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	RA23026	NE 28-31-27 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.

30. May. 2024
Date of signing

[redacted]
Signature

Lone Pine Jerseys LTD.
Corporate name (if applicable)

Adrian Haasi
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)
Permit Existing liquid Manure lagoon	40 m x 40m x 4.5m
Permit Existing Calf Barn	17m x 22m

AO note: applicant is also applying to expand and synthetically reline the earthen manure storage (EMS). On Oct. 22, 2024, the applicant proposed final dimensions = 49 m x 48 m x 3.3 m deep

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

Existing facilities	Dimensions (m) (length, width, and depth)	NRCB USE ONLY
1 Cattle Shed	7m x 15m	
2 Cattle Shed	7m x 17m	
3 Cattle Shed Dry Cows	8m x 22m	

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Existing facilities continued	Dimensions (m) (length, width, and depth)	NRCB USE ONLY
4 Heifer Shed	8m x 44m	Existing facilities have a deemed permit. See discussion in DS
5 Close up Dry Cows	7m x 20m	
6 3 Boxes Fresh Show Cows	18m x 21m	
7 Main Barn	16m x 50m	To be permitted
8 Calf Barn	17m x 22m	To be permitted
9 Liquid Lagoon	40m x 40m x 4.5m	
10 Bath Barn	16m x 16m	

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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

Construction completion date for proposed facilities July 2026

Additional information

Request of Grandfathering for 120 Milking Cows

AO note: applicant requested to change the grandfathering number to **110** milking cows on August 7, 2024.

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**
120 Jersey Milking Cows	0	120	120
Applicant has claimed a grandfathering number of 110 milking cows (plus associated dries and replacements)			
Applicant is applying to increase to 120 milking cows (plus associated dries and replacements)			

Last updated September 11, 2023

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

DECLARATION AND ACKNOWLEDGMENT OF APPLICANT CONCERNING *WATER ACT* LICENCE
issued by Alberta Environment and Protected Areas (EPA) for a confined feeding operation (CFO)
Date and sign one of the following four options

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

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

Signed this ____day of _____, 20____.

Signature of Applicant or Agent

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

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

Signed this ____ day of _____, 20____.

Signature of Applicant or Agent

OPTION 3: Additional water licence not required

1. I (we) declare that the CFO will not need a new licence from EPA under the *Water Act* for the development or activity proposed in this AOPA application.
2. **Provide**: Water license number(s) or water conveyance agreement details _____

Signed this 30 day of May, 20 24 [redacted]

Signature of Applicant or Agent

Last updated September 11, 2023

AO note: applicant is working with EPA to ensure they have sufficient licensing for the CFO.

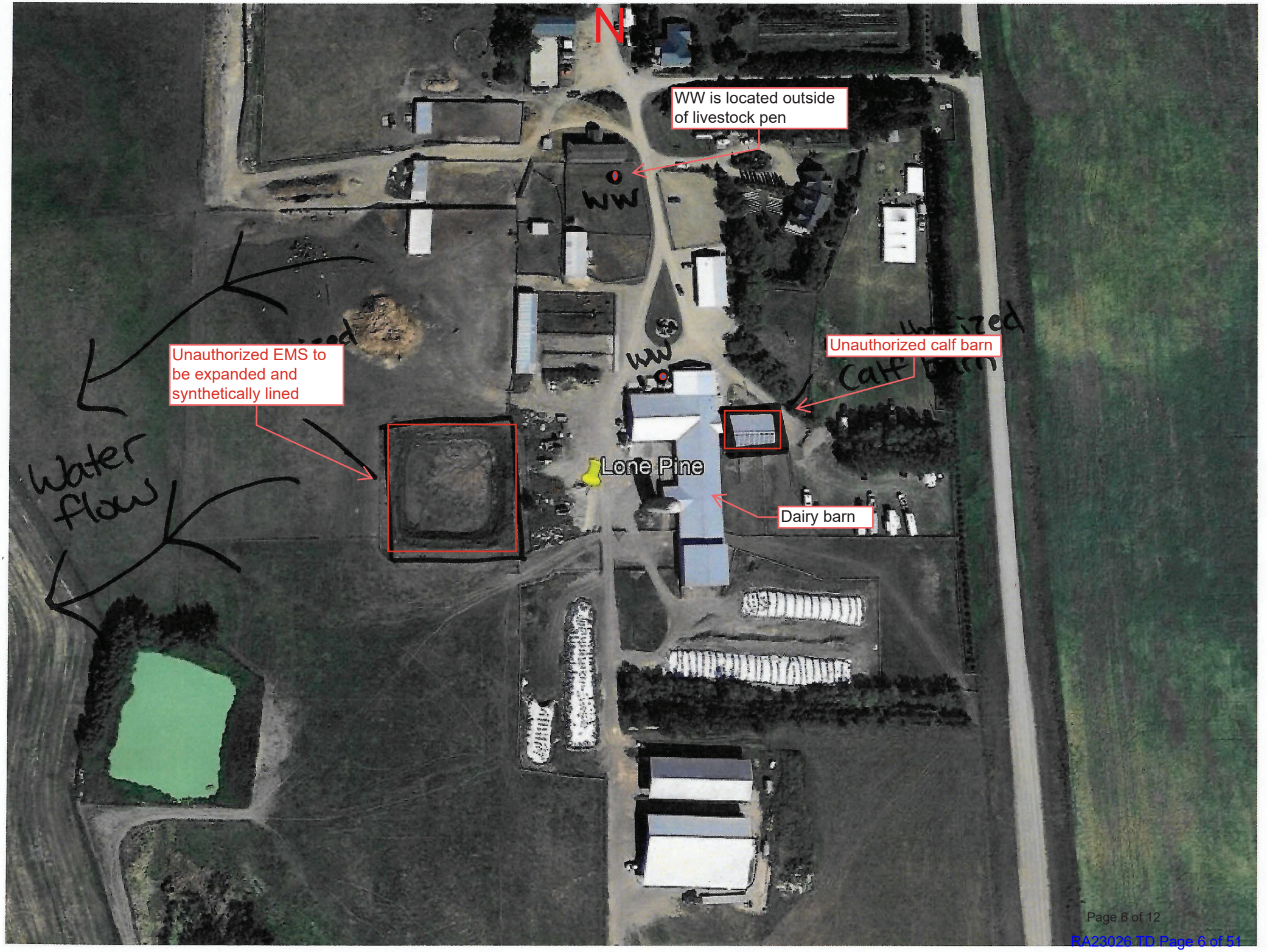
OPTION 4: Uncertain if *Water Act* licence is needed: acknowledgement of risk (for existing CFOs only)

