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	LA25014	NE 34-4-20 W4M

APPLICATION DISCLOSURE

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

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

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

Feb 13/25
Date of signing

[redacted]
Signature

OKC Farms
Corporate name (if applicable)

Paul Kleinsasser
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)
New Layer Barn	152.4 45 m
Attached Manure Storage	18.6 7.8 m

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

Existing facilities	Dimensions (m) (length, width, and depth)	NRCB USE ONLY
Hog Barn Dry Sow & Farrow	127 X 27	
Grower Finisher Barn	117 X 44	
Quarantine Barn 12.2 x 23.6 m · pit	12.2 x 23.6 mt Pit	

NRCB USE ONLY

Part 2 — Technical Requirements

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Existing facilities continued	Dimensions (m) (length, width, and depth)	NRCB USE ONLY
Layer Barn plus Manure Storage	94. 16.5	
Pullet Barn plus Manure Storage	80 X 16	
Compost Area	60 X 40	
Catch Basin	50 X 32.25 Deep	
Shelter & Pen	16 X 26 m.	
Duck Barn	12 X 16.8	
Hog Lagoon	112 m x 113 m x 4.6 Deep	

Part 2 — Technical Requirements

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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

Convert to Pullet Barn

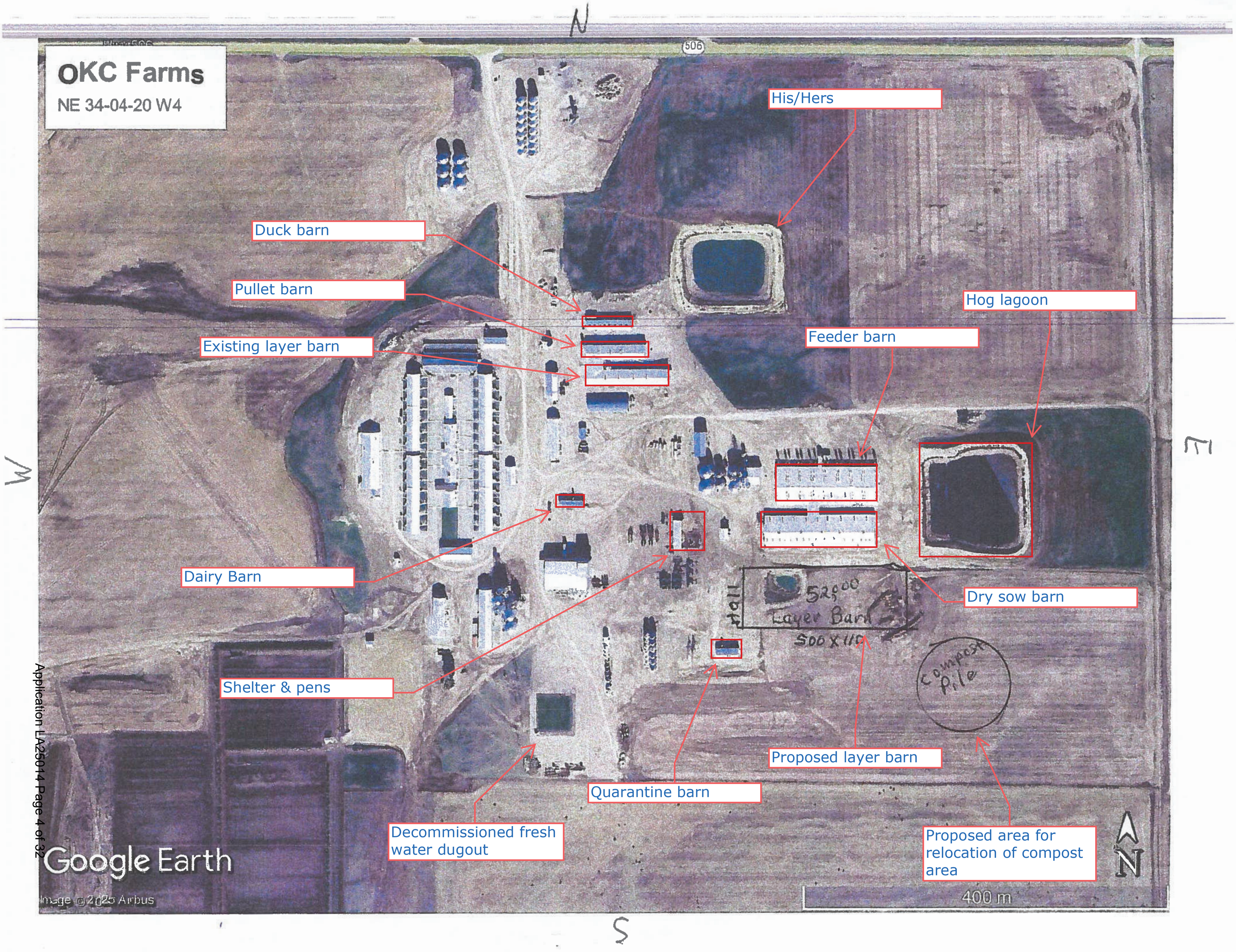
Construction completion date for proposed facilities October 2028

Additional information

AO Comment: Applicant is proposing to decommission the catch basin and relocate the compost area approximately 35 m South-East from its current location to accommodate the proposed new layer barn.

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**
Same as part 1			
Chicken Layers	20,000	+30,000	50,000
Chicken Pullets	25,000	+25,000	50,000
Swine Farrow to Finish	600	0	600
Milking Cows (plus dries & replacements)	70	-67	3
Beef Feeders	70	-60	10
Ducks	700	0	700
Chicken Broilers	0	700	700


OKC Farms
NE 34-04-20 W4
506
N
E
S
W
His/Hers
Duck barn
Pullet barn
Existing layer barn
Hog lagoon
Feeder barn
Dairy Barn
Dry sow barn
52,000
Layer Barn
500 x 110
110 ft
Shelter & pens
Compost Pile
Proposed layer barn
Quarantine barn
Decommissioned fresh water dugout
Proposed area for relocation of compost area
Google Earth
Image © 2025 Airbus
400 m
N

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 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 3 day of February 20 25. [redacted]

Signature of Applicant or Agent

conveyance agreement with RID 52 acre Ft

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 ____ day of _____, 20____. _____

Signature of Applicant or Agent

WATER CONVEYANCE AGREEMENT - OTHER USES
Irrigation Districts Act section 21(2)(a.1)

This Agreement is dated the 17 day of October, 2022.

Between:

OKC Farm Co. Ltd
(the "Applicant")

- and -

Raymond Irrigation District
Box 538
Raymond, Alberta T0K 2S0
(the "District")

BACKGROUND:

1. The Applicant has applied to the District under section 21(2)(a.1) of the *Irrigation Districts Act* R.S.A 2000, c. I-11 (the "Act"), to enter into a water conveyance agreement with the District to receive the delivery of water from the District for a purpose other than the use on irrigation acres, and for a purpose other than for the use under an alternate parcel delivery agreement, rural water use, or household purposes.

2. The District is the holder of several Licences that authorize the District to deliver water for any of the purposes specified in the Licences.

