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# Biophysical Assessment

Section 1-041-01-W5M and a Portion of
S ½-12-041-01-W5M
Gull Lake, Alberta

Presented to

Ms. Jacqueline Penn
A.D. Williams Engineering Inc.

## REVISION INDEX

| ECOMARK Project No.: ADWIL-08502-15451.00-0 | | | | | |
|---|---|---|---|---|---|
| B | October 14, 2008 | Final | AH | KB | MP |
| A | August 15, 2008 | Issue for Review | AH | JMB, BL | MP |
| **Rev** | **Date** | **Description** | **Prepared** | **Checked** | **Approved** |

**Letter Of Transmittal**

October 14, 2008 Our Project Number: ADWIL-08502-15451.00-0

Ms. Jacqueline Penn
A.D. Williams Engineering Inc.
210, 7240 Johnstone Drive
Red Deer, Alberta, T4P 3Y6

Dear Ms. Penn

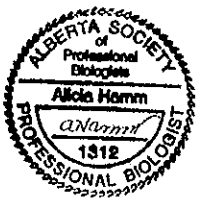
**Re: Biophysical Assessment**
**Section 1-041-01-W5M and a Portion of S ½-12-041-01-W5M, Gull Lake, Alberta**

We are pleased to present the above referenced biophysical assessment report (Report) for your benefit and use in assessing the environmental integrity of the property known as Section 1-041-01-W5M and a Portion of S ½-12-041-01-W5M, Gull Lake, Alberta.

This Report is based on a field reconnaissance, a records review including Alberta Natural Heritage Information Centre (ANHIC), Access Natural History Database maintained by the Federation of Alberta Naturalists (FAN), Fish and Wildlife Management Information System (FWMIS), and Federal *Species at Risk Act* and Provincial *Species at Risk Program,* soil surveys and regional groundwater assessments.

The opinions expressed in this Report are solely those of Ecomark Ltd. This Report is furnished in our capacity as consultants to A.D. Williams Engineering Inc. (Client) for the project described in this Report and do not necessarily reflect the viewpoint of the Client. The Report is written for the benefit and use of the Client, Frank Wilson, Lacombe County, Alberta Environment, Alberta Sustainable Resource Development, and Fisheries and Oceans Canada (Parties) and may only be relied upon by the Client and Parties in connection with the biophysical assessment. Conditions assessed are valid to the date of visual assessment and limited by the information that was shared by the third parties involved. Liability is limited to the invoiced amount for the Report. While every effort was made to confirm that the data collected from third parties is factual, complete, and accurate, Ecomark Ltd. makes no guarantees or warranties whatsoever with respect to such data.

Yours sincerely,




**Alicia Hamm, P. Biol.** **Professional Seal**

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# EXECUTIVE SUMMARY

At the request of Ms. Jacqueline Penn of A.D. Williams Engineering Inc., Ecomark Ltd. was retained to perform a biophysical assessment of the property known as Section 1-041-01-W5M and a Portion of S ½-12-041-01-W5M, Gull Lake, Alberta. The assessment is based on a field reconnaissance, a records review including Alberta Natural Heritage Information Centre (ANHIC), Access Natural History Database maintained by the Federation of Alberta Naturalists (FAN), Fish and Wildlife Management Information System (FWMIS), and Federal *Species at Risk Act* and Provincial *Species at Risk Program*, soil surveys, and regional groundwater assessments.

Conservation recommendations are found in section 5 of this biophysical assessment report (Report).

The opinions expressed in this Report are solely those of Ecomark Ltd. This Report is furnished in our capacity as consultants to A.D. Williams Engineering Inc. (Client) for the project described in this Report and do not necessarily reflect the viewpoint of the Client. The Report is written for the benefit and use of the Client, Frank Wilson, Lacombe County, Alberta Environment, Alberta Sustainable Resource Development, and Fisheries and Oceans Canada (Parties) and may only be relied upon by the Client and Parties in connection with the biophysical assessment. Conditions assessed are valid to the date of visual assessment and limited by the information that was shared by the third parties involved. Financial liability is limited to the invoiced amount of the report. While every effort is made to confirm that the data collected from third parties is factual, complete and accurate, Ecomark Ltd. makes no guarantees or warranties whatsoever with respect to such data.

# 1 INTRODUCTION

## 1.1 Scope

At the request of Jacqueline Penn of A.D. Williams Engineering Inc., Ecomark Ltd. was retained to perform a Biophysical Assessment of the property known as Section 1-041-01-W5M and a Portion of S ½-12-041-01-W5M, Gull Lake, Alberta. This assessment contains a records review, which includes:

a) Alberta Natural Heritage Information Centre (ANHIC)

b) Access Natural History Database maintained by the Federation of Alberta Naturalists (FAN)

c) Fish and Wildlife Management Information System (FWMIS)

d) Federal *Species at Risk Act* and Provincial *Species at Risk Program*

e) Soil Surveys

f) Regional Groundwater Assessment

This assessment also includes a field inspection, personal communications and conservation recommendations. The property was inspected June 16, 2008.

## 1.2 Development Project Description

The subject property is zoned as "A" Agricultural land use. According to the Gull Lake Management Plan: 2000 update, Lacombe County has a portion of the subject property designated as a potential residential area and accrued land (Scheffer Andrew Ltd., 2000).

It is proposed that the subject property be developed into an 18-hole public golf course, driving range, pro-shop, restaurant, 2200 Bare Land Condo lots, and 194 daily rental lots along with an inland marina, boat launches, and a public beach and picnic area.

## 1.3 Study Area

### 1.3.1 Location

The subject property is located in Section 1-041-01-W5M and a Portion of S ½-12-041-01-W5M, Gull Lake, Alberta. The total area of the site is 300.9 hectares (743.6 acres). The subject property is situated along the western shoreline of Gull Lake and is presently used as cultivated agricultural land, with the exception of the forested areas and sedge meadows along the shoreline. A mature forested hedgerow is situated along the western boundary of the subject property.

The subject property is located approximately 6 kilometers north of Bentley, Alberta at the corner of Township Road 410 and Range Road 11. The subject property extends north to the corner of Township Road 411 and Range Road 11. There are operating oil and gas developments immediately west of the subject property.

### 1.3.2 Climate and Physiographic Description

The subject property is located in the Central Parkland subregion of Alberta. Trembling aspen (*Populus tremuloides)* and balsam poplar (*Populus balsamifera*) are common tree species in this subregion. The mean annual temperature for the Central Parkland subregion is 2 degrees Celsius. The average temperature between May and September is 13 degrees Celsius. The frost-free period is approximately 95 days. The mean annual precipitation in this subregion is between 350 millimeters and 450 millimeters. The majority of the precipitation accumulates between May and September (NRC, 2006).

# 2 METHODS

## 2.1 Approach and Assessment Methods

An air photo review was conducted to determine land use changes and changes to vegetative features over time. A records review and literature review was also conducted to obtain plant and wildlife occurrence records, soil surveys and water quality data on or near the subject property.

A field inspection of the subject property was conducted June 16, 2008 and involved collecting vegetative information including dominant tree, dominant shrub and dominant grass species throughout the subject property. The field inspection focused on areas where productive and critical habitats were expected to occur. Evidence of wildlife (visual and wildlife tracks) was also detected on the subject property.

# 3 ASSESSMENT RESULTS

## 3.1 Historical Air Photos

Air photos from 1949 to 2005 were reviewed.

- **September-22-1949 AS150 #165 (1:40,000)**

  **Subject Property:** The southeast portion of the subject property was predominantly a forested slope and shoreline. East of the forested slope was a floodplain with no visible vegetation. The southwest portion of the property was cultivated agricultural land with a hedgerow along the western border. The north portion of the property was cultivated agricultural land with the shoreline to the east. The northwest side was forested and the east border appeared to be a floodplain. Vegetation was difficult to identify in this area.

  **Surrounding Property:** Gull Lake was located immediately east of the subject property with agricultural and forested land to the west. There was a large wetland northwest of the subject property.

- **June-30-1962 AS822 #44 (1:31,680)**

  **Subject Property:** An access road was constructed on the northwest part of the subject property with several buildings located at the end of it. A portion of forested land to the northwest and southwest was removed. There were shrubs growing east of the forested slope and eastern floodplain. Low-lying wet areas were located in the central and southern portions of the subject property.

  **Surrounding Property:** There was a farmyard northwest of the subject property. Low-lying areas around the subject property contained water.

- **August-22-1966 AS949 #189 (1:31,680)**

  **Subject Property:** There was a trail that ran along the southern boundary of the subject property to the shoreline. There were no other significant changes to the subject property.

  **Surrounding Property:** There were unidentified structures within the agricultural portion of the property to the northwest of the subject property. There was also a farm to the west of the subject property.

- **May-13-1969 AS1014 #81 (1:26,400)**

  **Subject Property:** There were trails east of the forested slope. Low lying areas within the cultivated field contained water and were not cultivated.

  **Surrounding Property:** There were no significant changes to the surrounding properties.

- **August-11-1975 AS1440 #65 (1:31,680)**

  **Subject Property:** There were more shrubs east of the forested slope near the lake. There were no other significant changes.

  **Surrounding Property:** There were no significant changes to the surrounding properties.

- **April-22-1983 AS2695 #206 (1:30,000)**

  **Subject Property:** There were several low-lying areas in the southern portion of the subject property.

  **Surrounding Property:** There were no significant changes to the surrounding properties.

- **July-12-1987 AS3610 #247 (1:30,000)**

  **Subject Property:** There was more shrubbery growing to the east of the forested slope all along the boundary of the subject property. In the central west portion of the subject proeprty, the land was predominately cultivated agricultural land with two low-lying areas.

  **Surrounding Property:** There were no significant changes to the surrounding properties.

- **June-04-1993 AS4416 #171 (1:30,000)**

  **Subject Property:** There was a lease site in the southwest portion of the subject property with two unidentified structures. There was shrubbery established around a low-lying area near the central portion of the subject property.

  **Surrounding Property:** There were no significant changes to the surrounding properties.

- **May-31-1998 AS4971 #15 (1:30,000)**

  **Subject Property:** The buildings in the northwest portion of the subject property were removed. In the south central portion of the subject property, the lease site was reclaimed and a berm was located immediately north of the site. A land disturbance was located in the area of the former low-lying area in the southern portion of the subject property. The shrubbery around the low-lying area in the central portion of the subject property was removed.

  **Surrounding Property:** The lease sites to the north and to the west of the subject property was reclaimed. There was a new residence to the south of the subject property.

- **May-31-2007 AS5408 #174 (1:40,000)**

  **Subject Property:** There was a rectangular berm and excavation that contained water located in the south central portion of the subject property. There was standing water over the former low-lying wet area immediately west of the berm.

  **Surrounding Property:** There was a large lease site and access road northwest of the subject property. There were also lease sites in the quarter sections immediately west and southwest of the subject property.

## 3.2 Field Reconnaissance, Sampling and Surveys

The field inspection identified six vegetative features that occurred on or near the subject property that may be affected by development of the subject property. The features included: temporary wetlands at the southwestern portion of the subject property; a mature hedgerow along the western boundary of the subject property; mature mixedwood forests along north- and east-facing slopes; young deciduous forests along the base of slope; sedge meadows along shoreline; and cultivated agricultural land.

At the time of the June inspection, temporary wetlands were observed in the southwestern portion of the subject property situated in topographically defined depressions surrounded by cultivated canola crop. These temporary wetlands were dry and contained wet meadow, and aquatic and weedy vegetation. The temporary wetlands were not cultivated, indicating that these areas likely contained water during the time of seeding. There was also a low-lying wet area that contained water immediately west of an excavation on the subject property. The air photo review indicated that the temporary wetlands on the subject property contained water occasionally in spring air photos, but were cultivated in drier years. It appears that the excavation changed surface drainage patterns causing water to collect immediately west of the excavation. Based on the Stewart and Kantrud Wetland Classification System, the wetlands on the subject property are temporary Class II wetlands. Water seepage is fairly rapid in these wetlands, so surface water is only maintained for a few weeks after snowmelt and occasionally for several days following heavy rainstorms. Fine-stemmed grasses, rushes, and sedges of low stature are the dominant vegetation (Stewart and Kantrud, 1971).

The air photo review and field inspection identified a mature hedgerow along the western boundary of the subject property that consisted of mature balsam poplar (*Populus tremuloides*) with well-developed understorey vegetation. A mature, mixedwood forest of similar composition along the north- and east-facing slopes towards Gull Lake was dominated by mature white spruce (*Picea glauca*) and trembling aspen (*Populus tremuloides*). Water levels in Gull Lake have dramatically declined since 1924 (Atlas of Alberta Lakes, 2005), so it is likely that Gull Lake once reached the base of the forested slope historically during high water levels. The mature, mixedwood forest transitioned into a young deciduous forest east of the forested slope. The young deciduous forest primarily consisted of trembling aspen (*Populus tremuloides*), balsam poplar (*Populus balsamifera*), willow (*Salix* spp.), mixed grasses and forbs. The young deciduous forest transitioned into sedge meadow immediately adjacent to Gull Lake.

The field inspection and air photo review identified sedge meadow along the northern and southeastern portions of the subject property immediately adjacent to Gull Lake. The sedge meadows were also found in topographical depressions within the forested areas. The sedge meadows consisted of sedges (*Carex* spp.), rushes (*Juncus* spp.), mixed grasses, and forbs. There was surface water present throughout the sedge meadow at the time of inspection.

The dominant vegetative feature on the subject property was cultivated agricultural land situated in upland areas. The cultivated agricultural land consisted of canola crop.

## 3.3 Topography

The subject property is undulating, with limiting slopes ranging from two to four percent (Alberta Agriculture and Rural Development, 2008) throughout the western portion of the subject property. The north- and east-facing forested slope sloped towards the sedge meadow and Gull Lake. The sedge meadow is a low relief landform with a limiting slope of two percent (Alberta Agriculture and Rural Development, 2008). The ground elevation near the subject property ranges from approximately 900 to 940 meters above sea level.

## 3.4 Geology

### 3.4.1 Surface Geology

In Lacombe County, surficial deposits are generally less than 30 meters thick but can be up to 50 meters thick in bedrock lows. The lower surficial deposits are primarily composed of fluvial and lacustrine deposits. Pre-glacial sand and gravel deposits overlie bedrock in buried valleys and can be up to 5 meters thick. The greatest thickness of sand and gravel deposits occur in buried valleys and meltwater channels (HCL, 2001).

According to the lithology descriptions for water wells on the subject property, there is blue clay over brown sandstone over brown shale over grey shale over grey sandstone over grey shale over grey sandstone (Alberta Environment, 2008).

### 3.4.2 Bedrock Geology

The Paskapoo Formation and the Upper Lacombe member underlie the subject property. The Paskapoo Formation is the upper bedrock with a thickness ranging from 0 to 500 meters. The Paskapoo includes sub crop formations consisting of cycles of thick, calcareous, tabular sandstones, siltstone and mudstone layers with minor conglomerates (HCL, 2001; O'Leary *et al.*, 1995). The Upper Lacombe Member has a maximum thickness of 250 meters and consists of shale interbedded with sandstone (HCL, 2001).

## 3.5 Hydrology

### 3.5.1 Surface Water

The subject property is situated along the western shoreline of Gull Lake and is within the Gull Lake Watershed. Gull Lake has a total surface area of 80.6 square kilometers and a drainage basin of 206 square

kilometers. The mean water depth is 5.4 meters and the maximum water depth is 8 meters (Atlas of Alberta Lakes, 2005).

There are no permanently flowing inlet or outlet streams in Gull Lake. The only naturally occurring outlet located at the southwest corner of the lake has been dry for many years. Water levels have dramatically declined in Gull Lake since 1924. Water levels dropped from 901.45 meters above sea level in 1924 to 898.5 meters above sea level in 1965 (Alberta Environment, 2008). In 1977, Alberta Environment began diverting water from the Blindman River to maintain water levels at a target elevation of 899.16 meters above sea level. Water pumping does not occur when water levels reach the target elevation (Atlas of Alberta Lakes, 2005). Recent water levels indicated that water levels rose naturally above the target elevation, with a recorded level of 899.172 meters above sea level in 2008 (Alberta Environment, 2008).

Gull Lake is a shallow, mesotrophic lake with moderate nutrient levels. There are relatively low concentrations of chlorophyll *a* and high levels of phosphorus. Runoff from agricultural land during snowmelt and rain events and bottom sediments contribute to the amount of total phosphorus into the lake (Atlas of Alberta Lakes, 2005). Bicarbonate, sodium, and sulphate are the dominant ions in Gull Lake. The lake is slightly saline with an average total dissolved solids (TDS) concentration of 753 milligrams per liter (Atlas of Alberta Lakes, 2005). Water diversions from Blindman River typically elevate total phosphorus concentrations and decrease TDS concentrations slightly as the result of pumping in water with high phosphorus and low salinity (Alberta Environment, 1989). Concentrations return to natural levels when pumping is discontinued (Atlas of Alberta Lakes, 2005).