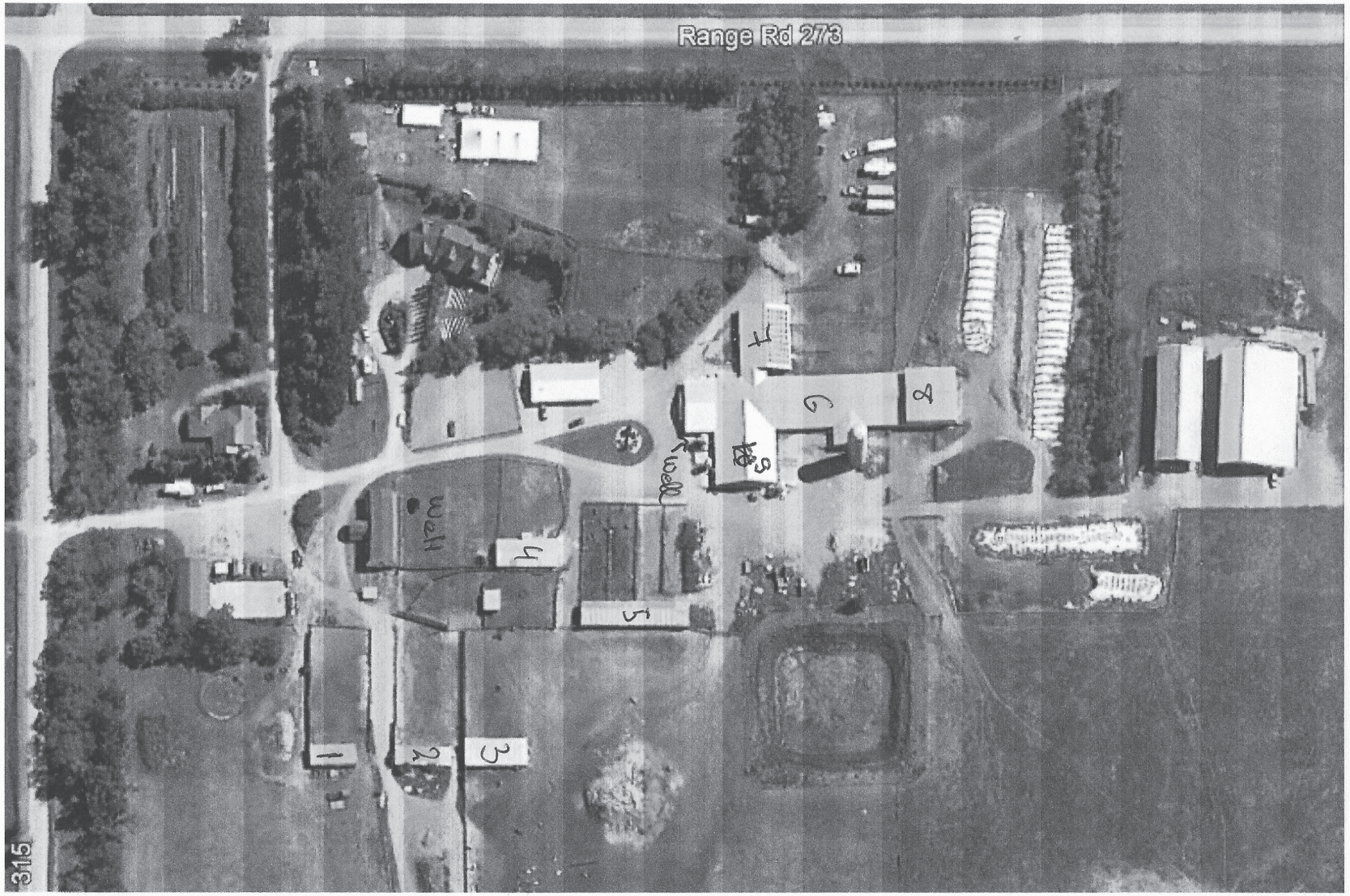
1. At this time, I (we) do not know whether a new water licence is needed from EPA under the *Water Act* for the development or activity proposed in this AOPA application.
2. If a new *Water Act* licence is needed, I (we) request that the NRCB process the AOPA application **independently of** EPA's processing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


N
WW is located outside of livestock pen
WW
Unauthorized EMS to be expanded and synthetically lined
Unauthorized calf barn
Lone Pine
Dairy barn
Water flow


Range Rd 273
315
N
well
well
1
2
3
4
5
6
7
8

1 Cattle Shelter

2 Cattle Shelter

3 Cattle Shelter

4 Close up Dry Cows

5 4 Pen Corral System

6 Main Free stall Barn

7 Calf Barn

8 Weaned Calf Barn

9 Loose housing 3 Boxes

Main Barn

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: lagoon **Proposed 1:** Extended lagoon with synthetic liner

Proposed 2: Calf barn **Proposed 3:**

	Facility and environmental risk information	Facilities: Existing	Proposed 1	Proposed 2	Proposed 3	NRCB USE ONLY: 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	>1 m confirmed
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
	How many water wells are within 100 m of the manure storage facility or manure collection area?	0	0			☐ YES ☐ NO ☒ YES with exemption	1 well ~70 m NE of EMS and ~28 m NW of calf barn
	What is the shortest distance from the manure collection or storage facility to a surface water body? (e.g., lake, creek, slough, seasonal)	250m	250 m			☒ YES ☐ NO ☐ YES with exemption	Slough ~191 m SW of EMS
Groundwater information	What is the depth to the water table?	> 10m	>10m			☒ YES ☐ NO ☐ YES with exemption	Measured at 4.4 mbgs
	What is the depth to the groundwater resource/aquifer you draw water from?	58 m	58 m			☒ YES ☐ NO ☐ YES with exemption	56.1 m using WWID 2090567

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

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

WATER WELL AND SURFACE WATER INFORMATION

Well IDs: 2090567 229586 _____

_____ _____ _____

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
229586	29 = exemption less likely; continue to next section	8 = exemption more likely	Calf barn
229586	29 = exemption less likely; continue to next section	8 = exemption more likely	EMS

Groundwater or surface water related comments:

Due to the combination of water well exemption screening tool scores, the distance from sources to the well, and ERST results, there will be a condition included that well 229586 will be sampled on an annual basis for NO3-N (nitrate nitrogen), and Chloride.

Part 2 — Technical Requirements

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NRCB USE ONLY

ENVIRONMENTAL RISK SCREENING INFORMATION

ERST for **proposed** facilities

Facility	Groundwater score	Surface water score	File number
Expanded and synthetically lined LMS	Low	Low	RA23026

ERST for **existing** facilities

Facility	Groundwater score	Surface water score	File number
Calf barn	Low	Low	RA23026
EMS	High	Low	RA23026
Dairy barn	Low	Low	RA23026

ERST related comments:

To address the high risk to groundwater of the existing EMS, the applicant has proposed to synthetically line the EMS to meet AOPA requirements. Additionally, implementation of a water well sampling program will further reduce the risk.

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	NRCB USE ONLY: MDS category (1-4)	NRCB USE ONLY: Distance (m)	NRCB USE ONLY: Waiver attached (if required)	NRCB USE ONLY: Meets regulations
Paul and Denise Boddy	NW 27 33 27 W4	500 m	Agriculture	1	371 m	N/A	Yes
Phillipsen Farm LTD	SE 32 33 27 W4		Ag	1	1,762 m	N/A	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)	NRCB USE ONLY: Agreement attached (if required)
Lone Pine Jerseys LTD	NE 28-31-27 W4		Black	48.6	
"	SE 28-31-27-W4		"	57.5	N/A
"	NW 28-31-27-W4		"	54.6	
"	SW 28-31-27-W4		"	56.3	
"	SE 33-31-27-W4		"	56.7	
			Total	273.7	

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

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

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

Additional information (attach any additional information as required)

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NRCB USE ONLY

MINIMUM DISTANCE SEPARATION

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

Margin of error (if applicable): +/- 3 m

Requirements (m): Category 1: 290 Category 2: 386 Category 3: 483 Category 4: 772

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: 111.4 ha

Land base listed: 273.7 ha

Area not suitable: N/A

Available area 273.7 ha 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 _____

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. Existing Calf Barn

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.	± 22m	17 m	0	
2.				
			TOTAL CAPACITY	374 m^2

☐ 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

Inclosed Barn

Liner protection

Describe how the physical integrity of the liner will be maintained

Check for Cracks, do maintenance on concrete

NRCB USE ONLY

Requirements met: ☒ YES ☐ NO

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

Concrete liner details

Concrete thickness	Method of sulphate protection:
6"	Type 50
Concrete strength	**Concrete reinforcement size and spacing**
30	10 mm 15"

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: 4.4 m — Requirements met: ☒ YES ☐ NO

Depth to Uppermost groundwater resource: 56.1 m — 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.