3. Section 6 of the Act authorizes the District to deliver water in accordance with the terms and conditions of the Licences.

4. The Applicant proposes that the water will be used on the lands legally described as:

MERIDIAN 4 RANGE 20 TOWNSHIP 4
SECTION 34
QUARTER NORTH WEST
CONTAINING 64.7 HECTARES (160 ACRES) MORE OR LESS
EXCEPTING THEREOUT:

PLAN	NUMBER	HECTARES	(ACRES)
ROAD	8710379	0.417	(1.03)

EXCEPTING THEREOUT ALL MINES AND MINERALS
AND THE RIGHT TO WORK THE SAME

(the "Lands")

5. The Applicant has applied for the following volume of water:

52 acre feet (the "Annual Volume").

6. The Applicant proposes to use the water for the following purpose:

DOMESTIC and LIVESTOCK use
(the "Purpose")

7. The District is prepared to deliver the Annual Volume to the Applicant on the Lands subject to the terms and conditions contained in this Agreement.

AGREEMENT:

The parties agree as follows:

1. **Definitions** - In this Agreement:
   a. "Agreement" means this Agreement including the Background;

   b. "Annual Fee" means the fee applicable to this Agreement established by the District by a fee by-law pursuant to section 115 of the Act;

   c. "Capital Fee" means the fee applicable to this Agreement identified as such in a fee by-law of the District pursuant to section 115 of the Act;

   d. "Default" includes the happening of any of the following events:

      i. failure of the Applicant to pay the Annual Fee by the due date;

      ii. use of any portion of the Annual Volume for other than the Purpose;

      iii. use of any portion of the Annual Volume on a parcel of land other than the Lands;

      iv. failure of the Applicant to pay the Capital Fee;

      v. the Applicant has used or is using any portion of the Annual Volume in a manner that is causing or may cause loss or damage to property or loss or injury to any person;

      vi. waste all or any portion of the Annual Volume or permit all or any portion of the Annual Volume to escape from the Lands;

      vii. the Applicant contravenes any provision of the Act or this Agreement, or

      viii. the Applicant files an assignment in Bankruptcy;

   e. "Delivery" means the delivery by the District of the Annual Volume to the Applicant;

f. "Irrigation Works" means Irrigation Works as defined in the Act;

g. "Licence" means the total of all the licences held by the District pursuant to the provisions of the *Water Act*, R.S.A. 2000 c. W-3;

h. "Point of Delivery" means that location on the Irrigation Works of the District at which the Annual Volume is delivered to the Applicant, and

i. "Turnout Structure" means such structure or works as are required by the District at the Point of Delivery to affect a conveyance of the Annual Volume from the Point of Delivery to the Lands.

2. **Delivery**

a. The District agrees to deliver to the Applicant at the Point of Delivery the Annual Volume.

b. The Annual Volume shall be delivered at times, rates and amounts as the District may have water available and capacity in its Irrigation Works for such delivery.

c. The total volume of water delivered in each year under this Agreement shall not exceed the Annual Volume.

3. **Purpose** - The Applicant will use the Annual Volume only for the Purpose and only on the Lands.

4. **Term** - This Agreement shall continue in full force and effect until terminated by either party in accordance with its terms.

5. **Consideration** - In consideration for the Delivery, the Applicant agrees to pay to the District fees established by By-Law pursuant to section 115 of the Act as follows:

A one-time fee in the sum of [redacted]
(the "Capital Fee") to be paid by the Applicant at the time of the execution of this Agreement, and

a. An Annual Fee, due and payable on or before the 31st day of December in each year during the currency of this Agreement.

6. **Point of Delivery** - The District shall deliver the Annual Volume to the Point of Delivery. The water shall be removed from the Irrigation Works of the District at the Point of Delivery through the Turnout Structure. The Turnout Structure shall comply with the District's standard specifications for such Irrigation Works, and shall be installed by the District, at the expense of the Applicant, and at all times material hereto shall be operated and maintained by the District.

7. **Works** - All turnout structures, equipment or works installed on the Irrigation Works of the District by the Applicant pursuant to this Agreement, shall become the property of the District.

8. **Metering** - The District may require the Applicant to supply, install and maintain a water measuring device approved by the District at the Point of Delivery or such other place as may be designated by the District for the purpose of measuring the amount of the Annual Volume delivered from time to time to the Applicant. The Applicant grants to the District the right and licence during the currency of this Agreement to enter upon the Lands and to monitor the use of and record the data collected by the measurement device.

9. **Ordering Water** - The Applicant shall order the delivery of water and call for the termination of such delivery in accordance with the applicable bylaws and policies of the District.

10. **Indemnity** - The Applicant shall indemnify and keep indemnified the District against any liability for losses and expenses of whatever kind or nature, including the establishment or increase of a reserve to cover any possible liability and the fees and disbursements of counsel, and against any losses and expenses, which the District may incur in connection with any one or more of the following events or circumstances (the "Events"):

    a. by reason of having delivered to the Applicant all or any portion of the Annual Volume;

    b. by reason of the inability of the District to deliver to the Applicant all or any portion of the Annual Volume;

    c. by reason of the failure of the Applicant to perform or comply with the terms and conditions of this Agreement, and

    d. in enforcing any of the terms and conditions of this Agreement/

11. The District may pay or compromise any claim, demand, suit, judgment or expense arising out of the Events and any such payment or compromise shall be binding upon the Applicant and included as a liability, loss or expense covered by this indemnity, provided the same was made by the District in the reasonable belief that it was liable for the amount disbursed, or that such payment or compromise was reasonable under all the circumstances.

12. In the event of any such payment or compromise by the District, an itemized statement of it prepared and certified by the manager or assistant manager of the District, itemizing of such payment or compromise shall be prima facie evidence of the fact and amount of the liability of the Applicant under this Agreement, in respect of the payment or compromise.

13. The District shall not be liable for any claim either direct, indirect or consequential, for loss, injury or damage whatsoever arising out of the failure or inability of the District to deliver all or any portion of the Annual Volume.

14. **Compliance With Laws** - The Applicant shall comply with and be bound by the provisions of all statutes and regulations applicable to the privileges hereby granted, and with all by-laws of the District regulating the supply and distribution of water.

15. **Default** - In the event the Applicant is in Default of any of the provisions of this Agreement, the District may forthwith stop delivery of water or terminate this Agreement and in such case, there shall be no abatement or refund of the Annual Fee paid by the Applicant to the District during the term of this Agreement prior to the stoppage or termination.

16. **Termination** - The Applicant may terminate this Agreement upon providing 30 days written notice to the District of its intention to do so, and following the expiry of the 30 day notice period, this Agreement shall be terminated and at an end and from that point forward, the Applicant shall have no further right or entitlement to or claim to the delivery of Annual Volume.

17. **Refund of Capital Fee** - Upon termination of this Agreement pursuant to **Clause 15 - Default** or **Clause 16 - Termination**, and provided the Applicant has paid all amounts due under this Agreement for Capital Fees and for Annual Fees, the District may pay to the Applicant such portion of the Capital Fee paid herein by the Applicant as the District may set out in a by-law passed from time to time.

