AREA STRUCTURE PLAN

For

PROPOSED SUBDIVISION

SW 27-046-06-W5M

LOMAS SUBDIVISION

In the

COUNTY OF WETASKIWIN

May 2025

1. INTRODUCTION

The owners of SW-27-046-06-W5M hereinafter referred to as the Developer - are proposing to subdivide three lake view lots (approximately 1 acre each) from their 20-acre parcel. The proposed division is attached as an appendix.

The proposed subdivision is located adjacent to Buck lake. The land is currently zoned residential recreational. The land is currently used for agricultural purposes.

An Area Structure Plan (ASP) is required by the County of Wetaskiwin before Council will approve a subdivision.

The Appendices to this ASP contains:

- Environmental assessment
- Phase I Groundwater Supply Assessment for Residential Subdivision
- AER Abandoned Well map

2. EXISTING CONDITIONS

The land is located on the northwest shore of Buck Lake and approximately 6 km north of the Hamlet of Buck Lake. Access to the proposed development from the south is by Range Road 63, which is paved to a point approximately 0.5 km south of the proposed development. Access is also provided from highway 22, located to the west, by a gravel road.

2.1. Site Characteristics

The land is relatively flat. The soil is predominantly a thin layer of topsoil over a silty clay material with clay till below. The land area to be developed is native grasses and is gathered for hay annually. Detailed site characteristics as well as aerial and ground photos can be found in Appendix 1 – the Environmental Assessment.

There are no oil or gas pipelines on the property with the exception of the Buck Mountain Gas Co-op feeder line to the existing buildings on the home lot. There are no abandoned wells on the property as per the Alberta Energy Regulator Abandoned Well map.

2.2. **Use of Surrounding Lands**

The land adjacent to the proposed development is zoned agricultural. The nearest subdivision, Bay View, is located 0.5 km to the south, and zoned Residential recreational.

There are no intensive livestock operations impacting the proposed development.

2.3. **Former Land Use**

The land has been used for taking hay crops and there does not appear to be any contamination in the form of animal waste.

2.4. **Present Land Use**

The land has been used for taking hay crops and there does not appear to be any contamination in the form of animal waste.

2.5. **Historical and Archaeological Features**

It is considered unlikely that the subject land contains any features of historical or archaeological interest. However, as required by Provincial Regulations, an application for a Historical Resources search has been submitted.

3. **PROVINCIAL AND FEDERAL REGULATIONS EFFECTING DEVELOPMENT**

The proposed development aligns with the county of Wetaskiwin land use bylaw, the Municipal Development plan (section 16) as well as the Developed Lakes Policy Area overlay.

Section 16.3.7 of the Municipal Development plan highlights:
Encourage residential subdivision and development within the Developed Lakes Policy Area Overlay where servicing capacity exists and where the proposed development is consistent with the parcel size and density established within the Lakeshore Residential District in the County LUB.

There is no highway within 800 m of the site and therefore the Developer is not required to submit an ASP for review by Alberta Transportation under the Municipal Government Act.

There are no identified sites, past or present, of gas and oil wells on the land and the gas pipelines to the west of the county road do not limit development on this site.

There are no landfill sites, sewage treatment sites, intensive livestock operations, sour gas installations or municipal boundaries, which would limit the development.

4. **PUBLIC ENGAGEMENT**

Orientation sessions for the general public are not considered necessary since there will be no impact - or change - lo the lake environment as such. The county mailed letters on behalf of the developers to adjacent landowners advising of the plan on March 4, 2025 and no concerns were received.

5. DEVELOPMENT CONCEPT

The proposed layout of the subdivision is shown on the attached concept plan in the Appendix.

The overall impact of the proposed development on the existing County road system, the surrounding land and the lake environment is anticipated to be minimal.

Regular monitoring and adherence to best practices will be essential to maintain compliance and minimize environmental impact as related to water quality, septic systems and solid waste management.

5.1. Municipal and Environmental Reserves, Park

The Environmental Assessment recommends a 6 meter buffer to open water and is noted in figure 3 of the report.

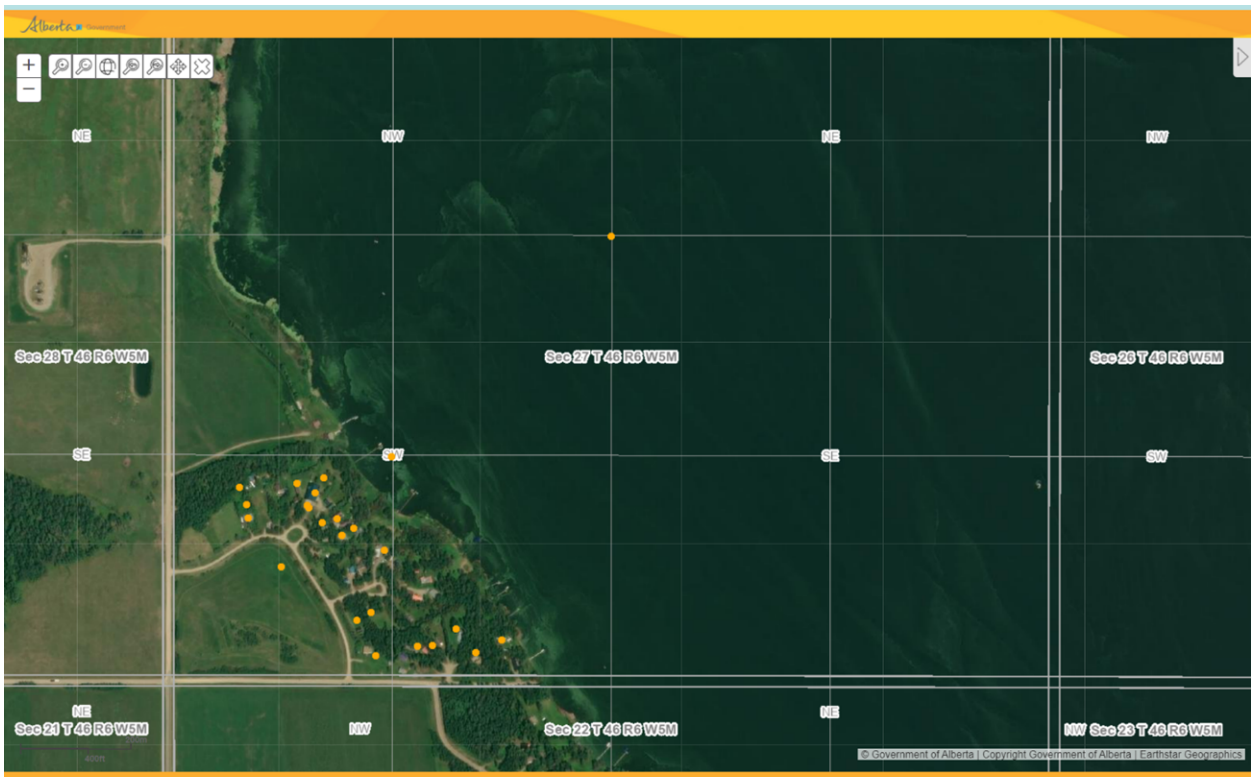
There is also seasonal marsh land within the lots that will remain as part of the development setback on the lots but not considered environmental reserve.

5.2. Road Access

The new lots will be accessible directly from Range Road 63. The traffic volume on the existing County road is very low and the new lots will have minimal impact

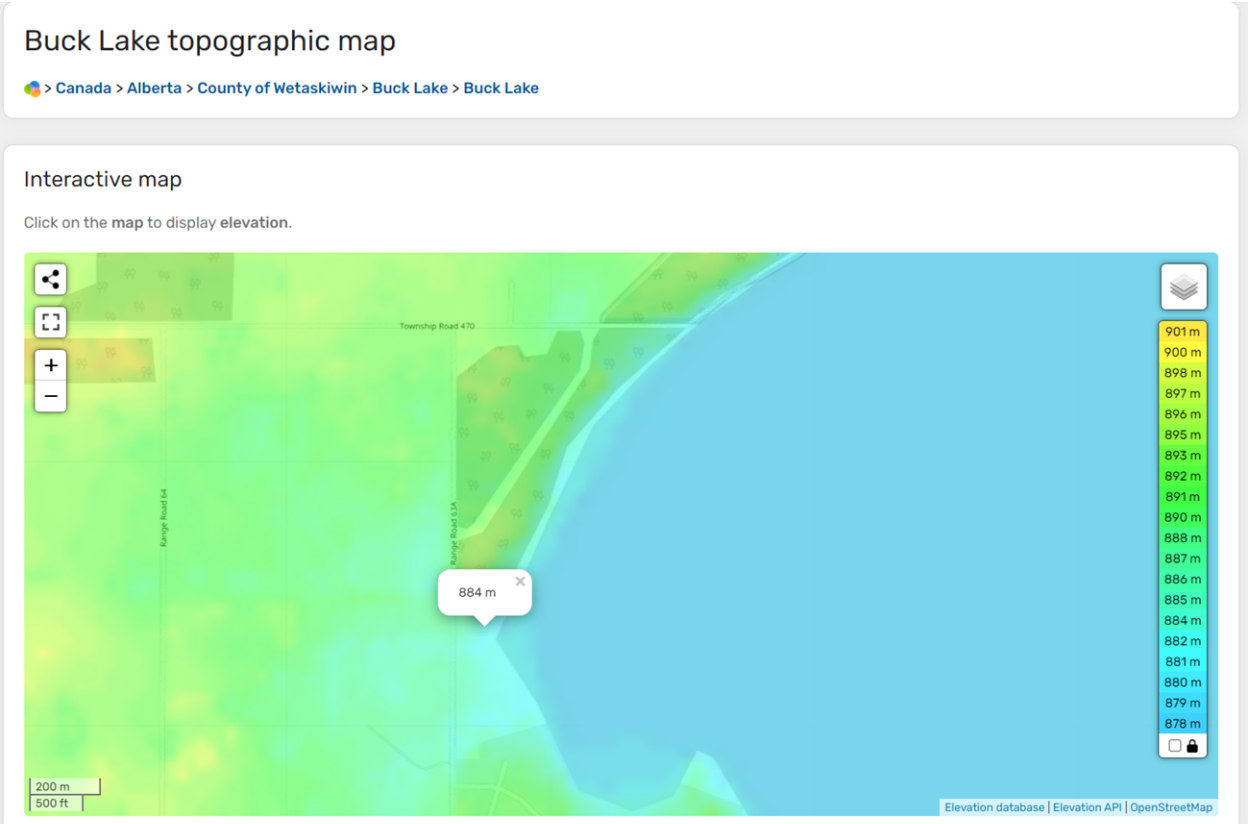
5.3. Water Supply

Water supply to the proposed subdivision will be by individual wells. A detailed Ground Water Supply Assessment can be found in Appendix 2.



5.4. **Storm Water Management and Floodplain Analysis**

The elevation of the proposed subdivision is 884M compared to the waterfront of 881M as shown in the topographical map below.



For storm water management a number of mitigation measures will be incorporated into the subdivision including:

- Existing vegetation will be maintained in natural state
- A buffer strip of natural areas located between the development and the lake front receiving waters
- Additional tree planting to support and manage runoff.

5.5. **Sewage Disposal**

The Developer proposes the use of individual septic tanks for sewage disposal. Owners of the new lots will be responsible for proper design, installation and maintenance of septic systems to prevent contamination.

5.6. **Utilities**

Natural gas will be supplied by the local gas co-op.

Electricity and telephone/cable TV will be by underground cable to be located within the 5 m utility easement and on the PULs where feasible.

5.7. **Solid Waste Disposal**

The County of Wetaskiwin operates a solid waste disposal site near Highway 22,

southwest of Buck Lake. Individual lot owners are expected *to* take the waste to this site. Alternatively, a communal waste disposal agreement with a contractor may be negotiated by the Homeowner's Association.

5.8. **Fire Protection**

Fire protection services will be provided through the Buck Lake Volunteer Fire Department, which is managed by the County Fire Chief. The fire station is located approximately 12 km away from the proposed subdivision.

5.9. **Policing**

The proposed subdivision will be policed by the County of Wetaskiwin Constabulary and by the Breton or Drayton Valley RCMP Detachments.

6. ASP Expiry clause

This document will expire if no development has started within three years of the date of Council approval.

APPENDIX 1

ENVIRONMENTAL ASSESSMENT

SW 27-046-06 W5M

PROPOSED SUBDIVISION

JANUARY 2025

HORIZON

ENVIRONMENT

Client: Kevin and Maureen Lomas

Distribution: Electronic

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Table of Contents

List of Tables

List of Appendices

List of Figures

1. INTRODUCTION

Horizon Environment Corp. (HEC) is pleased to submit our Environmental Assessment for a proposed subdivision of a 20-acre lot at SW 27-046-06 W5M. The subdivided area is proposed to consist of three lots each measuring approximately 1 ac. The purpose of the Environmental Assessment is to support the pre-development application and area structure plan for the subdivision, referred to as the Project.

The Project is located on freehold land next to Buck Lake, Alberta in Wetaskiwin County. Figure 1 in Appendix A shows the regional location of the Project.

2. REGULATORY SETTING

The Municipal Government Act (Government of Alberta, 2000) notes that a proposed subdivision is to provide part of that parcel of land as environmental reserve if it consists of:

(a) a swamp, gully, ravine, coulee, or natural drainage course;

(b) land that is subject to flooding or is, in the opinion of the subdivision authority, unstable; or

(c) a strip of land, not less than 6 metres in width, abutting the bed and shore of any body of water.

According to the Municipal Government Act (Government of Alberta, 2000) and body of water is to be interpreted as a reference to:

(a) a permanent and naturally occurring water body; or

(b) a naturally occurring river, stream, watercourse or lake.

3. SCOPE OF WORK

The scope of work included a desktop review and field assessment. The desktop review, field assessments and summary report were conducted to address the following valued ecosystem components (VECs) and will serve to determine if/where environmental reserves need to be established.

- Soil and Landforms;
- Vegetation;
- Wildlife; and
- Wetlands.

4. METHODS

4.1 Desktop Review

The desktop environmental review included the following online databases in conjunction with current habitat information and aerial/satellite imagery:

- Alberta Merged Wetland Inventory (AMWI);
- Water Act Code of Practice maps and other digitally available hydrological data;
- Fish and Wildlife Management Information System (FWMIS);

- Alberta Conservation Information Management System (ACIMS);
- AbaData Land Standing, Spills and Complaints and Agricultural Regions of Alberta Soil Inventory Database (AGRASID) databases;
- Landscape Analysis Tool (LAT);
- Wildlife Sensitivity Ranges;
- Government of Alberta (GoA) Alberta Water Wells database; and
- Historical Resource Values (HRV).

Were applicable, methods for the desktop reviews relevant to each of the VECs are summarized in their respective sections.

4.2 Soil and Landforms

The soil assessment was limited to reporting the desktop review results and excavating shallow soil pits by hand. Soil and landforms were classified using the Canadian System of Soil Classification (Soil Classification Working Group, 1998).

4.3 Vegetation Assessment

The vegetation assessment included documenting a list of dominant vascular and nonvascular species as well as identification of vegetation types or species that may require special consideration, including wetlands, rare plants, rare communities, and species at risk.

Using the desktop and field soil results, as well as the field landform and vegetation data, ecological classifications were assigned in accordance with Field Guide to Ecosites of West-Central Alberta (Beckingham et al., 1996)and/or the Guide to Range Plant Community Types and Carrying Capacity for the Dry and Central Mixedwood Subregions of Alberta (Moisey et al., 2016).

4.4 Preliminary Wildlife Assessment

A preliminary wildlife assessment was conducted within the Project area and 100 meters surrounding the Project area following the Alberta Wildlife Sweep Protocols Sensitive Species Inventory Guidelines (Government of Alberta Environment, 2020). Areas of high habitat potential for denning mammals and nesting birds were also assessed within the landowner's property. Where land access was not permitted, line of site and county roads were used to assess beyond the Project boundary. Habitat reconnaissance was also conducted to assess the suitability of sensitive species habitats, where applicable. The wildlife assessment does not replace the requirement for a pre-construction wildlife sweep or potential need for species specific surveys.

4.5 Wetland Assessment

Prior to the field assessment a desktop wetland delineation was conducted by reviewing publicly available aerial and satellite imagery. During the field assessment the desktop wetland delineation was conducted to confirm and refine the desktop delineations. Wetland delineations followed the Alberta Wetland Classification System and the Alberta Wetland Delineation Directive (Alberta ESRD, 2015; Government of Alberta, 2015). The wetland assessment does not include any potential Water Act applications or notifications that may be required.

5. RESULTS

5.1 Desktop Review

Were applicable, the results of the desktop reviews relevant to each of the VECs are summarized in their respective sections.

5.2 Soil and Landforms

Soils at the Project were investigated on October 9, 2024. The following subsections summarize the results of the soil and terrain survey. Site photographs showing the soils and landforms are included in Appendix B.

The inspection point identifications (IDs), coordinates, and general locations based on topography and ecology are summarized in Table 1.

Table 1. Soil Inspection and Sample Point Locations

Inspection Point ID	Coordinates (UTM NAD 83)	Location Description
24HA01	11U 647755, 5874048	Upland area currently hayed
24HA02	11U 647787, 5874078	Wetland along lake margins
24HA03	11U 647740, 5874093	Upland area currently hayed
24HA04	11U 647763, 5874134	Wetland along lake margins

5.2.1 Soil Classification

The upland areas of the Project were classified as Orthic Dark Gray Chernozems (O.DGC) of the Sundre (SUD) series. Low lying areas along the fringe of Buck Lake were classified as Rego Humic Gleysols (R.HG) of the Miscellaneous Gleysol (ZGL) series. Dominant parent material observed at the assessment points were coarse to medium textured (sandy loam to sandy clay loam) glaciofluvial (GLFL) materials deposited by wind or water. Based on regional soil data it is expected that these materials are underlain by coarse cobbly or gravelly materials. Soil classification data is summarized in Table 2 and mapped in Figure 2 in Appendix A.

