MAYWOOD
Environmental Ltd

Biophysical Assessment

SE29-040-22-W4M

Prepared for:

Taves Management Inc.

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May 2019

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1. INTRODUCTION

Maywood Environmental Ltd. (Maywood) was contracted by Taves Management Inc. to conduct a Biophysical Assessment of the land parcel SE29-040-22 W4M. The assessment is based on information available through desktop reviews and field data collected on April 28, 2019.

2. STUDY AREA LOCATION

The Site is located in Lacombe County, Alberta approximately 1 km west of the Hamlet of Mirror at SE29-040-22-W4M (52.467163°, -113.129950° at the center) (Figure 1). Highway 50 borders to the south and Township Road 223 runs along the east edge.

The Site was cultivated until the 1970's then seeded to grass. The area is characterized by low to medium topography and limited wetlands. The surrounding landscape is pasture and is used for grazing.

3. PHYSIOGRAPHIC DESCRIPTION

The Site is in the Central Parkland Natural Subregion of the Parkland Natural Region of Alberta (Natural Regions Committee 2006, Alberta Parks 2015). The Parkland Natural Region is the most populated region in the province and has been influenced by agriculture since the 1800's. The Central Parkland Natural Subregion is the largest subregion within the Parkland Region, encompassing 88 % of the Region. The Subregion is cultivated with patches of aspen forest and prairie vegetation communities encompassing 5 %.

The Central Parkland Subregion has an intermediate climate, with characteristics of the cool, moist north and the warm dry south (Natural Regions Committee 2006, Alberta Parks 2015). Rainfall peaks in July with significant amounts in June and August.

4. HISTORICAL AIR PHOTOS

Historical air photos were ordered from Alberta Environment and Parks and reviewed for land use changes, determining historical boundaries and the presence of wetlands in relation to the project footprint. Air photos were selected to provide seasonal climatic information that may be visible

from the air including drought and flooding.

Most notable in the historical air photos is the channel improvement completed in 1988 (Plan 8821758), Parlby Creek no longer crosses into the SE section of 29-040-W4M and a channel runs the entire section between the SW and SE sections. Other areas of interest include the treed section in the NE section and the SW section, both may indicate depressional areas or areas where water is more abundant and have the potential to form marshes. General mottling across the section is indictive of a hummocky, pothole topography.

Table 1. Historical air photos 1949 to present. See Appendix for air photos (Figure 2 - 9).

Air Photo (MM/DD/YY)	Photo ID (Roll AS# and Photo)	Resolution	Season	Monthly and/or Yearly Precipitation (mm)
1949	49-83A AS-0151_238	40000 B/W Super	N/A	N/A
1966 August	66-83A AS-0946_133	31680 B/W Kodak-XX	Summer	96.18 / 441.47
11/11/75	75-169 AS-1440_041	31680 B/W Pan-2405	Fall	9.45 / 458.92
1980	80-121 83A AS-2157_132	60000 B/W Pan-2405	N/A	515.21
03/06/86	586-025 AS-3287_297	25000 B/W Kodak-2405	Spring	57.9 / 519.41
27/05/92	T92-009 AS-4260_326	20000 B/W Kodak-XX	Spring	54.79 / 475.33
28/07/97	97-169 AS-4863_072	10000 B/W Agfa-200	Summer	47.69 / 440.09
2007	07-021 83Asw AS-5408_148	40000 B/W	N/A	443.46

5. FIELD ASSESSMENT

A biophysical assessment was conducted on April 28, 2019. The project foot print was traversed on foot. GPS coordinates and photographs were taken at all assessment points. Topography, hydrology, vegetation, wildlife and soils were investigated during the field visit and are described below.

6. TOPOGRAPHY

A desktop search was conducted of the Alberta Soil Information Viewer on January 10, 2019 (Government of Alberta 2019a). The project footprint is comprised of two topographical areas. The largest area is dominated by undulating, low relief topography with 2 % limiting slopes (U1l). The smallest area of the Site is the south eastern corner with a hummocky, low relief topography and 6 % limiting slopes (H1l).

Topography for the project footprint during the onsite visit are characterized as stated above; the surficial expression was undulating with low relief topography. A dugout with distinct edges was observed near the W fence line, in the SW quadrant of the quarter section. Majority of the surface water drains to the marsh area adjacent to the acreage. A small portion of the surface water drains to a low area within the project foot print.

7. GEOLOGY

A review of the Alberta Geological Survey Open – Alberta Interactive Minerals Map on January 12, 2019 (Government of Alberta 2019c) indicates the Site is located within in the Horseshoe Canyon formation dating to the Upper Cretaceous period (Figure 10). The Horseshoe Canyon formation is the lower part of the Edmonton Group with a maximum thickness of 350 meters and three separate designations: Upper, Middle and Lower (Holter, Chu and Yurko 1976).

The Horseshoe Canyon formation contains sandstone, mudstones, carbonaceous shales, and coal seams. A variety of depositional environments are represented in the succession, including floodplains, estuarine channels, and coal swamps.

Further review of the Alberta Interactive Minerals Map does not indicate any substantial mineral content within the project footprint.

8. HYDROLOGY

The Site is located within the South Saskatchewan River Basin and the Red Deer River watershed (Government of Alberta 2019d). Parlby Creek, a non-fish bearing creek runs from the NW to the SW sections of LSD 29-040-22-W4M and appears to have undergone channel improvement under Plan 882 1758 (Figure 11) in the summer of 1988. Parlby Creek as per 1992 Air Photos no

longer crosses into the SE section and remains confined to the SW section of 29-040-22-W4M.

A Water Crossing Restriction (April 16 to June 30) was discovered under the Red Deer Management area due to the class C water body designation on the channel improvement that drains into Buffalo Lake. At this time, there is no intention for any work to occur on or near the channel and as such this restriction does not apply to work occurring onsite. If any work is to occur on or near the channel this restriction would need to be reviewed and adhered to.

Review of the Alberta Merged Wetland Inventory (AMWI) in GeoDiscover Alberta on January 20, 2019, located several potential marshes within the Site location (Figure 12). An estimated wetland value for section 29-040-22-W4M was also provided (Figure 13) through the Alberta Wetland Rapid Evaluation Tool (ABWRET) in GeoDiscover Alberta on January 20, 2019. ABWRET indicates 24 Ha of potential wetlands in various categories (Class A = 6 Ha, Class C = 3 Ha and Class D = 14 Ha). Historical air photos provided additional detail indicating low, treed areas within the areas designated as marshes.

The Site visit on April 28, 2019 confirmed a marsh identified using AMWI are not within the footprint of the proposed Site. A shrubby riparian area was identified as a potential marsh and observed in the SW quadrant.

A low lying, ephemeral drainage path was identified within the proposed Site, where meltwater accumulates during spring snow melt. The low lying area had saturated the soils at the time of the assessment. There was no standing water or wetland species established in the drainage path. This area is not characteristic of a marsh but is consistent with a temporary meltwater drainage (Figure 14).

A review of GeoDiscover Alberta for Groundwater Vulnerability on January 20, 2019 indicates the potential of Medium and High risk to shallow groundwater quality by the potential impacts of surficial activities (Figure 15). Supplemental reports for storm water discharge and geotechnical can be obtained from Verity Lands to provide mitigation measures during construction and operations activities.

9. FLORA

The Site is located in the Central Parkland Natural Subregion (Natural Regions Committee 2006, Alberta Parks 2015). This Subregion is a transitional area with species characteristic of dry grasslands and moist forests. Native forest vegetation in this Subregion is characterized by

trembling aspen (*Populus tremuloides)* and balsam poplar (*Populus balsamifera*) forests with woody shrubs such as red osier dogwood (*Cornus stolonifera*), beaked hazelnut (*Corylus cornuta*), and bracted honeysuckle (*Lonicera involucrate*) dominating the understory. Native grassland species include plains rough fescue (*Festuca hallii*), June grass (*Koeleria macrantha*), and western wheat grass (*Pascopyrum smithii*). The Site is located in seed zone CP 1.2. The productive soils in the region have been used primarily for agricultural purposes with native vegetation sporadically present across the Subregion.

