BIOPHYSICAL ASSESSMENT

ALLAN BEACH RESORT

PARKLAND COUNTY, ALBERTA

Submitted to:

TRG Developments Corp.
Calgary, Alberta

Submitted by:
Bruce Thompson & Associates Inc.
Edmonton, Alberta

February 2012

TABLE OF CONTENTS

Contents

List of Tables

List of Figures

APPENDICES

1.0 INTRODUCTION

1.1 Background and Purpose.

This Biophysical Assessment has been developed for TRG Developments Corp. (Calgary, Alberta) and their consultants IBI Group Ltd. (Edmonton), as part of an application to develop the the Northeast quarter of Section 09 Township 053 Range 01 west of the Fifth Meridian (NE 09-053-01 W5M). The proposed project entails the development of the aforesaid land as a year-round resort.

The biophysical assessment is a necessary requirement for the approval of a more detailed Area Structure Plan for the proposed project site, as well as approval of the stormwater management plan for the subdivision, under the *Alberta Water Act* and the *Environmental Protection and Enhancement Act.*

A Biophysical Assessment is conducted to identify significant and sensitive environmental components on the project site prior to the development of an Area Structure Plan (ASP), and to make recommendations on the sustainability of the site, whether parts of it can or should be preserved in the natural state, and if so, what mitigation and monitoring measures are necessary to achieve sustainability. The Biophysical Assessment provides recommendations for dedication of lands to be conserved in their existing state within the context of the proposed development project, for the purposes of conservation of habitat, hydrology, protection of erodible land, water quality or other environmental needs.

Accordingly, the purpose of this Biophysical Assessment is:

- to identify and evaluate existing ecological features on the site as they appear at the present time;
- to provide practical recommendations for preserving or enhancing ecologically significant features within the context of the ASP;
- to provide general recommendations for mitigation of potential adverse environmental effects resulting from the development, on the site and on surrounding lands.

1.2 Development Project Overview and Site Location

The Property containing the site for the proposed development is located 7 km northwest of the Town of Stony Plain, and it lies within Parkland County, Alberta. The Property is about 24 km west of the City of Edmonton. The legal location is the northeast quarter of Section 09 Township 053 Range 01 west of the Fifth Meridian (NE 09-053-01 W5M).

The Property lies immediately west of Range Rd. 13, which is also known as Allan Beach Road, and is 0.7 km south of Highway 16 (Yellowhead Trail). The Property borders the east/south shore of Hubbles Lake, a major country residential and recreational area. The property is approximately 15.21 ha (37.8 acres) in size. Lying within it, on the east side, is a wetland/pond which is about 1.8 hectares in area and 560 m perimeter.

The property has served as a recreational resort for approximately 60 years; however, it has been closed since the fall of 2008. The landowner now wishes to modify and improve the existing property by developing a year-round resort.

The property is included in the Glory Hills Area Structure Plan (ASP) of Parkland County. The ASP identifies country residential development and public recreation as the preferred land-use for the area (Parkland County, 1987). On the south, west, north and northwest, the Property is adjacent to residential acreage developments or farmland.

Figs. 1-2 show the location of the project site in regional and local contexts. Figs. 3 and 4 show the boundaries of the proposed development site, and hence the study area for this Assessment.

Fig. 5 shows the GPS waypoints recorded at the site during the field reconnaissance in January, 2012.

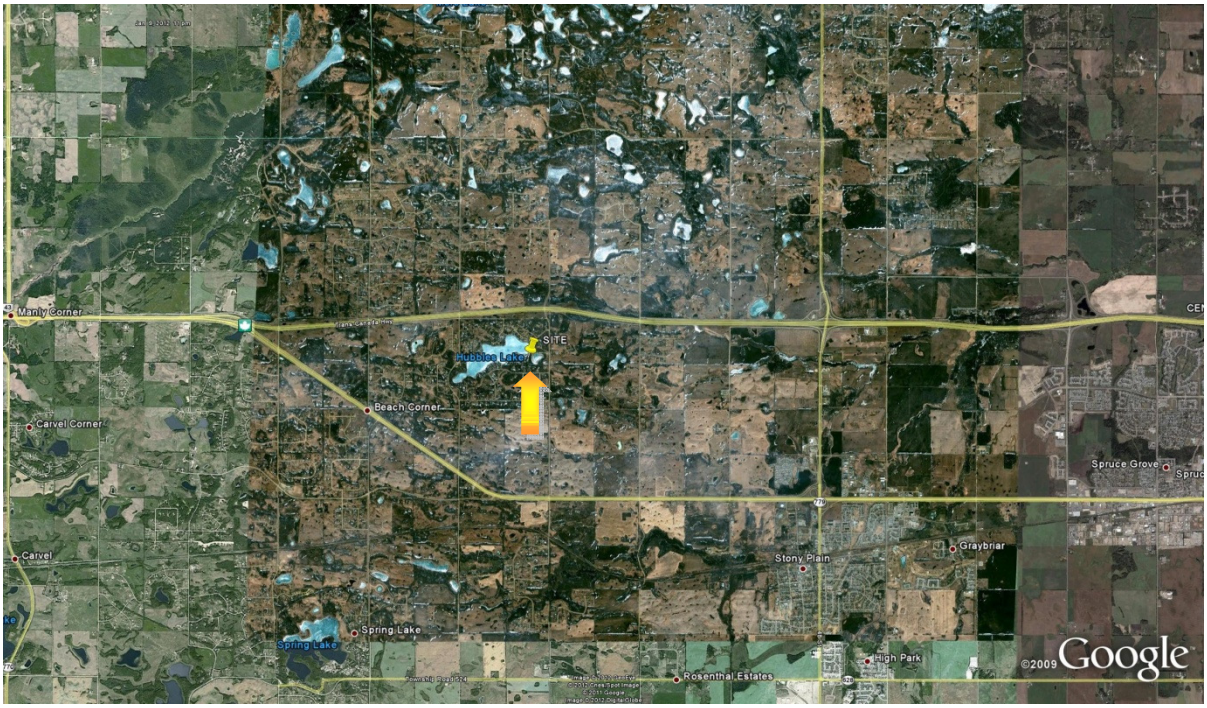

Fig. 1: *Location of the proposed development (yellow marker)(Google Earth Pro imagery).*

Fig. 2: *Location of the proposed development (Google Earth Professional imagery).*

Fig. 3: *Outline of the study area and the proposed development (yellow markers)(Google Earth Professional imagery).*

Fig. 4: *Outline of the study area and the proposed development (yellow shading)(Google Earth Professional imagery).*

Fig. 5: *Waypoints recorded during the field reconnaissance, January 9, 2012 (Google Earth Professional imagery).*

1.3 Scope of Biophysical Assessment

The Biophysical Assessment addresses all parts of the natural environment, and includes:

- Topography, geology and soils;
- Hydrology (surface water, ground water);
- Vegetation (terrestrial, wetland);
- Wildlife (birds, fish, herptiles, invertebrates, mammals) and its habitat;
- Sustainability of ecosystems;
- Linkages with adjacent ecosystems (connectivity); and
- Biodiversity and species at risk (rare, threatened and endangered species).

The geographical scope of the Assessment is the proposed project site, whose boundaries are shown in Fig. 4. However, where relevant the Assessment takes into account adjacent land uses and ecological linkages with the subject property in a regional context.

1.4 Planning History and Previous Assessments

In October 2009, a Biophysical Assessment for the Property and the project was completed by Focus Corporation of Calgary, Alberta (Focus Corporation, 2009). The Assessment covered those areas normally covered in Biophysical Assessments, i.e., land use, vegetation, climate, soils and geology, topography, water, wetlands, fisheries and wildlife. That Assessment was based on field studies that took place primarily in May/June of 2009.

Because the Focus Corporation's assessment and field studies took place during the spring and summer months, and because the present assessment was of necessity undertaken during the winter (of 2012), this report draws substantially upon the information that was collected during the Focus Corporation's assessment and published in their October 2009 report.

In addition, it is understood that the following site specific studies have been, or are expected to be, carried out on the Property:

- Stormwater/Drainage study
- Geotechnical Site Investigation
- Groundwater Study
- Phase 1 Environmental Site Assessment

2.0 REGULATORY MATTERS

The following is a listing of the main Acts and regulations at federal, provincial or municipal levels, which could be relevant to various aspects of the proposed development and possible effects on the environment or natural resources. It is to be noted that not all of the following legislation may be directly applicable to the development, and that the following is not a comprehensive list of any Act or regulation that could apply in any circumstance.

Federal Legislation

Canadian Environmental Assessment Act (CEAA)

The Canadian Environmental Assessment Act (CEAA) applies to a project if a Federal Government Minister (Federal Authority):

- proposes a project;
- grants money or financial assistance to a project;
- grants an interest in land to enable a project to be carried out (that is, sells, leases, or otherwise transfers control of); or
- exercises a regulatory duty in relation to a project, such as issuing a permit or Licence that is covered under the Law List Regulation.

With respect to the last item above, the federal *Fisheries Act* and the *Navigable Waters Protection Act* could trigger the need for an Environmental Assessment under CEAA if a crossing structure (e.g., footbridge) or an outfall/intake structure were being planned. In Alberta, there are harmonization agreements and mechanisms to reduce unnecessary duplication under CEAA and provincial environmental assessment requirements under the Alberta *Environmental Protection and Enhancement Act* and the Albert *Water Act* (see below). A discussion of the applicability of the *Fisheries Act* and the NWPA is provided below.

Migratory Birds Convention Act (MBCA), 1994

Under the Migratory Birds Regulation (under MBCA), no person shall hunt a migratory bird except under authority of a federal permit under this Act/Regulation. Subject to subsection 5(9), no person shall (a) disturb, destroy or take a nest, egg, nest shelter, eider duck shelter or duck box of a migratory bird, or (b) have in his possession a live migratory bird, or a carcass, skin, nest or egg of a migratory bird, except under authority of a permit licenced under this Act/Regulation. This Act and its Regulation become particularly important when removing trees to facilitate development, to landscape, or to remove fall hazard.

Typically, if construction activities require the cutting, transplanting or disturbance of trees or other nesting areas of migratory birds (including wetlands), Environment Canada will advise on the times of the year that these activities can take place, i.e., when the birds are not nesting and raising their young. These timeframes can vary depending on the particular bird species, but typically range from August/September to March/April. However, development can occur outside these periods, providing a migratory bird assessment is completed and the area is found to be free of active nests.

It is suggested that under such conditions, where it is nesting season and any trees could contain a migratory bird's nest, the proponent contact the provincial or federal wildlife offices (Alberta Sustainable Development or Environment Canada) to enquire whether the

operation can be carried out without harming migratory birds or their nests. Alternatively, a suitably experienced biologist could be brought in to advise as to whether migratory birds are nesting in the development area, and whether site-specific development activities are likely to harm migratory birds or their nests.

Fisheries Act

If there is any proposed activity that would destroy or adversely affect fish or fish habitat, such proposed activity would require an Authorization from Fisheries and Oceans Canada (DFO) under the *Fisheries Act*. The Fisheries Act {R.S. 1985, c. F14}, applies to all Canadian fisheries waters and assigns the Department of Fisheries and Oceans Canada (DFO) the responsibility to administer and enforce the conservation and protection of fish habitat on private property and on provincial and federal lands. The Fisheries Act prohibits the discharge of deleterious substances into a water body and requires that any works conducted in and around a water body accommodate fish passage and avoid harmful alteration, disruption, or destruction of fish and fish habitat (HADD). DFO follows a "no-net-loss" guiding principle for fish habitat, meaning that the quantity and productive capacity of the aquatic environment, including fish habitat, must be equivalent to or exceed that which existed prior to commencement of the works. Additionally, any unavoidable habitat loss must be balanced with replacement habitat. If any crossings of water body containing fish (e.g., a culvert) are being considered, both federal and provincial requirements would apply. If any substances were proposed to be released into a fish bearing water body, this too would require a notification.

For any works that may cause a HADD, e.g., a watercourse crossing, a Notification must be sent to DFO (as well as notification of Alberta Environment, under the Alberta *Water Act* and its Code of Practice; see below). Therefore, if the proposed project entails the crossing of a road or pipeline over, under or through a watercourse frequented by fish, notification will need to be made both provincially and federally.

Precautions must be also be taken to ensure that substances such as wood preservatives, paints, lubricants, or silt from erosion, do not enter any waterbodies or wetlands on or near the Property.

