the municipality did not specify the designation of land surrounding the proposed site. I reviewed the Land Use maps from Land Use Bylaw 1125 (2017 date) available from Starland County's website. I was unable to find a map showing the subject area; however, this is common in rural municipalities where it is common practice to list only land designations that are not agricultural. Therefore, I presume that the neighbouring lands are agricultural. This is confirmed by the municipality's response that the subject land (NW 15-33-21 W4M) is agricultural land.



AO Note: The applicant provided this map for ease of identifying spread lands (map date is unknown).

NRCB USE ONLY

MINIMUM DISTANCE SEPARATION

Methods used to determine distance (if applicable): aerial photography

Margin of error (if applicable): _____

Requirements (m): Category 1: 349 m Category 2: 465 m Category 3: 581 m Category 4: 930 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: 459 acres

Land base listed: 2720 acres

Area not suitable: The applicant has provided 6 times the minimum spreading land requirements

Available area _____ Requirement met: ☒ YES ☐ NO

Land spreading agreements required: ☐ YES ☒ NO

Manure management plan: ☐ YES ☒ NO If yes, plan is attached: ☐

AO Note: The applicant used a copy of a County land ownership map to show their proposed spread lands. These maps can often be several years old and may not show current landowners. I confirmed via land titles that the applicant owns the proposed spreadlands; therefore, manure spreading agreements are not required.

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 _____

This is a new site, therefore a grandfathering determination is not applicable here

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

ALL SIGNATURES IN FILE ☒ YES ☐ NO

DATES OF APPROVAL OFFICER SITE VISITS

August 7, 2020	
July 16, 2020	

CORRESPONDENCE WITH MUNICIPALITIES AND REFERRAL AGENCIES

Date deeming letters sent: June 17, 2020

Municipality: Starland 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: CNRL ☐ 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

LIQUID MANURE COLLECTION AND/OR STORAGE: In-barn - Concrete liner

*(complete a copy of this section for **EACH** proposed in-barn liquid manure storage facility with a concrete liner)*

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

1. Dairy Barn
2. Pump Room
3.

Manure storage capacity *(use one row in the table for **EACH** in-barn storage. Attach additional pages if you require more rows)*

	Length (m)	Width (m)	Total depth (m)	Depth below ground level (m)	NRCB USE ONLY Calculated storage capacity (m^3)
1.	332'	105'	4'	4'	pits 2 x 237 cubic m
2.	16'	16'	16'	16'	115 cubic metres
3.					
				TOTAL CAPACITY	589 cubic metres

AO Note: 2 in barn pits will be 105' x 20' x 4'. Each pit will provide 237 cubic metres storage

Concrete liner details

Scrape alleys or unslatted portions of barn floors (if applicable)	Concrete thickness: 5"	Method of sulphate protection: HS Concrete	
	Concrete strength: 30 Mpa	Concrete reinforcement size and spacing: 12"	
In-barn manure pit floors	Concrete thickness: 5"	Method of sulphate protection: HS Concrete	
	Concrete strength: 32 Mpa	Concrete reinforcement size and spacing: 12"	
In-barn manure pit walls	Concrete thickness: 5"	Method of sulphate protection: HS Concrete	
	Concrete strength: 30 Mpa	Horizontal reinforcement size and spacing: 12"	Vertical reinforcement size and spacing: 12"

LIQUID MANURE COLLECTION AND/OR STORAGE: In-barn - Concrete liner (cont.)

Describe how the joints at the junction of the pit walls, pit floors and any other joints will be sealed

Caulking

Describe sealing practices for piping, etc. that penetrates the liner

Caulking

Concrete requirements can be found in Technical Guideline Agdex 096-93
Guideline minimums:
Solid manure (wet): 30MPa (C)
Liquid manure: 32MPa (B)
Category A is required to be engineered
Method of sulphate protection:
Type 50 or Type 10 with fly ash or equivalent

NRCB USE ONLY

Requirements met: ☒ YES ☐ NO

Condition required: ☒ YES ☐ NO

Additional information

NRCB USE ONLY

Liquid manure storage volume calculator attached: ☒ YES ☐ NO

Depth to water table: > 4 m estimated — Requirements met: ☒ YES ☐ NO

Depth to uppermost groundwater resource: 25 m estimated — Requirements met: ☒ YES ☐ NO