Gull Lake is oriented in a northwest to southeast direction, in the same direction as the prevailing winds. Summer wind direction is generally from the northwest (O'Leary *et al.*, 1995). As Gull Lake is relatively shallow and exposed to the wind, the surface waters and bottom waters are well mixed and demonstrate high dissolved oxygen levels throughout the water column in summer. Dissolved oxygen levels may decline near the lake bottom in winter, but there is sufficient oxygen near the surface to support fish. No winter fish kills have been recorded for Gull Lake (Alberta Environment, 1989).

The field inspection also identified temporary wetlands in the southwestern portion of the subject property located in topographically defined depressions. Water seepage is fairly rapid in these wetlands, so surface water is only maintained for a few weeks after snowmelt and occasionally for several days following heavy rainstorms (Stewart and Kantrud, 1971).

The field inspection and air photo review also identified sedge meadows along the shoreline. The sedge meadows contained surface water at the time of inspection. Sedge meadows are situated in areas where surface drainage is poor.

### 3.5.2 Groundwater

Regional groundwater flow is divided into two distinct horizons: the upper surficial aquifer and the lower bedrock aquifer. Groundwaters in surficial aquifers near the subject property are found to be chemically hard ranging from 200 to 400 mg/L and are high in dissolved iron (HCL, 2001). The surficial groundwaters are also

high in total dissolved solids (TDS) and can have high sulfate concentrations. Groundwaters are mainly calcium-magnesium-bicarbonate or sodium bicarbonate-type waters. The apparent yield for individual water wells completed through the surficial aquifers range from less than 10 to 300 $m^3$/day (HCL, 2001).

Groundwaters in bedrock aquifers near the subject property have TDS concentrations ranging from 500 to 1,000 mg/L. Chloride concentrations are less than 10 mg/L and fluoride levels are too low to meet the daily needs recommended for human consumption. All groundwater types are found in the bedrock aquifers, however, the majority of groundwaters are sodium-bicarbonate or calcium-magnesium-bicarbonate-sulfate type waters. The apparent yield for individual water wells completed in the bedrock aquifers are generally in the range of 10 to 100 $m^3$/day (HCL, 2001).

According to the Alberta Environment Groundwater Information System, there are eighteen water wells located on the subject property and surrounding properties. Water well depths range from 17.4 to 329 meters, and non-pumping static levels range from 0 to 32 meters below ground surface. The water wells are registered for domestic, stock, industrial, and unknown water uses (Alberta Environment, 2008).

There are three water wells located on the subject property registered for stock water use. The wells were drilled to depths of 27.4, 54.8, and 54.8 meters, and have non-pumping static levels of 6.7, 7, and 7.3 meters below ground surface, respectively (Alberta Environment, 2008). There was one water well drilled for industrial use on the subject property, with a drilling depth of 18.3 meters and a non-pumping static level of 4.5 meters (Alberta Environment, 2008). For water well records, please refer to Appendix 2.

## 3.6 Soil

The subject property is located in the Central Parkland subregion of Alberta. Black and dark brown chernozems commonly occur under grassland vegetation and dark gray chernozems and luvisolics occur under moister aspen stands. The surficial deposits are generally ground moraine (NRC, 2006).

According to the Alberta Agriculture Online Soil Viewer, the western portion of the subject property consists of dark gray luvisols and orthic dark gray chernozems on medium textured till and transitions into orthic black chernozems on medium and moderately coarse textured sediments deposited by wind and water (Alberta Agriculture and Rural Development, 2008). The sedge meadow along the shoreline of Gull Lake consists of organic and gleysolic soils on undifferentiated materials (Alberta Agriculture and Rural Development, 2008).

## 3.7 Vegetation

The Alberta Natural Heritage Information Centre (ANHIC) was requested to provide information on rare plant occurrences in TWP-041-1-W5M. They reported that there are no rare plant occurrences on or near the subject property (Rintoul, 2008, Email Comm.).

The dominant vegetative species found in the temporary wetlands on the subject property included common great bulrush (*Scirpus lacustris ssp. validus*), water sedge (*Carex aquatilis*), Sartwell's sedge (*Carex sartwellii*), creeping spike-rush (*Eleocharis palustris)*, marsh reed grass (*Calamagrostis canadensis*), arrow-

leaved coltsfoot (*Petasites sagittatus*), Canada thistle (*Cirsium arvense*), and stinging nettle (*Urtica dioica*). The wetland margins were recently planted canola crop.

The dominant vegetative species found in the mature hedgerows included mature balsam poplar (*Populus balsamifera*), beaked hazelnut (*Corylus cornuta*), star-flowered false solomon's seal (*Smilacina stellata*), cow-parsnip (*Heracleum lanatum*), creamy peavine (*Lathyrus ochroleucus*), tall lungwort (*Mertensia paniculata*), wild red raspberry (*Rubus idaeus*), Canada violet (*Viola canadensis*), northern bedstraw (*Galium boreale*), and common horsetail (*Equisetum arvense*).

The dominant vegetative species found in the mature mixedwood forests on the north- and east-facing slopes and young deciduous forests on the subject property included mature white spruce (*Picea glauca*), trembling aspen (*Populus tremuloides*), balsam poplar (*Populus balsamifera*), red-osier dogwood (*Cornus stolonifera*), beaked hazelnut (*Corylus cornuta*), prickly rose (*Rosa acicularis*), gooseberry (*Ribes* spp.), fly honeysuckle (*Lonicera villosa*), Canada violet (*Viola canadensis*), cow parsnip (*Heracleum lanatum*), common pink wintergreen (*Pyrola asarifolia*), yellow lady's slipper (*Cypripedium calceolus*), hemp-nettle (*Galeopsis tetrahit*), yarrow (*Achillea millefolium*), common plantain (*Plantago major*), and sweet scented bedstraw (*Galium boreale*).

The shoreline habitat assessment of Gull Lake conducted by O'Leary *et al.* in 1995 noted that balsam poplar-aspen community type was the most dominant upland community type in the Gull Lake area. Trembling aspen (*Populus tremuloides*), balsam poplar (*Populus balsamifera*), white spruce (*Picea glauca*), and paper birch (*Betula papyrifera*) were present in the plant community, as well as red-osier dogwood (*Cornus stolonifera*), saskatoon (*Amelanchier alnifolia*), Canadian buffaloberry (*Sheperdia canadensis*), bracted honeysuckle (*Lonocera involucrata*), snowberry (*Symphorocarpus albus*), wild red raspberry (*Rubus idaeus*), and prickly rose (*Rosa acicularis*) (O'Leary *et al.*, 1995).

The dominant species found in the sedge meadow included balsam poplar (*Populus balsamifera*) seedlings, willow (*Salix* spp.), wolf willow (*Elaeagnus commutata*), green sedge (*Carex viridula*), water sedge (*Carex aquatilis*), slender sedge (*Carex lasiocarpa*), golden sedge (*Carex aurea*), great common bulrush (*Scirpus lacustris spp. validus*), Arctic rush (*Juncus baltica*), common blue-eyed grass (*Sisyrinchium montanum*), blunt-leaved sandwort (*Arenaria lateriflora*), meadow buttercup (*Ranunculus acris*), Canada anemone (*Anemone canadensis*), American vetch (*Vicia americana*), creamy peavine (*Lathyrus ochroleucus*), hybrid clover (*Trifolium hybridum*), marsh violet (*Viola palustris*), mealy primrose (*Primula incana*), wild strawberry (*Fragaria virginiana*), and fowl manna grass (*Glyceria striata*).

O'Leary *et al.* also report the presence of sedge meadow community types located in low-lying areas immediately adjacent to Gull Lake or in topographically defined depressions in upland areas. Willow (Salix spp.) is the dominant shrub species and common forbs include rush (*Juncus* spp.), sedges (*Carex* spp.), and mixed grasses (O'Leary et al., 1995).

## 3.8 Wildlife

### 3.8.1 Birds

Bird occurrence data for the subject property and surrounding areas was requested from Access Natural History Database maintained by the Federation of Alberta Naturalists (FAN). The queries resulted in 172 bird species that may occur on or near the subject property (Table 1).

At the time of inspection, American coot (*Fulica americana*), American crow (*Corvus brachyrhynchos*), black-capped chickadee (*Poecile atricapillus*), black-billed magpie (*Pica hudsonia*), Canadian goose (*Branta canadensis*), Franklin's gull (*Larus pipixcan*), red-tailed hawk (*Buteo jamaicensis*), red-winged blackbird (*Agelaius phoeniceus*), rose-breasted grosbeak (*Pheucticus ludovicianus*), song sparrow (*Melospiza melodia*), and yellow-headed blackbird (*Xanthocephalus xanthocephalus*) were detected on the subject property.

**Table 1: Potential Bird Species on or near the Subject Property Compiled from Federation of Alberta Naturalists (FAN)**

| Common Name | Scientific Name | Provincial Status | Federal Status |
|---|---|---|---|
| Alder Flycatcher | *Empidonax alnorum* | Secure | Not at Risk |
| American Avocet | *Recurvirostra americana* | Secure | Not at Risk |
| American Coot | *Fulica americana* | Secure | Not at Risk |
| American Goldfinch | *Carduelis tristis* | Secure | Not at Risk |
| American Pipit | *Anthus rubescens* | Secure | Not at Risk |
| American Redstart | *Setophaga ruticilla* | Secure | Not at Risk |
| American Robin | *Turdus migratorius* | Secure | Not at Risk |
| American Three-toed Woodpecker | *Picoides dorsalis* | Secure | Not at Risk |
| American Tree Sparrow | *Spizella arborea* | Secure | Not at Risk |
| American Wigeon | *Anas americana* | Secure | Not at Risk |
| American Crow | *Corvus brachyrhynchos* | Secure | Not at Risk |
| American White Pelican | *Pelecanus erythrorhynchos* | Sensitive | Not at Risk |
| Bald Eagle | *Haliaeetus leucocephalus* | Sensitive | Not at Risk |
| Bank Swallow | *Riparia riparia* | Secure | Not at Risk |
| Barred Owl | *Strix varia* | Sensitive | Not at Risk |
| Baltimore Oriole | *Icterus galbula* | Sensitive | Not at Risk |
| Barn Swallow | *Hirundo rustica* | Sensitive | Not at Risk |
| Belted Kingfisher | *Ceryle alcyon* | Secure | Not at Risk |
| Black-and-white Warbler | *Mniotilta varia* | Secure | Not at Risk |

| Common Name | Scientific Name | Provincial Status | Federal Status |
|---|---|---|---|
| Black-billed Cuckoo | *Coccyzus erythropthalmus* | Undetermined | Not at Risk |
| Black-billed Magpie | *Pica hudsonia* | Secure | Not at Risk |
| Black-capped Chickadee | *Poecile atricapilla* | Secure | Not at Risk |
| Blackpoll Warbler | *Dendroica striata* | Secure | Not at Risk |
| Black Tern | *Chlidonias niger* | Sensitive | Not at Risk |
| Blue-headed Vireo | *Vireo solitarius* | Secure | Not at Risk |
| Blue Jay | *Cyanocitta cristata* | Secure | Not at Risk |
| Blue-winged Teal | *Anas discors* | Secure | Not at Risk |
| Bohemian Waxwing | *Bombycilla garrulus* | Secure | Not at Risk |
| Bonaparte's Gull | *Larus philadelphia* | Secure | Not at Risk |
| Boreal Chickadee | *Poecile hudsonica* | Secure | Not at Risk |
| Boreal Owl | *Aegolius funereus* | Secure | Not at Risk |
| Brewer's Blackbird | *Euphagus cyanocephalus* | Secure | Not at Risk |
| Broad-winged Hawk | *Buteo platypterus* | Sensitive | Not at Risk |
| Brown-headed Cowbird | *Molothrus ater* | Secure | Not at Risk |
| Brown Creeper | *Certhia americana* | Sensitive | Not at Risk |
| Bufflehead | *Bucephala albeola* | Secure | Not at Risk |
| California Gull | *Larus californicus* | Secure | Not at Risk |
| Canada Goose | *Branta Canadensis* | Secure | Not at Risk |
| Cedar Waxwing | *Bombycilla cedrorum* | Secure | Not at Risk |
| Chipping Sparrow | *Spizella passerina* | Secure | Not at Risk |
| Clay-colored Sparrow | *Spizella pallida* | Secure | Not at Risk |
| Cliff Swallow | *Petrochelidon pyrrhonota* | Secure | Not at Risk |
| Common loon | *Gavia immer* | Secure | Not at Risk |
| Common Goldeneye | *Bucephala clangula* | Secure | Not at Risk |
| Common Grackle | *Quiscalus quiscula* | Secure | Not at Risk |
| Common Loon | *Gavia immer* | Secure | Not at Risk |
| Common Merganser | *Mergus merganser* | Secure | Not at Risk |
| Common Nighthawk | *Chordeiles minor* | Sensitive | Not at Risk |
| Common Raven | *Corvus corax* | Secure | Not at Risk |
| Common Redpoll | *Carduelis flammea* | Secure | Not at Risk |
| Common Tern | *Sterna hirundo* | Secure | Not at Risk |
| Common Yellowthroat | *Geothlypis trichas* | Sensitive | Not at Risk |
| Connecticut Warbler | *Oporornis agilis* | Secure | Not at Risk |

| Common Name | Scientific Name | Provincial Status | Federal Status |
|---|---|---|---|
| Cooper's Hawk | *Accipiter cooperii* | Secure | Not at Risk |
| Crow | *Corvus brachyrhynchos* | Secure | Not at Risk |
| Dark-eyed Junco | *Junco hyemalis* | Secure | Not at Risk |
| Downy Woodpecker | *Picoides pubescens* | Secure | Not at Risk |
| Eared Grebe | *Podiceps nigricollis* | Secure | Not at Risk |
| Eastern Bluebird | *Sialia sialis* | Secure | Not at Risk |
| Eastern Kingbird | *Tyrannus tyrannus* | Secure | Not at Risk |
| Eastern Phoebe | *Sayornis phoebe* | Sensitive | Not at Risk |
| Evening Grosbeak | *Coccothraustes vespertinus* | Secure | Not at Risk |
| European Starling | *Surnus vulgaris* | Secure | Not at Risk |
| Franklin's Gull | *Larus pipixcan* | Secure | Not at Risk |
| Fox Sparrow | *Passerella iliaca* | Secure | Not at Risk |
| Gadwall | *Anas stepera* | Secure | Not at Risk |
| Golden-crowned Kinglet | *Regulus strapa* | Secure | Not at Risk |
| Golden Eagle | *Aquils chrysaetos* | Sensitive | Not at Risk |
| Gray Jay | *Perisoreus canadensis* | Secure | Not at Risk |
| Gray-crowned Rosy-Finch | *Leucosticte tephrocotis* | Secure | Not at Risk |
| Great Blue Heron | *Ardea herodias* | Sensitive | Special Concern |
| Greater Yellowlegs | *Tringa melanoleuca* | Secure | Not at Risk |
| Great Gray Owl | *Strix nebulosa* | Sensitive | Not at Risk |
| Great Horned Owl | *Bubo virginianus* | Secure | Not at Risk |
| Green-winged Teal | *Anas crecca* | Sensitive | Not at Risk |
| Hairy Woodpecker | *Picoides villosus* | Secure | Not at Risk |
| Hermit Thrush | *Catharus guttatus* | Secure | Not at Risk |
| Herring Gull | *Larus argentatus* | Secure | Not at Risk |
| Horned Grebe | *Podiceps auritus* | Sensitive | Not at Risk |
| House Sparrow | *Passer domesticus* | Secure | Not at Risk |
| House Wren | *Troglodytes aedon* | Secure | Not at Risk |
| Killdeer | *Charadrius voiferus* | Secure | Not at Risk |
| Long-billed Dowitcher | *Limnodromus scolopaceus* | Secure | Not at Risk |
| Least Flycatcher | *Empidonax minimus* | Sensitive | Not at Risk |
| Le Conte's Sparrow | *Ammodramus leconteii* | Secure | Not at Risk |
| Lesser Scaup | *Aythya Affinis* | Sensitive | Not at Risk |
| Lesser Yellowlegs | *Tringa flavipes* | Secure | Not at Risk |

