Palm Bay Resort
Biophysical Assessment
Lacombe County, AB

Prepared for:

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1.0 Introduction

Stantec Consulting Ltd. (Stantec) was retained by Qualico Developments West Ltd. (Qualico) to conduct a Biophysical Assessment (Biophysical) in preparation for a development on northwest corner of Sylvan Lake, adjacent to Palm Bay in Lacombe County (the Study Area). The Study Area is identified by the legal description W ½ Section 34, Township 39, Range 2, West of the Fifth Meridian, and occupies an area of approximately 74.9 hectares. This property falls within the Lake Development Area as noted in the Sylvan Lake Management Plan 2000 Update.

1.1 OBJECTIVES

The objectives of the Biophysical were as follows:

- to determine the importance and conservation value of various natural areas located in the Study Area with respect to future development;
- to determine the value of existing wetlands, woodlots and other ecological features within the Study Area;
- to assess connectivity with other surrounding ecological features;
- to identify potential environmental and municipal reserve areas;
- to determine areas suitable and/or recommended for conservation easements;
- to identify applicable legislation; and
- to provide recommendations for conservation measures.

1.2 DEFINITIONS

Environmental Reserve (ER): consists of a swamp, gully, ravine, coulee or natural drainage course, land that is subject to flooding or is in the opinion of the subdivision authority unstable, or, a strip of land, not less than 6 meters in width abutting a bed and shore of any lake, river, stream or other body of water for the purpose of preventing pollution or providing public access to and beside the bed and shore (*Municipal Government Act*, 1980).

Municipal Reserve (MR): consists of land that is given to the municipality by the developer of a subdivision as part of the subdivision approval process. This land may only be used for public parks, public recreation areas, schools, or as separation areas between different land uses. The total area designated as municipal reserve may not exceed 10% of the total area of land to be developed (*Municipal Government Act*, 1980).

Conservation Easement (CE): consists of land that is donated by a landowner to a qualified organization in respect to all or part of the land for the purpose of protection, conservation and enhancement of the environment for biological diversity, natural scenic and esthetic value for the purpose of recreation, open space, environmental education or scientific research of other scientific studies (*Environmental Protection and Enhancement Act*, 1993).

Public Utility Lots (PUL): consists of land registered in the name of the municipality and is used for utility purposes, walkways and the installation and maintenance of utility services (*Municipal Government Act*, 1980).

1.3 SITE DESCRIPTION

The Study Area is bordered to the north by Rainy Creek Road (TWP 400) and agricultural fields, to the south by Sylvan Lake, and to the east and west by natural areas and agricultural land. The Study Area is currently composed primarily of agricultural land, and a large contiguous forested area in the south. Numerous wetlands and drainage areas are observed throughout the property (Figure 1, Appendix A).

1.4 PROJECT DESCRIPTION

Qualico is proposing a new residential lakeside community on the northwest corner of Sylvan Lake, adjacent to Palm Bay. The community will incorporate a mixture of low density residential near the lake, and medium density residential further back from the shoreline. The development will provide both a beach and marina development for the use of its residents. The development will also be designed to respect the sensitivity of the environment by dedicating a large tract of forest for conservation. An existing historic site will also be incorporated into the development as an amenity and educational resource for the residents.

2.0 Background Information

The following sections describe general information that pertains to the Study Area and its location in Lacombe County.

2.1 PREVIOUS REPORTS

2.1.1 Sylvan Lake Management Plan: 2000 Update

IBI Group (2000) was retained by eight municipalities around Sylvan Lake to develop a more current and comprehensive lake management plan, which updated the original *Sylvan Lake Management Plan* from 1986. The objective was to "promote responsible land use and development around Sylvan Lake". Limiting factors to development, including steep topography, water quality and public access to the lake, were identified. Based upon the limiting factors, guidance for future policies were outlined for the three major land uses around the lake: Lake Development Area, Residual Watershed Area and Urban (Growth Area).

As indicated in this plan, the Study Area is adjacent to key fisheries habitat and contains key ungulate habitat, which has been identified as Crown Land – Natural State.

2.1.2 Sylvan Lake Public Access Study: Findings and Recommendations Report

This report was prepared by ISL Infrastructure Systems et al. in January of 2003. The purpose of the report was to provide the municipalities that surround Sylvan Lake with a comprehensive, lake-wide action plan for dealing with the demand for improved public access to the lake. The study addressed two main objectives, which were assessing the Lake's overall capacity to support increased water-based recreation and to identify opportunities for improving public access to the lake. This report stated that the next step in the management of the lake will be the implementation of the recommendations laid out in the report. The following is the seven major roles and responsibilities described within the report: implementation management, monitoring and management coordination, new laws and regulations, special constables, watchdog (complaint line), education, and the involvement and coordination of non government organizations (NGO's).

2.1.3 Fish Habitat Assessment – Draft

This report was prepared by Stantec Consulting Ltd. (2007a) in December of 2007. It assessed the potential impacts of the proposed marina development concept located in the northeast portion of Sylvan Lake adjacent to key fish habitat. The objective of the assessment was to assist in developing mitigation and compensation strategies associated with the proposed development. It concluded that this area has been identified as an environmentally sensitive area in regards to fish habitat due to the presence of emergent vegetation and because of the valuable fish spawning habitat present. It was also identified as key whitefish spawning habitat

and further consultation with provincial, federal and municipal government agencies will be required to determine if appropriate compensation measures can de developed for the area.

2.1.4 Phase I ESA and Phase 1 ESA Update

These reports was prepared for the Study Area (W ½ 34-39-2-W5M), and were finalized in September of 2007 by Stantec Consulting Ltd. (2007b) The objective of these reports were to identify the potential environmental concerns for the Study Area. These were identified as the following:

- The Study Area is currently used for agricultural purposes and it is likely that various herbicides and pesticides have been used on the Study Area. If proper handling and storage of these products was maintained on the Study Area, they are of low environmental concern;
- The natural gas co-op pipelines located on the Study Area are of low environmental concern if they have been properly maintained;
- Several historical buildings were observed on the Study Area. They are of no environmental concern at this time, however the HRIA will make recommendations regarding further mapping required at this time;
- The water well observed, along with any other water wells that are found, should be decommissioned according to the *Alberta Water Act* following completion of the HRIA mapping;
- The outhouse observed on the Study Area is of no environmental concern at this time, however the HRIA may recommend additional work;
- The debris located throughout the Study Area and lakeshore including barrels, scrap metal, wood, and plastic bottles, should be disposed in an appropriate and environmentally safe manner;
- The area of burnt material located near the trail in the clearing on the lakeshore should be further investigated for signs of contamination; and
- Conversations with the archaeological crew onsite identified the possible presence of a tannery, a lumber mill and a blacksmith shop. Further attention should be paid to these areas to determine the possible presence of tanning agents, wood preserves, or ash deposits.

2.1.5 Historic Resources Impact Assessment

This report was prepared by Stantec Consulting Ltd. in September of 2009. Its objective was to identify historical sites on the W ½ 34-39-2-W5M. This report identified one site as the Palm Homestead, which was a Finnish settlement on the shores of Sylvan Lake. The objective of the

proposed project was to generate recommendations for what further work, if any, should be done on the Palm homestead features in the event of impact by development. The conclusion of this report was to avoid any disturbance of the homestead by any developments now or in the future. The following are specific recommendations developed from the report for the homestead. The recommendations are as follows:

- Palm Infant Burial Site: Place a permanent marker at the location of Ailie Solberg's earth mound and avoid all areas within a 50 m radius from this permanent marker with all future developments;

- Main Palm House: In the event of ground disturbing impacts to the Palm house cellar only, excavate 2 to 6 50 x 50 cm test excavations in the cellar and, if artifacts are present, conduct 3-4 square meters of salvage excavation on the cellar;

- Sauna: In the event of ground disturbing impacts to the sauna, excavate 10 square meters to determine construction techniques, spatial layout, and activity areas. It has been mentioned previously that there is some potential to interpret some of the Palm farmstead features for the benefit of the recreational community. If this is the case, an excellent feature to interpret or re-create may be the sauna, because of its ties to recreation, health, community, and enjoyment of the lake. As such, it provides an excellent opportunity to add a sense of history, community, and time depth to the already beautiful natural surroundings for the recreational community that is to come;

- Root Cellar: The detailed map and assessment of this feature is an adequate mitigation of impacts. No further work is recommended;

- Privy Depression: In the event of ground disturbing impact to this feature, excavate 2-3 horizontal (6 cubic) square meters;

- All Other Features of the Palm Homestead: This includes all of the other features of the Palm homestead for whom the best data to be gathered came simply from the mapping of their spatial relationships and the gathering of oral informant data. No further work is recommended on these features; and

- General: Interpret the features of the Palm Homestead to the recreational public. This could include interpretive signage on walking trails. Additionally, if it becomes warranted that excavation is necessary on any of the features (i.e. in the event of ground-disturbing impacts), consider the possibility of making the excavations open to the public to observe, with on-site tours or interpretation available during excavations.

2.1.6 Groundwater Evaluation

A groundwater evaluation was prepared by Stantec Consulting Ltd. in May of 2010. The objectives of the report were to determine whether adequate quantities of groundwater were available to support the proposed development of Palm Cove without impacting surrounding

users, the lake or the aquifer(s). The study involved the completion of two test wells, drilled on February 10 and 11, 2010.

A step test and pump test were conducted on a sandstone aquifer that was identified during drilling. These tests revealed that the production well has a sustainable yield of 445m^3/day; which is sufficient to sustain 1986 people, or 794 homes. The groundwater evaluation suggests that there is adequate recharge to meet the needs of the planned subdivision; and that the supply well will not induce infiltration from the lake above the natural flow-through amount, or affect the safe yield of the sandstone aquifer. The data also suggests that the sandstone aquifer tested for the project is not under the influence of surface water associated with Sylvan Lake.

2.2 GEOLOGY, HYDROGEOLOGY AND SOILS

The underlying geology of the Study Area consists partially of Sylvan Lake till ground moraine, and partially of organic depositional features. The Sylvan Lake till ground moraine is comprised mainly of thin, clayey to sandy materials deposited by the continental ice sheet which originated in the Canadian Shield. It contains numerous erratics of Precambrian rock types. The organic deposits consist of muskeg, peat and sedge bogs. Underlying the surficial features is the Paleocene Paskapoo Formation bedrock, which consists of a succession of greyish, calcareous sandstones, siltstones and mudstones which are essentially flat lying (Boydell *et al*. 1974).

The general hydrogeology in the area of the Study Area was assessed using the Hydrogeological Map of Rocky Mountain House, Alberta, NTS 83B (Tokarsky 1971). The groundwater flow in the immediate area of the Study Area wells up into Sylvan Lake, regionally groundwater flows northward. Specific information on the local groundwater conditions can be found in the groundwater evaluation report submitted under separate cover (Stantec 2010).

The soils along the north shore of Sylvan Lake are predominantly dark grey to orthic grey luvisols of the Benalto soil series (Alberta Soil Information Centre 2001). However, small areas of what appeared to be organic soils were noted during the site visits, though no detailed soil survey was conducted. The topography of the Study Area is rolling; and therefore, it can be expected that soils will be variable across the site.

2.3 CLIMATE DATA

The climate of the proposed development within the County of Lacombe is continental, with warm summers and cool winters. Long-term climate data (1971 to 2000) collected at a weather station in Red Deer, Alberta, to the east of the development area, are shown below (Environment Canada 2004):

Mean daily maximum temperature (^{o}C)	9.5
Mean daily minimum temperature (^{o}C)	-2.8

Mean annual rainfall (mm)	385.3
Mean annual precipitation (mm)	487.2

2.4 VEGETATION OF THE BOREAL FOREST NATURAL REGION

Sylvan Lake is located in the Dry Mixedwood Subregion of the larger Boreal Forest Natural Region (Natural Regions Committee 2006). This subregion contains a mosaic of deciduous and mixedwood forests, peatlands, fens, and other riparian areas.

The forested areas within this subregion are typically aspen (*Populus tremuloides*) dominated, with a co-dominance of balsam poplar (*Populus balsamifera*) in areas of elevated soil moisture. Other common tree species that may be present include white spruce (*Picea glauca*), paper birch (*Betula papyrifera*) and balsam fir (*Abies balsamea*). Black spruce (*Picea mariana*) occurs in some lowland and wetland areas. Understory shrub species associated with this upland forest typically include low-bush cranberry (*Viburnum edule*), beaked hazelnut (*Corylus cornuta*), prickly rose (*Rosa acicularis*), red-osier dogwood (*Cornus sericea*), willow (*Salix spp*.), raspberry (*Rubus idaeus*), and Saskatoon (*Amelanchier alnifolia*). Common herbaceous species include marsh reed grass (*Calamagrostis canadensis*), dewberry (*Rubus pubescens*), cream-colored pea vine (*Lathyrus ochroleucus*), Canada bunchberry (*Cornus canadensis)* and twinflower (*Linnaea borealis*).

The peatlands throughout this Subregion can be quite extensive in some areas, such as south of Athabasca, but are not as prevalent as in other Boreal Forest Subregions (Natural Regions Committee 2006). The peatland complexes typically contain both nutrient-poor, acidic bog dominated by black spruce (*Picea mariana*), labrador tea (*Ledum groenlandicum*), and peat mosses (*Sphagnum spp.).* The more nutrient-rich fens contain tamarack (*Larix laricina.*), dwarf birches (*Betula spp*), sedges (*Carex spp.*), and brown mosses (i.e. *Calliergon spp. Drepanocladus spp.,* and *Scorpidium spp*.) (Kershaw et al. 2001).

2.4.1 ACIMS Rare Plant Search Results

A search was conducted through the Alberta Conservation Information Management System (ACIMS) (formerly ANHIC) to determine if there were any occurrence reports of rare species within the boundaries of the Study Area. The search did not return any occurrence reports located in or around the Study Area. Response data for the ACIMS search can be found in Appendix B.

2.5 WILDLIFE

Common mammal species in the region include the white-tailed deer (Odocoileus virginianus), moose (*Alces alces*), coyote (*Canis latrans)*, porcupine (*Erethizon dorsatum*), red fox (*Vulpes vulpes*), skunk (*Mephitis mephitis*), snowshoe hare (*Lepus americanus*) and white-tailed jackrabbit (*Lepus townsendii*) (Natural Regions Committee 2006).

Assortments of resident and migratory bird species are also present. Raptors such as the great horned owl (*Bubo virginianus*), red-tailed hawk (*Buteo jamaicensis*), northern harrier (*Circus cyaneus*) and falcons are common when prey is abundant. Resident and migratory songbirds such as black-capped chickadees (*Poecile atricapillus*), American robin (*Turdus migratorius*), red breasted nuthatch (*Sitta canadensis*), warblers, and sparrows are abundant across the landscape and may include a rich diversity of species depending on available habitat. Wetland areas provide habitat for numerous waterfowl and shorebird species, such as the mallard (Anas platyrhynchos), Canada goose (*Branta canadensis*), northern pintail (*Anas acuta*), northern shoveler (*Anas clypeata*), red-winged blackbird (*Agelaius phoeniceus*) and killdeer (*Charadrius vociferus*)

Prior to the field survey, Ken Froggatt, Wildlife Management, S.E. Region was contacted to conduct a Fisheries and Wildlife Information System search for potential sensitive species occurrences for the Study Area. The search resulted in no known sensitive species occurrences for the Study Area.

2.6 HISTORICAL AND CURRENT LAND USE

The historical land use in the vicinity of the Study Area has been agriculture. Land adjacent to the lake has largely remained forested, with the exception of a historic homestead that was once present adjacent to the lake in the south western portion of the Study Area. This homestead has gradually become overgrown by forest since 1950.

Table 2.1 contains the results of a historical aerial photograph review of the Study Area. Aerial photographs from 1950 to 2001 showing changes over time have been included in Appendix C.

Table 2.1
Air Photo Descriptions (1950 to 1998)

Date	Description
1950	The southern half of the Study Area is covered with dense forest. The northern portion of the property is grassland with an undulating topography. A large drainage enters the property from the north running south. Two drainages passing east to west through the dense forested areas, empty into Sylvan Lake. Various depressions, wetlands and small drainage channels are evident across the site. Sylvan Lake appears very low, with exposed sand along the entire shoreline. A large sand bar is present off of the end of the peninsula curving northwards. A human settlement is located along the west shoreline. Several buildings are clustered close together. Beach access is evident through a clearing in the trees south of the settlement. The surrounding area has been cleared. An access road originating off of the Study Area comes from northwest of the Study Area south, curving along the west shoreline to the settlement.
1962	A large section of the northern edge of the forest has been cleared. Land immediately northeast of the settlement also appears to be under a different type of land management than the surrounding grassland. A linear disturbance is also evident running longitudinal through the centre of the Study Area to the forest. Trails between the settlement and the beach are evident in this air photo. Sylvan Lake has a higher water level in this picture compared to the previous photo.
1966	It appears the grassland is under uniform vegetation cover. The drainage channel running south through the grassland seems to be surrounded by a different vegetation type. The access road to the settlement does not look maintained. Sylvan Lake has a higher water level than both previous air photos. Residential development of the adjacent property's beach has started.

Date	Description
1970	The Study Area remains essentially the same as the previous photograph; however Sylvan Lake appears to be at a higher water level than the 1950s but with varying sand patterns.
1975	The Study Area remains essentially the same as the previous photograph except this air photo may have been taken when ice and/or snow was on the ground accounting for the white colour of Sylvan Lake along the west shoreline. Tree shadows also indicate the leaves have fallen from the trees. It appears the grassland area has been hayed. Access trails to the settlement from the road and from the settlement to the beach are evident.
1980	The Study Area remains very similar to the previous photograph, except the settlement clearing (excluding the beach) is filling in with trees.
1985	The Study Area remains essentially the same as the previous photograph. The grassland is dotted with bales. A building has been erected along the far west boundary of the Study Area.
1993	The settlement has almost been overtaken by trees, however the beach area has been maintained. A new linear disturbance runs east/west along the northern edge of the forest. Trees in the grassland drainage appear to be maturing.
1998	The Study Area remains essentially the same as the previous photograph. The settlement (excluding the maintained beach) has been overtaken by trees.

* 1998 aerial photograph has been included in Figure 1, Appendix A

2.7 ECOLOGICAL CONNECTIVITY

As a result of continuous urban and rural development and agricultural use, natural habitat conservation must be carefully considered in order to reduce habitat fragmentation. Factors such as the size, shape and distribution of natural habitat patches determine their ecological significance (Barnes and Adams 1999). A larger habitat patch may provide greater habitat opportunities for large animals and more species. The shape of a patch further affects its habitat suitability. For example, the ratio of area to edge is important such that patches with large areas and a minimum of edge are expected to provide the greatest habitat opportunities. Habitat connectivity is also important because natural areas that are linked can provide movement corridors for a variety of species and conserve ecosystem functions throughout the landscape. The size, shape, distribution and connectivity needs to be considered when investigating the habitat potential and conservation value of natural areas.

A large amount of habitat fragmentation currently exists within The municipality, although significant efforts are made to reduce developmental impacts on wildlife habitat. Topographical and natural drainage patterns that have been unsuitable for cultivation have typically been conserved on the landscape. It is expected that these natural areas will continue to be vulnerable to pressure from development. However, as their aesthetic and natural value becomes more desired by developers, a greater awareness of their natural value and importance for conservation may result in more conservation.

Due to the importance of habitat connectivity in the environment, we have included connectivity as part of our analysis and discussion in this report.

2.8 REGULATORY CONSIDERATIONS

The following outlines the main federal, provincial and municipal acts, regulations, or policies that may be relevant to certain facets of the residential project. However, this is not an all-encompassing list and other acts, regulations and policies may pertain to this project.

2.8.1 Federal Legislation

2.8.1.1 Fisheries Act

The *Fisheries Act* is directed at protecting and providing fish habitat. It regulates disturbances on the bed and banks of waterbodies such as lakes, creeks, rivers, and wetlands in order to prevent excessive disturbance to potential fish habitat, feeding and spawning areas, as well as shade and cover. The Act prohibits the deposition of a deleterious substance that can or will have an impact on fish or fish habitat and can include substances such as sediment, oil, grease, chemicals, and salts.

In the event that this project is considered to create a harmful alteration, destruction or disturbance (HADD) to fish or fish habitat an Authorization will need to be obtained. For projects that are expected to have a minimal amount of disturbance, a Letter of Advice is typically provided. This Act will apply to any stormwater infrastructure or recreational facilities that within, or linked to, Sylvan Lake.

2.8.1.2 Navigable Waters Act

The purpose of the Navigable Waters Protection Act is to protect the public right of navigation within Canada by ensuring a balance exists between the public right of navigation and the need to build structures such as bridges, dams and dock. The NWPA provides for the prohibition to build works in navigable waters, unless the work, its site and plans have been approved by the Minister of Transport on such terms and conditions as he deems fit. In addition, the Act provides for measures regarding removal of wreck or other obstacles to navigation and for the prohibition to throw or deposit any material in navigable waters.

This Act will apply to any in lake structures or objects proposed, such as marina facilities, docks and buoys (for swimming areas or navigation).

Migratory Bird Convention Act

The *Migratory Bird Convention Act* (MBCA) (1994) and the *Migratory Birds Regulations* (MBR) are directed at the protection and preservation of migratory birds and migratory bird habitat. The MBCA and MBR apply to various:

- migratory game birds, including ducks, geese, swan, cranes, shorebirds and pigeons;
- migratory insectivorous birds, including chickadees, cuckoos, hummingbirds, robins, swallows and woodpeckers; and

- other migratory non-game birds, including gulls, herons, loons, and puffins.

- This legislation creates a number of prohibitions designed to protect and conserve migratory birds. These include, but are not limited to:

- prohibition against disturbing, destroying, or taking a nest, egg, or nest shelter of a migratory bird; and

- prohibition against depositing or permitting to be deposited oil, oil wastes or any other substances harmful to migratory birds in any waters or any area frequented by migratory birds.

The Minister can issue permits for certain activities related to migratory birds. However, there are no permits for disturbing, destroying, or taking a nest, egg, or nest shelter of a migratory bird, nor for depositing or permitting to be deposited oil, oil wastes or any other substances harmful to migratory birds in any waters or any area frequented by migratory birds. These activities are strictly prohibited by the legislation. If municipal development activities result in the destruction or disturbance of migratory birds, nests or eggs, Environment Canada can take enforcement action.

Typically, if construction activities necessitate the cutting, transplanting or disturbance of trees or other nesting areas of migratory birds, Environment Canada will stipulate the times of the year that the construction can be undertaken (which coincides with times that the birds are not nesting and raising their young). These timeframes can vary depending on the particular migratory bird species, but will typically range between March/April through to September/October.

This Act will become important during tree removal activities necessary for the development of the area and may include grading, landscaping, or removal of hazards.

2.8.2 Provincial Legislation

Environmental Protection and Enhancement Act

The *Environmental Protection and Enhancement Act* (EPEA) (1992) is directed at ensuring the wise use of the environment through protection and enhancement. It creates a framework in a single act that takes an integrated approach to the protection of air, land and water. The Act strengthens and clarifies Alberta's environmental laws, and also eliminates duplication among existing Acts.

One of the Act's cornerstones is the guarantee of public participation in decisions affecting the environment. This public involvement includes increased access to information, participation in the Environmental Assessment and Approval Processes and the right, when directly affected, to appeal certain decisions.

This approval process acts as an early warning system by identifying and preventing potential problems before a project proceeds. As a further safeguard, approval conditions detail specific operating requirements that projects must meet. Regular inspections and monitoring will ensure projects comply with stringent environmental standards during and after their operation. Those projects that do not comply will be subject to enforcement action, which could include penalties of up to $1 million in fines and two years in jail.

The Wastewater and Storm Drainage Regulation, under EPEA, gives Alberta Environment the responsibility of regulating storm drainage and wastewater systems including the establishment of standards for such facilities and their operation. This includes naturalized wetlands, outfalls and related piping. Other areas that the Act addresses are emissions, release of substances, application and use of pesticides and incident reporting requirements.

This Act will apply to any stormwater management facilities and outfalls developed in conjunction with the development.

Public Lands Act

In 1930, Canada transferred control for the natural resources in Alberta to the province. Alberta passed the *Provincial Lands Act* on March 28, 1931, for the administration of lands, minerals, forests, fisheries and to control the drilling of gas wells. In 1949, this legislation was amended to become the *Public Lands Act*. It currently regulates various public land uses (i.e. forestry, grazing, land dispositions), sale and purchase of land, and declaration of water bodies as being owned by the Crown.

In response to the growing loss of wetlands on the landscape and the effect this may have on surface water management in Alberta, Cabinet in 1993 approved the Interim Policy for "Wetland Management in the Settled Area of Alberta".

The policy identified as its goal that *"the Government of Alberta is to sustain the social, economic and environmental benefits that functioning wetlands provide, now and in the future"*.

The intent of the policy is further defined as follows, in descending order of preference:

a) to conserve slough/marsh wetlands in a natural state.

b) to mitigate degradation or loss of slough/marsh wetland benefits as near to the site of disturbance as possible.

c) to enhance, restore or create slough/marsh wetlands in areas where wetlands have been depleted or degraded.

Generally, all surficial waters in Alberta are owned by the Province including the bed and shore of lakes, creeks, rivers, wetlands and drainage areas. If wetlands are proposed to be altered or removed from the landscape, as part of any development, Public Lands Approval is required and the “no net loss” policy is implemented.

Water Act

The *Water Act* came into force on January 1, 1999. It supports and promotes the conservation and management of water in Alberta. In addition, the Act also addresses the following:

- Protects existing licenses that are in good standing, by bringing them forward into and making them subject to the new Act.
- Protects existing traditional agricultural uses of water through a streamlined, voluntary registration process that "grandfathers" the relative priority of the right according to the date when the water was first used.
- Recognizes the importance of protecting Alberta's rivers, streams, lakes and wetlands, by requiring that a strategy for protecting the aquatic environment be developed as part of the provincial water management planning framework.
- Prohibits the export of Alberta's water to the United States.
- Prohibits any inter-basin transfers of water between Alberta's major river basins.

The Act prescribes that all water is the property of the Crown. An Approval is required to conduct an activity in a water body (s.36). An activity is defined broadly to include placing/constructing works within a water body, removing or disturbing ground and/or vegetation that results in altering the flow, level, direction and/or location of a water body. A license is required to divert or transfer water from a water body (s.49).

An approval for the project will be required if any wetlands or drainage courses are to be altered as part of the proposed development.

Weed Control Act

This Act regulates the control of restricted and noxious weeds in Alberta, some of which include Canada thistle (*Cirsium arvense*), scentless chamomile (*Matricaria perforata*), leafy spurge (*Euphorbia esula*), nodding thistle (*Carduus nutans*), dodder (*Cuscuta* spp.), Russian knapweed (*Centaurea repens*), yellow toadflax (*Linaria vulgaris*), purple loosestrife (*Lythrum salicaria*), Persian darnel (*Lolium persicum*) and others. It requires landowners to control weed infestations throughout their property and failing to do so can result in a fine or jail time.

The application of pesticides is controlled through the *Environmental Protection and Enhancement Act*.

Wildlife Act

Alberta's *Wildlife Act* is the main piece of provincial legislation that deals with wildlife. This Act regulates various aspects of hunting (i.e. licensing, seasons, draws etc.), control of diseased animals, damage or threat caused by private animals, and the restriction of access to areas in order to protect wildlife habitat.

The Act also protects the disturbance of wildlife habitation with respect to the nests and dens of endangered animals, upland game birds, and migratory birds defined in the *Migratory Bird Convention Act* throughout Alberta, throughout the year.

If the project being undertaken is expected to disturb or destroy wildlife habitation for wildlife species listed in the Act or the Act previously mentioned, potential regulatory requirements may need to be met depending on jurisdiction and land ownership.

2.8.3 Municipal Legislation/Policies

2.8.3.1 Lacombe County Municipal Development Plan

The Lacombe County Municipal Development Plan (MDP) provides broad policy direction for growth within the County. This document provides guidance for some aspects of residential design, such as minimum lot sizes, and also contains environmental elements such as minimum setbacks from waterbodies and restrictions on building in floodplains. Section 7.10 of the MDP triggers the requirement for an environmental impact assessment for any development with the potential to harm its surroundings.

2.8.3.2 Sylvan Lake Area Structure Plan

At the time this report was prepared, Lacombe County was in the process of preparing an Area Structure Plan (ASP) for the lands surrounding Sylvan Lake. The ASP will regulate many aspects of development in the Sylvan Lake area into the future. This ASP must be adhered to once it is complete, or amendments may need to be made.

3.0 Assessment Methodology

The following sections describe the assessment methodology developed to meet the objectives described in Section 1.1.

3.1 DESKTOP REVIEW

As a starting point for this assessment, Stantec accumulated and reviewed any and all pertinent environmental information and policies that Stantec personnel had access to at the time of writing. This task included a review of basic ecological information for the area, a review of applicable previous reports for the Study Area and adjacent lands, as well as a review of historic aerial photographs for the area. Part of this program also involved completing an assessment of ecological connectivity both within the Study Area (local), and on a larger regional scale and ecological priority ranking.

3.1.1 Habitat Connectivity

Connectivity is a measure of the interaction between all network components in an area, and indicates how the quality and arrangement of the individual components affect the movement of organisms among them (Bennett 2003). The connectivity of the natural features on the Study Area were ranked according to habitat value of the natural feature (i.e. how likely it is that wildlife will want to use a natural feature) and adjacent land use. Distance to adjoining natural features outside the Study Area boundary was also considered as most wildlife display gap avoidance behavior and will preferentially avoid crossing between habitat patches if the distance is too great (Barnum 2003). Distances between habitat patches in which species movement is likely include 45 m for birds (Tremblay and St. Clair 2009), 100 m for mobile species such as deer (Thomas *et al.* 1979), and approximately 50 m for amphibians (BC Ministry of Water 2004). Areas with smaller distances between habitat patches were considered to have a higher degree of connectivity.

3.1.2 Ecological Priority Ranking

Ecological priority ranking was derived using a combination of habitat type, size, quality, degree of connectivity with adjacent natural areas, environmental sensitivity, and sustainability. Environmental sensitivity will be determined based on the diversity of the plants and wildlife and the potential for negative impacts related to future development. Table 3.1 outlines the ranking system used to prioritize the various habitats.