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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)

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. Existing lagoon
2. Exstended lagoon

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: Inside end walls	Inside side walls	Outside walls	NRCB USE ONLY: Calculated storage capacity (excl. 0.5 m freeboard) (m³)	Filled in lower ¼? Y/N
1.	40	40	~~4.5~~ 2	~~0~~ 1.5	3 to 1	3 to 1	3 to 1		
2.	~~46~~	~~46~~	~~4.5~~	~~0~~	3 to 1	3 to 1	3 to 1		Y
							TOTAL CAPACITY	3,919 m³	

Final dimensions of expanded LMS: 49 m x 48 m x 3.3 m deep

Surface water control systems

Describe the run-on and runoff control system

Lagoon has freeboard, so no run in
3 water test holes installed by Elow Enviroweterengineering

Sealing

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

Pipe Flange that is installed on tarse both sides of liners

NRCB USE ONLY
Requirements met: ☒ YES ☐ NO

Liner protection

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

Inside liners
Outside will be done to Specs. by Jord Jagou 403-342-3679 Cell and

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

Inspection by owner.
Entrance for Manure mixer and pump will be cement on top of liner

NRCB USE ONLY
Requirements met: ☒ YES ☐ NO

Last updated February 26, 2021

LIQUID MANURE STORAGE: Synthetic liner (cont.)

Synthetic liner details

Provide synthetic liner material details

HDPE 60 mil liner

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

getting quote from
Layfield group
Terrafix
MCL Group

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: 4.4 m — Requirements met: ☒ YES ☐ NO

Depth to uppermost groundwater resource: 56.1 m — Requirements met: ☒ YES ☐ NO

ERST completed: ☒ see ERST page for details

Surface water control systems

Requirements met: ☒ YES ☐ NO — Details/comments:

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

NRCB USE ONLY **LIQUID MANURE STORAGE VOLUME CALCULATOR (if applicable)**	
Facility 1	
Name / description: Expanded/synthetically lined LMS	Capacity: 3,919 m^3
Facility 2	
Name / description	Capacity
Facility 3	
Name / description	Capacity
Facility 4	
Name / description	Capacity
TOTAL CAPACITY	3,919 m^3
REQUIRED 9 MONTH STORAGE CAPACITY	3,834 m^3
MEETS THE REQUIREMENTS FOR A MINIMUM OF 9 MONTHS STORAGE	☒ YES ☐ NO

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

Aug 3, 2023	
May 30, 2024	
Aug 1, 2024	

CORRESPONDENCE WITH MUNICIPALITIES AND REFERRAL AGENCIES

Date deeming letters sent: Aug 13, 2024

Municipality: Mountain View County

☒ 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: Crossroads Gas Co-op Ltd. and Ember Resources ☐ 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

Lone Pine Creamery
The Haeni Family

Alberta's newest on-farm creamery is up and running. Lone Pine Creamery, located east of Didsbury in Central Alberta, is the latest business venture of the Haeni family.

Roy Gourlay

The Farm

Adrian and Vreni Haeni, along with Vreni's parents Kurt and Marie-Louise, moved to Canada from Switzerland in 1993. They purchased Lone Pine Jerseys, a going-concern dairy farm of 480 acres with a milking herd of 55 Jerseys. Adrian, who grew up milking Red Holsteins in the Swiss Alps, intended to transition away from Jerseys but soon fell in love with the breed and their lively, curious temperaments, vitality, and resilience. He noted that their efficiency to feed and the high solids of their milk also made economic sense given Canada's component pricing system.

In the ensuing years, they purchased additional land, growing their farm to 820 acres on which they grow barley, oats, wheat, canola, and grass forages. They established and retained a great deal of pastureland on which they currently practice rotational grazing throughout the summer months. They increased their herd to 120 head, now being milked with two DeLaval Voluntary Milking Systems (VMS). Their four sons all grew up working alongside in the dairy operation.

The Haenis' passion for the Jersey breed has continued and the quality of their herd has been well recognized, including at the 2022 Westerner Dairy Showcase where their cows received Grand and Reserve Champion awards. They sell around 70 first and second lactation cows and numerous show heifers every year.

Diversifying the Dairy

The idea of incorporating a processing facility into their farm operations began 15 years ago. They saw the need for more processing capacity in their region and Adrian was drawn to the opportunity for independence and innovation. "We've always believed in adding value to the product. With processing, it's your own failure or your own success and you can influence that." As Adrian and Vreni began to look for more ways of incorporating their sons into the family farm, they started taking tangible steps towards opening a creamery.

After graduating with a degree in Agriculture Management from the University of Saskatchewan, Michael Haeni began working at a cheese plant near Brantford, Ontario. He gained valuable knowledge and skills in dairy processing and cheesemaking while training there and visiting nearby creameries. Eventually, he moved back to the family farm where he helped create a multi-phase business plan for the on-farm production of dairy products.

After a year and a half of construction, equipment procurement, licensing and product development, Lone Pine Creamery began production in September 2022.

The Creamery Opens

They are currently processing 2-3 days a week and offering whole milk (average 5.7% butterfat), cream-top milk and chocolate milk in 1L and 2L glass bottles as well as fresh cheese curds (a Canadian specialty known as the signature ingredient in poutine).

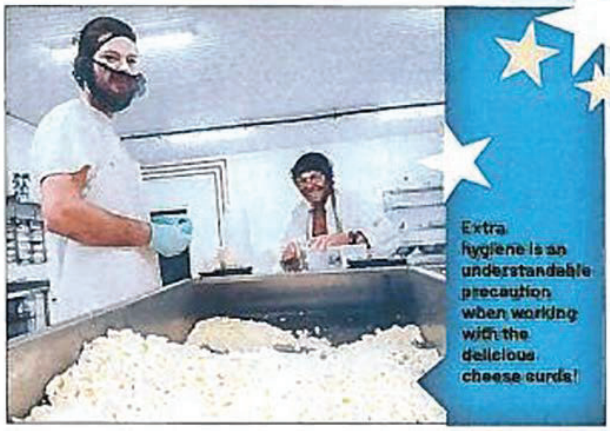
The Haenis have been very pleased with demand so far and are selling their product through local stores and restaurants, directly via their website, and in their small on-farm store. As they continue to grow, they plan on offering butter, cream and kefir - products for which they've already sensed a demand. Their long-term goals include making traditional Swiss-style cheeses such as Raclette and Gruyere.

The farm remains a family affair with everyone sharing responsibilities across all departments. Adrian continues to provide management of most farm logistics and works closely with Jonas on field work and herd health. Samuel has a growing passion for cheesemaking and is taking on more of the production in the creamery on top of his farm responsibilities. Michael oversees most logistics of the creamery and enjoys the marketing and advertising aspects of the role. Youngest brother, Nils, has a desire to stay involved in the family business but is currently gaining valuable off-farm experience as a Class 1 commercial driver for a local construction company.

When asked what advice he would share with other dairy farmers thinking about processing, Adrian said, "Don't be scared - there's a lot of people out there that want to help. If you really have a passion to do that, don't hesitate, just go for it." He emphasized that from an outside perspective, it can seem like a daunting venture but, "It doesn't have to be big at the beginning - you can grow into it."

To find out more about Lone Pine Farm & Creamery visit their website at www.lonepinejerseys.com or their pages on Facebook, Instagram, and YouTube.

Master Breeders, the Haeni family likes to breed and show the good ones. (L-R) Michael, Vreni, Adrian, Hannah, Sam, Jonas, Tay, Nils.



Extra hygiene is an understandable precaution when working with the delicious cheese curds!