| Common Name | Scientific Name | Provincial Status | Federal Status |
|---|---|---|---|
| Lincoln's Sparrow | *Melospiza lincolnii* | Secure | Not at Risk |
| Loggerhead Shrike | *Lanius ludovicianus* | Sensitive | Threatened |
| Mallard | *Anas platyrhnchos* | Secure | Not at Risk |
| Merlin | *Falco columbarius* | Secure | Not at Risk |
| Mountain Bluebird | *Sialia currucoides* | Secure | Not at Risk |
| Mourning Dove | *Zenaida macroura* | Secure | Not at Risk |
| Mourning Warbler | *Oporornis philadelphia* | Secure | Not at Risk |
| Myrtle Warbler | *Dendroica coronata* | Secure | Not at Risk |
| Northern Flicker | *Colaptes auratus* | Secure | Not at Risk |
| Northern Hawk Owl | *Surnia ulula* | Sensitive | Not at Risk |
| Northern Goshawk | *Accipiter gentilis* | Sensitive | Threatened |
| Northern Harrier | *Circus cyaneus* | Sensitive | Not at Risk |
| Northern Pigmy Owl | *Glaucudium gnoma* | Secure | Not at Risk |
| Northern Waterthrush | *Seiurus noveboracensis* | Secure | Not at Risk |
| Northern Rough-winged Swallow | *Stelgidopteryx serripennis* | Secure | Not at Risk |
| Northern Saw-whet Owl | *Aegolius acadicus* | Secure | Not at Risk |
| Northern Shoveler | *Anas clypeata* | Secure | Not at Risk |
| Northern Oriole | *Icterus galbula* | Secure | Not at Risk |
| Northern Mockingbird | *Mimus polyglottus* | Secure | Not at Risk |
| Olive-sided Flycatcher | *Contopus cooperi* | Secure | Not at Risk |
| Osprey | *Pandion haliaetus* | Sensitive | Not at Risk |
| Ovenbird | *Seiurus aurocapillus* | Secure | Not at Risk |
| Pectoral Sandpiper | *Calidris melanotos* | Secure | Not at Risk |
| Pied-billed Grebe | *Podilymbus podiceps* | Sensitive | Not at Risk |
| Pine Grosbeak | *Pinicola enucleator* | Secure | Not at Risk |
| Pine Siskin | *Carduelis pinus* | Secure | Not at Risk |
| Pileated Woodpecker | *Dryocopuc pileatus* | Sensitive | Not at Risk |
| Purple Finch | *Carpodacus purpureus* | Secure | Not at Risk |
| Rose-breasted Grosbeak | *Pheucticus ludocicianus* | Secure | Not at Risk |
| Red-eyed Vireo | *Vireo olivaceus* | Secure | Not at Risk |
| Red-necked Grebe | *Podiceps grisegena* | Secure | Not at Risk |
| Ring-billed Gull | *Larus delawarensis* | Secure | Not at Risk |
| Rose-breasted Grosbeak | *Pheucticus ludovicianus* | Secure | Not at Risk |
| Redhead | *Aythya americana* | Secure | Not at Risk |

| Common Name | Scientific Name | Provincial Status | Federal Status |
|---|---|---|---|
| Red-tailed Hawk | *Buteo jamaicensis* | Secure | Not at Risk |
| Ring-necked Duck | *Aythya collaris* | Secure | Not at Risk |
| Rock Pigeon | *Columbia livia* | Exotic | Not at Risk |
| Rough-legged Hawk | *Buteo lagopus* | Secure | Not at Risk |
| Ruby-crowned Kinglet | *Regulus calendula* | Secure | Not at Risk |
| Ruby-throated Hummingbird | *Archilochus colubris* | Secure | Not at Risk |
| Red-winged Blackbird | *Agelaius phoeniceus* | Secure | Not at Risk |
| Ruffed Grouse | *Bonasa umbellus* | Secure | Not at Risk |
| Rufous Hummingbird | *Selasphorus rufus* | Secure | Not at Risk |
| Rusty Blackbird | *Euphagus carolinus* | Sensitive | Special Concern |
| Sandhill Crane | *Grus canadensis* | Sensitive | Not at Risk |
| Savannah Sparrow | *Passerculus sandwichensis* | Secure | Not at Risk |
| Say's Phoebe | *Sayornis saya* | Secure | Not at Risk |
| Semi-palmated Sandpiper | *Calidris pusilla* | Secure | Not at Risk |
| Sharp-shinned Hawk | *Accipiter striatus* | Secure | Not at Risk |
| Slate-colored Junco | *Junco hyemalis* | Secure | Not at Risk |
| Solitary Vireo | *Vireo solitarius* | Secure | Not at Risk |
| Song Sparrow | *Melospiza melodia* | Secure | Not at Risk |
| Sora | *Porzana Carolina* | Sensitive | Not at Risk |
| Spotted Sandpiper | *Actitis macularis* | Secure | Not at Risk |
| Spruce Grouse | *Falcipennis canadensis* | Secure | Not at Risk |
| Swainson's Hawk | *Buteo swainsoni* | Sensitive | Not at Risk |
| Swainson's Thrush | *Catharus ustulatus* | Secure | Not at Risk |
| Swamp Sparrow | *Melospiza georgiana* | Secure | Not at Risk |
| Tennessee Warbler | *Vermivora peregrina* | Secure | Not at Risk |
| Townsend's Solitaire | *Myadestes townsendi* | Secure | Not at Risk |
| Tree Swallow | *Tachycineta bicolor* | Secure | Not at Risk |
| Trumpeter Swan | *Cygnus buccinator* | At Risk | At Risk |
| Tundra Swan | *Cygnus columbianus* | Secure | Not at Risk |
| Varied Thrush | *Ixoreus naevius* | Secure | Not at Risk |
| Veery | *Catharus fuscescens* | Secure | Not at Risk |
| Vesper Sparrow | *Pooecetes gramineus* | Secure | Not at Risk |
| Violet-green Swallow | *Tachycineta thalassina* | Secure | Not at Risk |
| Warbling Vireo | *Vireo glivus* | Secure | Not at Risk |

| Common Name | Scientific Name | Provincial Status | Federal Status |
|---|---|---|---|
| Western Kingbird | *Tyrannus verticalis* | Secure | Not at Risk |
| Western meadowlark | *Sturnella neglecta* | Secure | Not at Risk |
| Western Tanager | *Piranga ludoviciana* | Sensitive | Not at Risk |
| Western Wood-Pewee | *Contopus sordidulus* | Secure | Not at Risk |
| White-breasted Nuthatch | *Sitta carolinensis* | Secure | Not at Risk |
| White-crowned Sparrow | *Zonotrichia leucophrys* | Secure | Not at Risk |
| White-Throated Sparrow | *Zonotrichia albicollis* | Secure | Not at Risk |
| White-winged Crossbill | *Loxia leucoptera* | Secure | Not at Risk |
| White-winged Scoter | *Melanitta fusca* | Sensitive | Not at Risk |
| Willow Flycatcher | *Empidonax* traillii | Secure | Not at Risk |
| Wilson's Phalarope | *Phalaropus tricolor* | Secure | Not at Risk |
| Wilson's Snipe | *Gallinago delicata* | Secure | Not at Risk |
| Wilson's Warbler | *Wilsonia pusilla* | Secure | Not at Risk |
| Yellow-headed Blackbird | *Xanthocephalus xanthocephalus* | Secure | Not at Risk |
| Yellow-rumped Warbler | *Dendroica coronata* | Secure | Not at Risk |
| Yellow-shafted Flicker | *Colaptes auratus* | Secure | Not at Risk |
| Yellow Warbler | *Dendroica petechia* | Secure | Not at Risk |

### 3.8.2 Fish

The provincial Fish and Wildlife Management Information System (FWMIS) were requested to report fish occurrence data for Gull Lake. Based on a FWMIS occurrence records and a review of relevant literature, there are nine fish species reported in Gull Lake (Cooper, 2008, Email Comm; Atlas of Alberta Lakes, 2008)(Table 2).

**Table 2: Potential Fish Species on the Subject Property Compiled from Fish and Wildlife Management Information System (FWMIS) and Literature Review**

| Common Name | Scientific Name | Provincial Status | Federal Status |
|---|---|---|---|
| Brook Stickleback | *Culaea inconstans* | Secure | Not at Risk |
| Burbot | *Lota lota* | Secure | Not at Risk |
| Iowa Darter | *Etheostoma exile* | Secure | Not at Risk |
| Northern Pike | *Esox lucius* | Secure | Not at Risk |
| Lake Whitefish | *Coregonus clupeaformis* | Secure | Not at Risk |
| Yellow Perch | *Perca flavescens* | Secure | Not at Risk |

| Common Name | Scientific Name | Provincial Status | Federal Status |
|---|---|---|---|
| Walleye | *Stizostedion vitreum* | Secure | Not at Risk |
| Spottail Shiner | *Notropis hudsonius* | Secure | Not at Risk |
| White Sucker | *Catostomus commersoni* | Secure | Not at Risk |

### 3.8.3 Reptiles and Amphibians

The provincial Fish and Wildlife Management Information System (FWMIS) was requested to report any occurrence records of reptiles and amphibians for Twp-041-1-W5M. They did not report any herptile occurrences for the township (Cooper, 2008, Email Comm.). Based on a literature review, seven species of herptiles could potentially occur within the subject property (Table 3).

**Table 3: Potential Reptile and Amphibian Species on the Subject Property Compiled from Literature Review**

| Common Name | Scientific Name | Provincial Status | Federal Status |
|---|---|---|---|
| Boreal Chorus Frog | *Pseudacris maculata* | Secure | Not at Risk |
| Canadian Toad | *Bufo hemiophyrys* | May Be At Risk | Not at Risk |
| Northern Leopard Frog | *Rana pipiens* | At Risk | Special Concern |
| Red-sided Garter Snake | *Thamnophis sirtalis* | Sensitive | Not At Risk |
| Tiger Salamander | *Ambystoma tigrinum* | Secure | Not At Risk |
| Western Toad | *Bufo boreas* | Sensitive | Special Concern |
| Wood Frog | *Rana sylvatica* | Secure | Not At Risk |

### 3.8.4 Invertebrates

There are likely a number of common invertebrates that inhabit the subject property including earthworms, snails, ants, butterflies, moths, grasshoppers, bees, wasps, spiders, ground beetles, caddisflies, and mosquitoes (SRD, 2008). Numerous butterflies, caddisflies, and mosquitoes were detected on the subject property at the time of inspection.

### 3.8.5 Mammals

The provincial FWMIS was requested to report any wildlife occurrence records for Twp-041-1-W5M. They did not report any mammal occurrences for the township (Froggatt, 2008, Email Comm.). Based on a review of relevant literature, there are thirty-eight species that could potentially occur on or near the subject property (Table 4).

At the time of inspection, white-tailed deer (*Odocoileus virginianus*) and muskrat (*Ondatra zibethicus)* were observed on the subject property.

**Table 4: Potential Mammal Species on the Subject Property Compiled from Literature Review**

| Common Name | Scientific Name | Provincial Status | Federal Status |
|---|---|---|---|
| American Badger | *Taxidea taxus* | Sensitive | Not at Risk |
| American Mink | *Mustela vison* | Secure | Not at Risk |
| Arctic Shrew | *Sorex arcticus* | Secure | Not at Risk |
| Beaver | *Castor canadensis* | Secure | Not at Risk |
| Big Brown Bat | *Eptesicus fuscus* | Secure | Not at Risk |
| Black Bear | *Ursus americanus* | Secure | Not at Risk |
| Common Porcupine | *Erethizon dorsatum* | Secure | Not a Risk |
| Common Water Shrew | *Sorex palustris* | Secure | Not at Risk |
| Coyote | *Canis latrans* | Secure | Not at Risk |
| Deer Mouse | *Peromyscus maniculatus* | Secure | Not at Risk |
| Dusky Shrew | *Sorex monticolus* | Secure | Not at Risk |
| Hoary Bat | *Lasiurus cinereus* | Sensitive | Undetermined |
| House Mouse | *Mus musculus* | Exotic | Not at Risk |
| Least Chipmunk | *Tamias minimus* | Secure | Not at Risk |
| Least Weasel | *Mustela nivalis* | Secure | Not at Risk |
| Little Brown Bat | *Myotis lucifugus* | Secure | Not at Risk |
| Long-tailed Weasel | *Mustela frenata* | May Be At Risk | Not at Risk |
| Masked Shrew | *Sorex cinereus* | Secure | Not at risk |
| Meadow Jumping Mouse | *Zapus hudsonius* | Secure | Not at Risk |
| Meadow Vole | *Microtis pennsylvanicus* | Secure | Not at Risk |
| Moose | *Alces alces* | Secure | Not at Risk |
| Mule Deer | *Odocoileus hemionus* | Secure | Not at Risk |
| Muskrat | *Ondatra zibethicus* | Secure | Not at Risk |
| Northern Flying Squirrel | *Glaucomys sabrinus* | Secure | Not at Risk |
| Pygmy Shrew | *Sorex hoyi* | Secure | Not at Risk |
| Red Fox | *Vulpes vulpes* | Secure | Not at Risk |
| Red Squirrel | *Tamiasciurus hudsonicus* | Secure | Not a Risk |
| Richardson's Ground Squirrel | *Spermophilus richardsonii* | Secure | Not at Risk |

| Common Name | Scientific Name | Provincial Status | Federal Status |
|---|---|---|---|
| Short-tailed Weasel | *Mustela erminea* | Secure | Not at Risk |
| Silver-haired Bat | *Lasionycteris noctivagans* | Sensitive | Not at Risk |
| Snowshoe Hare | *Lepus americanus* | Secure | Not at Risk |
| Southern Red-backed Vole | *Clethrionomys gapperi* | Secure | Not at Risk |
| Striped Skunk | *Mephitis mephitis* | Secure | Not at Risk |
| Thirteen-lined Ground Squirrel | *Spermophilus tridcemlineatus* | Undetermined | Not at Risk |
| Western Jumping Mouse | *Zapus princeps* | Secure | Not at Risk |
| White-tailed Deer | *Odocoileus virginianus* | Secure | Not at Risk |
| White-tailed Rabbit | *Lepus townsendII* | Secure | Not at Risk |
| Woodchuck | *Marmota monax* | Secure | Not at Risk |

### 3.8.6 Rare, Threatened and Endangered Species

Based on the records review, there are no known provincially or globally ranked plant species of concern on or near the subject property (Rintoul, 2008, Email Comm.). Similarly, there are no known fish species of concern or invertebrate species of concern on or near the subject property.

Table 1 identified forty bird species of concern that may occur on or near the subject property. Based on the field inspection and review of habitat requirements, bird species of concern that rely on lake margins and forest edges have the greatest potential to occur on the subject property. Black tern (*Chlidonias niger*), green-winged teal (*Anas crecca*), lesser scaup (*Aythya affinis*), and white-winged scoter (*Melanitta fusca*) are all bird species of concern that nest in lake margins with dense emergent aquatic vegetation similar to the shoreline near the subject property (Birds of North America, 2008). Baltimore oriole (*Icterus galbula*), barn swallow (*Hirundo rustica*), common yellowthroat (*Geothlypis trichas*), and least flycatcher (*Empidonax minimus*) are bird species of concern that rely on forest edges similar to the mature hedgerows, mature mixedwood forest, and young deciduous forests on the subject property.

Table 3 identified four herptile species of concern that may occur on our near the subject property. Red-sided garter snake (*Thamnophis sirtalis*) may occur along the shoreline of Gull Lake. The temporary wetlands on the subject property may provide suitable habitat for amphibians such as Canadian toad (*Bufo hemiophrys*) and western toad (*Bufo boreas*), as these species breed in cool, shallow wetlands soon after snowmelt (SRD, 2008).

Table 4 identified four mammal species of concern that may occur on or near the subject property. Of the mammal species identified, the silver-haired bat (*Lasionycteris noctivagans*) has the greatest potential to occur on the subject property. Tree cavities in the mature hedgerows and mixedwood forests on the subject property may provide suitable summer roosting habitat for these species (Fisher *et al.*, 2000).

# 4 DISCUSSION

## 4.1 Temporary Wetlands

The field inspection and air photo review identified temporary Class II wetlands in portions of the subject property. Water seepage is fairly rapid in temporary Class II wetlands, so surface water is only maintained for a few weeks after snowmelt and occasionally for several days following heavy rainstorms (Stewart and Kantrud, 1971). Temporary wetlands are often cultivated in drier years.

Vegetation observed in the temporary wetlands at the southern portion of the subject property included common great bulrush (*Scirpus lacustris ssp. validus*), creeping spike-rush (*Eleocharis palustris*), marsh reed grass (*Calamagrostis canadensis*), water sedge (*Carex aquatilis)*, Sartwell's sedge (*Carex sartwellii*), arrow-leaved coltsfoot (*Petasites sagittatus*), Canada thistle (*Cirsium arvense*), and stinging nettle (*Urtica dioica*). No wildlife was observed in the temporary Class II wetlands at the time of inspection.

Temporary Class II wetlands may provide suitable seasonal habitat for shorebirds and rails such as killdeer (*Charadrius vociferus*), solitary sandpiper (*Tringa solitaria*), spotted sandpiper (*Actitis macularius*), American avocet (*Recurvirostra americana*), lesser yellow legs (*Tringa flavipes*), and sora (*Porzana carolina*) (Geowest Environmental Consultants, 1995; Birds of North America, 2008). Temporary wetlands tend to provide a high quality habitat for nesting birds, as these areas are highly productive and are the first wetlands to become ice-free in spring. The wetlands located on the subject property likely do not provide high quality habitat for birds, as wetlands that contain weedy vegetation are typically unattractive to nesting birds (Kantrud and Stewart, 1984).