18. **Water Quality** - The Applicant acknowledges that the Irrigation Works of the District is an open ditch system subjecting the water therein to contamination from all manner of environmental, human and animal factors and that the District does not regulate, control or monitor the quality of water in its Irrigation Works.

19. The Applicant acknowledges and agrees that the water in the Irrigation Works of the District may not be potable or may not be suitable for the Purpose, and that the District makes no representation, warranty or guarantee, express or implied that the water delivered under this Agreement is potable and fit for human or livestock consumption or suitable for the Purpose for use by the Applicant.

20. The Applicant agrees to accept the water delivered in the condition in which it may be found at the Point of Delivery from time to time and to provide such testing, treatment or filtering as the Applicant considers necessary for the use by the Applicant for the Purpose.

21. **Seasonal Delivery** - The Applicant acknowledges that the District can deliver the Annual Volume only during the irrigation season and that the water conveyance capacity of the Irrigation Works of the District is limited and the District will deliver, from time to time, so much of the Annual Volume as it, in its exclusive discretion, deems advisable.

22. **Non-Assignment or Transfer** - Neither this Agreement nor any of the rights and privileges contained in this Agreement is assignable or transferable by the Applicant, in whole or in part, without prior written consent of the District.

IN WITNESS WHEREOF the District has by its proper officers signed this Agreement and has affixed the seal of the District hereto, and the Applicant has hereunto set his hand and seal on the day and year first above written.

Witness to Signature of the Applicant

Applicant

Witness to Signature of the Applicant

Applicant

Raymond Irrigation District

Chairman

Manager

WP51: Other Uses - Water Conveyance Agreement

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: Hog Lagoon **Proposed 1:** New Layer Barn

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	
Surface water information	How many springs are within 100 m of the manure storage facility or manure collection area?	None	None			☐ YES ☐ NO ☐ YES with exemption	
	How many water wells are within 100 m of the manure storage facility or manure collection area?	None	None			☐ YES ☐ NO ☐ YES with exemption	
	What is the shortest distance from the manure collection or storage facility to a surface water body? (e.g., lake, creek, slough, seasonal)	2600 Meters	2600 Meters			☐ YES ☐ NO ☐ YES with exemption	
Groundwater information	What is the depth to the water table?		7 meters			☐ YES ☐ NO ☐ YES with exemption	
	What is the depth to the groundwater resource/aquifer you draw water from?	40 Meters	40 Meters			☐ YES ☐ NO ☐ YES with exemption	

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

Part 2 — Technical Requirements

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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**
Gordie Sawatary	SW 25-04-20 W4	2 miles					
Ridge Park	NW 06-05-20 W4	4 miles					
Dr Johnson	NW 24 -04-20 W4	3 ½ miles					

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)**
AO Comment: See attached map on next page for land base for manure application provided by OKC Farms. All land highlighted with a solid colour is owned by the applicant and is dryland (brown).					
			Total		

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

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

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

Additional information (attach any additional information as required)


9
N.W. Card
Anderson
10
N.E.Card
Harold
11
Blackie West
Blackie East
12
Alma
S.W. Card
S.E. Card
Hawkins Claim
4
-Matsuama- West
-Matsuama- East
-Nishimura- West
-Nishimura- East
3
Lynn 1
Lynn 2
Lynn 3
Lynn 4
2
Rasmussen 1
Rasmussen 2
Rasmussen 3
1
West Tenner
East Tenner
N
W
E
S
3 32
Snow
33
Gasaka # 3
Gasaka # 2
Gasaka # 1
Gasaka # 4
30
34
OK COLONY
G
Garden West
Garden East
35
East of OK School
Hayland
East Peterson
West Peterson
Hungry Horse
2014 Crop
BOB Wesley
28
BOB N.of house
BOB Sidehill
BOB S.W.
27
BOB Oil Rig
Thistle Corner
BOB S.of ThistleCo.
BOB N.of Zemp
BOB Acr. Coulee
26
Saruwatari
Powelson
21
Leeuwenburgh
22
KAY Zemp West
KAY Zemp East
KAY Zemp Sidehill
KAY Zemp Islands
23
Romeril
16
Leeuwenburgh
15
Sheep Pasture
540
36
14
KAY Pek N.W.
KAY Pek North
KAY Pek East
KAY Pek S.W.
KAY Pek South
KAY Bonnie V.
KAY N. of House
9
KAY E.of Barn
KAY T.of Hill
KAY Oilrig
10
W.of Perlich
Piece Between Coulee
11
PERLICH
12
Kinsey
520
Kay's Farm

16-Apr-14

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 - 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. New Layer Barn

2. with attached Manure Storage

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.	152.4	45 meters		
2.	18.6	7.8 meters		
			TOTAL CAPACITY	

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

Surface water control systems

Describe the run-on and runoff control system

All under Roof

Liner protection

Describe how the physical integrity of the liner will be maintained

check for cracks & seal as needed

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:
6 inches	Type 50
Concrete strength	**Concrete reinforcement size and spacing**
30 mpa	rebare ½ mim 12" on centre

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: _____ Requirements met: ☐ YES ☐ NO

Depth to Uppermost groundwater resource: _____ Requirements met: ☐ YES ☐ NO

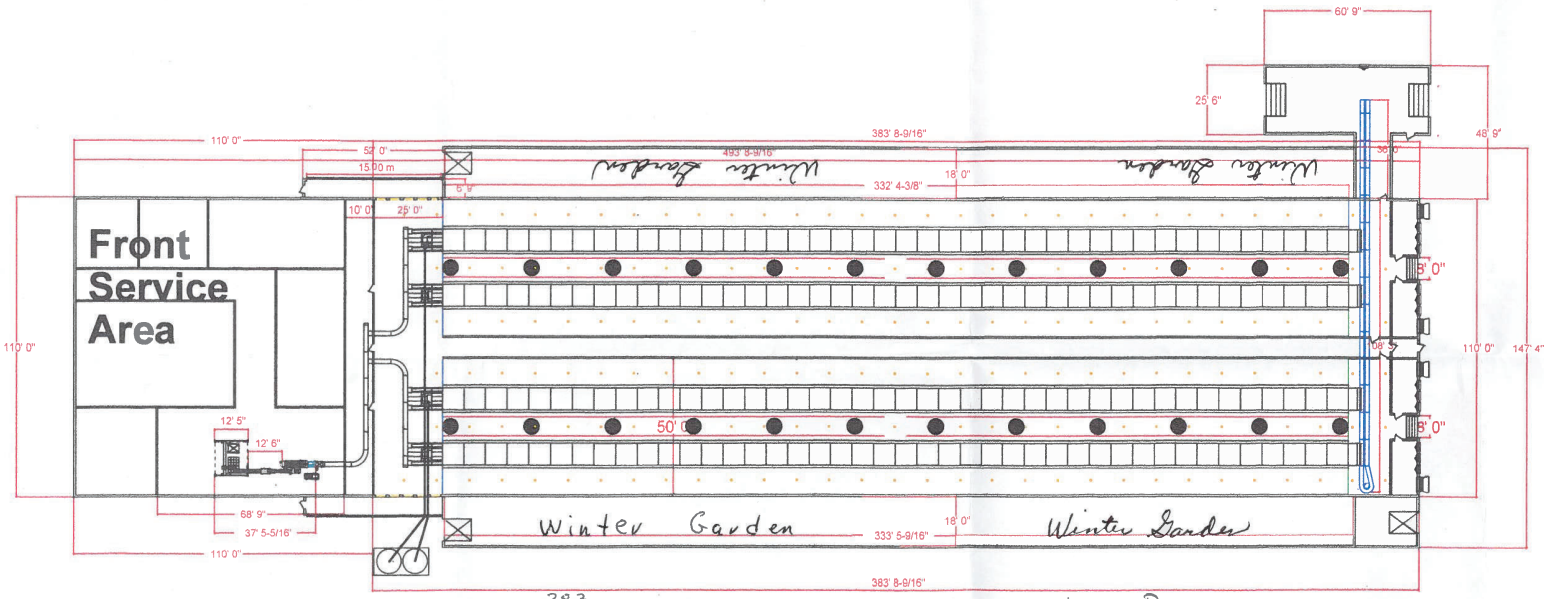
ERST completed: ☐ see ERST page for details