ENVIROWEST
ENGINEERING

Leak Detection Report

NE-28-31-27 W4M
Mountain View County, Alberta

Leak Detection Report
NE-28-31-27 W4M
Mountain View County, Alberta

Prepared For: Lone Pine Jerseys Ltd.
Adrien Haeni

Prepared By: Envirowest Engineering
Box 4248, Ponoka, AB, T4J 1R6
(403) 783-8229

Report Date: April 10, 2024

Project Number: 2308-43047

Private and Confidential

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1.0 Introduction and Scope of Work

Envirowest Engineering (Envirowest) was retained by Lone Pine Jerseys Ltd. to conduct an assessment on a current earthen liquid manure storage lagoon at a dairy confined feeding operation in Mountain View County, Alberta. The operation is located at NW-28-31-27 W4M. This property will be herein referred to as "the Site," as shown in Appendix A.

Envirowest advanced boreholes to determine soil conditions surrounding and beneath the current lagoon. All three boreholes were completed as groundwater monitoring wells to monitor current groundwater conditions both up- and downgradient of the lagoon.

The assessment has been completed in accordance with the standards and regulations associated with the amended Agricultural Operation Practices Act (GOA, 2020) and associated Standards and Administration Regulation (GOA, 2017) which govern all new and modified confined feeding operations, as well as the Government of Alberta's Leak Detection Groundwater Monitoring Parameters (Technical Guideline Agdex 096-52) and Leak Detection Groundwater Sampling (Technical Guideline Agdex 096-53) (GOA, 2018).

The Scope of Work required for the assessment includes the following:

- Locate all aboveground and underground utilities, lines, and hazards
- Complete three investigative boreholes surrounding the lagoon both up- and downgradient
- Collect soil samples at regular intervals from each borehole and maintain a lithologic description of the soils encountered
- Select soil samples from the boreholes for laboratory analysis for texture, where appropriate
- Complete three boreholes as groundwater monitoring wells to a depth which intersects the groundwater table beneath the lagoon
- Conduct groundwater monitoring of three newly installed monitoring wells, including depth to groundwater
- Collect groundwater samples from three new monitoring wells. The laboratory analysis for groundwater as outlined in the Leak Detection Agdex
- Survey elevation of all three wells to determine groundwater flow direction
- Complete a final report, including conclusions and recommendations

2.0 Site Description

The subject site is located approximately 24 km east of Didsbury, Alberta. The Site is an established operation, milking jersey dairy cows. The existing liquid EMS is located to the west of the barn. The lagoon is reportedly unlined/has an un-engineered liner.

The topography of the property and surrounding area is undulating with a high relief (Alberta Soil Information Viewer). An unnamed surface water body is located southwest of the Site.

The Geological Map of Alberta indicates that the Site is located in an area where the uppermost bedrock is of the Paskapoo formation which consists of grey to greenish grey, thick bedded calcareous, cherty sandstone; grey and green siltstone and mudstone; minor conglomerate, thin limestone, coal and tuff beds, and is non-marine in nature (Prior, 2013).

The quaternary geology is reported to be fluvial deposits consisting of gravel, sand, silt and clay, which includes local till and bedrock exposures. The area is particular to coarse sediment; gravel and sand with minor silt beds (Shetsen, 1987).

3.0 Investigation Methodology

A total of three boreholes were drilled at the site on January 16, 2024. The boreholes were completed adjacent to the lagoon both up- and downgradient. Groundwater monitoring wells were installed at all three of the borehole locations. Three groundwater samples were collected on March 7, 2024. The locations of the monitoring wells can be found in Appendix A (Figure 1.0), and certificates of analysis can be found in Appendix C.

3.1 Soil Investigation

All of the boreholes were completed through the use of a truck-mounted auger drill to depths from 6.0 to 9.0 meters below ground surface (mbgs). Logs of soil type and condition were completed for each borehole. These logs are contained in Appendix B.

Samples were collected at regular intervals during the drilling process of each borehole at changes in stratigraphy.

Six soil samples were selected for laboratory analysis of texture (sand, silt, clay).

3.2 Groundwater Investigation

The groundwater monitoring wells were completed using 51 mm diameter threaded PVC pipe and fittings. The bottom 3 meters of the piping was screened to allow for groundwater collection. The annulus of the well was filled with environmental filter sand to levels approximately 0.3 meters above the screened interval. The remainder of the annulus to the ground surface was sealed with a bentonite plug. The monitoring wells were completed above grade with steel protectors. The monitoring wells were surveyed to an onsite datum.

When assessing groundwater quality, a sample of water is collected from each well. The samples are gathered in individual dedicated point-source bailers and stored in laboratory-supplied 100 mL and 250 mL sample containers. Groundwater samples in the 100 mL containers to be analyzed for some nitrogen species are preserved with H_2SO_4. The groundwater level in each well is measured prior to sample collection.

The samples are then subjected to laboratory analysis of pH, electrical conductivity, dissolved potassium, dissolved phosphorus, chloride, nitrate-N, nitrite-N, ammonia-N, ammonia-N (un-ionized), and ammonia-N (ionized). Nitrate, nitrite, and chloride concentrations are components of animal manure and are considered to be good indicators of leakage from a manure storage lagoon. These components move more easily through the soil than do other manure constituents such as phosphates. Ammonia is changed over time to nitrates and nitrites through a nitrification process. These latter components would be indicators of a past leak or contaminant source or may occur at greater distances from the lagoon.

4.0 Assessment Results

4.1 Soil Quality

Soil samples collected at differing stratigraphy are tabulated below.

Table 1
Analytical Results: Soil Texture

Sample Description	24BH01-02	24BH01-03	24BH01-04	24BH02-01	24BH03-01	24BH03-02
Depth	1.25	3.5	6.0	2.25	2.0	3.75
Particle Size Distribution (Sand)	53	51	49	49	49	63
Particle Size Distribution (Silt)	24	26	22	28	38	22
Particle Size Distribution (Clay)	23	23	29	23	13	15
Soil Texture	Sandy Clay Loam	Sandy Clay Loam	Sandy Clay Loam	Sandy Clay Loam	Loam	Sandy Loam

Soil samples and borehole logs indicate intermittent clay content surrounding and beneath the lagoon. Sand seams within unsaturated conditions were present. The water table was found beneath the depth of the lagoon. Relative depth to groundwater as measured from the top of berm is discussed in the following section.

4.2 Groundwater Quality

Three groundwater monitoring wells (24MW01, 24MW02, and 24MW03) were monitored and sampled on March 7, 2024. The monitoring wells and depths to groundwater were surveyed to an onsite datum. The relative depth to groundwater is presented in Table 2.

Table 2
Groundwater Elevations

Monitoring Well	Relative Elevation (meters)	Depth to Groundwater (mbgs)	Relative Depth to Groundwater (mbgs)
24MW01 (BM)	0	5.62	5.62
24MW02	-3.49	2.93	6.42
24MW03	+0.02	4.38	4.36

Groundwater flow direction was found to be to the west southwest as indicated on Figure 1.0.

Groundwater analytical results are presented in Table 3.

Table 2:
Groundwater Analysis Results

Parameter	24MW01	24MW02*	24MW03*
Level (mbgs)	5.62	4.38	2.93
pH	7.06	7.15	7.66
Electrical Conductivity (uS/cm)	4160	4700	782
Ammonium	0.60	0.69	0.35
Ammonia-N (total)	0.46	0.53	0.27
Total Kjeldahl Nitrogen	11.1	19.5	<0.1
Chloride	671	600	58.5
Dissolved Potassium	16.2	15.5	5.96
Total Dissolved Phosphorus	0.27	0.70	<0.08
Nitrate-N	9.89	<0.02	<0.02
Nitrite-N	0.06	<0.01	<0.01

All units in mg/L, unless otherwise stated
Certificates of analysis report 24MW02 as 24MW03 and 24MW03 as 24MW02

In consideration of upgradient (24MW03) conditions as compared to downgradient conditions, it is determined that the current soil conditions of the lagoon are not sufficient to provide protection.