For this particular project, Hubbles Lake is recognized as containing a fish population (Northern Pike and Yellow Perch). The wetland/pond at the east end of the Property was apparently stocked with fish in the past, but a more recent study related to this project (Focus Corporation, 2009) failed to detect fish in that waterbody.

Apart from the above, no active watercourses were observed on the Property.

Navigable Waters Protection Act

If a watercourse is considered to be navigable for the purposes of the *Navigable Waters Protection Act (NWPA)*, the construction of a crossing over it would require an Authorization from Fisheries and Oceans Canada (DFO) under the NWPA. The legal scope of the term "navigation" refers to any vessel, even one as small as a canoe or kayak.

If there is to be a crossing structure in the form of a free-standing bridge, the DFO Operational Standards apply. Otherwise, a Notification should be sent to the local office of DFO. This report should be attached to that Notification. The information contained in it is intended to satisfy both DFO and Alberta Environment (AENV) requirements.

Both Hubbles Lake, and probably the small wetland at the east end of the Property would be considered as navigable by federal authorities. If there is a chance that navigability would

be obstructed or altered for these waterbodies, the NWPA would trigger a federal assessment. If a structure that has the potential to obstruct navigability is planned as part of the project, the federal authority responsible for the NWPA should be notified, and an assessment of what impacts are likely to occur, whether they are significant, and how they can be avoided or mitigated, should be submitted to them.

Species at Risk Act

The Species at Risk Act (SARA) was passed in 2002 as part of Canada's commitment to the international Convention on Biological Diversity. The intent of the SARA legislation is to prevent species that are listed in Schedule 1 of the Act from becoming extinct, threatened, or extirpated. Additionally, SARA strives to help in the recovery of any listed species through protecting the critical habitats of at-risk species. Under SARA, it is illegal to kill or harm any listed species, or to destroy the residences of any listed species that occur on federal lands. For listed species that that are found outside of federal lands, it is the duty of the province or territory to protect listed species through legislation. This legislation covers birds, plants, fish, mammals, insects, amphibians and reptiles.

In the present case, no rare or endangered species were observed on the portion of the land in which development is proposed (discussed later in this report). Perusal of the ASRD data bases did not reveal the presence or establishment of SARA-listed species on the Property or in the area (3-km radius).

Federal Policy on Wetland Conservation

The Federal Policy on Wetland Conservation was passed by Cabinet in 1991, with the objective of promoting "the conservation of Canada's wetlands to sustain their ecological and socio-economic functions, now and in the future" (Government of Canada, 1991). The Federal Policy on Wetland Conservation applies to the full range of federal activities and drives management decisions regarding the protection of wetland habitat on federal lands.

The two key commitments of the Federal Policy on Wetland Conservation include:

- no net loss of wetland functions on federal lands and waters through mitigation of all impacts of development related to these wetlands; and
- enhancement and rehabilitation of wetlands in areas where the continuing loss or degradation of wetlands has reached critical levels.

The wetland in the east part of the Property should therefore be protected against environmental degradation to the extent possible.

Provincial Legislation

Public Lands Act

The bed and shores of all watercourses and water bodies are considered public lands unless the Government of Canada owns them. As such, approvals under the Public Lands Act {R.S.A. 2000, c. P-40} are required for any activity on the bed or shore of Crown owned rivers, streams, or lakes. Any activity that alters or occupies the bed and shore of a water body may be done only after written approval.

A Licence of Occupation (LOC) would be required for instream structures and permanent or temporary facilities on Crown Land. A Licence of Occupation (LOC) is required under the *Public Lands Act* to build any structures that could have a negative impact on the bed and

shore of a waterbody (e.g., retaining walls, boat launching facilities, breakwater structures, and causeways).

There were no significant flowing creeks, streams or rivers observed on the Property in this study nor in a previous one (Focus Corporation, 2009). Any other flows along gulleys or draws on the Property would be regarded as intermittent rather than permanent streams. The ASRD Lands Department would normally claim only permanent, naturally occurring waterbodies as public lands.

This means that if development or changes/improvements are to be made to any part of the bed and shore of this waterbody, ASRD Lands should be notified and consulted; and they will need to approve any land use in or around this waterbody. The same would apply if the development will entail activities along the shore of Hubbles Lake, or otherwise affect the lake.

Environmental Protection and Enhancement Act, 1992

The Alberta *Environmental Protection and Enhancement Act (EPEA)* supports and promotes the protection, enhancement and wise use of the environment. It recognizes the impact of development, polluters paying for their actions, and other such acts.

The Act deals with the release of substances into the environment, regulating releases, and creating general prohibitions with respect to substance release, and also provides the necessary powers to regulate the handling of storm drainage and wastewater. A key part (Section 109) states that no person shall release or permit the release into the environment of a substance in an amount, concentration, or level or at a rate of release that causes or may cause a significant adverse effect, thus covering a very broad range of anti-pollution prohibitions.

Under the Wastewater and Storm Drainage Regulation, EPEA gives powers to Alberta Environment for the regulation of stormwater drainage and wastewater systems. The Wastewater and Storm Drainage Regulation and the Wastewater and Storm Drainage (Ministerial) Regulation enable the Department to regulate the operation of storm drainage and wastewater systems and establish standards for such facilities and their operators. This legislation sets out requirements for the construction and operation of municipal plants for handling of stormwater drainage and wastewater.

Among other things that the Act covers are the following:

- Harmful emissions to the air (Air Emissions Regulation);
- Release of harmful/toxic substances to the environment (Substance Release Regulation);
- Reclamation of disturbed lands (Conservation and Reclamation Regulation);
- Ozone-depleting substances (Ozone-Depleting Substances Regulation);
- Handling, use and application of pesticides (Pesticide Sales, Handling, Use and Application Regulation);
- Potable water (Potable Water Regulation); and
- Reporting of releases to the environment (Release Reporting Regulation).

EPEA allows for anti-litter orders to be issued for the control of waste on highways, water, ice and public and municipally owned land (which are referred to as enforcement orders).

Orders for the cleanup of unsightly property are referred to as environmental protection orders. The forms of both types of orders are set out in the regulations.

EPEA regulates the handling, storage and disposal of hazardous wastes under the Waste Control Regulation. Hazardous wastes are defined in the Regulation.

The Wastewater and Storm Drainage Regulation under AEPEA gives Alberta Environment the responsibility of regulating storm drainage and wastewater systems, including the establishment of standards for such facilities in their operation. This includes naturalized wetlands, other storm water management facilities, outfalls and related piping. Some of these matters may be applicable to the present project, depending on the infrastructural design.

Water Act

The Alberta Water Act, which came into force in 1999, supports and promotes the conservation and management of water. It regulates withdrawals and diversions of water, including drilling water wells, through a licensing and authorization system. It regulates water management works and undertakings, and authorizes temporary diversions through a licensing process.

Watercourse crossings (road, bridge, pipeline, telecommunications, etc.) are authorized/regulated through the Alberta Watercourse Crossings Codes of Practice. A Notification must be submitted to Alberta Environment detailing any watercourse crossing structures, and explaining how the construction and operation of the crossing meets the requirements of the Code.

Approval would be required under the *Water Act* from Alberta Environment in respect to any watercourses or wetlands that might be affected, or whose flows may be affected, by the proposed development. For this reason, any wetlands or watercourses on the Property need to be identified, classified and evaluated according to defined criteria. Measures would need to be developed to mitigate any adverse effects on any wetlands or watercourses that might occur on the Property. Under the provincial wetlands policy, any wetland that is to be disturbed or destroyed due to the project must be replaced with habitat of equal quality (habitat compensation), or equivalent financial compensation.

An approval is required to conduct an activity in a water body. An activity is defined generally to include placing or 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.

Construction of an outfall would also require that the Code of Practice for Outfall Structures on Waterbodies under the Water Act be followed. This Code of Practice dictates restricted activity periods on water bodies, and requires that certain design standards be followed. The Code of Practice also requires that notice be issued to the Director, Alberta Environment, prior to commencement of the work. Hydrological issues are discussed later in this report.

Approvals would be required under the *Water Act* to modify or fill any wetlands that might occur on the Property, and to construct any outfall drainage channel into a water body. This matter is discussed later in this report. The development Property borders Hubbles Lake, and contains a Class V wetland at its east end (W1 on Fig. 10). The *Water Act* requirements would apply to both of these water bodies and the riparian areas along their shores if they were to be drained, filled or otherwise disturbed or altered.

Weed Control

Under provincial legislation, only pesticides that have been registered for use in Canada by the Pest Management Regulatory Agency under the Canada *Pest Control Products Act* can be used in Alberta. Pesticides are regulated in Alberta under the Alberta *Environmental Protection and Enhancement Act* and supporting regulation (Pesticide Sales, Handling, Use and Application Regulation).

This legislation provides for the regulation of sales (pesticide vendors) and use (pesticide applicators) of pesticides in Alberta. In addition, there is the Environmental Code of Practice for Pesticides which provides more detailed direction for pesticide sales and use in Alberta.

In both the present study and the previous Assessment (Focus Corporation, 2009), an abundance of invasive, non-native vegetation was observed throughout much of the Property. It is recommended that such plant species, i.e., weeds, not be introduced as a result of project activities (e.g., filling and stockpiling of soil) and that where feasible existing weeds be controlled. Manual and cultural methods should be the priority, but where this is not practical, chemical weed control should follow the above regulations and standards; and in such a manner as not to affect the riparian vegetation, nor enter into Hubbles Lake or Allan Pond.

Wildlife Act

Alberta's Wildlife Act is the main piece of provincial legislation that deals with wildlife. Under the Act, hunting without a licence or out of season is prohibited, as is the possession of wildlife and controlled animals (defined in the Act). The Act also covers diseased animals, damage or threat caused by private animals, and the closing of areas to the public to protect wildlife, where necessary. Licences and permits are issued under the Act to regulate hunting or other activities, as outlined above.

If the Minister believes that any animal is diseased or materially infested by parasites and might present a danger to the life or health of any wildlife animal or endangered organism, or that any animal poses an ecological threat or genetic danger to wildlife or an endangered organism, he/she may order that the suspect animal be quarantined or direct a wildlife officer to seize the suspect animal and kill or otherwise dispose of it. If a wildlife officer believes that a privately owned animal is harassing wildlife, the officer can order the owner to confine it in acceptable manner. Other similar provisions apply where a privately owned animal is harassing, or posing a threat to, the life or health of wildlife, or is damaging wildlife habitat. Additionally, where a privately owned animal is believed to pose an immediate danger to any person, or is damaging or is imminently likely to damage property, an officer may capture or destroy the animal. If a wildlife officer believes that the health or safety of the public is in jeopardy in any area owing to the presence of wildlife or a controlled animal or from any attempt to capture or kill such an animal, the officer or guardian may make a written or oral order that the area be closed to public access for a specified period.

If beaver were to be killed, harmed or removed (e.g., to discourage blockages of surface water flow, or damaging trees), permission would need to be sought under the *Wildlife Act*.

Historical Resources Act

Section 37 of the Historical Resources Act provides the framework for Historical Resources Impact Assessments (HRIAs) and mitigative studies. When, in the opinion of the Minister of Alberta Community Development (ACD), an activity will or will likely result in the alteration, damage or destruction of an historic resource, the person or company undertaking the activity can be required to:

- conduct an HRIA on lands that may be affected by the activity;
- submit to ACD a report discussing the results of the HRIA;
- avoid any historic resources endangered by activity; or
- mitigate potential impacts by undertaking comprehensive studies.

HRIAs and mitigative studies are paid for by the person or company undertaking or proposing to undertake the activity. ACD regulates archaeological and paleontological fieldwork through a permit system. All decision-making in regard to the management of historical resources rests with ACD.

One of the requirements of an HRIA is to address compliance requirements associated with the Historical Resources Act of Alberta. As such, it becomes incumbent for the proponent to comply with any government requirements that result from a Historical Overview if one has been done. At a minimum, ACD should be contacted, to determine if they have any concerns about the Property in question, from an historical, archaeological or related perspective.

The Allan Beach development site borders a lake, and has elevated slopes -- two factors that figure in considering a site to have *potential* archaeological / historical or pre-historical importance. To our knowledge, no HRIA has been completed for this project.