Temporary Class II wetlands may also provide suitable breeding habitat for amphibians such as boreal chorus frogs (*Pseuacris maculata*), Canadian toad (*Bufo hemiophrys*), western toad (*Bufo boreas),* and wood frog (*Rana sylvatica*). These species typically breed in shallow, seasonal, or temporary wetlands soon after snowmelt (SRD, 2008). Although the wetlands on the subject property provide some breeding habitat, habitat offered along the shoreline likely provides higher quality dispersal opportunities and overwintering habitat for these species.

Alberta Environment owns all water in wetlands under the *Water Act* and approval must be obtained prior to impacting naturally occurring wetlands. Persons are expected to avoid damage or destruction of wetlands, minimize impact, and compensate for any unavoidable damage (Alberta Environment, 2007). As the temporary Class II wetlands on the subject property are considered naturally occurring wetlands, Alberta Environment may require wetland compensation for loss of these wetland features. Wetland compensation is based on compensation ratios. Replacement ratios between 3:1 and 10:1 (restored wetland to lost wetland) are typically used to calculate wetland restoration costs (Alberta Environment, 2007).

## 4.2 Hedgerows and Forested Areas

The air photo review and field inspection identified a mature hedgerow along the western boundary of the subject property that consisted of mature balsam poplar (*Populus tremuloides*) with well-developed understorey vegetation. A mature mixedwood forest of similar composition along the north- and east-facing

slopes towards Gull Lake was dominated by mature white spruce (*Picea glauca*) and trembling aspen (*Populus tremuloides*). The mature mixedwood forest transitioned into a young deciduous forest east of the forested slope. The young deciduous forest primarily consisted of trembling aspen (*Populus tremuloides*), balsam poplar (*Populus balsamifera*), willow (*Salix* spp.), mixed grasses, and forbs. The young deciduous forest transitioned into sedge meadow immediately adjacent to Gull Lake.

The mature hedgerows and forested areas on the subject property provide suitable habitat for bird species that nest and feed in forest edges. Alder flycatcher (*Empidonax alnorum*), American redstart (*Setophaga ruticilla*), Baltimore oriole (*Icterus galbula*), barn swallow (*Hirundo rustica),* black-and-white warbler (*Mniotilta varia*), common yellowthroat (*Geothlypis trichas*), least flycatcher (*Empidonax minimus*), red-eyed vireo (*Vireo olivaceus*), veery (*Catharus fuscescens*), and yellow warbler (*Dendroica petechia*) are songbirds that prefer mature mixedwood forests like the habitat features on the subject property (Rempel, 2007).

The mature mixedwood forests and hedgerows on the subject property also provide suitable habitat for small mammals such as least chipmunk (*Tamias minimus*), northern flying squirrel (*Glaucomys sabrinus*), red squirrel (*Tamiasciurus hudsonicus*), snowshoe hare (*Lepus americanus*), shrew (*Sorex* spp.), and vole (*Microtus* spp.). Forested areas promote habitat connectivity for small mammals (Tattersal *et al.*, 2002) and support higher growth rates in small mammal populations in disturbed landscapes (Fahrig and Merriam, 1985). The forest vegetation likely provides high quality cover and feeding habitat for ungulates such as mule deer (*Odocoileus hemionus*) and white-tailed deer (*Odocoileus virginianus*) (Fisher *et al.*, 2000).

## 4.3 Sedge Meadow

The field inspection and air photo review identified sedge meadow along the northern and southeastern portions of the subject property immediately adjacent to Gull Lake. The sedge meadow transitioned from the young deciduous forest west of the subject property. The sedge meadows were also found in topographical depressions within the forested areas. The sedge meadows consisted of sedges (*Carex* spp.), rushes (*Juncus* spp.), mixed grasses, and forbs. There was surface water present throughout the sedge meadow at the time of inspection.

The sedge meadows along the shoreline of the subject property are unique vegetative features to Gull Lake. Water levels have dramatically declined since 1924 (Atlas of Alberta Lakes, 2005) resulting in accrued land to develop in these areas. Vegetation in sedge meadows represents early successional stages. The soils in these areas are not fully developed, so vegetation is limited to species that are adapted to a high groundwater table and wet meadow conditions. Due to the undeveloped nature of the soils, these areas are particularly susceptible to erosion and soil compaction. Disturbance will likely remove any existing topsoil in these areas and result in the growth of weedy vegetation.

The sedge meadows transitioned in to dense bands of emergent aquatic vegetation along the east-facing shoreline. The sedge meadow and emergent aquatic vegetation provide high quality habitat for terns, shorebirds, waterfowl, and blackbirds such as black tern (*Chlidonias niger*), blue-winged teal (*Anas discors*), common tern (*Sterna hirundo*), green-winged teal (*Anas crecca*), killdeer (*Charadrius vociferus*), mallard (*Anas platyrhynchos*), red-winged blackbird (*Agelaius phoeniceus*), solitary sandpiper (*Tringa solitaria*),

spotted sandpiper (*Actitis macularius*), American avocet (*Recurvirostra americana*), lesser scaup (*Aythya affinis*), lesser yellowlegs (*Tringa flavipes*), white-winged scoter (*Melanitta fusca),* and yellow-headed blackbird (*Xanthocephalus xanthocephalus*) (O'Leary *et al.*, 1995; Birds of North America, 2008).

The emergent aquatic vegetation and beds of submergent aquatic macrophytes along the shoreline of Gull Lake also provide suitable spawning and rearing habitat for sport fish and prey fish like brook stickleback (*Culaea inconstans*), Iowa darter (*Etheostoma exile*), northern pike (*Esox lucius*), yellow perch (*Perca flavescens*), and spottail shiner (*Notropis hudsonius*) (Joynt and Sullivan, 2003).

Riparian areas are biologically diverse plant communities that are more productive than adjacent uplands. Nearly 80 percent of all wildlife in Alberta relies on riparian areas for part or all of their life cycle (SRD, 2008). Riparian areas also provide important migration corridors for birds, amphibians, and mammals. The riparian areas on the subject property primarily consist of sedge meadows and young deciduous forests. The sedge meadows protect surface water quality in Gull Lake by filtering water resources. Removal of sedge meadows on the subject property may potentially release sediments and increase nutrient loadings into Gull Lake.

### 4.4 Agricultural Land

The air photo review and field inspection identified that the remaining areas on the subject property were cultivated agricultural land that consisted of canola crop.

Agricultural land has the potential to provide suitable habitat for wildlife that rely on open habitats. The short-eared owl (*Asio flammeus*) is a bird species of concern that is associated with open habitats that support small mammal populations. This bird species normally nests on the ground in grasslands and hayfields. Due to its nesting habits, this bird species of concern is particularly sensitive to disturbance and habitat loss through development (Clayton, 2000). Similarly, the American badger (*Taxidea taxus*) is a mammal species of concern that relies on open, treeless areas with abundant prey (i.e. ground squirrels) for habitat (Fisher *et al.*, 2000). Cultivation disturbs valuable den habitat and inhibits species in these areas (Scobie, 2002). Based on the habitat features offered on the subject property, the cultivated agricultural land does not provide suitable habitat for these species.

Bird species that nest in forest edges and feed in open areas are the most likely species to occur on the subject property. Swainson's hawk (*Buteo swainsoni*) and red-tailed hawk (*Buteo jamaicensis)* are birds of prey that nest in trees and shrubs and feed in open habitats (SRD and ACA, 2006). These species are both well adapted to human activities and can be abundant in developed landscapes (SRD and ACA, 2006). At the time of inspection, a red-tailed hawk (*Buteo jamaicensis*) was observed foraging in the cultivated agricultural land at the northwestern portion of the subject property.

## 5 CONSERVATION RECOMMENDATIONS

The most valuable vegetative features on the subject property are: 1) shoreline along Gull Lake; 2) sedge meadows along the shoreline, and; 3) mature mixedwood forests of forested slopes. Loss of cultivated

agricultural lands and temporary Class II wetlands is a consequence of development and should not negatively impact the ecological integrity of surrounding properties.

Although the temporary Class II wetlands identified on the subject property may provide seasonal habitat for birds and amphibians, the wetland features do not provide high quality habitat for plants and wildlife due to agricultural activities. It is nearly impossible to sustain shallow water levels and maintain the existing wetland features amongst development of the subject property. These areas will likely fill in with weedy vegetation and will be unattractive wildlife habitat.

As the temporary Class II wetlands on the subject property are naturally occurring. Wetland compensation may be required for loss of these wetlands under the *Water Act.* Well-designed naturalized stormwater management facilities that will support emergent aquatic vegetation and sedges (*Carex* spp.) may provide adequate compensation. A *Water Act* approvals coordinator should be contacted to discuss wetland compensation options.

The mixedwood forest along the north- and east-facing slopes towards Gull Lake, the young deciduous forest, and the mature forested hedgerows contribute to the ecological integrity of the subject property. These areas promote biodiversity, provide suitable plant and wildlife habitat, and provide recreational opportunities for the public (i.e. bird watching). For these reasons, the mixedwood forest along the north- and east-facing slopes towards Gull Lake should be incorporated into development with minimal disturbance where practical. Young deciduous forest vegetation and mature hedgerows that must be removed to accommodate development should be replanted with vegetation naturalized to the Central Parkland subregion of Alberta.

The sedge meadows on the subject property are a truly unique vegetative feature to Gull Lake due to the decline in water levels. The sedge meadows have poorly developed soils, high groundwater tables, and vegetation representative of early successional stages. These areas are particularly sensitive to disturbance. Disturbances may potentially compact soils and remove any existing topsoil preventing the re-establishment of native vegetation and promoting the growth of weedy vegetation. Removal of existing vegetation may also result in increased sediment and nutrient loadings in Gull Lake. To prevent negative environmental effects, a minimum 30-meter vegetated buffer should also be applied from the ordinary high water mark of Gull Lake, and dedicated as Environmental Reserve (ER) land use. Sedge meadows will be preserved within the public lands located immediately east of the subject property. Where possible, sedge meadows should also be incorporated within development (*i.e.* a natural area at the northern portion of the subject property).

The sedge meadows on the subject property transitioned into dense bands of emergent aquatic vegetation and beds of submergent aquatic macrophytes. These areas provide high quality nesting and feeding habitat for shorebirds, terns, waterfowl, and blackbirds, as well as provide suitable spawning and rearing habitat for fish. For these reasons, the dense bands of emergent aquatic vegetation and beds of submergent aquatic macrophytes should be maintained along the shoreline with minimal disturbance, where possible. Removal of emergent aquatic vegetation will likely require fish habitat compensation under the *Fisheries Act*.

# References


Alberta Agricultural and Rural Development. Soil Online Viewer. Website accessed June 4, 2008. http://www.agric.gov.ab.ca/app21/infopage

Alberta Environment. 1989. Gull Lake. Environmental Water Quality Branch. Brochure accessed from the Albert a Department of the Environment Library.

Alberta Environment. February 2007. Provincial Wetland Restoration/Compensation Guide.

Alberta Environment Groundwater Information System. July 28, 2008. Water well reports for Section 1-041-01-W5M and S ½-12-041-01-W5M, Gull Lake, Alberta.

Atlas of Alberta Lakes. Website accessed July 28, 2008. http://sunsite.ualberta.ca/Projects/Alberta-Lakes/

Birds of North America Online. Website accessed August 6, 2008. http://bna.birds.cornell.edu/bna/

Cooper, Jason. April 14, 2008. Fisheries Management. Red Deer Area. Alberta Sustainable Resource Development. Email Communication.

Fahrig, L. and G. Merriam. 1985. Habitat Patch Connectivity and Population Survival. Ecology. 66 (6): 1762-1768.

Fisher, C., Pattie, D., and T. Hartson. 2000. Mammals of the Rocky Mountains. Lone Pine Publishing. Edmonton, Alberta.

Froggatt, Ken. Fish and Wildlife Division. Red Deer Area. Alberta Sustainable Resource Development. April 16, 2008. Email Communication.

Google Maps. Website accessed August 5, 2008. http://maps.google.ca

Hydrogeological Consultants Ltd. (HCL). 2001. Lacombe County: Part of Red Deer River Basin. Twp 038 to 041, W4M R 01 to 04, W5M. Regional Groundwater Assessment. Prepared for Lacombe County and Agricultaure and Agri-Food Canada.

Joynt, A. and M.G. Sullivan. 2003. Fish of Alberta. Lone Pine Publishing. Edmonton, Alberta.

Kantrud, H.A., and R.E. Stewart. 1984. Ecological Distribution and Crude Density of Breeding Birds on Prairie Wetlands. *The Journal of Wildlife Management.* 48 (2): 426-437.

Natural Regions Committee (NRC). 2006. Natural Regions and Subregions of Alberta. Compiled by D.J. Downing and W.W. Pettapiece. Government of Alberta. Pub. No. T/852.

O'Leary, D., Schultz, R. and J. Bentz. March 1995. Shoreline Habitat Assessment of Gull Lake, Alberta. GEOWEST Environmental Consultants Ltd. Prepared for Fish and Wildlife Division (Red Deer), Land Information Services Division, and Alberta Environmental Protection.

Rempel, S. 2007. Selecting Focal Songbird Species for Biodiversity Conservation Assessment: Response to Forest Cover Amount and Configuration. Avian Conservation and Ecology. 2 (1): 6.

Rintoul, John. Alberta Natural Heritage Information Centre. April 14, 2008. Email Communication.

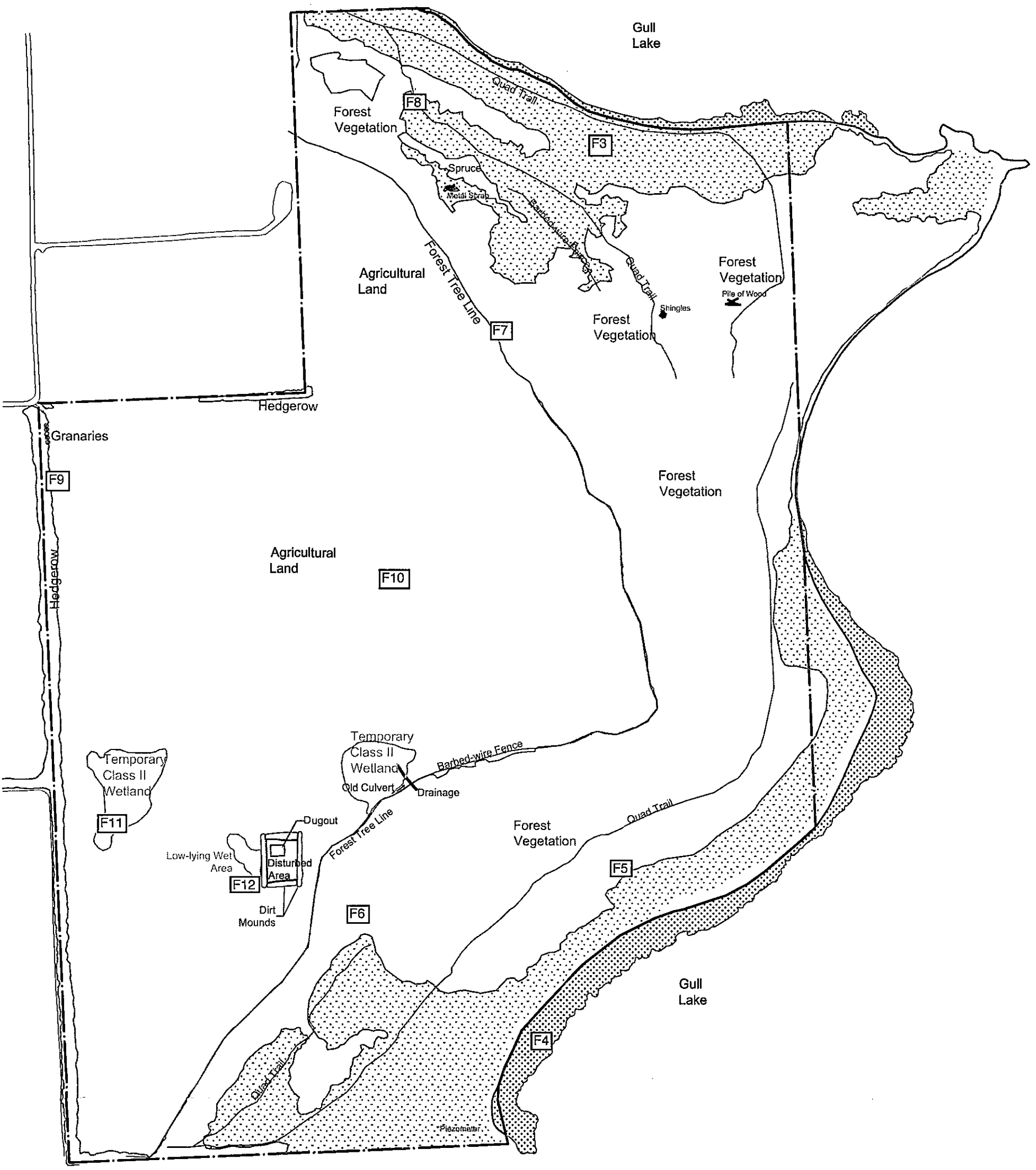
Scobie, D. 2002. Status of the American Badger (Taxidea taxus) in Alberta. Alberta Sustainable Resource Development, Fish and Wildlife Division, and Alberta Conservation Association, Wildlife Status Report No. 43, Edmonton, AB. 17 pp.