A desktop search of the ACIMS database was conducted on January 9, 2019 (Figure 16 and 17) and no rare plant communities or rare species were detected within the project footprint. There were no recent or historical occurrences of clubroot in the Site area (Figure 18 and 19) (Lacombe Country 2019).

During the April 28, 2019 site visit, vegetation consisted of heavily grazed tame pasture species with trembling aspen (*Populus tremuloides)*, balsam poplar (*Populus balsamifera*), red osier dogwood (*Cornus stolonifera*), saskatoon (*Amelanchier alniflolia*), *Salix* spp. and prickly wild rose (*Rosa acicularis*) community understory where woody vegetation exists. Due to grazing activities and timing of assessment, some grass species were not identifiable.

In the SE quadrant the vegetation consisted of the following: trembling aspen (*Populus tremuloides)*, balsam poplar (*Populus balsamifera*), red osier dogwood (*Cornus stolonifera*), wolf willow (*Elaeagnus commutate*), prickly wild rose (*Rosa acicularis*), buckbrush (*Symphoricarpos occidentalis*), currant/gooseberry *(Ribes* spp.), *Poa* spp., sagebrush buttercup (*Ranunculus glaberrimus*), smooth brome (*Bromus inermis*), yarrow (*Achillea millefolium*), pasture sage (*Artemesia cana*), prairie sage (*Artemisia frigida*), sagebrush buttercup (*Ranunculus glaberrimus*), *Festuca* spp., reed canary grass (*Phalaris arundinacea*) and Canada thistle (*Cirsium arvense*) inflorescences.

In the SW quadrant the vegetation consisted of the following: trembling aspen (*Populus tremuloides)*, balsam poplar (*Populus balsamifera*), *Salix* spp., saskatoon (*Amelanchier alnifolia*), currant/gooseberry (*Ribes* spp.), buckbrush (*Symphoricarpos occidentalis*), pasture sage (*Artemesia cana*), prairie sage (*Artemisia frigida*), pussy toes (*Antennaria* spp.), white clover (*Trifolium repens*), sage brush buttercup (*Ranunculus glaberrimus*), yarrow (*Achillea millefolium*), C*inquefoil* spp., *Poa* spp., *Festuca* spp., dandelion (*Taraxacum officinale*) and Canada thistle (*Cirsium arvense*) inflorescences.

In the NW quadrant the vegetation consisted of the following: *Poa* spp., smooth brome (*Bromus*

inermis), *Festuca* spp., *Agropyron* spp., sagebrush buttercup (*Ranunculus glaberrimus*), pasture sage (*Artemesia cana*), pasture sage (*Artemesia cana*), prairie sage (Arte*misia frigida*) and lichen species.

In the NE quadrant the vegetation consisted of the following: *Salix* spp., buckbrush (*Symphoricarpos occidentalis*), currant/gooseberry *(Ribes* spp.), field dock (*Rumex* spp.), pasture sage (*Artemesia cana*), prairie sage (*Artemisia frigida*), sagebrush buttercup (*Ranunculus glaberrimus*), *Festuca* spp., *Poa* spp., C*inquefoil* spp. and Canada thistle (*Cirsium arvense*) inflorescences.

There were no visual occurrences of rare or listed plant species within the project foot print during the field visit. The grazing intensity and timing of the assessment indicates a low potential for rare plant occurrences to be within the project foot print.

10. FAUNA

The Fisheries and Wildlife Management Information System (FWMIS) was searched on January 9, 2019 (Government of Alberta 2019b). Fish occurrences were detected outside of the Site footprint. No fish species were detected within the project area. The project footprint was highlighted as Sharp Tailed Grouse Habitat and Sensitive Raptor-Bald Eagle range, but no occurrences of those species are recorded in the FWMIS database.

Table 2. Wildlife species habitat detected in the project footprint.

Scientific Name	Common Name	Status 2015	Status 2010	Status 2005	Comments
Haliaeetus leucocephalus	Bald Eagle	Sensitive	Sensitive	Sensitive	A species once at risk throughout much of its North American range, but now recovering; low density in Alberta. Nests vulnerable to human disturbance, and as such, require protection.
Tympanuchus phasianellus	Sharp Tailed Grouse	Sensitive	Sensitive	Sensitive	A common, widespread species; however, population appears to be declining, and farming intensification has decreased habitat availability in central Alberta.

Adapted from Government of Alberta 2018.

During the April 28, 2019 on site assessment, one red tailed hawk was observed near the project foot print. Wild life trees were observed onsite during the assessment with pileated woodpecker activity. There is evidence of porcupines browsing the woody vegetation during the winter months. None of the species identified in the FWMIS search in the desktop review were observed at the time of the assessment. No other nests or denning activities were observed during the assessment.

11. SOIL

The Site is predominantly located within polygon 15345 of the Alberta Soil Information Viewer (Government of Alberta 2019a) found during a search on January 12, 2019. The desk top review indicates the soils on site consist of an Orthic Black Chernozem on moderately course textured (SL) sediments deposited by wind or water (PHS) and Gleysolic soils on undifferentiated materials (ZGW) of the dominate Peace Hills series and the co-dominate Ponoka series. A smaller section in the south eastern corner, polygon 15318, consists of an Orthic Black Chernozem on moderately course texture sediments deposited by wind or water (PHS) and poorly drained soils and soils that are finer textured than the dominant or co-dominant soils (18), also of the Peace Hills soils series and Ponoka soils series.

A review of the Red Deer Soil Survey Sheet indicates Peace Hills sandy loams are well to somewhat excessively drained soils mainly on level to undulating topography, developed on materials of alluvial deposition. Fine sandy loam is made up predominantly of fine sand and tend to be slightly heavier in texture than the other sandy loams, and the profiles consequently have more structure. The fine sandy loams are found on level topography and the heavy textured D horizon is often found within the average plant feeding range. The sandy loam soils may be made up predominantly of medium sand or the areas may be mixtures of containing coarse, medium and fine sandy loam profiles.

Peace Hills sandy loams can be distinguished in the field by a deep black sandy surface horizon, a thin lighter coloured horizon directly below the black and fairly loose sandy subsoil. The profiles are stone free (Bowser, Peters and Newton 1951).

Also associated with the Peace Hills sandy loam is the Ponoka Loam, developed on materials deposited in relatively slow-moving water, and therefore, have a fairly uniform texture throughout.

Ponoka loams are well drained soil usually found on level to gently undulating topography, are

medium textured black soils developed on a sandy loam to clay loam parent material of alluvial-lacustrine deposition over glacial till. The deposition is often lighter in texture in the lower layers than in the upper portion. Immediately above till contact is usually a sandy loam to gravelly loam deposition.

Ponoka loam generally can be recognized by a deep black surface horizon, a thin light-coloured subsurface horizon, and a uniform somewhat sandy subsoil. The areas are usually stone free although in places there is a concentration of boulders at the contact of the till and overlaying material (Bowser, Peters and Newton 1951).

During the April 28, 2019, on site visit four soil pits were dug in each quadrant of the pasture (Figure 14). Each hole was indicative of the typical soils that existed within the quadrant.

SE Pit #1 (Figure 20 and 21) consisted of a topsoil depth of 15 cm, with a slight colour change between the A and B horizon. The soil texture was a sandy loam with a granular-massive structure to both the A and B horizon. The soils are well drained, with no rooting restrictions observed. Sandy loams could be vulnerable to wind erosion during construction activities. There were no visual areas of soil contamination noted during assessment.