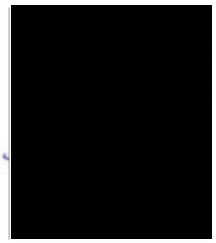
5.0 Closure

Envirowest Engineering is pleased to submit the report to Lone Pine Jerseys Ltd. The information and conclusions contained in this report are for their sole use. No other party is to rely upon the information contained within the report without the express written authorization of Envirowest Engineering.

Envirowest Engineering is not responsible for any damages that may be suffered as the result of any unauthorized use of, or reliance on, this report. Envirowest Engineering has performed the work and made the findings and conclusions set out in the report in a manner consistent with the level of care and skill normally exercised by members of the environmental engineer profession practicing under similar conditions at the time the work was performed. Envirowest Engineering accepts no responsibility for any deficiency, misstatement or inaccuracy in this report resulting from misinformation from any individuals or parties that provided information as part of this report.

We trust that this report meets your present needs. Please feel free to contact the undersigned with any questions or should you require additional information.

Respectfully submitted,



April 10, 2024

Prepared by:
Emily J. Low, P.Eng.
Envirowest Engineering

Reviewed by:
Leah Predy P.Ag.
Envirowest Engineering

PERMIT TO PRACTICE
2206165 ALBERTA LTD.

RM SIGNATURE: _____

RM APEGA ID #: 110373

DATE: April 10, 2024

PERMIT NUMBER: P014810
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)

2206165 Alberta Ltd. o/a Envirowest Engineering
Association of Professional Engineers and Geoscientists of Alberta
Permit to Practice No. P14810

6.0 Qualifications of Assessors

Ms. Emily Low, B.Sc., P.Eng, is an Environmental Engineer with Envirowest Engineering and has approximately 15 years of environmental assessment, monitoring, and remediation experience in the agricultural, industrial, real estate and development, and oil and gas sectors. Ms. Low has a Bachelor of Science in Chemical Engineering from the University of Alberta and is a certified Professional Engineer in Alberta (Association of Professional Engineers and Geoscientists of Alberta) and Ontario (Professional Engineers of Ontario).

Leah Predy, B.A., B.Sc., P.Ag., is a Professional Agrologist with Envirowest Engineering and has approximately 5 years of experience in the environmental field, both in field data collection and report preparation for environmental assessments, monitoring, and remediation, as well as agricultural projects. Prior to her employment with Envirowest Engineering, Leah had five years of experience managing rangelands and navigating legislation and regulations as a Rangeland Agrologist with the Government of Alberta. She is a Professional Agrologist in Alberta (Alberta Institute of Agrologists).

7.0 References

Bedrock Geology of Alberta (Map 600). Edmonton, AB: Alberta Research Council, Natural Resources Division, Terrain Sciences Department.

Shetsen, I. (1990). Quaternary Geology, Central Alberta. Edmonton, AB: Alberta Research Council, Natural Resources Division, Terrain Sciences Department.

Appendix A

Figures

ENVIROWEST ENGINEERING

Title:

Monitoring Well Locations and
Groundwater Flow Direction
Leak Detection Report
NE-28-31-27 W4M
Mountain View County, Alberta

Project No: 2308-43047	**Date:** April 10, 2024	**Figure No.:** 1.0
Scale:	**Prepared By:** E.Low	
Image Source: Google Earth Pro (September 13, 2022)		

Appendix B

Borehole Logs

ENVIROWEST ENGINEERING

LOG OF BORING 24BH01

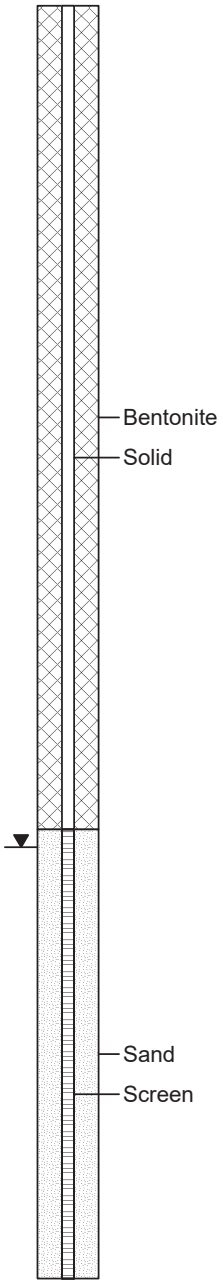
Leak Detection Report
NE-28-031-27 W4M
Mountain View County, Alberta

Project Number: 2308-43047
Modified ASTM D2487/D2488

Driller: : Ever Green Drilling
Drilling Method: : Truck Mounted Auger
Drill Date : January 16, 2024
Logged By: : Emily Low P.Eng.

Depth in Meters	Gastech Reading (ppm) 0 100 200 300 400 500	VOC Reading	GRAPHIC	DESCRIPTION
0.0				SAND, loose, dry, olive brown
0.3				
0.5				
0.8				
1.0				trace clay
1.3				
1.5				
1.8				
2.0				
2.3				
2.5				
2.8				
3.0				
3.3				SANDY CLAY, firm, olive brown
3.5				24BH01-02
3.8				
4.0				
4.3				sand lens. trace clay
4.5				Assumed depth of lagoon
4.8				
5.0				damp, brown
5.3				24BH01-03
5.5				
5.8				
6.0				24BH01-04
6.3				
6.5				
6.8				
7.0				grey
7.3				wet
7.5				
7.8				
8.0				
8.3				
8.5				
8.8				
9.0				

Well: 24MW01
Elev.:



Water Level

04-10-2024 Z:\Operations\Client Data\43047 Lone Pine Jerseys (Adrian Haeni)\24BH01.bor

ENVIROWEST ENGINEERING

LOG OF BORING 24BH02

Leak Detection Report
NE-28-031-27 W4M
Mountain View County, Alberta

Project Number: 2308-43047
Modified ASTM D2487/D2488

Driller: : Ever Green Drilling
Drilling Method: : Truck Mounted Auger
Drill Date : January 16, 2024
Logged By: : Emily Low P.Eng.

Well: 24MW02
Elev.:

Depth in Meters	Gastech Reading (ppm) 0 100 200 300 400 500	VOC Reading	GRAPHIC	DESCRIPTION
0.0				SAND, loose, dry, olive brown
0.3				
0.5				
0.8				
1.0				Assumed depth of lagoon trace clay
1.3				
1.5				SANDY CLAY, firm, olive brown 24BH02-01
1.8				
2.0				
2.3				
2.5				
2.8				
3.0				
3.3				CLAYEY SAND, wet, olive brown
3.5				
3.8				
4.0				
4.3				
4.5				
4.8				
5.0				
5.3				silt, grey
5.5				
5.8				
6.0				

Bentonite
Solid
Sand
Screen
Water Level

04-10-2024 Z:\Operations\Client Data\43047 Lone Pine Jerseys (Adrian Haeni)\24BH02.bor

ENVIROWEST ENGINEERING

LOG OF BORING 24BH03

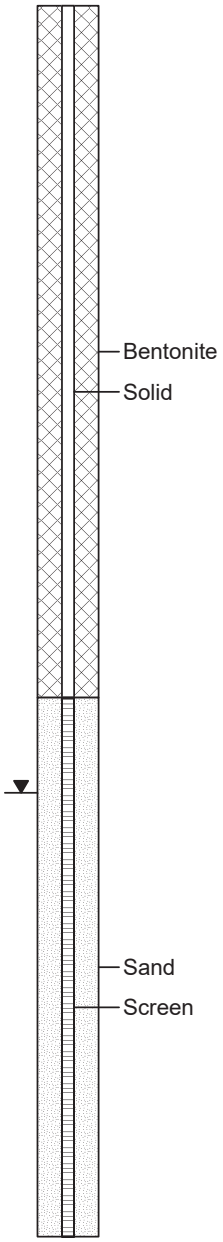
Leak Detection Report
NE-28-031-27 W4M
Mountain View County, Alberta

Project Number: 2308-43047
Modified ASTM D2487/D2488

Driller: : Ever Green Drilling
Drilling Method: : Truck Mounted Auger
Drill Date : January 16, 2024
Logged By: : Emily Low P.Eng.