Table 3.1
Habitat Priority Ranking System

Rank	Habitat Characteristics
High	▪ High connectivity to ecosystems across the landscape ▪ No ecosystem fragmentation ▪ High probability of rare species ▪ High biodiversity (richness and evenness) ▪ Significant habitat ▪ Sustainability potential high
Medium	▪ Some connectivity to ecosystems across the landscape ▪ Some ecosystem fragmentation ▪ Moderate probability of rare species ▪ Moderate biodiversity (richness and evenness) ▪ Moderate habitat ▪ Moderate sustainability potential
Low	▪ No connectivity to ecosystems across the landscape ▪ Complete ecosystem fragmentation ▪ Low probability of rare species ▪ Low biodiversity (richness and evenness) ▪ Provides marginal habitat ▪ Sustainability potential limited

3.2 FIELD PROGRAM

To achieve the objectives stated in Section 1.1 of this report, an intensive field assessment program was devised for this project. The goal of these assessments was to attain a high level of ecological knowledge for the property, allowing the design team to produce a highly desirable product while minimizing the environmental impacts to this sensitive area. The following sections describe the various assessments conducted as part of this field program.

3.2.1 Anuran Survey

A presence/absence survey of anuran species (frogs and toads) was conducted on May 13, 2008 (refer to Figure 2, Appendix A for survey locations). The timing of this survey was chosen to coincide with the breeding season of the majority of species expected to be in the area (based on the habitat present). The survey involved late evening auditory identification of species and relative abundance at six representative locations on the Study Area that were chosen during a daylight reconnaissance of the area. Surveys were conducted between 8:50pm (sunset) and 10:45pm during a period of high call volume, and involved approaching each site and observing calls in silence for a period of approximately 15-20 minutes.

Relative abundance of each species noted was recorded using a classification system outlined in Inventory Methods for Pond-breeding Amphibians and Painted Turtle (Resources Inventory Committee 1998), in which Class 0 represents no individuals calling; Class 1 represents a situation where calls are not overlapping (individuals can be counted); Class 2 represents

distinguishable calls but some overlap; and Class 3 represents full chorus or continual calls, where individuals cannot be distinguished.

3.2.2 Mammal Survey

A winter tracking survey was conducted by Stantec personnel on February 25, 2008 on the Study Area. Currently, standardized guidelines for winter tracking surveys have not been adopted by federal or provincial regulatory agencies in Alberta. In the absence of Alberta winter tracking guidelines, the following Resource Information Standards Committee (RISC) standards were adapted for this survey:

- Standards for Components of British Columbia's Biodiversity No. 25 - Inventory Methods for Medium-sized Territorial Carnivores: Coyote, Red Fox, Lynx, Bobcat, Wolverine, Fisher and Badger; and

- Standards for Components of British Columbia's Biodiversity No. 33 - Ground-based Inventory Methods for Selected Ungulates: Moose, Elk, and Deer.

The adapted guidelines used for this survey are summarized below:

- The study area should be effectually covered by systematic transect design, which takes into consideration the different habitats that may be present. These transects should cover habitat in proportion to their occurrence. The transect location selection should also take into consideration documented habitat relationships, and on the presence of confirmed and unconfirmed sightings. The spatial scale of habitat fragmentation is species dependent and can range from ecosection to the bigeoclimatic zone variant level. Therefore, pre-field planning and transect location determination is very important.

- Tracking should begin as soon as there is sufficient snow and appropriate conditions for tracking. Tracks are best observed immediately after a fresh snowfall, and are most obvious during sunny or slightly overcast days. Light is an important factor in seeing and identifying tracks. Therefore, tracking should occur during the day for best results. Surveys starting at dawn or dusk should be avoided. Days with 'flat' light conditions should also be avoided since this lighting type is not suitable for track identification.

- The start and endpoint of each transect should be marked by compass bearing, landmark, or GPS as required. Permanent labeled tags may be affixed to stakes or trees at the start and end points if the transect are to be used again.

- Each track that crosses or intercepts the transect line should be counted. All interceptions need to be counted even if they are made by the same animal, since determination of individuals is seldom possible. Data should be recorded as either 1) the number of tracks or each species counted along a 100m segment of the transect, or 2) the location of each track as encountered on the transect. If microhabitats are important, associate tracks with a brief description of the habitat type should be included.

- If an unknown, or sensitive species made track is encountered, the following information should be obtained for further identification or verification:

    1. GPS location,

    2. Location on a topographic map, or air photo;

    3. Information on habitat and area where track was found; and

    4. Compete track measurements.

The survey of the Study Area utilized a systematic transect design, made up of six transects which covered a representative portion of the forested habitats present within the Study Area. Biologists subsequently walked these transects, conducting more intensive observations along tracks, which were unidentifiable at the point of transect crossing. All mammal crossings were noted and a count/transect was generated for each species identified. Unknown tracks were identified using the Field Guild to Mammal Tracking in North America (Halfpenny, 1986). Please see Figure 3 (Appendix A) for transect locations.

All incidental sightings were also recorded and consisted of burrows, scat, tracks, pellets, antler rubs, browse scars, beds and stick nests as well as wildlife observations. Any significant sightings were located with the use of a GPS unit.

3.2.3 Avian Survey

A survey for avian species was conducted on May 28, 2008. Species were identified through visual and auditory identification. The survey consisted of eight survey points, each surveyed once in the morning and once in the evening for presence/absence of avian species. One survey point was located in the grassland/hay field in the northern portion of the Study Area, one was located at the grassland/forest interface, four were located at representative locations in the forest and two were located along the lakeshore (Figure 4, Appendix A). Each survey point involved traveling to the count location, waiting in silence for three minutes, and then recording the presence of any avian species identified at the site in a five minute period.

Incidental sightings were also recorded during the other surveys conducted at the site.

3.2.4 Owl Survey

Because typical avian surveys have limited success in detecting owls, a survey specific to owls was conducted on the Study Area in early May of 2008. The survey was timed to occur during the breeding season of the majority of the owl species expected to be in the area (based on the habitat present). Call playback (conducted under SRD Research Permit # 34454) of northern pygmy-owl, northern saw-whet owl, barred owl, long-eared owl, great horned owl and great gray owl species was utilized to determine presence/absence of these species. The surveys were conducted at three locations within the Study Area (Figure 5, Appendix A) between 11:10 pm on May 13, 2008 and 12:25 am on May 14, 2008. Each survey involved mobilization to the survey

site, three minutes of silence, playing of a species call over speakers, a minute of silence and observation, playing of the same species call again with another minute of silence and observation then playing of the next species call, etc. The total callback survey duration was approximately 20 minutes per site.

Incidental owl sightings during the other surveys conducted on site were also recorded.

3.2.5 Rare Plants & Vegetation

Three rare plant surveys were conducted as part of this assessment to account for temporal variation in the vegetation communities. The first rare plant survey was conducted mid-summer on July 2 5 and 26, 2007, a second survey, late season survey was conducted on September 12, 2007. The third and final survey was conducted on May 13, 2008 and focused on early emerging plants.

The surveys utilized a stratified meandering survey technique where transects were spaced approximately 100 m apart over the entire Study Area. Biologists subsequently walked these transects, compiling a species list of all vascular flora encountered along the way. Care was taken to conduct more intensive searches on any "micro sites" encountered, such as seeps and depressional areas. Any wetlands encountered during the survey were assessed using the Stewart and Kantrud (1971) wetland classification system. Bryophytes and lichens were not surveyed as part of this program. Refer to Figure 6 and 7 for transect locations (Appendix A).

4.0 Field Assessment Results

To achieve the objectives stated in Section 1.1 of this report, an intensive field assessment program was devised for the Study Area and included an assortment of vegetation and wildlife-based assessments. These assessments included rare plant surveys, wetland inventory, anuran, mammal, owl, and avian surveys. A detailed description of the findings for each of type of surveys has been summarized below. Refer to Appendix D for a detailed list of the species observed. In addition, site photographs associated with each survey have been included in Appendix E.

4.1 VEGETATION

Information on vegetation and vegetation communities was collected during the three rare plant assessments conducted on the site. Where applicable, the communities observed throughout the Study Area were classified in accordance with The Guide to Range Plant Community Types and Carrying Capacity for the Dry and Central Mixedwood Subregions in Alberta (Willoughby et al. 2006). For the communities that were not represented in the guide, a new community classification was determined.

4.1.1 Lake Shore Communities

The shore of Sylvan Lake along the Study Area is variable, and ranges from exposed south facing shores of varying topography to a sheltered, west to southwest facing bay. Emergent vegetation zones are wide and diverse in some areas, and nearly non-existent in others. The following vegetative communities were observed in close proximity to Sylvan Lake.

4.1.1.1 Reed Canary Grass (DMA23)

This community is found along the southeast portion of the Study Area, on the shore of Sylvan Lake and shifts into the reed grass transitional zone (refer to Section 4.1.1.2). A sparse cover of balsam poplar and willow species are also present within this community type. A list of dominant species within this community type is outlined below.

Graminoids

- *Phalaris arundinacea*
- *Polygonum amphibium*
- *Agrostis stolonifera*

Forbs

- *Stachys palustris*

4.1.1.2 Reed Grass Transitional Zone

No community classification could be found in the guide for this community type.

This is an emergent community that was found on the shore of Sylvan Lake in close proximity the reed canary grass community described in Section 4.1.1.1. The community represents a transitional zone from the aspen/balsam upland and reed canary grass community types to the typha/sedge to typha/sedge/bulrush community. It is similar in composition to the DMA2 marsh reed grass meadow community. This formal community type in the guide is found in close proximity to riparian areas such as linked and isolated marsh basins, and is dependent on standing water. However, the areas observed within the Study Area were part of the Sylvan Lake shoreline.

The dominant vegetation present throughout the reed grass transitional zone is northern reed grass, narrow reed grass, marsh reed grass, and reed canary grass. Awned, water and bottle sedge are also present. A sparse over story of willow species and balsam poplar trees are also present. A list of dominant species within this community type is outlined below.

Shrubs

- *Salix bebbiana*
- *Salix spp.*
- *Salix exigua*
- *Salix lucida*
- *Cornus sericea*

Graminoids

- *Calamagrostis inexpansa*
- *Calamagrostis stricta*
- *Phalaris arundinacea*
- *Carex anthoides*
- *Carex spp.*
- *Carex utriculata*

4.1.1.3 Bulrush-Cattail (DMA1a)

This is an emergent/submergent community type associated with standing water (approximately 0.15 to 6.5 m wide) on the edge of Sylvan Lake. As one moves inland, this community transforms into the reed grass transitional zone (refer to Section 4.1.1.2).

The dominant emergent vegetation was cattail and sedge species. Reed grass species were interspersed throughout. Submergent vegetation was dominated by species such as common mare's tail and hornwort. A list of dominant species within this community type is outlined below.

Emergent Species

- *Typha latifolia*
- *Scirpus acutus*
- *Carex Anthoides*
- *Carex Utriculata*
- *Carex spp.*
- Lemna minor

Submergent Species

- *Hippuris vulgaris*
- *Ceratophyllum demersum*

4.1.1.4 Bulrush

No community classification could be found in the guide for this community type. This emergent community type was dominated by bulrush and was located in deep water (0.6 to 1.2 m deep), adjacent to the bulrush/cattail community. This community is limited by water depth and would succeed to a bulrush cattail community in low water years.

The only species present within this community was giant bulrush (*Scirpus acutus).*

4.1.1.5 Silverberry/Kentucky Bluegrass

This community type is similar to DMA18 as defined in the guide; however the dominant grass was Kentucky bluegrass.

This community type was found on the northeast shore of Sylvan Lake on sandy disturbed soil located at the base of a steep south facing slope. Silverberry prefers moist, well drained seepage areas where overland flow provides additional moisture. The location at the bottom of a steep slope and close proximity to the water's edge creates ideal conditions for the proliferation of silverberry. A thin over story of balsam poplar was also present. A list of dominant species within this community type is outlined below.

Shrubs

- *Elaeagnus commutata*
- *Symphoricarpos alba*
- *Rosa acicularis*

Graminoids

- *Poa pratensis*
- *Bromus inermis*
- Agropyron trachycaulum (wetlands/wet meadows)

4.1.2 Wetland Communities

The topography of the Study Area is knob and kettle, and therefore contains several linked wetlands. These wetlands have been classified, under the Stewart and Kantrud wetland classification system (1971). A summary of information pertaining to the Stewart and Kantrud classification can be found in Section 6.0. Refer to Table 6.2 for a summary of the wetlands observed and Figure 8 (Appendix A) for wetland locations.

The various wetland communities observed are detailed in the sections below.

4.1.2.1 Sedge Meadow (DMA1)

This community type is found by standing water and can be dominated by water, beaked or awned sedge. It is characterized by poorly drained soils and the presence of standing water for a portion of year. As one moves to the drier edges, marsh reed grass becomes the dominant species. A list of dominant species within this community type is outlined below.

Shrubs

- *Salix spp.*
- *Cornus sericea*

Graminoids

- *Carex aquatilis*
- *Carex anthoides*
- *Carex rostrata*
- *Calamagrostis canadensis*

4.1.2.2 Marsh Reed Grass Meadow (DMA2)

This community is found on the edges of sedge meadows and moist draws, where the water table is lower and can be dominated by either species of reed grass. Willow can invade onto these sites to form the Willow/Marsh reed grass community type (refer to Section 4.1.2.4). A list of dominant species within this community type is outlined below.

Shrubs

- *Salix spp.*

Graminoids

- *Calamagrostis canadensis*
- *Calamagrostis inexpansa*
- *Calamagrostis stricta*

Forbs

- *Mentha arvense*
- *Urtica dioica*

4.1.2.3 Willow/Sedge (DMA10)

This community type is found along the edges of sedge meadows and in moist depressions. Generally, willow species become established at the edges of the sedge meadow due to the shorter duration of standing water. Increased flooding or high water years may result in the disappearance of willow and cause a transition to a sedge meadow community (refer to Section 4.1.2.1). A list of dominant species within this community type is outlined below.

Shrubs

- *Salix spp.*

Graminoids

- *Carex rostrata*
- *Carex atherodes*
- *Carex aquatilis*
- *Calamagrostis canadensis*

4.1.2.4 Willow/Marsh Reed Grass (DMA10a)

This community type is found along the edges of sedge and marsh reed grass meadows and in moist depressions. Willow species become established at the edges of these meadows due to the shorter duration of standing water. Increased flooding or high water years may result in the disappearance of the willow species, which will result in a transition to a marsh reed grass or sedge meadow community (refer to Sections 4.1.2.2 and 4.1.2.3, respectively). A list of dominant species within this community type is outlined below.

Shrubs

- *Salix spp.*

Graminoids

- *Calamagrostis canadensis*
- *Calamagrostis inexpansa*
- *Carex aquatilis*
- *Carex anthoides*
- *Phalaris arundinacea*

Forbs

- *Urtica dioica*
- *Mentha arvense*

4.1.2.5 Red Osier Dogwood/ Marsh Reed Grass (DMA17)

The guide describes this community type as occurring on alluvial terraces, stream banks, abandoned channels, on river flood plains, moist areas around springs, and seeps.

This community is much richer and has higher moisture levels than the adjacent upland aspen dominated forest communities. However, it is found to be much drier that the willow dominated shrublands in lower slope positions. In the absence of disturbance and a reduction in annual moisture, this community type will likely succeed to a balsam poplar and eventually white spruce dominated community type. A list of dominant species within this community type is outlined below.

Shrubs

- *Cornus sericea*
- *Rosa acicularis*
- *Symphoricarpos occidentalis*
- *Rubus idaeus*

Trees

- Populus balsamifera

Graminoids

- *Calamagrostis canadensis*
- *Poa palustris*

Forbs

- *Thalictrum venulosum*
- *Equisetum arvense*

4.1.3 Upland Communities

Three distinct vegetation communities dominated the upland native forest portions of this site, these sites are described below.

4.1.3.1 Trembling Aspen/Rose/Tall Forb (DMC2)

This community is a part of the low bush cranberry ecosite outlined by Beckingham and Archibald (1996) and Willoughby et al. (2006), and is a typical deciduous forest community type across central Alberta where native deciduous forest still persists. This community type was the dominant deciduous forest type observed throughout the forested portions of the Study Area. A list of dominant species within this community type is outlined below.

Shrubs

- *Corylus cornuta*
- *Rubus idaeus*
- *Lonicera involucrate*
- *Rosa acicularis*
- *Viburnum edule*

Trees

- *Populus tremuloides*
- Populus balsamifera

Graminoids

- *Calamagrostis canadensis*

Forbs

- *Epilobium angustifolium*
- *Rubus pubescens*
- *Petasites palmatus*
- *Fragaria virginiana*
- *Aster ciliolatus*
- *Lathyrus ochroleucus*
- *Aralia nudicaulis*

4.1.3.2 Balsam Poplar- Trembling Aspen/Willow (DMC8a)

This community type is typical of aspen forests adjacent to wet depressional areas and wetlands. This community type was found at the base of slopes and depressional areas throughout the forested portion of the Study Area. This community type represents the

transition from the meadow edge into the aspen and balsam poplar dominated forest. A list of dominant species within this community type is outlined below.

Shrubs

- *Salix spp*
- *Rubus idaeus*
- *Rosa acicularis*
- *Lonicera involucrata*

Trees

- *Populus balsamifera*
- *Populus tremuloides*
- *Betula papyrifera*

Graminoids

- *Calamagrostis canadensis*

Forbs

- *Fragaria virginiana*
- *Aster ciliolatus*
- *Mertensia paniculata*
- *Rubus pubescens*
- *Equisetum arvense*

4.1.3.3 Trembling Aspen/Saskatoon

This community type is similar to the DMC7 community type as outlined in the guide; however the site observed on the Study Area has historically been disturbed; therefore, a new classification was derived. The site is similar to a DMC7 community, but contains residual ornamental and agronomic species such as caragana, smooth brome, Kentucky bluegrass, and timothy.

This community type was found on the east portion of the Study Area in close proximity to the historic homestead. The area was mesic, with well drained soils. The over story was dominated by trembling aspen, and the shrub layer was mainly saskatoon. In time, in the absence of disturbance, this community type will likely succeed to a trembling aspen/rose/tall forb community type (refer to Section 4.1.3.1). A list of dominant species within this community type is outlined below.

Shrubs

- *Amelanchier alnifolia*
- *Caragana caragana*

Trees

- *Populus tremuloides*

Graminoids

- *Bromus inermis*
- *Poa pratensis*
- *Phleum pretense*

4.1.4 Disturbance Areas

Much of the Study Area was cultivated hay field, or previously disturbed as part of the historic homestead. The dominant vegetation communities found in these areas are described below.

4.1.4.1 Reed Canary Grass/Smooth Brome

This community is similar to the DMC16 community type as outlined in the guide; however no meadow foxtail was observed.

This community type is a seeded area on a moist rich soil substrate adjacent to Sylvan Lake on the east portion of the Study Area (the beach). The site was dominated by reed canary grass throughout the disturbed wet areas. Smooth brome dominated the dryer portions of the site. Annual fluctuations in the level of water would determine the extent and area of dominance of these two species. A list of dominant species within this community type is outlined below.

Graminoids

- *Bromus inermis*
- *Phalaris arundinacea*

4.1.4.2 Tame grassland

This community is similar to the DMB12 community type as outlined in the guide; however no creeping red fescue was present.

This community type was located throughout the northern portion of the Study Area and was classified as a tame pasture dominated by agronomic species. A list of dominant species within this community type is outlined below.

Graminoids

- *Poa pratensis*
- *Phleum pretense*
- *Bromis inermis*

Forbs

- *Trifolium spp*.

4.1.5 Rare Plants

Considerable survey effort was expended searching the Study Area for rare vascular plants. Three surveys were conducted over two years that targeted early season, mid-season and late-season rare plants. No rare plants were observed during any of the site visits.

4.2 WILDLIFE

The following sections detail the results of the targeted wildlife surveys conducted as part of this environmental assessment. It is worth noting that although a targeted reptile survey was not conducted during this assessment program, a red-sided garter snake (*Thamnophis sirtalis parietalis*) was observed near the south lakeshore during the rare plant survey. Other incidental wildlife sightings have been included in the relevant sections below.

4.2.1 Anuran Survey

The anuran survey took place between 8:51pm and 10:50pm, on May 13, 2009. The average temperature during the survey was 14°C and the weather was overcast with no wind. The survey consisted of six representative survey points, which are illustrated on Figure 2 (Appendix A). Only two species were observed during the survey, the boreal chorus frog (*Pseudacris triseriata*) and the wood frog (*Rana sylvatica*). The wood frog was observed at all sites except for Site #4, while the boreal chorus frog was observed at all sites except Site #5. The site with the highest call intensity was Site #6, where boreal chorus frogs were observed in full chorus. All other sites ranged from Class 1 (individual calls discernible) to Class 2 (distinguishable calls but some overlap) observations made for both species observed. A detailed listing of field data for this survey can be found in Appendix D.

4.2.2 Mammal Survey

The winter tracking program was conducted on February 25, 2008. The average temperature during the survey was -5°C and the weather was overcast with partial cloud cover. At the time of the survey, the newest snow cover was a few days old, a foot and a half of old snow comprised the snow base.

A cursory inspection of the agronomic areas revealed a lack of track activity; therefore, the focus of the survey was shifted to the forested portion of the Study Area.

Six transects in total were surveyed to identify the level of use within and surrounding the forested areas. This included two perimeter transects to observe mammal use along the transition areas between the forested areas, the lake, and the agronomic areas. Figure 3, Appendix A illustrates these transect locations.

A detailed account of the species observed can be found in Appendix D for the faunal species observed. Several incidental mammal observations were also made during the course of the various surveys and included moose, white tailed deer, coyote and red squirrel sightings. Significant bat activity, most likely little brown bats (*Myotis lucifugus)* and big brown bats *(Eptesicus fuscus)*, were also noted during the anuran survey; however these species were not confirmed.

4.2.2.1 Transect 1

Transect 1 was 1033 meters in length, and located along the transition area between the southeast portion of the forest area and Sylvan Lake (Figure 3, Appendix A). Twenty-nine interceptions were noted along this transect, which comprised of tracks from seven different species such as coyotes (*Canis Latrans*), deer (*Odocoileus sp*.), red squirrel (*Tamiasciurus hudsonicus*) , snowshoe hares (*Lepus americanus*), weasels (*Mustela sp.)*, voles and mice. The bulk of the interceptions were concentrated along the north portion of the transect from the beach area to the peninsula. The majority of these intercepts were from deer (ten) and coyotes (nine). Refer to Figure 3, Appendix A for animal concentrations associated with the areas surveyed.

The deer tracks noted were usually running parallel to this transect, with intercepts occurring where an animal(s) would cross over to enter or leave the forested area. In addition to deer tracks, numerous scat and scratch/forage marks were observed at various areas adjacent to either side of the transect.

The number of coyote intercepts on Transect 1 were the highest out of all the transects surveyed, with the majority of the coyote tracks noted from animals loitering on the ice in the emergent vegetation adjacent to the forested areas (refer to Figure 3, Appendix A). The coyote intercepts noted were from animals heading to and from the central area of the frozen lake and of animals paralleling the transect. The tracks observed rarely entered the forested portion of the Study Area and if they did, it was only when a well compacted trail was present. In addition to the tracks, one sign of a female coyote in estrous was observed at the start of the transect along the road leading to the beach. This sign was accompanied by multiple male urine markings and a high concentration of tracks.

In addition to coyote and deer crossings, one snowshoe hare intercept was also noted passing back and forth across the transect south of the beach. Numerous coyote tracks later converged with this track; however, no signs of chase or of a kill site were found. One vole, one mouse, and one red squirrel (*Tamiasciurus hudsonicus*) intercept were also noted, all appearing to be tracks of animals foraging in the emergent vegetation. Numerous “snow holes” or entrances to underground rodent tunnels were observed on the east side of the transect. The majority of

tracks and incidental observations were present within the cove south of the beach (Figure 3, Appendix A).

In addition to the rodent tracks noted, six weasel intercepts were also observed. These tracks were usually associated with woody vegetation that had fallen across the transect path or the rodent intercepts previously discussed.

Incidental wildlife was also observed while conducting the inspection of Transect 1 and included a warning trill from a territorial red squirrel.

4.2.2.2 Transect 2

The second transect was located in the south portion of the forested area and started in the southeast corner, heading northwest into the forested area towards the middle of Transect 1 (Figure 3, Appendix A). This transect was approximately 583 meters in length and a total of 18 intercepts were observed. Incidental observations included tracks, scat of ruffed grouse *(Bonasa umbellus*) activity.

The majority of interceptions noted were deer (11), and all of these signs were associated with defined trails heading to and from the interior of the forest. Coyote tracks (3) were also noted, but were all observed in proximity to the start of the transect.

A coyote was observed moving from the beginning of Transect 2 out towards the lake. Red squirrel activity was also observed near downed coarse woody material and the base of larger trees at various points adjacent to the transect.

4.2.2.3 Transect 3

Transect 3 was located within the central portion of the forested area and started at the end of Transect 2, heading southeast towards the neighboring property (Figure 3, Appendix A). The transect was 399 meters in length and contained deer (6), coyote (1), weasel (3), and squirrel (4) intercepts, the majority of which were fairly spread out. The coyote track was observed near the start of the transect. In addition to the intercepts noted, numerous incidental wildlife sightings were observed. One raven (*Corvus corax)* and one hairy woodpecker (*Picoides villosus*) was heard and later observed foraging near the central portion of this transect. In addition, tracks, scat of ruffed grouse and porcupine (*Erethizon dorsatum*) foraging activity was observed.

4.2.2.4 Transect 4

Transect 4 was located in the central portion of the large forested area in the south portion of the Study Area and was approximately 476 meters in length. This transect started at the end of Transect 3 and headed northwest towards Transect 1 (Figure 3, Appendix A). On this transect, 16 interceptions were noted, 11 of which were deer. The remaining intercepts were coyote (1), weasel (1), and red squirrel (3).

4.2.2.5 Transect 5

Transect 5 was located in the north portion of the large forested area, and was 327 meters in length. This transect originated at the end of Transect 4 and was oriented towards the northwest (Figure 3, Appendix A). A total of 24 intercepts were observed, and consisted of weasel (3), a coyote (1), and snowshoe hare (5). However, the majority of the intercepts noted were from deer (15), which accounted for the most deer crossings observed for all transects surveyed. Most of these crossings were clustered in the two wetlands that were dissected by this transect and in proximity to the forested/agronomic transition area.

4.2.2.6 Transect 6

Transect 6 was the second perimeter transect, and was located along the north agronomic/forest transition. This transect started at the end of Transect 5 and followed the outer edge of the forested area in a westerly direction. After following the edge of the forest, the last quarter of this transect cut into the forest extension on the west side of the Study Area and then terminated at the start of Transect 1 (Figure 3, Appendix A). This transect was 1250 meters in length and contained 30 observed intercepts, which were composed of: deer (13), coyote (4), snowshoe hare (9), weasel (2) and mice (2). This transect contained the most intercepts noted for all transects surveyed, and the highest number of individual snowshoe hare crossings. The majority of the deer observations were associated with the transition area just east and west of the northern forest extension, and the snowshoe hare, weasel, and mice intercepts were clustered in the west forest extension. The coyote crossings were all observed at the top of the road leading down to the beach, east of the north forest extension.

In addition to the intercepts noted, porcupine activity was observed in a small willow cluster north of the north forest extension. A large number of willow branches were freshly stripped in this area, and numerous tracks and scat piles were noted throughout the willow cluster. This activity was later determined to be the result of a porcupine that was tracked to another willow patch further north of this area.

4.2.3 Owl Survey

The owl callback survey took place between 11:10 pm on May 13, 2008, and 12:12 am on May 14, 2008. The average temperature during the survey was 11°C and the sky condition was overcast with little to no wind apparent during the survey. Three survey points were chosen on the Study Area, which have been illustrated in Figure 5 (Appendix A).

During the survey, long-eared owls (*Asio otus*) were noted at each survey point. It is theorized that all long-eared owl calls observed originated from a single individual, following the surveyors across the site. A barred owl (*Strix varia*) (a listed species, discussed below), was heard at Site 1 (see Figure 5, Appendix A), but the call was noted to be originating well west of the Study Area, from the other side of the bay. An incidental owl observation was also made during the rare plant survey conducted on May 13, 2008. The encounter was made at long range, and no

auditory calls were made. As such, it was not possible to confirm the species; however, the size of the bird observed indicates that it was likely a great horned owl (*Bubo virginianus*).

4.2.3.1 Barred Owl

As noted in Section 4.2.3, a barred owl was detected during the callback survey. The barred owl is a species listed as Sensitive by Alberta Sustainable Resource Development (Alberta Sustainable Resource Development 2005) and listed as S3S4 (a hybrid ranking of "apparently secure" (>100 occurrences) and "may be susceptible to extirpation because of large scale disturbances") on the Alberta Conservation Information Management System's (ACIMS) Watch List (Alberta Conservation Information Management System 2008).

The barred owl's home range has been estimated at approximately 337 ha in the breeding season (Olson 1999). However, factors such as prey availability and habitat characteristics can vastly increase their range over the winter months (Alberta Sustainable Resource Development 2005).

The barred owl's habitat primarily consists of old mixedwood stands in the breeding season (Mazur et al. 1998, Takats 1998, Olsen 1999). This owl prefers large tracts of unfragmented forest near riparian areas or wetlands, with few clearings in which the owls may be predated by great horned owls. These owls are cavity nesting, and not being a small bird, require trees of substantial diameter in which to nest. In the Boreal Forest Natural Region of Alberta, it has been found that most nests for this species occur in balsam poplar and trembling aspen snags (dead trees), averaging 52 cm diameter at breast height (dbh) (Olsen 1999). However, once incubation is complete and the owlets are too big to inhabit the nest, conifers are required to provide cover until the young learn to fly in 10-12 weeks (Alberta Sustainable Resource Development 2005).

This species has been listed as Sensitive and S3S4 due to its reliance on old growth stands, and tracts of unfragmented forest; both of which are in decline due to current forest management and resource development practices (Alberta Sustainable Resource Development 2005).

An individual of this species was detected in the vicinity of the Study Area, but was not believed to be present on the Study Area.

4.2.4 Avian Survey

Avian surveys targeting songbirds, waterfowl, woodpeckers, etc. were conducted between 7:50 am and 10:00 am, then again between 7:15 pm and 8:15 pm on May 28, 2008. The average temperature was 11°C during the morning survey, and 20°C during the evening survey. Winds were moderate during the morning, and calm to slightly breezy during the evening survey. Sky condition was clear during both survey periods.

The Study Area contains a wide variety of habitat types including grassland, deciduous forest, mixedwood forest, wetland and riparian areas, deepwater and all the transition zones in between. As a result, the Study Area was found to be rich in avian species diversity with 47 separate avian species observed during the survey.

Twenty-six species, including nine waterfowl and shorebird species, were observed to occupy areas adjacent or within the lake at Survey Points 4 and 5 (Figure 4, Appendix A). Survey Point 4 had an abundance of emergent vegetation stretching into the lake, providing excellent nesting and foraging habitat for waterfowl species including, but not limited to, blue-winged teal (*Anas discors*), American coot (*Fulica americana*) and sora (*Porzana carolina*). Survey Point 5 had a narrower band of emergent vegetation in the lake, but provided a more sheltered deep water zone in which diving ducks such as the common Goldeneye (*Bucephala clangula*) can forage.