SW Pit #2 (Figure 22 and 23) consisted of topsoil a soil depth of 21 cm, with a slight colour change between the A and B horizon. The soil texture was a sandy loam with a granular-massive structure to both the A and B horizon. The soils are well drained, with no rooting restrictions observed. There was one natural blowout (Figure 24) observed in this quadrant and cattle have been utilizing the blowout. Sandy loams could be vulnerable to wind erosion during construction activities. There were no visual areas of soil contamination noted during assessment.

NW Pit #3 (Figure 25 and 26) consisted of topsoil a soil depth of 18 cm, with a slight colour change between the A and B horizon. The soil texture was a sandy loam with a granular-massive structure to both the A and B horizon. The soils are well drained, with no rooting restrictions observed. There were several natural blowouts observed in this quadrant and cattle have been utilizing these blowouts. Sandy loams could be vulnerable to wind erosion during construction activities. There were no visual areas of soil contamination noted during assessment.

NE Pit #4 (Figure 27 and 28) consisted of topsoil a soil depth of 20+ cm, with a slight colour change between the A and B horizon. The soil texture was a loam with a sub angular blocky structure in the A horizon. The soils were saturated at the time of the assessment, but had no standing water on the surface. Wet loamy soils are susceptible to compaction during construction activities. There were no visual areas of soil contamination noted during assessment.

12. CONSERVATION RECOMMENDATIONS

12.1 Environmental Reserve/Environmental Reserve Easement

Through the desktop search, no environmental features requiring protection or to provide public access to or along lakes and rivers were noted. The Site visit on April 28, 2019 confirmed this assessment.

12.2 Municipal Reserve

Through the desktop search, the study area is likely not a suitable land base for the development of recreation facilities for the use and enjoyment of County residents and the general public. There were no areas noted during the desktop search that indicated the study area provides important access links to other lands, including water access, or offers undeveloped green spaces that act as buffers between different land uses. The onsite visit on April 2, 2019 confirmed this assessment.

13. MITIGATION AND MONITORING RECOMMENDATIONS

Most of the proposed project foot print will occur on well drained sandy loam soils. No critical habitat for the FWMIS listed species were observed during the April 28, 2019 assessment. Tree clearing will occur near the ATCO facility to allow for access to the construction areas and proposed project foot print. Clearing should be completed after the migratory bird breeding season (April to September). The shrubby marsh in the SW quadrant, adjacent to the acreage is projected to be outside the project foot print and should remain intact.

The objective of mitigations outlined in this assessment report are to ensure that construction and operation activities minimize soil erosion potential, disruption to drainage patterns, sediment runoff and the spread of undesirable species during construction activities. There is a responsibility for the owner to return disturbed areas, where possible, within the project foot back to equivalent land capability.

Construction Phase Recommended Mitigations:

- Ensure erosion and sediment control measures around the construction area are in place to prevent sediment runoff from entering the marsh area in the SW corner.

- Strip topsoil to the depth of the colour change. Ensure topsoil and subsoil stockpiles are separated (at least 1 m apart).
- Ensure culverts are installed and are maintained properly during construction and operations of the access road into the project foot print.
- Ensure all equipment is cleaned prior to arriving onsite. This will mitigate the spread of undesirable species along with any potential clubroot spores.
- Ensure an approved (in consultation with landowner) and No. 1 certified seed mix is used to re-seed any areas disturbed during construction activities. The seed mix seed certificate should be reviewed for any noxious weeds prior to purchasing.
- Retain, where possible, wildlife trees suitable for habitat in the woody vegetated areas of the site.

Operations Phase Recommended Mitigations:

- Maintain vegetative cover where possible to aid in the erosion of the sandy loam soils.
- Ensure there is a wet weather contingency plan. Stop work in wet conditions or implement matting to ensure there is no rutting or compaction to soils.
- Ensure that surface water discharge is being monitored regularly to prevent an excess of sediment loading and soil erosion into any sensitive areas, such as the marsh, low lying areas, and off site.

14. CLOSURE

Maywood would like to thank Taves Management Inc. for the opportunity to work on this project. Should you have any questions or concerns please contact the undersigned at 403-358-2509.

Cheryl Quaschnick (Thesen), B.Sc. P.Ag
Environmental Specialist

Permit to Practice 4659

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APPENDIX

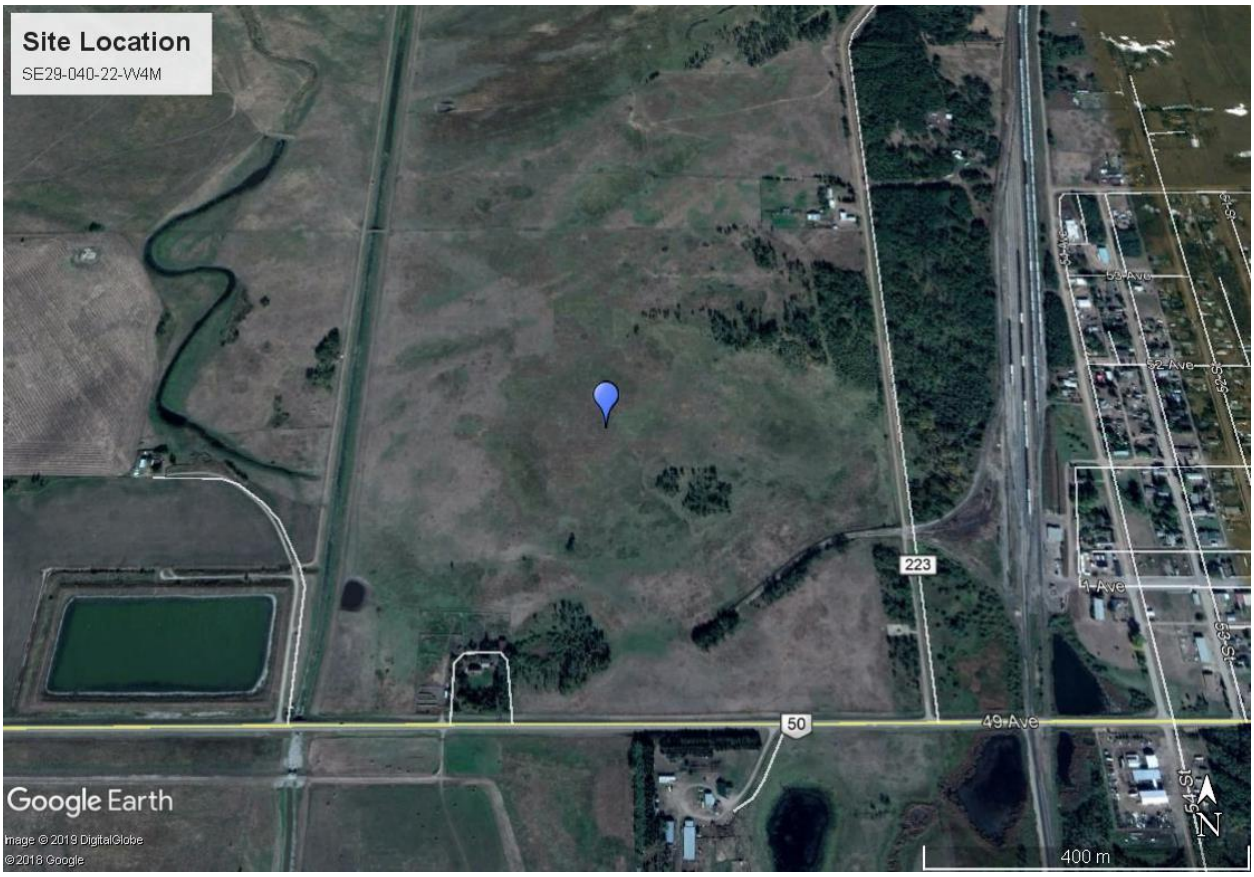

Figure 1. Site location marked at the center (Google Earth 2019).