Depth in Meters	Gastech Reading (ppm) 0 100 200 300 400 500	VOC Reading	GRAPHIC	DESCRIPTION
0.0				SAND, loose, dry, olive brown
0.3				
0.5				
0.8				
1.0				
1.3				24BH03-01
1.5				trace clay
1.8				
2.0				
2.3				
2.5				
2.8				
3.0				
3.3				CLAYEY SAND, firm, olive brown
3.5				24BH03-02
3.8				
4.0				
4.3				
4.5				Assumed depth of lagoon
4.8				
5.0				
5.3				
5.5				
5.8				
6.0				
6.3				
6.5				
6.8				
7.0				
7.3				
7.5				

Well: 24MW03
Elev.:



Water Level

04-10-2024 Z:\Operations\Client Data\43047 Lone Pine Jerseys (Adrian Haeni)\24BH03.bor

Appendix C

Analytical Results

AGAT Laboratories

6310 ROPER ROAD
EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
http://www.agatlabs.com

CLIENT NAME: ENVIROWEST
BOX 4248, 5118-50th STREET
PONOKA, AB T4J1R6
(403) 783-8229

ATTENTION TO: Emily Low

PROJECT: 43037

AGAT WORK ORDER: 24E128068

SOIL ANALYSIS REVIEWED BY: Melinda Guay, Technical Reviewer

WATER ANALYSIS REVIEWED BY: Jennifer Liu, Analyst

DATE REPORTED: Mar 21, 2024

PAGES (INCLUDING COVER): 10

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (780) 395-2525

*Notes

Disclaimer:

- *All work conducted herein has been done using accepted standard protocols, and generally accepted practices and methods. AGAT test methods may incorporate modifications from the specified reference methods to improve performance.*
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EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 24E128068

PROJECT: 43037

CLIENT NAME: ENVIROWEST

ATTENTION TO: Emily Low

SAMPLING SITE:

SAMPLED BY:

Particle Size by Hydrometer

DATE RECEIVED: 2024-03-08

DATE REPORTED: 2024-03-14

		SAMPLE DESCRIPTION:		24BH01-03	24BH01-02	24BH01-04	24BH02-01	24BH03-01	24BH03-02
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		2024-01-16	2024-01-16	2024-01-16	2024-01-16	2024-01-16	2024-01-16
Parameter	Unit	G / S	RDL	5713478	5713501	5713502	5713503	5713504	5713505
Particle Size Distribution (Sand)	%		2	51	53	49	49	49	63
Particle Size Distribution (Silt)	%		NA	26	24	22	28	38	22
Particle Size Distribution (Clay)	%		NA	23	23	29	23	13	15
Soil Texture				Sandy Clay Loam	Sandy Clay Loam	Sandy Clay Loam	Sandy Clay Loam	Loam	Sandy Loam

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

5713478-5713505 % Silt is a calculated parameter. The calculated value is determined by subtracting the percent sand and clay values from 100 percent.

Analysis performed at AGAT Edmonton (unless marked by *)

Certified By: [redacted]

AGAT Laboratories

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CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 24E128068

PROJECT: 43037

CLIENT NAME: ENVIROWEST

ATTENTION TO: Emily Low

SAMPLING SITE:

SAMPLED BY:

Water Analysis - TKN, Ammonium, TDP

DATE RECEIVED: 2024-03-08

DATE REPORTED: 2024-03-21

		SAMPLE DESCRIPTION:		24MW01		24MW02		24MW03
		SAMPLE TYPE:		Water		Water		Water
		DATE SAMPLED:		2024-03-07 11:00		2024-03-07 11:10		2024-03-07 11:15
Parameter	Unit	G / S	RDL	5713506	RDL	5713507	RDL	5713508
Total Kjeldahl Nitrogen	mg/L		0.5	11.1	0.1	<0.1	0.5	19.5
Ammonia, Total (as N)	mg/L		0.02	0.46	0.02	0.27	0.02	0.53
Total Dissolved Phosphorus	mg/L		0.08	0.27	0.08	<0.08	0.08	0.70
pH	pH Units		NA	7.06	NA	7.66	NA	7.15
Ammonium (NH4+)	mg/L		0.02	0.60	0.02	0.35	0.02	0.69

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Analysis performed at AGAT Calgary (unless marked by *)

Certified By: [redacted]

AGAT Laboratories

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FAX (780)462-2490
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 24E128068

PROJECT: 43037

CLIENT NAME: ENVIROWEST

ATTENTION TO: Emily Low

SAMPLING SITE:

SAMPLED BY:

Water Package - Routine Chemistry Water Analysis - Lab Filtered Cations

DATE RECEIVED: 2024-03-08

DATE REPORTED: 2024-03-14

		SAMPLE DESCRIPTION:		24MW01		24MW02		24MW03
		SAMPLE TYPE:		Water		Water		Water
		DATE SAMPLED:		2024-03-07 11:00		2024-03-07 11:10		2024-03-07 11:15
Parameter	Unit	G / S	RDL	5713506	RDL	5713507	RDL	5713508
pH	pH Units	7.0-10.5	N/A	7.15	N/A	7.93	N/A	7.43
p - Alkalinity (as CaCO3)	mg/L		5	<5	5	<5	5	<5
T - Alkalinity (as CaCO3)	mg/L		5	1340	5	300	5	1790
Bicarbonate	mg/L		5	1670	5	372	5	2240
Carbonate	mg/L		5	<5	5	<5	5	<5
Hydroxide	mg/L		5	<5	5	<5	5	<5
Electrical Conductivity	uS/cm		5	4160	5	782	5	4700
Chloride	mg/L	(250)	1.5	671	1.0	58.5	1.5	600
Fluoride	mg/L	1.5	0.03	0.09	0.01	0.16	0.03	0.10
Nitrate	mg/L	45	0.5	43.8	0.5	<0.5	0.5	<0.5
Nitrate-N	mg/L	10	0.02	9.89	0.02	<0.02	0.02	<0.02
Nitrite	mg/L	3	0.10	0.19	0.05	<0.05	0.10	<0.10
Nitrite-N	mg/L	1	0.01	0.06	0.01	<0.01	0.01	<0.01
Nitrate+Nitrite - Nitrogen	mg/L		0.02	9.95	0.02	<0.02	0.02	<0.02
Sulfate	mg/L	(500)	1.0	99.5	1.0	37.4	1.0	27.1
Dissolved Calcium	mg/L		0.07	392	1.4	101	0.28	313
Dissolved Magnesium	mg/L		0.05	214	0.05	31.1	0.05	213
Dissolved Sodium	mg/L		0.05	350	0.05	24.5	0.05	596
Dissolved Potassium	mg/L		0.05	16.2	0.05	5.96	0.05	15.5
Dissolved Iron	mg/L		0.001	0.008	0.001	<0.001	0.001	0.077
Dissolved Manganese	mg/L		0.00005	3.89	0.00005	0.668	0.0005	3.01
Sodium Adsorption Ratio				3.53		0.55		6.37
Calculated TDS	mg/L		0.6	2610	0.6	441	0.6	2870
Hardness	mg CaCO3/L		0.5	1860	0.5	380	0.5	1660
Ion Balance	%		1	108	1	104	1	110
Lab Filtration on Routine for IC				Complete		Complete		Complete
Lab Filtration on Routine for Metals				Complete		Complete		Complete

Certified By: [redacted]

AGAT Laboratories

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TEL (780)395-2525
FAX (780)462-2490
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 24E128068

PROJECT: 43037

CLIENT NAME: ENVIROWEST

ATTENTION TO: Emily Low

SAMPLING SITE:

SAMPLED BY:

Water Package - Routine Chemistry Water Analysis - Lab Filtered Cations

DATE RECEIVED: 2024-03-08

DATE REPORTED: 2024-03-14

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to 2022 Canadian Drinking Water Quality MAC (AO)
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

5713506-5713508 < - Values refer to Report Detection Limits.
SAR is a calculated parameter. The calculated parameter is non-accredited. The parameters that are components of the calculation are accredited.
If sodium results in mg/L are less than detection, SAR is non-calculable and is reported as 0.
Ion Balance is a calculated parameter. The calculated parameter is non-accredited. The parameters that are components of the calculation are accredited.
Hardness is a calculated parameter. The calculated parameter is non-accredited. The parameters that are components of the calculation are accredited.
Calculated TDS is a calculated parameter. The calculated parameter is non-accredited. The parameters that are components of the calculation are accredited.