Table 2. Soil Classification Data

Inspection Point ID	Subgroup	Parent Material	Soil Series
24HA01	O.DGC	GLFL	Sundre (SUD)
24HA02	R.HG	GLFL	Misc. Gleysol (ZDL)
24HA03	O.DGC	GLFL	Sundre (SUD)
24HA04	R.HG	GLFL	Misc. Gleysol (ZDL)

5.2.2 Physical Soil Properties and Series Characteristics

Physical characteristics using a representative inspection point for each of the dominant and significant soil series are summarized in the following subsections.

5.2.2.1 Sundre (SUD)

Extent:	Upland hayed areas
Soil Class:	R.HG Rego Humic Gleysol
Parent Material:	L4 - Medium textured (L, SiL, VFSL, SCL, CL, SiCL) over gravel or gravelly coarse textured (S, LS, SL, FSL) materials (includes cobbly and stony variations)
Drainage:	Moderately well drained (MWD)
Surface Stones:	Non-stony (S0), No stones or too few to interfere with cultivation (0.01% cover and >25 m apart).
Topography:	Class 3 slopes (2-5%)
Inspection Point:	24HA01

Horizon	Depth (cm)	Texture	Colour	Structure	Consistence
Ap	0-22	Loam	10YR 2/1	W/M/GR	Very Friable
Bm	22-33	Silty Clay Loam	10YR 3/2	W/M/SB	Friable
Cgj	33-40	Sandy Clay Loam	10YR 5/2	Massive (M)	Friable

Comments:
- Found in upland areas.
- Topsoil depths averaged 21 cm.
- Colour contrast between topsoil and upper subsoil is good and can be used as a guide for stripping.
- Clay loam textured topsoil and organics have a medium risk of wind erosion.
- Water erosion risk is low due to medium textured soils and very gentle slopes.

5.2.2.2 Miscellaneous Gleysol (ZGL)

Extent:	Wetland areas along the lake margins
Soil Class:	R.HG Rego Humic Gleysol
Parent Material:	L5 - Coarse textured (S, LS, SL, FSL) over gravel or gravelly coarse textured (S, LS, SL, FSL) materials (includes cobbly and stony variations)
Drainage:	Poorly drained (PD)
Surface Stones:	Non-stony (S0), No stones or too few to interfere with cultivation (0.01% cover and >25 m apart)
Topography:	Class 3 slopes (2-5%)
Inspection Point:	24HA02

Horizon	Depth (cm)	Texture	Colour	Structure	Consistence
Of	0-23	-	-	-	-
Om	23-33	-	-	-	-
Cg	33-40	Sandy Loam	10YR 5/1	Massive (M)	Friable (Fr)

Comments:
- Found at lower slope positions and depressional areas.
- Organic depths ranged from 33 to 40 cm.
- Organic soils have a low risk of wind erosion.
- Water erosion risk is low due to organic materials and very gentle slopes.

5.2.3 Terrain Assessment

Table 3 summarizes the terrain information gathered during the assessment. The overall surface drainage of the Project slopes east towards Buck Lake. A notable feature is a vegetated berm that bordered the lake and measures an average height of 0.80 m.

Table 3. Terrain Assessment Results

Inspection site	Surface Expression	Slope Class	Slope Position	Drainage	Landuse	Surface Stoniness Class	Aspect	Landform
24HA01	Undulating	Class 3	Mid	MWD	Upland	S0	East	U1h
24HA02	Undulating	Class 3	Depression	PD	Wetland	S0	East	U1h
24HA03	Undulating	Class 3	Mid	MWD	Upland	S0	East	U1h
24HA04	Undulating	Class 3	Depression	PD	Wetland	S0	East	U1h

5.3 Vegetation and Ecological Assessment

5.3.1 Landuse and Vegetation

Upland areas at the Project are dominated by hayland consisting of smooth brome (Bromus inermis), timothy (*Phleum pratense*) and clover (*Trifolium hybridum*). The banks and shallow open water edges of Buck Lake are dominated by common cattails (*Typha latifolia*). The wetland margin of Buck Lake beyond the approximate 0.80 m tall banks are dominated by reed canary grass (*Phalaris arundinacea*), sedge (*Carex* species) and willows (*Salix* species) with occurrences of common nettle (*Urtica dioica*), cow parsnip (*Heracleum maximum*) and western dock (*Rumex occidentalis*).

5.3.2 Ecological Classification

Landuse for the Project was dominantly agricultural; therefore, the plant communities were classified using the Guide to Range Plant Community Types and Carrying Capacity for the Dry and Central Mixedwood Subregions of Alberta. The Project is located in the Central Mixedwood (CM) subregion/ecological area and is dominated by tame forages (F). The upper slope positions of the Project were considered to have a mesic moisture regime (CMF11 Tall Productive species dominated) with a transition to a subhygric moisture regime (CMF21 Tall Productive species dominated) at the lower slope positions. The plant community that best aligned with the wetland areas adjacent to Buck Lake is 'DMA11 Willow/Reed grass fen moderate disturbance'. Landuse for the Project is shown on Figure 3 in Appendix A.

5.3.3 Rare Plants

A search of the ACIMS database was conducted October 8, 2024, and did not identify any tracked or watched elements. The ACIMS database search results are included in Appendix C. There were no rare plants observed during the field assessment of the Project.

5.3.4 Weeds and Invasive Species

Weed species observed during the assessment and are summarized in Table 4.

Table 4. Weed Species

Weed Species	Status[1]	Notes
Canada thistle (Cirsium arvense)	Noxious	A few patches and several sporadically occurring weeds
Dandelion (*Taraxacum officinale*)	Undesirable	Several sporadically occurring weeds

Weed Control Regulation (Government of Alberta, 2010)

5.4 Preliminary Wildlife Assessment

A desktop review was conducted for the Project prior to initiating the field assessment. This included the review of current habitat information and an online search of the Fish and Wildlife Management Information System (FWMIS) within 1 km of the Project. Results of the 1 km radius search did not identify any species in the wildlife inventory (terrestrial or avian species), but did note several species in the fish inventory (Appendix D). The Project is not located within a High-Risk Watershed or any Wildlife or Other Sensitive Species zones or ranges.

At the time of the field assessment there were no wildlife or wildlife features observed within the project footprint. Wildlife features identified in the assessment area are summarized in Table 5 and shown in Figure 4 in Appendix A. Incidental observations are summarized in Table 6.

Table 5. Wildlife Feature Summary

Feature Number	Species Common Name	Species Scientific Name	Notes
Dilapidated stick nest 1	Unknown	-	No individuals noted, approximately 170 meters from the Project.
Dilapidated stick nest 2	Unknown	-	No individuals noted, approximately 130 meters from the Project.
Dilapidated stick nest 3	Unknown	-	No individuals noted, approximately 80 meters from the Project.

Table 6. Incidental Wildlife Observations

Species Common Name	Species Scientific Name	Alberta Status[1]	SARA Status[2]	Notes
Black-capped chickadee	*Poecile atricapillus*	Secure	Not listed	Visual

1. Alberta Wild Species General Status Listing 2020 (Government of Alberta, 2024)
2. Species at Risk Act (SARA) (Government of Canada, 2002)

5.5 Wetland Assessment

The results of the wetland assessment concluded that there were two wetlands found within the Project and one adjacent to the Project (Buck Lake) (Table 7 and Figure 5 in Appendix A).

Table 7. Wetland Area of Impacts Summary

Wetland ID	Wetland Classification	Notes
WT-01	Temporary graminoid marsh	Located on agricultural land that is currently seeded to hay.
WT-02A	Seasonal graminoid marsh	Fringe wetland / riparian area to Buck Lake
WT-02B	Buck Lake	Area of open water and emergent vegetation (cattails)

The Project is within the North Saskatchewan River HUC 2 watershed and the Buck Lake – Wabamun Lake HUC 6 watershed. The Project lies approximately 300 m north of an unnamed strahler order 1 watercourse which is a tributary to Buck Lake. Lands within the Project slope east towards Buck Lake (Appendix A Figure 2).

6. DISCUSSION

Based on the results of the Environmental Site Assessment of the Project the following determinations have been made.

- Soils and landscapes were considered to be stable based on soil textures, vegetative cover, and very gentle slopes (<5%).
- The Project is protected from flooding from rises in lake levels due to an elevated bank measuring an average height of 0.80m (measured from the upland side of the lake).
- Being that Buck Lake is a permanent, naturally occurring water body (lake), a strip of land, not less than 6 meters in width, should be considered as an environmental reserve (Figure 6).
- WT-02A is hydrologically connected to Buck Lake and provides valuable ecosystem functions including flood, erosion, and sediment protection, as well as wildlife habitat, it is recommended that this area be considered as a 'no development area' (i.e. maintained as a vegetated strip of land) (Figure 6).
- If wetland WT01 is disturbed as part of any future developments at the Project a Water Act approval will be required.
- There were no sensitive or at-risk species or habitat features requiring specific protection or setbacks observed at the time of the assessment. Wildlife surveys and preconstruction wildlife sweeps should be considered if development is to occur. The type of survey will be dependent on the proposed disturbance and timing of construction and should be done in consultation with a professional wildlife biologist.
- There were no rare ecological communities or plants observed requiring specific protection or setbacks at the time of the assessment.

7. DISCLOSURE

Horizon Environment Corp. (HEC) has prepared this report considering government regulations available at the time of the assessment. HEC has not made an independent verification of historical or analytical results provided by third parties and therefore makes no assurances regarding the accuracy of such information. It has assumed such information is correct. Where indicated or implied the conclusions are based on visual observation and/or analytical testing conducted at the time of the assessment. The conclusions do not apply to any areas of the Project not investigated.

This report is intended for the exclusive use of the company, organization, or individual to whom it is addressed and may not be relied upon by any third party without the express written permission of HEC. The investigation and reporting have been conducted with a reasonable level of attention and skill, in accordance with standards prevailing in the environmental consulting profession at the time of report date in the location in which the report was prepared.

Any use which a third party makes of this report, or any reliance on decisions to be made based on it, are the responsibility of such third parties. HEC accepts no responsibility for damages, if any, suffered by any third party because of the use of this report or any decisions made, or actions based on this report.

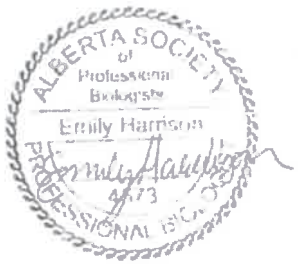
8. CLOSURE

HEC appreciated the opportunity to work on this project. If we can provide clarification, please call the undersigned at 587-885-0657.

Yours truly,

Horizon Environment Corp.

Prepared by:



Emily Harrison B.Sc., P.Biol.

Technical Specialist

Reviewed by:

Danny Lajoie B.Sc., P.Ag.

Technical & Regulatory Expert

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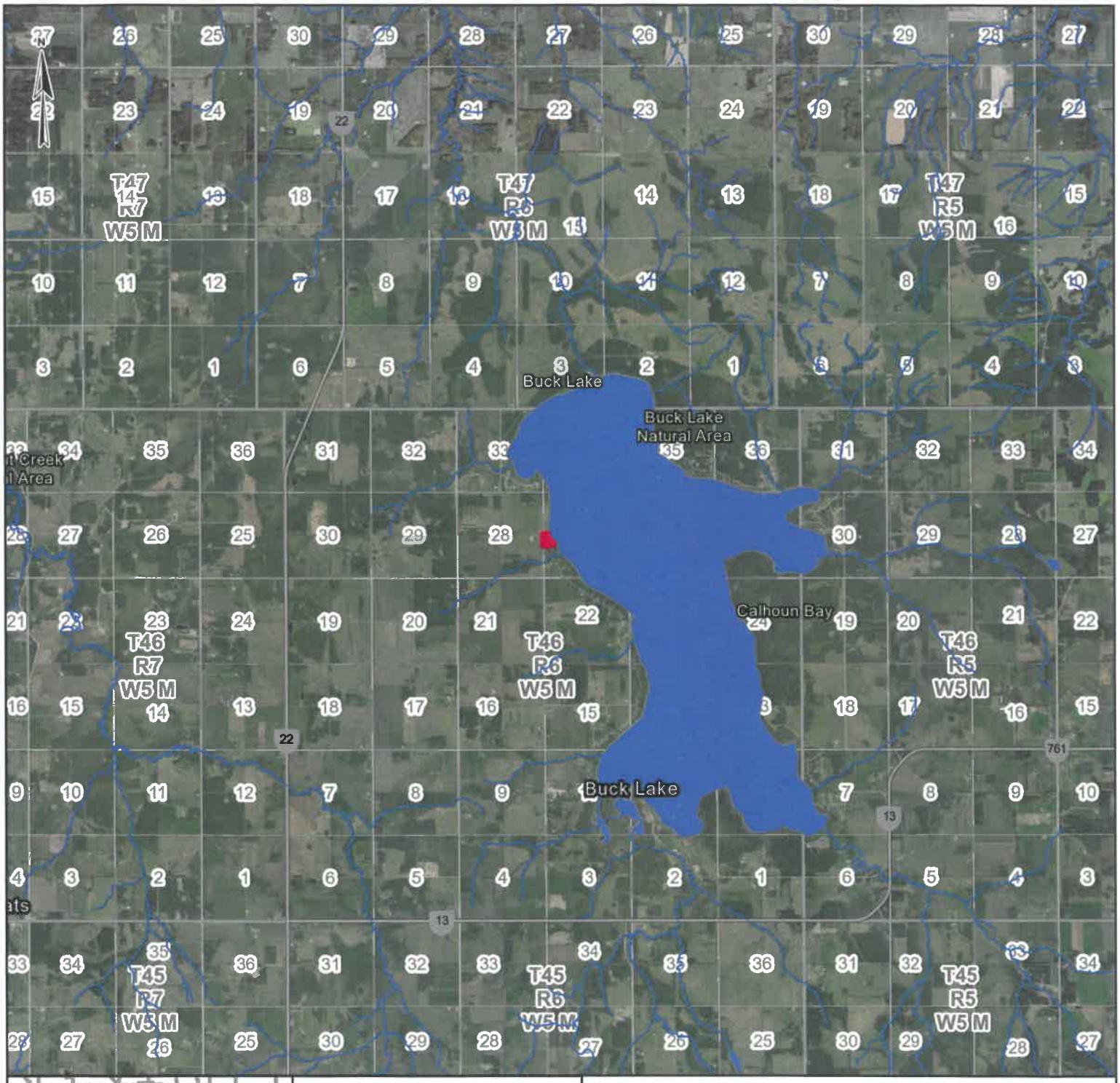
APPENDIX A

Site Figures



Legend

- Project Location
- FWMIS Hydropolygon
- FWMIS Hydroarcs

Maureen and Kevin Lomas	
SW-27-046-06 W5M	
Regional Location	
Figure 1	2024-12-18
Scale: 1:100,000	0 — 3,000 Meters

HORIZON ENVIRONMENT

Spatial Reference
Name: NAD 1983 10TM AEP Forest

Legend

Proposed Subdivision to 6m Buffer from Open Water

Soil Series

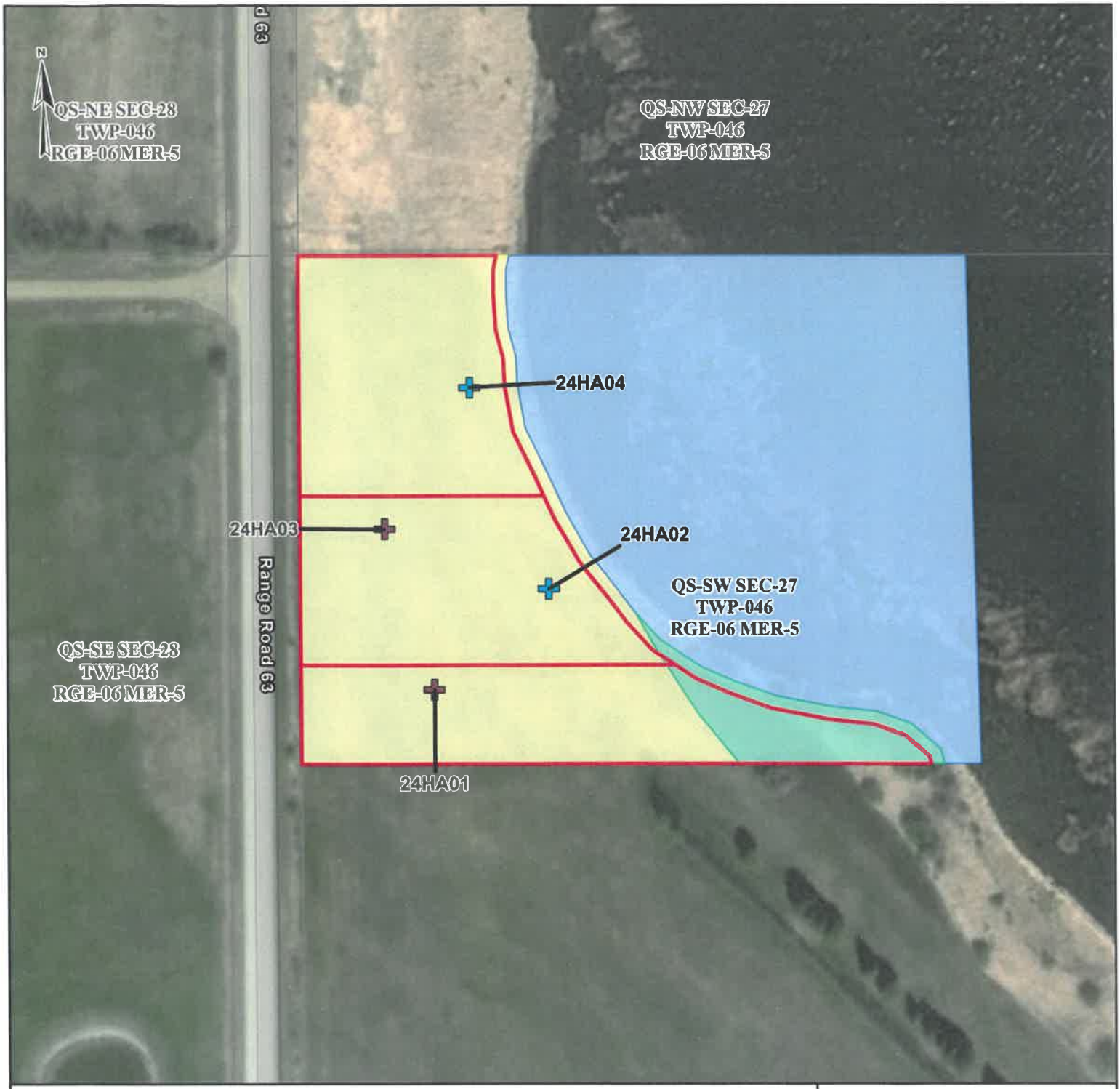
- Misc. Gleysol (ZDL)
- Sundre (SUD)