Figure 2. Historical air photo 1949 SE29-040-22-W4M.

Figure 3. Historical air photo 1966 SE29-040-22-W4M.

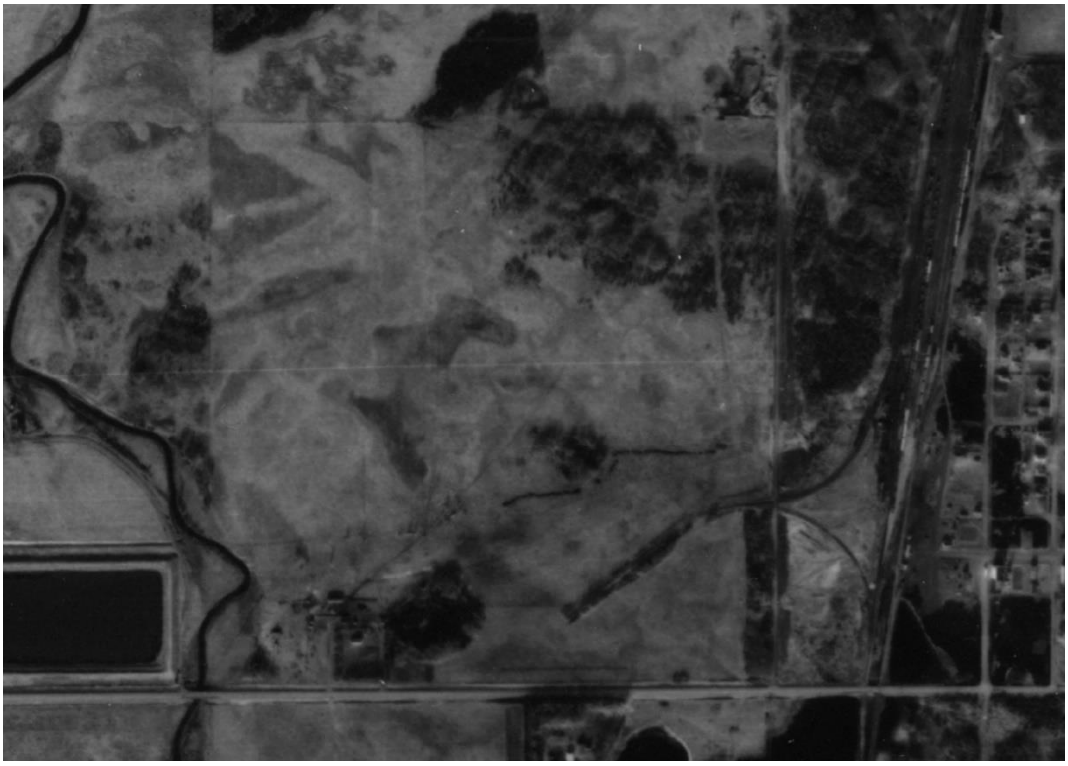

Figure 4. Historical air photo 1975 SE29-040-22-W4M.

Figure 5. Historical air photo 1980 SE29-040-22-W4M.

Figure 6. Historical air photo 1986 SE29-040-22-W4M.

Figure 7. Historical air photo 1992 SE29-040-22-W4M.

Figure 8. Historical air photo 1997 SE29-040-22-W4M.

Figure 9. Historical air photo 2007 SE29-040-22-W4M.

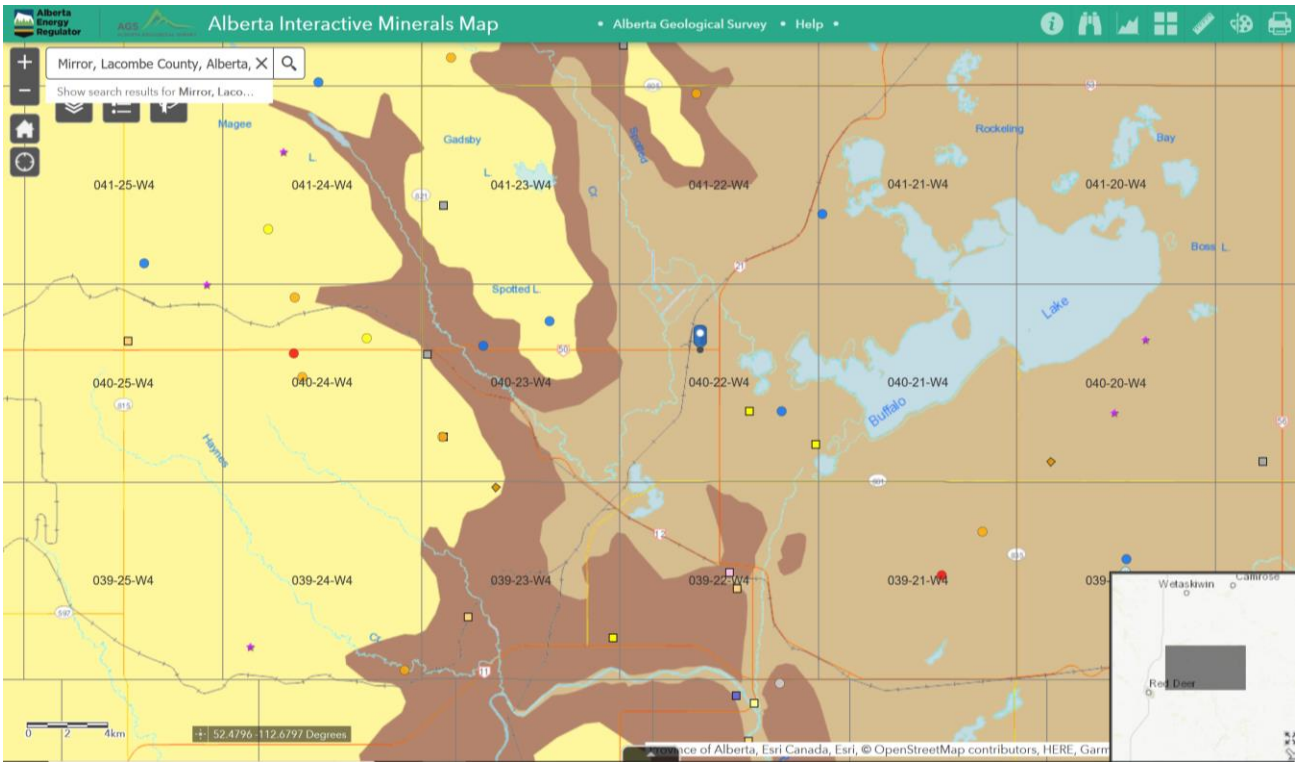

Figure 10. Map results from the Alberta Geological Survey – Alberta Interactive Minerals Map search (AIMM, 2019).