Forty-three species, including a large variety of passerine species, were observed to occupy the inland areas of the property, including the black-headed grosbeak (*Pheucticus melanocephalus*) and the willow flycatcher (*Empidonax traillii*) (both are listed species and are further discussed in Section 4.2.4.1 and Section 4.2.4.2 respectively). Survey Point 1 was located within the non-native grassland and housed common species such as the clay-colored sparrow (*Spizella pallida*) and the ground nesting savannah sparrow (*Passerculus sandwichensis*). Survey Point 6 was located at the grassland/forest interface, resulting in the detection of warblers, such as the Connecticut warbler (*Oporornis agilis*) and the yellow-rumped warbler (*Dendroica coronata*).

The remainder of the survey points were located within the forested area of the property. This area was topographically diverse, with rolling hills and scattered depressional and wetland areas. The forest itself was vertically well stratified, with healthy low shrub, tall shrub and canopy layers, and also contained several clearings providing a wide variety of habitats for foraging, resting and breeding. This area was rich with passerine species including, but not limited to, black-headed grosbeaks (*Pheucticus melanocephalus*), yellow warblers (*Dendroica palmarum*), least flycatchers (*Empidonax minimus*), ruby-crowned kinglet (*Regulus calendula*) and red-eyed vireos (*Vireo olivaceus*). Active American robin (*Turdus migratorius*) nests were also observed in this area, as well as other nests whose host species were not determined.

A detailed list of avian species observed at each survey point shown on Figure 4 (Appendix A) can be found in Appendix D. Several incidental sightings were also noted during various other surveys, including, but not limited to, red tailed hawk (*Buteo jamaicensis*), ruffed grouse (*Bonasa umbellus*), black-capped chickadee (*Poecile atricapilla*), white-breasted nuthatch (*Sitta carolinensis*) and pileated woodpecker (*Dryocopus pileatus*).

4.2.4.1 Black-Headed Grosbeak

As discussed in Section 4.2.4, the black-headed grosbeak was detected during the songbird survey. The black-headed grosbeak is ranked S2B on the ACIMS Bird Tracking List because of its restricted distribution in Alberta, and secure by Sustainable Resource Development, Fish and Wildlife division (Alberta Conservation Information Management System 2010, Alberta Sustainable Resource Development 2008). The rank of S2 signifies 6-20 occurrences or fewer,

or many individuals in few locations, while the B in the ranking is a modifier to indicate breeding status of a migratory species.

The black-headed grosbeak inhabits deciduous and mixed forests, primarily with under stories containing tall shrubs (Semenchuk 1992). This species is fairly tolerant of human disturbance, and has been found to breed in yards and gardens where sufficient nesting cover is present (Federation of Alberta Naturalists 2007). The black-headed grosbeak's range in Alberta has historically been limited to the southern portion of the province, with breeding records limited to areas in and around Waterton Lakes National Park; however, in recent years the range of the species has been expanding north, and individuals have been observed as far north as Wainwright (Federation of Alberta Naturalists 2007, Semenchuk 1992).

Many individuals (approximately 6-20) of this species were observed both visually and by auditory calls and song in the central portion of the contiguous forested area.

4.2.4.2 Willow Flycatcher

The willow flycatcher is another listed species that was observed on the Study Area and is ranked as S3B on the ACIMS Bird Tracking List and secure by Sustainable Resource Development, Fish and Wildlife division (Alberta Conservation Information Management System 2010, Alberta Sustainable Resource Development 2008). The rank of S3 signifies 21-100 occurrences, while as above, the B in the ranking is a modifier to indicate breeding status of a migratory species.

Willow flycatchers prefer wet environments with low bushes for nesting, and tall bushes or trees for song perches (Federation of Alberta Naturalists 2007). This species if of very limited distribution in Alberta, and breeding records are generally limited to the mountains and foothills, even though seemingly suitable nesting habitat exists elsewhere in the province (Federation of Alberta Naturalists 2007, Semenchuk 1992).

This species was identified through auditory means at only one location on the Study Area (Survey Point 3 (Figure 4, Appendix A)).

5.0 Field Data Interpretation

The quality and importance of habitat is dependent on a number of factors such as cover, vertical structure, stages of maturity, number and diversity of plant communities, species richness, and inter and intra connectivity. The following analyses of connectivity and ecological priority are based on the methodology outlined in Section 3.1.

5.1 ECOLOGICAL CONNECTIVITY

The Study Area contains varying degrees of inter and intra connectivity. The following sections detail the level of connectivity for the various assemblages noted on the Study Area and is based primarily on current land use, distance between habitat units, habitat value, and animal use as observed during the various assessments. Connectivity linkages are displayed using color-coded arrows to indicate movement, direction, and level of importance.

Inter-connectivity (the connectivity of the immediate Study Area) was assessed beyond the boundaries to a distance of one kilometer. Refer to Figure 9 (Appendix A) for the locations of the various levels of connectivity associated with the Study Area.

5.1.1 Intra-connectivity

Intra-connectivity within the Study Area is very good, with the majority of the natural areas being in close enough proximity to result in unhampered wildlife movement. This was quite evident during the winter tracking survey conducted in February 2008. The majority of wildlife movement noted during this survey was along the transition zones following the outer edges of the forested areas and along the shorelines.

5.1.2 Inter-connectivity

Overall, there appears to be significant functional connectivity to natural areas within the south portion of the Study Area, with natural areas to the east and moderate connectivity to the treed areas towards the west. In addition, the shoreline represents a very important connection with adjacent areas, and becomes quite significant during winter, when connections become available across the lake.

Connectivity towards the north is greatly reduced by Rainy Creek Road directly north of the Study Area and open fields.

5.2 ECOLOGICAL PRIORITY RANKINGS

The Study Area contains a mosaic of habitats, including cropland, forested areas, lake shore, isolated and linked wetlands. In this Section, the natural features noted on the Study Area will be ranked according to several factors, including environmental sensitivity and sustainability. Environmental sensitivity will be determined based on the diversity of the plants and wildlife and the potential for negative impacts related to future development. Ecosystem connectivity and

fragmentation is directly related to sustainability. In order for a habitat patch to be sustainable, an appropriate area must be present which provides adequate seed sources and wildlife habitat for continued propagation. It is often suggested that forested areas containing less than 5 ha and wetlands containing less than 3 ha are likely not viable features unless ecological linkages to other natural areas are provided (City of Edmonton 1995). A single large habitat patch or a series of several small connected habitat patches may be appropriate for sustainability, based on the SLOSS (single large or several small) principle of landscape ecology. Depending on the habitat characteristics, a ranking will be applied in order to determine the feasibility of maintaining a particular habitat on the landscape. Figure 10 (Appendix A) and Table 5.1 summarize the priority rankings assigned to each natural feature.

Table 5.1
Ecological Priority Rankings

Category	Priority	Area (ha)
Agricultural Area	Low	33.47
Forested Area	Medium	12.08
	High	29.34
Approximate Total		74.89

** Area of the drainage channel does not take into consideration the extent of the riparian area. This area is primarily the channel as delineated from the aerial photograph.

5.2.1 Low Ecological Priority

The agricultural area observed on the north portion of the Study Area (Figure 10, Appendix A) was ranked as having low ecological priority. This is due to the lack of habitat (cover, food source etc.) provided and is supported by the limited use of the area by wildlife (as observed during the various surveys and assessments). These areas contained a high assemblage of weed and agronomic species and based on the ranking system provided in Section 3, Table 3.1, the agricultural areas have low potential for rare species and low species richness.

5.2.2 Medium Ecological Priority

The transition areas from the agricultural area, the windrow along the northeast, the drainage area in the north of the property, and the smaller treed area to the west of the large contiguous forested section were given a medium priority ranking (refer to Figure 10, Appendix A). This determination was based on:

- Moderate impact by trail clearing in the transition areas and the forested area to the west of the large contiguous forested area;
- Moderate species richness and contained many weedy and agronomic species, and a higher level of anthropogenic impacts for all areas mentioned; and
- Moderate habitat value and community richness.

5.2.3 High Ecological Priority

The large contiguous forested area along the south portion of the Study Area, including various nested wetlands (Wetlands 2 to 13), and the native shoreline (Figure 10, Appendix A), was rated as having a high ecological priority (refer to Section 4, Table 4.1). This determination was based on:

- The high degree of intra and inter connectivity with natural areas within, and adjacent to the Study Area;
- a high species richness, as represented by the collection of unique, rare, and diverse floral and faunal units observed for these areas;
- a wide assemblage and assortment of differing vegetation communities;
- excellent variation/vertical stratification within the vegetation communities noted;
- the robust nature due to the large size of the forested area and contiguous nature of these various natural areas noted; and
- The large contiguous forested area and associated native shoreline also represents a high degree of winter connectivity with natural areas across the lake during the winter months.

6.0 Wetland Interpretation

The Study Area contains several isolated and linked wetlands, with the majority resided within the large contiguous forested area in the south of the Study Area. All wetlands of Class II or higher, under the Stewart and Kantrud wetland classification system (1971), were delineated in the field. In addition, several Class I ephemeral wetlands were observed, but were not delineated as they were numerous and do not require regulatory approval considerations under the wetland policies in place at the time this report was written.

Overall, thirteen Class II or higher wetlands were noted; nine of which were Class II Temporary Ponds, three were Class III Seasonal Ponds; and one was a Class VII Fen Pond. Refer to Table 6.1 for a summary of the wetlands observed and Figure 8 (Appendix A) for wetland locations.

Table 6.1
Wetland Classification

Wetland	Stewart and Kantrud (1971) Wetland Classification	Wetland Area (hectares)
W1	Class III Seasonal Pond	0.08
W2	Class II Temporary Pond	0.08
W3	Class II Temporary Pond	0.01
W4	Class II Temporary Pond	0.11
W5	Class III Seasonal Pond	0.28
W6	Class II Temporary Pond	0.01
W7	Class II Temporary Pond	0.01
W8	Class II Temporary Pond	0.04
W9	Class III Seasonal Pond	0.14
W10	Class II Temporary Pond	0.17
W11	Class II Temporary Pond	0.02
W12	Class VII Fen Pond	0.28
W13	Class II Temporary Pond	0.11
	Total Area	**1.34**

7.0 Discussion and Recommendations

Stantec Consulting Ltd. (Stantec) was retained by Qualico Developments West Ltd. to conduct a Biophysical Assessment (Biophysical) in preparation for future development of land identified by the legal description W ½ Section 34, Township 39, Range 2, West of the Fifth Meridian (Study Area) occupying an area of approximately 74.9 hectares.

7.1 DISCUSSION AND SUMMARY OF RESULTS

7.1.1 Vegetation

The shoreline portion of the Study Area was quite variable, and ranged from exposed south facing shores of varying topography to a sheltered, west to southwest facing bay. Emergent vegetation zones are wide and diverse in some areas, and nearly non-existent in others.

Inland, the topography of the Study Area was knob and kettle, and was a mixture of agricultural and forested areas. Three distinct vegetation communities dominated the upland native forest portions of this property and the cultivated portions were hay field, or previously disturbed as part of the historic homestead.

Throughout the upland areas numerous overland drainage areas and linked and isolated wetlands were observed. Thirteen wetlands were classified, under the Stewart and Kantrud wetland classification system (1971), nine were Class II Temporary Ponds, three were Class III Seasonal Ponds and one was a Class VII Fen Pond.

7.1.2 Wildlife

The Study Area contains a wide variety of habitat types including grassland, deciduous forest, mixedwood forest, wetland and riparian areas, deepwater and all the transition zones in between. As a result, the Study Area was found to be rich in faunal species diversity with: 47 separate avian species observed during the avian survey and a concentration of large and medium sized mammals utilizing the forested areas along the shoreline, the transition areas, and within the large contiguous forested area. Numerous small mammals, anurans, and one reptile were also observed infrequently during the various assessments and surveys.

During the various surveys, three listed species (barred owl, black-headed grosbeak, and willow flycatcher) were observed. Refer to Section 7.13 for a detailed summary of these species.

In addition to terrestrial surveys, a fisheries assessment was conducted for the bed of Sylvan Lake immediately adjacent to the Study Area. This report concluded that this area has been identified as a key environmentally sensitive area in regards to fish habitat due to the presence of emergent vegetation and because of the valuable fish spawning habitat present. It was also identified as key whitefish spawning habitat.

7.1.3 Rare Species

Prior to the implementation of the field program, search requests were conducted through ACIMS and the Fisheries and Wildlife Information System (FWIMS) to determine if there were any occurrence reports of rare species within the boundaries of the Study Area. Both search requests resulted in no known sensitive floral or faunal species occurrences.

Considerable survey effort was expended searching the Study Area for rare vascular plants. Three surveys were conducted over two years that targeted early season, mid-season and late-season rare plants. No rare plants were observed during any of the site visits.

During the various faunal surveys, only three listed species were observed or heard. The following sections summarize and discuss these findings.

7.1.3.1 Barred Owl

An individual of this species was detected in the vicinity of the Study Area, but was not believed to be present on the Study Area. Given the habitat characteristics of the property, it is possible, but unlikely that barred owls are using the forested portion of the property for breeding habitat. The vast majority of trees on the Study Area are not of sufficient diameter to house a cavity nest of sufficient size for this species. A small area within the southwest portion of the Study Area may contain trees of suitable dimensions, along with the requisite nearby conifers to support this species. However, it is more likely that this area is utilized as winter range, though the potential presence of great horned owls in the area may be a limiting factor.

7.1.3.2 Black-Headed Grosbeak

Many individuals (approximately 6-20) of this species were observed both visually and by auditory calls and song in the central portion of the contiguous forested area. Individuals kept their distance from surveyors for the most part, only occasionally moving into visual range, making it difficult to narrow down the actual number of individuals present. No black-headed grosbeak nests were discovered during the course of the survey, nor was any behavior indicative of parents protecting a nest observed. However, the apparent presence of a community of this species rather than only individuals indicates that potential may exist for breeding activities to take place at this location.

7.1.3.3 Willow Flycatcher

This species was identified through auditory means at only one location on the Study Area. Based on the location of the Study Area relative to its known breeding habitat, it is unlikely that this species would be breeding on the Study Area. The individual noted may have been simply migrating through the area.

7.2 POTENTIAL FOR CONSERVATION

Overall the Study Area was ranked into three priority categories based on several factors, including environmental sensitivity and sustainability. The agricultural areas were determined to be of low priority due to a high level of anthropogenic manipulation, concentration of non-native species, lack of wildlife habitat, and low connectivity potential.

In addition, the transition areas, narrow window on the east of the Study Area, small forested area to the west, and portions of the north drainage were considered of moderate priority due to a moderate level of richness, connectivity, and a higher degree of fragmentation.

The areas with the highest potential for ecological sustainability and the highest priority for conservation were the large contiguous forested area and nested wetlands residing in the south portion of the Study Area and the native shoreline associated with this forested area. These areas were chosen due to the contiguity with natural areas within the Study Area, and to adjacent natural areas, the multitude of variable vegetation communities, and a high level of species richness.

The possible use of Conservation Easements (CE) or strategically placed Municipal Reserve (MR) or Environmental Reserve (ER) within the Study Area could aid in maintaining the ecological integrity of these high priority areas in light of development.

Modifications to the landscape, such as the development of roads, housing, and other related infrastructure, will impact ecosystem function by altering hydrology, impeding animal movement, removal of habitat, as well as the addition of pollutants. Fortunately, many of these impacts can be mitigated through the use of beneficial management practices, reclamation and habitat enhancements.

8.0 General Recommendations

The following outlines the general recommendations for the Study Area based on the information collected and discussed in previous sections of this report.

Based on the Biophysical, the following recommendations are provided:

- For any future development, it is recommended that construction occur in such a way as to maintain the large contiguous forested area located in the south portion of the Study Area as much as possible.
- Maintain the current drainage flow currently observed throughout the Study Area as much as possible. In particular, avoid altering the various drainage areas noted on the property, as this would most likely fundamentally change their structure and function and/or result in compensation requirements;
- Key environmentally sensitive areas for fish habitat and the presence of valuable whitefish spawning habitat was observed within the cove to the south of the Study Area. Further consultation with provincial, federal, and municipal government agencies will be required to determine if appropriate compensation measures can be developed if this area is to be disturbed;
- A historical site was identified on the Study Area. It was concluded that this area should be left undisturbed. However, further consultation with Alberta Culture and Community Spirit may be required to determine what will be required regarding future disturbance by any developments now or in the future;
- Implement buffers surrounding any retained natural areas;
- Use stormwater management facilities (constructed wetlands) in addition to vegetated buffers to treat surficial runoff from developed areas prior to release to Sylvan Lake;
- All wetlands of Class II or above according to the Stewart and Kantrud (1971) classification system require compensation under the Alberta Wetland Compensation Guide (Alberta Environment 2007). ASRD, under the *Public Lands Act*, may only claim ownership of the bed and shore of “permanent” waterbodies, which typically includes only Class IV or higher. Therefore, in response to the removal of any wetlands located on the Study Area, it is suggested that both Alberta Environment (AENV) and Alberta Sustainable Resources Development (ASRD) be contacted prior to wetland disturbance or removal to ascertain if approval and compensation is required;
- If constructed wetlands (SWMFs) are proposed, the Study Area would benefit from a naturalized design. Different depths of water should be incorporated along with zones of emergent and non-emergent vegetation. Native soils should be salvaged from any current wetlands slated for removal and used to establish a native seed bank within the constructed

water features. The use of these salvaged soils will promote native wetland plant growth and will assist in the revegetation and habitat creation;

- If trails/pedestrian linkages are proposed for future development, small bridges or para-ramps between the retained natural areas and proposed SWMF should be considered. This will allow for the movement of amphibians and small mammals across roadways;

- Microsites and man-made structures may be used to further enhanced habitat. These may include bat boxes, duck tunnels, rock piles and brush piles. Examples of these types of enhanced habitat structures that will promote a biologically diverse environment include:

    - Bat boxes attached to poles or trees will provide suitable habitat for bat species. The implementation of bat boxes will also aid in keeping bats away from buildings where they are not desired while controlling insect populations such as mosquitoes;

    - Duck tunnels are above ground structures used by mallard ducks as alternative nesting sites and have proven to be an effective form of artificial nests (Zimmerling et al. 2006);

    - Brush piles offer a unique habitat to small mammal species such as mice and voles, in addition to insect species. They also provide shelter for many species of birds; and

    - Boulder piles placed close to water edges offer a unique habitat for amphibian species to bask in the sun and for insects, such as dragonflies, to perch.

- Use native plantings whenever possible. Native plantings require little maintenance and will provide resources for local wildlife (BC Ministry of Environment 2004);

- If residential lots are planned within the large contiguous forested area, pocket development is suggested to limit anthropogenic disturbances to wildlife habitat and fragmentation.

- Utilize low light systems around or in any natural areas, such as a SWMF or the forested areas, to reduce disturbance on wildlife utilizing the area and to minimize light pollution; and

- Interpretive signs are often beneficial around environmentally sensitive areas, such as buffers or conserved tree stands, to inform the public of their ecological importance and explain why the area was conserved. This will serve to both educate the public and limit inadvertent damage to the conserved areas and buffer zones.

- Ensure that the Development Team provide a Tree Protection Plan (TPP) at the engineering stages of development (if required);

- Create a tree protection zone (TPZ) and delineate with a temporary visible barrier (such as snow fence) will decrease soil compaction and increase survivability of edge trees. No vehicles, personnel or construction material (except for the fencing) should be allowed within the barrier if this method is implemented. In this case, the TPZ will act as the permanent buffer;

- A fence without gates or dense shrub border should be constructed around the development pockets bordering the retained natural areas in order to restrict anthropogenic impacts;
- Clearing of native vegetation should be avoided between April 15 and July 31 pursuant to county policy to prevent harm to nesting migratory birds and breeding wildlife and the federal *Migratory Birds Convention Act*;
- Prior to construction activities, the boundaries of the all retained natural areas should be clearly identified with fencing or flagging, and reviewed with the construction contractor;
- All works and undertakings should be adequately designed and mitigated to prevent erosion and sedimentation. Sedimentation and erosion control measures should be implemented prior to work and maintained throughout the course of construction, using a variety of techniques as per detailed design;
- All disturbed areas should be re-vegetated with native vegetation as soon as possible;
- Appropriate precautions should be taken to ensure that deleterious substances do not enter drainage courses or seasonal and permanent waterbodies; and
- All debris generated from construction activities should be properly removed from the site.

9.0 Limitations and Qualifications

In conducting the investigation and rendering our conclusions, Stantec gives the benefit of its best judgment based on its experience and in accordance with generally accepted professional standards for this type of investigation. This report was submitted with the best information to date and on the information provided. The conclusions made within this report are a professional opinion, environmental condition, no other warranty, expressed or implied is made. This report has been prepared for the exclusive use of Qualico Developments West Ltd.for the purposes of assessing the current state of the neighbourhood site. Any use which any third party makes of this report, or any reliance on or decisions to be made on it, are the responsibility of such third parties. Stantec accepts no responsibility for damages, if any, suffered by any other third party as a result of decisions made or actions based on this report. Our conclusions are limited by the following:

- All vegetation and wildlife inventories were completed during the dates and times specified and conditions may vary outside that time;
- The information contained within this report is based on the information provided to date by various agencies and the design drawings available at the time of report preparation; and
- The investigation was limited to those parameters specifically outlined in this report.

10.0 Stantec Quality Management Program

This report, entitled **"Palm Bay Resort Biophysical Assessment, Lacombe County, Alberta; Prepared for: Qualico Developments West Ltd.; Prepared by: Stantec Consulting Ltd.; July 2010"** was produced by the following individual(s):

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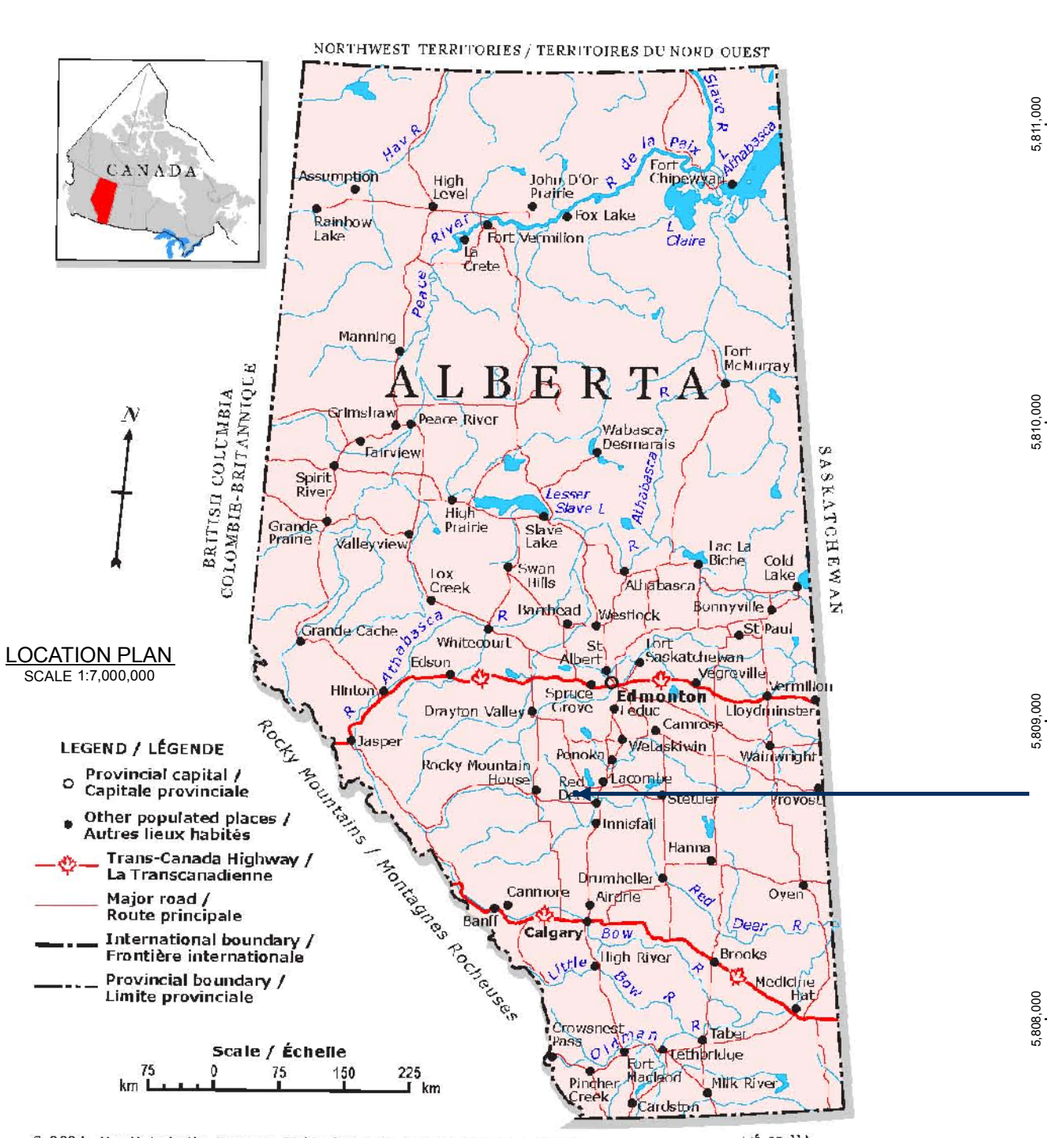
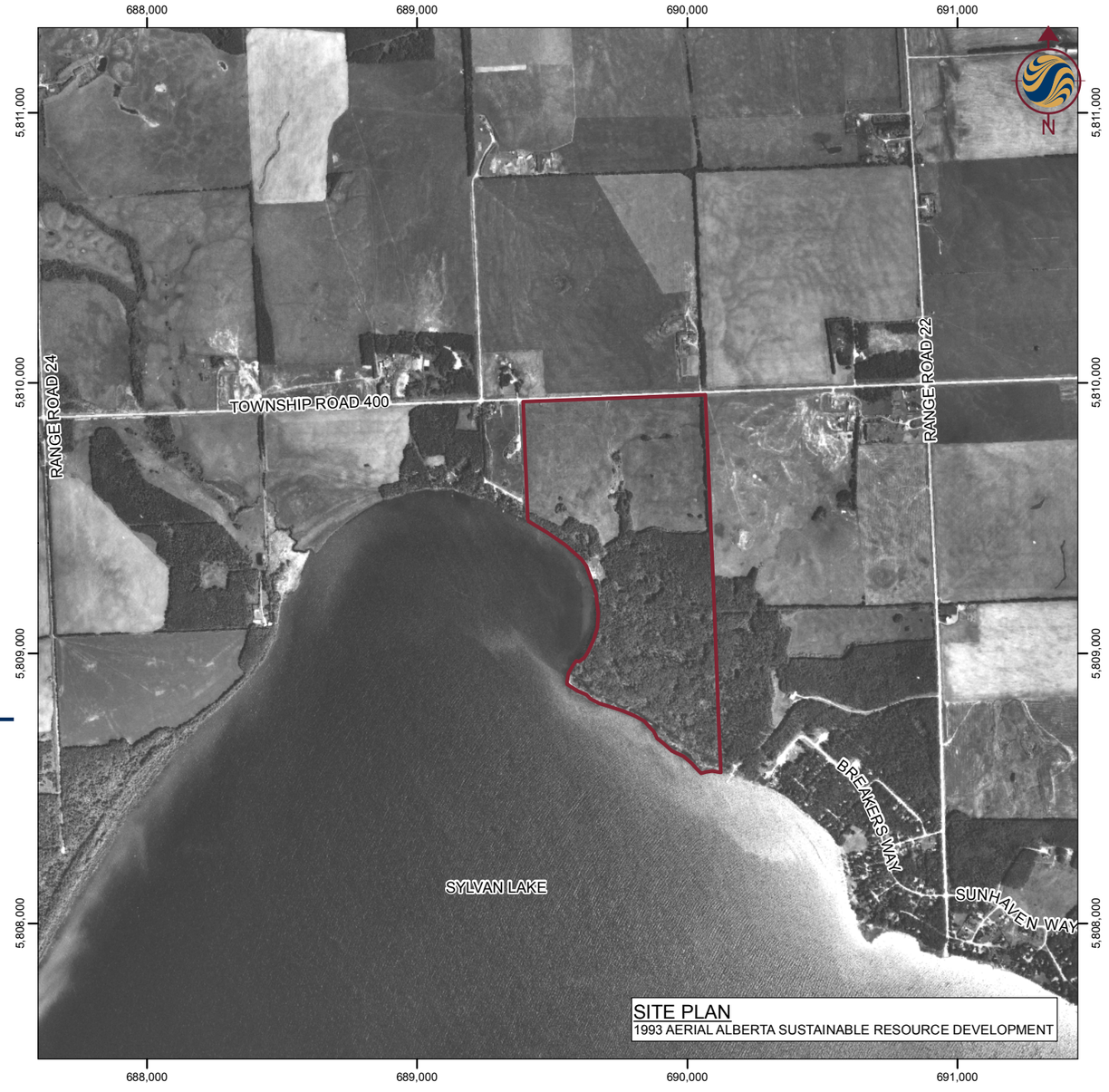
APPENDIX A
FIGURES



LOCATION PLAN
SCALE 1:7,000,000



SITE PLAN
1993 AERIAL ALBERTA SUSTAINABLE RESOURCE DEVELOPMENT

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2010-07-29 01:45PM By: rcassells

July, 2010
1102-17665

Stantec

Projection: UTM Zone 11 Projection: NAD 83
Imagery obtained from Alberta Sustainable Resource Development, 1993.