Surface water control systems

Requirements met: ☐ YES ☐ NO Details/comments:

Concrete liner details

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



383 / 110 / 495 → Long Wide 110 + 36 Winter Run

Manure Storage 61" X 26

Big Dutchman Natura Step Free Run Layer Complex
2 Rooms Free Run
25200 Hens per room

Walbern Agri Systems
Linden Alberta

OKColony
Raymond Alberta

Free Run Layer
Jan 2025
Floor Plan

AO Comment: Soil investigation report to accompany relocation of compost area.

August 5, 2003

Project Number: E998-001-00-0500

Paul Kliensasser
OK Hutterite Brethren
PO Box 504
Raymond, AB T0K 2S0

Dear Paul:

RE: Geotechnical Investigation, Proposed Catchment Facility and Poultry Facility

As requested, UMA Engineering Ltd. recently completed a geotechnical investigation for the above project. This letter provides the results of the drilling program and recommendations for the construction of the catchment and poultry facilities.

1. Field Investigation and Laboratory Testing

The field investigation was done on June 17, 2003 and consisted of the drilling of five testholes as shown on Drawing 01-B-1001 attached. The testholes were drilled to completion depths of between 5.0 m and 6.1 m below existing grade. One testhole (TH03-01) was drilled at the proposed poultry facility. Three testholes (TH03-02, TH03-03, and TH03-04) were drilled to install monitoring wells around the existing lagoons. The final testhole (TH03-05) was drilled at the location for the proposed catchment facility. Split spoon samples with SPT tests were taken in TH03-01. Disturbed grab samples were taken in TH03-02 to TH03-05. Standpipe piezometers were installed in all five testholes.

The testholes were logged in the field by a geotechnical technician from UMA Engineering Ltd.

Laboratory testing consisted of moisture content determinations on all samples and two permeability tests. The results of the laboratory testing are included on the testhole logs.

2. Subsurface Conditions

Poultry Facility

The soils at the proposed poultry facility consisted of a 0.6 m thick layer of clay fill over organics to a depth of 1.5 m. At 1.5 m the soils were a medium to low plastic clay till that was stiff to very stiff in consistency. The groundwater level measured in the standpipe on June 20, 2003 was 2.1 m below grade.

Lagoon

The primary soil logged in the three lagoon testholes was clay. Topsoil layers were found in TH03-02 and TH03-03 at depths of 0.7 m and 0.65 m, respectively. The topsoil layer in TH03-02 was 0.3 m thick. In TH03-03, the layer was 1.35 m thick. The native soil in the three testholes

uma

was silty, sandy, medium plastic clay till. A thin sand pocket (0.3 m) was logged within the clay till at 2.7 m in TH03-02.

Catchment Facility

In the catchment facility (TH03-05) the stratigraphy was 1.5 m of low to medium plastic clay; 4.0 m of silty, sandy medium plastic clay till; and medium to fine grained sand from 5.5 m to the end of the testhole. The permeability tests showed that the native clays had permeabilities of between 1.7×10^{-7} cm/sec and 2.6×10^{-8} cm/sec.

3. Evaluation and Recommendations

Based on the results of the drilling, the soils are suitable for the construction of both the poultry facility and the catchment facility.

It is understood that the poultry facility will be a single storey structure without a basement. Therefore, shallow strip and spread footings are suitable foundations for the structure. The footings should be placed on native clay at 1.5 m below grade and should be designed for an allowable bearing capacity of 100 kPa. Based on the type of soils, Type 50 cement should be used to construct the footings and floor slab.

If you have any questions regarding the above or need further recommendations, please call the undersigned at (403) 270-9277.

Sincerely,

UMA ENGINEERING LTD.

PROFESSIONAL ENGINEERS AND GEOSCIENTISTS ASSOCIATION OF ALBERTA

PERMIT TO PRACTICE
UMA ENGINEERING LTD.
Signature
Date Aug. 6/03
PERMIT NUMBER: P 329
The Association of Professional Engineers, Geologists and Geophysicists of Alberta

Ms. G.D. Griffin, M. Eng., P. Eng.
Geotechnical Engineer
ggriffin@umagroup.com

GDG:mve
Encls.

PROJECT: Proposed Poultry Facility	CLIENT: OK Hutterite Bretheren	TESTHOLE NO: 03-01
LOCATION: See Site Plan		PROJECT NO.: E998-001-00
CONTRACTOR: Chilako Drilling Services	METHOD: Solid Stem Auger	ELEVATION (m):

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

BACKFILL TYPE: BENTONITE | GRAVEL | SLOUGH | GROUT | CUTTINGS | SAND

DEPTH (m)	SLOTTED PIEZOMETER	USC	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	SPT (Standard Pen Test) (Blows/300mm) 20 40 60 80 PLASTIC M.C. LIQUID 10 20 30 40	COMMENTS	DEPTH (m)
0		CI		CLAY (FILL) - silty, sandy, brown, moist						0
1		OL		ORGANICS (TOPSOIL) - silty, brown to dark brown, damp						1
2		CI		CLAY (TILL) - silty, sandy, trace gravel, stiff, medium plastic, brown, moist Groundwater Level 2.1 m June 20, 2003		1	10			2
3										3
4		CI-CL		CLAY (TILL) - silty, sandy, very stiff, low to medium plastic, brown, moist to wet, seepage at 3.1 m		2	13			4
5				END OF TESTHOLE AT 5.0 m		3	29			5
6										6
7										7
8										8
9										9
10										

LOG OF TESTHOLE OK COLONY LOGS.GPJ UMA.GDT 1/8/03

uma

LOGGED BY: JDF	COMPLETION DEPTH: 5.00 m
REVIEWED BY: GDG	COMPLETION DATE: 17/6/03
PROJECT ENGINEER: G. Griffin	

PROJECT: Proposed Poultry Facility	CLIENT: OK Hutterite Bretheren	TESTHOLE NO: **03-02**
LOCATION: See Site Plan		PROJECT NO.: E998-001-00
CONTRACTOR: Chilako Drilling Services	METHOD: Solid Stem Auger	ELEVATION (m):