Species at Risk Program

Alberta has a Species at Risk Program, which was initiated as a response to the provinces commitment to the Accord for the Protection of Species at Risk in Canada. The intent of the Accord is to prevent species in Canada from becoming extinct as a consequence of human activity. As part of the assessment procedure, all species of concern are generally assessed and are classified as one of the following categories 1) At Risk; 2) May Be at Risk; 3) Sensitive; 4) Undetermined; and 5) Secure. Any species that is designated as “At Risk” or “May Be at Risk” undergoes a detailed status assessment and is formally designated as Endangered, Threatened, Special Concern, Data Deficient, or Not At Risk. Any species that is designated as Endangered or Threatened becomes legally protected under Alberta’s Wildlife Act {R.S.A 2000, c.W-10}. This legal designation prohibits the disturbance, killing or trafficking of these species, and provides immediate protection of nests and den sites. Any species that is designated as “Sensitive” after a general assessment, or as “Special Concern” after a detailed assessment becomes eligible for special management actions designed to prevent the species from becoming “At Risk”.

A search of ACIMS database maps on January 17, 2012, showed no Element Occurrences (sensitive or non-sensitive) on or near the Property.

Interim Policy for Wetland Management in the Settled Area of Alberta and Guidelines for Wetland Habitat Compensation

Developed in 1993, this interim policy provides direction on the management of wetlands in the settled areas (white zone) of Alberta (Alberta Water Resources Commission, 1993). The primary goal of the policy is to “sustain the social, economic, and environmental benefits that functioning wetlands provide, now and in the future” by conserving wetlands in a natural state, mitigating the degradation and loss of wetlands, and enhancing, restoring, or creating wetlands in areas where they have been depleted or degraded.

If the flow of surface water is altered or blocked, or if a wetland is being altered or destroyed by filling in or draining, the Alberta Policy on Wetlands and the *Alberta Water Act* would

apply. The Policy, in essence, requires that there be no *net* loss in wetland habitats in Alberta. If a wetland is destroyed, then compensation must be provided by the person or persons responsible for effecting such damage. Under the policy, compensation can be through directly creating equivalent wetland habitat in another location, or by paying a recognized wetland manager (e.g., Ducks Unlimited) to accomplish this. If the compensation sites are within a certain distance from the affected one, the compensation ratio is 3 hectares of new wetland to 1 hectare of affected wetland. Beyond a certain distance between compensated wetlands and affected wetlands, the ratio becomes higher, and increases with progressive distance. This would apply if any wetland that might occur on the Property were affected by the development or related construction activities.

One Class V wetland of significant size was observed on the Property (Allan Pond). It is understood that the wetland will be protected as an Environmental Reserve. In that case, the issue of compensation would not arise. If wetlands were to be lost or degraded as a result of the proposed development, however, compensation would need to be discussed with Alberta Environment, as per the Alberta Wetland Compensation Guidelines.

Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems

Alberta Environmental Protection has established standards and guidelines for the design and operation of municipal waterworks, wastewater and storm drainage systems (Alberta Environmental Protection, 1997). These standards and guidelines outline four types of requirements: Performance Standards, Design Standards, Design Guidelines, and Operating and Monitoring Requirements and Guidelines. These requirements are all directed towards ensuring public health and environmental protection.

Wastewater and Storm Drainage Regulation and Wastewater and Storm Drainage (Ministerial) Regulation

The Wastewater and Storm Drainage Regulation {AR 119/93} and the Wastewater and Storm Drainage (Ministerial) Regulation {AR 120/93} fall under Part 4, Division 1 of the Environmental Protection and Enhancement Act {R.S.A. 2000, c. E-12}. These regulations create general prohibitions with respect to substance release to the environment and provide powers to regulate the handling of wastewater and storm drainage.

Stormwater Management Guidelines for the Province of Alberta

These guidelines were developed as a result of increased urbanization and public expectation for improved runoff control. These guidelines direct the planning, analysis, design, construction, operation, and maintenance of stormwater management systems to address concerns associated with stormwater runoff and its impact on urban and rural development, and aquatic resources. These guidelines include Best Management Practices for stormwater management and quality control.

Code of Practice for Outfall Structures on Water Bodies

The Code of Practice for Outfall Structures on Water Bodies came into effect in September 2003. Activities regulated under the CoP for outfalls include the placement, construction, installation, maintenance, replacement or removal of an outfall structure, and any activities related to the placement, construction, installation, maintenance, replacement or removal of the structure. The CoP establishes standards to ensure that any disturbance or impact to the environment that occurs as a result of the placement of an outfall structure is minimized. The Guide to Requirements for Outfall Structures on Water Bodies was published in

December 2004. The guide was designed to clarify the obligations of those involved in outfall structure activities. The document outlines methodologies for biological and physical assessments, and provides a list of best management practices for the construction, operation, and monitoring of outfall structures. Appropriate mitigation measures would need to be taken if a stormwater outfall is planned for the new subdivision. If there is to be a discharge structure for surface water originating from the Property, this Code of Practice will need to be followed.

Code of Practice for Watercourse Crossings

Activities regulated under the CoP include the placement, construction, installation, maintenance, replacement or removal of a watercourse crossing, by a road, pipeline or telecommunications line; and any activities related to the placement, construction installation, maintenance, replacement, or removal of it. The Code establishes standards to ensure that any disturbance or impact to the environment that occurs as a result of the placement, maintenance, or removal of a watercourse crossing is minimized. This Code would apply, therefore, if a crossing structure were to be used for any waterbodies entering or crossing the Property. Appropriate mitigation measures would need to be taken in respect to crossing any drainage course. If a project were to entail a crossing over a permanent watercourse, the appropriate mitigation would need to be incorporated into the design, and Alberta Environment would need to be notified as per the requirements of the Code. In the present case, no streams, creeks or other permanent watercourses were observed on the Property.

Municipal Government

Most Municipal Government bodies in Alberta now require that a Biophysical Assessment be done prior to subdivision of land, and before the completion of an ASP or other site-specific development plan. One of the purposes of the Biophysical Assessment, in general, is to provide a specific assessment process for dedication of Environmental Reserve, Municipal Reserve and Conservation Easement based on municipal, community and environmental needs. In addition, it makes recommendations as to how to avoid, minimize or control adverse effects on the existing environment resulting from the development, if it is to proceed, and how to incorporate the principles of sustainability in designing and constructing the development.

This report addresses the County's requirement for a Biophysical Assessment. The investigation also compiles information that would be useful for regulatory determinations under the *Water Act,* the *Public Lands* Act and other applicable acts and policies as outlined above.

3.0 APPROACH AND METHODS

The Biophysical Assessment was conducted to describe and interpret site features as they existed at the time of the field reconnaissance, which took place on January 9, 2012. The study included the following activities:

- Consultation with the firm undertaking the detailed design of the proposed subdivision development;
- Review of any maps, previous reports, etc., completed for this project;
- Examination of historical aerial photographs, to assess surrounding land use, vegetation areas, developments, etc.;
- Database searches, e.g., ANHIC database for tracked and listed species;
- Field reconnaissance of the site; and
- Analysis of the information, and drafting Biophysical Assessment report.

The scope of the field reconnaissance was to observe features of vegetation, drainage, wildlife and other components of the natural environment, as existed at the time of the field reconnaissance. The types and distribution of vegetation, the type of forest, drainage features, wildlife and wildlife signs (e.g., tracks, feces, hair, burrows, nests, rubs, scrapes, etc.), and any other environmental features, were noted by location and documented with photographs.

Because there was slight snow cover during the visit, features of vegetation, soils, etc. were not entirely visible. Many species of plants or animals are not visible at that time of year because of their life cycles and snow cover. **As mentioned above, this report draws substantially upon the field information that was collected during the Focus Corporation's assessment and published in their August 2009 (updated October 2009) report.**

Locations and features of the Property were geolocated using a Garmin GPS60Cx hand-held GPS unit. The coordinates of all waypoints are given in Table A1 of Appendix A. Fig. 5 shows the waypoints established during the field reconnaissance.

The contours of the site were observed on topographical drawings and directly in the field, and note was made of any depressions which might form a wetland, gully or natural drainage course. Historical aerial photos were examined from 1949 through 2009 (available from Alberta Government), to learn about past and present vegetation cover, earthworks, human activities or places on the site water tends to collect. Potential wetlands were also identified by noting lower topographical areas, and dark-shaded areas in the aerial photographs. The potential wetlands were then observed in the field, and the vegetation growing there was examined. Samples of vegetation were taken from any low-lying areas on the subject property and identified. Classification of these areas as potential wetlands was done mainly according to the Stewart and Kantrud Wetland Classification System (Stewart and Kantrud, 1971). The historical aerial photographs were examined to determine the configuration of each low, wet area and the amount of surface water present in various years.

GPS Waypoints are specific locations established by the GPS instrument, abbreviated in this report as “WP”, so that Waypoint 23, for example, is referred to as “WP23”. They are shown in Fig. 5.

The spatial area of each wetland or other feature was determined from aerial imagery, and ground-truthed by marking the perimeter of wetland vegetation using GPS in the field.

4.0 THE EXISTING ENVIRONMENT

4.1 CLIMATE AND AIR QUALITY

The proposed development site lies within the Dry Mixedwood Sub-Region of the Boreal Forest Natural Region of northeastern Alberta, although it lies very near to the transition between the Dry Mixedwood and Central Parkland Sub-Regions (Alberta Environmental Protection, 1998. Natural Regions and Sub-Regions of Alberta (map)). Observations in the field suggested that the vegetation and soils and landforms resemble the Dry Mixedwood Sub-Region.

The climate of the Dry Mixedwood Sub-Region is sub-humid, continental with short, cool summers and long, cold winters. The mean May - September temperature within the Sub-Region is about 11-13^{o} C and the growing period is about 80 - 90 days. Annual precipitation averages about 380 mm with June and July the wettest months. Winters are relatively dry with about 60 mm of precipitation.

The most frequent wind direction varies minimally over the year. Wind directions are mainly from the northwest except during February, April, July and December when they are predominately from the west. Monthly wind speeds are fairly consistent throughout the year (9.3 to 11.9 km/hr).

In the previous biophysical assessment (Focus Corporation, 2009), climate data was collected from Environment Canada. Climatic data was compiled for the 30 year period, 1978 to 2008, from the Edmonton Stony Plain Station; located approximately 2.6 km southwest of the Property.

Over the period 1978 to 2008, the average monthly temperature for the winter months (December to February) was -9°C with extreme monthly temperature fluctuations (-17.5°C to +39°C) over the 30 year period. Average monthly winter precipitation is 19.15 mm; 92% of which consists of snow.

The average monthly temperature for the spring months (March to May) was 4.3°C; increasing from a March average of -2.7°C to a May average of 10.8°C, with extreme (average) monthly temperature fluctuations of -11°C to +20°C over the 30 year period. Average monthly precipitation is 33 mm; 67.6% of which consists of rain (Focus Corporation, 2009).

The average monthly temperature for the summer months (June to August) was 15.8°C; with mean minimum and maximum temperatures of 10°C and 20°C, respectively, over the 30 year period. Average monthly precipitation is 85 mm; all of which consists of rain.

The average monthly temperature for the fall months (September to November) was 4.1°C; decreasing from a September average of -11°C, an October average of 5.6°C, to a November average of -4°C over the 30 year period. Average monthly precipitation is 32 mm; with 97% falling as rain in September, 54% as rain in October and <1% as rain in November (Focus Corporation, 2009).

Generally, average winter and summer temperatures have decreased since 1978. No discernable change was found in the spring and fall temperature trends. The average precipitation trend for the months June to March are declining, while April and May precipitation trends are slightly increasing (Focus Corporation, 2009).

Agricultural and related industrial activities predominate local emission sources. Higher particulate air quality levels may occur on a temporary basis as a result of agricultural and industrial (e.g., construction, road dust, fires) activity. Vehicle exhaust fumes may be another source of minor air pollution, given the proximity to populated areas and roads.

4.2 PHYSIOGRAPHY AND TOPOGRAPHY

Physiography

The physiography of the Dry Mixedwood Sub-Region is typically of hummocky moraine landform, with glaciolacustrine, aeolian dunes, organic deposits and sand outwash plains. Generally, the land in the vicinity of the development site can be described as undulating or hummocky, with local depressions, gullies and knolls.

Landscapes in the Property area are dominantly undulating to hummocky moraines (till) with significant glaciolacustrine blankets over till (Pedocan 1993). The AGRASID polygons show a hummocky, high relief landform with a limiting slope of 25% for the northern portion (Polygon 19376), and an organic landform with a limiting slope of 1% for the southern portion (Polygon 19435) (Alberta Agriculture and Rural Development 2009).