Legend
STUDY AREA

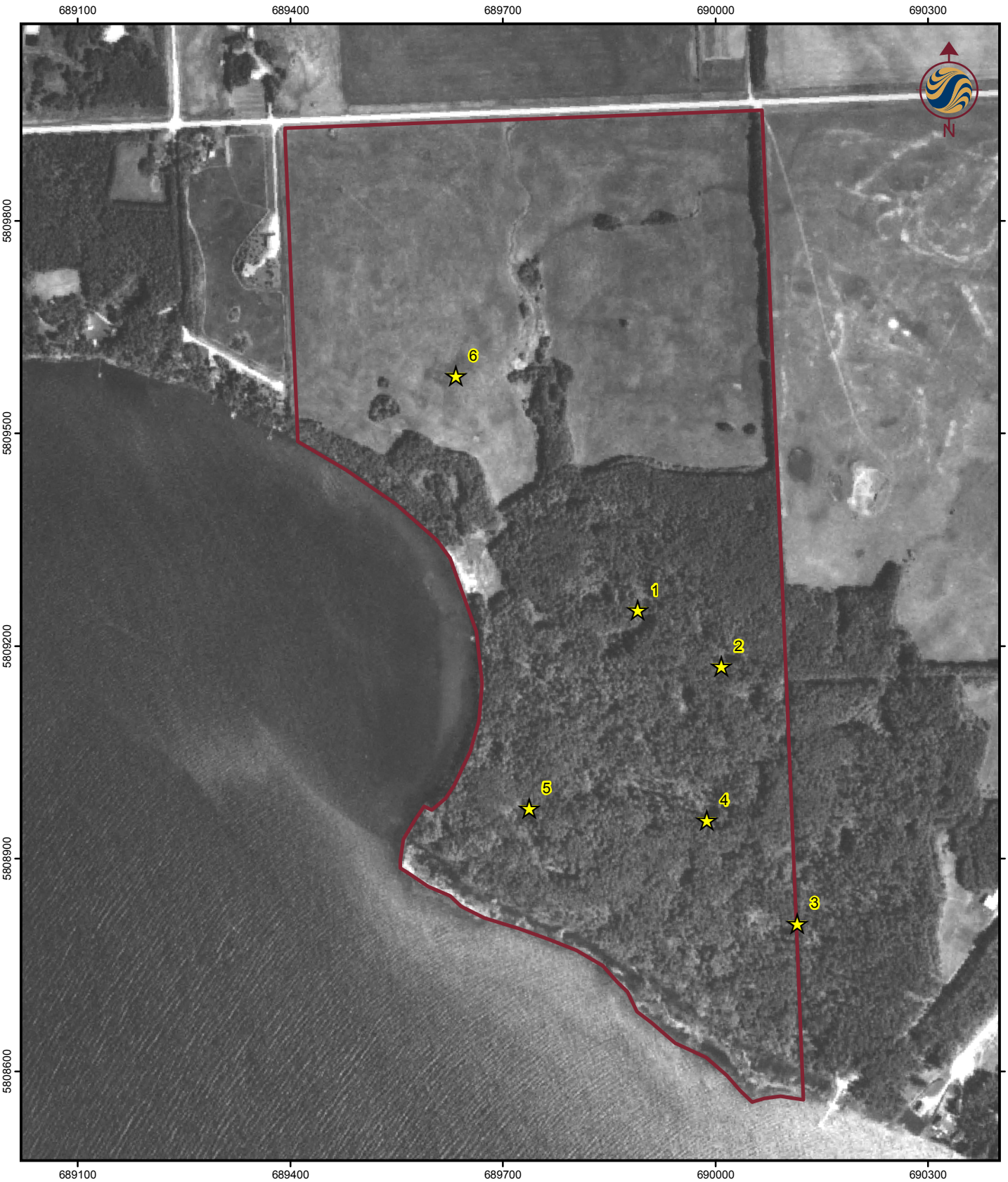
Site Description
W1/2 34-39-02 W5M
Lacombe County, Alberta

1:20,000 0 200 400 600 800 1,000 Metres
This map is for reference purposes only

Client/Project
QUALICO DEVELOPMENTS WEST LTD.
BIOPHYSICAL ASSESSMENT

Figure No.
1

Title
SITE LOCATION PLAN



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2010-07-29 01:47PM By: rcassells

July, 2010
1102-17665

CALL BACK SURVEY LOCATION

STUDY AREA

Stantec

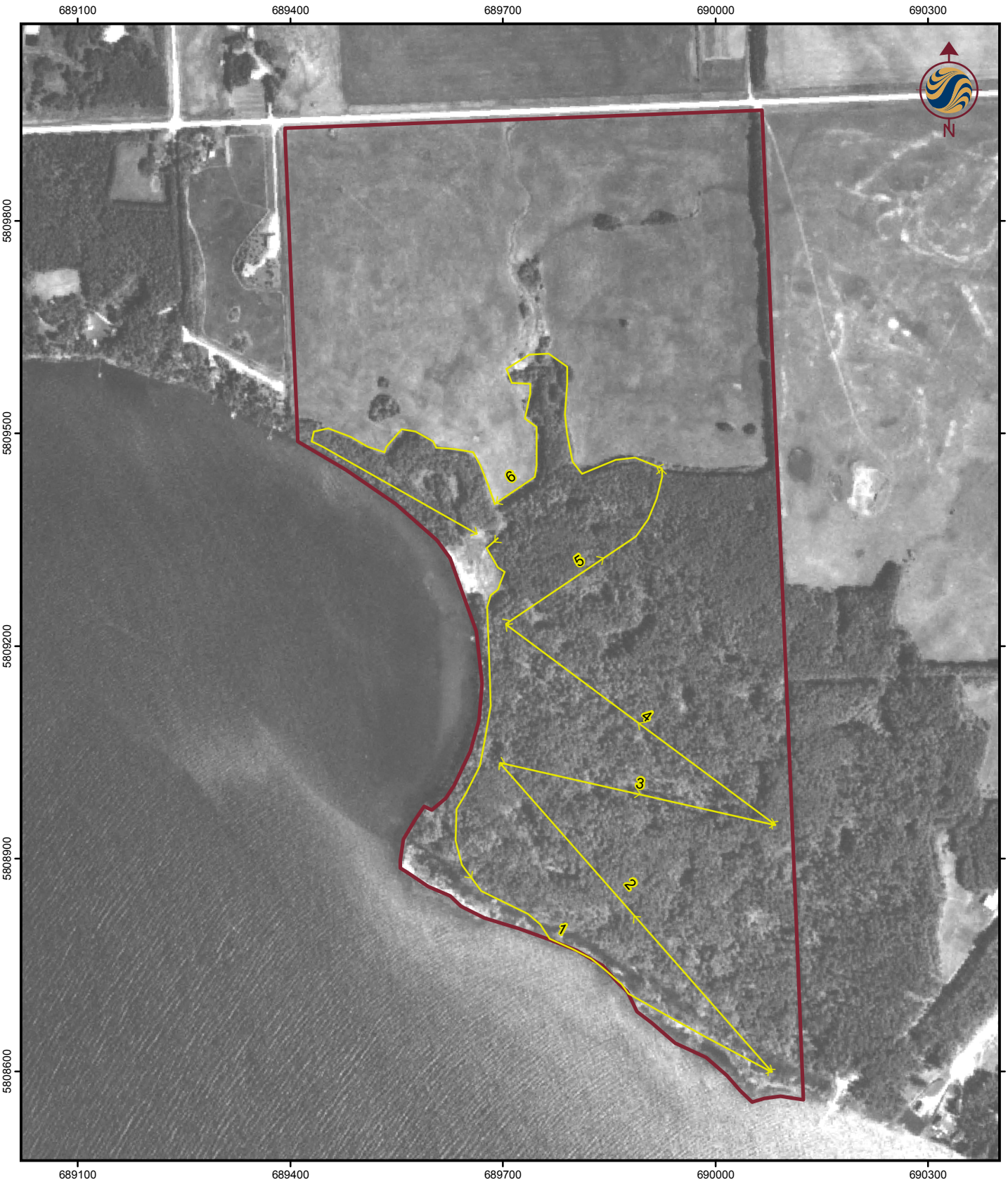
Projection: UTM Zone 12 Datum: NAD 83
Imagery obtained from Alberta Sustainable Resource Development, 1993.

0 60 120 180 240 300
1:7,500 Metres
This map is for reference purposes only

Client/Project
QUALICO DEVELOPMENTS WEST LTD.
BIOPHYSICAL ASSESSMENT

Figure No.
2

Title
ANURAN SURVEY LOCATIONS



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2010-07-29 01:48PM By: rcassells

July, 2010
1102-17665

TRANSECT

STUDY AREA

Stantec

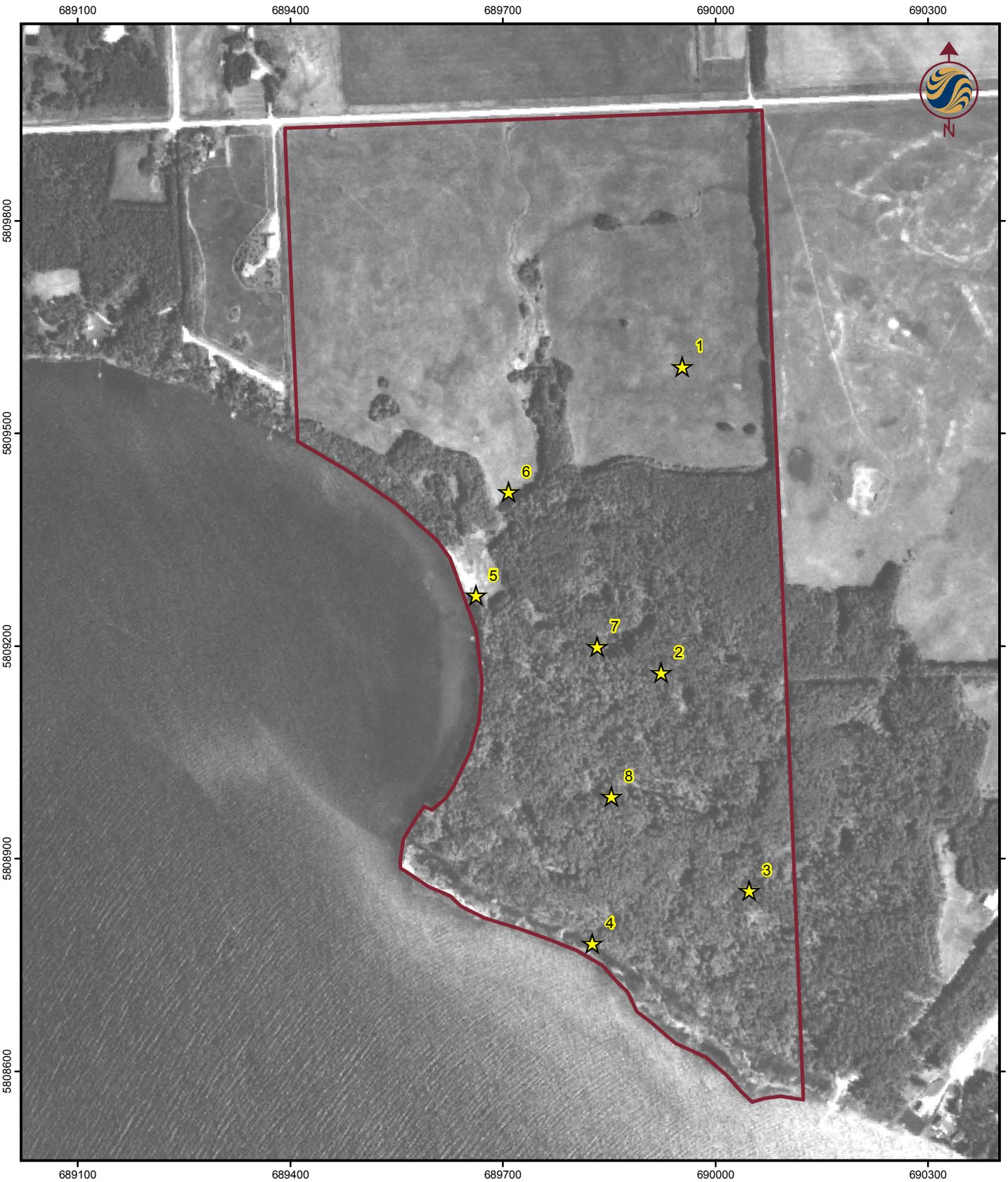
Projection: UTM Zone 12 Datum: NAD 83
Imagery obtained from Alberta Sustainable Resource Development, 1993.

0 60 120 180 240 300
1:7,500 Metres
This map is for reference purposes only

Client/Project
QUALICO DEVELOPMENTS WEST LTD.
BIOPHYSICAL ASSESSMENT

Figure No.
3

Title
WINTER TRACKING SURVEY LOCATIONS



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July, 2010
1102-17665

POINT COUNT SURVEY LOCATION

STUDY AREA

Stantec

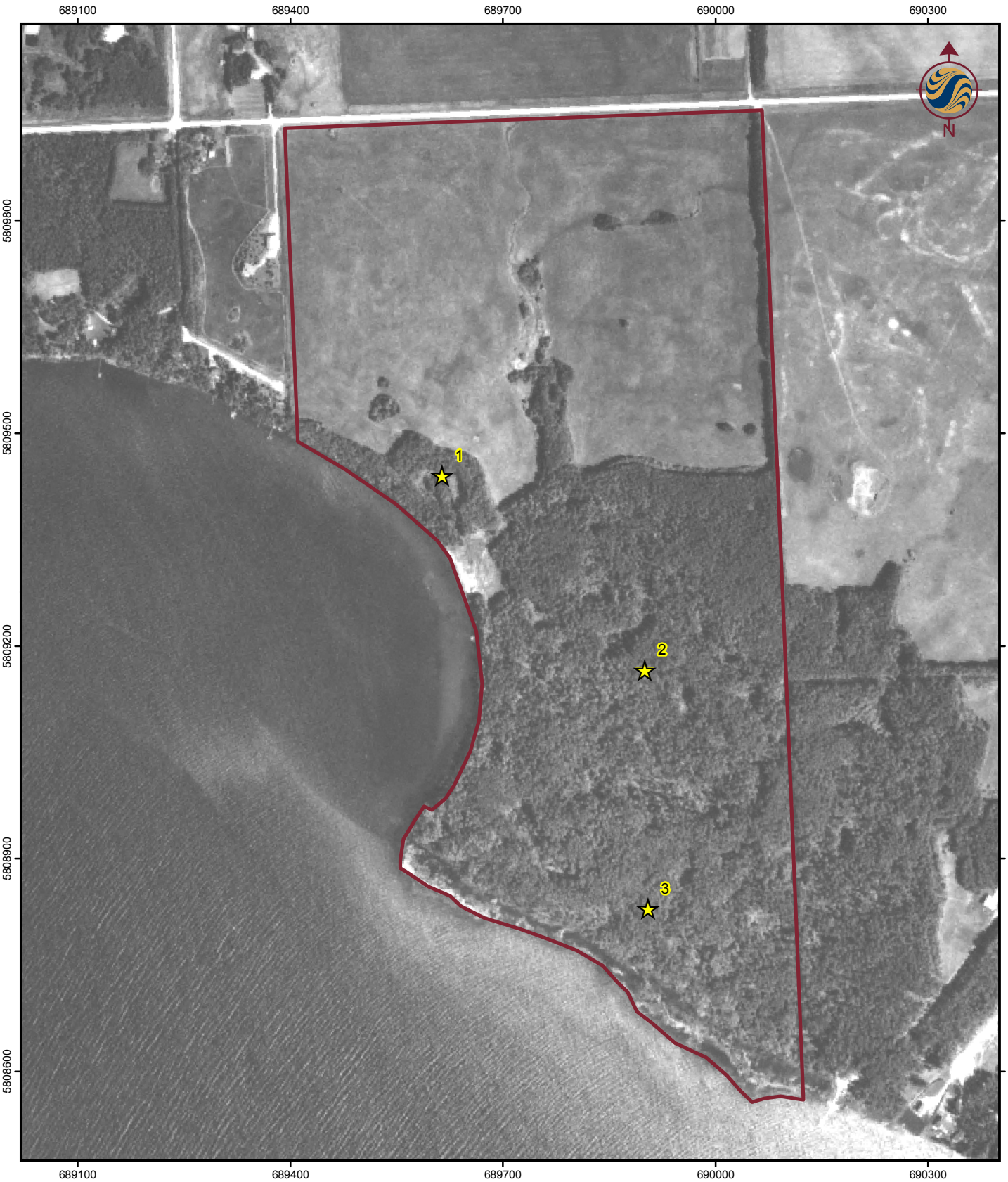
Projection: UTM Zone 12 Datum: NAD 83
Imagery obtained from Alberta Sustainable Resource Development, 1993.

0 60 120 180 240 300
1:7,500 Metres
This map is for reference purposes only

Client/Project
QUALICO DEVELOPMENTS WEST LTD.
BIOPHYSICAL ASSESSMENT

Figure No.
4

Title
AVIAN SURVEY LOCATIONS



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July, 2010
1102-17665

CALL BACK SURVEY LOCATION

STUDY AREA

0 60 120 180 240 300
1:7,500 Metres
This map is for reference purposes only

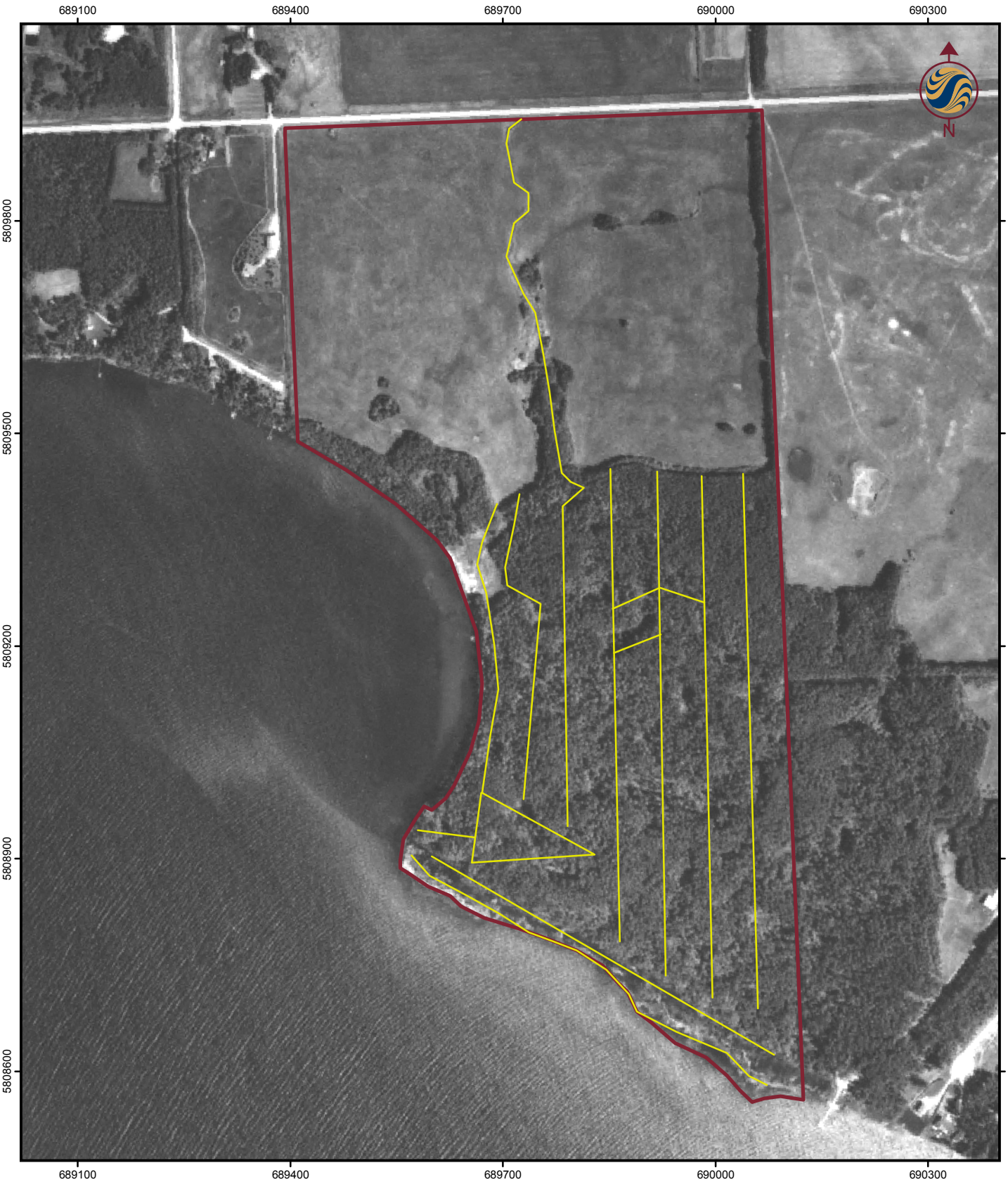
Stantec

Projection: UTM Zone 12 Datum: NAD 83
Imagery obtained from Alberta Sustainable Resource Development, 1993.

Client/Project
QUALICO DEVELOPMENTS WEST LTD.
BIOPHYSICAL ASSESSMENT

Figure No.
5

Title
OWL SURVEY LOCATIONS



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July, 2010
1102-17665

Stantec

Projection: UTM Zone 12 Datum: NAD 83
Imagery obtained from Alberta Sustainable Resource Development, 1993.

TRANSECT
STUDY AREA

1:7,500 0 60 120 180 240 300 Metres
This map is for reference purposes only

Client/Project
QUALICO DEVELOPMENTS WEST LTD.
BIOPHYSICAL ASSESSMENT

Figure No.
6

Title
RARE PLANT SURVEY TRANSECT LOCATIONS (JULY 2007)

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2010-07-29 02:30PM By: rcassells

July, 2010
1102-17665

TRANSECT
STUDY AREA

Stantec

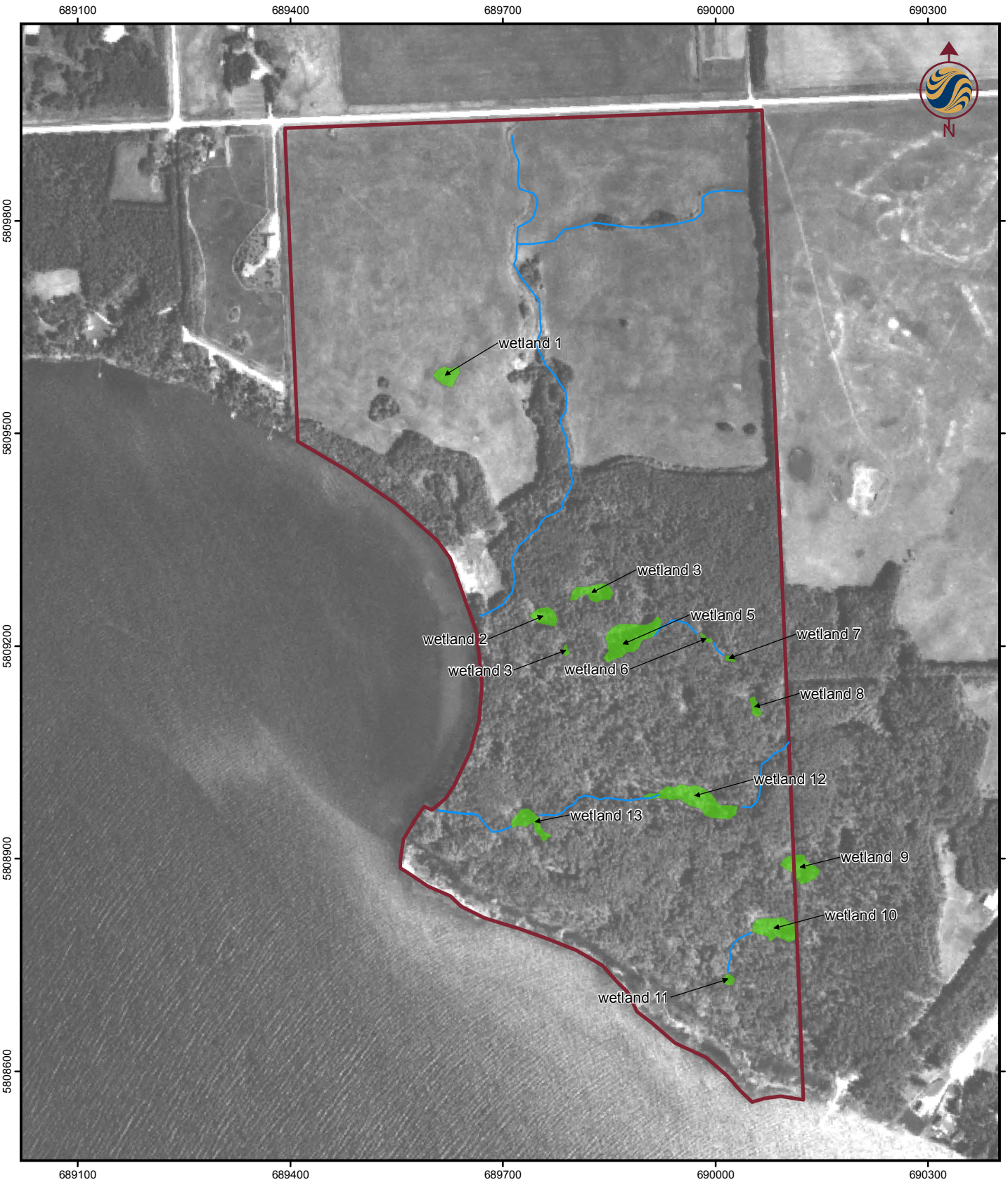
Projection: UTM Zone 12 Datum: NAD 83
Imagery obtained from Alberta Sustainable Resource Development, 1993.

0 60 120 180 240 300
1:7,500 Metres
This map is for reference purposes only

Client/Project
QUALICO DEVELOPMENTS WEST LTD.
BIOPHYSICAL ASSESSMENT

Figure No.
7

Title
RARE PLANT SURVEY TRANSECT LOCATIONS (MAY 2008)



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2010-07-29 02:30PM By: rcassells

July, 2010
1102-17665

DRAINAGE
STUDY AREA
WETLAND

0 60 120 180 240 300
1:7,500 Metres
This map is for reference purposes only

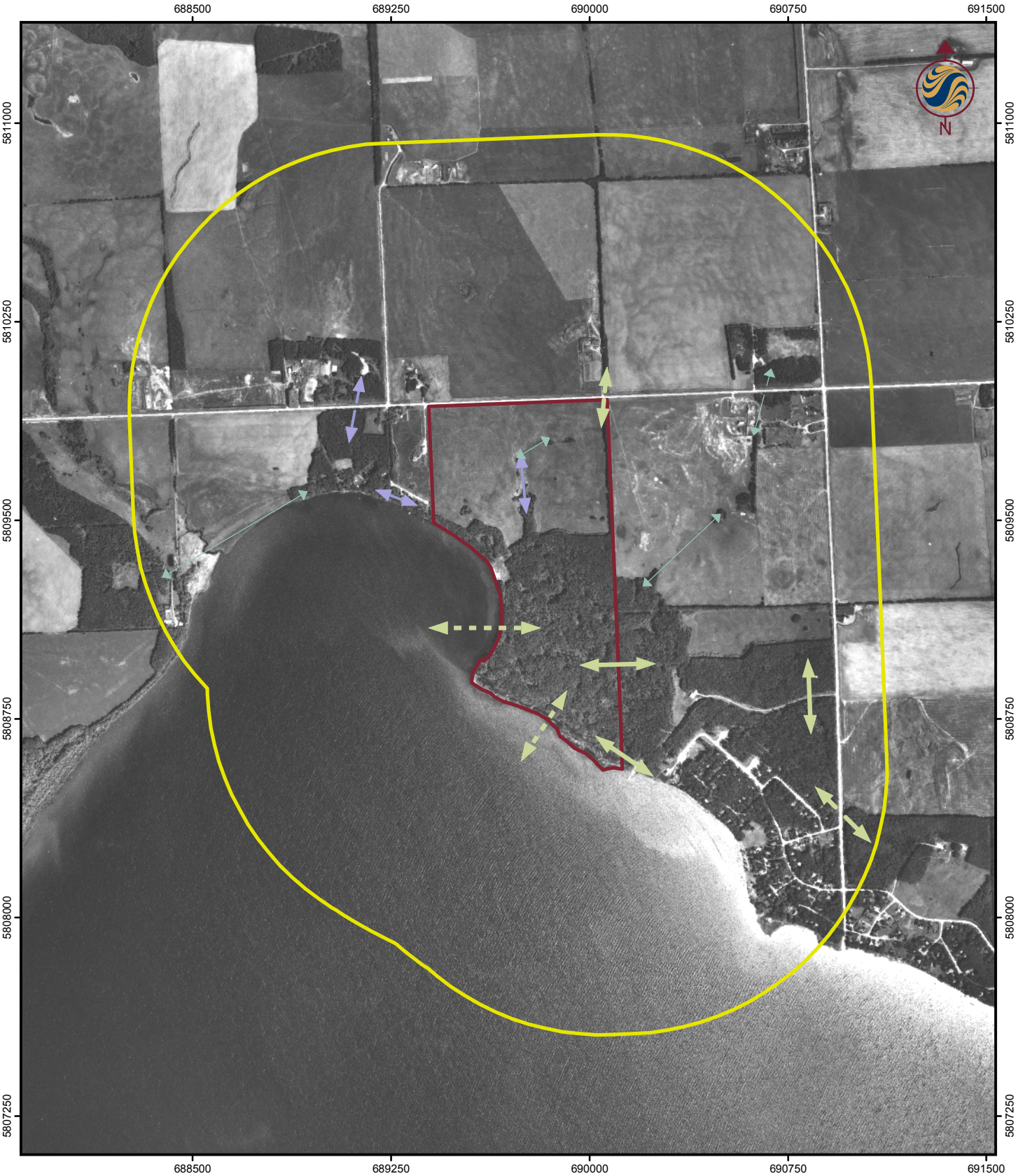
Stantec

Projection: UTM Zone 12 Datum: NAD 83
Imagery obtained from Alberta Sustainable Resource Development, 1993.

Client/Project
QUALICO DEVELOPMENTS WEST LTD.
BIOPHYSICAL ASSESSMENT

Figure No.
8

Title
WETLAND LOCATIONS



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July, 2010
1102-17665

1 Km BUFFER
STUDY AREA

CONNECTIVITY
LOW
MEDIUM
HIGH
SEASONAL

0 150 300 450 600 750
1:20,000 Metres
This map is for reference purposes only

Stantec

Projection: UTM Zone 12 Datum: NAD 83
Imagery obtained from Alberta Sustainable Resource Development, 1993.

Client/Project
QUALICO DEVELOPMENTS WEST LTD.
BIOPHYSICAL ASSESSMENT

Figure No.
9

Title
HABITAT CONNECTIVITY

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2010-07-29 02:57PM By: rcassells

July, 2010
1102-17665

STUDY AREA

PRIORITY RANKING

- LOW
- MEDIUM
- HIGH

0 60 120 180 240 300

1:7,500 Metres

This map is for reference purposes only

Stantec

Projection: UTM Zone 12 Datum: NAD 83
Imagery obtained from Alberta Sustainable Resource Development, 1993.

Client/Project
QUALICO DEVELOPMENTS WEST LTD.
BIOPHYSICAL ASSESSMENT

Figure No.
10

Title
ECOLOGICAL PRIORITY RANKING

APPENDIX B
ANHIC

From: Drajs Vujnovic [Drajs.Vujnovic@gov.ab.ca] on behalf of John Rintoul [John.Rintoul@gov.ab.ca]
Sent: Wednesday, November 14, 2007 11:56 AM
To: Obert, Marc
Subject: RE: Occurrence Request

In response to your request regarding element occurrences in the vicinity of **W 1/2 of 34-39-02-W5M,** I have reviewed the information in the Alberta Natural Heritage Information Centre (ANHIC). We have no occurrences recorded in our system to date, for elements on our tracking lists in the vicinity of your area of interest. However this does **not** indicate that occurrences do not exist in this area. The absence of records could indicate that very few inventories/surveys have been done in this part of the province.