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

BACKFILL TYPE: BENTONITE | GRAVEL | SLOUGH | GROUT | CUTTINGS | SAND

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	PLASTIC / M.C. / LIQUID (10 20 30 40)	COMMENTS	DEPTH (m)
0	CI		CLAY (FILL)					0
			Groundwater Level 0.8 m June 20, 2003					
	OL		ORGANICS (TOPSOIL)					
1			CLAY (TILL) - silty, sandy, trace gravel, medium plastic, brown, wet		1			1
2	CI				2			2
	SP		SAND - some gravel, some fines, brown, saturated					
3			CLAY (TILL) - silty, sandy, trace gravel, very stiff, medium plastic, brown, moist					3
4			- seepage					4
	CI							
5								5
6			END OF TESTHOLE AT 6.1 m					6
7								7
8								8
9								9
10								

LOG OF TESTHOLE OK COLONY LOGS.GPJ UMA.GDT 1/8/03

uma

LOGGED BY: JDF	COMPLETION DEPTH: 6.10 m
REVIEWED BY: GDG	COMPLETION DATE: 17/6/03
PROJECT ENGINEER: G. Griffin	

PROJECT: Proposed Poultry Facility	CLIENT: OK Hutterite Bretheren	TESTHOLE NO: **03-03**
LOCATION: See Site Plan		PROJECT NO.: E998-001-00
CONTRACTOR: Chilako Drilling Services	METHOD: Solid Stem Auger	ELEVATION (m):

SAMPLE TYPE: GRAB; SHELBY TUBE; SPLIT SPOON; BULK; NO RECOVERY; CORE

BACKFILL TYPE: BENTONITE; GRAVEL; SLOUGH; GROUT; CUTTINGS; SAND

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	PLASTIC / M.C. / LIQUID (10 20 30 40)	COMMENTS	DEPTH (m)
0	CI		CLAY (FILL) - silty, medium plastic, brown					0
1	OL		ORGANICS (TOPSOIL)					1
			Groundwater Level 1.4 m June 20, 2003					
2			CLAY (TILL) - silty, sandy, stiff, medium plastic, brown, moist to wet		1			2
3					2			3
4	CI		- seepage					4
5								5
6			END OF TESTHOLE AT 6.1 m					6
7								7
8								8
9								9
10								

LOG OF TESTHOLE OK COLONY LOGS.GPJ UMA.GDT 1/8/03

uma

LOGGED BY: JDF	COMPLETION DEPTH: 6.10 m
REVIEWED BY: GDG	COMPLETION DATE: 17/6/03
PROJECT ENGINEER: G. Griffin	Page 1 of 1

PROJECT: Proposed Poultry Facility	CLIENT: OK Hutterite Bretheren	TESTHOLE NO: 03-04
LOCATION: See Site Plan		PROJECT NO.: E998-001-00
CONTRACTOR: Chilako Drilling Services	METHOD: Solid Stem Auger	ELEVATION (m):

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

BACKFILL TYPE: BENTONITE | GRAVEL | SLOUGH | GROUT | CUTTINGS | SAND

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	PLASTIC / M.C. / LIQUID (10 20 30 40)	COMMENTS	DEPTH (m)
0			CLAY (TILL) - silty, sandy, trace gravel, medium plastic, brown, moist					0
1			Groundwater Level 1.1 m June 20, 2003 - moist to wet		1			1
2			- moist		2			2
3	CI				3			3
4					4			4
5					5			5
6			END OF TESTHOLE AT 6.1 m					6
7								7
8								8
9								9
10								

LOG OF TESTHOLE OK COLONY LOGS.GPJ UMA.GDT 1/8/03

uma

LOGGED BY: JDF	COMPLETION DEPTH: 6.10 m
REVIEWED BY: GDG	COMPLETION DATE: 17/6/03
PROJECT ENGINEER: G. Griffin	Page 1 of 1

PROJECT: Proposed Poultry Facility	CLIENT: OK Hutterite Bretheren	TESTHOLE NO: **03-05**
LOCATION: See Site Plan		PROJECT NO.: E998-001-00
CONTRACTOR: Chilako Drilling Services	METHOD: Solid Stem Auger	ELEVATION (m):

SAMPLE TYPE: GRAB | SHELBY TUBE | SPLIT SPOON | BULK | NO RECOVERY | CORE

BACKFILL TYPE: BENTONITE | GRAVEL | SLOUGH | GROUT | CUTTINGS | SAND

DEPTH (m)	SLOTTED PIEZOMETER	USC	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	PLASTIC / M.C. / LIQUID (10 20 30 40)	COMMENTS	DEPTH (m)
0				CLAY - silty, sandy, firm to stiff, medium to low plastic, brown, moist to wet					0
1		CI-CL		Groundwater Level 0.7 m June 20, 2003		1			1
2				CLAY (TILL) - silty, sandy, trace gravel, very stiff, medium plastic, damp to moist		2			2
3		CI							3
4									4
5									5
6		SP		SAND - medium to fine grained, brown, saturated					6
				END OF TESTHOLE AT 6.1 m					
7									7
8									8
9									9
10									

LOG OF TESTHOLE OK COLONY LOGS.GPJ UMA.GDT 1/8/03

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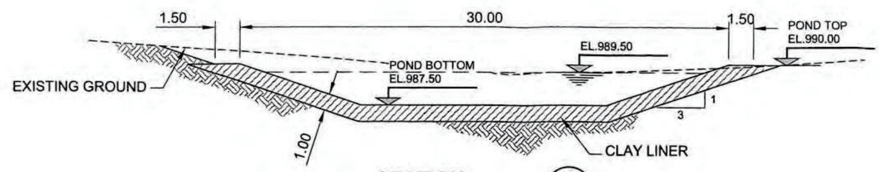
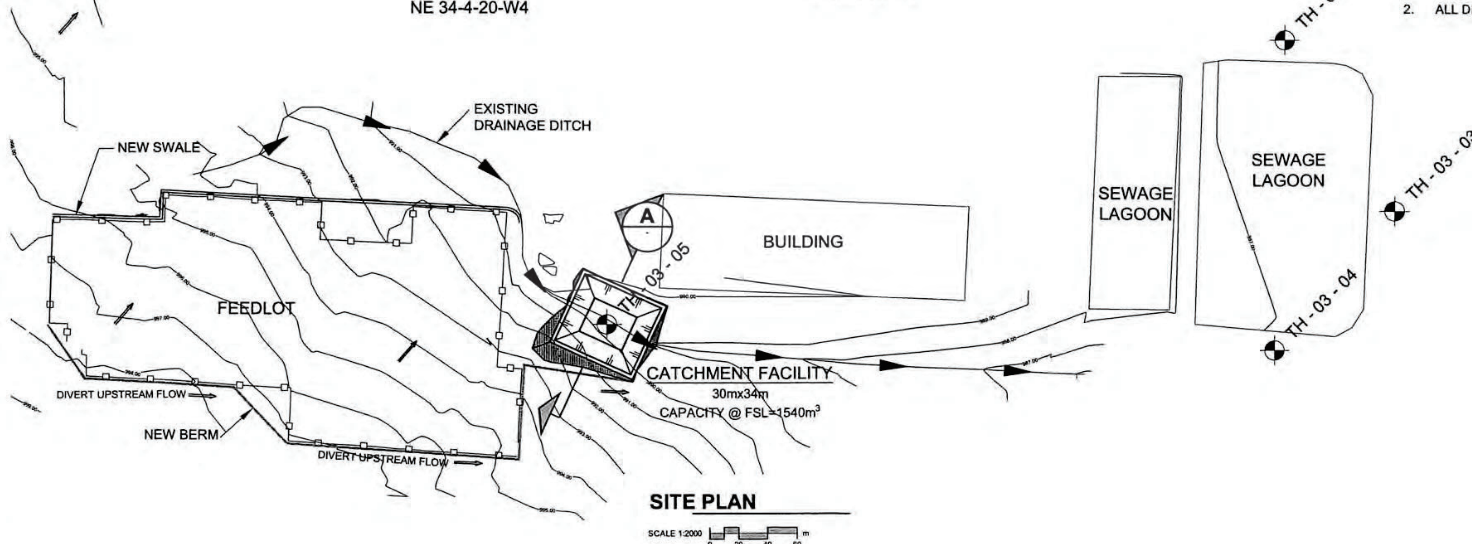
LOGGED BY: JDF	COMPLETION DEPTH: 6.10 m
REVIEWED BY: GDG	COMPLETION DATE: 17/6/03
PROJECT ENGINEER: G. Griffin	Page 1 of 1