Topography

Fig. 6 is a topographical map showing the contours on the Property. Basically, the South part of the Property contains hummocky slopes that descend toward the north and Hubbles Lake. On the East part of the Property, the land is sloped down towards Allen pond. The land around the beach on the northeast side of the Property slopes gently downward to the shore of the lake.

Due to topography and soils, the Property offers little or no potential for agriculture.

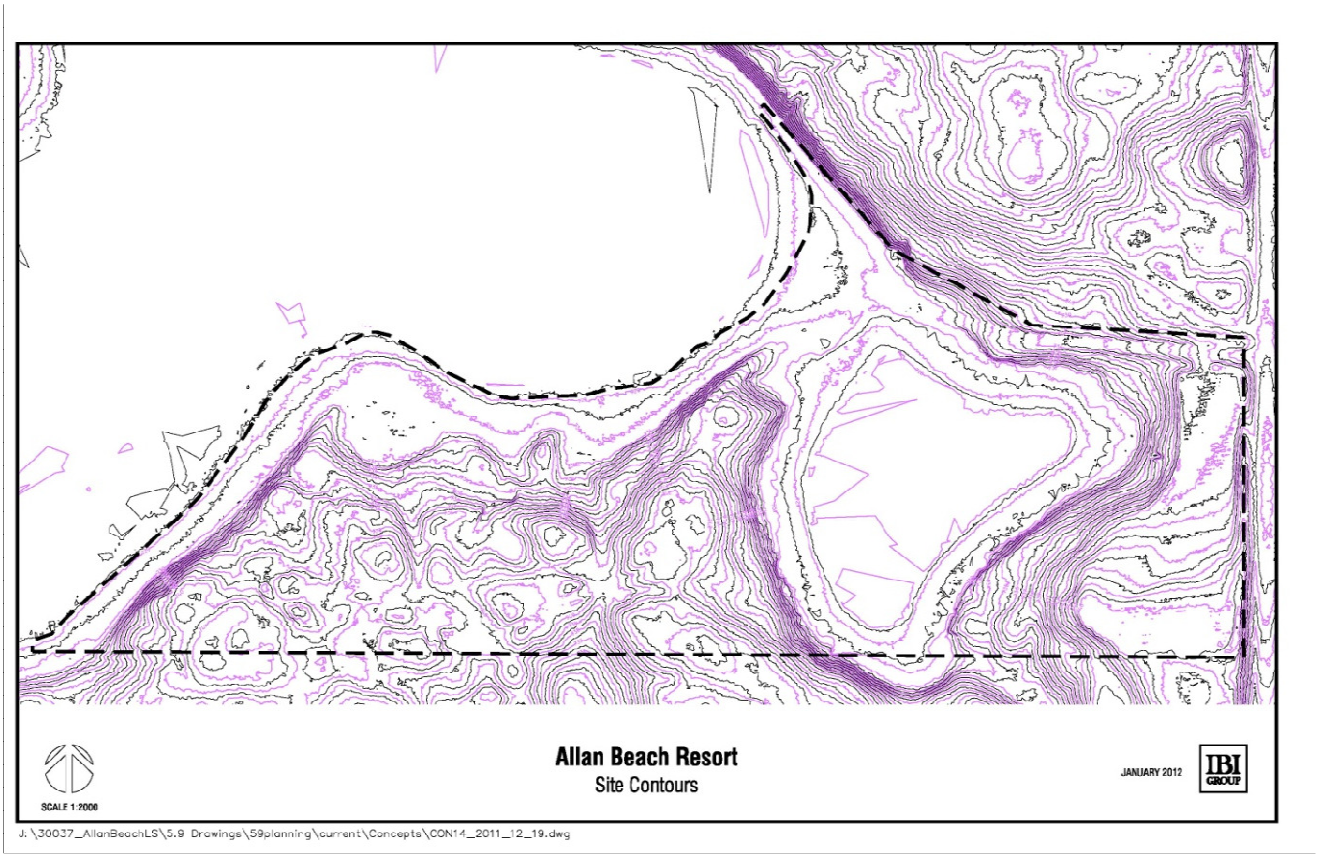

Fig. 6: *Contour map of the Property.*

4.3 GEOLOGY AND SOILS

Geology

The bedrock geology of the Wabamun Lake area (which includes the Property) consists of the Upper Cretaceous Horseshoe Canyon Formation. The Horseshoe Canyon Formation is comprised of non-marine, grey feldspathic, clayey sandstone, grey bentonitic mudstone and carbonaceous shale, concretionary ironstone beds, scattered coal and bentonite beds of variable thickness, as well as minor limestone beds (Hamilton et al. 1999, as quoted in Focus Corporation (2009)).

Surficial geology of the Wabamun Lake area consists of Late Pleistocene glaciodeltaic deposits characterized by laminated to massive structured sand and silt with minor amounts of clay and gravel sediments. Some pockets of glacial till exist within the area. Quaternary drift lying above bedrock varies from 60 m to 90 m in thickness in the region (Andriashek et al. 1979, as quoted in Focus Corporation (2009)).

Soils

Soils of the Dry Mixedwood Boreal Forest are typically gray luvisols in well-drained, upland till sites and eutric brunisols in coarse-textured sandy uplands. Organics and gleysolics occur on wet depressional sites.

Soil data was taken from the Agricultural Region of Alberta Soil Inventory Database (AGRASID, Alberta Agriculture and Food, and Agriculture and Agri-Food Canada) Soils Information Viewer. AGRASID uses the Land Suitability Rating System (LSRS) for the production of spring-seeded small grains (wheat, barley, and oats). This rating system replaces the Canada Land Inventory (CLI) suitability values (Alberta Agriculture, and Rural Development 2009, as quoted in Focus Corporation (2009)).

The LSRS rating indicates that 80% of the land is Class 4; marginal for sustained production of the specific crops. The subclass (T) indicates landscapes with slopes steep enough to incur a risk of water erosion or to limit cultivation (Focus Corporation, 2009).

The remaining 20% of the land is rated as Class 7, and is considered unsuitable for the production of the specified crops. The subclass (W) indicates soils in which excess water (not due to inundation) limits the production of the specified crops. Excess water may result from a high water table or inadequate soil drainage. The soil subclass (V) indicates soils with a pH value either too high or too low for optimum growth of the specified crops (Agronomic Interpretations Working Group 1995). The northernmost soil polygon is 1786 ha in size and consists of a mixture of Brightbank, Glory, Carvel and Miscellaneous Organic Soil Series. This polygon consists of Dark Gray Luvisol on moderately coarse textured (SL) sediments deposited by wind or water (Brightbank), Orthic Gray Luvisol on medium textured (L, SiL) sediments deposited by wind and water (Glory). The polygon includes poorly drained soils (Alberta Agriculture and Rural Development 2009, as quoted in Focus Corporation (2009)).

The Property falls within Soil Correlation Area #11 (Pedocan 1993). Soils in this area are Dark Gray Chernozems and Luvisols with some Orthic Gray Luvisols. Depressional areas contain Gleysols (often with a peaty surface layer) and occasionally Organic soils. Profile development is generally 70 cm deep, with 10 cm to 30 cm of dark gray coloured A horizon, occasionally with a light gray leached (Ae) horizon below. Cultivated Gray Luvisols have a dark coloured Ap horizon but native soils have a gray leached (Ae) horizon (Pedocan 1993, as quoted in Focus Corporation (2009)).

The southernmost soil polygon is a mixture of Miscellaneous Organic and Kerensky Soil Series. Miscellaneous Organic Soil Series are found in depressional areas, while Kerensky and Glory Soil Series are found on lower slope locations. Brightbank and Carvel Soil Series are found at top of slope and mid-slope locations (Alberta Agriculture and Rural Development 2009, as quoted in Focus Corporation (2009).

Further details and illustrations are provided in the earlier biophysical report (Focus Corporation, 2009).

A Geotechnical study of soils in the Property area, conducted in 2008 found that elevation changes over the Property were approximately 18 m. Testholes advanced to a depth of between 5.8 m and 21.0 m, showed that the soils may be classified as ice contact lacustrine and fluvial deposits. Fill material was encountered during testhole drilling. These fill materials consisted of topsoil, organic clays, silts, clays and gravel. Greater depths of fill materials were located near Allan Pond wetland. Further details are available in the geotechnical report by J.R. Paine and Associates Ltd. (2008).

Soil Sensitivity

The soils in some areas on the southern slopes are previously disturbed. Forested areas occurring on the Property were on hummocky slopes ranging to about 20 degrees, with some of the sloped areas being naturally "benched". In some places they are soft and organic, while in others, bare, sandy soil was exposed. There is the potential for soil erosion particularly near the base of the slopes surrounding Allan Pond. Examples include: WP15, WP18, WP21, WP26, WP33 (viewing platform) and WP50.

In some locations, supporting walls have been erected to contain any ground instability, and in some areas there is soil instability and erosion. Great care will need to be taken in the construction, to ensure that some of these highly erodible soils are not excessively disturbed and vegetation is not lost from it. Existing vegetation helps to hold otherwise unstable soils in place. Excavated and otherwise disturbed areas should be re-vegetated with native vegetation immediately after construction, to ensure that major erosion and wasting problems are not caused.

Due to both topography and soils, the Property offers little or no potential for agriculture.

4.4 SURFACE WATER

Regional Drainage

Fig. 7 shows a drainage map of the land around the site, taken from 1:50,000 NTS mapping. Apart from Hubbles Lake and Allan Pond to its east, there are no major rivers or other watercourses on the Property, nor in the immediate vicinity of the project site. The nearest watercourse to the project site is the headwaters of Atim Creek (south branch), which eventually drains into Big Lake to the east. There are also a number of marshy areas shown (blue cross-hatching) to the south, and further, to the east.

Hubbles Lake has no defined watercourses as inlet or outlet. It is likely that groundwater inflow provides a significant amount of water to the lake (Prepas n.d. as cited in University of Alberta 1990a). The Hubbles Lake drainage basin is 20 times the area of the lake, but only 1.36 km² of the basin contributes runoff to the lake (Alta. Envir. n.d. {b} as cited in University of Alberta 1990a). The surface area of Hubbles Lake is only 0.40 km2.

The water level of Hubbles Lake has varied only 0.3 m since mid-1974. Since there is no surface outlet, the residence time of the lake water is likely very long, but as the amount of groundwater inflow or outflow is not known, the water residence time cannot be accurately calculated. Based on surface flows, it is estimated to be more than 100 years (University of Alberta 1990a, as quoted in Focus Corporation (2009)).

Because Hubbles Lake is small, deep, and protected from wind by hills and trees, the water does not mix from top to bottom in most years. Consequently, the water quality of the lake is quite unusual (University of Alberta 1990). Alberta Health Services monitors water quality in Hubbles Lake. The water in Allan Pond is not monitored (Focus Corporation, 2009).

Site Drainage

Based on the hummocky site topography, as referred to above, the surface water drainage at a micro- level can be expected to be complex. However, at a macro- level, the drainage can be expected to be from the slopes on the south and east sides of the Property, towards the north and west and thus towards Allan Pond and Hubbles Lake. Fig. 8 shows this general pattern of overland surface water flow.