Please remember that the results of a data search by the Alberta Natural Heritage Information Centre are not intended as a final statement on the presence, absence, or condition of elements within a given area, or as a substitute for on-site surveys which may be required for environmental assessments.

Please also be advised that this information only addresses known occurrence information for elements of conservation concern. For rare vertebrate wildlife observation data, please contact the Fish and Wildlife Division representative closest to your area of concern.

Also, we are asking for your help in keeping our data bases as accurate and up-to-date as possible. If you should discover any new element occurrences, please let us know. Feel free to notify us of any inaccuracies or discrepancies you may notice in our data, and give us your suggestions on how our services could be more useful to you.

Dragomir Vujnovic

for

John Rintoul
Section Head and Information Coordinator
Alberta Natural Heritage Information Centre
Heritage Protection and Recreation Management Branch
Parks, Conservation, Recreation and Sport Division
Alberta Tourism, Parks, Recreation and Culture
(780) 427-6639
john.rintoul@gov.ab.ca

The Alberta Natural Heritage Information Centre is a member of NatureServe's network of conservation data centres - A Network Connecting Science with Conservation.

Un Réseau pour la Science et la Conservation.
ANHIC web site: http://www.cd.gov.ab.ca/preserving/parks/anhic/flashindex.asp
NatureServe web site: http://www.natureserve.org/
The Nature Conservancy's Conserveronline web site: http://www.conserveonline.org

Dragomir Drajs Vujnovic, Zoologist
Tourism, Parks, Recreation and Culture
Parks, Conservation, Recreation and Sport Division
Parks Resource Management Coordination Branch
Alberta Natural Heritage Information Centre

3rd Floor, Oxbridge Place
9820 - 106 Street
Edmonton, Alberta, Canada T5K 2J6

tel. 780.427.7159
fax 780.427.5980
toll free 1.866.427.3582
e-mail Drajs.Vujnovic@gov.ab.ca
http://www.cd.gov.ab.ca/preserving/parks/anhic/flashindex.asp

---

From: Obert, Marc [mailto:marc.obert@stantec.com]
Sent: November 14, 2007 11:35
To: John Rintoul
Subject: Occurrence Request

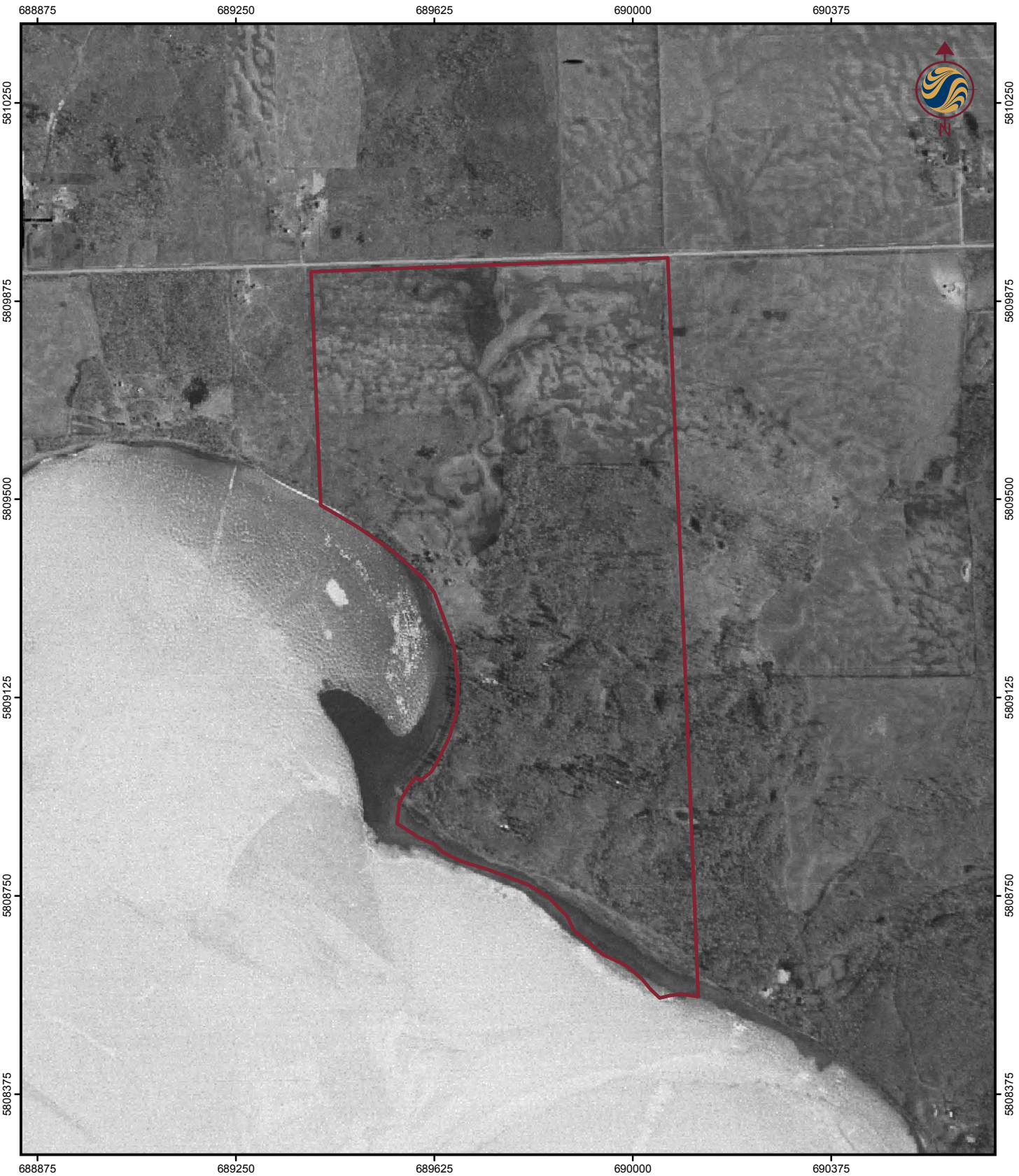
Hello John,

I hope the day is treating you well. I was wondering if you could conduct an element occurrence search for the W 1/2 of 34-39-02-W5M northeast shore of Sylvan Lake.

Thanks,

Marc Obert, B.Sc., A.Ag., BIT
Environmental Scientist
Stantec
10160 - 112 Street
Edmonton AB T5K 2L6
Ph: (780) 969-2194
Fx: (780) 718-7249
marc.obert@stantec.com
stantec.com

APPENDIX C
AERIAL PHOTOGRAPHS



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2010-07-29 03:09PM By: rcassells

July, 2010
1102-17665

STUDY AREA

Stantec

Projection: UTM Zone 12 Datum: NAD 83
Resource Development, 1949.

1:10,000 0 75 150 225 300 375 Metres
This map is for reference purposes only

Client/Project
QUALICO DEVELOPMENTS WEST LTD.
BIOPHYSICAL ASSESSMENT

Figure No.
1949

Title
HISTORIC AERIAL PHOTOGRAPH REVIEW

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2010-07-29 03:08PM By: rcassells

July, 2010
1102-17665

STUDY AREA

Stantec

Projection: UTM Zone 12 Datum: NAD 83
Imagery obtained from Alberta Sustainable Resource Development, 1962.

0 75 150 225 300 375
1:10,000 Metres
This map is for reference purposes only

Client/Project
QUALICO DEVELOPMENTS WEST LTD.
BIOPHYSICAL ASSESSMENT

Figure No.
1962

Title
HISTORIC AERIAL PHOTOGRAPH REVIEW

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2010-07-29 03:22PM By: rcassells

July, 2010
1102-17665

STUDY AREA

Stantec

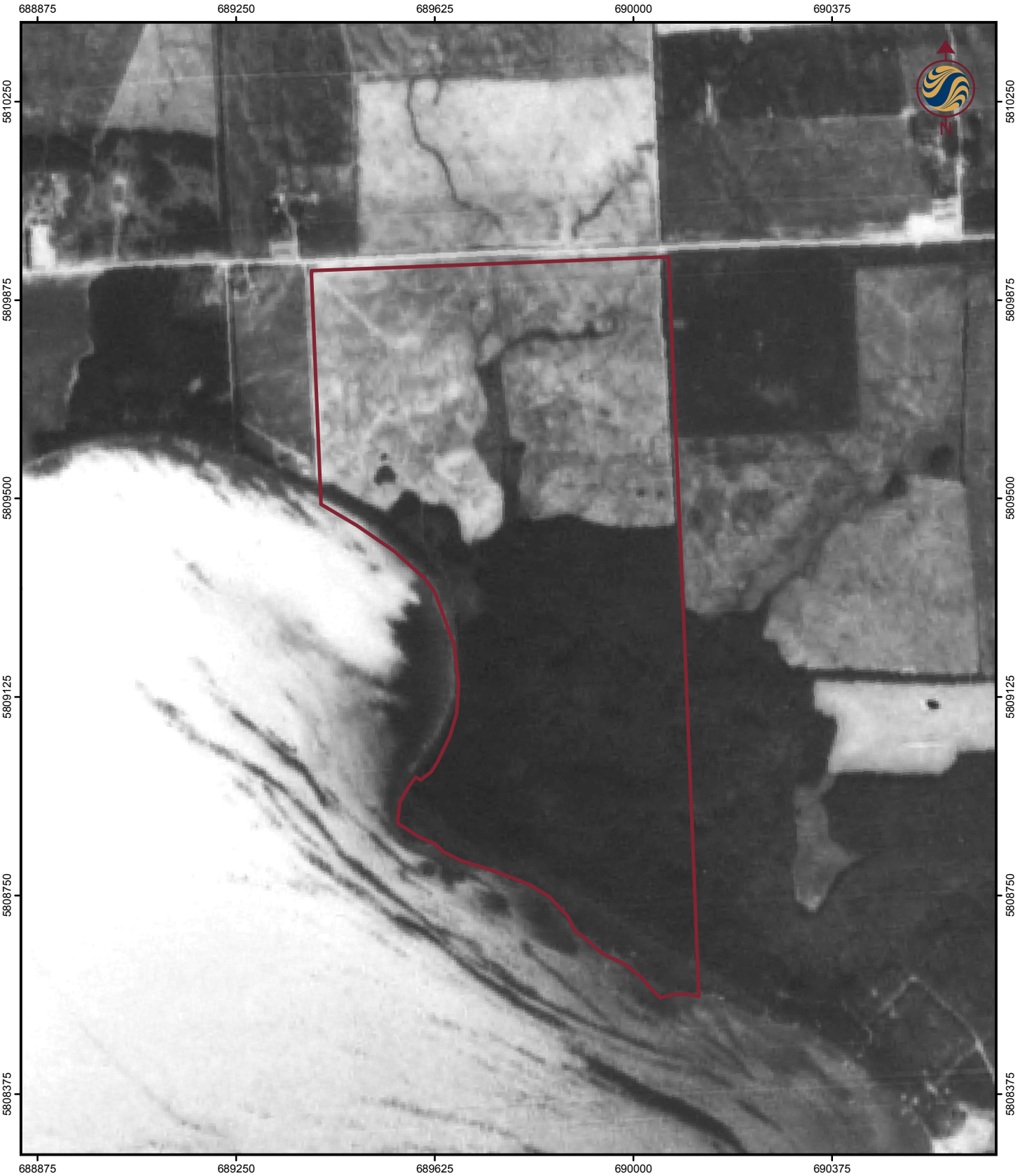
Projection: UTM Zone 12 Datum: NAD 83
Imagery obtained from Alberta Sustainable Resource Development, 1962.

0 75 150 225 300 375
1:10,000 Metres
This map is for reference purposes only

Client/Project
QUALICO DEVELOPMENTS WEST LTD.
BIOPHYSICAL ASSESSMENT

Figure No.
1966

Title
HISTORIC AERIAL PHOTOGRAPH REVIEW



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2010-07-29 03:11PM By: rcassells

July, 2010
1102-17665

STUDY AREA

Stantec

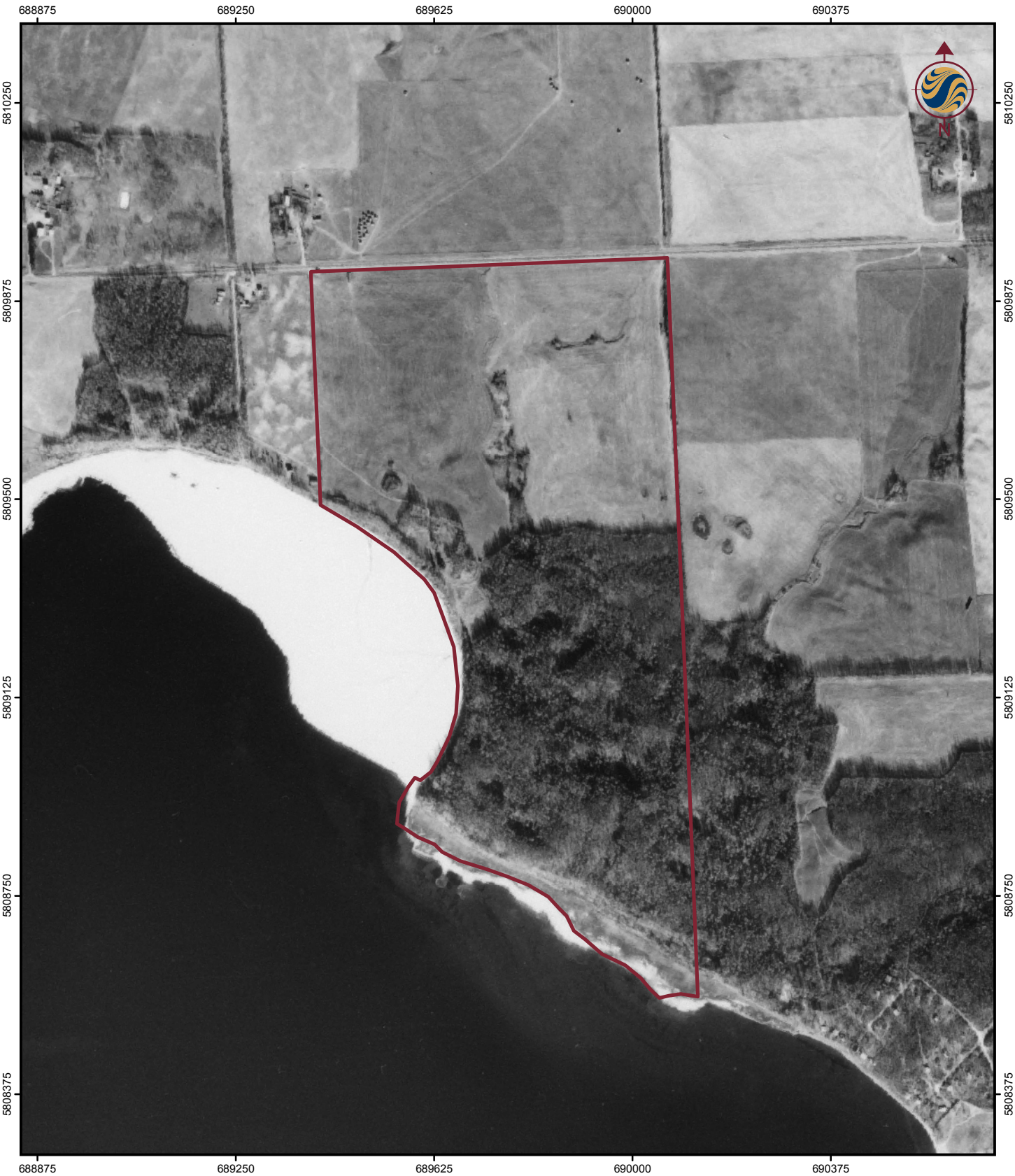
Projection: UTM Zone 12 Datum: NAD 83
Imagery obtained from Alberta Sustainable Resource Development, 1970.

0 75 150 225 300 375
1:10,000 Metres
This map is for reference purposes only

Client/Project
QUALICO DEVELOPMENTS WEST LTD.
BIOPHYSICAL ASSESSMENT

Figure No.
1970

Title
HISTORIC AERIAL PHOTOGRAPH REVIEW



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2010-07-29 03:12PM By: rcassells

July, 2010
1102-17665

STUDY AREA

Stantec

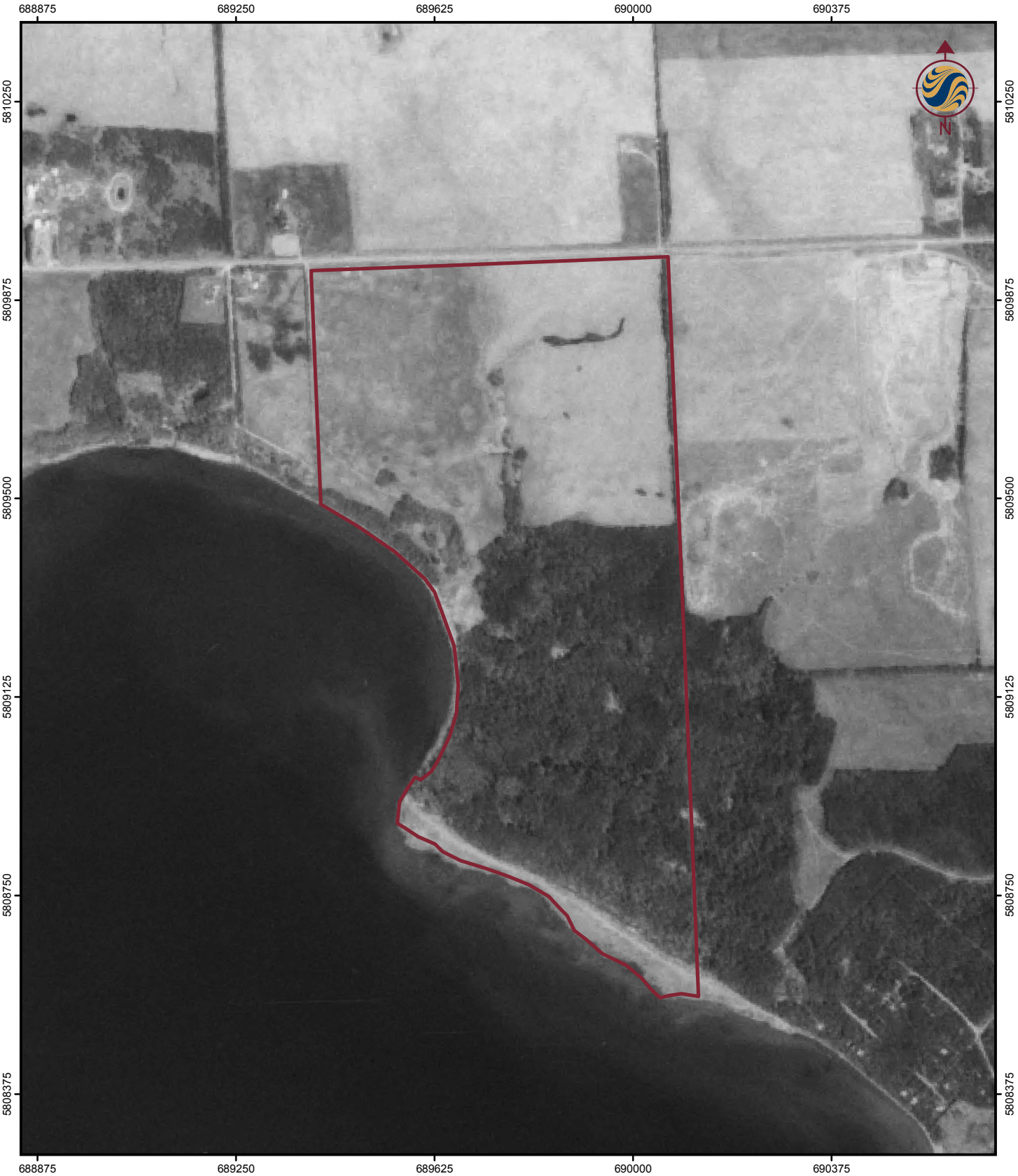
Projection: UTM Zone 12 Datum: NAD 83
Imagery obtained from Alberta Sustainable Resource Development, 1975.

0 75 150 225 300 375
1:10,000 Metres
This map is for reference purposes only

Client/Project
QUALICO DEVELOPMENTS WEST LTD.
BIOPHYSICAL ASSESSMENT

Figure No.
1975

Title
HISTORIC AERIAL PHOTOGRAPH REVIEW



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2010-07-29 03:13PM By: rcassells

July, 2010
1102-17665

STUDY AREA

Stantec

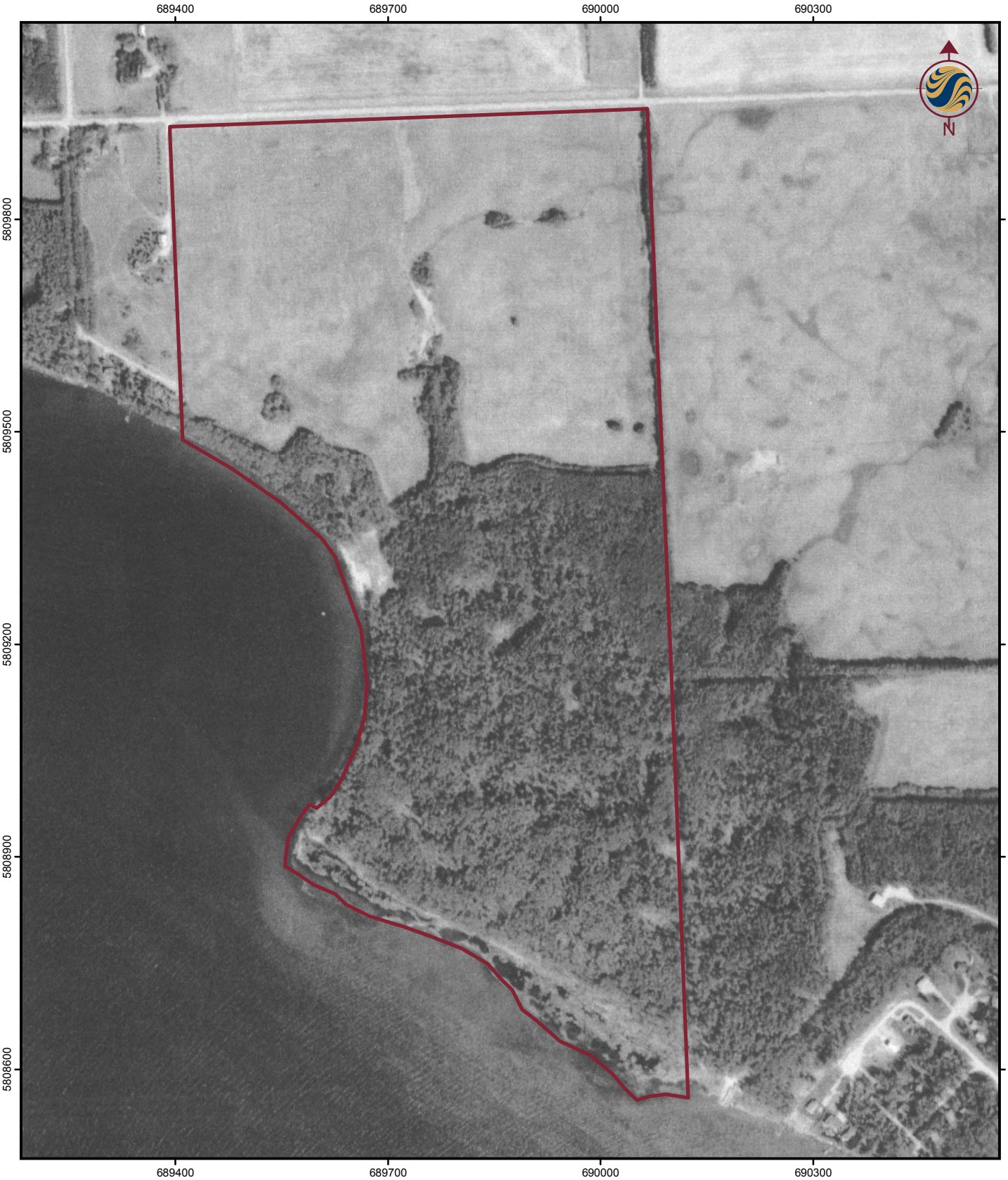
Projection: UTM Zone 12 Datum: NAD 83
Imagery obtained from Alberta Sustainable Resource Development, 1980.

0 75 150 225 300 375
1:10,000 Metres
This map is for reference purposes only

Client/Project
QUALICO DEVELOPMENTS WEST LTD.
BIOPHYSICAL ASSESSMENT

Figure No.
1980

Title
HISTORIC AERIAL PHOTOGRAPH REVIEW



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2010-07-29 03:14PM By: rcassells

July, 2010
1102-17665

STUDY AREA

Stantec

Projection: UTM Zone 12 Datum: NAD 83
Imagery obtained from Alberta Sustainable Resource Development, 1998.