SECTION (A)

SCALE 1:300

CATCHMENT FACILITY
3:1 SIDESLOPES TYPICAL



SITE PLAN

SCALE 1:2000

LEGEND

OVERLAND DRAINAGE SYSTEM ROUTE	
ORIGINAL GROUND CONTOUR	000.00
EXISTING POWERPOLE	
CUT AREA	
FILL AREA	
TESTHOLE	TH - 03 - ##

NOTES

1. THE EXISTENCE, LOCATION AND ELEVATION OF UTILITIES AND/OR CONCEALED STRUCTURES AT THE PROJECT SITE ARE NOT GUARANTEED BY UMA. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE EXISTENCE, LOCATION AND ELEVATION OF ALL SUCH UTILITIES AND/OR STRUCTURES AND IS RESPONSIBLE FOR NOTIFYING THE APPROPRIATE COMPANY, DEPARTMENT OR PERSON(S) OF ITS INTENTION TO CARRY OUT ITS OPERATIONS.
2. ALL DIMENSIONS IN METRES UNLESS OTHERWISE SPECIFIED.

I/R	YY/MM/DD	ISSUE/REVISION DESCRIPTION	DRN	CHK	DES	CHK	ENG	APP
A	03/08/01	Issued For Report	TA	BS	JF	GG	GG	GG

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OK Hutterian Brethern
Poultry Facility

Proposed Catchment Facility
Site Plan & Section

PROJECT NUMBER	DRAWING NUMBER	ISSUE/REVISION
E998-001-00	01-B-1001	A

B SIZE 11" x 17" (279mm x 432mm)   Saved By: mloppe PLOT: 03-08-05:11:27:06 AM By: mloppe   UMA FILE NAME: ORIGINAL: \\LETHBRIDGE\E998-001-00_01-B-1001_RA.DWG

EXPLANATION OF FIELD & LABORATORY TEST DATA

The field and laboratory test results, as shown for each hole, are described below.

1. NATURAL MOISTURE CONTENT

The relationship between the natural moisture content and depth is significant in determining the subsurface moisture conditions. The Atterberg Limits for a sample should be compared to its natural moisture content and plotted on the Plasticity Chart in order to determine the soil classification.

2. SOIL PROFILE AND DESCRIPTION

Each soil strata is classified and described noting any special conditions. The Modified Unified Classification System (MUCS) is used. The soil profile refers to the existing ground level at the time the hole was done. Where available, the ground elevation is shown. The soil symbols used are shown in detail on the soil classification chart.

3. TESTS ON SOIL SAMPLES

Laboratory and field tests are identified by the following and are on the logs:

N - Standard Penetration Test (SPT) Blow Count. The SPT is conducted in the field to assess the in situ consistency of cohesive soils and the relative density of non-cohesive soils. The N value recorded is the number of blows from a 63.5 kg hammer dropped 760 mm which is required to drive a 51 mm split spoon sampler 300 mm into the soil.

SO_4 - Water Soluble Sulphate Content. Expressed in percent. Conducted primarily to determine requirements for the use of sulphate resistant cement. Further details on the water soluble sulphate content are given in Section 6.

γ_D - Dry Unit Weight. Usually expressed in kN/m^3.

γ_T - Total Unit Weight. Usually expressed in kN/m^3.

Q_U - Unconfined Compressive Strength. Usually expressed in kPa and may be used in determining allowable bearing capacity of the soil.

C_U - Undrained Shear Strength. Usually expressed in kPa. This value is determined by either a direct shear test or by an unconfined compression test and may also be used in determining the allowable bearing capacity of the soil.

C_{PEN} - Pocket Penetrometer Reading. Usually expressed in kPa. Estimate of the undrained shear strength as determined by a pocket penetrometer.

The following tests may also be performed on selected soil samples and the results are given on separate sheets enclosed with the logs:

- Grain Size Analysis
- Standard or Modified Proctor Compaction Test
- California Bearing Ratio Test
- Direct Shear Test
- Permeability Test
- Consolidation Test
- Triaxial Test

4. SOIL DENSITY AND CONSISTENCY

The SPT test described above may be used to estimate the consistency of cohesive soils and the density of cohesionless soils. These approximate relationships are summarized in the following tables:

Table 1 Cohesive Soils

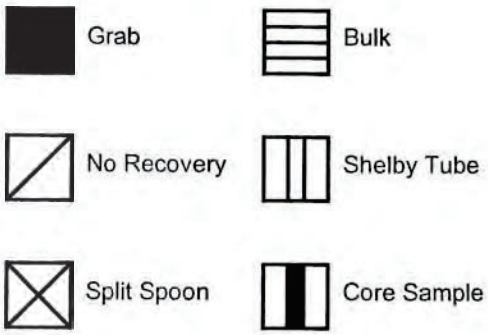
N	Consistency	C_u (kPa) approx.
0 - 1	Very Soft	< 10
1 - 4	Soft	10 - 25
4 - 8	Firm	25 - 50
8 - 15	Stiff	50 - 100
15 - 30	Very Stiff	100 - 200
30 - 60	Hard	200 - 300
> 60	Very Hard	> 300

Table 2 Cohesionless Soils

N	Density
0 - 5	Very Loose
5 - 10	Loose
10 - 30	Compact
30 - 50	Dense
> 50	Very Dense

5. SAMPLE CONDITION AND TYPE

The depth, type, and condition of samples are indicated on the logs by the following symbols:



6. WATER SOLUBLE SULPHATE CONCENTRATION

The following table, from CSA Standard A23.1-00, indicates the requirements for concrete subjected to sulphate attack based upon the percentage of water-soluble sulphate as presented on the logs. CSA Standard A23.1-00 should be read in conjunction with the table.