Stewart, R.E. and H.A. Kantrud. 1971. Classification of Natural Ponds and Lakes in the Glaciated Prairie Region. Resource Publication 92, Bureau of Sport Fisheries and Wildlife, U.S. Fish and Wildlife Service, Washington, D.C. Jamestown, ND: Northern Prairie Wildlife Research Centre Online. http://www.npwrc.usgs.gov/resource/wetlands/pondlake/index.htm (Version 16APR1998).

Stewart, R.E. and H.A. Kanatrud. 1973. Ecological Distribution of Breeding Waterfowl Populations in North Dakota. *Journal of Wildlife Management.* 37 (1): 39-50.

Sustainable Resource Development (SRD). Website accessed August 6, 2008. http://www.srd.gov.ab.ca/

Tattersall, F.H., Macdonald, D.W., Hart, B.J., Johnson, P., Manley, W. and R. Feber. 2002. Is habitat linearity important for small mammal communities on farmland? Journal of Applied Ecology. 39: 643-652.




Area of Class II Wetland: 35386.9 m²

Legend

- Sedge Meadow
- Emergent Aquatic Vegetation
- Development Boundary
- Ordinary Water Mark
- F3 Figure 3

| REV # | DATE: | DESCRIPTION |
|---|---|---|
| 1.0 | 2008-08-04 | DRAFT FOR REVIEW |
| 2.0 | 2008-08-07 | ADDED AND CALCULATED WETLAND AREAS |
| 3.0 | 2008-09-08 | MINOR CHANGES |

SITE PLAN WITH VEGETATIVE FEATURES
1-41-01-W5M & S½-12-41-01-W5M
Gull Lake, AB

DRAWN BY: HY
REVIEWED BY: AH
APPROVED BY: AH

ECOMARK

PROJECT: ADWIL-08502-15451.00-0
DATE: 2008-09-08
DWG NAME: ADWIL-0850x-15451.00-0_SP1_d-hy-5

REV 3.0
FIG 1

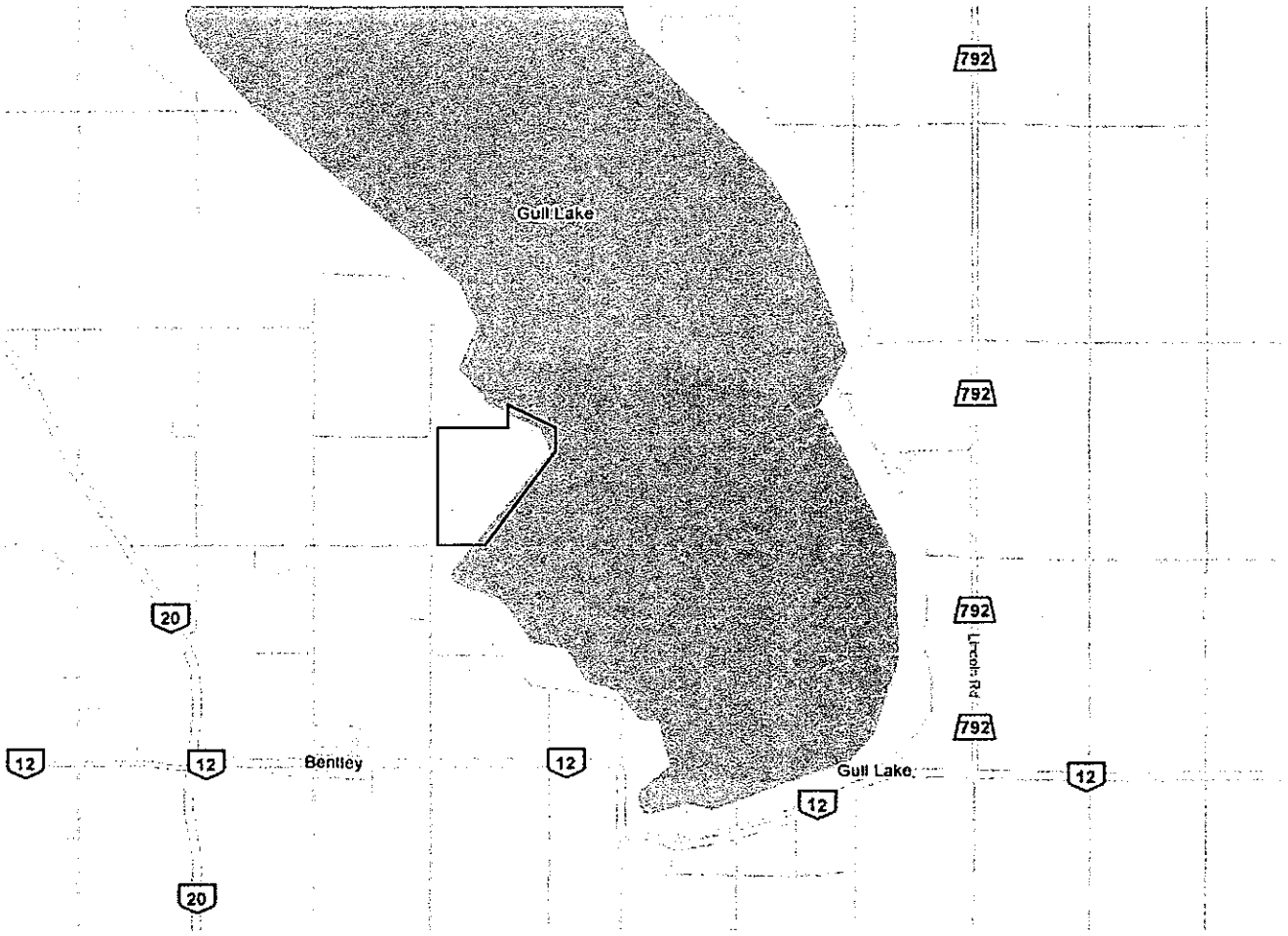



**Figure 2: Map of Area (Google Maps, 2008)**

**Figure 3: Sedge Meadow along North-facing Shoreline at the Northern Portion of the Subject Property (Location Reference F3)**

**Figure 4: Sedge Meadow and Bands of Emergent Vegetation along East-facing Shoreline at Southeastern Portion of the Subject Property (Location Reference F4)**

**Figure 5: Transition from Sedge Meadow to Young Deciduous Forest at the Central Portion of the Subject Property (Location Reference F5)**

**Figure 6: Mature Mixedwood Forest Immediately East of the Agricultural Land (Location Reference F6)**

**Figure 7: Mature Mixedwood Forested Slope (Location Reference F7)**

**Figure 8: Quad Trail through the Mixedwood Forested Area and Sedge Meadow at the Northern Portion of the Subject Property (Location Reference F8)**

**Figure 9: Mature Forested Hedgerow along the Western Boundary of Subject Property (Location Reference F9)**

**Figure 10: Cultivated Agricultural Land at the Western Portion of the Subject Property (Location Reference F10)**

**Figure 11: Temporary Class II Wetland within Agriculture Land at the Southwestern Portion of the Subject Property (Location Reference F11)**

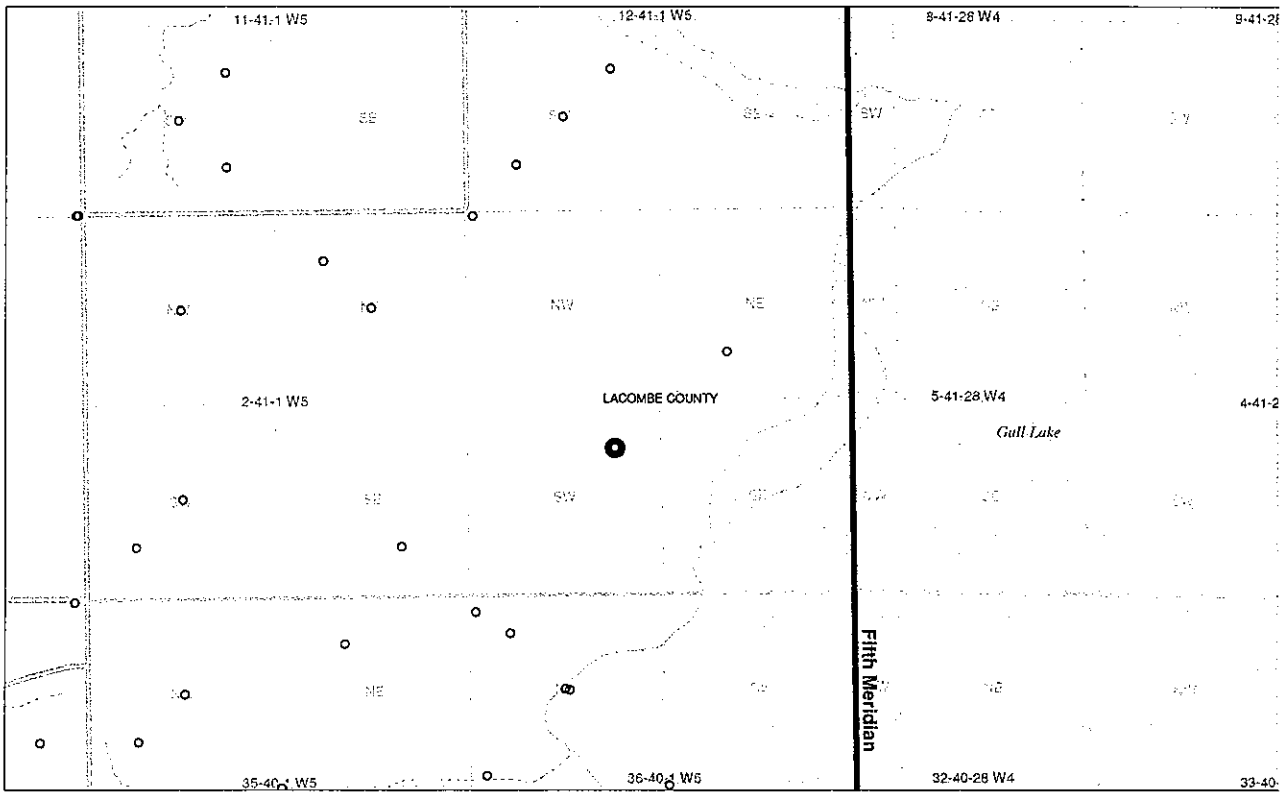
**Figure 12: Excavation at South Central Portion of the Subject Property (Location Reference F12)**

# Appendix 1: Historical Air Photos

# TELUS Geomatics - Alberta Map

waterwell

Water Wellsites




SCALE 1 : 32,067

500 0 500 1,000 1,500

METERS

N

# Water Well Drilling Report

Alberta Environment

The data contained in this report is supplied by the Driller. The province disclaims responsibility for its accuracy.

| | |
|---|---|
| Well I.D.: | 0341921 |
| Map Verified: | Map |
| Date Report Received: | 2002/12/13 |
| Measurements: | Metric |

## 1. Contractor & Well Owner Information

| | | |
|---|---|---|
| Company Name: ALKEN BASIN DRILLING LTD. | | Drilling Company Approval No.: 38394 |
| Mailing Address: BOX 47 | City or Town: BENTLEY AB CANADA | Postal Code: T0C 0J0 |
| WellOwner's Name: SANDY POINT FARMS | Well Location Identifier: | |
| P.O. Box Number: 119 | Mailing Address: BENTLEY | Postal Code: T0C 0J0 |
| City: | Province: | Country: |

## 2. Well Location

| 1/4 or LSD | Sec | Twp | Rge | Westof M |
|---|---|---|---|---|
| 10 | 01 | 041 | 01 | 5 |

Location in Quarter
0 M from Boundary
0 M from Boundary

Lot Block Plan

Well Elev: M
How Obtain: Not Obtain

## 3. Drilling Information

Type of Work: New Well
Reclaimed Well
Date Reclaimed: Materials Used:
Method of Drilling: Rotary
Flowing Well: No
Gas Present: No
Rate: Liters
Oil Present: No
Proposed well use: Stock
Anticipated Water Requirements/day 0 Liters

## 6. Well Yield

| Test Date (yyyy/mm/dd): | Start Time: |
|---|---|
| 2002/11/20 | 11:00 AM |

Test Method: Air

Non pumping static level: 6.71 M

Rate of water removal: 227.3 Liters/Min

Depth of pump intake: 54.86 M

Water level at end of pumping: 19.81 M

Distance from top of CM casing to ground level:

| Depth To water level (meters) | Elapsed Time Drawdown Minutes:Sec | Recovery |
|---|---|---|
| 15.4 | 1:00 | 10.1 |
| 17.5 | 2:00 | 8 |
| 18.42 | 3:00 | 7.81 |
| 18.63 | 4:00 | 7.77 |
| 19.05 | 5:00 | 7.74 |
| 19.32 | 6:00 | 7.72 |
| 19.41 | 7:00 | 7.71 |
| 19.52 | 8:00 | 7.7 |
| 19.62 | 9:00 | 7.69 |
| 19.69 | 10:00 | 7.68 |
| 19.8 | 12:00 | 7.66 |
| 19.92 | 14:00 | 7.65 |
| 19.84 | 16:00 | 7.64 |
| 19.88 | 20:00 | 7.63 |
| 19.75 | 25:00 | 7.62 |
| 19.74 | 30:00 | 7.62 |
| 19.72 | 35:00 | 7.61 |
| 19.72 | 40:00 | 7.6 |
| 19.77 | 50:00 | 7.59 |
| 19.82 | 60:00 | 7.57 |
| 19.87 | 75:00 | 7.56 |
| 19.92 | 90:00 | 7.54 |
| 19.93 | 105:00 | 7.52 |
| 19.95 | 120:00 | 7.5 |

Total Drawdown: 13.11 M

If water removal was less than 2 hr duration, reason why:

Recommended pumping rate: 227.3 Liters/Min

Recommended pump intake: 48.77 M

Type Pump Installed
Pump Type:

## 4. Formation Log

| Depth from ground level (meters) | Lithology Description |
|---|---|
| 3.66 | Clay |
| 10.67 | Brown Shale |
| 12.8 | Brown Sandstone |
| 15.24 | Gray Sandstone |
| 21.34 | Gray Shale |
| 24.08 | Gray Sandstone |
| 32.31 | Gray Shale |
| 51.82 | Gray Sandstone |
| 54.86 | Gray Shale |

## 5. Well Completion

| | |
|---|---|
| Date Started(yyyy/mm/dd): 2002/11/20 | Date Completed (yyyy/mm/dd): 2002/11/20 |
| Well Depth: 54.86 M | Borehole Diameter: 0 CM |
| Casing Type: Steel | Liner Type: Plastic |
| Size OD: 21.89 CM | Size OD: 17.78 CM |
| Wall Thickness: 0.93 CM | Wall Thickness: 0.97 CM |
| Bottom at: 31.7 M | Top: 24.38 M Bottom: 54.86 M |
| Perforations from: 36.58 M to: 48.77 M<br>from: 0 M to: 0 M<br>from: 0 M to: 0 M | Perforations Size:<br>1.27 CM x 1.27 CM<br>0 CM x 0 CM<br>0 CM x 0 CM |

Perforated by: Hand Drill

Seal: Driven & Bentonite from: 0 M to: 31.7 M
Seal: from: 0 M to: 0 M
Seal: from: 0 M to: 0 M

| | |
|---|---|
| Screen Type: from: 0 M to: 0 M | Screen ID: 0 CM Slot Size: 0 CM |
| Screen Type: from: 0 M to: 0 M | Screen ID: 0 CM Slot Size: 0 CM |

Screen Installation Method:

Fittings Top: Bottom:

Pack: Grain Size: Amount:

Geophysical Log Taken:
Retained on Files:

Additional Test and/or Pump Data
Chemistries taken By Driller: No
Held: 0 Documents Held: 1

Pitless Adapter Type:
Drop Pipe Type:
Length: M Diameter: CM

Comments:

## 7. Contractor Certification

Driller's Name: UNKNOWN DRILLER
Certification No.: 12389Q
This well was constructed in accordance with the Water

| | | |
|---|---|---|
| | Well regulation of the Alberta Environmental Protection & Enhancement Act. All information in this report is true.<br>Signature Yr Mo Day | Pump Model:<br>H.P.:<br>Any further pumptest information? |

# Water Well Drilling Report

Alberta Environment

The data contained in this report is supplied by the Driller. The province disclaims responsibility for its accuracy.

| | |
|---|---|
| Well I.D.: | 0341922 |
| Map Verified: | Map |
| Date Report Received: | 2002/12/11 |
| Measurements: | Metric |

## 1. Contractor & Well Owner Information

| | | |
|---|---|---|
| Company Name: ALKEN BASIN DRILLING LTD. | | Drilling Company Approval No.: 38394 |
| Mailing Address: BOX 47 | City or Town: BENTLEY AB CANADA | Postal Code: T0C 0J0 |
| WellOwner's Name: SANDY POINT FARMS | Well Location Identifier: | |
| P.O. Box Number: 119 | Mailing Address: BENTLEY | Postal Code: T0C 0J0 |
| City: | Province: | Country: |