Maureen and Kevin Lomas	
SW-27-046-06 W5M	
Soils and Landscape	
Figure 2	2024-12-20
Scale: 1:1,500	

Spatial Reference
Name: NAD 1983 10TM AEP Forest

0 30 Meters

HORIZON ENVIRONMENT



Legend

- 1ac Proposed Subdivision to 6m Buffer from Open Water
- Misc. Gleysol (ZDL)
- Sundre (SUD)
- Hay
- Open Water
- Wetland

Maureen and Kevin Lomas	
SW-27-046-06 W5M	
Landuse	
Figure 3	2024-12-20
Scale: 1:1,500	

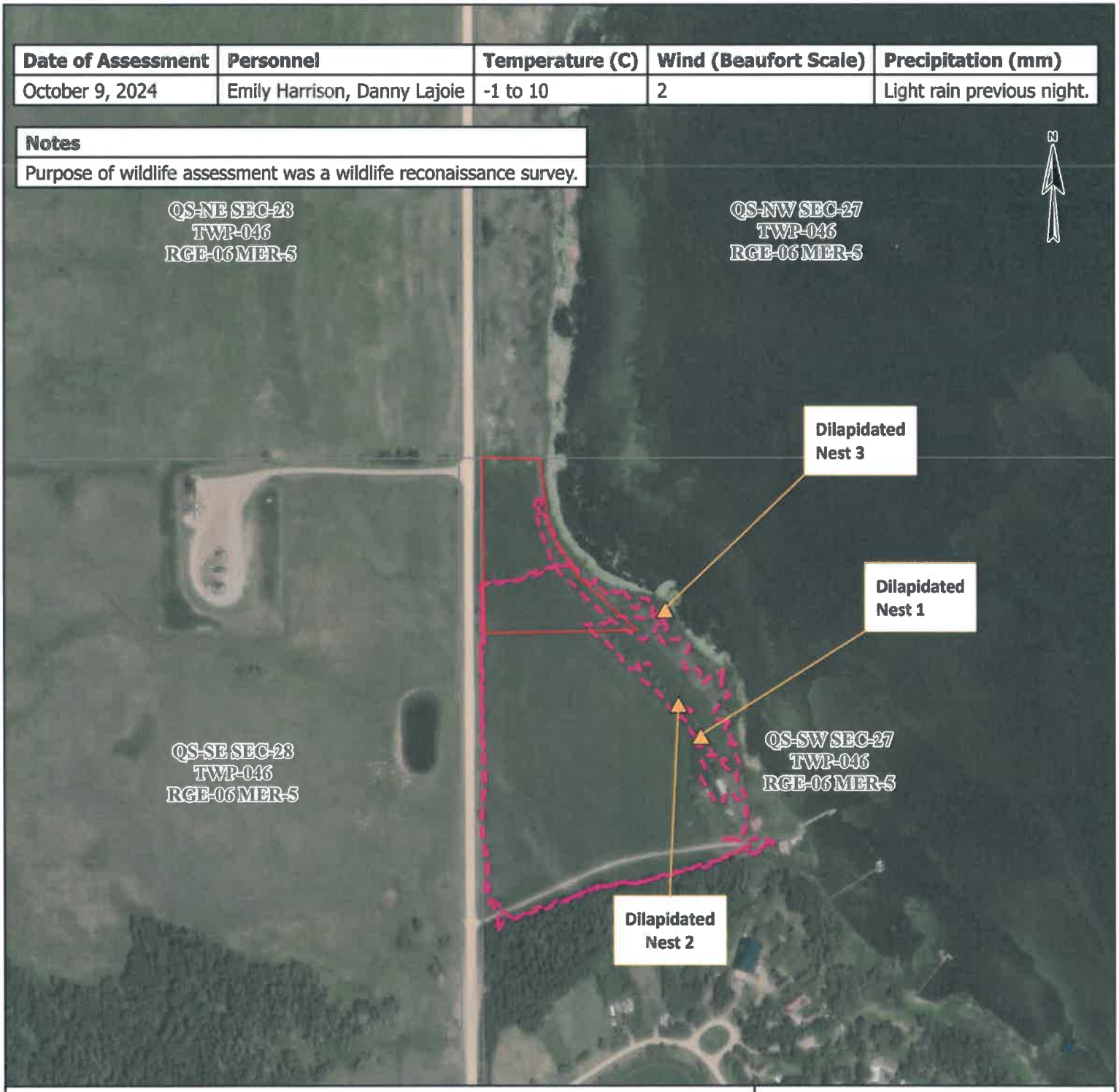
Spatial Reference
Name: NAD 1983 10TM AEP Forest

0 — 100 Meters

HORIZON ENVIRONMENT

Date of Assessment	Personnel	Temperature (C)	Wind (Beaufort Scale)	Precipitation (mm)
October 9, 2024	Emily Harrison, Danny Lajoie	-1 to 10	2	Light rain previous night.

Notes
Purpose of wildlife assessment was a wildlife reconaissance survey.



Legend

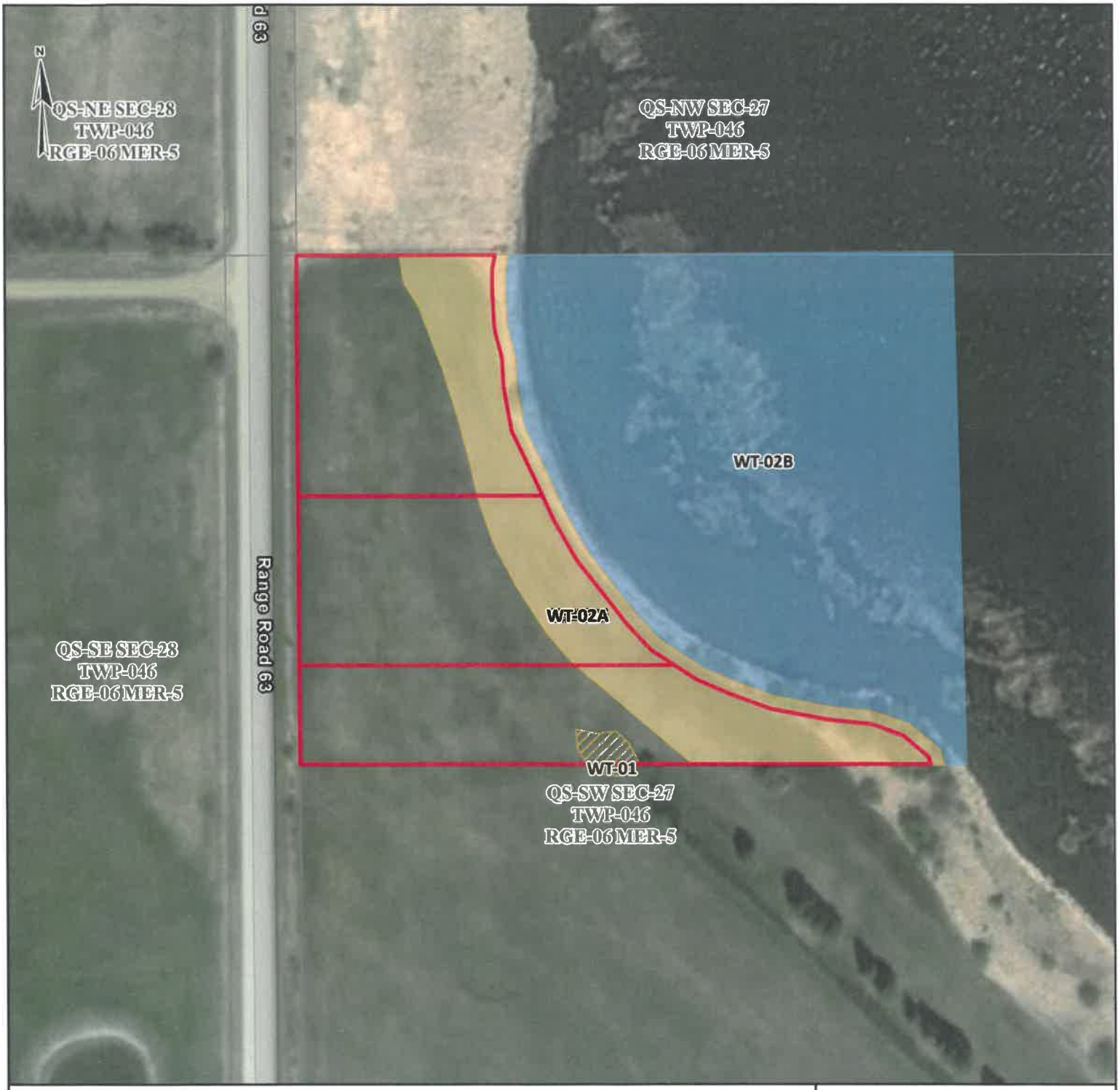
- Tracks
- Wildlife Feature

Maureen and Kevin Lomas	
SW-27-046-06W5M	
Wildlife - Field Assessment	
Figure 2	2024-10-21
Scale: 1:5,000	

HORIZON ENVIRONMENT

Spatial Reference
Name: NAD 1983 10TM AEP Forest

0 150 Meters



Legend

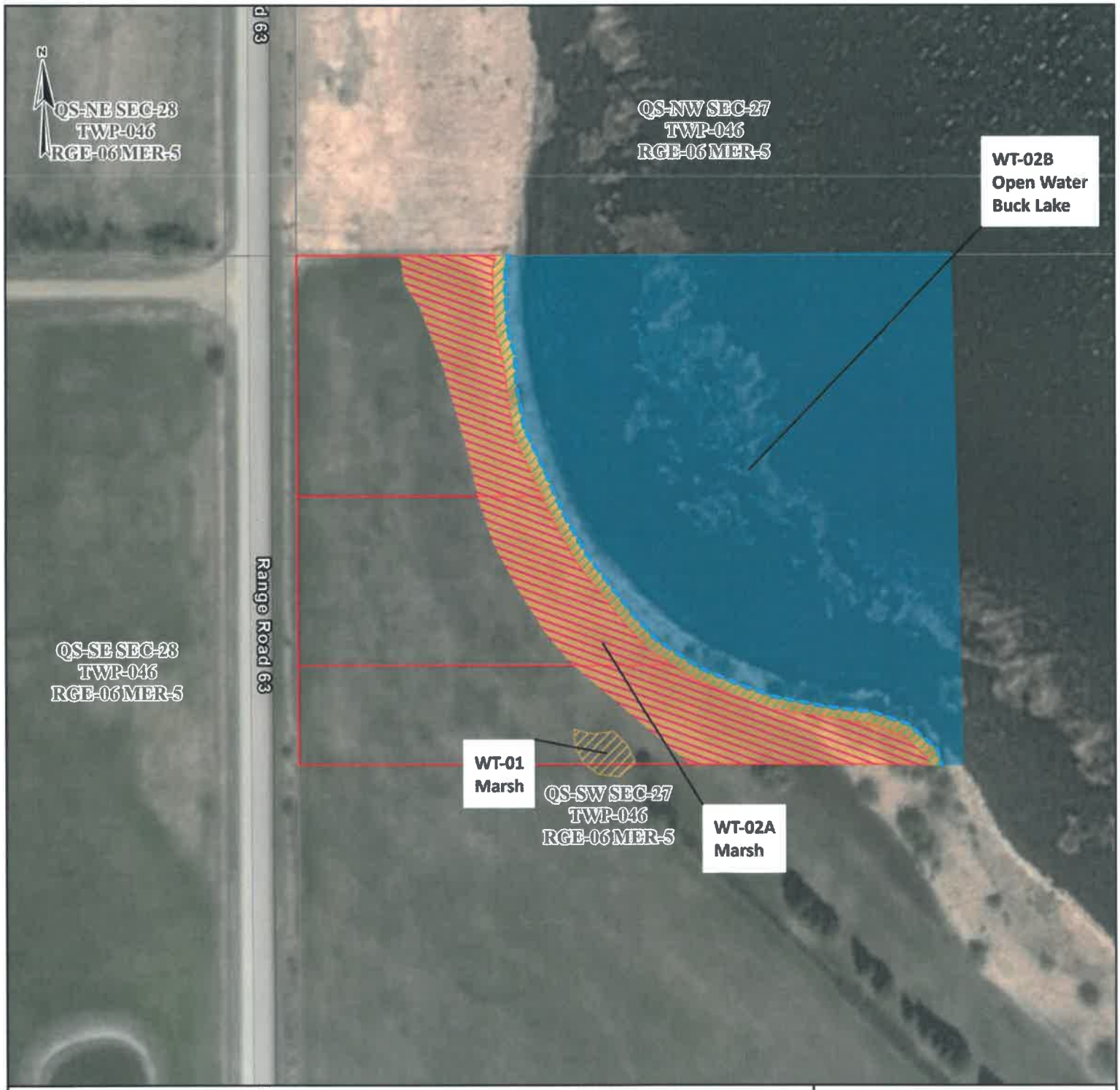
- 1ac Proposed Subdivision to 6m Buffer from Open Water
- Permanent Open Water
- Seasonal Graminoid Marsh
- Temporary Graminoid Marsh

Maureen and Kevin Lomas	
SW-27-046-06 W5M	
Wetland Delineations	
Figure 5	2024-12-20
Scale: 1:1,500	

Spatial Reference
Name: NAD 1983 10TM AEP Forest

0 — 100 Meters

HORIZON ENVIRONMENT



Legend

- 1ac Proposed Subdivision to 6m Buffer from Open Water
- Open Water
- Seasonal Graminoid Marsh
- Temporary Graminoid Marsh
- Environmental Reserve
- No Development Area
- Shoreline

Maureen and Kevin Lomas

SW-27-046-06 W5M

Environmental Reserve

Figure 6 | 2025-01-16

Scale: 1:1,500

Spatial Reference
Name: NAD 1983 10TM AEP Forest

0 — 100 Meters

HORIZON ENVIRONMENT

APPENDIX B

Site Photographs

Photograph 1 viewing north within riparian wetland

Photograph 2 viewing riparian wetland boundary with open water of Buck Lake

Photograph 3 viewing wetland area WT-01

Photograph 4 viewing water tolerant vegetation within wetland area WT-01

Photograph 5 viewing north at 24HA01 upland area

Photograph 6 viewing east at 24HA01 upland area

Photograph 7 viewing south at 24HA01 upland area

Photograph 8 viewing west at 24HA01 upland area

Photograph 9 viewing soil pit at 24HA01 upland area

Photograph 10 viewing vegetation at 24HA01 upland area

Photograph 11 viewing north at 24HA04 wetland area

Photograph 12 viewing east at 24HA04 wetland area

Photograph 13 viewing south at 24HA04 wetland area

Photograph 14 viewing west at 24HA04 wetland area

Photograph 15 viewing soil pit at 24HA04 wetland area

Photograph 16 viewing water altered soil at 24HA04 wetland area

Photograph 1 viewing Dilapidated Nest 1 in large spruce tree

Photograph 2 viewing Dilapidated Nest 2 in large spruce tree

Photograph 3 viewing Dilapidated Nest 3 in willow near boundary of riparian wetland and open water area of Buck Lake

Photograph 4 viewing riparian habitat along Buck Lake

Photograph 5 viewing windrow line of trees habitat in hay field

Photograph 6 viewing hay habitat

APPENDIX C

ACIMS Database Search Results

Date: 8/10/2024
Requestor: Consultant
Reason for Request: Land Use Planning
SEC: 27 **TWP**: 046 **RGE**: 06 **MER**: 5

Alberta Parks

Non-sensitive EOs (updated: June 2022)

M_RR_TTT_SS	EO_ID	ECODE	S_RANK	SNAME	SCOMNAME	LAST_OBS_D

No Non-sensitive EOs Found: Next Steps - See FAQ (https://www.albertaparks.ca/albertaparksca/management-land-use/alberta-conservation-information-management-system-acims/faqs.aspx#2 - Process)

Sensitive EOs (updated: June 2022)

M-RR-TTT	EO_ID	ECODE	S_RANK	SNAME	SCOMNAME	LAST_OBS_D

No Sensitive EOs Found: Next Steps - See FAQ (https://www.albertaparks.ca/albertaparksca/management-land-use/alberta-conservation-information-management-system-acims/faqs.aspx#2 - Process)

Updated: Aug 31, 2022

APPENDIX D

FWMIS Database Search Results

Alberta Environment and Parks

Fish and Wildlife Internet Mapping Tool (FWIMT)

(source database: Fish and Wildlife Management Information System (FWMIS))

Species Summary Report

Report Date: 08-Oct-2024 17:04

Species present within the current extent

Fish Inventory	Wildlife Inventory	Stocked Inventory
BROOK STICKLEBACK	No Species Found in Search Extent	No Species Found in Search Extent
BURBOT		
IOWA DARTER		
LAKE WHITEFISH		
NORTHERN PIKE		
SPOTTAIL SHINER		
WALLEYE		
WHITE SUCKER		
YELLOW PERCH		