Table 3 Requirements For Concrete Subjected to Sulphate Attack*

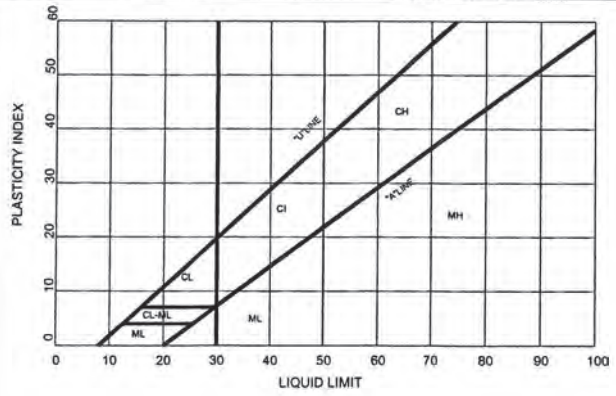
Class of exposure	Degree of exposure	Water-soluble sulphate (SO_4) in soil sample, %	Sulphate (SO_4) in ground water samples, mg/L	Minimum Specified 56 d compressive strength, MPa†	Maximum water/cementing materials ratio‡	Air content category §	Cementing materials to be used **††
S-1	Very severe	over 2.0	over 10,000	35	0.40	2	50
S-2	Severe	0.20 - 2.0	1,500 - 10,000	32	0.45	2	50
S-3	Moderate	0.10 - 0.20	150 - 1,500	30	0.50	2	20E‡‡, 40, or 50E

* For sea water exposure see Clause 15.4
† Where supplementary cementing materials are used, the owner may also specify other test ages.
‡ See Clause 15.1.4
§ For steel trowelled interior slabs on grade, subject to sulphate attack but not freeze-thaw, air entrainment is not required.
** See Clause 15.1.5
†† Cementing material combinations with equivalent performance may be used (see Clauses 3.2, 3.3, and 3.4)
‡‡ Type 20E cement with moderate sulphate resistance (see Clause 3.1.2)
Note: Type 50E cement shall not be used in reinforced concrete exposed to both chlorides and sulphates. Refer to Clause 15.4.

7. GROUNDWATER TABLE

The groundwater table is indicated by the equilibrium level of water in a standpipe installed in a testhole or test pit. This level is generally taken at least 24 hours after installation of the standpipe. The groundwater level is subject to seasonal variations and is usually highest in the spring. The symbol on the logs indicating the groundwater level is an inverted solid triangle (▼).

MAJOR DIVISION			UMA LOG SYMBOLS	MUCS	TYPICAL DESCRIPTION	LABORATORY CLASSIFICATION CRITERIA	
COARSE GRAINED SOILS	GRAVELS (MORE THAN HALF COARSE GRAINS LARGER THAN 4.75 mm)	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL GRADED GRAVELS, LITTLE OR NO FINES	$C_u = \frac{D_{60}}{D_{10}} > 4$ $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}} = 1 \text{ to } 3$	
				GP	POORLY GRADED GRAVELS AND GRAVEL-SAND MIXTURES, LITTLE OR NO FINES	NOT MEETING ABOVE REQUIREMENTS	
		DIRTY GRAVELS (WITH SOME FINES)		GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES	CONTENT OF FINES EXCEEDS 12%	ATTERBERG LIMITS BELOW 'A' LINE W_p LESS THAN 4
				GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES		ATTERBERG LIMITS ABOVE 'A' LINE W_p MORE THAN 7
	SANDS (MORE THAN HALF COARSE GRAINS SMALLER THAN 4.75 mm)	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES	$C_u = \frac{D_{60}}{D_{10}} > 6$ $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}} = 1 \text{ to } 3$	
				SP	POORLY GRADED SANDS, LITTLE OR NO FINES	NOT MEETING ABOVE REQUIREMENTS	
		DIRTY SANDS (WITH SOME FINES)		SM	SILTY SANDS, SAND-SILT MIXTURES	CONTENT OF FINES EXCEEDS 12%	ATTERBERG LIMITS BELOW 'A' LINE W_p LESS THAN 4
				SC	CLAYEY SANDS, SAND-CLAY MIXTURES		ATTERBERG LIMITS ABOVE 'A' LINE W_p MORE THAN 7
FINE GRAINED SOILS	SILTS (BELOW 'A' LINE NEGLIGIBLE ORGANIC CONTENT)	$W_L < 50$		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY SANDS OF SLIGHT PLASTICITY	CLASSIFICATION IS BASED UPON PLASTICITY CHART (SEE BELOW)	
		$W_L > 50$		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS		
	CLAYS (ABOVE 'A' LINE NEGLIGIBLE ORGANIC CONTENT)	$W_L < 30$		CL	INORGANIC CLAYS OF LOW PLASTICITY, GRAVELLY, SANDY, OR SILTY CLAYS, LEAN CLAYS	WHENEVER THE NATURE OF THE FINE CONTENT HAS NOT BEEN DETERMINED, IT IS DESIGNATED BY THE LETTER 'F'. E.G. SF IS A MIXTURE OF SAND WITH SILT OR CLAY	
		$30 < W_L < 50$		CI	INORGANIC CLAYS OF MEDIUM PLASTICITY, SILTY CLAYS		
		$W_L > 50$		CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS		
	ORGANIC SILTS & CLAYS (BELOW 'A' LINE)	$W_L < 50$		OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY		
		$W_L > 50$		OH	ORGANIC CLAYS OF HIGH PLASTICITY		
HIGHLY ORGANIC SOILS				Pt	PEAT AND OTHER HIGHLY ORGANIC SOILS	STRONG COLOUR OR ODOUR, AND OFTEN FIBROUS TEXTURE	
BEDROCK				BR	SEE REPORT DESCRIPTION		



SOIL COMPONENTS

FRACTION		SIEVE SIZE (mm) PASSING	SIEVE SIZE (mm) RETAINED	DEFINING RANGES OF PERCENTAGE BY WEIGHT OF MINOR COMPONENTS PERCENT	IDENTIFIER
GRAVEL	COARSE	75	19	50 - 35	AND
	FINE	19	4.75		
SAND	COARSE	4.75	2.00	35 – 20	____Y
	MEDIUM	2.00	0.425		
	FINE	0.425	0.080	20 – 10	SOME
SILT (non-plastic) or CLAY (plastic)		0.080		10 - 1	TRACE

OVERSIZE MATERIALS

ROUNDED OR SUB-ROUNDED	ANGULAR
COBBLES 75 mm TO 200 mm BOULDERS >200 mm	ROCK FRAGMENTS ROCKS > 0.75 m3 IN VOLUME

NOTE :
1. BOUNDARY CLASSIFICATION POSSESSING CHARACTERISTICS OF TWO GROUPS ARE GIVEN GROUP SYMBOLS, E.G. GW-GC IS A WELL GRADED GRAVEL MIXTURE WITH CLAY BINDER BETWEEN 5% AND 12%