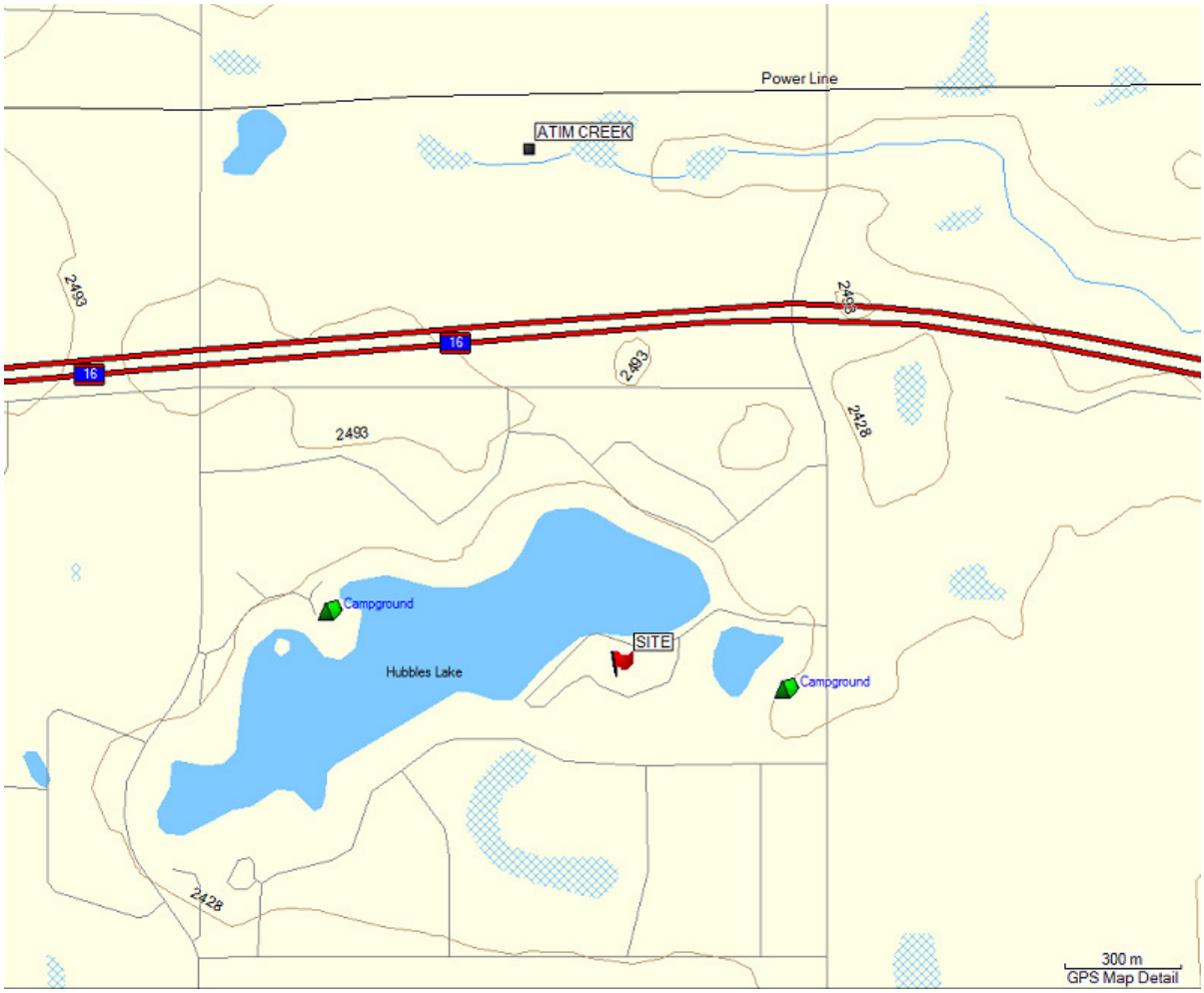

Fig. 7: Topographical map of the vicinity of Hubbles Lake and the project site, taken from 1:50,000 NTS mapping.

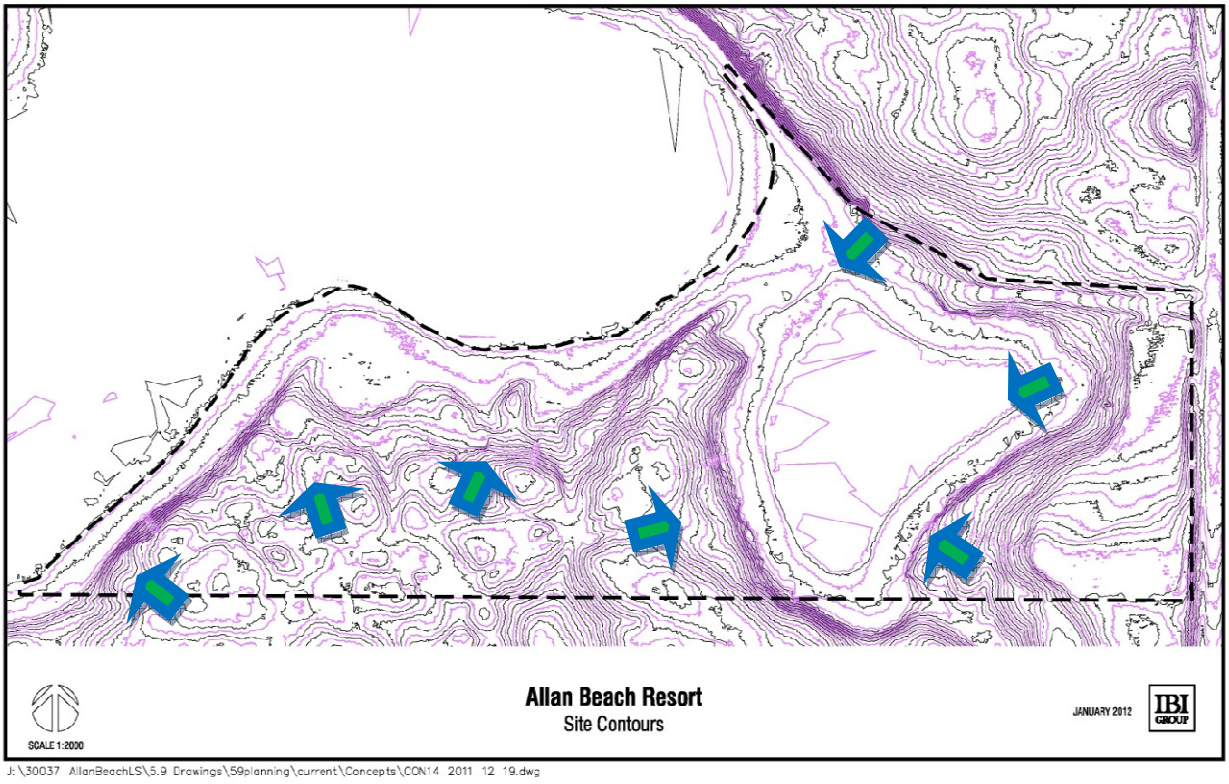

Fig. 8: *Existing surface water drainage patterns and wetlands identified on the Property. Blue arrows indicate direction of surface water flow, as inferred from contours.*

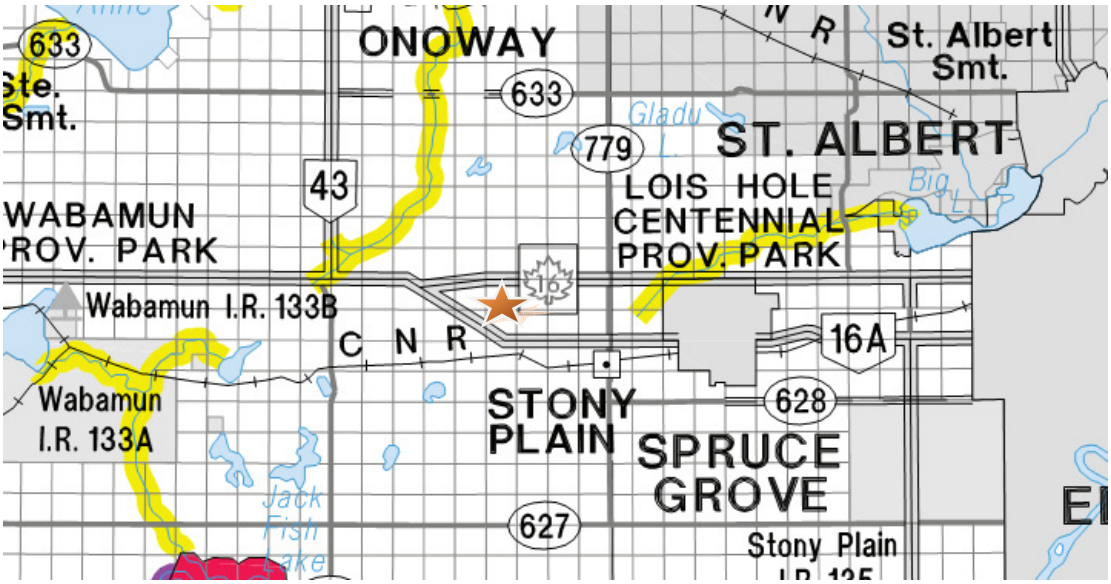

Fig. 9: *Extract from the map of classed waterbodies for the Watercourse Crossing Code of Practice (Alberta Environment, 2006, Stony Plain Management Area). Orange star indicates location of the subject site.*

Surface Water Quality

In the biophysical assessment that was conducted by Focus Corporation in 2009, water samples were taken within Allan Pond, and analyses were made for acidity (pH), temperature and dissolved oxygen. The results are shown in Table 1, below. The data indicate that the water in Allan Pond meets or exceeds minimum criteria of AENV Guidelines for the protection of freshwater aquatic life for the parameters that were examined.

Table 1: Allan Pond Water Quality (Focus Corporation, 2009)

Parameter	Result
pH	8.8
Temperature	12.1℃
Dissolved Oxygen	16.7 mg/L

4.5 SURROUNDING LAND USE

To this date, the Property has been developed and used as a resort with lease sites available for recreational vehicle (RV) use. Before 2008, Allan Pond and its perimeter was used as an unofficial seasonal recreation site. The remainder of this section dealing with land use, including the observations made from historical aerial photographs, is taken from the previous biophysical assessment, conducted by Focus Corporation (Focus Corporation, 2009).

The Property is included in the Glory Hills Area Structure Plan of Parkland County, which identifies country residential development and public recreation as the land use best suited to the Plan area (Parkland County 1987). The Property is bordered to the south and north-east by residential acreage developments; by Hubbles Lake to the west and by Range Road 13 and residential acreage development and farmland to the east.

Historical aerial photography between the years 1949 to 2001 were examined to determine changes in land use, both on the Property and on adjacent properties. Observations of note were as follows:

> 2001: The Property is developed with lots and vehicles on a cleared area around Allan Pond. Larger buildings are visible on an area of low vegetation between the Pond and the beach at Hubbles Lake. The eastern part of the Property appears to be an area of low vegetation. The western part of the Property, along the south shore of Hubbles Lake, shows development of a road, bare shoreline and an area with vehicles. There are lots in the upland areas with clearings and access roads. Some of the lots have vehicles and what appear to be buildings. There are residences visible to the north, south and west of the Property with access roads. A two lane road, visible to the east, is known to be Range Road 13.
>
> 1991: There are no significant changes from the 2001 photograph.
>
> 1982: There are no significant changes from the 2001 photograph.
>
> 1971: Allan Pond appears to be much smaller, and appears in two separate pools. The beach area of Hubbles Lake appears to be less developed, and the west shoreline area has a road, but no developed lots. The upland lots and access roads appear smaller with no structures on them. There are no residences visible to the south of the Property.
>
> 1962: The Pond appears to be one waterbody, the same size and shape as previously described from 1982 to 2001. There do not appear to be any lots on the Allan Pond margin, but a road around the Pond is visible. Apart from this, there are no significant changes from the 1971 photograph.
>
> 1949: There are no lots or access roads on the upland areas and there does not appear to be any residential development around Hubbles Lake. The land appears to be forested to the west and south with agriculture to the east and north. There appears to be a road around Allan Pond and along the southern shore of Hubbles Lake.

Historical aerial photographs are contained in Appendix 1 of the previous biophysical assessment report (Focus Corporation, 2009).

4.6 VEGETATION COMMUNITIES

The Biophysical Assessment was conducted to describe and interpret vegetation communities as they existed at the time of the field reconnaissance, which took place in January, 2012. Because there was slight snow cover during the visit, features of vegetation, soils, etc. were not entirely visible. Many species of plants are not visible at that time of year because of their life cycles, and due to snow cover. As mentioned above, this report draws in part upon the field information that was collected during the Focus Corporation's assessment and published in their August 2009 (updated October 2009) report.

This section provides a description of the vegetation communities that were observed on the site in the field reconnaissance, which was done in January, 2012, preceded by a general description of vegetation in a regional context.

Regional Context

Among the vegetation communities of the Dry Mixedwood sub-region, trembling aspen (*Populus tremuloides*) is an important species, occurring in both pure and mixed stands. Balsam poplar (*Populus balsamifera*) frequently occurs with aspen especially on moister sites in depressions and along streams. Coniferous species are more common further north in the Dry Mixedwood sub-region with mixed stands of aspen and white spruce being widespread. Dry, sandy upland sites are usually occupied by Jack Pine (*Pinus banksiana*) forests. Peatlands are common throughout the sub-region and are extensive in some areas.