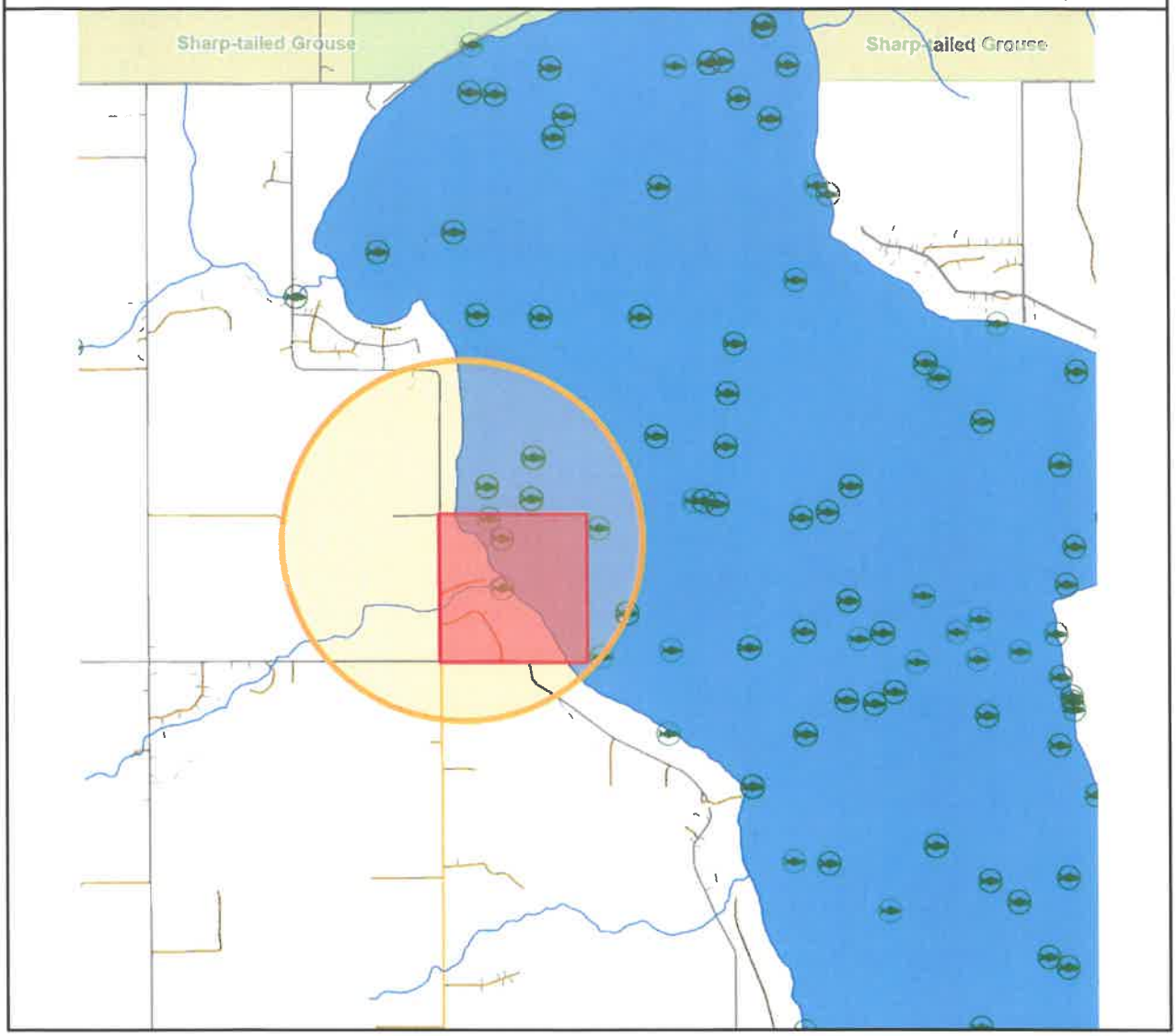
Buffer Extent

Centroid (X,Y)	Projection	Centroid (Qtr Sec Twp Rng Mer)	Radius or Dimensions
513601, 5869426	10-TM AEP Forest	SW 27 46 6 5	1 kilometers

Contact Information

For contact information, please visit:
https://www.alberta.ca/fisheries-and-wildlife-management-contacts.aspx

08-Oct-2024 17:04 **Map Results**



APPENDIX 2

Phase I Groundwater Supply Assessment for Residential Subdivision

SW-27-46-06W5
Wetaskiwin County

Project #: AW.159.01
December 2024

1900, 700 – 2ND STREET SW, CALGARY, AB, T2P 2W2
PHONE 403.991.1879 WWW.ARLETTA.CA

arletta water resources

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

1. EXECUTIVE SUMMARY

A Phase I Groundwater Supply Assessment was undertaken for a proposed 3-lot residential subdivision located within SW-27-46-26W4 to better understand the quality and distribution of aquifer resources in the area as they relate to the future development of the property and its water requirements.

The uppermost strata in the area consists of glaciolacustrine deposits followed by interbedded sandstone and shale of the Paskapoo Formation. The best aquifer targets for future wells on Site are the interbedded bedrock shale-sandstone aquifer units of the Paskapoo Formation, likely present from 30 – 50+ metres below ground level.

A short-term pumping test was conducted on an well servicing the existing residence on Site, which shows a well yield in excess of 600 m^3/day, well over the required volume for domestic use and shows the aquifers underlying the Site are highly productive.

Conservative projected water yields from wells completed within these aquifers are within the range of 10 – 30 m^3/day (3,653 – 10,958 m^3/year or 1.5 – 4.6 imperial gallons per minute), based on pumping test data from surrounding wells and maps generated in previous consulting reports. Yields on the order of 100 – 500 m^3/day are likely. Sufficient aquifer yields exist to meet the demands of the *Water Act* (3.4 m^3/day or 1,250 m^3/year) for individual domestic supply wells.

A moderate volume of the groundwater supply is currently utilized by existing domestic, licensed, or traditional groundwater users in the area. Based on available pumping test data, sufficient aquifer supply exists in the area to meet the demands of the *Water Act* (3.4 m^3/day or 1,250 m^3/year) for individual domestic supply wells.

Based on available pumping test data, the diversion of 1,250 m^3/year of water for household purposes under Section 21 of the *Water Act* will not interfere with any household users, licensees or traditional agriculture users who exist when the subdivision is approved. A review of water levels in the wells with time shows no significant changes and the aquifer supplies are sustainable.

A water quality report from the on site well was evaluated to determine baseline water chemistry characteristics. Future supply wells completed in bedrock aquifers at a similar depth will likely have similar water chemistry. Based on the water quality analysis the water is suitable for the intended use without treatment. It is recommended that a sample from the future supply wells be collected and analyzed prior to long term use to ensure the water meets drinking water quality standards for long-term human consumption.

2. INTRODUCTION

Arletta Water Resources (Arletta) was retained by Maureen Lomas. to complete a Phase I Groundwater Supply assessment for a proposed 3-lot residential subdivision within SW-27-46-06W5, herein referred to as "the Site". The assessment was undertaken to better understand the quality and distribution of aquifer resources in the area as they relate to the future development of the property and its water requirements.

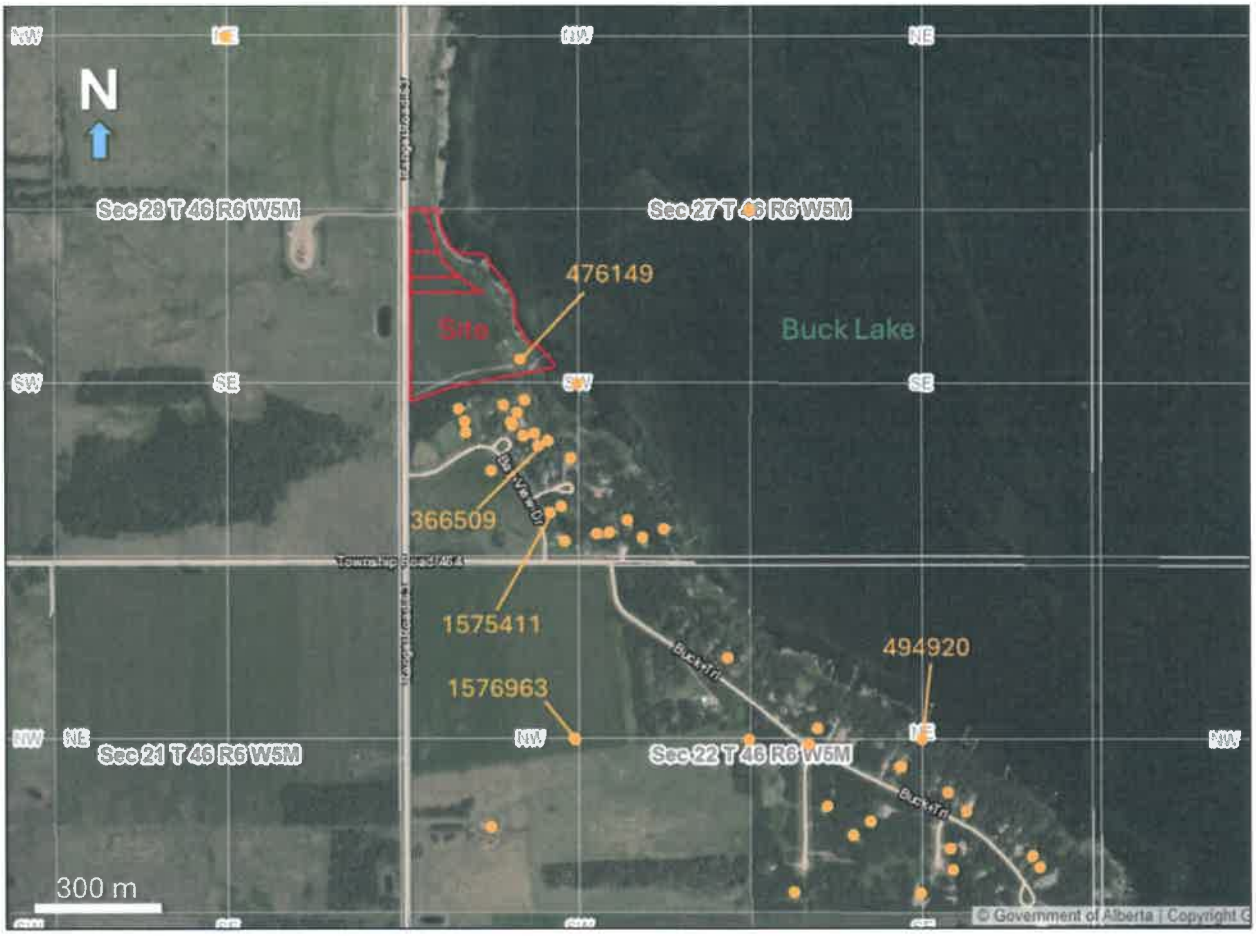
The Site is in Wetaskiwin County along the northeast shore of Buck Lake, Alberta. The Site area consists predominantly of agricultural land to the west with high density subdivision development to the north and south. A portion of the Wetaskiwin County landownership map and subject Site quarter section location is shown in Figure 1.

Figure 1. Wetaskiwin County landownership map and subject site ¼ section location

Water is required to supply a new proposed 3-lot subdivision, with an individual water supply well required on each newly created lot. Each residential lot is entitled to water at a rate of 1,250 m³/year (3.4 m³/day) under the *Water Act*. A map showing the proposed subdivision is included in Appendix I.

An aerial photo of the Site showing the state of the property, and existing water supply well locations relative to the Site as listed on the Alberta Environment and Parks water well database is shown in Figure 2.

Figure 2. Air photo of the Site relative to existing water well locations

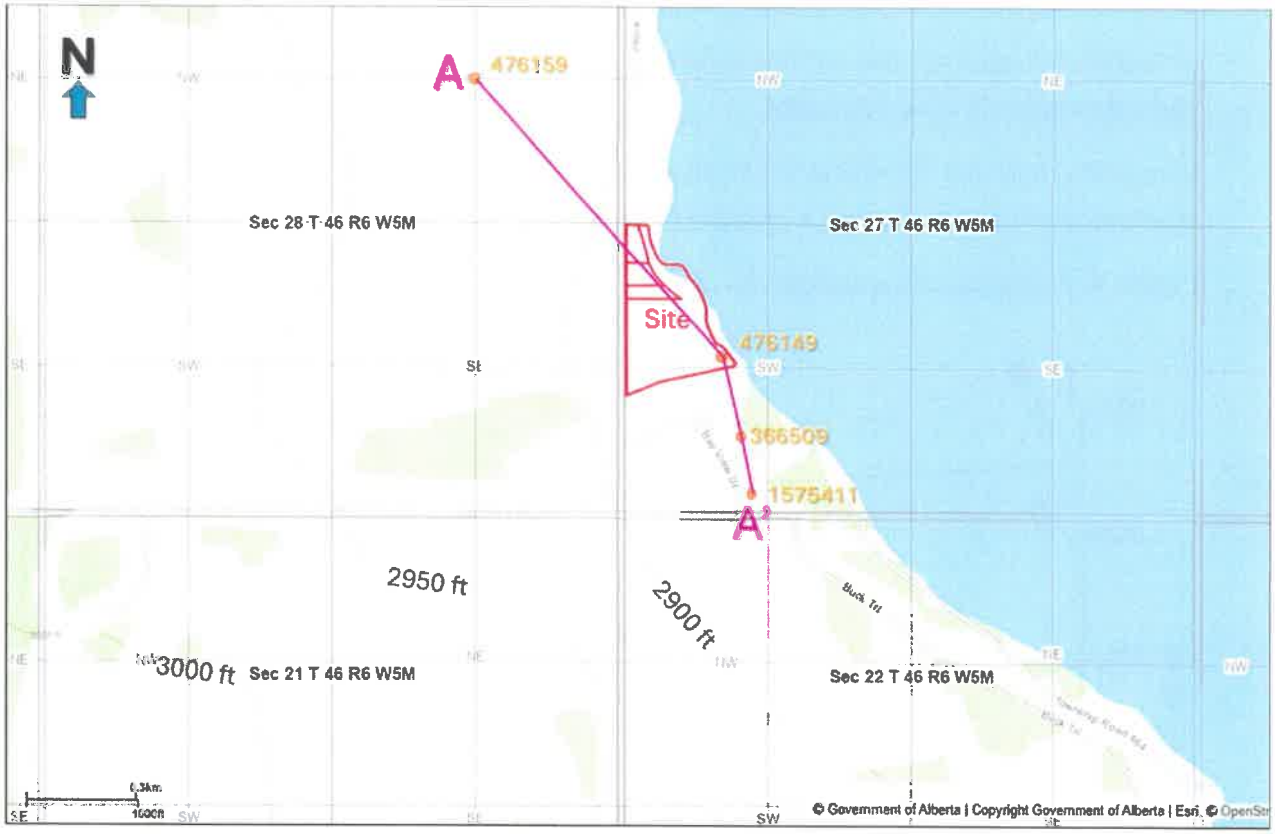


The relevant wells have listed well ID's. The water well database does not list any wells present on the three new subdivision lots. There is on existing well on Site that services the residence within the southeast.

3. TOPOGRAPHY

The Site surface is relatively flat and dips gently towards the east, with surface elevation ranging less than 3 metres across the Site. The Site is located at an approximate elevation of 880 metres above sea level (masl). The closest surface water is Buck Lake, located immediately east of the property boundary. A surface topography map showing surface drainage and the location of wells used in the geologic cross section is as follows:

Figure 3. Topographic map with cross section line A – A'



4. NATURE OF REGIONAL AQUIFERS

4.1. SURFICIAL GEOLOGY

The surficial strata in the area are mapped in *Surficial Geology Wabamun Lake* (1979) as undifferentiated glaciolacustrine deposits consisting of predominately clay or mixed silt and clay, with some areas including sand and pebbles. The unit is generally less than 3 metres thick, and the topography of the unit is described as flat, reflecting the underlying surface topography.

Based on the strata listed on the Water Well Drillers Report for the supply wells near the Site (Figure 2), the upper strata consist of 6 – 11 metres of mostly clay, with some wells reporting clay mixed with sand and gravel. No surficial gravel beds that could serve as aquifers were found in wells close to the Site.

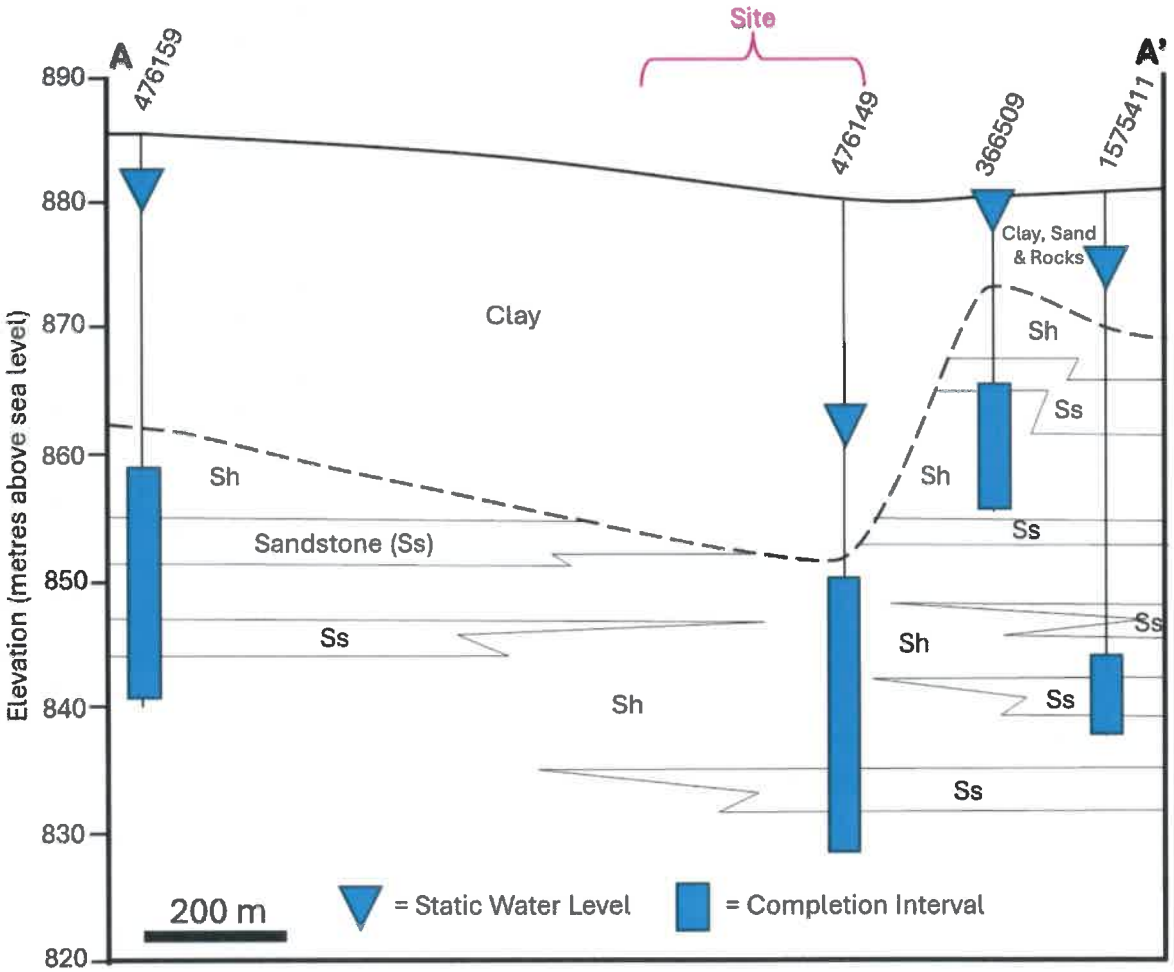
4.2. BEDROCK GEOLOGY

The strata consists of the early/lower Paleocene fluvial sandstones of the Paskapoo Formation. The Paskapoo Formation is a non-marine fluvial deposit consisting of interbedded sandstone channel bodies and overbank mudstone, siltstone and

shale. The formation is one of Alberta's largest and most prolific aquifers, supporting more wells than any other aquifer in Alberta's prairies. The priority target aquifers in the formation are the permeable and porous channel sandstones, while the surrounding mud and shale act as confining aquitards. Water Well Drilling Reports indicate bedrock in the area consists of interbedded layers of shale and sandstone.