## 2. Well Location

| 1/4 or LSD | Sec | Twp | Rge | Westof M |
|---|---|---|---|---|
| 10 | 01 | 041 | 01 | 5 |

Location in Quarter
0 M from Boundary
0 M from Boundary

Lot Block Plan

Well Elev: M
How Obtain: Not Obtain

## 3. Drilling Information

Type of Work: New Well
Reclaimed Well
Date Reclaimed: Materials Used:
Method of Drilling: Rotary
Flowing Well: No Rate: Liters
Gas Present: No Oil Present: No

Proposed well use: Stock
Anticipated Water Requirements/day 0 Liters

## 6. Well Yield

| Test Date (yyyy/mm/dd): | Start Time: |
|---|---|
| 2002/11/13 | 11:00 AM |

Test Method: Air

Non pumping static level: 7.32 M

Rate of water removal: 227.3 Liters/Min

Depth of pump intake: 54.86 M

Water level at end of pumping: 19.81 M

Distance from top of CM casing to ground level:

Depth To water level (meters)

| Elapsed Time Drawdown | Minutes:Sec | Recovery |
|---|---|---|
| 15.4 | 1:00 | 10.1 |
| 17.5 | 2:00 | 8 |
| 18.42 | 3:00 | 7.81 |
| 18.63 | 4:00 | 7.77 |
| 19.05 | 5:00 | 7.74 |
| 19.32 | 6:00 | 7.72 |
| 19.42 | 7:00 | 7.71 |
| 19.51 | 8:00 | 7.7 |
| 19.61 | 9:00 | 7.69 |
| 19.68 | 10:00 | 7.68 |
| 19.9 | 14:00 | 7.65 |
| 19.87 | 20:00 | 7.63 |
| 19.76 | 25:00 | 7.62 |
| 19.67 | 30:00 | 7.62 |
| 19.7 | 40:00 | 7.6 |
| 19.75 | 50:00 | 7.59 |
| 19.8 | 60:00 | 7.57 |
| 19.85 | 75:00 | 7.56 |
| 19.9 | 90:00 | 7.55 |
| 19.93 | 120:00 | 7.54 |

Total Drawdown: 12.5 M

If water removal was less than 2 hr duration, reason why:

Recommended pumping rate: 227.3 Liters/Min

Recommended pump intake: 51.82 M

Type Pump Installed
Pump Type:
Pump Model:
H.P.:
Any further pumptest information?

## 4. Formation Log

| Depth from ground level (meters) | Lithology Description |
|---|---|
| 4.27 | Brown Clay |
| 7.32 | Brown Sandstone |
| 10.97 | Brown Shale |
| 11.89 | Gray Shale |
| 13.72 | Gray Sandstone |
| 14.63 | Gray Shale |
| 17.68 | Gray Sandstone |
| 21.95 | Gray Shale |
| 24.69 | Gray Sandstone |
| 32.61 | Gray Shale |
| 51.82 | Gray Sandstone |
| 54.86 | Gray Shale |

## 5. Well Completion

| | |
|---|---|
| Date Started(yyyy/mm/dd): 2002/11/13 | Date Completed (yyyy/mm/dd): 2002/11/13 |
| Well Depth: 54.86 M | Borehole Diameter: 0 CM |
| Casing Type: Steel | Liner Type: Plastic |
| Size OD: 14.12 CM | Size OD: 11.43 CM |
| Wall Thickness: 0.66 CM | Wall Thickness: 0.54 CM |
| Bottom at: 29.57 M | Top: 24.38 M Bottom: 54.86 M |
| Perforations from: 36.58 M to: 51.82 M<br>from: 0 M to: 0 M<br>from: 0 M to: 0 M | Perforations Size: 1.27 CM x 1.27 CM<br>0 CM x 0 CM<br>0 CM x 0 CM |
| Perforated by: Hand Drill | |
| Seal: Driven & Bentonite from: 0 M | to: 29.57 M |
| Seal: from: 0 M | to: 0 M |
| Seal: from: 0 M | to: 0 M |
| Screen Type: from: 0 M to: 0 M | Screen ID: 0 CM Slot Size: 0 CM |
| Screen Type: from: 0 M to: 0 M | Screen ID: 0 CM Slot Size: 0 CM |
| Screen Installation Method: | |
| Fittings Top: | Bottom: |
| Pack: Grain Size: | Amount: |
| Geophysical Log Taken: Retained on Files: | |
| Additional Test and/or Pump Data Chemistries taken By Driller: No Held: 0 | Documents Held: 1 |
| Pitless Adapter Type: Drop Pipe Type: Length: M | Diameter: CM |
| Comments: | |

## 7. Contractor Certification

| | |
|---|---|
| Driller's Name: | UNKNOWN DRILLER |
| Certification No.: | VA3129 |

This well was constructed in accordance with the Water

Well regulation of the Alberta Environmental Protection & Enhancement Act. All information in this report is true.
Signature Yr Mo Day

# Water Well Drilling Report

Alberta Environment

The data contained in this report is supplied by the Driller. The province disclaims responsibility for its accuracy.

| | |
|---|---|
| Well I.D.: | 0341923 |
| Map Verified: | Map |
| Date Report Received: | 2002/12/11 |
| Measurements: | Metric |

## 1. Contractor & Well Owner Information

| | | |
|---|---|---|
| Company Name: ALKEN BASIN DRILLING LTD. | | Drilling Company Approval No.: 38394 |
| Mailing Address: BOX 47 | City or Town: BENTLEY AB CANADA | Postal Code: T0C 0J0 |
| WellOwner's Name: SANDY POINT FARMS | Well Location Identifier: | |
| P.O. Box Number: 119 | Mailing Address: BENTLEY | Postal Code: T0C 0J0 |
| City: | Province: | Country: |

## 2. Well Location

| 1/4 or LSD | Sec | Twp | Rge | Westof M |
|---|---|---|---|---|
| 10 | 01 | 041 | 01 | 5 |

Location in Quarter
0 M from Boundary
0 M from Boundary

Lot Block Plan

Well Elev: M
How Obtain: Not Obtain

## 3. Drilling Information

Type of Work: New Well
Reclaimed Well
Date Reclaimed:
Materials Used:

Method of Drilling: Rotary

Flowing Well: No
Gas Present: No
Rate: Liters
Oil Present: No

Proposed well use: Stock
Anticipated Water Requirements/day 0 Liters

## 4. Formation Log

| Depth from ground level (meters) | Lithology Description |
|---|---|
| 5.18 | Brown Clay |
| 7.32 | Brown Sandstone |
| 9.14 | Brown Shale |
| 10.36 | Brownish Green Sandstone |
| 11.28 | Brownish Green Fractured Shale |
| 12.19 | Gray Shale |
| 13.41 | Gray Hard Sandstone |
| 17.07 | Gray Shale |
| 17.98 | Gray Sandstone |
| 21.34 | Gray Shale |
| 22.25 | Green Shale |
| 24.69 | Gray Sandstone |
| 27.43 | Gray Shale |

## 5. Well Completion

| | |
|---|---|
| Date Started(yyyy/mm/dd): 2002/11/13 | Date Completed (yyyy/mm/dd): 2002/11/13 |
| Well Depth: 27.43 M | Borehole Diameter: 0 CM |
| Casing Type: Steel | Liner Type: Plastic |
| Size OD: 14.12 CM | Size OD: 11.43 CM |
| Wall Thickness: 0.66 CM | Wall Thickness: 0.54 CM |
| Bottom at: 11.28 M | Top: 9.14 M Bottom: 27.43 M |
| Perforations from: 21.34 M to: 24.38 M<br>from: 0 M to: 0 M<br>from: 0 M to: 0 M | Perforations Size: 1.27 CM x 1.27 CM<br>0 CM x 0 CM<br>0 CM x 0 CM |
| Perforated by: Hand Drill | |
| Seal: Driven & Bentonite from: 0 M | to: 11.28 M |
| Seal: from: 0 M | to: 0 M |
| Seal: from: 0 M | to: 0 M |
| Screen Type: from: 0 M to: 0 M | Screen ID: 0 CM Slot Size: 0 CM |
| Screen Type: from: 0 M to: 0 M | Screen ID: 0 CM Slot Size: 0 CM |
| Screen Installation Method: | |
| Fittings Top: | Bottom: |
| Pack: Grain Size: | Amount: |
| Geophysical Log Taken: Retained on Files: | |
| Additional Test and/or Pump Data Chemistries taken By Driller: No Held: 0 | Documents Held: 1 |
| Pitless Adapter Type: Drop Pipe Type: Length: M | Diameter: CM |
| Comments: | |

## 6. Well Yield

Test Date (yyyy/mm/dd): 2002/11/13
Start Time: 11:00 AM
Test Method: Air

Non pumping static level: 7.01 M

Rate of water removal: 90.92 Liters/Min

Depth of pump intake: 27.43 M

Water level at end of pumping: 12.19 M

Distance from top of CM casing to ground level:

| Depth To water level (meters) | Elapsed Time Drawdown Minutes:Sec | Recovery |
|---|---|---|
| 9.65 | 1:00 | 8.25 |
| 10.7 | 2:00 | 7.98 |
| 11.12 | 3:00 | 7.86 |
| 11.35 | 4:00 | 7.76 |
| 11.45 | 5:00 | 7.75 |
| 11.52 | 6:00 | 7.73 |
| 11.58 | 7:00 | 7.69 |
| 11.62 | 8:00 | 7.67 |
| 11.64 | 9:00 | 7.64 |
| 11.66 | 10:00 | 7.63 |
| 11.76 | 14:00 | 7.58 |
| 11.78 | 20:00 | 7.54 |
| 11.85 | 25:00 | 7.53 |
| 11.92 | 30:00 | 7.5 |
| 12.17 | 40:00 | 7.47 |
| 12.25 | 50:00 | 7.44 |
| 12.4 | 60:00 | 7.43 |
| 12.25 | 75:00 | 7.41 |
| 12.15 | 90:00 | 7.38 |
| 12.31 | 120:00 | 7.33 |

Total Drawdown: 5.18 M

If water removal was less than 2 hr duration, reason why:

Recommended pumping rate: 90.92 Liters/Min

Recommended pump intake: 21.34 M

Type Pump Installed
Pump Type:
Pump Model:
H.P.:
Any further pumptest information?

## 7. Contractor Certification

Driller's Name: UNKNOWN DRILLER
Certification No.: VA3129
This well was constructed in accordance with the Water

Well regulation of the Alberta Environmental Protection & Enhancement Act. All information in this report is true.
Signature Yr Mo Day

# Water Well Drilling Report

Alberta Environment

The data contained in this report is supplied by the Driller. The province disclaims responsibility for its accuracy.

| | |
|---|---|
| Well I.D.: | 0355320 |
| Map Verified: | Not Verified |
| Date Report Received: | 1988/03/07 |
| Measurements: | Metric |

## 1. Contractor & Well Owner Information

| | | |
|---|---|---|
| Company Name: ALKEN BASIN DRILLING LTD. | | Drilling Company Approval No.: 38394 |
| Mailing Address: BOX 47 | City or Town: BENTLEY AB CANADA | Postal Code: T0C 0J0 |
| WellOwner's Name: TRILOGY | Well Location Identifier: | |
| P.O. Box Number: | Mailing Address: NISKU | Postal Code: |
| City: | Province: | Country: |

## 2. Well Location

| 1/4 or LSD | Sec | Twp | Rge | Westof M |
|---|---|---|---|---|
| 06 | 01 | 041 | 01 | 5 |

Location in Quarter
0 M from Boundary
0 M from Boundary

Lot Block Plan

Well Elev: M
How Obtain: Not Obtain

## 3. Drilling Information

Type of Work: Old Well-Abandoned
Reclaimed Well
Date Reclaimed: 1988/03/15 Materials Used: Unknown

Method of Drilling: Rotary

Flowing Well: No Rate: Liters
Gas Present: Oil Present:

Proposed well use: Industrial
Anticipated Water Requirements/day 0 Liters

## 4. Formation Log

| Depth from ground level (meters) | Lithology Description |
|---|---|
| 9.14 | Clay |
| 18.29 | Sandstone |

## 5. Well Completion

| | |
|---|---|
| Date Started(yyyy/mm/dd): 1988/02/23 | Date Completed (yyyy/mm/dd): 1988/02/23 |
| Well Depth: 18.29 M | Borehole Diameter: 0 CM |
| Casing Type: Steel | Liner Type: |
| Size OD: 11.43 CM | Size OD: 0 CM |
| Wall Thickness: 0.4 CM | Wall Thickness: 0 CM |
| Bottom at: 18.29 M | Top: 0 M Bottom: 0 M |

Perforations
from: 0 M to: 0 M
from: 0 M to: 0 M
from: 0 M to: 0 M

Perforations Size:
0 CM x 0 CM
0 CM x 0 CM
0 CM x 0 CM

Perforated by:

Seal: Shale Trap
from: 0 M to: 12.19 M

Seal:
from: 0 M to: 0 M

Seal:
from: 0 M to: 0 M

Screen Type:
from: 0 M to: 0 M
Screen ID: 0 CM
Slot Size: 0 CM

Screen Type:
from: 0 M to: 0 M
Screen ID: 0 CM
Slot Size: 0 CM

Screen Installation Method:

Fittings
Top: Bottom:

Pack:
Grain Size: Amount: 0

Geophysical Log Taken:
Retained on Files:

Additional Test and/or Pump Data
Chemistries taken By Driller: No
Held: 0 Documents Held: 3

Pitless Adapter Type:
Drop Pipe Type:
Length: M Diameter: CM

Comments:
Spartan 28.

## 6. Well Yield

| | |
|---|---|
| Test Date (yyyy/mm/dd): 1988/02/23 | Start Time: 11:00 AM |
| Test Method: Pump | |
| Non pumping static level: | 4.57 M |
| Rate of water removal: | 204.57 Liters/Min |
| Depth of pump intake: | 0 M |
| Water level at end of pumping: | 10.67 M |

Distance from top of CM casing to ground level:

Depth To water level (meters)
Elapsed Time
Drawdown Minutes:Sec Recovery
Total Drawdown: 6.1 M

If water removal was less than 2 hr duration, reason why:

Recommended pumping rate: 204.57 Liters/Min

Recommended pump intake: 14.02 M

Type Pump Installed
Pump Type: SUB
Pump Model: TURBINE
H.P.:
Any further pumptest information?

## 7. Contractor Certification

Driller's Name: UNKNOWN DRILLER
Certification No.: VA4790
This well was constructed in accordance with the Water

Well regulation of the Alberta Environmental Protection & Enhancement Act. All information in this report is true.
Signature Yr Mo Day

# Water Well Drilling Report

Alberta Environment

The data contained in this report is supplied by the Driller. The province disclaims responsibility for its accuracy.

| | |
|---|---|
| Well I.D.: | 0435633 |
| Map Verified: | Not Verified |
| Date Report Received: | |
| Measurements: | Metric |

## 1. Contractor & Well Owner Information

| | | |
|---|---|---|
| Company Name: UNKNOWN DRILLER | | Drilling Company Approval No.: 99999 |
| Mailing Address: UNKNOWN | City or Town: UNKNOWN AB CA | Postal Code: |
| WellOwner's Name: CALIFORNIA STANDARD CO#THE-500 | Well Location Identifier: | |
| P.O. Box Number: | Mailing Address: | Postal Code: |
| City: | Province: | Country: |

## 2. Well Location

| 1/4 or LSD | Sec | Twp | Rge | Westof M |
|---|---|---|---|---|
| 13 | 01 | 041 | 01 | 5 |

Location in Quarter
15.54 M from N Boundary
10.97 M from W Boundary

Lot Block Plan

Well Elev: 932.63 M
How Obtain: Survey-Tra

## 3. Drilling Information

Type of Work: Structure Test Hole
Reclaimed Well
Date Reclaimed: Materials Used:

Method of Drilling: Unknown

Flowing Well: No
Gas Present: No
Rate: Liters
Oil Present: No

Proposed well use: Unknown
Anticipated Water Requirements/day 0 Liters

## 4. Formation Log

| Depth from ground level (meters) | Lithology Description |
|---|---|

## 5. Well Completion

| | |
|---|---|
| Date Started(yyyy/mm/dd): | Date Completed (yyyy/mm/dd): 1953/06/29 |
| Well Depth: 329.18 M | Borehole Diameter: 0 CM |
| Casing Type: | Liner Type: |
| Size OD: 0 CM | Size OD: 0 CM |
| Wall Thickness: 0 CM | Wall Thickness: 0 CM |
| Bottom at: 0 M | Top: 0 M Bottom: 0 M |
| Perforations from: 0 M to: 0 M<br>from: 0 M to: 0 M<br>from: 0 M to: 0 M | Perforations Size:<br>0 CM x 0 CM<br>0 CM x 0 CM<br>0 CM x 0 CM |
| Perforated by: | |
| Seal: from: 0 M | to: 0 M |
| Seal: from: 0 M | to: 0 M |
| Seal: from: 0 M | to: 0 M |
| Screen Type: from: 0 M to: 0 M | Screen ID: 0 CM Slot Size: 0 CM |
| Screen Type: from: 0 M to: 0 M | Screen ID: 0 CM Slot Size: 0 CM |
| Screen Installation Method: | |
| Fittings Top: | Bottom: |
| Pack: Grain Size: | Amount: |
| Geophysical Log Taken: ELECTRIC<br>Retained on Files: ELECTRIC yes | |
| Additional Test and/or Pump Data<br>Chemistries taken By Driller: No<br>Held: 0 | Documents Held: 1 |
| Pitless Adapter Type:<br>Drop Pipe Type:<br>Length: | Diameter: |
| Comments: | |

## 6. Well Yield

Test Date (yyyy/mm/dd): Start Time:

Test Method:

Non pumping static level: M

Rate of water removal: Liters/Min

Depth of pump intake: M

Water level at end of pumping: M

Distance from top of casing to ground level: CM

Depth To water level (meters)
Elapsed Time
Drawdown Minutes:Sec Recovery

Total Drawdown: M

If water removal was less than 2 hr duration, reason why:

Recommended pumping rate: Liters/Min

Recommended pump intake: M

Type pump installed
Pump type:
Pump model:
H.P.:
Any further pumptest information?