Analysis performed at AGAT Calgary (unless marked by *)

Certified By: [redacted]

AGAT Laboratories

6310 ROPER ROAD
EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
http://www.agatlabs.com

Quality Assurance

CLIENT NAME: ENVIROWEST

AGAT WORK ORDER: 24E128068

PROJECT: 43037

ATTENTION TO: Emily Low

SAMPLING SITE:

SAMPLED BY:

Soil Analysis

RPT Date:			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Particle Size by Hydrometer															
Particle Size Distribution (Sand)	74	5713478	51	51	0.0%	< 2	98%	80%	120%	NA			NA		
Particle Size Distribution (Silt)	74	5713478	26	26	0.0%		107%	80%	120%	NA			NA		
Particle Size Distribution (Clay)	74	5713478	23	23	0.0%		97%	80%	120%	NA			NA		

Certified By:

AGAT Laboratories

6310 ROPER ROAD
EDMONTON, ALBERTA
CANADA T6B 3P9
TEL (780)395-2525
FAX (780)462-2490
http://www.agatlabs.com

Quality Assurance

CLIENT NAME: ENVIROWEST

AGAT WORK ORDER: 24E128068

PROJECT: 43037

ATTENTION TO: Emily Low

SAMPLING SITE:

SAMPLED BY:

Water Analysis

RPT Date:			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Water Package - Routine Chemistry Water Analysis - Lab Filtered Cations															
pH	5721505	5721505	7.53	7.54	0.1%	N/A	101%	90%	110%						
p - Alkalinity (as CaCO3)	5721505	5721505	<5	<5	NA	< 5	NA	80%	120%						
T - Alkalinity (as CaCO3)	5721505	5721505	443	436	1.6%	< 5	101%	80%	120%						
Bicarbonate	5721505	5721505	443	436	1.6%	< 5	NA								
Carbonate	5721505	5721505	<5	<5	NA	< 5	NA								
Hydroxide	5721505	5721505	<5	<5	NA	< 5	NA								
Electrical Conductivity	5721505	5721505	1070	1060	0.3%	< 5	103%	90%	110%						
Chloride	5713506	5713506	671	677	0.9%	< 1.0	98%	70%	130%	89%	80%	120%	NA	70%	130%
Fluoride	5713506	5713506	<0.3	<0.3	NA	< 0.01	98%	70%	130%	98%	80%	120%	95%	70%	130%
Nitrate	5713506	5713506	44.8	44.9	0.1%	< 0.5	100%	70%	130%	94%	80%	120%	101%	70%	130%
Nitrite	5713506	5713506	<1.0	<1.0	NA	< 0.05	100%	70%	130%	93%	80%	120%	97%	70%	130%
Sulfate	5713506	5713506	100	100	0.5%	< 1.0	102%	70%	130%	99%	80%	120%	102%	70%	130%
Dissolved Calcium	5711790	5711790	<0.07	<0.07	NA	< 0.07	103%	70%	130%	NA	80%	120%	94%	70%	130%
Dissolved Magnesium	5711790	5711790	<0.05	<0.05	NA	< 0.05	103%	70%	130%	NA	80%	120%	94%	70%	130%
Dissolved Sodium	5711790	5711790	<0.05	<0.05	NA	< 0.05	106%	70%	130%	NA	80%	120%	95%	70%	130%
Dissolved Potassium	5711790	5711790	<0.05	<0.05	NA	< 0.05	99%	70%	130%	NA	80%	120%	92%	70%	130%
Dissolved Iron	5711790	5711790	<0.001	<0.001	NA	< 0.001	107%	70%	130%	NA	80%	120%	96%	70%	130%
Dissolved Manganese	5711790	5711790	0.00020	0.00020	NA	0.00028	101%	70%	130%	NA	80%	120%	93%	70%	130%

Comments: Matrix spike NA: Spike level < native concentration. Matrix spike acceptance limits do not apply and are not calculated.
Duplicate NA: results are less than 5X the RDL and RDP will not be calculated.

pH has been analyzed past the recommended holding time of 15 minutes from sampling (field measurement ideal if more accurate data required)

Nitrate and Nitrite: The regulatory hold time for the analysis of nitrate and/or nitrite in water is 72 hours.

Water Analysis - TKN, Ammonium, TDP															
Total Kjeldahl Nitrogen	5719117	5719117	0.8	0.7	13.3%	< 0.1	87%	70%	130%	89%	80%	120%	101%	70%	130%
Ammonia, Total (as N)	5655686	5655686	0.03	0.03	NA	< 0.02	100%	70%	130%	103%	80%	120%	103%	70%	130%
Total Dissolved Phosphorus	5721972	5721972	<0.08	<0.08	NA	< 0.08	91%	70%	130%	93%	80%	120%	95%	70%	130%
pH	9022	3508	7.15	7.15	0.0%		100%	90%	110%						

Comments: Matrix spike NA: Spike level < native concentration. Matrix spike acceptance limits do not apply and are not calculated.
Duplicate NA: results are less than 5X the RDL and RDP will not be calculated.

Nitrate and Nitrite: The regulatory hold time for the analysis of nitrate and/or nitrite in water is 72 hours.

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Method Summary

CLIENT NAME: ENVIROWEST

AGAT WORK ORDER: 24E128068

PROJECT: 43037

ATTENTION TO: Emily Low

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Particle Size Distribution (Sand)	INOR-171-6010	JONES 2001; SHEPPARD 2007	HYDROMETER
Particle Size Distribution (Silt)	INOR-171-6010	JONES 2001; SHEPPARD 2007	HYDROMETER
Particle Size Distribution (Clay)	SOIL 0520; SOIL 0110; SOIL 0120	JONES 2001; SHEPPARD 2007	HYDROMETER
Water Analysis			
Total Kjeldahl Nitrogen	INST-0520	EPA 351.2	DISCRETE ANALYZER
Ammonia, Total (as N)	INST 0340	SM 4500-NH3 G	CONTINUOUS FLOW ANALYZER
Total Dissolved Phosphorus	WATR 0200; INST 0140	SM 3030E	ICP/OES
pH	INST 0101, INST 0104	SM 4500 H+	PH METER
Ammonium (NH4+)	INST 0340	SM 4500-NH3 G	CONTINUOUS FLOW ANALYZER
p - Alkalinity (as CaCO3)	INST-0100, INST-0101	SM 2320 B	TITRATION
T - Alkalinity (as CaCO3)	INST-0100, INST-0101	SM 2320 B	TITRATION
Bicarbonate	INST 0101	SM 2320 B	PC TITRATE
Carbonate	INST 0101	SM 2320 B	PC TITRATE
Hydroxide	INST 0101	SM 2320 B	PC TITRATE
Electrical Conductivity	INST 0101, INST 0120	SM 2510 B	CONDUCTIVITY METER
Chloride	INST 0150	SM 4110 B	ION CHROMATOGRAPH
Fluoride	INST 0150	SM 4110 B	ION CHROMATOGRAPH
Nitrate	INST 0150	SM 4110 B	ION CHROMATOGRAPH
Nitrate-N	INST 0150	SM 4110 B	CALCULATION
Nitrite	INST 0150	SM 4110 B	ION CHROMATOGRAPH
Nitrite-N	INST 0150	SM 4110 B	CALCULATION
Nitrate+Nitrite - Nitrogen	INST 0150	SM 4110 B	CALCULATION
Sulfate	INST 0150	SM 4110 B	ION CHROMATOGRAPH
Dissolved Calcium	INST 0141	SM 3125 B	ICP-MS
Dissolved Magnesium	INST 0141	SM 3125 B	ICP-MS
Dissolved Sodium	INST 0141	SM 3125 B	ICP-MS
Dissolved Potassium	INST 0141	SM 3125 B	ICP-MS
Dissolved Iron	INST 0141	SM 3125 B	ICP-MS
Dissolved Manganese	INST 0141	SM 3125 B	ICP-MS
Sodium Adsorption Ratio		CARTER & GREGORICH 2007	CALCULATION
Calculated TDS		SM 1030E	CALCULATION
Hardness		SM 2340 B	CALCULATION
Ion Balance		SM 1030E	CALCULATION
Lab Filtration on Routine for IC			N/A
Lab Filtration on Routine for Metals			N/A