Using existing Water Well Drilling Reports in the area, a cross section (A – A') showing the relationship between topography, target aquifers and static water levels is presented in Figure 4.

Figure 4. Geologic cross section A – A'

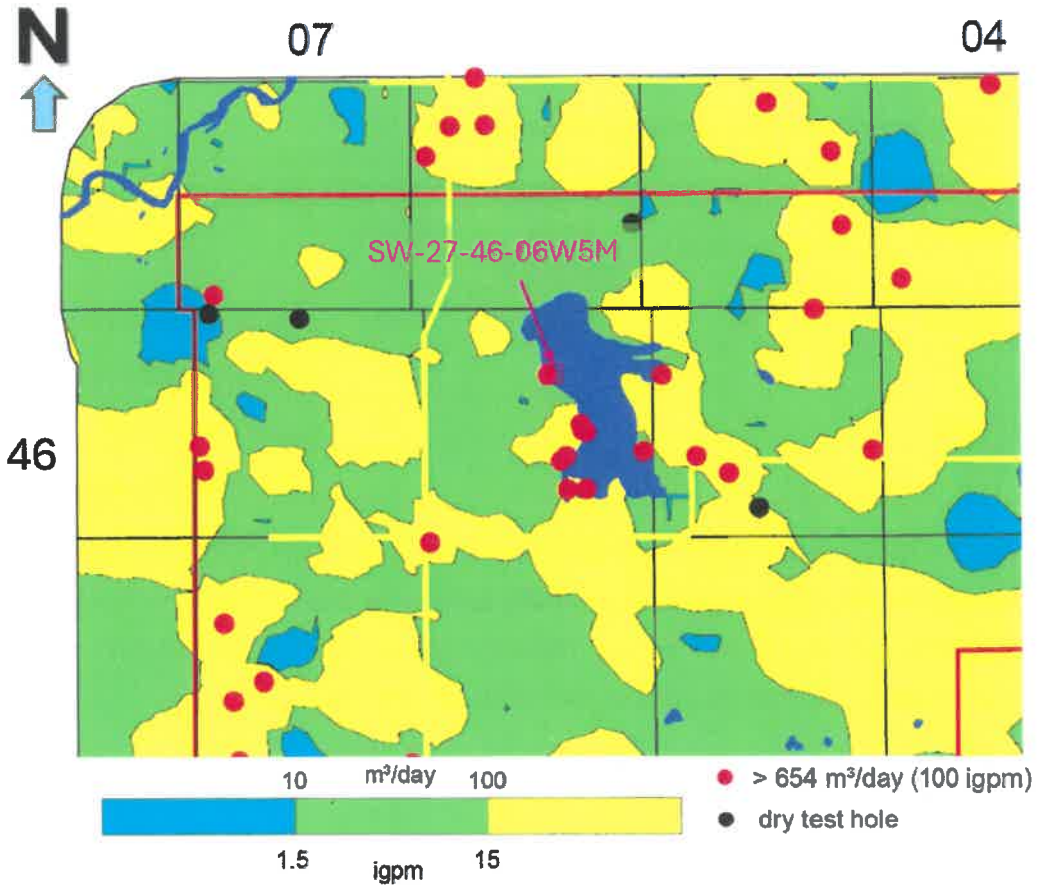


Surficial deposits in the area consist of a layer of clay, which thins towards the south of the Site and starts to contain a mixture of sand and rocks with the clay. The well closest to the Site (#476149) appears to produce from a thick, confined interbedded sandstone-shale aquifer at depths of 30 – 50 metres below ground. Wells further from the Site intersect similarly interbedded shale-sandstone aquifers at depths of 15 - 45 metres below ground. These aquifers likely also extend below the Site.

Future supply wells on the proposed lots could be completed in the shale-sandstone bedrock aquifers likely found below the Site from 30 – 50+ metres below ground level. The neighbouring wells with available pumping test data (476149, 366509 and 1575411) have safe yield rates of 613, 152 and 185 m³/day, respectively (See Section 6). There is evidence that aquifers in the immediate area could produce at rates suitable for domestic supply (3.5 m³/day)

Future supply wells completed over bedrock aquifer units could have an anticipated yield of over 10 - 100 m³/day based on data shown in Figure 5, compiled as part of a regional groundwater assessment of Wetaskiwin County (HCL, 2008). The assessment also shows the site is close to a well yielding over 100 igpm. Based on projected yields discussed further in Section 6 it appears well yields fall within and above the range interpreted in Figure 5.

Figure 5. Apparent yield for water wells completed in upper bedrock aquifers



(Portion of Figure 22 from Hydrogeological Consultants Report – Wetaskiwin County, 2008)

5. AREA GROUNDWATER USERS

A search of Alberta Environment and Parks water well data base was done to determine the number of water wells and their associated use in the area. A search was conducted of the wells within a 1.6 km (1-mile) radius of the Site. The search shows a total of 96 groundwater wells within the area. Most of the wells are designated for domestic use with two wells for stock use and one for industrial purposes. The wells were completed to depths of 18.3 – 91.4 metres from 1971 – 2022. A summary of the well information from the AEP database is included in Appendix II.

5.1. LICENSED WATER USERS

A search of AEP's authorization viewer water license database was undertaken to determine if any groundwater licenses are present in the area. A search of licenses and registrations for the subject site and adjoining eight sections was undertaken. A summary of the groundwater licenses and registrations in the area is as follows:

Table 1: Area groundwater license and registration summary

Location	Licences/ Registration	Licensed Depth Interval (m)	Licensed Volume (m^3)	Licensee/*Registrant*
28-46-06W5	1/0	? – 45.7	15,457	Samson Tribal Enterprises Ltd.
33-46-06W5	0/3	--	--	*Rick Hammond & Alex Danyluk*
		--	--	*Lynn Creek Farms*
		--	--	*Public Land Management*

Licenses for surface water withdrawals were not included in the Table 1 summary. One license for groundwater extraction was found in the area. Three registrations were also found in the area. Registrations may include surface water or groundwater diversions up to 6,250 m^3 per year. The groundwater use in the area can be described as moderate, consisting largely of unregistered domestic groundwater user with low licensed usage.

6. AREA AQUIFER PROPERTIES

Four existing supply wells near the Site had pumping test information available for analysis included in their Water Well Drilling Reports. A 2+2 hour pumping test was also completed on the well located within the southeast corner of the Site (#476149) in November 2024 by personnel from Darcy's Drilling. This well was pumped at a rate of 5 imperial gallons per minute for 120 minutes and showed less than 1 m of drawdown, indicating a highly productive well. The pumping test report from Darcy's Drilling is attached in Appendix 2.

The location of this well (Well ID 476149) and other existing supply wells relative to the Site are shown in Figure 2. The pumping tests were analyzed with the aid of AQTESOLV software developed by Hydrosoft Inc. to estimate aquifer properties (Appendix III). A summary of well yield and associated aquifer properties produced from this analysis are tabulated below.

Table 2. Area aquifer properties

GIC Well ID	Distance (m) and Direction from Site	Depth to Top of Aquifer (m)	Aquifer Thickness (m)	Aquifer Type	Aquifer Transmissivity (m^2/day)	Safe Well Yield (Q_{20}) (m^3/day)
476149	On site	43.3	20.7	Shale & Sandstone	72.0	613
366509	385 SE	13.7	9.1	Shale	51.6	152
1575411	550 SE	35.1	6.1	Shale & Sandstone	28.1	185
1576963	1,080 SE	31.7	7.9	Sandstone	139	1,190
494920	1,510 SE	33.2	5.5	Siltstone & Sandstone	173	984

The twenty-year safe yield of the supply wells (Q_{20}) was calculated using the modified Moell method as suggested in Alberta Environments Guide to Groundwater Authorization (February 2023) as follows:

$$Q_{20} = \frac{(0.7 \times Q \times H_a)}{s_{100min} + (s_{20yrs} - s_{100th})}$$

Where:

Q	-	Pump test flow rate (m^3/day)
H_a	-	Available Head (m)
$S_{100\ min}$	-	Observed drawdown at 100 minutes (m)
$(S_{20yrs} - S_{100\ th})$	-	Difference between drawdown at 20 years and 100 min (m)
0.7	-	Safety factor

Analysis of pumping test data from wells completed in confined bedrock aquifers near the Site produce a safe yield ranging from 152 – 1,190 m³/day, wider than the range interpreted in Figure 5. The nearby wells with available pumping test data are more than sufficient to meet domestic requirements of 3.4 m³/day.

The bedrock aquifer permeability in the area appears moderate to high. There does not appear to be any correlation between aquifer depth and well productivity. A conservative anticipated yield for future subdivision wells installed in bedrock aquifers below the Site would be between 10 – 30 m³/day (3,653 – 10,958 m³/year or 1.5 – 4.6 imperial gallons per minute), with evidence of higher yielding wells in the area. Sufficient aquifer yields exist in the area to meet the demands of the *Water Act* (3.4 m³/day or 1,250 m³/year) for individual domestic supply wells.

7. EFFECT ON EXISTING GROUNDWATER USERS

Using the Cooper-Jacob equation the expected drawdown through time can be calculated at various radial distances from the supply well as follows:

$$s = \frac{(0.183 \times Q)}{T} \times Log\left(\frac{2.25 \times T \times t}{r^2 \times S}\right)$$

Where:

s	-	Drawdown (m)
S	-	Storativity (S) (5.0 x 10^{-5})
Q	-	Pump rate (3.4 m³/day)
T	-	Average Transmissivity* (92.7 m²/day)
t	-	Time (days)
r	-	Radial distance from pumping well (m)

Water level drawdown at various distances from the pumping well are tabulated as a function of time in Table 3.

Table 3. Cooper-Jacob distance drawdown calculations

Distance (m)/ Time (days)	100	350	525	850	1000	1600	3000
1	0.02	0.01	0.01	0.01	0.00	0.00	0.00
7	0.02	0.02	0.01	0.01	0.01	0.01	0.00
30	0.03	0.02	0.02	0.02	0.01	0.01	0.01
365	0.03	0.03	0.03	0.02	0.02	0.02	0.01
1826	0.04	0.03	0.03	0.03	0.03	0.02	0.02
3652	0.04	0.03	0.03	0.03	0.03	0.03	0.02
7305	0.04	0.04	0.03	0.03	0.03	0.03	0.02

The following assumptions were included in the above calculation: A conservative storativity value of 5.0×10^{-5} for a confined aquifer, a continuous consumption rate of 3.4 m^3/day, average aquifer transmissivity* as determined from the pumping tests interpretations (92.7 m^2/day – See Table 2), no recharge is occurring, and all wells are screened over the same aquifer.

From the above table, we can infer that a neighboring well (< 100 metres) in the same aquifer could experience up to 0.04 metres of additional drawdown over a 20-year (7305 day) pumping period due to pumping from a future supply well on a lot for domestic purposes. This additional drawdown is negligible over a 20-year pumping period and pumping from the new supply wells for domestic purposes will not impact the ability of existing wells to provide water.

As the magnitude of interference drawdown between the future supply wells and existing wells are all calculated to be below 1 metre (Table 3) the proximity of the future supply wells to one another will have minimal impact on well performance. It is recommended that the future wells be placed at least 30 metres apart from one another.

8. AREA WATER QUALITY

A water quality sample was collected from the supply well servicing the residence on the southeast corner of the Site on November 25th, 2024. The water sample was collected by personnel from Darcy's Drilling Services following completion of the 2 hour pumping test on the well and then submitted for routine and microbiological analysis to KaizenLab on November 26th, 2024. The water analysis report for from KaizenLab is attached in Appendix IV and a summary of the results, with a comparison to Health Canada Guidelines for Canadian Drinking Water Quality (2024) is as follows:

Table 4. Area aquifer quality

Parameter	Units	Well ID 476149	CDWQ MAC/AO
Well depth	metres	48.8	
Date sampled	mm/dd/yyyy	11/25/2024	-
pH	pH	8.0	7.0 – 10.5
EC (@ 25˚C)	µS/cm	1,800	--
Calcium	mg/L	12.3	--
Magnesium	mg/L	2.1	--
Sodium	mg/L	397	200

Potassium	mg/L	3.2	--
Chloride	mg/L	<0.5	250
Nitrate	mg/L	<0.010	**10**
Nitrite	mg/L	<0.005	**1**
Sulfate	mg/L	472	500
Manganese	mg/L	<0.05	**0.12**
Bicarbonate	mg/L	578	–
Iron	mg/L	<0.05	0.3
Total Dissolved Solids	mg/L	*1,171*	500
Fluoride	mg/L	<0.10	**1.5**
Total Alkalinity	mg/L	474	--
Escherichia Coliforms	MPN/100mL	<1	**0**
Total Coliforms	MPN/100mL	<1	**0**
MAC – Maximum Allowable Concentration AO – Aesthetic Objective			

The water from the well exceeded aesthetic objectives set for the concentration of sodium and total dissolved solids (TDS). No maximum allowable concentration (MAC) guidelines were exceeded. Future supply wells completed in bedrock aquifers at a similar depth will likely have similar water chemistry and be suitable for use without treatment. It is recommended that a sample from the future supply wells be collected and analyzed prior to long term use to ensure the water meets drinking water quality standards for long-term human consumption.

9. REFERENCES

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10. CLOSURE

This report has been prepared for the sole use of the Kevin & Maureen Lomas and their agents. Any third party that intends to rely on this report must obtain the prior written consent of Arletta Environmental Consulting Corp. Any use of, or reliance on, this report by a third party without the prior written consent of Arletta Environmental Consulting Corp. is the sole responsibility of any such third party. Arletta Environmental Consulting Corp. as author of this report, assumes no liability for damages whatsoever suffered by any party as a result of decisions made or actions taken based on this report. This limitation of liability includes decisions to either purchase or sell the Property.

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If you require additional information, please feel free to contact the undersigned.

Arletta Water Resources

PROFESSIONAL GEOSCIENTIST ALANNA E. FELSKE ID 128102 ALBERTA

Alanna Felske

Digitally signed by Alanna Felske
Date: 2024.12.13 09:30:14 -07'00'

Alanna Felske, P.Geo
Intermediate Hydrogeologist

PROFESSIONAL GEOLOGIST KEN HUGO ALBERTA

2024-12-13

Ken Hugo, P.Geol.
Senior Hydrogeologist

APPENDICES

Appendix I:
Subdivision Plan


Star Lake

Legend

- Original Proposed Area Split in 3 Equal Areas
- Lake/Open Water Area
- Riparian Wetland Area
- Wetland

SW 27-046-06 W5M	
Maureen and Kevin Lomas	
Environmental Assessment	
Figure 2	2024-10-23
Scale: 1:2,000	

HORIZON ENVIRONMENT

Spatial Reference
Name: NAD 1983 10TM AEP Forest

0 100 Meters

Appendix II:
Water Well Reconnaissance Report

Alberta

Reconnaissance Report

View in Imperial

Export to Excel

Groundwater Wells

Please click the water Well ID to generate the Water Well Drilling Report.