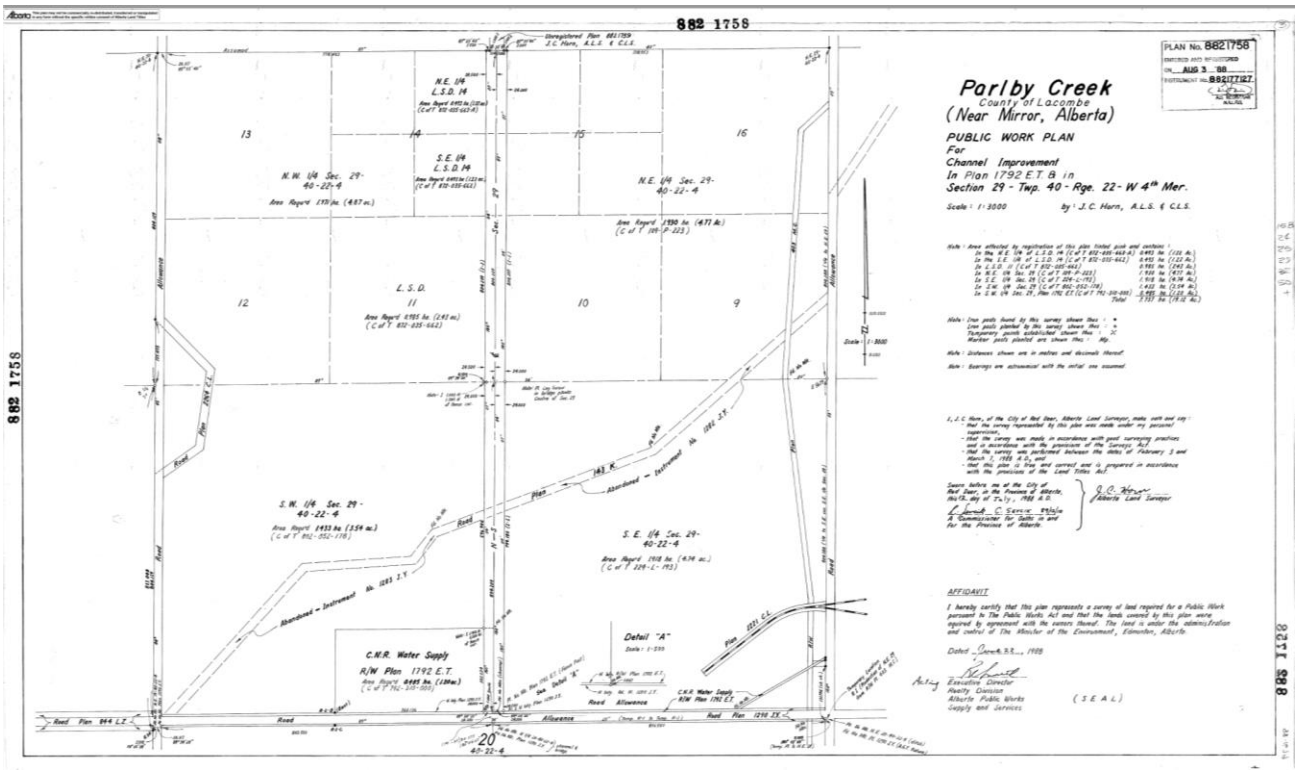

Figure 11. Parlby Creek Channel Improvement August 03, 1988.

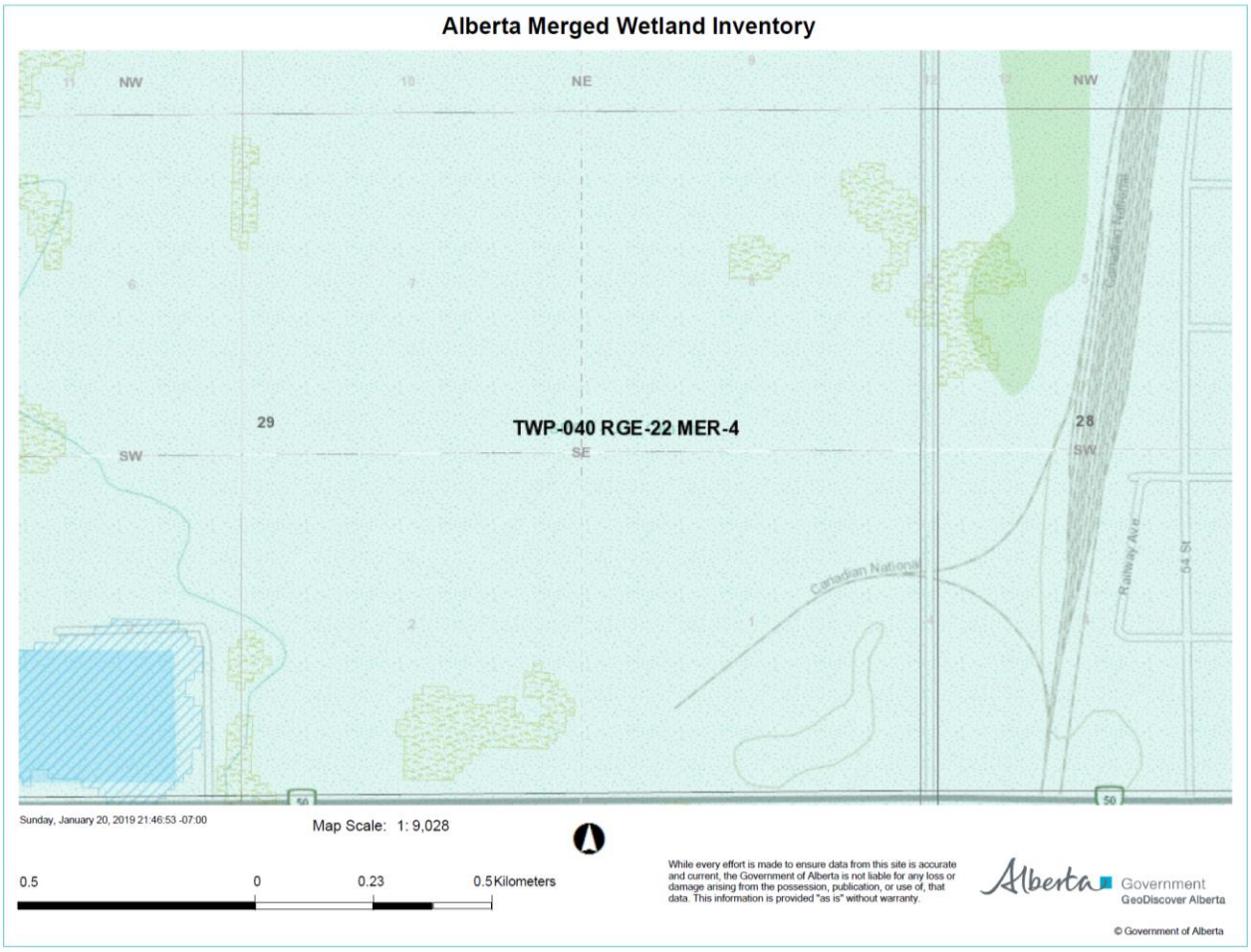

Figure 12. Map of results from GeoDiscover - Alberta Merged Wetland Inventory (AWMI, 2019).