In drier situations, the forest is dominated by trembling aspen, and in moister areas (e.g., in depressions, near waterbodies) it is dominated by balsam poplar. Both are characterized by a diverse understory. Species characteristic of the aspen forest type include snowberry (*Symphoricarpos albus*), saskatoon (*Amelanchier alnifolia*), beaked hazelnut (*Corylus cornuta*), choke cherry (*Prunus virginiana*), bunchberry (*Cornus canadensis*), wild lily-of-the-valley (*Maianthemum canadense*) and false melic grass (*Schizachne purpurascens*).

In the moister (poplar dominated) areas, the understory is very diverse, consisting of such plants as red osier dogwood (*Cornus stolonifera*), beaked hazelnut (*Corylus cornuta*), pussy willow (*Salix discolor*), northern gooseberry (*Ribes oxyacanthoides*), green alder (*Alnus crispa*), bracted honeysuckle (*Lonicera involucrata*), bluebells (*Mertensia paniculata*), palmate-leaved coltsfoot (*Petasites palmatus*), Bishop's cap (*Mitella nuda*) and baneberry (*Actaea rubra*). Species common to both types include wild rose (*Rosa acicularis*), woods rose (*Rosa woodsii*), low-bush cranberry (*Viburnum edule*), wild red raspberry (*Rubus idaeus*), dewberry (*Rubus pubescens*), twining honeysuckle (*Lonicera dioica*), wild sarsaparilla (*Aralia nudicaulis*), bearded wheat grass (*Agropyron trachycaulum*), fairy bells (*Disporum trachycarpum*), pink wintergreen (*Pyrola asarifolia*), Lindley's aster (*Aster ciliolatus*), northern bedstraw (*Galium boreale*), fireweed (*Epilobium angustifolium*), cream-colored peavine (*Lathyrus ochroleucus*), American vetch (*Vicia americana*), and star-flowered Solomon's seal (*Smilacina stellata*).

Shrub communities are common in the subregion and often extend in belts outward from the forest communities. Major species are *Symphoricarpos occidentalis, Rosa spp., Prunus virginiana, P. pensylvanica, Amelanchier alnifolia* and *Elaeagnus commutata*.

Poorly drained areas typically contain peatlands, including bogs or fens. Bogs are generally acidic, nutrient-poor, and vegetated with black spruce, sphagnum moss, various lichens including caribou moss, Labrador tea and other plants. Fens are generally alkaline, nutrient-rich and vegetated with tamarack as well as black spruce, willows and other shrubs and herbs. The differing chemistry of bogs and fens is due to the fact that bogs are fed by surface water and

fens are fed by groundwater. Many of Alberta's rare plants (e.g., orchids) are found in bogs and fens, because of the special chemical and ecological conditions found in these ecosystems.

Site Context

The following basic types of vegetation community were observed on the study site:

- deciduous forest stands (aspen/poplar dominated);
- coniferous stands; and
- riparian and aquatic vegetation (shoreline and wetland).

Fig. 10 is a vegetation map of the Property. Each of the above vegetation community types are indicated with a different colour, explained in the legend of the Figure.

In Appendix B, site photographs illustrating the various features of the Property are given. It should be noted that the field reconnaissance took place at only one time of year (January) and therefore many plant species that might occur on the site may not have been identifiable at that time.

In the field reconnaissance of January, 2012, it was observed that a large portion of the site consisted of deciduous forest, while the remainder was relatively highly disturbed land consisting either of grassed areas, driveways, or gravelly terrain related to the former RV parking pads and campsite areas, as well as the administration area. These driveways and pads occurred around Allan Pond (i.e., the large wetland at the east end of the site shown as W1 on Fig. 10), and throughout the deciduous forest areas, taking up a relatively large portion of the site. The beach area at the east end of Hubbles Lake represented the other area clear of trees. All of the above cleared areas are shaded in yellow in Fig. 10, while the deciduous forest areas are shaded in light green.

Additionally, a row of mature white spruce trees (*Picea glauca*) were observed near the administration buildings near the northwest of Allan Pond (CF1 on Fig. 10). A row of mature willow trees at least 10 m in height was also observed at the north side of the wetland (not shown on Fig. 10).

Deciduous Forest

Areas DF1, DF2, DF3 and DF4 on Fig. 10 were observed to be mainly similar in the composition of their upper and lower canopies as well as their ground cover. The dominant tree species were trembling aspen (*Populus tremuloides*) and balsam poplar (*P. balsamifera*), with about 1-5% representation by white birch (*Betula papyrifera*). Both aspen/poplar and birch trees ranged in size/age from young trees (2-5 cm DBH) to mid-age (5-15 cm DBH) to mature (15-30 cm or more DBH). The trees, on the whole, appeared to be relatively healthy, with only a few signs of broken/leaning trees, and a moderate amount of deadfall. The degree of topkill could not be observed accurately at this time of year. It was noted that the area DF4, at the west end of the site, contained mainly young to mid-age deciduous trees, while DF1, DF2 and DF3 represented a mix of young, mid-age and older trees.

The understory of DF1, DF2 and DF3 appeared to be moderately dense, with good recruitment of young aspen/poplar and birch trees. This is a favourable indication of longer term sustainability of these forested areas. Other trees, shrubs or forbs associated with the understory included saskatoon, alder and willows of several species. Ground vegetation included honeysuckle, gooseberry, prickly wild rose, high bush cranberry and buffaloberry. As mentioned above, only some ground vegetation would be visible and identifiable in January.

Other species of plants that were reported by Focus (2009), included bunchberry (*Cornus canadensis*), ferns (*Dryopteris spp.*), purple avens (*Geum rivale)*, wild asters (*Aster spp.)*, fireweed (*Epilobium angustifolium*), creamy peavine (*Lathyrus ocroleucus*), wild lily of the valley (*Maienthemum canadense*), liverworts (*Marchantia spp.*), bedstraw (*Galium trifidum*), wild sarsaparilla (*Aralia nudicaulis*), baneberry (*Actaea rubra*), wintergreen (*Pyrola minor*), bluebells (*Mertensia paniculata*), as well as several mosses and lichens. In addition, they reported a number of weed species, including Canada thistle (*Cirsium arvense*), sow thistle (*Sonchus arvensis*) and dandelions (*Taraxacum officinale*).

A complete listing of the plants observed by Focus Corporation (2009) in these areas is given in Appendix 2 of the previous biophysical impact assessment (Focus Corporation (2009)).

Ground cover was mainly leaf litter, with some areas of high deadfall, but with most of the area having low to moderate deadfall density. A typical aspen forest floor and wood/bark assemblage of mosses and lichens were observed by Focus Corporation (2009), including stocking moss (*Pylaisiella polyantha*) and red-stemmed feathermoss (*Pleurozium schreberi*).

It should be noted that the forested areas occurring on the Property were on hummocky slopes ranging to about 20 degrees, with some of the sloped areas being naturally "benched". In some locations, supporting walls have been erected to contain any ground instability, and in some areas there is soil instability and erosion, for example at WP15, WP18, WP21, WP26, WP33 (viewing platform) and WP50.

In addition to areas DF1, DF2 , DF3 and DF4, there were linear patches of mainly young aspen/poplar, sandbar willow (*Salix exigua*), beaked willow (*S. bebbiana*), river alder (*Alnus rugosa*) and young white birch lying parallel to the shore area of Hubbles Lake (shown as DF5 on Fig. 10). These trees, although not more than about 5 m in height, would provide a visual/noise buffer to some extent, between the Lake and the forested areas of the proposed resort area.

The canopy structure and assortment of vegetation shown in Areas DF1 - DF4 is one that is very common in this ecological subregion, and is typical of well-drained but sufficiently moist situations. These forest areas appeared to be relatively healthy, without signs of unusually high stem breakage, topkill or deadfall. This forest, although fragmented substantially by trails and parking/camping pads, will probably remain sustainable without further encroachment or stress. The presence of weeds of a number of varieties is one factor threatening to diminish sustainability, particularly near the edges and disturbed areas of the tree blocks.

Coniferous Stands

Only a few spruce trees were observed in all of areas DF1 - DF4. However, there was a row of mature white spruce trees near the northwest of Allan Pond and near the administration buildings (shown as CF1 on Fig. 10). These trees appeared to be in relatively good condition.

Riparian and Aquatic Vegetation

Hubbles Lake Shoreline:

The stretch of shoreline along the south/east sides of Hubbles Lake, which coincides with the development site (WP37-WP49), supported a zone of emergent vegetation that was 3-4 m in width in most places. The emergent vegetation comprised cattails (*Typha latifolia*), bulrushes (*Scirpus lacustris*), and at least two species of sedge (*Carex aquatilis* and *C. lasiocarpa*). Further inshore, there was a zone of weedy plants and young trees such as white birch, sandbar willow and alder. Also visible in the shoreline vegetation were wire rush (*Juncus*

balticus) and marsh reed grass (*Calamagrostis canadensis*). In the previous survey (Focus Corporation, 2009), six species of willow were observed along the shoreline of Hubbles Lake including beaked willow (*Salix bebbiana*) and sandbar willow (*S. exigua*).

The previous biophysical assessment (Focus Corporation, 2009) also mention: arrowhead (*Sagittaria cuneata*) and giant bur-reed (*Sparganium eurycarpum*), with stonewort *(Chara sp.*) being the most abundant species of submergent vegetation. Northern water milfoil (*Myriophyllum exalbescens*) and Sago pondweed (*Potamogeton pectinatus*) are thought to occur commonly but at low densities in Hubbles Lake.

It is interesting to note that within most of the shoreline area adjacent to the Property (i.e., east of WP37, the dominant emergent vegetation species was bulrushes, while west of WP37 it was dominated by cattails. This would appear to be the result of human intervention. The previous biophysical assessment also observed that substantial areas of aquatic vegetation have been removed by cottage and resort owners (Focus Corporation, 2009).

Focus Corporation (2009) observed bryophytes in the riparian zone, including leafy liverwort (*Lophozia ventricosa*), green-tongue liverwort (*Marchantia polymorpha*), copper wire moss (*Pohlia nutans*), fire moss (*Ceratodon purpureus*) and tufted moss (*Aulacomnium palustre*).

Although infested by weeds to some extent, the emergent zone appeared to be vigorous and healthy, with no signs of stressed or dying vegetation. The vegetation in the emergent zone is important, as it very effectively absorbs nutrients in the form of nitrogen and phosphorus compounds, which otherwise impair lake quality by promoting algal blooms and ultimately anoxic conditions when the algae decompose and bacterial populations increase.

Allan Pond (Wetland W1):

Wetland W1, which comprises much of the east end of the Property, had a zone of emergent vegetation that was 1-2 m in width in most places. The emergent vegetation was dominated by cattails, with sedges being another constituent (probably *Carex aquatilis* and *C. lasiocarpa*). Further inshore, there was a disturbed zone used for travel by vehicles, and parking/camping pads. In the previous survey (Focus Corporation, 2009), six species of willow were observed outside of the riparian zone on the other side of the gravel road that encircles the pond. A row of large, mature shining willows (*Salix lasiandra*) were observed along the north shore of the wetland. These, and the abovementioned row of mature spruce trees, were likely planted but might have been original inhabitants of the area prior to the disturbances of the park development.

Focus Corporation (2009) observed the presence of the submergent plants coontail (*Ceratophyllum demersum*) and spiked water milfoil (*Myriophyllum spicatum*) in the pond. They also noted waterside feathermoss (*Bracythecium rivulare*), which was the only bryophyte observed in this riparian zone.

These authors found forbs in the riparian areas, including horsetail (*Equisetum arvense*), fireweed (*Epilobium angustifolium*), marsh skullcap (*Scutellaria galericulata*), arrow-leaved coltsfoot (*Petasites sagittatus*) and purple avens (*Geum rivale*), but they further noted that most of the ground plants observed around Allan Pond were upland species and/or invasive species. A list of the weedy species provided by Focus Corporation (2009) is given in Table 6 of Focus (Focus Corporation, 2009). This present investigation made a similar observation.

On the basis of the assemblage and distribution of vegetation on Allan Pond, it would be considered as a Class V wetland (permanent pond) under the classification system of Stewart and Kantrud (1971). The spatial area of the wetland is approximately 1.8 hectares, its perimeter approximately 560 m.

The riparian vegetation on Wetland W1 appeared to be vigorous and healthy (apart from the tracks caused by a snowmobile at the northwest corner of the pond).