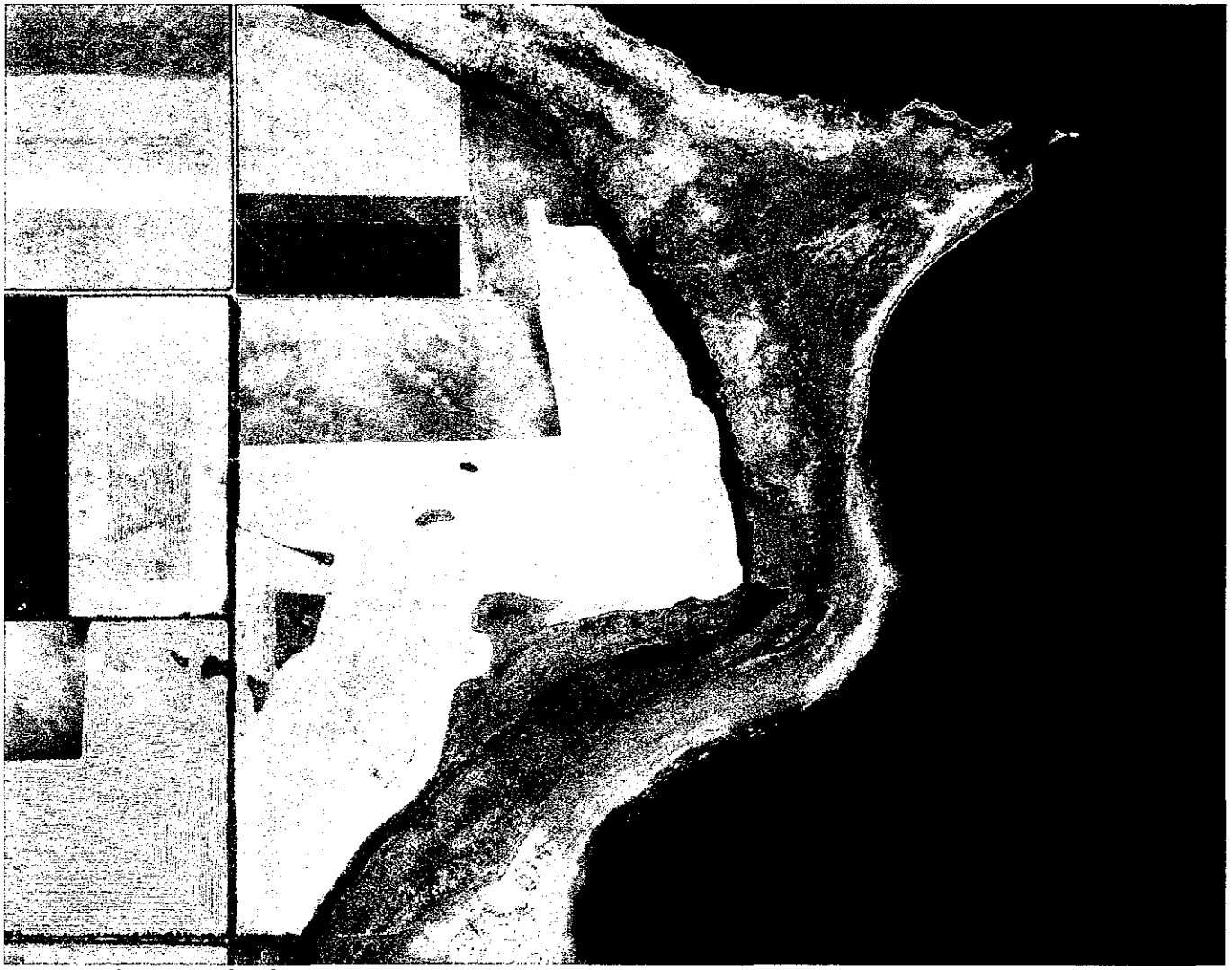
## 7. Contractor Certification

Driller's Name: UNKNOWN DRILLER
Certification No.:

| | | |
|---|---|---|
| | Well regulation of the Alberta Environmental Protection & Enhancement Act. All information in this report is true.<br>Signature Yr Mo Day | |