ERST completed: ☒ see ERST page for details

Concrete liner requirements

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

SOLID MANURE, COMPOST, & COMPOSTING MATERIALS: Barns, feedlots, & storage facilities - Concrete liner

*(complete a copy of this section for **EACH** barn, feedlot, and storage facility for solid manure, composting materials, or compost with a concrete liner)*

Facility description / name *(as indicated on site plan)* **1.** Dry Cow Shed

2. _____

Manure storage capacity

	Length (m)	Width (m)	Depth below grade to the bottom of the liner (m)	**NRCB USE ONLY** Estimated storage capacity (m^3)
1.	580'	190'	Grade	> 9 months storage
2.				
			TOTAL CAPACITY	> 9 months storage

☐ 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

Half is under roof

Out door will be sloped away, run-on will have small berm

Liner protection

Describe how the physical integrity of the liner will be maintained

Concrete

AO Note: While concrete generally does not require extensive maintenance in comparison to other liners, it is expected that the applicant will notify the NRCB if excessive wear or cracking occurs in the liner.

NRCB USE ONLY

Requirements met: ☒ YES ☐ NO

SOLID MANURE, COMPOST, & COMPOSTING MATERIALS: Barns, feedlots, & storage facilities - Concrete liner (cont.)

Concrete liner details

Concrete thickness	Method of sulphate protection:
5"	HS Concrete
Concrete strength	**Concrete reinforcement size and spacing**
30 Mpa	12"

Concrete requirements can be found in Technical Guideline Agdex 096-93
Guideline minimums:
Solid manure: 25MPa (D)
Solid manure (wet): 30MPa (C)
Method of sulphate protection:
Type 50 or Type 10 with fly ash or equivalent

NRCB USE ONLY
Requirements met: ☒ YES ☐ NO
Condition required: ☒ YES ☐ NO
Report attached: ☐ YES ☒ NO

Additional information *(attach as required)*

NRCB USE ONLY

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

Depth to water table: > 4 m Requirements met: ☒ YES ☐ NO

Depth to Uppermost groundwater resource: Estimated 25 m Requirements met: ☒ YES ☐ NO

ERST completed: ☒ see ERST page for details

Surface water control systems

Requirements met: ☒ YES ☐ NO Details/comments:

The applicant has proposed to control surface water by way of adequate sloping and by installing a berm. The proposed facility will be 1/2 under roof, which will further lessen the impacts to surface water.

Concrete liner details

The proposed liner meets the concrete technical guidelines

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

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)

LIQUID MANURE STORAGE: Synthetic liner

*(complete a copy of this section for **EACH** proposed liquid manure storage facility with a synthetic liner)*

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

1. Starland Coloy Lagoon
2. _____

Manure storage capacity *(use one row in the table for **EACH** cell of the synthetic lined storage, attach additional pages if you require more rows)*

	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)	Filled in lower ¼? Y/N
1.	96	42	4.4	4.4	3H:1V	3H:1V	4H:1V	9,314 cubic m	yes
2.									
							TOTAL CAPACITY	9,314 cubic m	

AO Note: The applicant has proposed an EMS 4.9 m in depth, with 4.4 m below grade.

Surface water control systems

Describe the run-on and runoff control system

Perimeter Berm and 0.5m free board

Run-off: Oversized for number cows indicated and 0.5m free board
Run-on: Design incorporates a 0.5m high, above grade perimeter berm

Sealing

Describe sealing practices for piping, etc. that penetrates the liner

Pipe boot welded to the liner materiel and Clamped to the pipe.

NRCB USE ONLY
Requirements met: ☒ YES ☐ NO

Liner protection

Describe how the inside walls, bottom and outside walls are protected from erosion

Concrete access ramp and agitation pad will be poured to protect the liner during emptying and agitation

Describe how the physical integrity of the liner will be maintained from other damage

A fence will be built to restrict access to sythetic liner

NRCB USE ONLY
Requirements met: ☒ YES ☐ NO

LIQUID MANURE STORAGE: Synthetic liner (cont.)