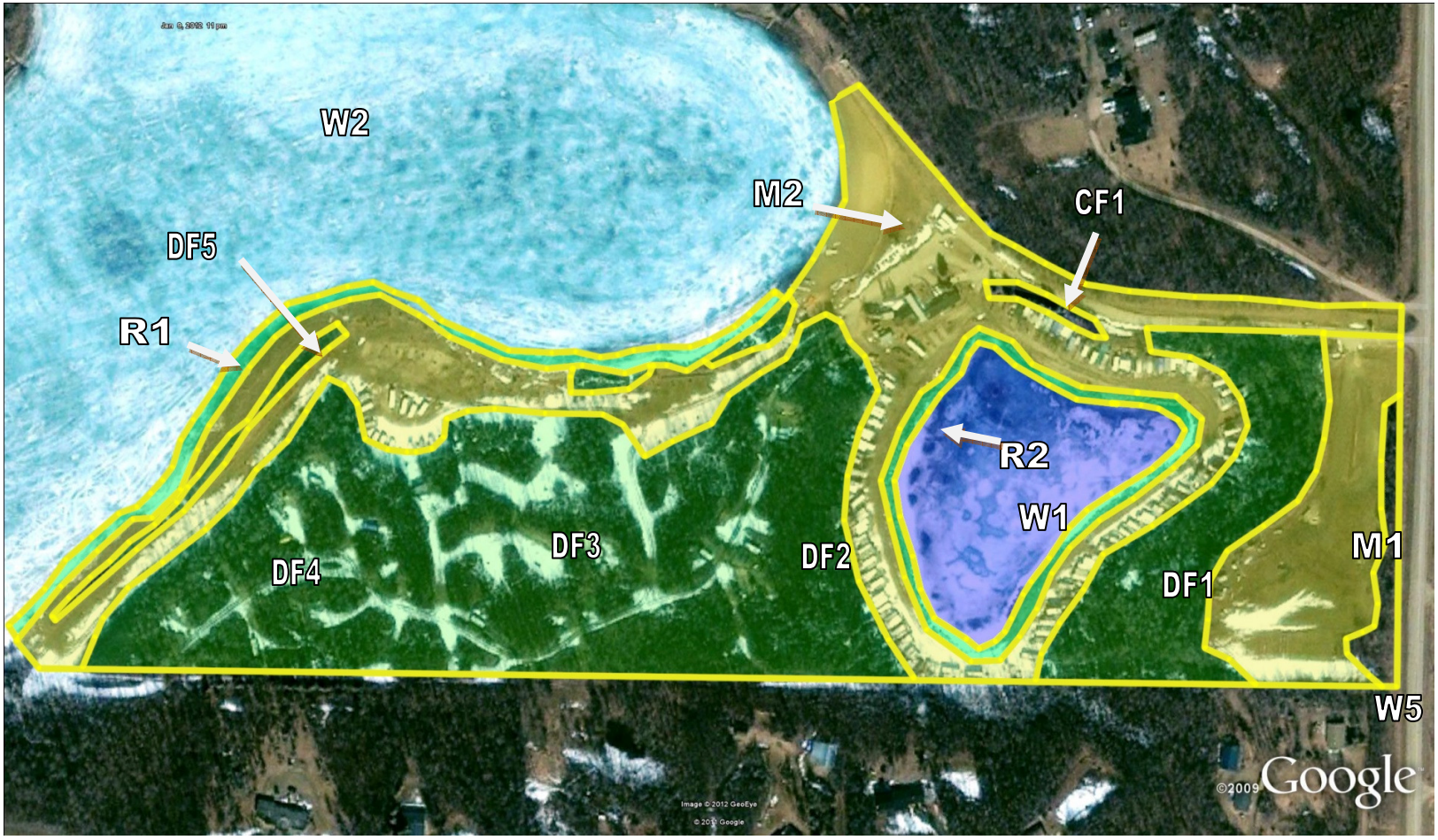

Fig. 10*: Vegetation map of the study area (see legend below).*

Vegetation Community		
Open fields, pasture, sandy or disturbed areas	yellow	M
Deciduous forest stands (mainly aspen, poplar, birch)	light green	DF
Coniferous forest stands (mature white spruce)	deep green	CF
Riparian emergent aquatic vegetation (cattails, bulrushes, sedges)	blue-green	R
Open water/ice	blue	W

4.7 WILDLIFE

Regional Context

Characteristic avian species of deciduous forests in the Dry Mixedwood sub-region include such species least flycatcher, house wren, ovenbird, red-eyed and warbling vireos, Baltimore oriole and rose-breasted grosbeak. Species of mixedwood forests include birds such as yellow-bellied sapsucker, Swainson's thrush, solitary vireo, magnolia warbler, white-throated sparrow, pileated woodpecker and northern goshawk.

The richest fauna is to be found in riparian mixedwoods and shrublands associated with swamps, ponds, streams and lakes. Some species, such as yellow and black-and-white warblers, American redstart, song sparrow, northern water thrush, fox sparrow and Philadelphia vireo are mostly restricted to these sites.

Throughout the Boreal Forest Natural Region, typical, widespread mammals include beaver, muskrat, moose, varying hare, black bear, wolf, lynx, red-backed vole, various species of shrew, deer mouse, least chipmunk, red squirrel and ermine. Others, such as fisher, wolverine, river otter, and woodland caribou, are less common and locally distributed.

The animals of the Central Parkland Subregion are a mix of elements of the Northern Fescue Subregion and the boreal mixedwood Subregions. At the southern edge of the Subregion, grassland species such as upland sandpiper, Sprague's pipit and Baird's sparrow occur but become less common further north. Along the northern boundary, boreal forest species such as broad-winged hawk and rose-breasted grosbeak are more common. Franklin's ground squirrel and piping plover range primarily in this Subregion. Species characteristic of forested uplands include red-eyed vireo, red-tailed hawk, least flycatcher, Baltimore oriole, yellow warbler, white-tailed deer, American porcupine, northern pocket-gopher and snowshoe hare. Wetlands are common in this Subregion and contain a wide variety of birds and amphibians.

Mammalian wildlife that could be expected to occur commonly in riparian areas include moose, white-tailed deer, beaver, muskrat, mink, weasel, skunk, red fox, and various smaller mammals such as deer mouse, red-backed vole, meadow vole, and various species of shrews. The shrews are commonly found on the margin of lakes, bogs, muskeg and streams, though not by any means restricted to such habitats.

Wildlife Likely to Utilize the Property

The Canada land inventory designates the Property as class I (high capability) for waterfowl, i.e., no significant limitations to the production of waterfowl, Environment Canada, 1981). Ducks Unlimited Canada has two conservation projects in Section 09-053-01 W5M, but they are outside the boundaries of the Property.

The land on the Property also provides high land capability (Class 2) for ungulates (deer and moose). Specifically, there may be slight limitations in the supply of nutrients in the soil for optimum plant growth (Environment Canada 1980). There are no identified ungulate winter ranges on the Property (D. Hunter, ASRD, 2009, as quoted in Focus Corporation, 2009).

The property borders the South and East shores of Hubbles Lake, which provides locally significant habitat for waterfowl shorebirds as well as terrestrial birds and mammals.

On the basis of the vegetation observed there, the deciduous forest areas on the slopes of the Property, i.e., areas DF1, DF2, DF3 and DF4, would represent good habitat for ungulates (deer, moose), passerine birds, ground birds, and to some extent raptors, as well as small mammals

such as hare, voles, shrews and mice. This habitat would offer visual and thermal shelter, as well as browse for ungulates and prey for predators.

Herptiles such as garter snakes would find good habitat for hibernacula, shelter and various life activities such as feeding.

The portion of the Property that includes the shoreline of Hubbles Lake represents excellent habitat for a wide variety of shorebirds (sandpipers, rails), waterfowl (ducks, geese, grebes), amphibians (frogs, toads, salamanders) and an assortment of invertebrates that are important as food for higher trophic levels. Aquatic organisms such as amphipods, gastropods, aquatic insects and other invertebrate fauna would find favourable habitat there, and would serve as food for birds, fish and other wildlife that frequent lakeshore habitats.

Based on observations and experience in biophysical assessments in similar ecological situations, common wildlife species that might be expected to inhabit or use the natural area include: white-tailed, moose, elk, snowshoe hare, white-tailed jackrabbit, red squirrel, thirteen-lined ground squirrel, least chipmunk, porcupine, coyote, black bear (occasional), cougar (occasional), and various small mammals including bats. A reasonably high diversity of songbirds and raptor species would be expected in the area, based on the location and vegetative communities. In addition to providing nesting habitat, woodlots such as this site are important for migratory songbirds in that they provide both food and cover during migration periods.

Clay-coloured, Song and Savannah Sparrows would be numerous and associated with the shrub communities, edges, and adjacent grassland, along with Cedar Waxwings and Orange-crowned Warblers. American Robins, Least and Alder Flycatchers and Tennessee Warblers could be expected to inhabit the tall shrub/mid-canopy layer, while Warbling and Red-eyed Vireos might be found in the upper canopy of the treed area. Swainson's Thrushes and Veerys may occur in the lower canopy areas along with White-throated Sparrows. The moderately abundant snags and fallen dead wood would provide food and/or habitat for various birds and insects, including woodpeckers and secondary cavity nesters like Mountain Bluebirds, Red-breasted and White-breasted Nuthatches (not abundant on this site because of lack of conifers), Black-capped Chickadees, House Wrens, Tree Swallows, Kestrels and other species that use cavities created by woodpeckers. Yellow warblers might be expected to occur in the willow/tall shrub areas around the lakeshore and on adjacent upland. Brown-headed Cowbirds that commonly use nests of Yellow Warblers to lay their eggs could be found in the edges and the forested area of the site. In addition to the owls and hawks discussed above, raptors such as Merlins, Red-tailed, Swainson’s, and Broad-winged Hawks, Sharp-shinned, Cooper's, or Goshawks have a potential to inhabit the site.

Due to the presence of surface water around the edge of the lake, and over-wintering cover (forested area), several common species of amphibians are likely to be present on the site, including: Boreal Chorus Frogs, Wood Frogs and Tiger Salamander. Reptiles would likely be represented by garter snakes on this site.

Mammalian wildlife that could be expected to occur along the lakeshore include moose, white-tailed deer, beaver, muskrat, mink, weasel, skunk, red fox, and various smaller mammals such as deer mouse, red-backed vole, meadow vole, and various species of shrews.

Numerous species of waterfowl could be expected to utilize the lake and its shore, including the cattail, bulrush, sedge, marsh reed grass and willow transition zones. Table 2 gives a list of the waterfowl that could be expected to use these habitats, based on its location and habitat structure, and their relative abundance in the sub-region. Table 3 gives a list of the bird species

that could be expected to breed in or otherwise inhabit the site, including the forest and lakeshore areas.