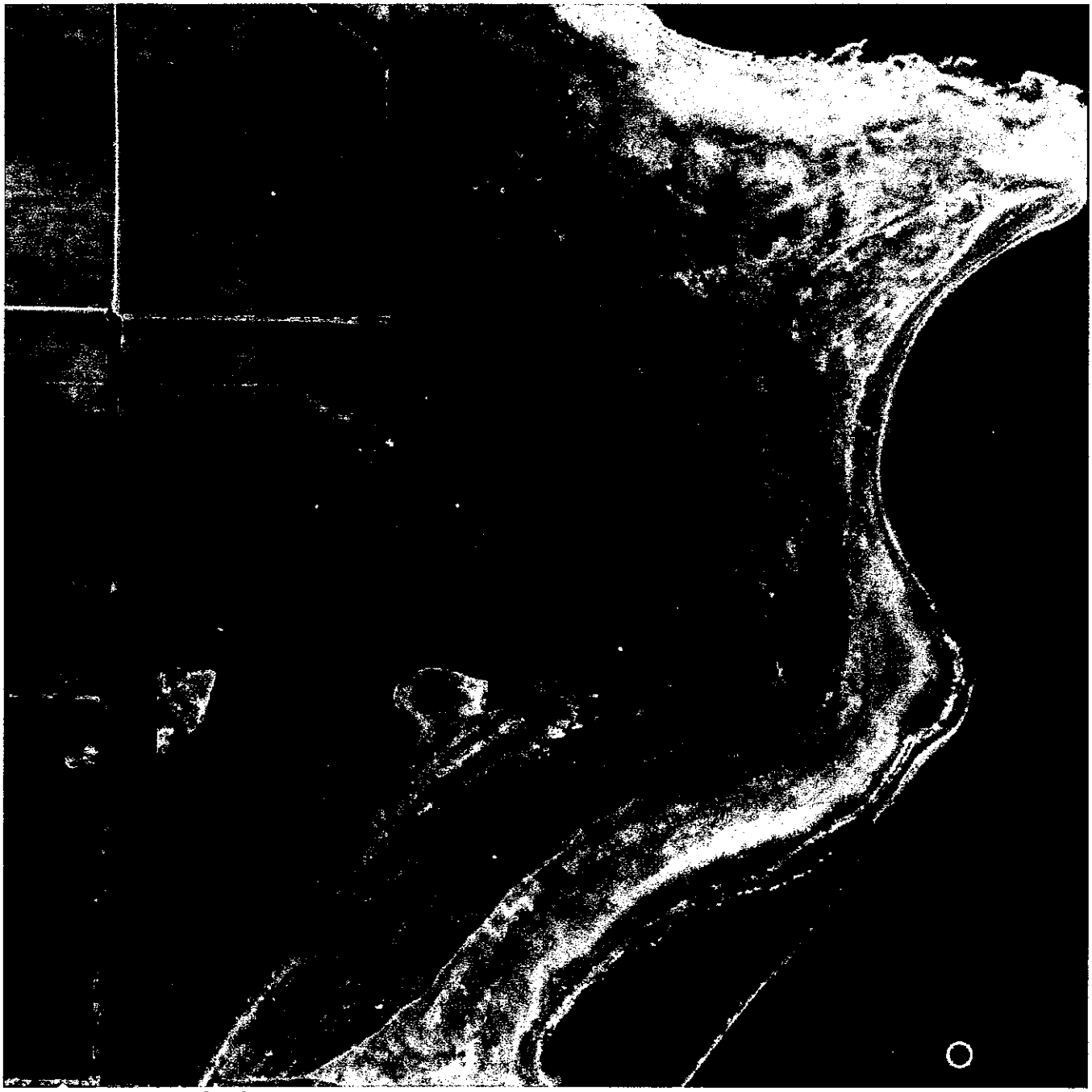
**September 22, 1949 Air Photo**

**June 30, 1962 Air Photo**



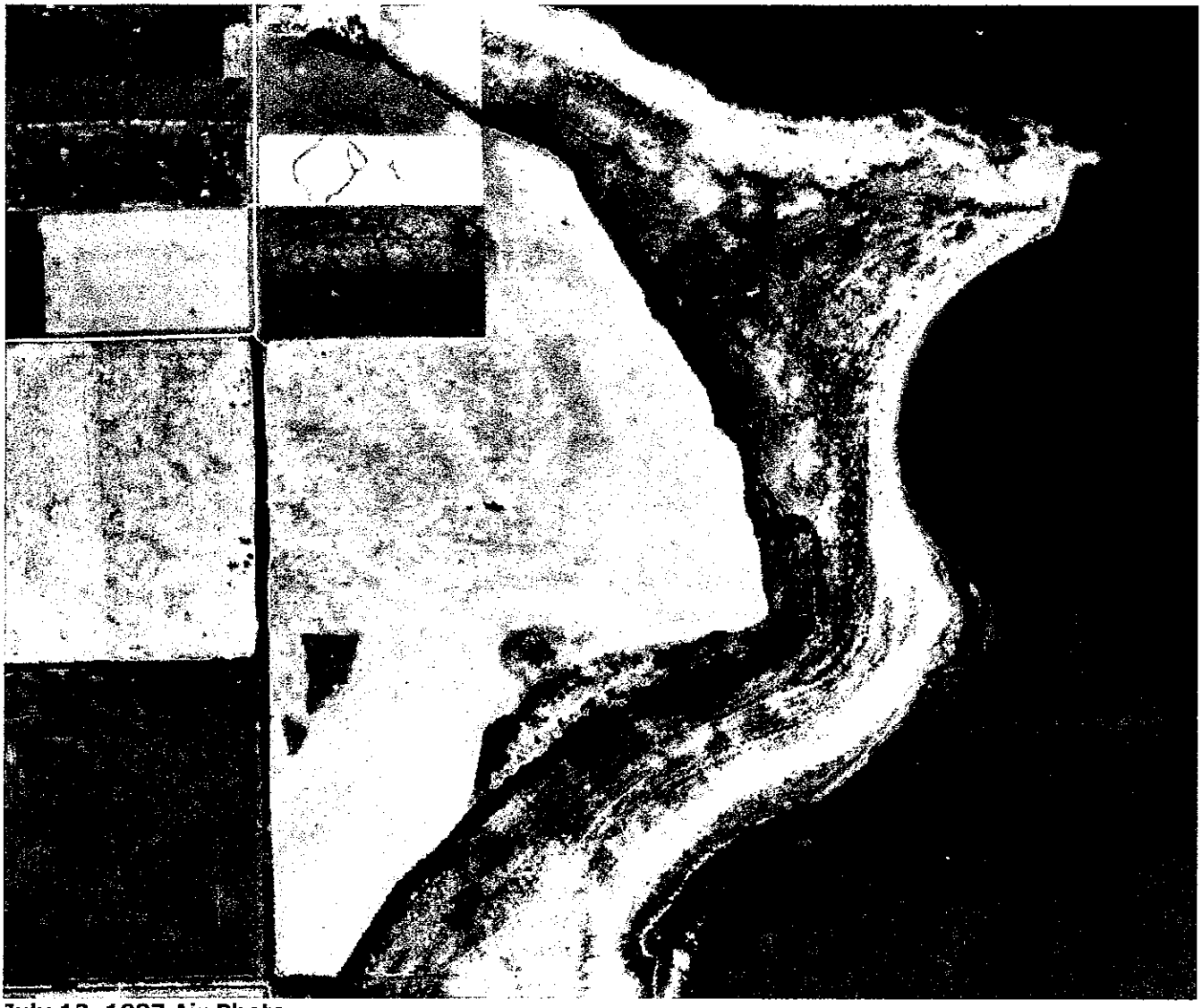
**August 22, 1966 Air Photo**

**May 13, 1969 Air Photo**

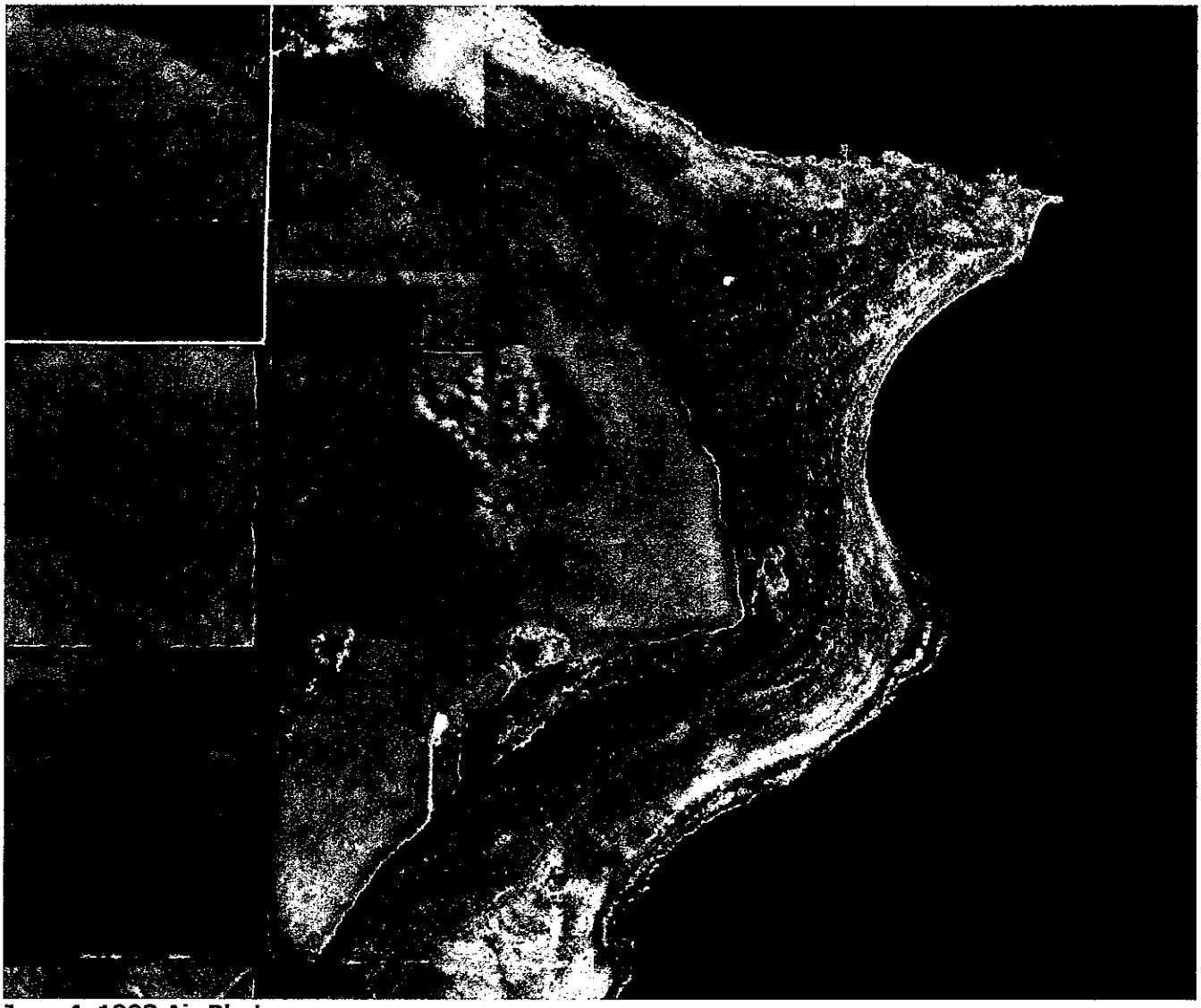


**August 11, 1975 Air Photo**

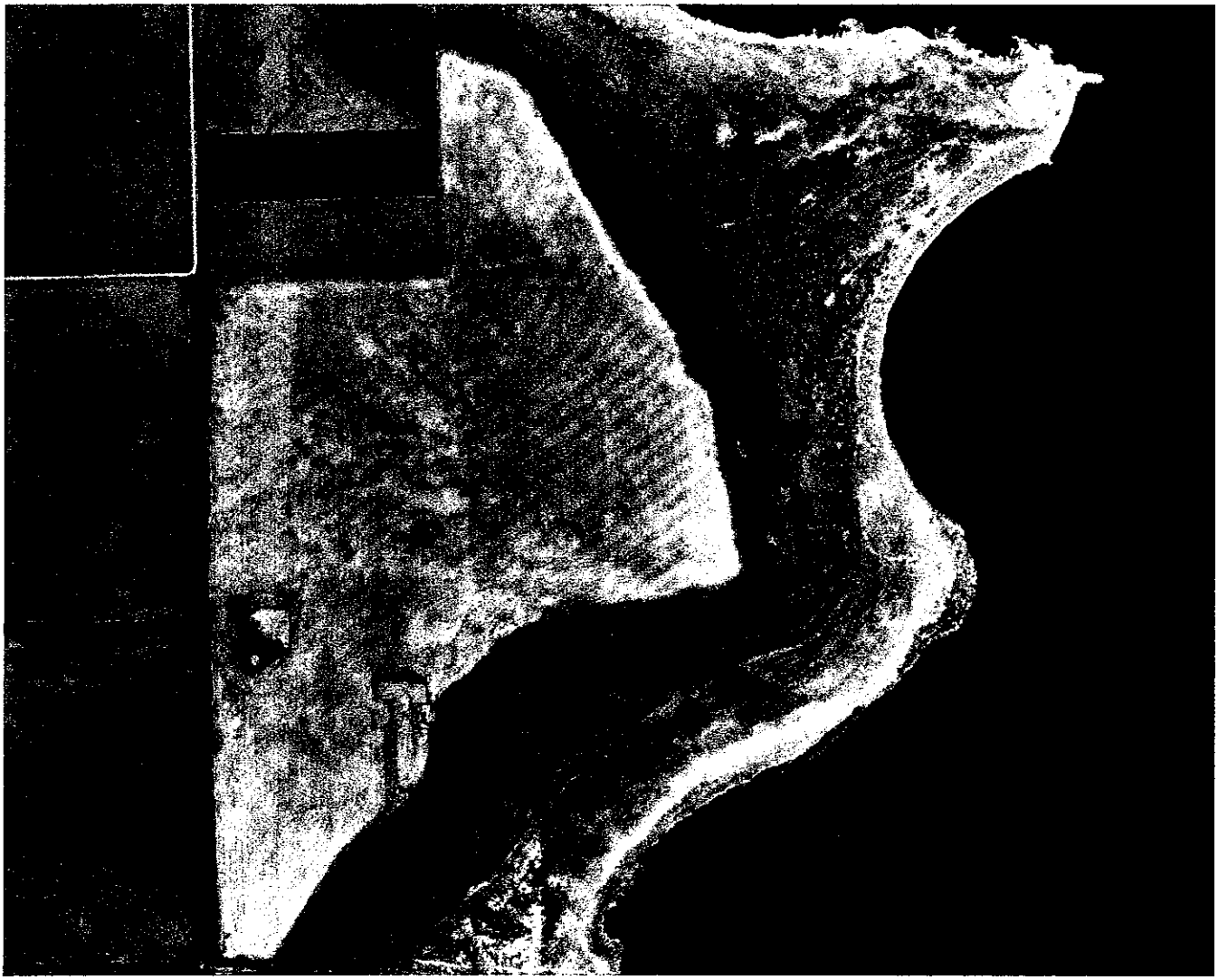
**April 22, 1983 Air Photo**



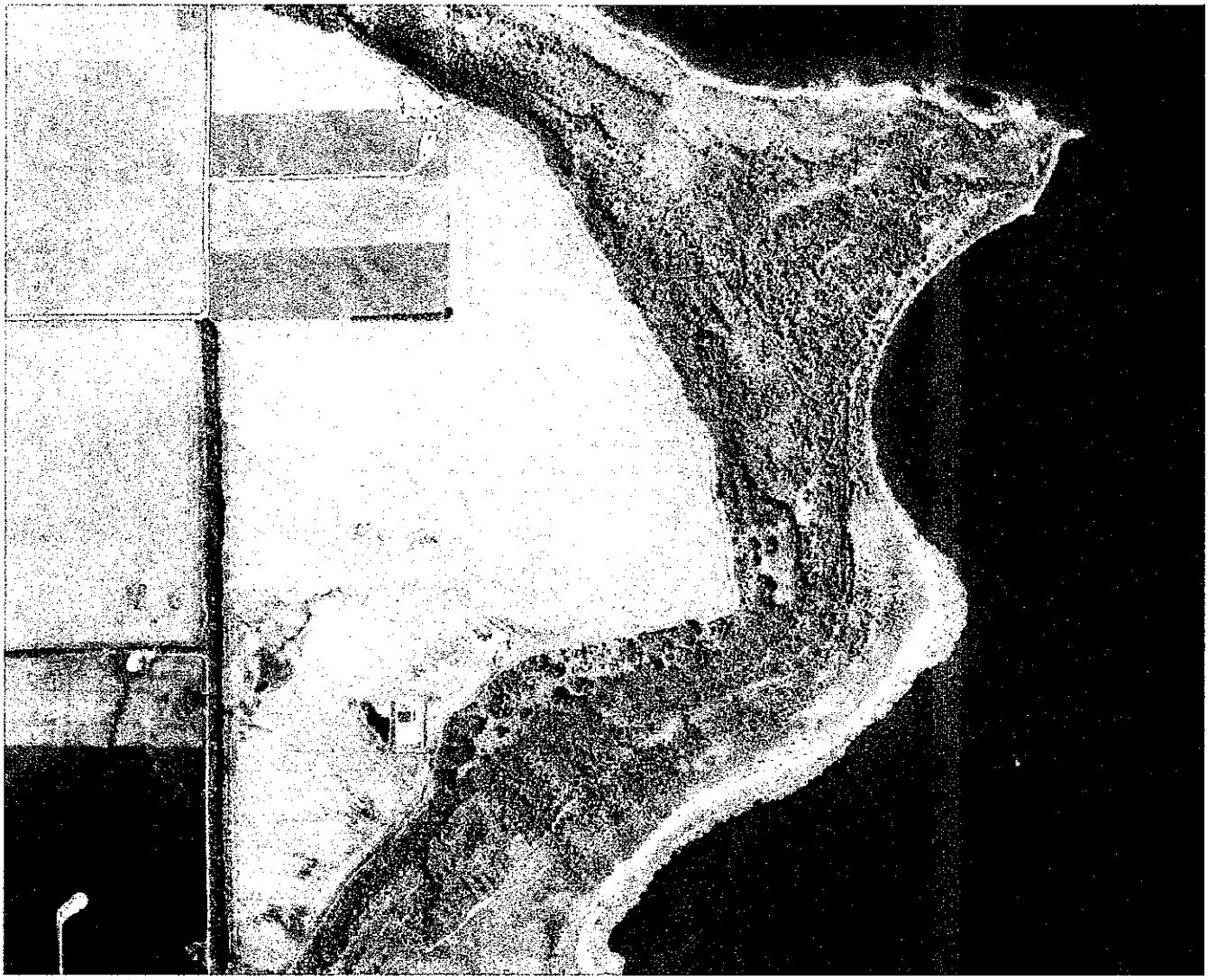
**July 12, 1987 Air Photo**



**June 4, 1993 Air Photo**



**May 31, 1998 Air Photo**



**May 31, 2007 Air Photo**

# Appendix 2: Alberta Environment Water Well Search

# Appendix 3: Qualifications and Information Pertaining to the Environmental Consultants

**Name of Firm:** Ecomark Ltd.

**Address:** 100 – 14964 – 121A Avenue, Edmonton, Alberta T5V 1A3

**Phone:** (780) 444–0706

**Fax:** 1–866–337–8631

**Date Established:** January 11, 2000

**Insurance Coverage:**

- Professional Errors & Omissions - $2,000,000
- Commercial General Liability - $1,000,000
- WCB Account

**Safety Training:** All professional staff at Ecomark has appropriate safety training in WHIMS, $H_2S$ Alive, TDG, First Aid and Ground Disturbance Practices.

We excel in assessments, reclamation and remediation, and corporate environmental management. Our experience covers phase 1, 2, and 3 environmental assessments and environmental audits on the widest variety of industrial/commercial and residential properties and companies. We also have extensive facility experience, from scouting potential routes and facilities, through audit of existing facilities, to final reclamation and restoration of disturbed habitats.

One of our key strengths is corporate (government) liability assessments. We evaluate the environmental liability incumbent to a site or sites. We have been relied on by major corporations to place a monetary value on the environmental liability of assets being acquired, disposed of, or maintained.

Our staff provides Ecomark with 28 years of individual professional experience. We have appropriate professional errors and omission (E&O) insurance, contractors general liability (CGL) insurance, and Worker's Compensation. We have also attained Small Employer Certificate of Recognition (SECOR) safety status. A professional biologist, professional chemist, professional engineer, or professional geologist warrants all our work. We do quality, fully warranted assessments that all parties can understand.

## Ecomark Ltd. Projects and Experience

### Phase 1 Environmental Assessments

Phase 1 environmental assessments throughout Canada

### Phase 2 Environmental Assessments

Phase 2 environmental assessments throughout Canada

Tier 2 risk assessments, Airdrie, Sundre, and North Garrington, Alberta

### Phase 3 and 4 Environmental Assessments

Oilfields reclamation in Devon, Bonnie Glen and Redwater

Oil lease cleanups

Class 3 railway derailment cleanup and complete railway line abandonment

Diesel spill remediation

Fuel tank removals and cleanups

Underground storage tank remediation

Contaminated soil cleanups

Landfill reclamations

Salt spill weeping tile design and geotechnical assessment

Bioremediation, audit, waste cleanup, and process redesign

Erith River crossings reclamation

Peat bog sewage treatment field reclamation

Grading, cleanup, and reclamation of Mountain Park Loop

Pipeline crossing inspection, creek monitoring, and reclamation

Native grass and forbs species research for boreal forest reclamation

Stabilization of a mineral spring

Mitigation measures and further recommendations for rare native grasslands

Constructed wetland, survey, plan, construction

Wastewater tertiary treatment

### Mould Assessments

Mould assessments

Indoor air quality assessments

### Assessments – Reports, Acquisition, Habitat, Hazard, Environmental Impact and Others

Corporate environmental acquisition assessments

Chemical/brownfield site assessments

Federal and provincial environmental impact assessments

Health risk impact assessment, Health Board equivalent of an EIA

Environmental compliance audit for health facilities

Commercial environmental audits and technical reviews

Hazard identification assessments for industry, developers, and municipalities

Complete biophysical assessments, including wetland and aquatic assessments Compost research and field application trials

Nutrient management in intensive livestock operations

Effects on nitrogen leaching in soils with the application of bedding

Effects of phosphogypsum on compost

Waste operations

Route selection and design of river crossings for pipelines

Technology evaluations for secondary off-gas treatment, cement kiln

Scouting, application, and approvals for linear development projects

Medicine Lodge Loop environmental assessment

Environmental field report for Cheviot and Mountain Park Railway

Stormwater outflow inspection and installation, Atim Creek

Culvert installation under Atim Creek CN Right-Of-Way

Aquatic inspection in Athabasca and North Saskatchewan drainages

Fisheries monitoring studies and research and creek fisheries assessments

Transalta fish recovery tank for Lake Wabamun

Dredging impact literature search and sediment survey, Lake Wabamun

Rare plant studies throughout western Canada, including a study covering 1.8 million hectares in northwestern Saskatchewan, and smaller studies in BC and Alberta

Technology, composting alternatives, fly ash for road building material

**Air, Water, Soil and Biomonitoring**

Groundwater monitoring

Soil monitoring

Vegetation, lichen, and agricultural field biomonitoring

Establishment of biomonitoring plots complete with FCIR and Air Photo interpretation

Indoor air quality monitoring

**Environmental Systems Development**

Landfill design and development

Establishment of bioremediation, composting, and recycling facilities

Environmental training module and delivery

Environmental procedures manual for North American Construction Group

EUB waste module manual and delivery

Northern Alberta compost brochure and manual

Building operator training program waste module

Habitat restoration and environmental aspects of linear development

Fisheries training (linear development)

Cleanup of upstream oilfield sites for World Bank Russia training program

Training for Alberta Onsite Waste Water training program

Waste management system development

Waste module for downstream oilfield operations in Venezuela

Waste audit report on waste resource management at Northlands Park

Management of animal bedding from a race track by diversion from landfill and use in composting or incorporation into farm fields

Compost marketing study for the University of Alberta

Sewage field testing

Intensive livestock composting seminar for the County of Lamont

Assessment of waste dewatering market for Western Canada

Waste audit and waste minimization implementation

Development of integrated waste management facility for Fero, Yukon

Environmental management course, waste management, construction, and operations for Russia World Bank

Development of waste management facility for Margao, India

International hazardous waste management pricing survey

Operational enhancement of community septic system and design of new infiltration field

Establishment of hazardous waste transfer station, including market analysis

Assistance in establishing bioremediation market

Assistance and rewrite of production unit subscription and business plan

Assistance on CADR grinding technology

Assessment of proposals for PCB regulatory framework for Colombia

Historical environmental review for Paintearth Resource Recovery Centre, Coronation, Alberta

Energy management plan

Development of micropower interconnection on-line manual

Installation of monitoring and demonstration system for solar heating project

## Applications, Licenses, and Regulatory Assistance

Facility approval applications

Integrated municipal waste facility Board of Health application

Industrial application for waste handling facilities

Waste management applications

AEUB Guide 58 applications

AEUB Guide 55 support

Water well application for facility water supply system

Redefinition of hazardous waste for Canadian Environmental Protection Act

Assessment of regulations for importation of hauling waste from other countries

Development of the Medicine Hat Waste Management Facility, Petro-Canada

Development of the Paintearth Resource Recovery Centre

Development of commercial land for Wetaskiwin, Alberta

## Patricia Coughlan

**From:** Alicia Hamm [ahamm@ecomarkenv.com]
**Sent:** October 14, 2008 12:55 PM
**To:** Patricia Coughlan
**Subject:** Re: Printing and Binding - ADWIL projects


Transmittal Form.doc (382 KB)

Also, please see attached transmittal form. We will need 3 copies of each report couriered to Jacquie Penn at A.D. Williams in Red Deer.

Please bill you time to ADWIL-08502-15451.0-0 or ADWIL-08504-15451.0-0.

Thanks,

--
Alicia Hamm-Tropak, P.Biol.
Ecomark Ltd.
#200, 638 11 Avenue SW
Calgary, Alberta
Canada T2R 0E2
P: (403) 410-3867
F: 1-866-337-8631 (Toll-Free)
E: ahamm@ecomarkenv.com
W: http://www.ecomarkenv.com



On 10/14/08 12:01 PM, "Patricia Coughlan" <pcoughlan@ecomarkenv.com> wrote:

> Hi, Alicia,
>
> Just so I know, will the reports be all ready to print - pdfed in the
> right order, for example? I have never worked on pdfing the complete
> report together before (that procedure began after my stint as project
> assistant years ago). So, if we need to manipulate the reports before
> printing, I will need Leanne's assistance if you have not already done
> this. Although I think I understood that the PMs generally did this,
> right?
>
> Sincerely,
>
> Patricia Coughlan, Executive Assistant
> Ecomark Ltd.
> 100 - 16812 - 114 Avenue
> Edmonton, AB T5M 3S2
> P: (780) 444-0706
> F: (780) 481-2431
> Toll Free Fax: 1-866-337-8631
>
> Visit our web site: www.ecomarkenv.com
>
> This email, including any attachments, contains confidential
> information and is intended only for the person(s) named above.
> Distribution, copying or disclosure is strictly prohibited. If you
> receive this email in error, please notify us immediately and delete
> the original transmission. Thank you.
>
>
>

> -----Original Message-----
> From: Alicia Hamm [mailto:ahamm@ecomarkenv.com]
> Sent: October 14, 2008 9:07 AM
> To: Leanne Spencley; Patricia Coughlan
> Subject: Printing and Binding - ADWIL projects
>
>
> Hi Leanne, Hi Pat:
>
> I have four reports for ADWIL that needs to be printed and bound, and
> couriered to A.D. Williams in Red Deer tomorrow (October 15). I know
> you are busy training the new project assistant, but hopefully you are
> able (or the new project assistant) is able to help with this request.
>
> The client needs these reports to send to Lacombe County Wednesday or
> Thursday this week. I am working on some minor changes to the reports,
> but will let you know as soon as they are ready for printing.
>
> Thank you both for your help! If you have any questions or concerns,
> please let me know.
>
> Sincerely,