Synthetic liner details

Provide synthetic liner material details

Layfield HDPE 60 1.5mm

Additional information *(attach copies of design/engineering reports)*

See Att

NRCB USE ONLY

Requirements met: ☒ YES ☐ NO

Condition required: ☒ YES ☐ NO

Report attached: ☒ YES ☐ NO

NRCB USE ONLY

Liquid manure storage volume calculator attached: ☒ YES ☐ NO

Depth to water table: > 4 m — Requirements met: ☒ YES ☐ NO

Depth to uppermost groundwater resource: 25 m — Requirements met: ☒ YES ☐ NO

ERST completed: ☒ see ERST page for details

Surface water control systems

Requirements met: ☒ YES ☐ NO

Details/comments:

The proposed liquid manure storage will have a 0.5 m berm in order to prevent run-on. The liquid manure storage is more than 1.5 times the minimum capacity requirements.

Synthetic liner requirements

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

Construction plans approved by professional engineer: ☐ YES ☒ NO

Will liner be installed by manufacturer approved contractor and qualified third party?: ☒ YES ☐ NO

Preparation of liner bed (comments):

Condition required: ☒ YES ☐ NO

Earthen Manure Storage Volume Calculator

Dimensions of EMS	Metric		English Units	
Capacity of EMS			**Capacity of EMS**	
Length*	96.0	m	314.96	Feet
Width*	42.0	m	137.80	Feet
Total Depth*	4.9	m	16.08	Feet
Water Depth	4.40	m	14.44	Feet
End Slope*	3	run:rise	3	run:rise
Side Slope*	3	run:rise	3	run:rise
Length of Bottom	66.6			
Width of Bottom	12.6			
Total Capacity @ top of Bank	**11,228**	**m^3**	**396,529**	**ft^3**
			2,469,912	**Imp. Gal.**

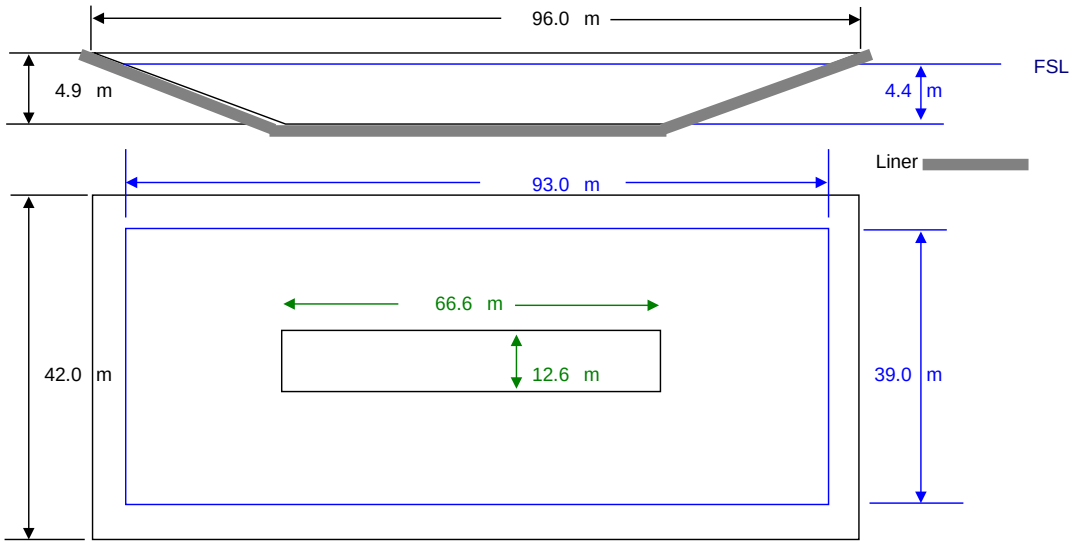
* Only cells in blue can be changed.