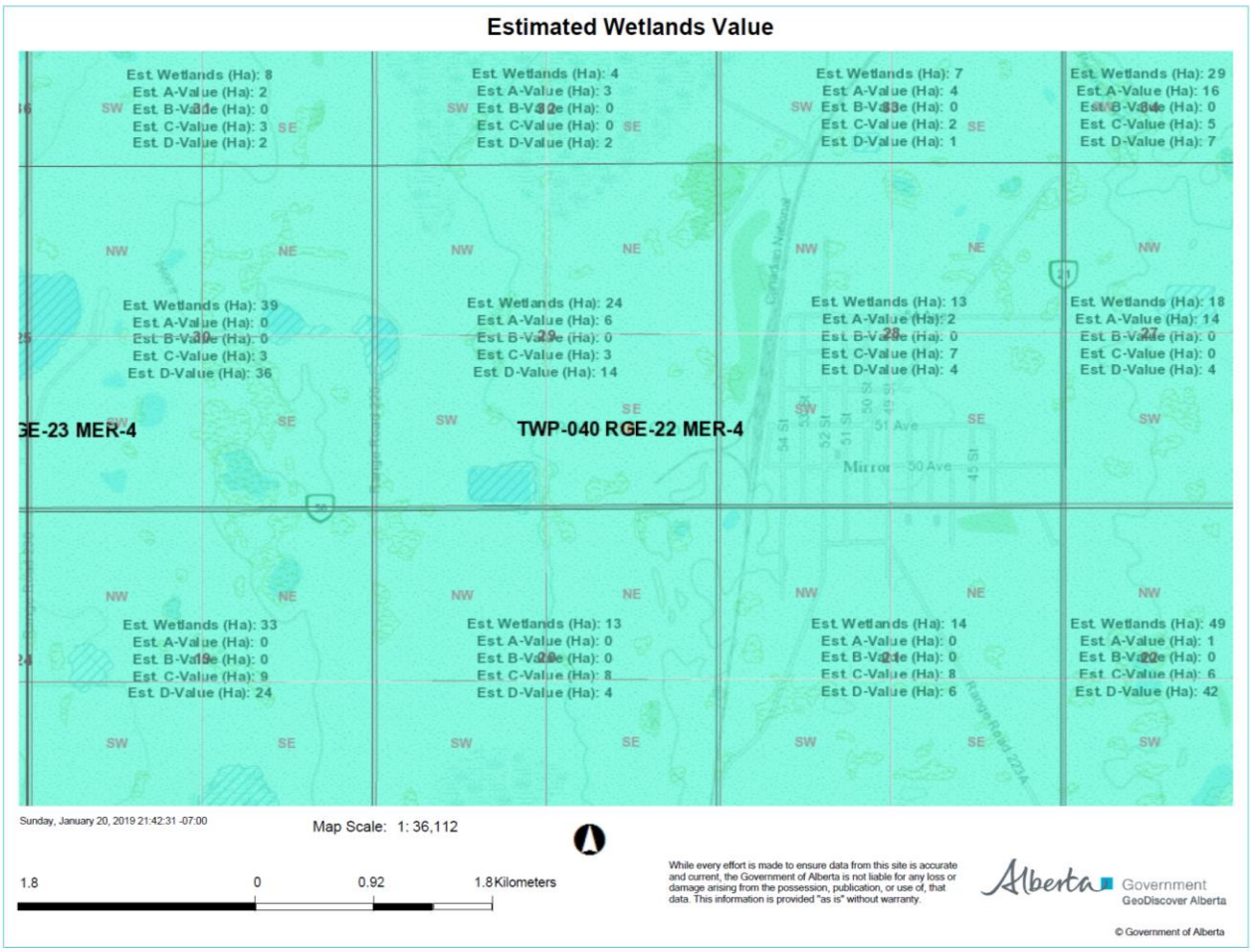

Figure 13. Map of results from GeoDiscover - Alberta Wetland Rapid Evaluation Tool (ABWRET, 2019).

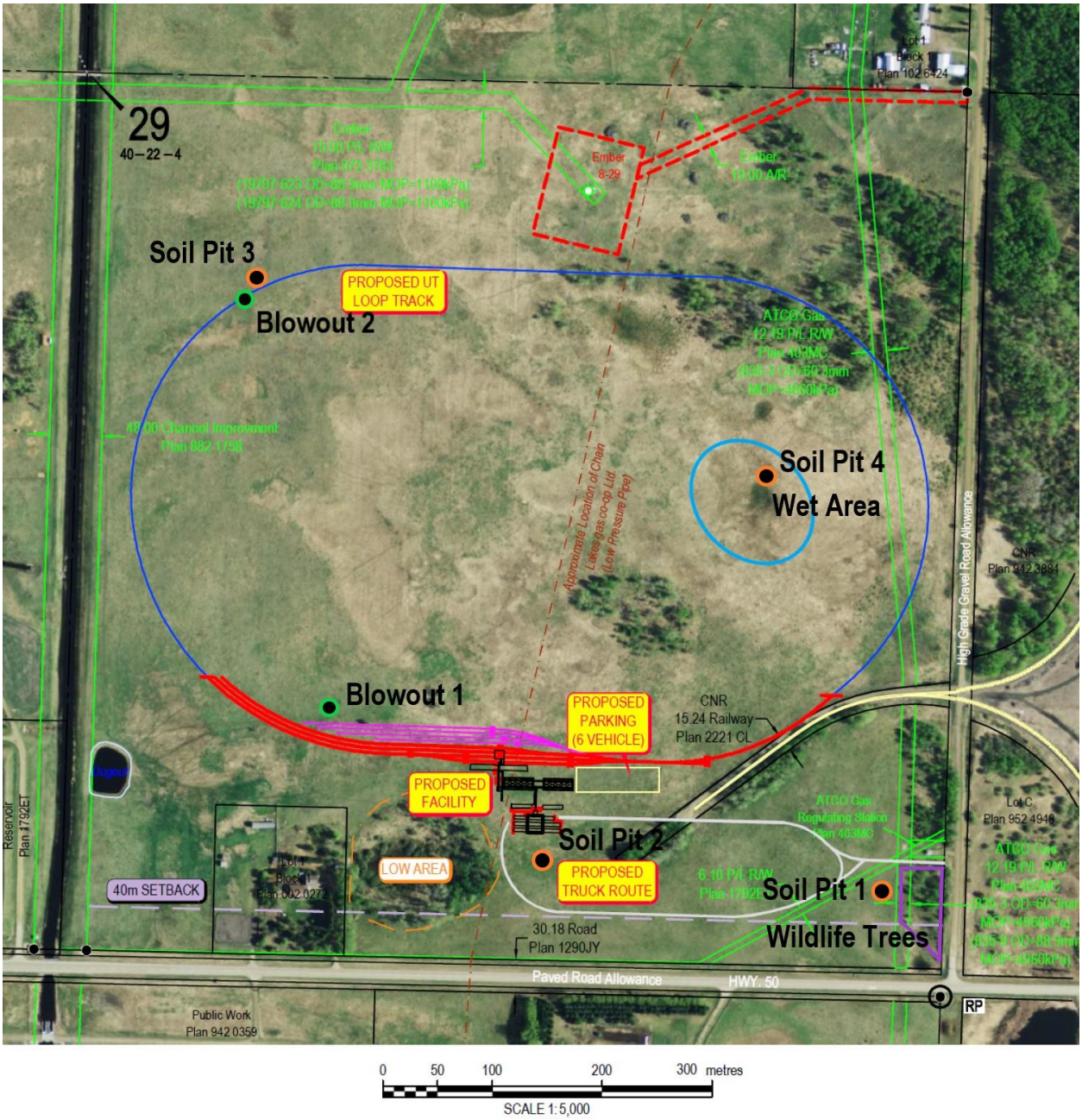

Figure 14. Survey Results SE29-040-22 W4M.