GIC Well ID	LSD	SEC	TWP	RGE	M	DRILLING COMPANY	DATE COMPLETED	DEPTH (m)	TYPE OF WORK	USE	CHM	LT	PT	WELL OWNER	STATIC LEVEL (m)	TEST RATE (L/min)	SC_DIA (cm)
350489	SE	33	46	6	5	MID-WEST WATER WELLS LTD.	1990-03-29	36.58	New Well	Domestic		12		HAUSER, MORRIS	6.10	45.46	14.12
351543	NW	22	46	6	5	GORDON'S DRILLING LTD.	1990-05-04	34.75	New Well	Domestic		9		GOBEIL, LAURIER	7.62	159.11	15.24
351978	10	22	46	6	5	MORRILL'S WATER WELL DRILLING LTD.	1990-07-20	49.99	New Well	Domestic		14		KOLTON, ROY	13.11	181.84	13.97
353142	4	27	46	6	5	MORRILL'S WATER WELL DRILLING LTD.	1990-10-09	32.92	New Well	Domestic		17		BUSENIUS, BILL	3.35	113.65	13.97
353904	NE	22	46	6	5	GLEN JOHNSON WATER WELL DRILLING	1986-08-28	43.59	New Well	Domestic		2		WILSON, BUD	10.36	31.82	11.43
354026	3	27	46	6	5	MORRILL'S WATER WELL DRILLING LTD.	1985-07-02	36.27	New Well	Domestic		6		PARSONS, RANDY	5.49	36.37	11.43
357287	NH	22	46	6	5	PANKY'S CONSOLIDATED LTD.	1991-05-09	36.58	New Well	Domestic		5		WISGERS, DON	12.19	136.38	14.12
357983	NW	22	46	6	5	BIG IRON DRILLING LTD.	1991-06-21	42.67	New Well	Domestic		11		SAUKELD, RON	8.53	11.37	13.97
362091	4	27	46	6	5	GLEN JOHNSON WATER WELL DRILLING	1991-08-18	42.67	New Well	Domestic		4	5	HIERLIHY, ARNOLD	4.27	81.83	11.43
364723	4	27	46	6	5	FRASER, RON	1992-05-01	22.86	New Well	Domestic		8		SAMPERT, LLOYD	2.44	68.19	11.43
366509	4	27	46	6	5	HERTZ DRILLING COMPANY LTD.	1992-10-25	22.86	New Well	Domestic		4	25	TERLETSKI, RUDY	2.44	90.92	16.81
376718	NE	22	46	6	5	MORRILL'S WATER WELL DRILLING LTD.	1993-10-08	48.77	New Well	Domestic		14		INGLIS, RANDY	10.67	68.19	13.97
407471	4	27	46	6	5	MORRILL'S WATER WELL DRILLING LTD.	1995-07-10	39.62	New Well	Domestic		15	23	JOHNSON, JIM	6.10	63.65	13.97
467621	4	27	46	6	5	ALKEN BASIN DRILLING LTD.	1997-06-16	36.58	New Well	Domestic		17	12	DRYEN, ROBERT/INEZ	7.92	63.65	13.97
469924	4	27	46	6	5	MID-WEST DRILLING LTD.	1998-06-04	21.34	New Well	Domestic		7	11	CHRONIK, JOHN	4.57	90.92	13.97
469925	4	27	46	6	5	MID-WEST DRILLING LTD.	1997-11-20	18.29	New Well	Domestic		10	5	HENDRICKSON, HOWARD	3.05	227.30	13.97
469926	4	27	46	6	5	MID-WEST DRILLING LTD.	1997-11-20	24.38	New Well	Domestic		16	16	WONGSTEDT, AL	1.52	68.19	13.97
476127	NW	22	46	6	5	BIG IRON DRILLING LTD.	1982-12-30	30.48	New Well	Domestic		5		LYMBURNER, DON	12.19	45.46	14.12
476128	NW	22	46	6	5	VINO'S WATER WELL DRILLING	1986-04-19	91.44	New Well	Domestic		6		LEE, BRIAN	17.37	22.73	13.97
476129	NW	22	46	6	5	FRASER, RON	1988-07-25	27.43	New Well	Domestic		3		CARTER, C.	3.96	22.73	11.43

Alberta

Reconnaissance Report

View in Imperial

Export to Excel

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476130	NH	22	46	6	5	UNKNOWN DRILLER		48.77	Chemistry	Domestic	1			LEE, BRIAN			0.00
476131	NH	22	46	6	5	UNKNOWN DRILLER		36.58	Chemistry	Domestic	1			EMES, ELAINE	30.48		0.00
476132	NH	22	46	6	5	UNKNOWN DRILLER		16.76	Chemistry	Domestic	1			WILSON, J.			0.00
476134	NH	22	46	6	5	MORRILL'S WATER WELL DRILLING LTD.	1989-07-27	30.48	New Well	Domestic		11		GEDDES, DON	9.75	181.84	13.97
476135	NH	22	46	6	5	MORRILL'S WATER WELL DRILLING LTD.	1989-08-15	39.01	New Well	Domestic		17		MCKAY, NEIL	9.75	136.38	13.97
476136	NE	22	46	6	5	UNKNOWN DRILLER	1970-01-01	3.05	Test Hole	Domestic		3		HYDROGEOL CONSULTANTS #TH1			0.00
476137	NE	22	46	6	5	UNKNOWN DRILLER	1970-01-01	3.05	Test Hole	Domestic		4		HYDROGEOL CONSULTANTS #TH2			0.00
476138	NE	22	46	6	5	UNKNOWN DRILLER	1970-01-01	3.05	Test Hole	Domestic		4		HYDROGEOL CONSULTANTS #TH3			0.00
476139	NE	22	46	6	5	UNKNOWN DRILLER	1970-01-01	3.05	Test Hole	Domestic		3		HYDROGEOL CONSULTANTS #TH4			0.00
476140	NE	22	46	6	5	UNKNOWN DRILLER	1970-01-01	3.05	Test Hole	Domestic		3		HYDROGEOL CONSULTANTS #TH5			0.00
476141	NE	22	46	6	5	UNKNOWN DRILLER	1970-01-01	3.05	Test Hole	Domestic		3		HYDROGEOL CONSULTANTS #TH6			0.00
476142	NE	22	46	6	5	BIG IRON DRILLING LTD.	1979-05-31	39.62	New Well	Domestic		12		HAROLD, TOM	9.14	45.46	14.12
476143	NE	22	46	6	5	FRASER, RON	1987-03-29	32.00	New Well	Domestic		5		MELIN, ART	2.44	45.46	12.70
476144	NE	22	46	6	5	UNKNOWN DRILLER		24.38	Chemistry	Domestic				LYMBURNER, DON J.			0.00
476149	4	27	46	6	5	BURGESS, GEORGE WELL DRILLING LTD.	1984-07-06	48.77	New Well	Domestic	1	4		MILLER, DON	18.90	18.18	11.43
476150	4	27	46	6	5	BURGESS, GEORGE WELL DRILLING LTD.	1980-06-30	36.58	New Well	Domestic		8		GARSTAD, RAY			11.58
476151	4	27	46	6	5	KAP'S DRILLING LTD.	1985-07-17	55.78	New Well	Domestic	1	7		BARILKO, JOHN	9.14		11.58
476152	SW	27	46	6	5	UNKNOWN DRILLER		0.00	Chemistry	Domestic				WILTON, H.R.			0.00
476153	3	27	46	6	5	INGLIS WATER WELL DRILLING	1988-01-23	24.38	New Well	Domestic		6		NADEMA, GEO	3.05	45.46	14.12
476154	4	27	46	6	5	KAP'S DRILLING LTD.	1981-08-13	33.53	New Well	Domestic		6		BONE, MICHAEL	3.05	95.47	11.58

Alberta

Reconnaissance Report

View in Imperial

Export to Excel

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476155	4	27	46	6	5	UNKNOWN DRILLER		14.94	Well Inventory	Domestic	1			ADAMS			0.00
476156		27	46	6	5	UNKNOWN DRILLER		30.48	Chemistry	Domestic	1			SADLER, W.D.			0.00
476157	SW	28	46	6	5	FRASER, RON	1981-05-22	35.05	New Well	Domestic & Stock		3		LYKA, ALEX	12.80	6.82	11.58
476158	NW	28	46	6	5	MORRILL'S WATER WELL DRILLING LTD.	1971-05-01	54.86	New Well	Domestic	1	10		PARKER, DONALD	32.00	81.83	13.97
476159	NE	28	46	6	5	BOB'S DRILLING & BACKHOE SERVICE LTD.	1981-03-10	42.67	New Well	Stock		9		SAMSON TRIBAL ENT LTD	6.10	22.73	11.58
477451	12	22	46	6	5	BRADSHAW DM & SONS	1980-06-16	25.60	New Well	Stock		8		BOWHAY, ALLEN	13.72	72.74	14.12
477452	NW	22	46	6	5	UNKNOWN DRILLER		25.91	Chemistry	Domestic	1			ADAMS, LARRY			0.00
477453	NW	22	46	6	5	PLATZ, A. WELL DRILLING	1983-06-08	18.29	New Well	Domestic		4		OBERG, ARNIE	7.01	36.37	14.12
477454	NW	22	46	6	5	UNKNOWN DRILLER		18.29	Chemistry	Domestic	1			LEE, BRIAN			0.00
491858	NW	22	46	6	5	ALKEN BASIN DRILLING LTD.	1998-08-12	35.05	New Well	Domestic		8	13	BUTTERWORTH, CAL	8.53	54.55	13.97
491859	NE	22	46	6	5	RODCO DRILLING	1995-07-16	31.39	New Well	Domestic		5	4	SANDERSON, PAT	9.24	81.83	15.24
491860	4	27	46	6	5	ALKEN BASIN DRILLING LTD.	1999-03-08	42.67	New Well	Domestic		14	8	WEAP, MURRAY	8.84	136.38	13.97
493382	NW	22	46	6	5	SCHMIDT DRILLING LTD.	1995-05-25	30.48	New Well	Domestic		6	9	CANDLER, WES	9.11	100.01	15.24
494920	NE	22	46	6	5	BAR K DRILLING LTD.	1999-08-20	39.62	New Well	Domestic		16	16	BAIRD, WARD/BONNIE	10.21	45.46	15.24
497949	NW	22	46	6	5	BIG COUNTRY DRILLING LTD.	2001-05-20	45.72	New Well	Domestic		10	19	BELTER, GEORGE/LIL	10.06	54.55	15.24
498707	NE	22	46	6	5	MORRILL'S WATER WELL DRILLING LTD.	2001-05-22	45.11	New Well	Domestic		9	14	BADGER, E./C.	10.67	54.55	13.97
499800	10	22	46	6	5	D&D WATER WELL DRILLING & SERVICING LTD.	2001-08-07	35.36	New Well	Domestic		6	11	BRIDGES, DENNIS/HAZEL	12.50	95.47	15.24
499801	3	27	46	6	5	D&D WATER WELL DRILLING & SERVICING LTD.	2001-08-07	29.26	New Well	Domestic		6	15	ENNS, BOB	3.66	109.11	15.24
1060216	3	27	46	6	5	ALKEN BASIN DRILLING LTD.	2002-10-11	54.86	New Well	Domestic		16	10	LANZ, STUART/PAM	9.14	72.74	14.12
1060217	4	27	46	6	5	ALKEN BASIN DRILLING LTD.	2002-10-10	36.58	New Well	Domestic		11	9	ROBERTS, AL	5.18	363.69	14.13

Alberta

Reconnaissance Report

View in Imperial

Export to Excel

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1545391	10	22	46	6	5	MORRILL'S WATER WELL DRILLING LTD.	2002-08-26	46.94	New Well	Domestic		13	17	LORENZ, GWEN	10.36	54.55	13.97
1545394	14	22	46	6	5	MORRILL'S WATER WELL DRILLING LTD.	2004-11-22	42.67	New Well	Domestic		13	19	BARGHOLTZ, LYLE	10.97	54.55	13.97
1545527	6	28	46	6	5	MORRILL'S WATER WELL DRILLING LTD.	2000-10-11	38.40	New Well	Industrial		7		PETRO BANK C/O PAIAK ENG. LTD.	12.19	227.30	13.97
1546057	15	22	46	6	5	MORRILL'S WATER WELL DRILLING LTD.	2008-07-11	39.01	New Well	Domestic		13	21	NORMAND, TROY	9.14	136.38	13.97
1575411	4	27	46	6	5	PAPLEY DRILLING LTD.	2006-09-27	41.15	New Well	Domestic		10	25	CHERBAN, DARREN	7.32	45.46	15.24
1576511	14	21	46	6	5	PAPLEY DRILLING LTD.	2017-09-15	64.01	New Well	Domestic		9	25	PIERCE, ROBIN	16.34	27.28	15.24
1576963	NW	22	46	6	5	PAPLEY DRILLING LTD.	2022-10-01	39.62	New Well	Domestic		5	25	MIKE'S HOMES	10.30	54.55	15.24
1717147	1	33	46	6	5	SUMMERS DRILLING LTD.	2021-03-09	42.67	New Well	Domestic		16	16	WEBER, BARRY & CARRIE	9.24	136.38	15.24
1735487	14	21	46	6	5	TALL PINE DRILLING LTD.	2008-07-01	42.67	New Well	Domestic		5	9	THORNTON, BILL	11.58	68.19	15.24
2085146	2	33	46	6	5	BLACK DOG DRILLING & ENV SERV. LTD.	2009-08-20	42.67	New Well	Domestic		6	10	HAUSER, MORRIS	5.18	136.38	15.24
2085148	2	33	46	6	5	BLACK DOG DRILLING & ENV SERV. LTD.	2009-08-24	42.67	New Well	Domestic		6	9	MARKIW, IHOR	5.79	136.38	15.24
2085149	2	33	46	6	5	BLACK DOG DRILLING & ENV SERV. LTD.	2009-08-24	42.67	New Well	Domestic		8	11	LUMLEY, FRANK	8.53	136.38	15.24
2085152	2	33	46	6	5	BLACK DOG DRILLING & ENV SERV. LTD.	2009-08-17	42.67	New Well	Domestic		8	10	WARREN, MARIAN	9.14	136.38	15.24
2085153	2	33	46	6	5	BLACK DOG DRILLING & ENV SERV. LTD.	2009-08-18	42.67	New Well	Domestic		8	9	SUN SHINE HOMES (2007) INC.	8.53	136.38	15.24
2085154	2	33	46	6	5	BLACK DOG DRILLING & ENV SERV. LTD.	2009-08-18	42.67	New Well	Domestic		8	8	SUN SHINE HOMES (2007) INC.	8.53	136.38	15.24
2085155	2	33	46	6	5	BLACK DOG DRILLING & ENV SERV. LTD.	2009-08-17	42.67	New Well	Domestic		8	11	WARREN, DARRELL	7.92	136.38	15.24
2085156	2	33	6	6	5	BLACK DOG DRILLING & ENV SERV. LTD.	2009-08-20	42.67	New Well	Domestic		6	10	SPRAGUE, KEVIN	5.18	136.38	15.24
2085198	2	33	6	6	5	BLACK DOG DRILLING & ENV SERV. LTD.	2009-10-26	42.67	New Well	Domestic		6	10	SUNSHINE HOMES	6.40	136.38	15.24
2085206	SE	33	46	6	5	BLACK DOG DRILLING & ENV SERV. LTD.	2010-06-21	48.77	New Well	Domestic		7	12	GOGAL, MARVIN	11.58	181.84	15.24
2085243	2	33	46	6	5	BLACK DOG DRILLING & ENV SERV. LTD.	2010-11-03	42.67	New Well	Domestic		7	13	SMITH, JEFF	10.06	136.38	15.24

Alberta

Reconnaissance Report

View in Imperial

Export to Excel

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2085244	2	33	46	6	5	BLACK DOG DRILLING & ENV SERV. LTD.	2010-11-03	42.67	New Well	Domestic		8	13	FAYANT, DERRIK	9.14	136.38	15.24
2085413	2	33	46	6	5	BLACK DOG DRILLING & ENV SERV. LTD.	2012-10-11	42.67	New Well	Domestic		9	11	LACZA, KEVIN	5.79	90.92	15.24
2085440	2	33	46	6	5	BLACK DOG DRILLING & ENV SERV. LTD.	2012-10-31	42.67	New Well	Domestic		8	12	TEBB, KEN & BEV	5.49	113.65	15.24
2085610	2	33	46	6	5	BLACK DOG DRILLING & ENV SERV. LTD.	2014-06-25	42.67	New Well	Domestic		8	14	AHLSKOG	7.92	113.65	15.24
2085651	2	33	46	6	5	BLACK DOG DRILLING & ENV SERV. LTD.	2014-08-14	42.67	New Well	Domestic		8	9	HILDABRANDT, PETER	7.32	113.65	15.24
2085695	2	33	46	6	5	BLACK DOG DRILLING & ENV SERV. LTD.	2015-04-29	42.67	New Well	Domestic		4	14	LLOYD, BRIAN	7.32	113.65	15.24
2085697	2	33	46	6	5	BLACK DOG DRILLING & ENV SERV. LTD.	2015-04-28	42.67	New Well	Domestic		4	13	HOUSENGA, MARVIN & JUDY	7.01	113.65	15.24
2085698	2	33	46	6	5	BLACK DOG DRILLING & ENV SERV. LTD.	2015-04-28	42.67	New Well	Domestic		6	14	RUTLEDGE, BILL	6.40	113.65	15.24
2085721	1	33	46	6	5	BLACK DOG DRILLING & ENV SERV. LTD.	2015-04-29	42.67	New Well	Domestic		6		HAUSER DEVELOPMENT CORP	7.01	90.92	15.24
2085811	2	33	46	6	5	BLACK DOG DRILLING & ENV SERV. LTD.	2015-10-21	42.67	New Well	Domestic		6	14	DUORAK, DEBBIE	9.75	136.38	15.24
2086072	10	22	46	6	5	BLACK DOG DRILLING & ENV SERV. LTD.	2017-09-29	48.77	New Well	Domestic		8	8	DOUCET, RAY	16.46	136.38	15.24
2086282	1	33	46	6	5	BLACK DOG DRILLING & ENV SERV. LTD.	2020-06-22	42.67	New Well	Domestic		6	12	KUNN, RYAN	6.10	181.84	15.24
2086283	1	33	46	6	5	BLACK DOG DRILLING & ENV SERV. LTD.	2020-06-22	42.67	New Well	Domestic		6	13	DOWNEY, DARYL	6.71	181.84	15.24
2086287	1	33	46	6	5	BLACK DOG DRILLING & ENV SERV. LTD.	2020-07-22	42.67	New Well	Domestic		8	10	GRAY, BRETT	7.32	181.84	15.24
2086288	1	33	46	6	5	BLACK DOG DRILLING & ENV SERV. LTD.	2020-07-22	42.67	New Well	Domestic		8	10	FRANCIS, LLOYD	7.01	181.84	15.24
2086298	2	33	46	6	5	BLACK DOG DRILLING & ENV SERV. LTD.	2020-06-24	42.67	New Well	Domestic		6	15	CHOVERIY, DANNY	6.40	181.84	15.24
2086300	1	33	46	6	5	BLACK DOG DRILLING & ENV SERV. LTD.	2020-07-21	42.67	New Well	Domestic		9	11	LUC, ADAM	6.40	181.84	15.24
2086383	2	33	46	6	5	BLACK DOG DRILLING & ENV SERV. LTD.	2021-05-31	48.77	New Well	Domestic		8	11	HO, DIANE	4.57	181.84	15.24
2086438	1	33	46	6	5	BLACK DOG DRILLING & ENV SERV. LTD.	2021-07-07	42.67	New Well	Domestic		6	16	DEGENSTEIN, CLARK	4.27	136.38	15.24
2086585	1	33	46	6	5	BLACK DOG DRILLING & ENV SERV. LTD.	2022-06-29	42.67	New Well	Domestic		7	14	1184819 AB LTD	9.14	68.19	15.24