Volume of Liquid Manure at Specified Depth			Volume at Freeboard	
Length (liquid manure level)	93.0	m	305.12	Feet
Width (liquid manure level)	39.0	m	127.95	Feet
Depth	4.9	m	16.08	Feet
Water Depth	4.40	m	14.44	Feet
End Slope	3	run:rise	3	run:rise
Side Slope	3	run:rise	3	run:rise
Total Volume@ freeboard depth	**9,314**	**m^3**	**328,937**	**ft^3**
			2,048,891	**Imp. Gal.**
Surface Area of Liquid Manure	**3,627**	**m^2**	**39,041**	**ft^2**

AO Note: The minimum requirements of 6450 cubic metres is based upon a traditional parlour milking system. These requirements include 30 L/cow/day wash water. The applicant is proposing to use a robotic milking system. These systems typically use considerably less water than parlours. Therefore, the actual nine month storage requirement will be less than the 6450 cubic metres. Nevertheless, the applicant has provided more than sufficient amount of storage capacity.

Nine Month Storage Requirement	
6,450	**m^3**
227,780	**ft^3**
1,418,801	**Imp. Gal.**

<--- Use Sheet "1. Nine Month Storage Calc" to calculate this number



NTS - Not Drawn To Scale

1. Product Description

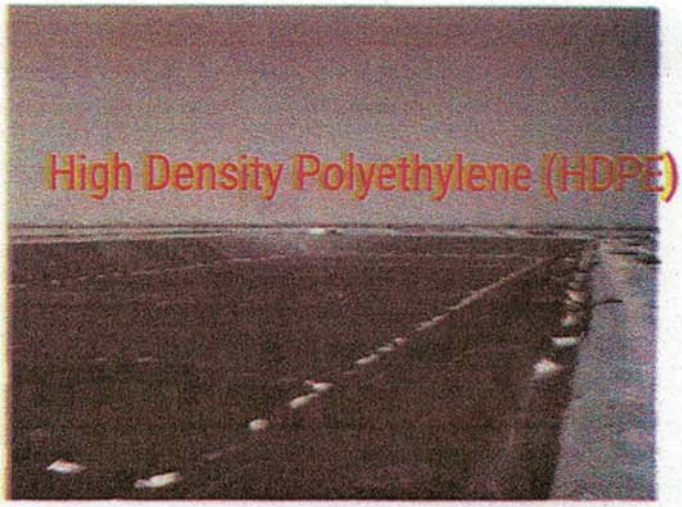
The popularity of High Density Polyethylene (HDPE) is primarily due to its low initial material cost and excellent chemical resistance. This allows thicker sections to be used compared to other geomembrane materials. A thick, durable, HDPE liner can be placed in exposed applications where the cost of other materials may be prohibitive. HDPE has excellent chemical resistance which is often the driving force behind the selection of HDPE. HDPE is a field assembled lining material that cannot be practically fabricated in the shop. All HDPE projects, regardless of size, must be installed by trained installers. HDPE is a versatile material which is used widely across all applications. One of the main uses of HDPE is for landfill base liners where its chemical resistance is used to good effect. HDPE can also be used in a multitude of secondary containments, pond linings, and water containment projects. HDPE is best used as an exposed lining material, and has the UV resistance required for many years of outstanding service.

2. Technical Data

Materials information is on page 2.

3. Installation

HDPE is a field fabricated material with all welding and testing taking place in the field. This opens up issues of weather and temperature during installation. HDPE installations need to be completed by skilled installers working with great care and attention to detail. Field welds on HDPE are made with two techniques; wedge welding and extrusion welding. Weather is a major factor in all HDPE lining installations. Precipitation in any form, whether rain, snow, dew, or fog can bring HDPE installation to a halt. Cold weather can slow down an installation, however HDPE has been installed in temperatures as low as -40°C (-40°F). The presence of moisture in the form of frost, snow, and ice are bigger problems than outside air temperatures.



4. Availability and Cost

Available from Layfield or distributors. Call
425-254-1075 Pacific time
780-453-6731 Mountain time, or
905-761-9123 Eastern time

5. Manufactured For

Layfield USA Corp.
Layfield Canada Ltd.

6. Warranty

Products sold will meet Layfield's published specifications. Any extended warranty required by the buyer must be negotiated at the time of order. Extended warranties may be available on this product and may be at extra cost. Full warranty details are available from Layfield.

7. Maintenance

Geomembranes should be inspected at least once per year for damage, stress, or any other detrimental condition. The entire containment area should be visually inspected annually. Layfield provides geomembrane maintenance services on request.