MODIFIED UNIFIED CLASSIFICATION SYSTEM FOR SOILS

JULY 1996

uma

PERMEABILITY TEST

uma

CLIENT :	OK COLONY		
PROJECT :	PROPOSED POULTRY FACILITY		
JOB No. :	E998-001-00		
LOCATION :	CATCHMENT 0.0-1.5m	SAMPLE:	#1
BOREHOLE:	TEST HOLE 4	DEPTH :	
DATE :	20-Jun-03	TECHNICIAN :	CB

SAMPLE DATA

Sample Descriptic			
Sample Diameter (mm) :		Cross Section Area (cm^2)	
Initial Sample Length (mm) :		Initial Volume (cm^3)	
Final Sample Length (mm)		Final Volume(cm^3)	
		Change in Volume (cm^3)	

MOISTURE DETERMINATION			DENSITY DETERMINATION		
	Before	After		Before	After
Tare No. :			Mould No.		
Wt. Sample (wet + tare) (g)	172.4	372.1	Wt. Sample (wet + mould) (g)	3996.3	4046.8
Wt. Sample (dry + tare) (g)	146.6	305.8	Wt. Mould (g)	2065.2	2065.2
Wt. Tare (g)	16.0	15.8	Wt. Sample (wet) (g)	1931.1	1981.6
Wt. Water (g)	25.8	66.3	Volume Mould (cm^3)	938.0	938.0
Wt. Sample (dry) (g)	130.6	290.0	Wet Density (kg/m^3)	2059	2113
Moisture Content (%)	19.8%	22.9%	Dry Density (kg/m^3)	1719	1719

PERMEABILITY TEST DATA

				Elapsed Time (sec)			Permeability (cm/s)	
Date	Temp	h1	h2	Time	Elapsed Time		Initial	Average
June 23, 2003	23	60.0		11:00 AM				
June 24, 2003	23		51.5	8:30 AM	86400		2.35E-07	
June 24, 2003	23	60.0		8:30 AM				
June 25, 2003	23		53.7	8:00 AM	86400		1.71E-07	
June 25, 2003	23	60.0		8:00 AM				
June 26, 2003	23		49.5	8:00 AM	86400		2.96E-07	
June 26, 2003	23	60.0		8:00 AM				
June 27, 2003	23		54.8	8:00 AM	86400		1.40E-07	
June 27, 2003	23	60.0		9:00 AM				
June 30, 2003	23		45.2	9:00 AM	259200		1.45E-07	
June 30, 2003	23	60.0		9:00 AM				
July 2, 2003	23		49.9	8:00 AM	172800		1.42E-07	
July 2, 2003	23	60.0		8:00 AM				
July 3, 2003	23		54.5	8:00 AM	86400		1.48E-07	
July 3, 2003	23	60.0		8:00 AM				
July 4, 2003	23		54.8	8:00 AM	86400		1.40E-07	
July 4, 2003	23	60.0		8:00 AM				
July 7, 2003	23		46.1	8:00 AM	259200		1.35E-07	
July 7, 2003	23	60.0		8:00 AM				
July 8, 2003	23		54.9	8:30 AM	86400		1.37E-07	
July 8, 2003	23	60.0		8:30 AM				
July 9, 2003	23		54.0	8:00 AM	86400		1.62E-07	
July 9, 2003	23	60.0		8:00 AM				
July 10, 2003	23		53.7	8:00 AM	86400		1.71E-07	
July 10, 2003	23	60.0		8:00 AM				
July 11, 2003	23		53.4	8:00 AM	86400		1.79E-07	
AVERAGE PERMEABILITY FOR TEST							1.71E-07	

REMARKS:

PERMEABILITY TEST

uma

CLIENT :	OK COLONY		
PROJECT :	PROPOSED POULTRY FACILITY		
JOB No. :	E998-001-00		
LOCATION :	3G4 1.5-3.0m	SAMPLE:	#2
BOREHOLE:	TEST HOLE 4	DEPTH :	
DATE :	20-Jun-03	TECHNICIAN :	TP

SAMPLE DATA

Sample Descriptic			
Sample Diameter (mm) :		Cross Section Area (cm^2)	
Initial Sample Length (mm) :		Initial Volume (cm^3)	
Final Sample Length (mm)		Final Volume(cm^3)	
		Change in Volume (cm^3)	

MOISTURE DETERMINATION

	Before	After
Tare No. :		
Wt. Sample (wet + tare) (g)	150.8	245.3
Wt. Sample (dry + tare) (g)	131.6	211.8
Wt. Tare (g)	15.6	16.3
Wt. Water (g)	19.2	33.5
Wt. Sample (dry) (g)	116.0	195.5
Moisture Content (%)	16.6%	17.1%

DENSITY DETERMINATION

	Before	After
Mould No.		
Wt. Sample (wet + mould) (g)	4070.9	4105.5
Wt. Mould (g)	2057.1	2057.1
Wt. Sample (wet) (g)	2013.8	2048.4
Volume Mould (cm^3)	938.0	938.0
Wet Density (kg/m^3)	2147	2184
Dry Density (kg/m^3)	1842	1864

PERMEABILITY TEST DATA

				Elapsed Time (sec)			Permeability (cm/s)	
Date	Temp	h1	h2	Time	Elapsed Time		Initial	Average
June 23, 2003	23	60.0		11:00 AM				
June 24, 2003	23		54.5	8:30 AM	86400		1.48E-07	
June 24, 2003	23	60.0		8:30 AM				
June 25, 2003	23		59.0	8:00 AM	86400		2.59E-08	
June 25, 2003	23	60.0		8:00 AM				
June 26, 2003	23		59.5	8:00 AM	86400		1.29E-08	
June 26, 2003	23	60.0		8:00 AM				
June 27, 2003	23		59.9	8:00 AM	86400		2.57E-09	
June 27, 2003	23	60.0		9:00 AM				
June 30, 2003	23		58.1	9:00 AM	259200		1.65E-08	
June 30, 2003	23	60.0		8:00 AM				
July 2, 2003	23		58.0	8:00 AM	172800		2.61E-08	
July 2, 2003	23	60.0		8:00 AM				
July 3, 2003	23		58.5	8:00 AM	86400		3.90E-08	
July 3, 2003	23	60.0		8:00 AM				
July 4, 2003	23		59.2	8:00 AM	86400		2.07E-08	
July 4, 2003	23	60.0		8:00 AM				
July 7, 2003	23		55.9	8:00 AM	259200		3.63E-08	
July 7, 2003	23	60.0		8:30 AM				
July 8, 2003	23		59.2	8:30 AM	86400		2.07E-08	
July 8, 2003	23	60.0		8:00 AM				
July 9, 2003	23		59.4	8:00 AM	86400		1.55E-08	
July 9, 2003	23	60.0		8:00 AM				
July 10, 2003	23		59.6	8:00 AM	86400		1.03E-08	
July 10, 2003	23	60.0		8:00 AM				
July 11, 2003	23		59.6	8:00 AM	86400		1.03E-08	
AVERAGE PERMEABILITY FOR TEST							1.20E-08	

REMARKS:

FORM : 030620-2
DATE: 17/08/2003