Alberta

Reconnaissance Report

View in Imperial

Export to Excel

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2086586	1	33	46	6	5	BLACK DOG DRILLING & ENV SERV. LTD.	2022-06-29	42.67	New Well	Domestic		7	14	CHEHADE, KEVIN	9.14	68.19	15.24
2086587	1	33	46	6	5	BLACK DOG DRILLING & ENV SERV. LTD.	2022-06-29	42.67	New Well	Domestic		5	11	CARNAHAN, JOEL & NATASHA	10.67	90.92	15.24
2086589	1	33	46	6	5	BLACK DOG DRILLING & ENV SERV. LTD.	2022-06-03	48.77	New Well	Domestic		9	23	GREKUL, MARY	12.80	22.73	15.24
2086600	14	21	46	6	5	BLACK DOG DRILLING & ENV SERV. LTD.	2022-07-22	54.86	New Well	Domestic		7	14	SUTTON, GRANT	19.81	90.92	14.13
2086643	1	33	46	6	5	BLACK DOG DRILLING & ENV SERV. LTD.	2022-10-04	42.67	New Well	Domestic		7	13	RENWICK, GLEN	9.14	90.92	16.67
2086644	2	33	46	6	5	BLACK DOG DRILLING & ENV SERV. LTD.	2022-10-04	42.67	New Well	Domestic		8	13	HEATH, DOUG	10.67	68.19	16.67
2088566	10	22	46	6	5	DARCY'S DRILLING SERVICES LTD.	2013-07-23	39.01	New Well	Domestic		10	20	RAVENWOOD ENTERPRISES	15.54	81.83	13.97
2089205	3	27	46	6	5	DARCY'S DRILLING SERVICES LTD.	2020-01-06	41.15	New Well	Domestic		8	23	BAIN, SHERRI	7.01	63.65	14.13
2089330	2	33	46	6	5	DARCY'S DRILLING SERVICES LTD.	2021-05-26	42.06	New Well	Domestic		9	23	TEBB, SHANE	7.01	68.19	14.13
9866016	2	33	46	6	5	BEAST DRILLING LTD.	2017-09-07	41.15	New Well	Domestic		11	25	HOUSER DEVELOPMENT CORP	5.18	159.11	15.24
9866017	1	33	46	6	5	BEAST DRILLING LTD.	2017-09-13	36.58	New Well	Domestic		6	25	HOUSER DEVEOPMENT CORP	6.40	140.93	15.24

Appendix III:
AQTESOLV Plots

DARCY'S DRILLING SERVICES LTD.
PEACE · DRAYTON VALLEY

Well Test Report

Date:	November 25 2024	**Land Owner:**	Kevin & Maureen Lomas
Time:	10:15 AM	**Address:**	464019 Range Road 63
Performed By:	Tim Oickle	**Phone Number:**	780-999-3177

WELL INFORMATION

Casing Material:	Galvanized		**Measured Total Depth of Well:**		
Casing Diameter:	4"		**Top of Casing (TOC) relative to Ground Level (GL):**		0.25 m
Water Well Top:	CAP		**Top of Casing (TOC) above Ground (Stick-up):**		
Water Well Condition:		RUSTED	**Pressure Tank:**	BLADDER	
Pump:	SUBMERSIBLE				
Wellhead Completion Type:	Pitless Adaptor				

Groundwater discharged through pressure system:		NO	**Digital Picture taken of well head:**	YES	
Water Level lowered to pump intake during test:		NO	**Water well Use:**	Domestic	
Used for Irrigation:		NO	**Number of People:**	4	**Number of Animals:** 1

GROUNDWATER QUALITY CONCERNS

Corrosion of Water well casing:	YES		**Sediment in Groundwater:**		NO
Description:	Slight Rust		**Description:**	Clean & Clear	
Water Treatment		Absent	**Change in Water Quality**		NO
Odour:	NONE				

GROUNDWATER DETAILS

Appearance:	Clear		**Sediment:**		NO
Odour:	None		**Description:**		
Gas Present:		NO	**Explain:**		

Groundwater sampling location disinfected:	YES		**Sample Taken From:**	Hose End
First Sample:	12:30 PM		Date:	*11/25/2024*
	Routine			Microbiological

DARCY'S DRILLING SERVICES LTD.
PEACE - BRITISH VALLEY

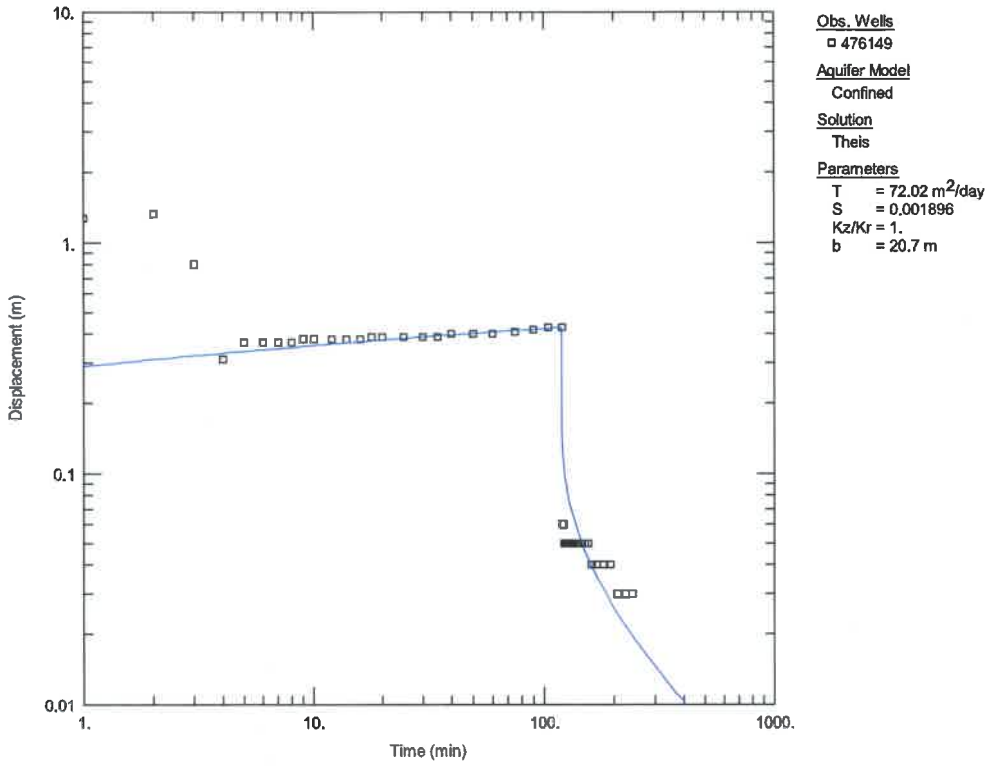
Well Test Report

Measurements take from TOP OF CASING

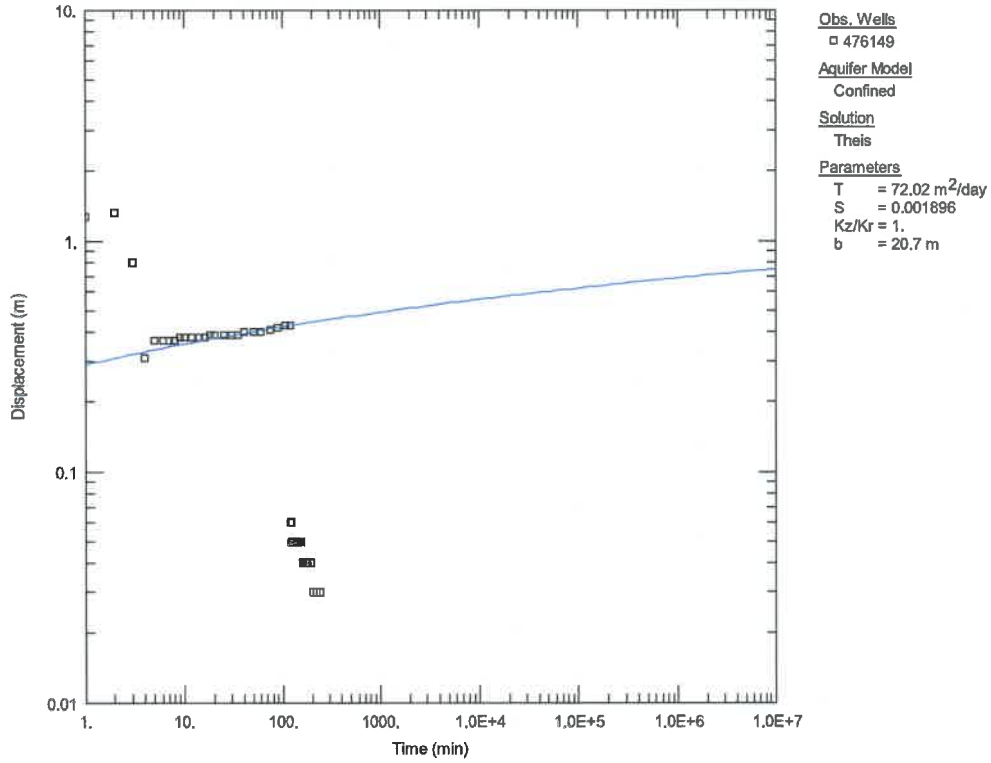
PUMPING INTERVAL Time	Depth to Water Level M	Discharge GPM	RECOVERY INTERVAL Time	Depth to Water Level M
-5	2.88			
0	2.88			
1	4.15		1	2.94
2	4.21		2	2.94
3	3.68		3	2.93
4	3.19		4	2.93
5	3.25		5	2.93
6	3.25		6	2.93
7	3.25		7	2.93
8	3.25		8	2.93
9	3.26		9	2.93
10	3.26		10	2.93
12	3.26		12	2.93
14	3.26		14	2.93
16	3.26		16	2.93
18	3.27		18	2.93
20	3.27		20	2.93
25	3.27		25	2.93
30	3.27		30	2.93
35	3.27		35	2.93
40	3.28		40	2.92
50	3.28		50	2.92
60	3.28		60	2.92
75	3.29		75	2.92
90	3.30		90	2.91
105	3.31		105	2.91
120	3.31		120	2.91

Well Test Report

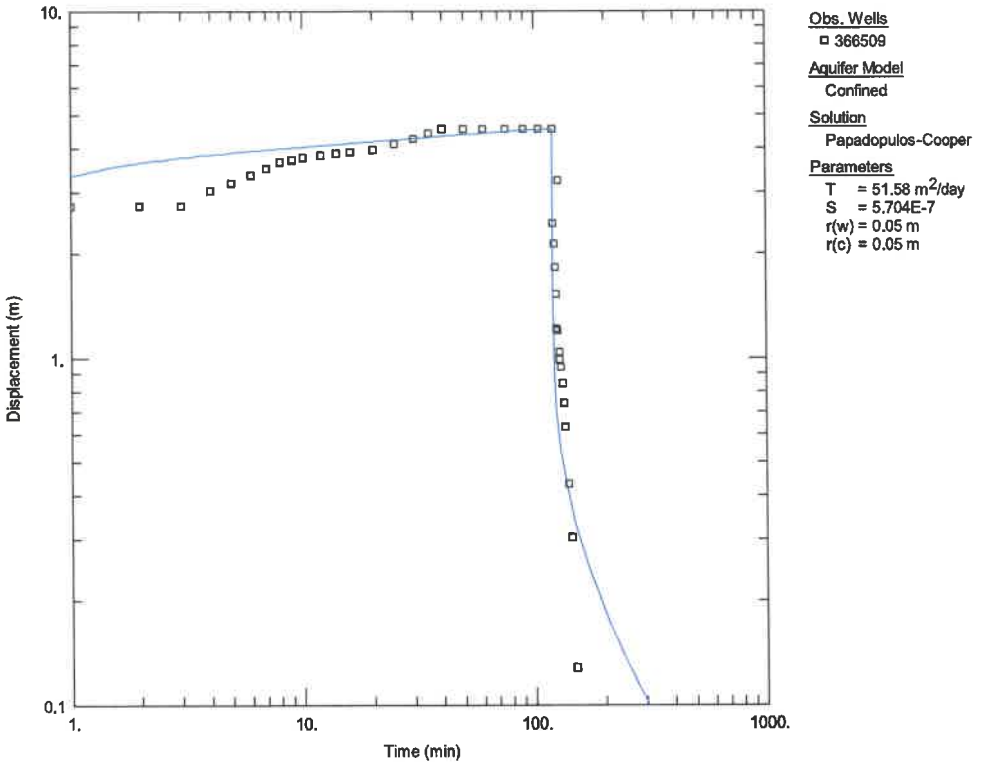
PICTURES



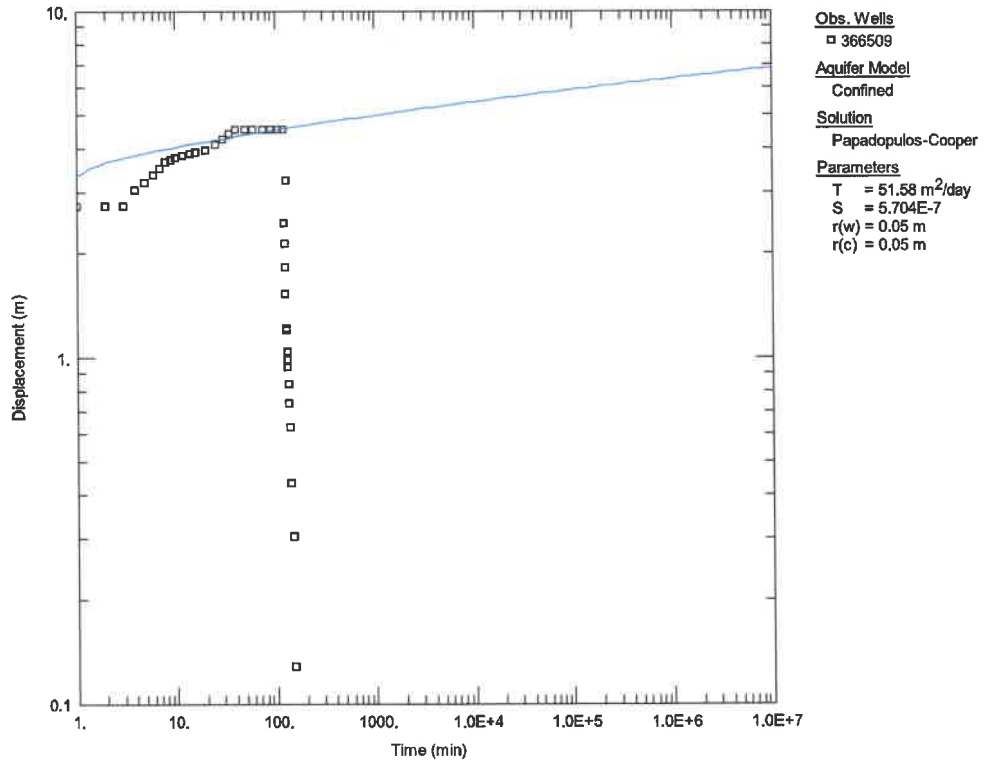
III.A. Pumping test solution fit to data from GIC Well ID 476149



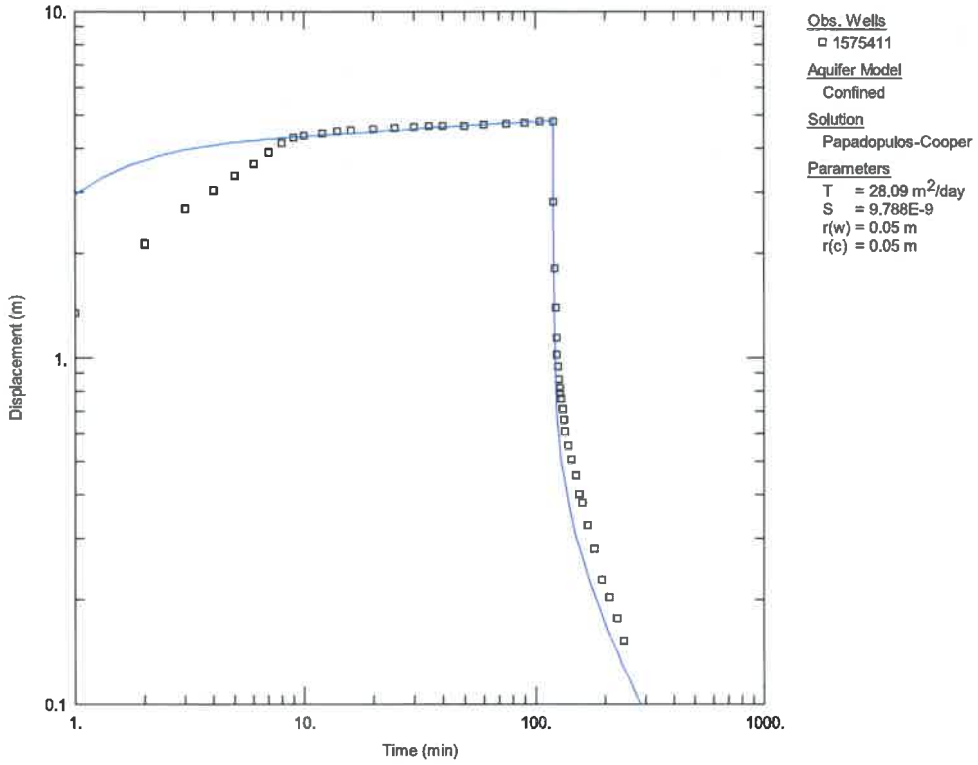
III.B. Solution extrapolated to 20 years of pumping