0 60 120 180 240 300
1:7,500 Metres
This map is for reference purposes only

Client/Project
QUALICO DEVELOPMENTS WEST LTD.
BIOPHYSICAL ASSESSMENT

Figure No.
1998

Title
HISTORIC AERIAL PHOTOGRAPH REVIEW

APPENDIX D
SPECIES LIST

PLANT SPECIES CHECKLIST												
Project Number :	1102-17665											
Location :	Sylvan Lake											
Date :	July 25 and 26, 2007											
Habitat Type :	Grassland, Forest and Riparian											
							Grassland	Drainage Area	Forest	Wetland	Lake Shore	Disturbed	
Division	**Subdivision**	**Class**	**Family**	**Genus species**	**Common name**		**Present**	**Present**	**Present**	**Present**	**Present**	**Present**	**Rank**
TREES													
Spermatophyta	Gymnospermae	Pinopsida	Pinaceae	*Abies balsamea*	balsam fir								
Spermatophyta	Angiospermae	Dicotyledoneae	Aceraceae	*Acer negundo*	Manitoba maple								Introduced
Spermatophyta	Angiospermae	Dicotyledoneae	Betulaceae	*Betula papyrifera*	white birch			x	x	x			
Spermatophyta	Angiospermae	Dicotyledoneae	Oleaceae	*Fraxinus pennsylvanica*	green ash								
Spermatophyta	Gymnospermae	Pinopsida	Pinaceae	*Larix laricina*	tamarack/larch								
Spermatophyta	Gymnospermae	Pinopsida	Pinaceae	*Picea glauca*	white spruce				x	x		x	
Spermatophyta	Gymnospermae	Pinopsida	Pinaceae	*Picea mariana*	black spruce			x	x	x			
Spermatophyta	Gymnospermae	Pinopsida	Pinaceae	*Pinus banksiana*	jack pine								
Spermatophyta	Gymnospermae	Pinopsida	Pinaceae	*Pinus contorta*	lodgepole pine								
Spermatophyta	Angiospermae	Dicotyledoneae	Salicaceae	*Populus balsamifera*	balsam poplar			x	x		x	x	
Spermatophyta	Angiospermae	Dicotyledoneae	Salicaceae	*Populus tremuloides*	aspen poplar			x	x	x	x	x	
Spermatophyta	Angiospermae	Dicotyledoneae	Fagaceae	*Quercus macrocarpa*	bur oak								
Spermatophyta	Angiospermae	Dicotyledoneae	Ulmaceae	*Ulmus americana*	American elm								
SHRUBS													
Spermatophyta	Angiospermae	Dicotyledoneae	Betulaceae	*Alnus crispa*	green alder								
Spermatophyta	Angiospermae	Dicotyledoneae	Betulaceae	*Alnus rugosa*	river alder								
Spermatophyta	Angiospermae	Dicotyledoneae	Betulaceae	*Alnus spp.*	alder								
Spermatophyta	Angiospermae	Dicotyledoneae	Rosaceae	*Amelanchier alnifolia*	Saskatoon				x		x	x	
Spermatophyta	Angiospermae	Dicotyledoneae	Ericaceae	*Andromeda polifolia var. glaucophylla*	bog-rosemary								
Spermatophyta	Angiospermae	Dicotyledoneae	Ericaceae	*Arctostaphylos uva-ursi*	bearberry								
Spermatophyta	Angiospermae	Dicotyledoneae	Compositae	*Artemisia cana*	silver sagebrush								
Spermatophyta	Angiospermae	Dicotyledoneae	Compositae	*Artemisia frigida*	pasture sagewort								
Spermatophyta	Angiospermae	Dicotyledoneae	Betulaceae	*Betula glandulosa*	bog birch								
Spermatophyta	Angiospermae	Dicotyledoneae	Betulaceae	*Betula occidentalis*	water birch								
Spermatophyta	Angiospermae	Dicotyledoneae	Betulaceae	*Betula pumila*	dwarf birch								
Spermatophyta	Angiospermae	Dicotyledoneae	Leguminosae	*Caragana arborescens*	common caragana						x	x	
Spermatophyta	Angiospermae	Dicotyledoneae	Rhamnaceae	*Ceanothus spp.*	lilac								
Spermatophyta	Angiospermae	Dicotyledoneae	Ericaceae	*Chamaedaphne calyculata*	leatherleaf								
Spermatophyta	Angiospermae	Dicotyledoneae	Rosaceae	*Cotoneaster acutifolius*	cotoneaster								
Spermatophyta	Angiospermae	Dicotyledoneae	Cornaceae	*Cornus sericea*	red osier dogwood				x		x		
Spermatophyta	Angiospermae	Dicotyledoneae	Betulaceae	*Corylus cornuta*	beaked hazelnut				x				
Spermatophyta	Angiospermae	Dicotyledoneae	Elaeagnaceae	*Elaeagnus commutata*	silverberry/wolf-willow				x		x		
Spermatophyta	Angiospermae	Dicotyledoneae	Ericaceae	*Gaultheria hispidula*	creeping snowberry								
Spermatophyta	Gymnospermae	Pinopsida	Cupressaceae	*Juniperus communis*	ground juniper								
Spermatophyta	Gymnospermae	Pinopsida	Cupressaceae	*Juniperus horizontalis*	creeping juniper								
Spermatophyta	Angiospermae	Dicotyledoneae	Ericaceae	*Kalmia polifolia*	northern bog-laurel								
Spermatophyta	Angiospermae	Dicotyledoneae	Ericaceae	*Ledum groenlandicum*	Labrador tea								
Spermatophyta	Angiospermae	Dicotyledoneae	Caprifoliaceae	*Lonicera dioica*	twining honeysuckle				x	x			
Spermatophyta	Angiospermae	Dicotyledoneae	Caprifoliaceae	*Lonicera involucrata*	bracted honeysuckle				x				
Spermatophyta	Angiospermae	Dicotyledoneae	Caprifoliaceae	*Lonicera tatarica*	tartarian honeysuckle								
Spermatophyta	Angiospermae	Dicotyledoneae	Caprifoliaceae	*Lonicera villosa*	fly honeysuckle			x	x		x	x	
Spermatophyta	Angiospermae	Dicotyledoneae	Caprifoliaceae	*Lonicera spp.*	honeysuckle								
Spermatophyta	Angiospermae	Dicotyledoneae	Ericaceae	*Oxycoccus microcarpus*	small bog-cranberry								
Spermatophyta	Angiospermae	Dicotyledoneae	Rosaceae	*Potentilla fruticosa*	shrubby cinquefoil								
Spermatophyta	Angiospermae	Dicotyledoneae	Rosaceae	*Prunus pensylvanica*	pin cherry								
Spermatophyta	Angiospermae	Dicotyledoneae	Rosaceae	*Prunus virginiana*	choke cherry			x	x				
Spermatophyta	Angiospermae	Dicotyledoneae	Saxifragaceae	*Ribes americanum*	wild black currant				x		x		
Spermatophyta	Angiospermae	Dicotyledoneae	Saxifragaceae	*Ribes glandulosum*	skunk currant				x		x		
Spermatophyta	Angiospermae	Dicotyledoneae	Saxifragaceae	*Ribes hudsonianum*	northern black currant				x	x	x		
Spermatophyta	Angiospermae	Dicotyledoneae	Saxifragaceae	*Ribes lacustre*	black gooseberry				x			x	
Spermatophyta	Angiospermae	Dicotyledoneae	Saxifragaceae	*Ribes oxyacanthoides*	northern gooseberry				x				
Spermatophyta	Angiospermae	Dicotyledoneae	Saxifragaceae	*Ribes triste*	swamp red currant				x	x			
Spermatophyta	Angiospermae	Dicotyledoneae	Saxifragaceae	*Ribes spp.*									
Spermatophyta	Angiospermae	Dicotyledoneae	Rosaceae	*Rosa acicularis*	prickly rose		x		x			x	
Spermatophyta	Angiospermae	Dicotyledoneae	Rosaceae	*Rosa woodsii*	wild rose				x		x		
Spermatophyta	Angiospermae	Dicotyledoneae	Rosaceae	*Rubus acaulis*	dwarf raspberry				x				
Spermatophyta	Angiospermae	Dicotyledoneae	Rosaceae	*Rubus idaeus*	wild raspberry			x	x	x	x	x	
Spermatophyta	Angiospermae	Dicotyledoneae	Rosaceae	*Rubus pubescens*	trailing raspberry				x				
Spermatophyta	Angiospermae	Dicotyledoneae	Salicaceae	*Salix bebbiana*	beaked willow								
Spermatophyta	Angiospermae	Dicotyledoneae	Salicaceae	*Salix discolor*	pussy willow								
Spermatophyta	Angiospermae	Dicotyledoneae	Salicaceae	*Salix exigua*	narrow-leaved willow						x		
Spermatophyta	Angiospermae	Dicotyledoneae	Salicaceae	*Salix glauca*	grey-leaved willow						x		
Spermatophyta	Angiospermae	Dicotyledoneae	Salicaceae	*Salix lutea*	yellow willow								
Spermatophyta	Angiospermae	Dicotyledoneae	Salicaceae	*Salix petiolaris*	meadow willow						x		
Spermatophyta	Angiospermae	Dicotyledoneae	Salicaceae	*Salix prolixa*	Mackenzie's willow								
Spermatophyta	Angiospermae	Dicotyledoneae	Salicaceae	*Salix pyrifolia*	balsam willow								
Spermatophyta	Angiospermae	Dicotyledoneae	Salicaceae	*Salix maccalliana*	Maccall's willow								
Spermatophyta	Angiospermae	Dicotyledoneae	Salicaceae	*Salix lasiandra*	western shining willow								
Spermatophyta	Angiospermae	Dicotyledoneae	Salicaceae	*Salix lucida*	shining willow						x		
Spermatophyta	Angiospermae	Dicotyledoneae	Salicaceae	*Salix spp.*	willow		x			x	x		
Spermatophyta	Angiospermae	Dicotyledoneae	Elaeagnaceae	*Shepherdia canadensis*	Canada buffaloberry				x				
Spermatophyta	Angiospermae	Dicotyledoneae	Rosaceae	*Sorbus aucuparia*	European mountain ash								
Spermatophyta	Angiospermae	Dicotyledoneae	Rosaceae	*Sorbus scopulina*	western mountain ash								
Spermatophyta	Angiospermae	Dicotyledoneae	Rosaceae	*Sorbus spp.*	mountain ash								Introduced
Spermatophyta	Angiospermae	Dicotyledoneae	Rosaceae	*Spirea alba*	narrow-leaved meadowsweet				x				
Spermatophyta	Angiospermae	Dicotyledoneae	Caprifoliaceae	*Symphoricarpos albus*	common snowberry			x	x	x	x		
Spermatophyta	Angiospermae	Dicotyledoneae	Caprifoliaceae	*Symphoricarpos occidentalis*	western snowberry				x			x	
Spermatophyta	Angiospermae	Dicotyledoneae	Vacciniaceae	*Vaccinium cespitosum*	dwarf bilberry								
Spermatophyta	Angiospermae	Dicotyledoneae	Vacciniaceae	*Vaccinium myrtilloides*	blueberry				x				
Spermatophyta	Angiospermae	Dicotyledoneae	Vacciniaceae	*Vaccinium vitis-idaea*	bog cranberry								
Spermatophyta	Angiospermae	Dicotyledoneae	Caprifoliaceae	*Viburnum edule*	low bush cranberry			x	x				
Spermatophyta	Angiospermae	Dicotyledoneae	Caprifoliaceae	*Viburnum opulus*	high bush cranberry				x				
GRASSES, SEDGES & RUSHES													
Spermatophyta	Angiospermae	Monocotyledoneae	Gramineae	*Agropyron cristatum*	crested wheatgrass								
Spermatophyta	Angiospermae	Monocotyledoneae	Gramineae	*Agropyron dasystachyum*	northern wheat grass			x					
Spermatophyta	Angiospermae	Monocotyledoneae	Gramineae	*Agropyron repens*	quack grass		x			x			
Spermatophyta	Angiospermae	Monocotyledoneae	Gramineae	*Agropyron smithii*	western wheat grass						x		
Spermatophyta	Angiospermae	Monocotyledoneae	Gramineae	*Agropyron spp.*	wheat grass spp.				x				
Spermatophyta	Angiospermae	Monocotyledoneae	Gramineae	*Agropyron trachycaulum*	slender wheat grass		x		x			x	
Spermatophyta	Angiospermae	Monocotyledoneae	Gramineae	*Agropyron trachycaulum var. unilateral*	bearded wheat grass								
Spermatophyta	Angiospermae	Monocotyledoneae	Gramineae	*Agrostis scabra*	hair grass, tickle grass		x		X	x		x	
Spermatophyta	Angiospermae	Monocotyledoneae	Gramineae	*Agrostis spp.*	hair grass					x			
Spermatophyta	Angiospermae	Monocotyledoneae	Gramineae	*Agrostis stolonifera*	redtop			x				x	
Spermatophyta	Angiospermae	Monocotyledoneae	Gramineae	*Alopecurus aequalis*	short-awned foxtail								
Spermatophyta	Angiospermae	Monocotyledoneae	Gramineae	*Alopecurus pratensis*	meadow foxtail								
Spermatophyta	Angiospermae	Monocotyledoneae	Gramineae	*Avena fatua*	wild oats								
Spermatophyta	Angiospermae	Monocotyledoneae	Gramineae	*Beckmannia syzigachne*	slough grass								
Spermatophyta	Angiospermae	Monocotyledoneae	Gramineae	*Bromus ciliatus*	fringed brome			x	x	x			
Spermatophyta	Angiospermae	Monocotyledoneae	Gramineae	*Bromus inermis ssp. inermis*	smooth brome		x	x	x		x	x	Introduced
Spermatophyta	Angiospermae	Monocotyledoneae	Gramineae	*Bromus inermis ssp. pumpellianus*	northern brome				x				
Spermatophyta	Angiospermae	Monocotyledoneae	Gramineae	*Bromus spp.*	brome								
Spermatophyta	Angiospermae	Monocotyledoneae	Gramineae	*Calamagrostis canadensis*	reed grass/bluejoint			x	x	x	x		
Spermatophyta	Angiospermae	Monocotyledoneae	Gramineae	*Calamagrostis inexpansa*	northern reedgrass				x		x		
Spermatophyta	Angiospermae	Monocotyledoneae	Cyperaceae	*Carex aenea*	bronze sedge								
Spermatophyta	Angiospermae	Monocotyledoneae	Cyperaceae	*Carex aquatilis*	water sedge						x		
Spermatophyta	Angiospermae	Monocotyledoneae	Cyperaceae	*Carex atherodes*	awned sedge					x	x		
Spermatophyta	Angiospermae	Monocotyledoneae	Cyperaceae	*Carex aurea*	golden sedge								
Spermatophyta	Angiospermae	Monocotyledoneae	Cyperaceae	*Carex canescens*	short sedge								
		Monocotyledoneae	Cyperaceae	*Carex chordorrhiza*	prostrate sedge						x		

PLANT SPECIES CHECKLIST												
Project Number :	1102-17665											
Location :	Sylvan Lake											
Date :	July 25 and 26, 2007											
Habitat Type :	Grassland, Forest and Riparian											
						Grassland	Drainage Area	Forest	Wetland	Lake Shore	Disturbed	
Division	**Subdivision**	**Class**	**Family**	**Genus species**	**Common name**	**Present**	**Present**	**Present**	**Present**	**Present**	**Present**	**Rank**
Spermatophyta	Angiospermae	Monocotyledoneae	Cyperaceae	*Carex deweyana*	Dewey's sedge							
Spermatophyta	Angiospermae	Monocotyledoneae	Cyperaceae	*Carex disperma*	two-seeded sedge							
Spermatophyta	Angiospermae	Monocotyledoneae	Cyperaceae	*Carex interior*	inland sedge							
Spermatophyta	Angiospermae	Monocotyledoneae	Cyperaceae	*Carex media*	Norway Sedge							
Spermatophyta	Angiospermae	Monocotyledoneae	Cyperaceae	*Carex paupercula*	bog sedge							
Spermatophyta	Angiospermae	Monocotyledoneae	Cyperaceae	*Carex peckii*	Peck's sedge							
Spermatophyta	Angiospermae	Monocotyledoneae	Cyperaceae	*Carex sartwellii*	Sartwell's sedge							
Spermatophyta	Angiospermae	Monocotyledoneae	Cyperaceae	*Carex siccata*	hay sedge							
Spermatophyta	Angiospermae	Monocotyledoneae	Cyperaceae	*Carex tenera*	quill sedge, slender sedge					x		
Spermatophyta	Angiospermae	Monocotyledoneae	Cyperaceae	*Carex tenuiflora*	thin-flowered sedge							
Spermatophyta	Angiospermae	Monocotyledoneae	Cyperaceae	*Carex utriculata*	beaked sedge		x			x		
Spermatophyta	Angiospermae	Monocotyledoneae	Cyperaceae	*Carex viridula*	green sedge							
Spermatophyta	Angiospermae	Monocotyledoneae	Cyperaceae	*Carex spp.*	sedge	x	x	x	x	x		
		Monocotyledoneae	Cyperaceae	*Cinna latifolia*	Drooping Wood-Reed			x			x	
Spermatophyta	Angiospermae	Monocotyledoneae	Gramineae	*Dactylis glomerata*	orchard grass							
Spermatophyta	Angiospermae	Monocotyledoneae	Gramineae	*Danthonia spp.*	oat grass			x				
Spermatophyta	Angiospermae	Monocotyledoneae	Gramineae	*Deschampsia cespitosa*	tufted hair grass			x	x			
Spermatophyta	Angiospermae	Monocotyledoneae	Cyperaceae	*Eleocharis acicularis*	needle spike-rush							
Spermatophyta	Angiospermae	Monocotyledoneae	Cyperaceae	*Eleocharis palustris*	creeping spike-rush							
Spermatophyta	Angiospermae	Monocotyledoneae	Cyperaceae	*Eleocharis spp.*	spike-rush							
Spermatophyta	Angiospermae	Monocotyledoneae	Gramineae	*Elymus innovatus*	hairy wild rye							
Spermatophyta	Angiospermae	Monocotyledoneae	Gramineae	*Elymus spp.*	rye grass	x		x			x	
Spermatophyta	Angiospermae	Monocotyledoneae	Cyperaceae	*Eriophorum angustifolium*	tall cotton grass							
Spermatophyta	Angiospermae	Monocotyledoneae	Cyperaceae	*Eriophorum chamissonis*	russet cotton grass							
Spermatophyta	Angiospermae	Monocotyledoneae	Cyperaceae	*Eriophorum gracile*	slender cotton grass							
Spermatophyta	Angiospermae	Monocotyledoneae	Gramineae	*Festuca spp.*	fescue							
Spermatophyta	Angiospermae	Monocotyledoneae	Gramineae	*Glyceria grandis*	tall manna grass		x		x			
Spermatophyta	Angiospermae	Monocotyledoneae	Gramineae	*Glyceria pulchella*	graceful manna grass							
Spermatophyta	Angiospermae	Monocotyledoneae	Gramineae	*Glyceria striata*	fowl manna grass							
Spermatophyta	Angiospermae	Monocotyledoneae	Gramineae	*Hierochloe odorata*	sweet grass							
Spermatophyta	Angiospermae	Monocotyledoneae	Gramineae	*Hordeum jubatum*	foxtail barley							
		Monocotyledoneae	Gramineae	*Juncus balticus*	wire rush					x		
		Monocotyledoneae	Gramineae	*Juncus spp*	Rush species		x					
Spermatophyta	Angiospermae	Monocotyledoneae	Gramineae	*Koeleria cristata*	June grass							
Spermatophyta	Angiospermae	Monocotyledoneae	Gramineae	*Muhlenbergia glomerata*	bog muhly							
Spermatophyta	Angiospermae	Monocotyledoneae	Gramineae	*Oryzopsis asperifolia*	rice grass							
Spermatophyta	Angiospermae	Monocotyledoneae	Gramineae	*Oryzopsis spp.*	rice grass			x				
Spermatophyta	Angiospermae	Monocotyledoneae	Gramineae	*Phalaris arundinacea*	reed canary grass				x	x	x	
Spermatophyta	Angiospermae	Monocotyledoneae	Gramineae	*Phleum pratense*	timothy	x		x			x	
Spermatophyta	Angiospermae	Monocotyledoneae	Gramineae	*Poa pratensis*	Kentucky bluegrass	x	x	x			x	
Spermatophyta	Angiospermae	Monocotyledoneae	Gramineae	*Poa sandbergii*	Sandberg's bluegrass							
Spermatophyta	Angiospermae	Monocotyledoneae	Gramineae	*Poa palustris*	fowl bluegrass	x			x	x		
Spermatophyta	Angiospermae	Monocotyledoneae	Gramineae	*Poa spp.*	bluegrass							
Spermatophyta	Angiospermae	Monocotyledoneae	Gramineae	*Schizachne purpurascens*	purple oat grass							
Spermatophyta	Angiospermae	Monocotyledoneae	Gramineae	*Scolochloa festucacea*	spangle top grass							
Spermatophyta	Angiospermae	Monocotyledoneae	Gramineae	*Sphenopholis intermedia*	slender wedge grass							
Spermatophyta	Angiospermae	Monocotyledoneae	Gramineae	*Stipa curtiseta*	western porcupine grass							
Spermatophyta	Angiospermae	Monocotyledoneae	Gramineae	*Stipa viridula*	green needle grass							
WILDFLOWERS/FORBS												
Spermatophyta	Angiospermae	Dicotyledoneae	Compositae	*Achillea millefolium*	yarrow	x	x	x		x	x	
Spermatophyta	Angiospermae	Dicotyledoneae	Compositae	*Achillea sibirica*	Siberian yarrow			x		x	x	
Spermatophyta	Angiospermae	Dicotyledoneae	Ranunculaceae	*Actaea rubra*	baneberry			x				
Spermatophyta	Angiospermae	Dicotyledoneae	Rosaceae	*Agrimoy striata*	agrimony	x		x	x		x	
Spermatophyta	Angiospermae	Dicotyledoneae	Amaranthaceae	*Amaranthus retroflexus*	red-root pigweed							
Spermatophyta	Angiospermae	Dicotyledoneae	Ranunculaceae	*Anemone canadensis*	Canada anemone		x	x			x	
Spermatophyta	Angiospermae	Dicotyledoneae	Ranunculaceae	*Anemone multifida*	cut-leaved anemone		x					
Spermatophyta	Angiospermae	Dicotyledoneae	Ranunculaceae	*Anemone patens*	prairie crocus							
Spermatophyta	Angiospermae	Dicotyledoneae	Ranunculaceae	*Anemone riparia*	tall anemone							
Spermatophyta	Angiospermae	Dicotyledoneae	Compositae	*Antennaria neglecta*	common pussytoes							
Spermatophyta	Angiospermae	Dicotyledoneae	Compositae	*Antennaria parvifolia*	small-leaved pussytoes		x					
Spermatophyta	Angiospermae	Dicotyledoneae	Ranunculaceae	*Aquilegia brevistyla*	blue columbine							
Spermatophyta	Angiospermae	Dicotyledoneae	Cruciferae	*Arabis holboellii*	reflexed rock cress							
Spermatophyta	Angiospermae	Dicotyledoneae	Araliaceae	*Aralia nudicaulis*	wild sarsaparilla			x			x	
Spermatophyta	Angiospermae	Dicotyledoneae	Araliaceae	*Aralia hispida*	bristly sasparilla							
Spermatophyta	Angiospermae	Dicotyledoneae	Cruciferae	*Armoracia rusticana*	horseradish							
Spermatophyta	Angiospermae	Dicotyledoneae	Labiatae	*Agastache foeniculum*	giant hyssop		x	x				
Spermatophyta	Angiospermae	Dicotyledoneae	Rosaceae	*Agrimonia striata*	agrimony							
Spermatophyta	Angiospermae	Dicotyledoneae	Apocynaceae	*Apocynum androsaemifolium*	spreading dogbane			x			x	
Spermatophyta	Angiospermae	Dicotyledoneae	Asteraceae	*Arnica chamissonis*	leafy arnica						x	
Spermatophyta	Angiospermae	Dicotyledoneae	Compositae	*Artemisia absinthium*	absinth wormwood							
Spermatophyta	Angiospermae	Dicotyledoneae	Compositae	*Artemisia biennis*	biennial wormwood							
Spermatophyta	Angiospermae	Dicotyledoneae	Compositae	*Artemisia frigida*	sage							
Spermatophyta	Angiospermae	Dicotyledoneae	Liliaceae	*Asparagus officinalis*	asparagus							
Spermatophyta	Angiospermae	Dicotyledoneae	Compositae	*Aster Borealis*	rush aster							
Spermatophyta	Angiospermae	Dicotyledoneae	Compositae	*Aster ciliolatus*	fringed aster		x	x	x			
Spermatophyta	Angiospermae	Dicotyledoneae	Compositae	*Aster conspicuus*	showy aster	x		x			x	
Spermatophyta	Angiospermae	Dicotyledoneae	Compositae	*Aster ericoides spp. pansus*	tufted white prairie aster							
Spermatophyta	Angiospermae	Dicotyledoneae	Compositae	*Aster laevis*	smooth aster	x						
Spermatophyta	Angiospermae	Dicotyledoneae	Compositae	*Aster lindleyanus*	Lindley's aster							
Spermatophyta	Angiospermae	Dicotyledoneae	Compositae	*Aster modestus*	large northern aster							
Spermatophyta	Angiospermae	Dicotyledoneae	Compositae	*Aster puniceus*	purple-stemmed aster				x			
Spermatophyta	Angiospermae	Dicotyledoneae	Compositae	*Aster spp.*	aster							
Spermatophyta	Angiospermae	Dicotyledoneae	Leguminosae	*Astragalus canadensis*	Canadian milk-vetch							
Spermatophyta	Angiospermae	Dicotyledoneae	Compositae	*Bidens cernua*	nodding beggar-ticks							
Spermatophyta	Angiospermae	Dicotyledoneae	Brassicaceae	*Brassica kaber*	wild mustard							
Spermatophyta	Angiospermae	Monocotyledoneae	Araceae	*Calla palustris*	water arum							
Spermatophyta	Angiospermae	Dicotyledoneae	Ranunculaceae	*Caltha palustris*	yellow marsh-marigold		x	x	x	x		
Spermatophyta	Angiospermae	Dicotyledoneae	Campanulaceae	*Campanula rotundifolia*	common harebell			x				
		Dicotyledoneae	Cruciferae	*Capsella bursa-pastoris*	shepherds purse						x	
Spermatophyta	Angiospermae	Dicotyledoneae	Scrophulariaceae	*Castilleja miniata*	common red paintbrush							
Spermatophyta	Angiospermae	Dicotyledoneae	Chenopodiaceae	*Chenopodium album*	lamb's-quarters							
Spermatophyta	Angiospermae	Dicotyledoneae	Chenopodiaceae	*Chenopodium capitatum*	strawberry blite							
Spermatophyta	Angiospermae	Dicotyledoneae	Chenopodiaceae	*Chenopodium gigantospermum*	maple-leaved goosefoot			x				
Spermatophyta	Angiospermae	Dicotyledoneae	Chenopodiaceae	*Chenopodium spp.*				x				
Spermatophyta	Angiospermae	Dicotyledoneae	Compositae	*Chrysanthemum leucanthemum*	Ox-eyed daisy							
Spermatophyta	Angiospermae	Dicotyledoneae	Umbelliferae	*Cicuta maculata var. angustifolia*	water-hemlock				x	x		
		Dicotyledoneae	Onagraceae	*Circaea alpina*	small enchanter's-nightshade		x		x			
Spermatophyta	Angiospermae	Dicotyledoneae	Compositae	*Cirsium arvense*	Canada thistle	x			x	x	x	Introduced
Spermatophyta	Angiospermae	Dicotyledoneae	Compositae	*Cirsium flodmanii*	Flodman's thistle							
		Dicotyledoneae	Ranunculaceae	*Clematis spp.*	Clematis			x				
Spermatophyta	Angiospermae	Dicotyledoneae	Convolvulaceae	*Convolvulus sepium*	wild morning glory							
Spermatophyta	Angiospermae	Monocotyledoneae	Orchidaceae	*Corallorhiza maculata*	spotted coralroot			x				S3
Spermatophyta	Angiospermae	Monocotyledoneae	Orchidaceae	*Corallorhiza trifida*	pale coralroot							
Spermatophyta	Angiospermae	Dicotyledoneae	Cornaceae	*Cornus canadensis*	bunchberry			x				
Spermatophyta	Angiospermae	Dicotyledoneae	Compositae	*Crepis tectorum*	narrow-leaved hawk's-beard			x				
Spermatophyta	Angiospermae	Monocotyledoneae	Orchidaceae	*Cypripedium calceolus*	yellow lady's-slipper							
Spermatophyta	Angiospermae	Dicotyledoneae	Ranunculaceae	*Delphinium glaucum*	tall larkspur				x			
Spermatophyta	Angiospermae	Dicotyledoneae	Cruciferae	*Descurainia sophia*	flixweed							
Spermatophyta	Angiospermae	Monocotyledoneae	Liliaceae	*Disporum trachycarpum*	fairybells			x				
Spermatophyta	Angiospermae	Dicotyledoneae	Primulaceae	*Dodecatheon pulchellum*	shooting star							

PLANT SPECIES CHECKLIST												
Project Number :	1102-17665											
Location :	Sylvan Lake											
Date :	July 25 and 26, 2007											
Habitat Type :	Grassland, Forest and Riparian											
						Grassland	Drainage Area	Forest	Wetland	Lake Shore	Disturbed	
Division	**Subdivision**	**Class**	**Family**	**Genus species**	**Common name**	**Present**	**Present**	**Present**	**Present**	**Present**	**Present**	**Rank**
Spermatophyta	Angiospermae	Dicotyledoneae	Labiatae	*Dracocephalum parviflorum*	American dragonhead							
Spermatophyta	Angiospermae	Dicotyledoneae	Droseraceae	*Drosera rotundifolia*	round-leaved sundew							
Spermatophyta	Angiospermae	Dicotyledoneae	Onagraceae	*Epilobium angustifolium*	fireweed		x	x			x	
Spermatophyta	Angiospermae	Dicotyledoneae	Onagraceae	*Epilobium ciliatum*	northern willowherb							
Spermatophyta	Angiospermae	Dicotyledoneae	Onagraceae	*Epilobium palustris*	marsh willowherb							
Spermatophyta	Angiospermae	Dicotyledoneae	Onagraceae	*Epilobium gladulosum*	purple-leaved willowherb		x		x		x	
Spermatophyta	Angiospermae	Dicotyledoneae	Compositae	*Erigeron canadensis*	Canada fleabane							
		Dicotyledoneae	Compositae	*Erigeron glabellus*	Smooth fleabane		x					
Spermatophyta	Angiospermae	Dicotyledoneae	Compositae	*Erigeron philadelphicus*	Philadelphia fleabane		x	x				
Spermatophyta	Angiospermae	Dicotyledoneae	Cruciferae	*Erysimum cheiranthoides*	wormseed mustard							
Spermatophyta	Angiospermae	Dicotyledoneae	Euphorbiaceae	*Euphorbia esula*	leafy spurge							
		Dicotyledoneae	Polygonaceae	*Fagopyrum esculentum*	common buckwheat						x	
Spermatophyta	Angiospermae	Dicotyledoneae	Rosaceae	*Fragaria vesca*	woodland strawberry	x	x	x			x	
Spermatophyta	Angiospermae	Dicotyledoneae	Rosaceae	*Fragaria virginiana*	wild strawberry		x	x			x	
Spermatophyta	Angiospermae	Dicotyledoneae	Labiatae	*Galeopsis tetrahit*	hemp-nettle					x	x	Introduced
Spermatophyta	Angiospermae	Dicotyledoneae	Rubiaceae	*Galium aparine*	cleavers			x				Introduced
Spermatophyta	Angiospermae	Dicotyledoneae	Rubiaceae	*Galium boreale*	northern bedstraw		x	x	x	x	x	
Spermatophyta	Angiospermae	Dicotyledoneae	Rubiaceae	*Galium trifidum*	small bedstraw							
Spermatophyta	Angiospermae	Dicotyledoneae	Rubiaceae	*Galium triflorum*	sweet-scented bedstraw		x	x		x		
Spermatophyta	Angiospermae	Dicotyledoneae	Santalaceae	*Geocaulon lividum*	northern bastard toadflax							
		Dicotyledoneae	Geraniaceae	*Geranium bicknellii*	Bicknell's geranium						x	
		Dicotyledoneae	Geraniaceae	*Geranium viscosissium*	sticky purple geranium							
Spermatophyta	Angiospermae	Dicotyledoneae	Rosaceae	*Geum aleppicum*	yellow avens					x		
Spermatophyta	Angiospermae	Dicotyledoneae	Rosaceae	*Geum macrophyllum*	large-leaved avens	x	x	x	x		x	
Spermatophyta	Angiospermae	Dicotyledoneae	Rosaceae	*Geum rivale*	purple avens							
Spermatophyta	Angiospermae	Dicotyledoneae	Rosaceae	*Geum triflorum*	three-flowered avens							
		Dicotyledoneae	Greaniaceae	*Geum spp.*	avens				x			
Spermatophyta	Angiospermae	Dicotyledoneae	Leguminosae	*Glycyrrhiza lepidota*	wild licorice							
Spermatophyta	Angiospermae	Monocotyledoneae	Orchidaceae	*Goodyera repens*	lesser rattlesnake plantain							
Spermatophyta	Angiospermae	Monocotyledoneae	Orchidaceae	*Habenaria hyperborea*	northern greeen bog orchid							
Spermatophyta	Angiospermae	Monocotyledoneae	Orchidaceae	*Habenaria obtusata*	blunt-leaved bog orchid							
Spermatophyta	Angiospermae	Monocotyledoneae	Orchidaceae	*Habenaria vividis*	bracted bog orchid							
		Dicotyledoneae	Gentianaceae	*Halenia deflexa*	spurred gentian						x	
Spermatophyta	Angiospermae	Dicotyledoneae	Compositae	*Haploppaus uniflorus*	one-flowered goldenweed					x		
Spermatophyta	Angiospermae	Monocotyledoneae	Orchidaceae	*Hedysarum alpinum*	alpine sweet vetch							
Spermatophyta	Angiospermae	Dicotyledoneae	Umbelliferae	*Heracleum lanatum*	cow-parsnip		x	x	x	x	x	
Spermatophyta	Angiospermae	Dicotyledoneae	Cruciferae	*Hesperis matronalis*	dame's rocket							
Spermatophyta	Angiospermae	Dicotyledoneae	Asteraceae	*Hieracium umbellatum*	narrow-leaved hawkweed						x	
Spermatophyta	Angiospermae	Dicotyledoneae	Balsaminaceae	*Impatiens biflora*	jewel weed							
Spermatophyta	Angiospermae	Dicotyledoneae	Balsaminaceae	*Impatiens capensis*	spotted touch-me-not							
Spermatophyta	Angiospermae	Dicotyledoneae	Chenopodiaceae	*Kochia scoparia*	kochia							
Spermatophyta	Angiospermae	Dicotyledoneae	Boraginaceae	*Lappula squarrosa*	blue bur							
Spermatophyta	Angiospermae	Dicotyledoneae	Leguminosae	*Lathyrus ochroleucus*	cream-colored vetchling	x		x			x	
Spermatophyta	Angiospermae	Dicotyledoneae	Leguminosae	*Lathyrus venosus*	purple vetchling			x				
Spermatophyta	Angiospermae	Dicotyledoneae	Cruciferae	*Lepidium densiflorum*	common peppergrass							
Spermatophyta	Angiospermae	Dicotyledoneae	Liliaceae	*Lilium philadelphicum var. andinum*	western wood lily							
Spermatophyta	Angiospermae	Dicotyledoneae	Scrophulariaceae	*Linaria vulgaris*	yellow toadflax							
Spermatophyta	Angiospermae	Dicotyledoneae	Caprifoliaceae	*Linnaea borealis*	twin-flower				x			
Spermatophyta	Angiospermae	Dicotyledoneae	Fabaceae	*Lotus corniculatus*	birdsfoot trefoil							
Spermatophyta	Angiospermae	Dicotyledoneae	Primulaceae	*Lysimachia ciliata*	fringed loosestrife		x	x				
Spermatophyta	Angiospermae	Monocotyledoneae	Liliaceae	*Maianthemum canadense*	wild lily-of-the-valley			x			x	
Spermatophyta	Angiospermae	Dicotyledoneae	Compositae	*Matricaria perforata*	scentless chamomile							
Spermatophyta	Angiospermae	Dicotyledoneae	Compositae	*Matricaria matricarioides*	pineapple-weed							
Spermatophyta	Angiospermae	Dicotyledoneae	Leguminosae	*Medicago sativa*	alfalfa	x						
Spermatophyta	Angiospermae	Dicotyledoneae	Leguminosae	*Melilotus albus*	white sweet clover							
Spermatophyta	Angiospermae	Dicotyledoneae	Leguminosae	*Melilotus officinalis*	yellow sweet clover							
Spermatophyta	Angiospermae	Dicotyledoneae	Labiatae	*Mentha arvensis*	wild mint		x		x	x		
Spermatophyta	Angiospermae	Dicotyledoneae	Boraginaceae	*Mertensia paniculata*	tall lungwort			x	x			
Spermatophyta	Angiospermae	Dicotyledoneae	Saxifragaceae	*Mitella nuda*	bishop's-cap			x			x	
Spermatophyta	Angiospermae	Dicotyledoneae	Caryophyllaceae	*Moehringia lateriflora*	blunt leaved sandwort							
Spermatophyta	Angiospermae	Dicotyledoneae	Monotropaceae	*Monotropa uniflora*	Indian pipe							S3
Spermatophyta	Angiospermae	Dicotyledoneae	Apicaceae	*Osmorhiza depauperata*	spreading sweet-cicely			x				
		Dicotyledoneae	Apicaceae	*Osmorhiza longistylis*	smooth sweet-cicely		x	x	x			
Spermatophyta	Angiospermae	Dicotyledoneae	Leguminosae	*Oxytropis splendens*	showy locoweed							
Spermatophyta	Angiospermae	Monocotyledoneae	Parnassiaceae	*Parnassia palustris*	northern grass-of-parnassus							
Spermatophyta	Angiospermae	Monocotyledoneae	Parnassiaceae	*Pedicularis labradorica*	Labrador lousewort							
Spermatophyta	Angiospermae	Dicotyledoneae	Compositae	*Petasites palmatus*	palmate-leaved coltsfoot			x		x		
Spermatophyta	Angiospermae	Dicotyledoneae	Compositae	*Petasites sagittatus*	arrow-leaved coltsfoot			x		x		
Spermatophyta	Angiospermae	Dicotyledoneae	Plantaginaceae	*Plantago major*	common plantain			x			x	
Spermatophyta	Angiospermae	Dicotyledoneae	Polygonaceae	*Polygonum lapathifolium*	pale persicavia							
Spermatophyta	Angiospermae	Dicotyledoneae	Polygonaceae	*Polygonum aviculare*	Prostrate knotweed							
		Dicotyledoneae	Polygonaceae	*Polygonum spp.*	smartweed species				x	x		
Spermatophyta	Angiospermae	Dicotyledoneae	Rosaceae	*Potentilla anserina*	silverweed							
Spermatophyta	Angiospermae	Dicotyledoneae	Rosaceae	*Potentilla arguta*	white cinquefoil							
Spermatophyta	Angiospermae	Dicotyledoneae	Rosaceae	*Potentilla gracilis*	graceful cinquefoil							
Spermatophyta	Angiospermae	Dicotyledoneae	Rosaceae	*Potentilla hippiana*	woolly cinquefoil							
Spermatophyta	Angiospermae	Dicotyledoneae	Rosaceae	*Potentilla norvegica*	rough cinquefoil			x			x	
Spermatophyta	Angiospermae	Dicotyledoneae	Rosaceae	*Potentilla palustris*	marsh cinquefoil							
Spermatophyta	Angiospermae	Dicotyledoneae	Rosaceae	*Potentilla tridentata*	three-toothed cinquefoil							
Spermatophyta	Angiospermae	Dicotyledoneae	Primulaceae	*Primula incana*	mealy primrose							
Spermatophyta	Angiospermae	Dicotyledoneae	Pyrolaceae	*Pyrola asarifolia*	pink wintergreen			x				
Spermatophyta	Angiospermae	Dicotyledoneae	Pyrolaceae	*Pyrola secunda*	one-sided wintergreen							
Spermatophyta	Angiospermae	Dicotyledoneae	Pyrolaceae	*Pyrola virens*	green wintergreen							
Spermatophyta	Angiospermae	Dicotyledoneae	Pyrolaceae	*Pyrola spp.*	wintergreen			x				
Spermatophyta	Angiospermae	Dicotyledoneae	Ranunculaceae	*Ranunculus abortivus*	small-flowered buttercup							
Spermatophyta	Angiospermae	Dicotyledoneae	Ranunculaceae	*Ranunculus acris*	tall buttercup	x	x					
Spermatophyta	Angiospermae	Dicotyledoneae	Ranunculaceae	*Ranunculus lapponicus*	lapland buttercup							
Spermatophyta	Angiospermae	Dicotyledoneae	Ranunculaceae	*Ranunculus macounii*	Macoun's buttercup							
Spermatophyta	Angiospermae	Dicotyledoneae	Ranunculaceae	*Ranunculus sceleratus*	celery-leaved buttercup							
Spermatophyta	Angiospermae	Dicotyledoneae	Ranunculaceae	*Ranunculus spp.*	buttercup							
Spermatophyta	Angiospermae	Dicotyledoneae	Anacardiaceae	*Rhus radicans*	poison-ivy							
Spermatophyta	Angiospermae	Dicotyledoneae	Cruciferae	*Rorippa islandica*	marsh yellow cress							
Spermatophyta	Angiospermae	Dicotyledoneae	Cruciferae	*Rorippa palustris*	yellow cress							
Spermatophyta	Angiospermae	Dicotyledoneae	Rosaceae	*Rubus acaulis*	dwarf raspberry			x				
Spermatophyta	Angiospermae	Dicotyledoneae	Rosaceae	*Rubus chamaemorus*	cloudberry							
Spermatophyta	Angiospermae	Dicotyledoneae	Rosaceae	*Rubus pubescens*	dewberry			x				
		Dicotyledoneae	Polygonaceae	*Rumex crispus*	curled dock					x		
Spermatophyta	Angiospermae	Dicotyledoneae	Polygonaceae	*Rumex maritimus*	golden dock							
Spermatophyta	Angiospermae	Dicotyledoneae	Polygonaceae	*Rumex occidentalis*	western dock		x					
Spermatophyta	Angiospermae	Dicotyledoneae	Polygonaceae	*Rumex triangulivalvis*	narrow-leaved dock							
Spermatophyta	Angiospermae	Dicotyledoneae	Polygonaceae	*Rumex spp*	dock		x					
Spermatophyta	Angiospermae	Dicotyledoneae	Chenopodiaceae	*Salsola pestifer*	Russian thistle							
Spermatophyta	Angiospermae	Dicotyledoneae	Umbelliferae	*Sanicula marilandica*	snake-root			x				
Spermatophyta	Angiospermae	Dicotyledoneae	Sarraceniaceae	*Sarracenia purpurea*	pitcher-plant							
		Dicotyledoneae	Labiatae	*Scutellaria galericulata*	marsh skullcap		x		x	x		
Spermatophyta	Angiospermae	Dicotyledoneae	Compositae	*Senecio congestus*	marsh ragwort			x				
Spermatophyta	Angiospermae	Dicotyledoneae	Compositae	*Senecio eremophilus*	cut-leaved ragwort							
Spermatophyta	Angiospermae	Dicotyledoneae	Compositae	*Senecio vulgaris*	common groundsel							
Spermatophyta	Angiospermae	Dicotyledoneae	Chenopodiaceae	*Silene cucubalus*	bladder campion							
Spermatophyta	Angiospermae	Dicotyledoneae	Chenopodiaceae	*Silene pratensis*	white cockle							