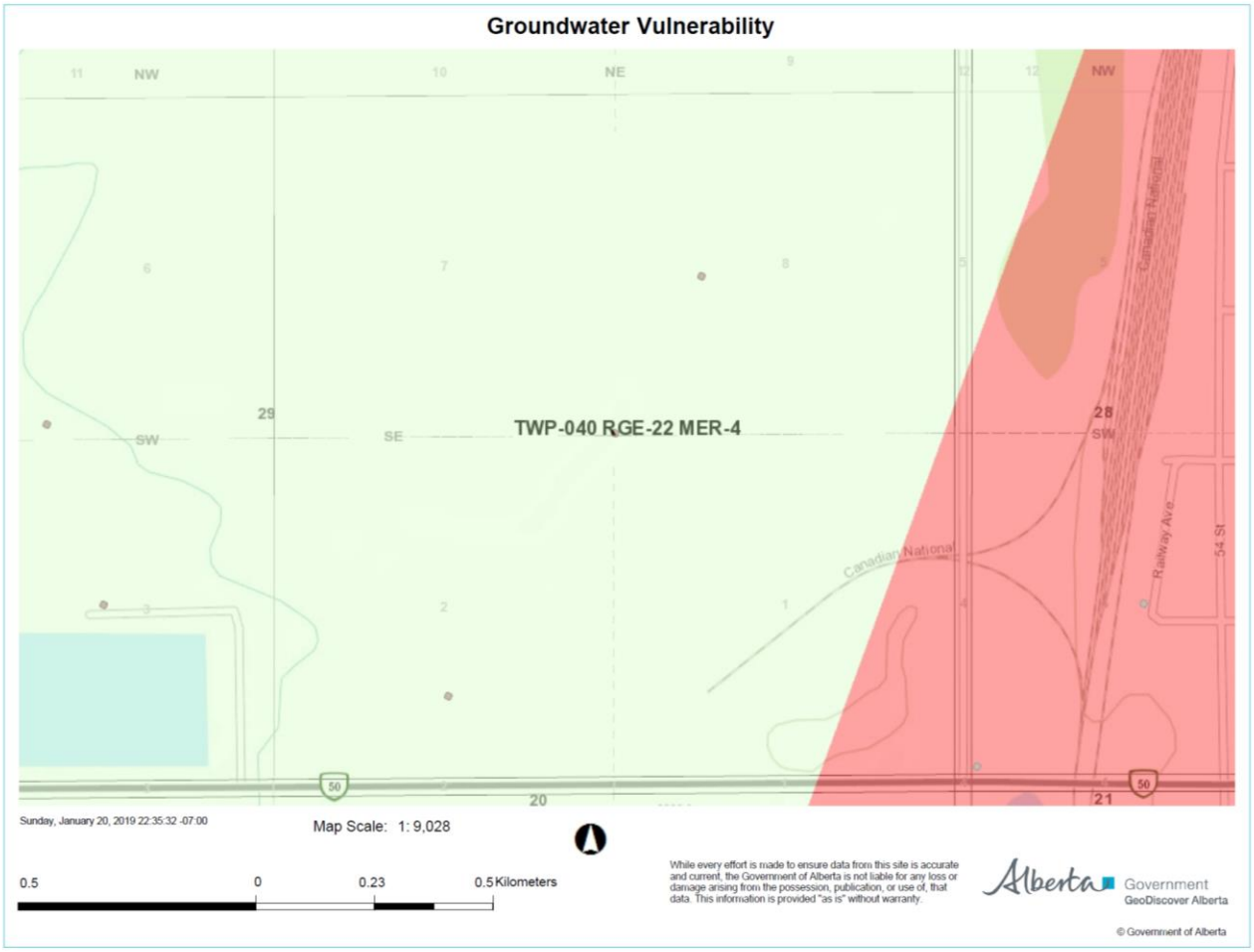

Figure 15. Map of results from GeoDiscover Alberta – Groundwater Vulnerability Red Deer Region (2019).

Date: 9/1/2019
Requestor: Consultant
Reason for Request: Environmental Assessment
SEC: 29 **TWP:** 040 **RGE:** 22 **MER:** 4

Alberta Parks

Non-sensitive EOs: 0 (*Data Updated:October 2017*)

M-RR-TTT-SS	EO_ID	ECODE	S_RANK	SNAME	SCOMNAME	LAST_OBS_D
No Non-sensitive EOs Found: Next Steps - See FAQ						

Sensitive EOs: 0 (*Data Updated:October 2017*)

M-RR-TTT	EO_ID	ECODE	S_RANK	SNAME	SCOMNAME	LAST_OBS_D
No Sensitive EOs Found: Next Steps - See FAQ						

Protected Areas: 0 (*Data Updated:October 2017*)

M-RR-TTT-SS	PROTECTED AREA NAME	TYPE	IUCN
No Protected Areas Found			

Crown Reservations/Notations: 0 (*Data Updated:October 2017*)

M-RR-TTT-SS	NAME	TYPE
No Crown Reservations/Notations Found		

Figure 16. Results of the Alberta Conservation Information Management System search (ACIMS 2019).

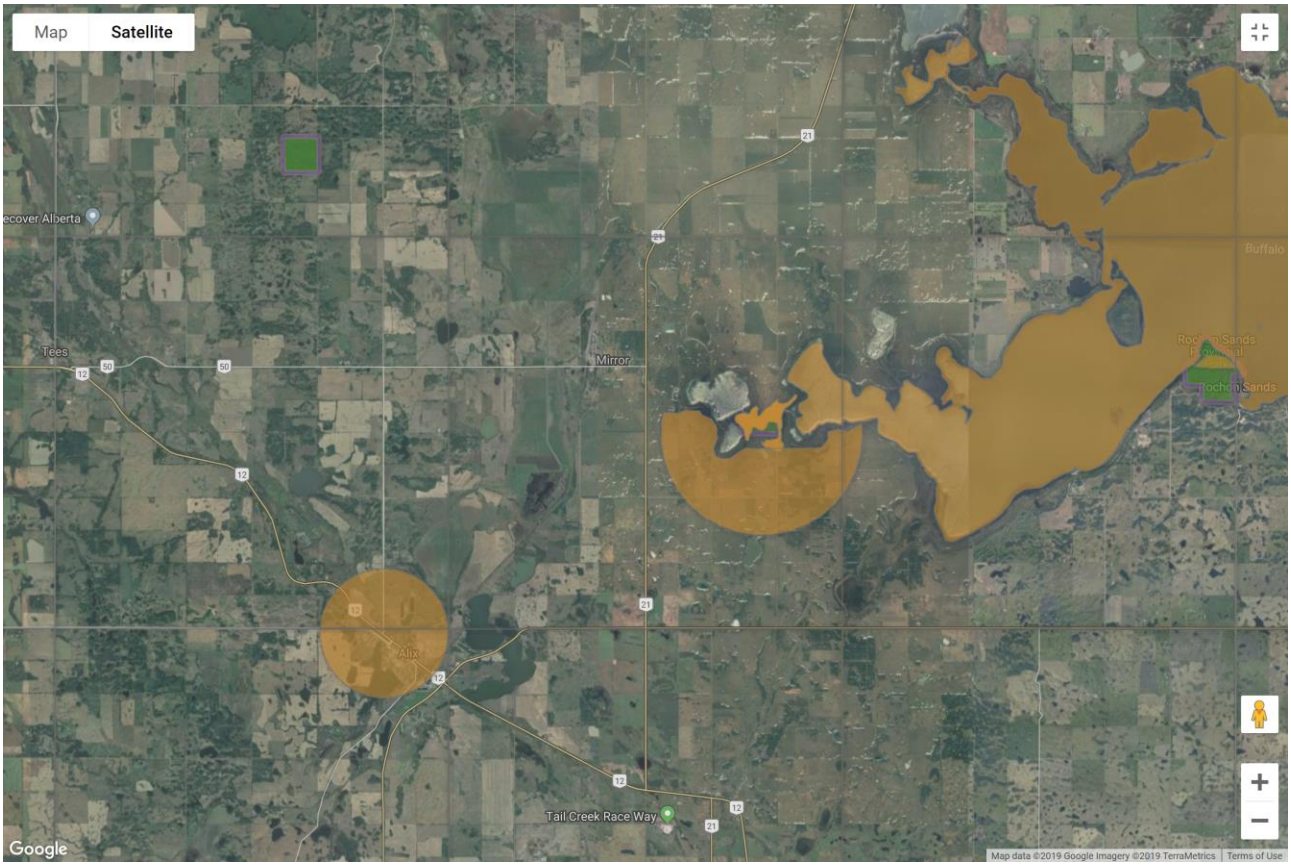

Figure 17. Map of results from the Alberta Conservation Information Management System search (ACIMS 2019).