8. Designed and Installed By

Layfield USA Corp.
Layfield Canada Ltd.

9. Filing Systems

10.

17 Oct 2016	HDPE Minimum Material Properties					
Style	**ASTM**	**HDPE 40 Smooth**	**HDPE 60 Smooth**	**HDPE 80 Smooth**	**HDPE 60 Textured**	**HDPE 80 Textured**
Nominal Thickness	D5199	40 mil 1.0 mm	60 mil 1.5 mm	80 mil 2.0 mm	57 mil 1.45 mm	76 mil 1.90 mm
Asperity Height	D7466				16 mil 0.4 mm	16 mil 0.4 mm
Density (Untextured)	D792	≥ 0.94 mg/l	≥ 0.94 mg/l	≥ 0.94 mg/l	≥ 0.94 mg/l	≥ 0.94 mg/l
Tensile Strength Modified Type IV Die	D6693 Yield Stress	84 ppi 15 kN/m	126 ppi 22 kN/m	168 ppi 29 kN/m	126 ppi 22 kN/m	168 ppi 29 kN/m
	Break Stress	152 ppi 27 kN/m	228 ppi 40 kN/m	304 ppi 53 kN/m	90 ppi 16 kN/m	120 ppi 21 kN/m
	Yield Strain 33 mm Guage	12%	12%	12%	12%	12%
	Break Strain 50 mm Guage	700%	700%	700%	100%	100%
Tear Resistance	D1004	28 lbs 125 N	42 lbs 187 N	56 lbs 249 N	42 lbs 187 N	56 lbs 249 N
Stress Cracking	D5397	500 Hours	500 Hours	500 Hours	500 Hours	500 Hours
Puncture Resistance	D4833	72 lbs 320 N	108 lbs 480 N	144 lbs 640 N	90 lbs 400 N	120 lbs 534 N
Carbon Black Content	D6370	≥ 2.0%	≥ 2.0%	≥ 2.0%	≥ 2.0%%	≥ 2.0%
Carbon Black Dispersion	D5596	CAT 1 or 2	CAT 1 or 2	CAT 1 or 2	CAT 1 or 2	CAT 1 or 2
Maximum Continuous use Temperature[1]		60°C	60°C	60°C	60°C	60°C

[1]Please contact Layfield Technical Services for more information

11.

17 Oct 2016	HDPE Minimum Field Seam Strengths					
Style	**ASTM D6392**	**HDPE 40 Smooth**	**HDPE 60 Smooth**	**HDPE 80 Smooth**	**HDPE 60 Textured**	**HDPE 80 Textured**
Bonded Seam Strength Test Temp 23°C, 73°F	25.4 mm (1") Strip	80 ppi 14 N/mm	120 ppi 21 N/mm	160 ppi 28 N/mm	120 ppi 21 N/mm	160 ppi 28 N/mm
Peel Adhesion Strength (Extrusion Welds)	25.4 mm (1") Strip	52 ppi 9 N/mm	78 ppi 14 N/mm	104 ppi 18 N/mm	78 ppi 14 N/mm	104 ppi 18 N/mm

NRCB USE ONLY

LIQUID MANURE STORAGE VOLUME CALCULATOR (if applicable)

Facility 1 Dairy Barn pits	2 x 237 cubic metres
Name / description	Capacity 474 cubic metres
Facility 2 Dairy barn transfer pit ("pump room")	
Name / description	Capacity 115 cubic metres
Facility 3 Synthetically lined liquid manure storage	
Name / description	Capacity 9314 cubic metres
Facility 4	
Name / description	Capacity

TOTAL CAPACITY	9903 cubic metres
REQUIRED 9 MONTH STORAGE CAPACITY	6450 cubic metres*
MEETS THE REQUIREMENTS FOR A MINIMUM OF 9 MONTHS STORAGE	☒ YES ☐ NO

* See previous notes in the TD regarding how the required 9 month storage capacity is calculated to be higher than what the applicant will likely need. This difference is due to the applicant using a robotic milking system (less water usage) than the calculations listed (parlour milking systems use 30L/cow/day wash water). Nevertheless, the applicant has provided more than the minimum storage requirements.