PLANT SPECIES CHECKLIST												
Project Number :	1102-17665											
Location :	Sylvan Lake											
Date :	July 25 and 26, 2007											
Habitat Type :	Grassland, Forest and Riparian											
						Grassland	Drainage Area	Forest	Wetland	Lake Shore	Disturbed	
Division	**Subdivision**	**Class**	**Family**	**Genus species**	**Common name**	**Present**	**Present**	**Present**	**Present**	**Present**	**Present**	**Rank**
Spermatophyta	Angiospermae	Dicotyledoneae	Iridaceae	*Sisyrinchium montanum*	common blue-eyed grass							
Spermatophyta	Angiospermae	Dicotyledoneae	Umbelliferae	*Sium suave*	water-parsnip					x		
Spermatophyta	Angiospermae	Monocotyledoneae	Liliaceae	*Smilacina stellata*	star-flowered false solomon's seal			x			x	
Spermatophyta	Angiospermae	Monocotyledoneae	Liliaceae	*Smilacina trifolia*	three-leaved false solomon's-seal							
Spermatophyta	Angiospermae	Dicotyledoneae	Compositae	*Solidago canadensis*	Canada golden rod	x	x	x		x	x	
Spermatophyta	Angiospermae	Dicotyledoneae	Compositae	*Sonchus arvensis*	perennial sow-thistle			x				Introduced
Spermatophyta	Angiospermae	Dicotyledoneae	Compositae	*Sonchus asper*	spiny-leaved sow thistle		x					
Spermatophyta	Angiospermae	Dicotyledoneae	Labiatae	*Stachys palustris*	marsh hedge nettle		x		x	x		
Spermatophyta	Angiospermae	Dicotyledoneae	Caryophyllaceae	*Stellaria longifolia*	long-leaved chickweed			x			x	
Spermatophyta	Angiospermae	Dicotyledoneae	Caryophyllaceae	*Stellaria longipes*	long-stalked chickweed							
Spermatophyta	Angiospermae	Dicotyledoneae	Caryophyllaceae	*Stellaria media*	common chickweed							
Spermatophyta	Angiospermae	Monocotyledoneae	Liliaceae	*Streptopus amplexifolius*	clasping-leaved twisted-stalk							
Spermatophyta	Angiospermae	Dicotyledoneae	Compositae	*Tanacetum vulgare*	tansy							
Spermatophyta	Angiospermae	Dicotyledoneae	Compositae	*Taraxacum officinale*	dandelion	x		x				Introduced
Spermatophyta	Angiospermae	Dicotyledoneae	Ranunculaceae	*Thalictrum venulosum*	veiny meadow rue		x	x	x	x	x	
Spermatophyta	Angiospermae	Dicotyledoneae	Ranunculaceae	*Thalictrum dasycarpum*	tall veiny rue							
Spermatophyta	Angiospermae	Dicotyledoneae	Cruciferae	*Thlaspi arvense*	stinkweed/penny cress					x		
Spermatophyta	Angiospermae	Dicotyledoneae	Compositae	*Tragopogon dubius*	goat's beard							
Spermatophyta	Angiospermae	Dicotyledoneae	Primulaceae	*Trientalis borealis*	northern starflower							
Spermatophyta	Angiospermae	Dicotyledoneae	Leguminosae	*Trifolium hybridum*	alsike clover	x	x	x	x		x	Introduced
Spermatophyta	Angiospermae	Dicotyledoneae	Leguminosae	*Trifolium repens*	white clover	x	x	x	x		x	
Spermatophyta	Angiospermae	Dicotyledoneae	Uryicaceae	*Urtica dioica*	stinging nettle		x	x	x	x		
Spermatophyta	Angiospermae	Dicotyledoneae	Scrophulariaceae	*Verbascum thapsus*	common mullein							
		Dicotyledoneae	Scrophulariaceae	*Veronica americana*	american brooklime				x			
Spermatophyta	Angiospermae	Dicotyledoneae	Leguminosae	*Vicia americana*	American vetch	x	x	x		x	x	
Spermatophyta	Angiospermae	Dicotyledoneae	Leguminosae	*Vicia cracca*	tufted vetch							
Spermatophyta	Angiospermae	Dicotyledoneae	Violaceae	*Viola adunca*	early blue violet							
Spermatophyta	Angiospermae	Dicotyledoneae	Violaceae	*Viola canadensis*	Canada violet			x		x	x	
Spermatophyta	Angiospermae	Dicotyledoneae	Violaceae	*Viola nephrophylla*	bog violet							
Spermatophyta	Angiospermae	Dicotyledoneae	Violaceae	*Viola renifolia*	kidney-leaved violet							
Spermatophyta	Angiospermae	Dicotyledoneae	Violaceae	*Viola spp*	violet							
Spermatophyta	Angiospermae	Dicotyledoneae	Umbelliferae	*Zizia aptera*	heart-leaved alexanders							
AQUATICS												
Spermatophyta	Angiospermae	Dicotyledoneae	Callitrichaceae	*Callitriche verna*	water starwort							
Spermatophyta	Angiospermae	Dicotyledoneae	Callitrichaceae	*Callitriche palustris*	vernal water-starwort							
Spermatophyta	Angiospermae	Dicotyledoneae	Ceratophyllaceae	*Ceratophyllum demersum*	coontail					x		
Spermatophyta	Angiospermae	Dicotyledoneae	Haloragaceae	*Hippuris vulgaris*	common mare's-tail					x		
Spermatophyta	Angiospermae	Monocotyledoneae	Lemnaceae	*Lemna minor*	common duckweed					x		
Spermatophyta	Angiospermae	Dicotyledoneae	Gentianaceae	*Menyanthes trifoliata*	buck-bean							
Spermatophyta	Angiospermae	Dicotyledoneae	Haloragaceae	*Myriophyllum exalbescens*	northern water milfoil							
Spermatophyta	Angiospermae	Dicotyledoneae	Nymphaeaceae	*Nuphar variegata*	small yellow pond-lily							
Spermatophyta	Angiospermae	Monocotyledoneae	Polygonaceae	*Polygonum amphibium*	water smartweed		x		x			
Spermatophyta	Angiospermae	Monocotyledoneae	Zosteraceae	*Potamogeton filiformis*	thread-leaved pondweed							
Spermatophyta	Angiospermae	Monocotyledoneae	Zosteraceae	*Potamogeton richardsonii*	Richardson's pondweed							
Spermatophyta	Angiospermae	Dicotyledoneae	Rosaceae	*Potentilla palustris*	marsh cinquefoil							
Spermatophyta	Angiospermae	Dicotyledoneae	Ranunculaceae	*Ranunculus gmelinii*	yellow water-buttercup							
Spermatophyta	Angiospermae	Monocotyledoneae	Alismaceae	*Sagittaria cuneata*	arum-leaved arrowhead					x		
Spermatophyta	Angiospermae	Monocotyledoneae	Cyperaceae	*Scirpus lacustris*	common great bulrush					x		
Spermatophyta	Angiospermae	Monocotyledoneae	Cyperaceae	*Scirpus microcarpus*	small fruited bullrush							
Spermatophyta	Angiospermae	Monocotyledoneae	Juncaginaceae	*Triglochin maritima*	seaside arrow-grass							
Spermatophyta	Angiospermae	Monocotyledoneae	Typhaceae	*Typha latifolia*	cattail		x			x		
Spermatophyta	Angiospermae	Dicotyledoneae	Lentibulariaceae	*Utricularia vulgaris*	common bladderwort					x		
FERNS & ALLIES												
Pteridophyta	-	Filicopsida	Dryopteridaceae	*Athyrium filix-femina*	common ladyfern							
Pteridophyta	-	Filicopsida	Ophioglossaceae	*Botrychium virginianum*	virginia grape fern							
Pteridophyta	-	Equisetopsida	Equisetaceae	*Equisetum arvense*	common horsetail	x				x		
		Equisetopsida	Equisetaceae	*Equisetum fluviatile*	swamp horsetail					x		
Pteridophyta	-	Equisetopsida	Equisetaceae	*Equisetum hyemale*	common scouring rush							
Pteridophyta	-	Equisetopsida	Equisetaceae	*Equisetum palustre*	marsh horsetail							
Pteridophyta	-	Equisetopsida	Equisetaceae	*Equisetum pratense*	meadow horsetail				x	x		
Pteridophyta	-	Equisetopsida	Equisetaceae	*Equisetum scirpoides*	dwarf scouring rush							
Pteridophyta	-	Equisetopsida	Equisetaceae	*Equisetum sylvaticum*	woodland horsetail							
Pteridophyta	-	Filicopsida	Polypodiaceae	*Dryopteris austriaca*	spinulose shield fern		x		x			
Pteridophyta	-	Filicopsida	Polypodiaceae	*Dryopteris disjuncta*	oak fern							
		Polypodiophyta	Polypodiaceae	*Dryopteris spp.*	shield fern				x			
Pteridophyta	-	Lycopodiopsida	Lycopodiaceae	*Lycopodium annotinum*	stiff club moss							
Pteridophyta	-	Lycopodiopsida	Lycopodiaceae	*Lycopodium complanatum*	ground cedar							
Pteridophyta	-	Lycopodiopsida	Lycopodiaceae	*Lycopodium obscurum*	ground pine							
Pteridophyta	-	Filicopsida	Polypodiaceae	*Matteuccia struthiopteris*	ostrich fern							
Pteridophyta	-	Lycopodiopsida	Selaginellaceae	*Selaginella densa*	prairie selaginella							
MOSSES & LIVERWORTS												
Bryophyta	-	Leucodontales	Climaciaceae	*Climacium dendroides*	common tree moss							
Hepatophyta	Hepaticae	Hepaticae	Hepatopsida	*Conocephalum conicum*	snake liverwort				x			
Bryophyta	-	Bryopsida	Hylocomiaceae	*Hylocomium splendens*	stair-step moss							
Bryophyta	-	Bryopsida	Orthotrichaceae	*Orthotrichum speciosum*	showy bristle moss							
Bryophyta	-	Bryopsida	Polytrichaceae	*Polytrichum commune*	common hair-cap							
Bryophyta	-	Bryopsida	Polytrichaceae	*Polytrichum juniperinum*	juniper moss			x				
Bryophyta	-	Bryopsida	Hypnaceae	*Ptilium crista-castrensis*	knight's plume moss		x	x				
Bryophyta	-	Bryopsida	Hypnaceae	*Pylaisiella polyantha*	aspen moss							
Bryophyta	-	Sphagnopsida	Sphagnaceae	*Sphagnum spp.*	peat moss							
		Bryophyta	Ditrichaceae	*Ceratodon purpurpeus*	purple horn-toothed moss					x		
LICHENS												
Ascomycota	-	Ascomycota	Cladoniaceae	*Cladina rangiferina*	grey reindeer lichen							
Ascomycota	-	Ascomycota	Cladoniaceae	*Cladina stellaris*	northern reindeer lichen							
Ascomycota	-	Ascomycota	Cladoniaceae	*Cladonia borealis*	red pixie-cup							
Ascomycota	-	Ascomycota	Icmadophilaceae	*Icamadophila ericetorum*	fairy puke							
Ascomycota	-	Ascomycota	-	Lichen *spp.*	leaf lichens							
		Ascomycota	Myceteae	Peltigera didactyla	apple pelt			x				
TOTAL PLANT SPECIES						27		106	51	67	54	

ANIMAL SPECIES CHECKLIST					
Project Number :		1102-17665			
Location :		Sylvan Lake			
Date :		July 25 and 26, Sepember 12, 2007			
Habitat Type :		Grassland, Forest and Riparian			
Class	**Order**	**Family**	**Genus species**	**common name**	**Present**
UNGULATES					
Mammalia	Artiodactyla	Cervidae	*Alces alces*	moose	x
Mammalia	Artiodactyla	Antilocapridae	*Antilocapra americana*	antelope	
Mammalia	Artiodactyla	Bovidae	*Bos bison*	buffalo	
Mammalia	Artiodactyla	Cervidae	*Cervus elaphus*	elk	
Mammalia	Artiodactyla	Cervidae	*Odocoileus hemionus*	mule deer	
Mammalia	Artiodactyla	Cervidae	*Odocoileus spp.*	deer	x
Mammalia	Artiodactyla	Cervidae	*Odocoileus virginianus*	white-tailed deer	
Mammalia	Artiodactyla	Bovidae	*Oreamnos americanus*	mountain goat	
Mammalia	Artiodactyla	Bovidae	*Ovis canadensis*	bighorn sheep	
Mammalia	Artiodactyla	Cervidae	*Rangifer tarandus*	caribou	
CARNIVORES					
Mammalia	Carnivora	Canidae	*Alopex lagopus*	arctic fox	
Mammalia	Carnivora	Canidae	*Canis latrans*	coyote	
Mammalia	Carnivora	Canidae	*Canis lupus*	grey wolf	
Mammalia	Carnivora	Mustelidae	*Gulo gulo*	wolverine	
Mammalia	Carnivora	Mustelidae	*Lontra canadensis*	northern river otter	
Mammalia	Carnivora	Felidae	*Lynx canadensis*	lynx	
Mammalia	Carnivora	Felidae	*Lynx rufus*	bobcat	
Mammalia	Carnivora	Mustelidae	*Martes americana*	marten	
Mammalia	Carnivora	Mustelidae	*Martes pennanti*	fisher	
Mammalia	Carnivora	Mephitidae	*Mephitis mephitis*	skunk	
Mammalia	Carnivora	Mustelidae	*Mustela erminea*	short-tailed weasel	
Mammalia	Carnivora	Mustelidae	*Mustela frenata*	long-tailed weasel	
Mammalia	Carnivora	Mustelidae	*Mustela nigripes*	black-footed ferret	
Mammalia	Carnivora	Mustelidae	*Mustela nivalis*	least weasel	
Mammalia	Carnivora	Mustelidae	*Mustela vison*	mink	
Mammalia	Carnivora	Procyonidae	*Procyon lotor*	raccoon	
Mammalia	Carnivora	Felidae	*Puma concolor*	cougar	
Mammalia	Carnivora	Mustelidae	*Taxidea taxus*	badger	
Mammalia	Carnivora	Canidae	*Urocyon cinereoargenteus*	grey fox	
Mammalia	Carnivora	Ursidae	*Ursus americanus*	black bear	
Mammalia	Carnivora	Ursidae	*Ursus arctos*	grizzly bear	
Mammalia	Carnivora	Canidae	*Vulpes velox*	swift fox	
Mammalia	Carnivora	Canidae	*Vulpes vulpes*	red fox	
RODENTS					
Mammalia	Rodentia	Castoridae	*Castor canadensis*	beaver	
Mammalia	Rodentia	Muridae	*Clethrionomys gapperi*	southern red-backed vole	
Mammalia	Rodentia	Heteromyidae	*Dipodomys ordii*	Ord's kangaroo rat	
Mammalia	Rodentia	Erethizontidae	*Erethizon dorsatum*	porcupine	
Mammalia	Rodentia	Sciuridae	*Glaucomys sabrinus*	northern flying squirrel	
Mammalia	Rodentia	Muridae	*Lemmiscus curtatus*	sagebrush vole	
Mammalia	Rodentia	Muridae	*Lemmus trimucronatus*	brown lemming	
Mammalia	Rodentia	Sciuridae	*Marmota caligata*	hoary marmot	
Mammalia	Rodentia	Sciuridae	*Marmota flaviventris*	yellow-bellied marmot	
Mammalia	Rodentia	Sciuridae	*Marmota monax*	woodchuck	
Mammalia	Rodentia	Muridae	*Microtis pennsylvanicus*	meadow vole	
Mammalia	Rodentia	Muridae	*Microtus longicaudus*	long-tailed vole	
Mammalia	Rodentia	Muridae	*Microtus ochrogaster*	prairie vole	
Mammalia	Rodentia	Muridae	*Microtus richardsoni*	water vole	
Mammalia	Rodentia	Muridae	*Microtus xanthognathus*	yellow-cheeked vole	
Mammalia	Rodentia	Muridae	*Mus musculus*	house mouse	
Mammalia	Rodentia	Muridae	*Neotoma cinerea*	bushy-tailed woodrat	
Mammalia	Rodentia	Muridae	*Ondatra zibethicus*	muskrat	
Mammalia	Rodentia	Muridae	*Onychomys leucogaster*	northern grasshopper mouse	
Mammalia	Rodentia	Heteromyidae	*Perognathus fasciatus*	olive-backed pocket mouse	
Mammalia	Rodentia	Muridae	*Peromyscus maniculatus*	deer mouse	
Mammalia	Rodentia	Muridae	*Phenacomys intermedius*	western heather vole	
Mammalia	Rodentia	Muridae	*Rattus norvegicus*	norway rat	
Mammalia	Rodentia	Muridae	*Reithrodontomys megalotis*	western harvest mouse	
Mammalia	Rodentia	Sciuridae	*Sciurus carolinensis*	eastern grey squirrel	
Mammalia	Rodentia	Sciuridae	*Spermophilus columbianus*	columbian ground squirrel	
Mammalia	Rodentia	Sciuridae	*Spermophilus franklinii*	franklin's ground squirrel	
Mammalia	Rodentia	Sciuridae	*Spermophilus lateralis*	golden-mantled ground squirrel	
Mammalia	Rodentia	Sciuridae	*Spermophilus richardsonii*	richardson's ground squirrel	
Mammalia	Rodentia	Sciuridae	*Spermophilus tridecemlineatus*	thirteen-lined ground squirrel	
Mammalia	Rodentia	Muridae	*Synaptomys borealis*	northern bog lemming	
Mammalia	Rodentia	Sciuridae	*Tamias amoenus*	yellow-pine chipmunk	

ANIMAL SPECIES CHECKLIST					
Project Number :		1102-17665			
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Date :		July 25 and 26, Sepember 12, 2007			
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Class	**Order**	**Family**	**Genus species**	**common name**	**Present**
Mammalia	Rodentia	Sciuridae	*Tamias minimus*	least chipmunk	
Mammalia	Rodentia	Sciuridae	*Tamias ruficadus*	red-tailed chipmunk	
Mammalia	Rodentia	Sciuridae	*Tamiasciurus hudsonicus*	red squirrel	x
Mammalia	Rodentia	Geomyidae	*Thomomys talpoides*	northern pocket gopher	
Mammalia	Rodentia	Zapodidae	*Zapus hudsonius*	meadow jumping mouse	
Mammalia	Rodentia	Zapodidae	*Zapus princeps*	western jumping mouse	
PIKAS, HARES & RABBITS					
Mammalia	Lagomorpha	Leporidae	*Lepus americanus*	snowshoe hare	
Mammalia	Lagomorpha	Leporidae	*Lepus townsendii*	white-tailed jackrabbit	
Mammalia	Lagomorpha	Ochotonidae	*Ochotona princeps*	american pika	
Mammalia	Lagomorpha	Leporidae	*Sylvilagus nuttallii*	mountain cottontail	
BATS					
Mammalia	Chiroptera	Vespertilionidae	*Eptesicus fuscus*	big brown bat	
Mammalia	Chiroptera	Vespertilionidae	*Lasionycteris noctivagans*	silver-haired bat	
Mammalia	Chiroptera	Vespertilionidae	*Lasiurus borealis*	eastern red bat	
Mammalia	Chiroptera	Vespertilionidae	*Lasiurus cinereus*	hoary bat	
Mammalia	Chiroptera	Vespertilionidae	*Myotis ciliolabrum*	western small-footed bat	
Mammalia	Chiroptera	Vespertilionidae	*Myotis evotis*	long-eared bat	
Mammalia	Chiroptera	Vespertilionidae	*Myotis keenii*	Kenn's Myotis	
Mammalia	Chiroptera	Vespertilionidae	*Myotis lucifugus*	little brown bat	
Mammalia	Chiroptera	Vespertilionidae	*Myotis septentrionalis*	northern bat	
Mammalia	Chiroptera	Vespertilionidae	*Myotis volans*	long-legged bat	
INSECTIVORES					
Mammalia	Insectivora	Soricidae	*Sorex arcticus*	arctic shrew	
Mammalia	Insectivora	Soricidae	*Sorex cinereus*	masked shrew	
Mammalia	Insectivora	Soricidae	*Sorex haydeni*	prairie shrew	
Mammalia	Insectivora	Soricidae	*Sorex hoyi*	pygmy shrew	
Mammalia	Insectivora	Soricidae	*Sorex monticolus*	dusky shrew	
Mammalia	Insectivora	Soricidae	*Sorex palustris*	common water shrew	
Mammalia	Insectivora	Soricidae	*Sorex vagrans*	vagrant shrew	
REPTILES					
Reptilia	Testudines	Emydidae	*Chrysemys picta*	western painted turtle	
Reptilia	Squamata	Viperidae	*Crotalus viridis*	prairie rattlesnake	
Reptilia	Squamata	Colubridae	*Heterodon nasicus*	western hognose snake	
Reptilia	Squamata	Phrynosomatidae	*Phrynosoma douglasii*	short-horned lizard	
Reptilia	Squamata	Colubridae	*Pituophis melanoleucus*	bull snake	
Reptilia	Squamata	Colubridae	*Thamnophis elegans*	wandering garter snake	
Reptilia	Squamata	Colubridae	*Thamnophis radix*	plains garter snake	
Reptilia	Squamata	Colubridae	*Thamnophis sirtalis*	red-sided garter snake	
AMPHIBIANS					
Amphibia	Caudata	Ambystomatidae	*Ambystoma macrodactylum*	long-toed salamander	
Amphibia	Caudata	Ambystomatidae	*Ambystoma tigrinium*	tiger salamander	
Amphibia	Anura	Bufonidae	*Bufo boreas*	western toad	
Amphibia	Anura	Bufonidae	*Bufo cognatus*	great plains toad	
Amphibia	Anura	Bufonidae	*Bufo hemiophrys*	Canadian toad	
Amphibia	Anura	Hylidae	*Pseudacris triseriata*	boreal chorus frog	
Amphibia	Anura	Ranidae	*Rana pipiens*	northern leopard frog	
Amphibia	Anura	Ranidae	*Rana pretiosa*	spotted frog	
Amphibia	Anura	Ranidae	*Rana sylvatica*	wood frog	x
Amphibia	Anura	Pelobatidae	*Scaphiopus bombifrons*	plains spadefoot	
TOTAL ANIMAL SPECIES					4