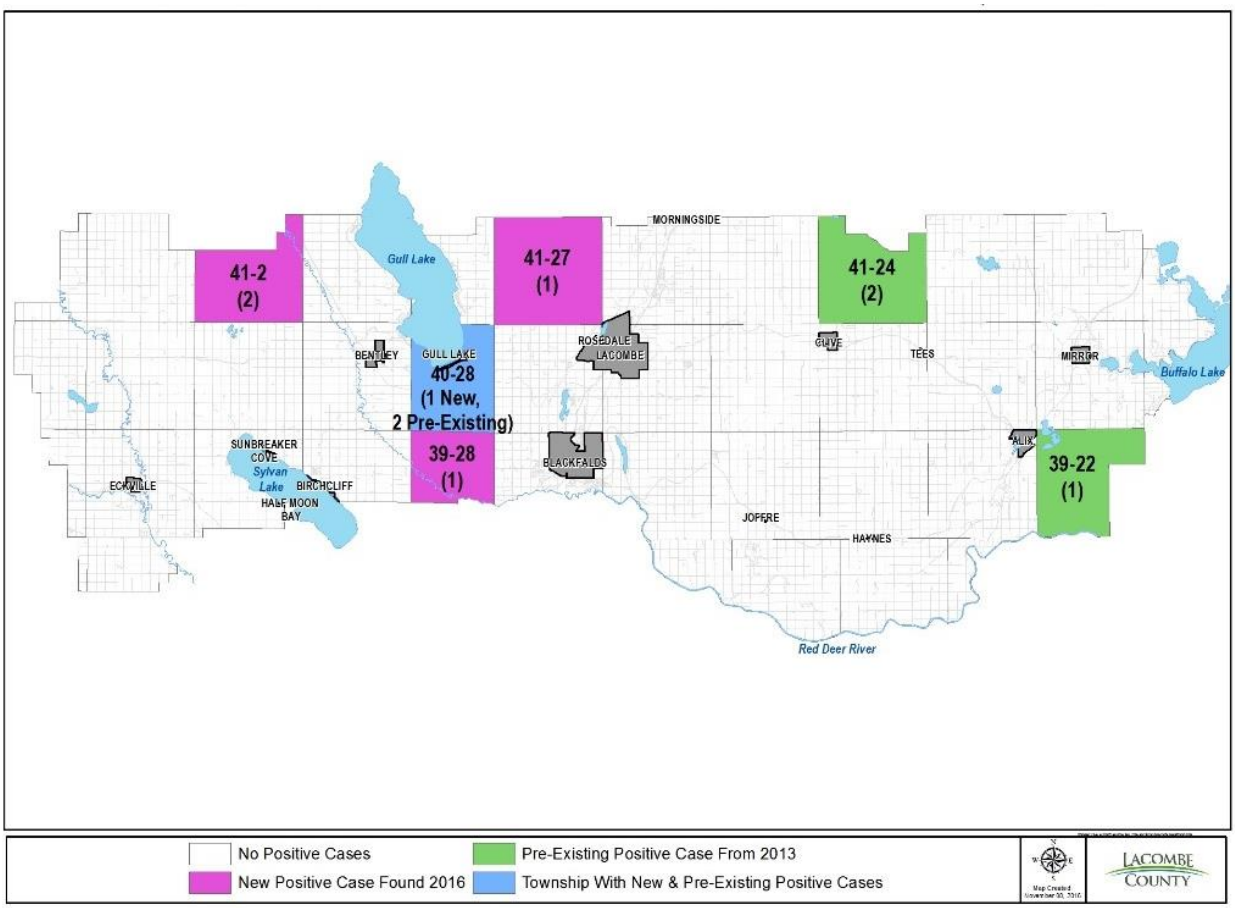

Figure 18. Clubroot occurrences in Lacombe County in 2016 (Lacombe County 2019).

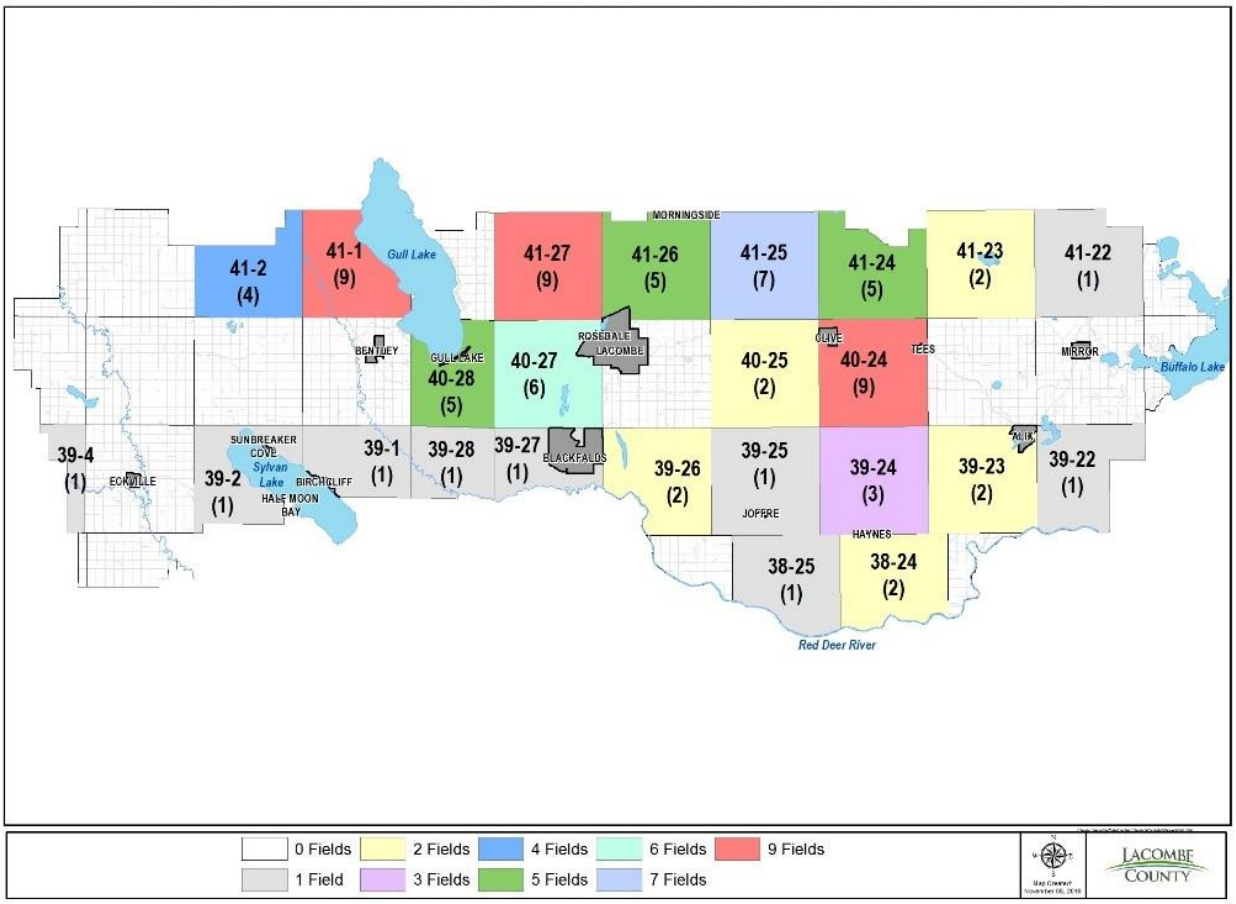

Figure 19. Clubroot occurrences in Lacombe County in 2008-2016 (Lacombe County 2019).

Figure 20. Soil pit #1 facing north.

Figure 21. Soil pit #1 facing south.

Figure 22. Soil pit #2 facing north.

Figure 23. Soil pit #2 facing south.

Figure 24. Natural blowout in the SE quadrant of the site.

Figure 25. Soil pit #3 facing north.

Figure 26. Soil pit #3 facing south.

Figure 27. Soil pit #4 facing north.

Figure 28. Soil pit #4 facing south.