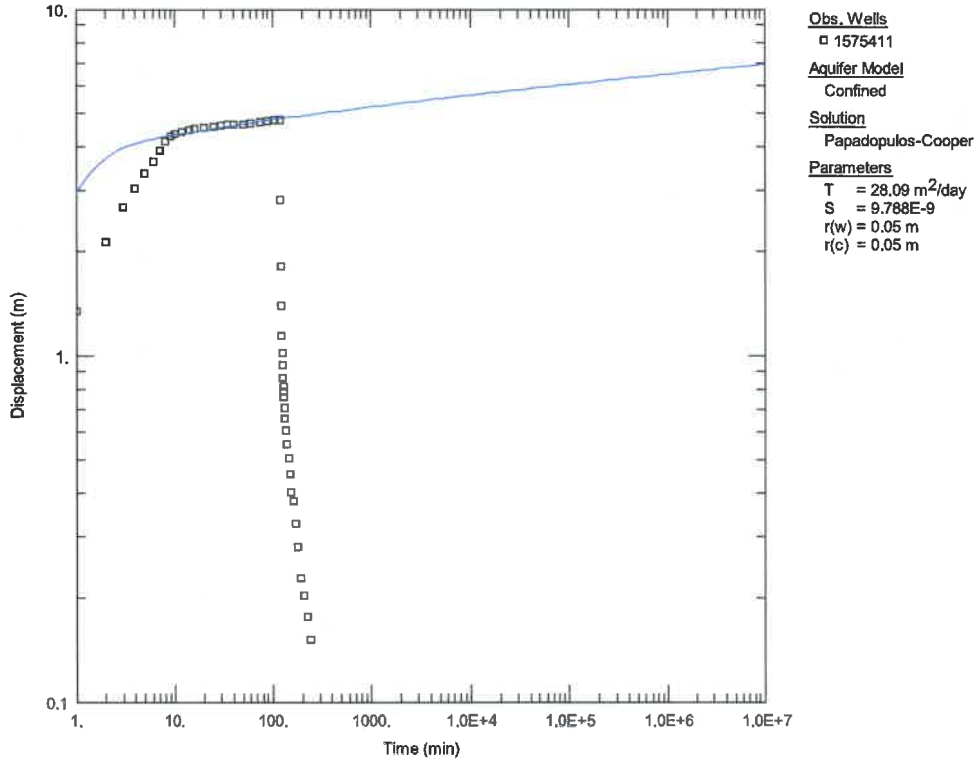
III.C. Pumping test solution fit to data from GIC Well ID 366509



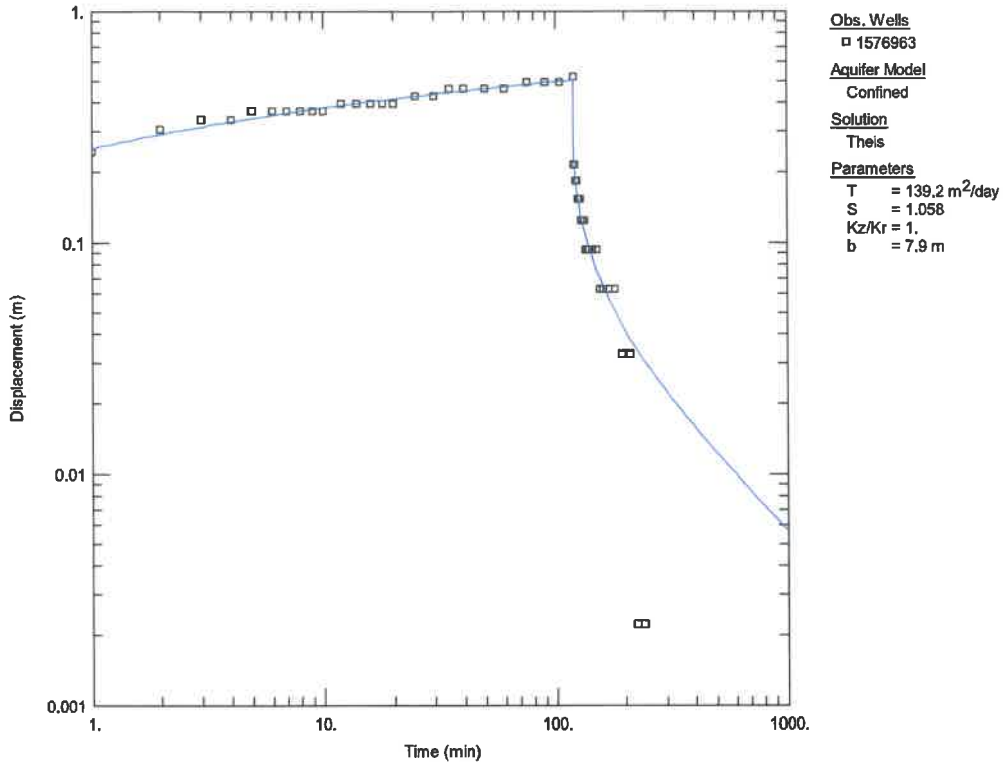
III.D. Solution extrapolated to 20 years of pumping



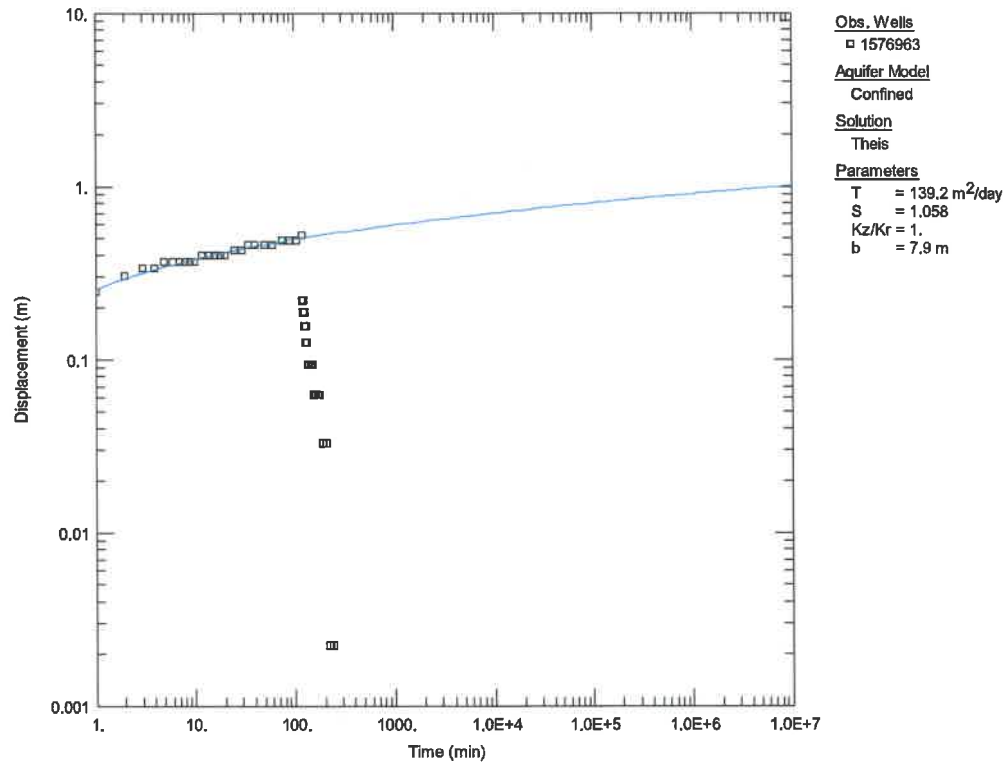
III.E. Pumping test solution fit to data from GIC Well ID 1575411



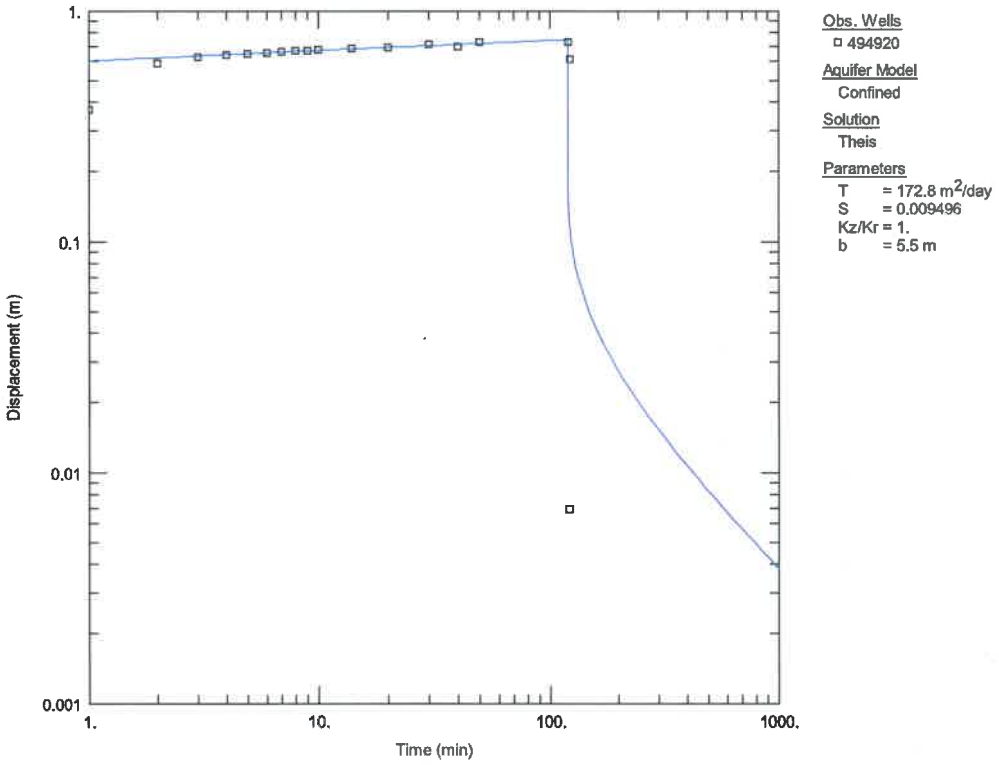
III.F. Solution extrapolated to 20 years of pumping



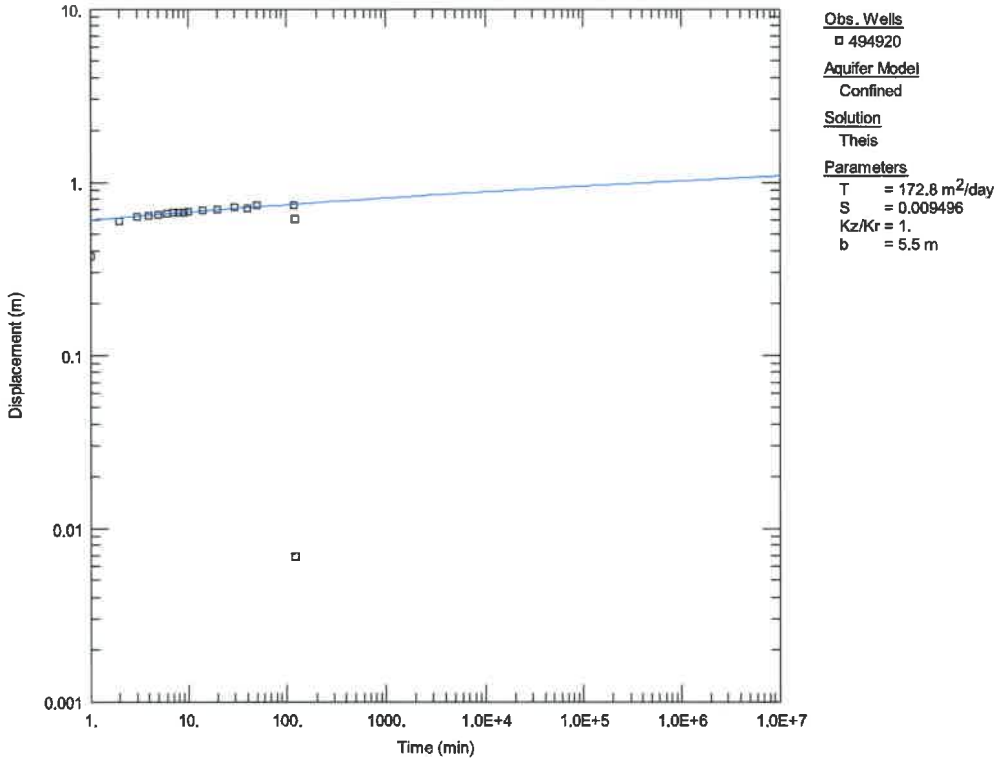
III.G. Pumping test solution fit to data from GIC Well ID 1576963



III.H. Solution extrapolated to 20 years of pumping



III.I. Pumping test solution fit to data from GIC Well ID 494920



III.J. Solution extrapolated to 20 years of pumping

Appendix IV:
Water Quality Reports

Unit# 288, 2880 45 Ave S.E.
Calgary, AB, T2B 3M1
Phone (403) 297-0868
Fax: (403) 297-0869

KaizenLAB

ANALYTICAL REPORT

Client: Darcy's Drilling Services Ltd.
1-3614 67 St
Ponoka, AB T4J 1J8

Attention: Mike Schmidt

KaizenLAB JOB #:	342054
DATE RECEIVED:	26-Nov-2024
DATE REPORTED:	03-Dec-2024
PROJECT ID:	Kevin Lomas
LOCATION:	

KaizenLAB Sample #: 342054_001 **Sample ID:** Hose
Date Sampled: 12:30 25-Nov-2024

Parameter Description	Units	Result	Guideline Limits*	Comment
Basic Water Potability Analysis (Potability pkg #1)				
Electrical Conductivity (EC) at 25°C	uS/cm	1800		
pH		8.0	7.0-10.5 (AO)	Acceptable
Potability Package Calculations				
Ion Balance (calculated)	%	106.66		
Total Dissolved Solids (calculated)	mg/L	1171	500 (AO)	Unacceptable
Alkalinity Parameters of Water				
Alkalinity (phenolphthalein, as CaCO3) [1]	mg/L	<2.0		
Alkalinity (total, as CaCO3)	mg/L	474.4		
Bicarbonate (as HCO3) [1]	mg/L	578.4		
Carbonate (as CO3) [1]	mg/L	<1.5		
Hydroxide (as OH) [1]	mg/L	<0.5		
Anions in Water by IC				
Bromide	mg/L	<0.10		
Chloride	mg/L	<0.50	250 (AO)	Acceptable
Fluoride	mg/L	<0.10	1.5 (MAC)	Pass
Nitrate-N	mg/L	<0.010	10 (MAC)	Pass
Nitrite-N	mg/L	<0.005	1 (MAC)	Pass
Nitrite-N + Nitrate-N	mg/L	<0.015		
Phosphate	mg/L	<0.10		
Sulphate	mg/L	472.2	500 (AO)	Acceptable
Cations in Water by ICP-OES				
Dissolved Calcium	mg/L	12.3		
Dissolved Iron[1]	mg/L	<0.05	0.3 (AO)	Acceptable

*CDWQG = Canadian Drinking Water Quality Guidelines, Health Canada 2024: MAC = Maximum Acceptable Concentration (affects health), AO = Aesthetic Objective (does not affect health but affects color, taste, etc.), OG = Operational Guidance

Unit# 288, 2880 45 Ave S.E.
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Phone (403) 297-0868
Fax: (403) 297-0869
e-Mail: kaizenlab@kaizenlab.ca

KaizenLAB

KaizenLAB Sample #: 342054_001 **Sample ID:** Hose
Date Sampled: 12:30 25-Nov-2024

Parameter Description	Units	Result	Guideline Limits*	Comment
Dissolved Magnesium	mg/L	2.1		
Dissolved Manganese[1]	mg/L	<0.05		
Dissolved Potassium	mg/L	3.2		
Dissolved Sodium	mg/L	396.6	200 (AO)	Unacceptable
Hardness (calculated, as CaCO3)	mg/L	39.3		
Sodium Adsorption Ratio		27.52		
Total Coliforms and E. Coli in water				
E. Coli	MPN/100mL	<1	0 (MAC)	Pass
Total Coliforms	MPN/100mL	<1	0 (MAC)	Pass

Test Methodologies

Alkalinity in Water: Modified from SM 2320 B
Anions in Water: Modified from SM 4110 B
Cations in Water by ICP-OES: Modified from SM 3030 B and SM 3120 B
E. coli in Water: Modified from SM 9223 B
Electrical Conductivity in Water: Modified from SM 2510 B and CCME Guidance Manual Volume 4, 2016
pH of Water: Modified from SM 4500-H+ B
Total Coliforms in Water: Modified from SM 9223 B
Total Dissolved Solids and Ion Sums/Ratios (calculation): Modified from SM 1030 E

Final Review by:

Irene De Leon
Client Services Representative

Note: The results in this report relate only to the items tested and as received. Information is available for any items in 7.8.2.1 of ISO/IEC 17025:2017 that cannot be put on a test report. The report shall not be reproduced except in full without written approval of KaizenLAB. The validity of results may be affected if the information is provided by the customer.
Test methodologies are accredited in accordance with ISO/IEC 17025 via CALA, unless otherwise specified in the description of the methods .
[1]This analyte is not accredited, even though analyzed by an accredited methodology.

Pass/Acceptable: The measurement result conforms with the specification limit when the measurement uncertainty is taken into account.
Pass/Acceptable:** It is not possible to state conformance using a 95 % coverage probability for the expanded uncertainty although the measurement result is below the limit.
Fail/Unacceptable: The measurement result does not conform with the specification limit when the measurement uncertainty is taken into account.

The statement of conformity is based on a 95% coverage probability for the expanded uncertainty. The test results and the statement of conformance with specification in this report relate only to the test sample as analysed/tested and not to the sample/item from which the test sample was drawn.

APPENDIX 3

Abandoned Well Map