ANIMAL SPECIES CHECKLIST					
Project Number :		1102-17665			
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Class	**Order**	**Family**	**Genus species**	**common name**	**Present**
UNGULATES					
Mammalia	Artiodactyla	Cervidae	*Alces alces*	moose	x
Mammalia	Artiodactyla	Antilocapridae	*Antilocapra americana*	antelope	
Mammalia	Artiodactyla	Bovidae	*Bos bison*	buffalo	
Mammalia	Artiodactyla	Cervidae	*Cervus elaphus*	elk	
Mammalia	Artiodactyla	Cervidae	*Odocoileus hemionus*	mule deer	
Mammalia	Artiodactyla	Cervidae	*Odocoileus spp.*	deer	x
Mammalia	Artiodactyla	Cervidae	*Odocoileus virginianus*	white-tailed deer	
Mammalia	Artiodactyla	Bovidae	*Oreamnos americanus*	mountain goat	
Mammalia	Artiodactyla	Bovidae	*Ovis canadensis*	bighorn sheep	
Mammalia	Artiodactyla	Cervidae	*Rangifer tarandus*	caribou	
CARNIVORES					
Mammalia	Carnivora	Canidae	*Alopex lagopus*	arctic fox	
Mammalia	Carnivora	Canidae	*Canis latrans*	coyote	
Mammalia	Carnivora	Canidae	*Canis lupus*	grey wolf	
Mammalia	Carnivora	Mustelidae	*Gulo gulo*	wolverine	
Mammalia	Carnivora	Mustelidae	*Lontra canadensis*	northern river otter	
Mammalia	Carnivora	Felidae	*Lynx canadensis*	lynx	
Mammalia	Carnivora	Felidae	*Lynx rufus*	bobcat	
Mammalia	Carnivora	Mustelidae	*Martes americana*	marten	
Mammalia	Carnivora	Mustelidae	*Martes pennanti*	fisher	
Mammalia	Carnivora	Mephitidae	*Mephitis mephitis*	skunk	
Mammalia	Carnivora	Mustelidae	*Mustela erminea*	short-tailed weasel	
Mammalia	Carnivora	Mustelidae	*Mustela frenata*	long-tailed weasel	
Mammalia	Carnivora	Mustelidae	*Mustela nigripes*	black-footed ferret	
Mammalia	Carnivora	Mustelidae	*Mustela nivalis*	least weasel	
Mammalia	Carnivora	Mustelidae	*Mustela vison*	mink	
Mammalia	Carnivora	Procyonidae	*Procyon lotor*	raccoon	
Mammalia	Carnivora	Felidae	*Puma concolor*	cougar	
Mammalia	Carnivora	Mustelidae	*Taxidea taxus*	badger	
Mammalia	Carnivora	Canidae	*Urocyon cinereoargenteus*	grey fox	
Mammalia	Carnivora	Ursidae	*Ursus americanus*	black bear	
Mammalia	Carnivora	Ursidae	*Ursus arctos*	grizzly bear	
Mammalia	Carnivora	Canidae	*Vulpes velox*	swift fox	
Mammalia	Carnivora	Canidae	*Vulpes vulpes*	red fox	
RODENTS					
Mammalia	Rodentia	Castoridae	*Castor canadensis*	beaver	
Mammalia	Rodentia	Muridae	*Clethrionomys gapperi*	southern red-backed vole	
Mammalia	Rodentia	Heteromyidae	*Dipodomys ordii*	Ord's kangaroo rat	
Mammalia	Rodentia	Erethizontidae	*Erethizon dorsatum*	porcupine	
Mammalia	Rodentia	Sciuridae	*Glaucomys sabrinus*	northern flying squirrel	
Mammalia	Rodentia	Muridae	*Lemmiscus curtatus*	sagebrush vole	
Mammalia	Rodentia	Muridae	*Lemmus trimucronatus*	brown lemming	
Mammalia	Rodentia	Sciuridae	*Marmota caligata*	hoary marmot	
Mammalia	Rodentia	Sciuridae	*Marmota flaviventris*	yellow-bellied marmot	
Mammalia	Rodentia	Sciuridae	*Marmota monax*	woodchuck	
Mammalia	Rodentia	Muridae	*Microtis pennsylvanicus*	meadow vole	
Mammalia	Rodentia	Muridae	*Microtus longicaudus*	long-tailed vole	
Mammalia	Rodentia	Muridae	*Microtus ochrogaster*	prairie vole	
Mammalia	Rodentia	Muridae	*Microtus richardsoni*	water vole	
Mammalia	Rodentia	Muridae	*Microtus xanthognathus*	yellow-cheeked vole	
Mammalia	Rodentia	Muridae	*Mus musculus*	house mouse	
Mammalia	Rodentia	Muridae	*Neotoma cinerea*	bushy-tailed woodrat	
Mammalia	Rodentia	Muridae	*Ondatra zibethicus*	muskrat	
Mammalia	Rodentia	Muridae	*Onychomys leucogaster*	northern grasshopper mouse	
Mammalia	Rodentia	Heteromyidae	*Perognathus fasciatus*	olive-backed pocket mouse	
Mammalia	Rodentia	Muridae	*Peromyscus maniculatus*	deer mouse	
Mammalia	Rodentia	Muridae	*Phenacomys intermedius*	western heather vole	
Mammalia	Rodentia	Muridae	*Rattus norvegicus*	norway rat	
Mammalia	Rodentia	Muridae	*Reithrodontomys megalotis*	western harvest mouse	
Mammalia	Rodentia	Sciuridae	*Sciurus carolinensis*	eastern grey squirrel	
Mammalia	Rodentia	Sciuridae	*Spermophilus columbianus*	columbian ground squirrel	
Mammalia	Rodentia	Sciuridae	*Spermophilus franklinii*	franklin's ground squirrel	
Mammalia	Rodentia	Sciuridae	*Spermophilus lateralis*	golden-mantled ground squirrel	
Mammalia	Rodentia	Sciuridae	*Spermophilus richardsonii*	richardson's ground squirrel	
Mammalia	Rodentia	Sciuridae	*Spermophilus tridecemlineatus*	thirteen-lined ground squirrel	
Mammalia	Rodentia	Muridae	*Synaptomys borealis*	northern bog lemming	
Mammalia	Rodentia	Sciuridae	*Tamias amoenus*	yellow-pine chipmunk	

ANIMAL SPECIES CHECKLIST					
Project Number :		1102-17665			
Location :		Sylvan Lake			
Date :		July 25 and 26, Sepember 12, 2007			
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Class	**Order**	**Family**	**Genus species**	**common name**	**Present**
Mammalia	Rodentia	Sciuridae	*Tamias minimus*	least chipmunk	
Mammalia	Rodentia	Sciuridae	*Tamias ruficadus*	red-tailed chipmunk	
Mammalia	Rodentia	Sciuridae	*Tamiasciurus hudsonicus*	red squirrel	x
Mammalia	Rodentia	Geomyidae	*Thomomys talpoides*	northern pocket gopher	
Mammalia	Rodentia	Zapodidae	*Zapus hudsonius*	meadow jumping mouse	
Mammalia	Rodentia	Zapodidae	*Zapus princeps*	western jumping mouse	
PIKAS, HARES & RABBITS					
Mammalia	Lagomorpha	Leporidae	*Lepus americanus*	snowshoe hare	
Mammalia	Lagomorpha	Leporidae	*Lepus townsendii*	white-tailed jackrabbit	
Mammalia	Lagomorpha	Ochotonidae	*Ochotona princeps*	american pika	
Mammalia	Lagomorpha	Leporidae	*Sylvilagus nuttallii*	mountain cottontail	
BATS					
Mammalia	Chiroptera	Vespertilionidae	*Eptesicus fuscus*	big brown bat	
Mammalia	Chiroptera	Vespertilionidae	*Lasionycteris noctivagans*	silver-haired bat	
Mammalia	Chiroptera	Vespertilionidae	*Lasiurus borealis*	eastern red bat	
Mammalia	Chiroptera	Vespertilionidae	*Lasiurus cinereus*	hoary bat	
Mammalia	Chiroptera	Vespertilionidae	*Myotis ciliolabrum*	western small-footed bat	
Mammalia	Chiroptera	Vespertilionidae	*Myotis evotis*	long-eared bat	
Mammalia	Chiroptera	Vespertilionidae	*Myotis keenii*	Kenn's Myotis	
Mammalia	Chiroptera	Vespertilionidae	*Myotis lucifugus*	little brown bat	
Mammalia	Chiroptera	Vespertilionidae	*Myotis septentrionalis*	northern bat	
Mammalia	Chiroptera	Vespertilionidae	*Myotis volans*	long-legged bat	
INSECTIVORES					
Mammalia	Insectivora	Soricidae	*Sorex arcticus*	arctic shrew	
Mammalia	Insectivora	Soricidae	*Sorex cinereus*	masked shrew	
Mammalia	Insectivora	Soricidae	*Sorex haydeni*	prairie shrew	
Mammalia	Insectivora	Soricidae	*Sorex hoyi*	pygmy shrew	
Mammalia	Insectivora	Soricidae	*Sorex monticolus*	dusky shrew	
Mammalia	Insectivora	Soricidae	*Sorex palustris*	common water shrew	
Mammalia	Insectivora	Soricidae	*Sorex vagrans*	vagrant shrew	
REPTILES					
Reptilia	Testudines	Emydidae	*Chrysemys picta*	western painted turtle	
Reptilia	Squamata	Viperidae	*Crotalus viridis*	prairie rattlesnake	
Reptilia	Squamata	Colubridae	*Heterodon nasicus*	western hognose snake	
Reptilia	Squamata	Phrynosomatidae	*Phrynosoma douglasii*	short-horned lizard	
Reptilia	Squamata	Colubridae	*Pituophis melanoleucus*	bull snake	
Reptilia	Squamata	Colubridae	*Thamnophis elegans*	wandering garter snake	
Reptilia	Squamata	Colubridae	*Thamnophis radix*	plains garter snake	
Reptilia	Squamata	Colubridae	*Thamnophis sirtalis*	red-sided garter snake	
AMPHIBIANS					
Amphibia	Caudata	Ambystomatidae	*Ambystoma macrodactylum*	long-toed salamander	
Amphibia	Caudata	Ambystomatidae	*Ambystoma tigrinium*	tiger salamander	
Amphibia	Anura	Bufonidae	*Bufo boreas*	western toad	
Amphibia	Anura	Bufonidae	*Bufo cognatus*	great plains toad	
Amphibia	Anura	Bufonidae	*Bufo hemiophrys*	Canadian toad	
Amphibia	Anura	Hylidae	*Pseudacris triseriata*	boreal chorus frog	
Amphibia	Anura	Ranidae	*Rana pipiens*	northern leopard frog	
Amphibia	Anura	Ranidae	*Rana pretiosa*	spotted frog	
Amphibia	Anura	Ranidae	*Rana sylvatica*	wood frog	x
Amphibia	Anura	Pelobatidae	*Scaphiopus bombifrons*	plains spadefoot	
TOTAL ANIMAL SPECIES					4

BIRD SPECIES CHECKLIST					
Project Number :	1102-17665				
Location :	Sylvan Lake				
Date :	July 25 and 26, Sepember 12, 2007				
Habitat Type :	Grassland, Forest and Riparian				
Class	**Order**	**Family**	**Genus species**	**common name**	**Present**
BIRDS OF PREY					
Aves	Falconiformes	Accipitridae	*Accipiter cooperii*	Cooper's hawk	
Aves	Falconiformes	Accipitridae	*Accipiter gentilis*	northern goshawk	
Aves	Falconiformes	Accipitridae	*Accipiter striatus*	sharp-shinned hawk	
Aves	Strigiformes	Strigidae	*Aegolius acadicus*	northern saw-whet owl	
Aves	Strigiformes	Strigidae	*Aegolius funereus*	boreal owl	
Aves	Falconiformes	Accipitridae	*Aquila chrysaetos*	golden eagle	
Aves	Strigiformes	Strigidae	*Asio otus*	long-eared owl	
Aves	Strigiformes	Strigidae	*Bubo virginianus*	great horned owl	
Aves	Falconiformes	Accipitridae	*Buteo jamaicensis*	red-tailed hawk	
Aves	Falconiformes	Accipitridae	*Buteo platypterus*	broad-winged hawk	
Aves	Falconiformes	Accipitridae	*Buteo swainsoni*	Swainson's hawk	
Aves	Falconiformes	Accipitridae	*Circus cyaneus*	northern harrier	
Aves	Falconiformes	Falconidae	*Falco columbarius*	merlin	
Aves	Falconiformes	Falconidae	*Falco mexicanus*	prairie falcon	
Aves	Falconiformes	Falconidae	*Falco peregrinus*	peregrine falcon	
Aves	Falconiformes	Falconidae	*Falco sparverius*	American kestrel	
Aves	Falconiformes	Accipitridae	*Haliaeetus leucocephalus*	bald eagle	
Aves	Falconiformes	Falconidae	*Pandion haliaetus*	osprey	
Aves	Strigiformes	Strigidae	*Strix nebulosa*	great gray owl	
Aves	Strigiformes	Strigidae	*Strix varia*	barred owl	
Aves	Strigiformes	Strigidae	*Surnia ulula*	northern hawk owl	
DUCKLIKE BIRDS					
Aves	Anseriformes	Anatidae	*Anas acuta*	northern pintail	
Aves	Anseriformes	Anatidae	*Anas americana*	American wigeon	
Aves	Anseriformes	Anatidae	*Anas clypeata*	northern shoveler	x
Aves	Anseriformes	Anatidae	*Anas crecca*	green-winged teal	
Aves	Anseriformes	Anatidae	*Anas cyanoptera*	cinnamon teal	
Aves	Anseriformes	Anatidae	*Anas discors*	blue-winged teal	
Aves	Anseriformes	Anatidae	*Anas platyrhynchos*	mallard	x
Aves	Anseriformes	Anatidae	*Anas strepera*	gadwall	
Aves	Anseriformes	Anatidae	*Aythya affinis*	lesser scaup	
Aves	Anseriformes	Anatidae	*Aythya americana*	redhead	
Aves	Anseriformes	Anatidae	*Aythya valisineria*	canvasback	
Aves	Anseriformes	Anatidae	*Branta canadensis*	Canada goose	
Aves	Anseriformes	Anatidae	*Bucephala albeola*	bufflehead	
Aves	Anseriformes	Anatidae	*Bucephala clangula*	common goldeneye	x
Aves	Anseriformes	Anatidae	*Bucephala islandica*	Barrow's goldeneye	
Aves	Gruiformes	Rallidae	*Fulica americana*	American coot	x
Aves	Gaviformes	Gaviidae	*Gavia immer*	common loon	
Aves	Anseriformes	Anatidae	*Mergus merganser*	common merganser	
Aves	Anseriformes	Anatidae	*Oxyura jamaicensis*	ruddy duck	
Aves	Podicipediformes	Podicipedidae	*Podiceps auritus*	horned grebe	
Aves	Podicipediformes	Podicipedidae	*Podiceps grisegena*	red-necked grebe	x
Aves	Podicipediformes	Podicipedidae	*Podiceps nigricollis*	eared grebe	
Aves	Podicipediformes	Podicipedidae	*Podilymbus podiceps*	pied-billed grebe	
Aves	Gruiformes	Rallidae	*Porzana carolina*	sora	x
SHOREBIRDS & SEABIRDS					
Aves	Charadriiformes	Scolopacidae	*Actitis macularia*	spotted sandpiper	
Aves	Ciconiiformes	Ardeidae	*Ardea herodias*	great blue heron	
Aves	Charadriiformes	Scolopacidae	*Bartramia longicauda*	upland sandpiper	
Aves	Charadriiformes	Scolopacidae	*Catoptrophorus semipalmatus*	willet	
Aves	Charadriiformes	Charadriidae	*Charadrius vociferus*	killdeer	
Aves	Charadriiformes	Laridae	*Chlidonias niger*	black tern	
Aves	Charadriiformes	Scolopacidae	*Gallinago gallinago*	common snipe	
Aves	Charadriiformes	Laridae	*Larus californicus*	california gull	
Aves	Charadriiformes	Laridae	*Larus delawarensis*	ring-billed gull	
Aves	Charadriiformes	Laridae	*Larus pipixcan*	franklin's gull	
Aves	Pelecaniformes	Pelecanidae	*Pelecanus erythrorhynchos*	American white pelican	
Aves	Charadriiformes	Scolopacidae	*Phalaropus tricolor*	Wilson's phalarope	
Aves	Charadriiformes	Recurvirostridae	*Recurvirostra americana*	American avocet	
Aves	Charadriiformes	Laridae	*Sterna hirundo*	common tern	
Aves	Charadriiformes	Scolopacidae	*Tringa flavipes*	lesser yellowlegs	
Aves	Charadriiformes	Scolopacidae	*Tringa melanoleuca*	greater yellowlegs	
Aves	Charadriiformes	Scolopacidae	*Tringa solitaria*	solitary sandpiper	
NONPASSERINE LAND BIRDS					
Aves	Coraciiformes	Alcedinidae	*Ceryle alcyon*	belted kingfisher	
Aves	Caprimulgiformes	Caprimulgidae	*Chordeiles minor*	common nighthawk	
Aves	Cuculiformes	Cuculidae	*Coccyzus erythropthalmus*	black-billed cuckoo	
Aves	Piciformes	Picidae	*Colaptes auratus*	northern flicker	x

BIRD SPECIES CHECKLIST					
Project Number :	1102-17665				
Location :	Sylvan Lake				
Date :	July 25 and 26, Sepember 12, 2007				
Habitat Type :	Grassland, Forest and Riparian				
Class	**Order**	**Family**	**Genus species**	**common name**	**Present**
Aves	Columbiformes	Columbidae	*Columba livia*	rock dove	
Aves	Piciformes	Picidae	*Dryocopus pileatus*	pileated woodpecker	
Aves	Gruiformes	Gruidae	*Grus canadensis*	sandhill crane	
Aves	Piciformes	Picidae	*Picoides arcticus*	black-backed woodpecker	
Aves	Piciformes	Picidae	*Picoides pubescens*	downy woodpecker	x
Aves	Piciformes	Picidae	*Picoides tridactylus*	three-toed woodpecker	
Aves	Piciformes	Picidae	*Picoides villosus*	hairy woodpecker	x
Aves	Piciformes	Picidae	*Picoides spp.*	woodpecker	
Aves	Piciformes	Picidae	*Sphyrapicus varius*	yellow-bellied sapsucker	
Aves	Columbiformes	Columbidae	*Zenaida macroura*	mourning dove	
PASSERINE BIRDS					
Aves	Passeriformes	Emberizidae	*Agelaius phoeniceus*	red-winged blackbird	x
Aves	Passeriformes	Emberizidae	*Ammodramus nelsoni*	Nelson's sharp-tailed sparrow	
Aves	Passeriformes	Bombycillidae	*Bombycilla cedrorum*	cedar waxwing	
Aves	Passeriformes	Bombycillidae	*Bombycilla garrulus*	bohemian waxwing	
Aves	Passeriformes	Bombycillidae	*Bombycilla spp.*	waxwing	
Aves	Passeriformes	Phasianidae	*Bonasa umbellus*	ruffed grouse	
Aves	Passeriformes	Fringillidae	*Carduelis flammea*	common redpoll	
Aves	Passeriformes	Fringillidae	*Carduelis hornemanni*	haory redpoll	
Aves	Passeriformes	Fringillidae	*Carduelis tristis*	American goldfinch	
Aves	Passeriformes	Fringillidae	*Carpodacus purpureus*	purple finch	
Aves	Passeriformes	Muscicapidae	*Catharus fuscescens*	veery	
Aves	Passeriformes	Muscicapidae	*Catharus guttatus*	hermit thrush	
Aves	Passeriformes	Muscicapidae	*Catharus ustulatus*	Swainson's thrush	
Aves	Passeriformes	Certhiidae	*Certhia americana*	brown creeper	
Aves	Passeriformes	Emberizidae	*Chondestes grammacus*	lark sparrow	
Aves	Passeriformes	Troglodytidae	*Cistothorus palustris*	marsh wren	
Aves	Passeriformes	Fringillidae	*Coccothraustes vespertinus*	evening grosbeak	
Aves	Passeriformes	Tyrannidae	*Contopus cooperi*	olive-sided flycatcher	
Aves	Passeriformes	Tyrannidae	*Contopus sordidulus*	western wood-pewee	
Aves	Passeriformes	Corvidae	*Corvus brachyrhynchos*	American crow	
Aves	Passeriformes	Corvidae	*Corvus corax*	common raven	
Aves	Passeriformes	Corvidae	*Cyanocitta cristata*	blue jay	
Aves	Passeriformes	Emberizidae	*Dendroica coronata*	yellow-rumped warbler	x
Aves	Passeriformes	Emberizidae	*Dendroica palmarum*	palm warbler	
Aves	Passeriformes	Emberizidae	*Dendroica petechia*	yellow warbler	x
Aves	Passeriformes	Emberizidae	*Dendroica virens*	black-throated green warbler	
Aves	Passeriformes	Mimidae	*Dumetella carolinensis*	gray catbird	
Aves	Passeriformes	Empidonax	*Empidonax alnorum*	alder flycatcher	
Aves	Passeriformes	Empidonax	*Empidonax flaviventris*	yellow-bellied flycatcher	
Aves	Passeriformes	Empidonax	*Empidonax minimus*	least flycatcher	
Aves	Passeriformes	Alaudidae	*Eremophila alpestris*	horned lark	
Aves	Passeriformes	Emberizidae	*Euphagus carolinus*	rusty blackbird	
Aves	Passeriformes	Emberizidae	*Euphagus cyanocephalus*	Brewer's blackbird	
Aves	Passeriformes	Emberizidae	*Geothlypis trichas*	common yellowthroat	
Aves	Passeriformes	Hirundinidae	*Hirundo rustica*	barn swallow	
Aves	Passeriformes	Emberizidae	*Icterus galbula*	Baltimore oriole	
Aves	Passeriformes	Emberizidae	*Junco hyemalis*	dark-eyed junco	
Aves	Passeriformes	Laniidae	*Lanius ludovicianus*	loggerhead shrike	
Aves	Passeriformes	Fringillidae	*Loxia curvirostra*	red crossbill	
Aves	Passeriformes	Emberizidae	*Melospiza georgiana*	swamp sparrow	
Aves	Passeriformes	Emberizidae	*Melospiza lincolnii*	Lincoln's sparrow	
Aves	Passeriformes	Emberizidae	*Melospiza melodia*	song sparrow	
Aves	Passeriformes	Emberizidae	*Mniotilta varia*	black-and-white warbler	
Aves	Passeriformes	Emberizidae	*Molothrus ater*	brown-headed cowbird	
Aves	Passeriformes	Muscicapidae	*Myadestes townsendi*	Townsend's solitaire	
Aves	Passeriformes	Emberizidae	*Oporornis agilis*	Connecticut warbler	
Aves	Passeriformes	Emberizidae	*Oporornis philadelphia*	mourning warbler	
Aves	Passeriformes	Paridae	*Parus atricapillus*	black-capped chickadee	x
Aves	Passeriformes	Passeridae	*Passer domesticus*	house sparrow	
Aves	Passeriformes	Emberizidae	*Passerculus sandwichensis*	savannah sparrow	
Aves	Passeriformes	Phasianidae	*Perdix perdix*	gray partridge	
Aves	Passeriformes	Corvidae	*Perisoreus canadensis*	gray jay	
Aves	Passeriformes	Hirundinidae	*Petrochelidon pyrrhonota*	cliff swallow	
Aves	Passeriformes	Phasianidae	*Phasianus colchicus*	ring-necked pheasant	
Aves	Passeriformes	Emberizidae	*Pheucticus ludovicianus*	rose-breasted grosbeak	
Aves	Passeriformes	Corvidae	*Pica pica*	black-billed magpie	
Aves	Passeriformes	Fringillidae	*Pinicola enucleator*	pine grosbeak	
Aves	Passeriformes	Emberizidae	*Piranga ludoviciana*	western tanager	
Aves	Passeriformes	Emberizidae	*Plectrophenax nivalis*	snow bunting	

BIRD SPECIES CHECKLIST					
Project Number :	1102-17665				
Location :	Sylvan Lake				
Date :	July 25 and 26, Sepember 12, 2007				
Habitat Type :	Grassland, Forest and Riparian				
Class	**Order**	**Family**	**Genus species**	**common name**	**Present**
Aves	Passeriformes	Paridae	*Poecile gambeli*	mountain chickadee	
Aves	Passeriformes	Paridae	*Poecile hudsonicus*	boreal chickadee	
Aves	Passeriformes	Emberizidae	*Pooecetes gramineus*	vesper sparrow	
Aves	Passeriformes	Hirundinidae	*Progne subis*	purple martin	
Aves	Passeriformes	Emberizidae	*Quiscalus quiscula*	common grackle	
Aves	Passeriformes	Sylviidae	*Regulus calendula*	ruby-crowned kinglet	
Aves	Passeriformes	Sylviidae	*Regulus satrapa*	golden-crowned kinglet	
Aves	Passeriformes	Hirundinidae	*Riparia riparia*	bank swallow	
Aves	Passeriformes	Tyrannidae	*Sayornis phoebe*	eastern phoebe	
Aves	Passeriformes	Tyrannidae	*Sayornis saya*	Say's phoebe	
Aves	Passeriformes	Emberizidae	*Seiurus aurocapillus*	ovenbird	
Aves	Passeriformes	Emberizidae	*Setophaga ruticilla*	American redstart	
Aves	Passeriformes	Muscicapidae	*Sialia currucoides*	mountain bluebird	
Aves	Passeriformes	Sittidae	*Sitta canadensis*	red-breasted nuthatch	
Aves	Passeriformes	Sittidae	*Sitta carolinensis*	white-breasted nuthatch	x
Aves	Passeriformes	Fringillidae	*Spinus pinus*	pine siskin	x
Aves	Passeriformes	Emberizidae	*Spizella arborea*	American tree sparrow	
Aves	Passeriformes	Emberizidae	*Spizella pallida*	clay-colored sparrow	
Aves	Passeriformes	Emberizidae	*Spizella passerina*	chipping sparrow	
Aves	Passeriformes	Hirundinidae	*Stelgidopteryx serripennis*	northern rough-winged swallow	
Aves	Passeriformes	Emberizidae	*Sturnella neglecta*	western meadowlark	
Aves	Passeriformes	Sturnidae	*Sturnus vulgaris*	European starling	
Aves	Passeriformes	Hirundinidae	*Tachycineta bicolor*	tree swallow	
Aves	Passeriformes	Mimidae	*Toxostoma rufum*	brown thrasher	
Aves	Passeriformes	Troglodytidae	*Troglodytes aedon*	house wren	x
Aves	Passeriformes	Muscicapidae	*Turdus migratorius*	American robin	
Aves	Passeriformes	Phasianidae	*Tympanuchus phasianellus*	sharp-tailed grouse	
Aves	Passeriformes	Tyrannidae	*Tyrannus tyrannus*	eastern kingbird	
Aves	Passeriformes	Emberizidae	*Vermivora celata*	orange-crowned warbler	
Aves	Passeriformes	Emberizidae	*Vermivora peregrina*	Tennessee warbler	
Aves	Passeriformes	Vireonidae	*Vireo gilvus*	warbling vireo	
Aves	Passeriformes	Vireonidae	*Vireo olivaceus*	red-eyed vireo	x
Aves	Passeriformes	Vireonidae	*Vireo philadelphicus*	philadelphia vireo	
Aves	Passeriformes	Vireonidae	*Vireo solitarius*	blue-headed vireo	
Aves	Passeriformes	Emberizidae	*Wilsonia canadensis*	canada warbler	x
Aves	Passeriformes	Emberizidae	*Wilsonia pusilla*	Wilson's warbler	
Aves	Passeriformes	Emberizidae	*Xanthocephalus xanthocephalus*	yellow-headed blackbird	
Aves	Passeriformes	Emberizidae	*Zonotrichia albicollis*	white-throated sparrow	x
				hummingbird	x
				Western Pheobe	x
TOTAL BIRD SPECIES					18

FISH SPECIES CHECKLIST						
Project Number :		1102-17665				
Location :		Sylvan Lake				
Date :		July 25 and 26, Sepember 12, 2007				
Habitat Type :		Grassland, Forest and Riparian				
Class	**Order**	**Family**	**Genus species**	**common name**	**Present**	**Rank**
Fish Species						
Pisces	Cypriniformes	Catostomidae	*Catastomus commersoni*	white sucker		Secure
Pisces	Cypriniformes	Catostomidae	*Catostomus catostomus*	longnose sucker		Secure
Pisces	Cypriniformes	Cyprinidae	*Couesius plumbeus*	lake chub		Secure
Pisces	Gasterosteiformes	Gasterosteidae	*Culaea inconstans*	brook stickleback		Secure
Pisces	Gadiformes	Gadidae	*Lota lota*	burbot	X	Secure
Pisces	Cypriniformes	Cyprinidae	*Notropis hudsonius*	spot-tailed shiner		Secure
Pisces	Percopsiformes	Percopsidae	*Percopsis omiscomaycus*	trout perch		Secure
Pisces	Cypriniformes	Cyprinidae		minnow spp.		
				Jr. Pike	x	
TOTAL FISH SPECIES					1	

APPENDIX E
SITE PHOTOGRAPHS

Photo 1. Nested wetland (wetland 12) within contiguous forested area, Rare Plant Assessment, July 25, 2007.

Photo 2. Deciduous dominated community within contiguous forested area, Rare Plant Assessment, July 25, 2007.

Photo 3. East side of Cove, Rare Plant Assessment, July 25, 2007.

Photo 4. Shoreline, north of contiguous forest area near peninsula, facing south, Rare Plant Assessment, July 25, 2007.

Photo 5. Wetland 1, facing south, Rare Plant Assessment, July 25, 2007.

Photo 6. Agricultural area, west side of Subject Property, facing north, Rare Plant Assessment, July 25, 2007.

Photo 7. Deciduous dominated community within contiguous forested area, Rare Plant Assessment, July 26, 2007.

Photo 8. Shoreline of Sylvan Lake, Rare Plant Assessment, July 26, 2007.

Photo 9. Drainage area running from the north, south into the contiguous forested area, Rare Plant Assessment, July 26, 2007.

Photo 10. Shoreline of Sylvan Lake, Rare Plant Assessment, July 26, 2007

Photo 11. Agricultural area, Rare Plant Assessment, July 26, 2007

Photo12. Fen area within the south portion of the contiguous forested area, Rare Plant Assessment, July 26, 2007.

Photo 13. Contiguous forest Area, Rare Plant Assessment, Rare Plant Assessment, September 13, 2007.

Photo 14. Contiguous forest area, Rare Plant Assessment, September 13, 2007.

Photo 15. Nested Wetland (Wetland 10) within southeast portion of contiguous forested area, Rare Plant Assessment, September 13, 2007.

Photo 16. Shore area, north of contiguous forest area, facing south, Rare Plant Assessment, September 13, 2007.

Photo 17. Agricultural area on west side of Subject Property, north of small forested area, Rare Plant Assessment, September, 13, 2007.

Photo 18. Wood frog, incidental observation, Rare Plant Assessment, May 13, 2008

Photo 19. West side of cove, facing west, May 13, 2008

Photo 20. Drainage area within forested extension north of contiguous forested area, facing south, Avian Survey, May 28, 2008..

Photo 21. Wetland 5, facing south, Avian Survey, May 28, 2008..

Photo 22. Drainage area within south portion of the contiguous forested area located between wetland 12 and 13, Avian Survey, May 28, 2008.

Photo 23. Wetland 5, facing south, Avian Survey, May 28, 2008..

Photo 24. East side of cove, facing south, Feb 25, 2008.

Photo 25. Coyote markings, female in estrus, Mammal Tracking Survey, February 2008.

Photo 26. Ruffed grouse, Incidental observation, Mammal Tracking Survey, February 25, 2008.

Photo 27. Red squirrel, incidental observation, Mammal Tracking Survey, February 25, 2008.

Photo 28. Porcupine incidental observation, Mammal Tracking Survey, February 25, 2008.