AGAT Laboratories
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Laboratory Use Only
Arrival Temperature: 6.8°C
Cooler Quantity: C
Custody Seal Intact: ☐ Yes ☐ No ☐ N/A
AGAT Job Number: 24E128068

Chain of Custody Record

Emergency Support Services Hotline 1-855-AGAT 245 (1-855-242-8245)

Report Information
Company: Enviroest Engineering
Contact: Emily Low
Address:
Phone: 403-783-8229

Project Information
Client Project #: 43037
Site Location:
Sample By: Elow
AGAT Quote #:
If a quotation number is not provided, client will be billed at standard rates. See terms and conditions of quote for full details.

Invoice To Same as Report to ☑
Company:
Contact:
Email:
Address
Phone:
PO/CC #:

Report Information
1. Name: Emily Low
Email: elow@enviroestengineering.ca
2. Name:
Email:
3. Name:
Email:

Requirements *(Selection may impact detection limits)*

CCME	AB Tier 1	Alberta Surface Water
☐ Agricultural	☐ Agricultural	☐ Chronic
☐ Industrial	☐ Industrial	☐ Acute
☐ Residential/Park	☐ Residential/Park	☐ SK Notice of Site Cond.
☐ Commercial	☐ Commercial	☐ Drinking Water
☐ FWAL	☐ Natural Area	☐ Other:

Is this part of the Alberta SRP program? ☐ YES ☐ NO (If yes, please fill below)
Application Number:
Grant Amount:
Well/Facility/Location ID:
UWI:

Turnaround Time Required (TAT)
'24 MAR 8 10:47 AM

Regular TAT ☑ 5 to 7 Business Days
Rush TAT ☐ <24 Hours (200%) ☐ Next Business Day (100%) ☐ 2 Business Days (50%) ☐ 3 Business Days(25%)
Date Required:

LABORATORY USE (LAB ID #)	SAMPLE IDENTIFICATION	DEPTH	DATE/TIME SAMPLED	SAMPLE MATRIX	COMMENTS	# OF CONTAINERS: VIALS / JARS	# OF CONTAINERS: BAGS	# OF CONTAINERS: BOTTLES	Field Filtered (Y/N)	Preserved (Y/N)	Detailed Salinity: ☐ AB ☐ SK ☐ BC ☐ D50	☐ CCME/AB : BTEX/F1-F4 ☐ CCME/AB : BTEX/F1-F2	☐ BC: BTEXS/VPH/EPH ☐ BC: LEPH/HEPH	SK: BTEX/TVH/C11-C22, C23-C60	Soil Metals: ☐ HWS-B ☐ SP-B ☐ Hg ☐ Cr^{6+}	Water Metals: ☐ Dissolved ☐ Total ☐ Hg ☐ Cr^{6+}	Routine Water Chemistry	Landfill: ☐ AB Class 2 ☐ BC ☐ SK	Coliforms: ☐ Total ☐ Fecal ☐ E.coli	Particle Size: ☐ Sieve (75µm) ☐ Texture	TVH	Total Dissolved Phosphorus	Hold For 30 Days No Analysis (Additional Fee)	Ammonia	Long Term Storage - 6 Months	Long Term Storage - 1 Year	Hazardous (Y/N)
1	24BH01-03		Jan 16/24	Soil			1													X	X							
2	24BH01-02		↓	↓			1													X								
3	24BH01-04						1													X								
4	24BH02-01						1													X								
5	24BH03-01						1													X								
6	24BH03-02						1													X								
7	24MW01		March 7/24	H_2O				4									X				X	X	X					
8	24MW02		11:00					4									X				X	X	X					
9	24MW03		11:10	↓				4									X				X	X	X					
10			11:15																									

Mar 8

Samples Relinquished By (Print Name and Sign)	Date/Time	Samples Received By (Print Name and Sign)	Date/Time
Emily Low [redacted]	Mar 7/24 10:36	[redacted]	Mar 7/24
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time

Pink Copy - Client
Yellow Copy - AGAT
White Copy- AGAT

Page 1 of 1
N°: AB 180824

Document ID: DIV-50-1507.007
Date Revised: Oct 14, 2021

AGAT Laboratories

SAMPLE INTEGRITY RECEIPT FORM

RECEIVING BASICS - Shipping

Company/Consultant: Enviroweft

Courier: DIC Prepaid Collect

Waybill#: ✓

Branch: EDM GP FN FM RD VAN LYD FSJ EST SASK Other:___

If multiple sites were submitted at once: Yes No

Custody Seal Intact: Yes No N/A

TAT: <24hr 24-48hr 48-72hr Reg Other_____

Cooler Quantity: C

TIME SENSITIVE ISSUES - Shipping

ALREADY EXCEEDED HOLD TIME? Yes No

Inorganic Tests (Please Circle): Mibi , BOD , Nitrate/Nitrite , Turbidity , Color , Microtox , Ortho PO4 , Tedlar Bag , Residual Chlorine , Chlorophyll* , Chloroamines*

Earliest Expiry:_____

Hydrocarbons: Earliest Expiry _____

SAMPLE INTEGRITY - Shipping

Hazardous Samples: YES NO Precaution Taken:_____

Legal Samples: Yes No

International Samples: Yes No

Tape Sealed: Yes No

Coolant Used: Icepack Bagged Ice Free Ice Free Water None

Temperature (Bottles/Jars only) N/A if only Soil Bags Received

FROZEN (Please Circle if samples received Frozen)

1 (Bottle/Jar) 1.4+0.2+0.7=0.8 °C 2(Bottle/Jar)___+___+___=____ °C

3 (Bottle/Jar)___+___+___=____ °C 4 (Bottle/Jar)___+___+___=____ °C

5 (Bottle/Jar)___+___+___=____ °C 6 (Bottle/Jar)___+___+___=____ °C

7 (Bottle/Jar)___+___+___=____ °C 8 (Bottle/Jar)___+___+___=____ °C

9 (Bottle/Jar)___+___+___=____ °C 10 (Bottle/Jar)___+___+___=____ °C

(If more than 10 coolers are received use another sheet of paper and attach)

LOGISTICS USE ONLY

Workorder No: 24E128068

Samples Damaged: Yes No If YES why?

No Bubble Wrap Frozen Courier

Other: _____

Account Project Manager: _____ have they been notified of the above issues: Yes No

Whom spoken to: _____ Date/Time: _____

CPM Initial_____

General Comments: _____

* Subcontracted Analysis (See CPM)

Date issued: March 11, 2020
Document ID: SR-9505.004