Table 2: *Waterfowl expected to utilize the forest and lakeshore areas of the Property.*

Species	Relative Abundance in the Parkland Natural Region	Preferred Type of Habitat
American widgeon	relatively abundant	Shallow ponds, pools, marshes
Black Duck	very uncommon	Shallow ponds, pools, marshes
Blue-winged Teal	Abundant	Shallow ponds, pools, marshes
Bufflehead	Abundant	Larger sloughs, ponds, lakes. Nest in cavities in trees and stumps
Canvasback	relatively abundant	Larger sloughs, ponds, lakes
Cinnamon Teal	Scarce-relatively abundant	Shallow ponds, pools, marshes
Common Goldeneye	relatively abundant	Larger sloughs, ponds, lakes. Nest in cavities in trees and stumps
Gadwall	Abundant	Shallow ponds, pools, marshes
Green-winged Teal	Relatively abundant	Shallow ponds, pools, marshes
Harlequin Duck	Very uncommon	
Lesser Scaup	relatively abundant	Larger sloughs, ponds, lakes
Mallard	Abundant	Shallow ponds, pools, marshes
Northern Shoveller	Abundant	Shallow ponds, pools, marshes
Pintail	Scarce	Shallow ponds, pools, marshes
Redhead	relatively abundant	Larger sloughs, ponds, lakes
Ring-necked duck	scarce-relatively abundant	Larger sloughs, ponds, lakes
Ruddy Duck	relatively abundant-abundant	Larger sloughs, ponds, lakes
Surf Scoter	Scarce	Larger sloughs, ponds, lakes
White-winged Scoter	relatively abundant	Larger sloughs, ponds, lakes
Wood Duck	Very uncommon	Nest cavities of trees, stumps near water

Table 3: *Common and scientific names of birds observed/expected to breed or use the subject site (expected derived from The Atlas of Breeding Birds of Alberta).*

Canada Goose	*Branta canadensis*	Black-capped Chickadee	*Parus atricapillus*
Gadwall	*Anas strepera*	Boreal Chickadee	*Poecile hudsonica*
American Widgeon	*Anas americana*	Red-breasted Nuthatch	*Sitta canadensis*
Mallard	*Anas platyrhychos*	White-breasted Nuthatch	*Sitta carolinensis*
Blue-winged Teal	*Anas discors*	Brown Creeper	*Certhia americana*
Northern Shoveler	*Anas clypeata*	House Wren	*Troglodytes aedon*
Green-winged Teal	*Anas crecca*	Winter Wren	*Troglodytes troglodytes*
Bufflehead	*Bucephala albeola*	Ruby-crowned Kinglet	*Regulus calendula*
Common Goldeneye	*Bucephala clangula*	Mountain Bluebird	*Sialia currucoides*
Common Merganser	*Mergus merganser*		
Gray Partridge	*Perdix perdix*	Veery	*Catharus fuscesens*
Ring-necked Pheasant	*Phasianus colchicus*	Swainson's Thrush	*Catharus ustulatus*
Ruffed Grouse	*Bonasa umbellus*		
Solitary Sandpiper	*Tringa solitaria*		
Great Blue Heron	*Ardea herodias*	Hermit Thrush	*Catharus guttatus*
Merlin	*Falco columbarius*		
Sharp-shinned Hawk	*Accipiter striatus*	American Robin	*Turdus migratorius*
Cooper's Hawk	*Accipiter cooperii*	Gray Catbird	*Dumetella carolinensis*
Northern Goshawk	*Accipiter gentiles*	Bohemian Waxwing	*Bombycilla garrulus*
Swainson's Hawk	*Buteo swainsoni*	Cedar Waxwing	*Bombycilla cedrorum*
Red-tailed Hawk	*Buteo jamaicensis*	European Starling	*Sturnus vulgaris*
American Kestrel	*Falco sparverius*	Tennessee Warbler	*Vermivora peregrina*
Great Horned Owl	*Bubo virginianus*	Orange-crowned Warbler	*Vermivora celata*
Long-eared Owl	*Asio otus*	Yellow Warbler	*Dendroica petechia*
Northern Saw-whet	*Aegolius acadicus*	Yellow-rumped Warbler	*Dendroica coronata*
Ruby-throated Hummingbird	*Archilochus colubris*	American Redstart	*Setophaga ruticilla*
Belted Kingfisher	*Ceryle alcyon*	Ovenbird	*Seiurus aurocapillus*
Yellow-bellied Sapsucker	*Sphyrapicus varius*	Common Yellow-throat	*Geothlypis trichas*
Downy Woodpecker	*Picoides pubescens*	Western Tanager	*Piranga ludoviciana*
Hairy Woodpecker	*Picoides villosus*	American Tree sparrow	*Spizella arborea*
Northern Flicker	*Colaptes auratus*	Chipping Sparrow	*Spizella passerine*
Pileated Woodpecker	*Dryocopus pileatus*	Clay-coloured Sparrow	*Spizella pallida*
Olive-sided Flycatcher	*Contopus cooperi*	Savannah Sparrow	*Passerculus sandwichensis*
Western Wood-Pewee	*Contopus sordidulus*	Song Sparrow	*Melospiza melodia*
Alder Flycatcher	*Epidonax alnorum*	Lincoln's Sparrow	*Melospiza lincolnii*
Least Flycatcher	*Epidonax minimus*	White-throated Sparrow	*Zonotrichia albicollis*
Eastern Phoebe	*Sayornis phoebe*	Dark-eyed Junco	*Junco hyemalis*
Eastern Kingbird	*Tyrannus tyrannus*	Rose-breasted Grosbeak	*Pheucticus ludovicianus*
Northern Shrike	*Lanius excubitor*	Red-winged Blackbird	*Agelaius phoeniceus*
		Brewer's blackbird	*Euphagus cyanocephalus*
Warbling Vireo	*Vireo gilvus*	Common Grackle	*Quiscalus quiscula*
Philadelphia Vireo	*Vireo philadelphicus*	Brown-headed Cowbird	*Molothrus ater*
Red-eyed Vireo	*Vireo olivaceus*	Baltimore Oriole	*Icterus galbula*
Blue Jay	*Cyanocitta cristata*	Pine Grosbeak	*Pinicola enucleator*
Black-billed Magpie	*Pica pica*	Purple Finch	*Carpodacus purpureus*
American Crow	*Corvus brachyrhynchos*	White-winged Crossbill	*Loxia leucoptera*
Common Raven	*Corvus corax*	Common Redpoll	*Carduelis flammea*
Tree Swallow	*Tachycineta bicolor*	Pine Siskin	*Carduelis pinus*
Bank Swallow	*Riparia riparia*	American Goldfinch	*Carduelis tristis*
Cliff Swallow	*Petrochelidon pyrrhonota*	Evening Grosbeak	*Coccothraustes vespertinus*
Barn Swallow	*Hirundo rustica*	House Sparrow	*Passer domesticus*

Species of Management Concern

Species of management concern include species listed or identified federally (*Species at Risk Act*) and species identified by COSEWIC as endangered, threatened, or of special concern. This also includes species listed as endangered or threatened under the Alberta Wildlife Act, as well as those designated as "at risk", "may be at risk", and "sensitive" by Alberta Sustainable Resource Development. Potential wildlife species of management concern that may occur on the Property are shown in the table below (Table 4, taken from Focus Corporation, 2009).

Table 4: *Potential Wildlife Species of Management Concern in the Property (from Table 4 of Focus, 2009).*

Species	*Species at Risk Act*[1] Status	Alberta *Wildlife Act*[2] Status
Western Toad *Bufo boreas*	Special Concern; Schedule 1	-
Peregrine Falcon anatum subspecies *Falco peregrinus anatum*	Threatened; Schedule 1	Threatened
Yellow Rail *Coturnicops noveborasensis*	Special Concern; Schedule 1	-
Short-eared Owl *Asio flammeus*	Special Concern; Schedule 3	-
Sprague's Pipit *Anthus spragueii*	Threatened; Schedule 1	-
Loggerhead Shrike excubitorides subspecies *Lanius ludovicianus excubitorides*	Threatened; Schedule 1	-
Rusty Blackbird *Euphagys carolinus*	Special Concern; Schedule 1	-

[1] Canada *Species at Risk Act*

[2] Alberta *Wildlife Act*

A search of the Alberta Fish and Wildlife Management Information System (FWMIS) was conducted by ASRD in 2009 (H. Wollis, as quoted in Focus Corporation, 2009). The search revealed that Canadian toads were observed in Section 09-053-01 W5M in the 1960s and 1970. At one time, Canadian toads were considered to be common but are now designated provincially as "may be at risk" due to dramatic declines in population size and distribution (ASRD, 2009b). Additionally, there was a report of a northern leopard frog being found in the

same location about two decades ago. Northern leopard frogs are designated as "at risk" in Alberta and as "threatened" under the *Wildlife Act*. The authors of the previous biophysical assessment did not report seeing any northern leopard frogs on the Property during the field reconnaissance of June 2009 (Focus Corporation, 2009). The same authors report that ANHIC searches were conducted in 2009, which revealed no tracked wildlife occurrences on the Property to that date. However, very few inventories or surveys have been conducted in the vicinity of the Property (Focus Corporation, 2009).

A search of ACIMS database maps on January 17, 2012, showed no Element Occurrences (sensitive or non-sensitive) on or near the Property.

Wildlife Observed in the 2012 Field Study

In the January 2012 field reconnaissance, numerous signs of deer, hare and coyote were observed along the lakeshore area and just north of the row of deciduous trees marked as DF5 on Fig. 10. This habitat would offer visual shelter for numerous small mammals (e.g., hare) as well as shelter and browse for ungulates. The existence of small mammals and avian wildlife there would also attract wildlife that are predators.

Game trails were observed at several points throughout the Property. A major route of dispersion by ungulates and other mammals is through the barbed wire fence at the northeast corner of the Property and thence to the southwest, continuing down the forested slope and through either the forest area DF1/DF2 or between it and the east edge of Allan Pond. From here, the tracks disperse into DF3 and DF4. The chain-link fence along the south and east boundaries of the Property may restrict wildlife mobility between the Property and areas south of it.

Signs of ungulates included:

- Deer pellet groups and urine;
- Deer antler rub;
- Coyote scats;
- Deer and moose tracks; and
- Tuft of hair caught on barbed wire fence near the northeast corner of the Property.

Birds observed during the field reconnaissance included:

- Black-capped Chickadees
- Black-billed Magpies
- American Crows

Obviously, very few migratory bird species would be observed in this area in January.

Observations Made in 2009 Field Studies

In the previous biophysical study carried out by Focus Corporation, a total of 28 species, including two amphibian/reptile, 22 bird, and four mammal species, were observed on the Property during the wildlife surveys, which were carried out in May and June of 2009 (Focus Corporation, 2009). Of these, five of the wildlife species recorded on the Property were considered species of management concern. Of these five species, only the Rusty Blackbird is federally listed under the *Species at Risk Act*. This observation was somewhat in doubt, however.

In call surveys and area searches for amphibians, no amphibians (i.e., egg masses, tadpoles or adults) were reported, either at Hubbles Lake or Allan Pond within the Property. However, the calls of 4-7 boreal chorus frogs were heard at a listening station located 500 m Southwest of the Property. Other reports indicated that there were frogs, either wood frogs or boreal chorus frogs, at Allan Pond.

Red-sided garter snakes (*Thamnophis sirtalis parietalis*) were observed within the Property in June, 2009 (Focus Corporation, 2009). These snakes are designated as "sensitive" in Alberta. In all, there were three sightings of read sided garter snakes in the Property, one of which was in the emergent vegetation along the shore of Hubbles Lake, and the other in the grassy area by the abandoned store located along the access road north of Allan Pond.

In total, nine species of waterfowl and waterbirds were observed during surveys conducted in May and June, 2009 (Focus Corporation, 2009). Of these, five species were confirmed as nesting in the Property.

Table 5 (Focus Corporation, 2009) below shows the number of species and individuals of waterfowl and waterbirds observed using Allan Pond in the May/June 2009 field studies. Table 6 (Focus Corporation, 2009) shows the same information for bird species using Hubbles Lake at that time.

Table 5: *Waterfowl and Waterbirds Observed Using Allan Pond (Table 10 of Focus, 2009).*

Species	Number of Individuals Observed	Age Class	Sex	Confirmed Breeding in the Property
Red-necked Grebe (*Podiceps grisegena*)	2	Adult	M/F (pair)	Yes
American Coot (*Fulica americana*)	2	Adult	M/F (pair)	Yes
Mallard (*Anas platyrhynchos*)	2	Adult	M/F (pair)	Yes
Canada Goose (*Branta canadensis*)	2	Adult	M/F (pair)	Yes
Common Merganser (*Mergus merganser*)	1	Adult	Unknown	No

Table 6: *Waterfowl and Waterbirds Observed Using Hubbles Lake (Table 11 of Focus, 2009).*

Species	Number of Individuals Observed	Age Class	Sex	Confirmed Breeding in the Property	Observation Notes
Red-necked Grebe (*Podiceps grisegena*)	2	Adult	M/F (pair)	Yes	Hubbles Lake
American Coot (*Fulica americana*)	2	Adult	M/F (pair)	Yes	Hubbles Lake
Mallard (*Anas platyrhynchos*)	2	Adult	M/F (pair)	Yes	Hubbles Lake
Common Loon (*Gavia immer*)	2	Adult	M/F (pair)	Yes	Hubbles Lake
Sandhill Crane (*Grus canadensis*)	1	Adult	Unknown	No	Fly By
Franklin's Gull (*Leucophaeus pipixcan*)	~12	Adult	Mixed	No	Fly By
Ring-billed Gull (*Larus delawarensis*)	7	Adult	Mixed	No	Fly By

Numerous stick and cavity nests were observed scattered throughout the upland areas on the South side of the Property. However, none of the stick nests in the Property appeared active during the wildlife survey, which took place in May/June 2009. The majority of cavity nests observed on the Property were inactive as well. Signs of woodpecker and sapsucker foraging, as well as the sightings of the Pileated Woodpecker, Hairy Woodpecker and Yellow Bellied Sapsuckers on the Property may have indicated potential occupants of the nest cavities. The Pileated Woodpecker is designated as "sensitive" in Alberta. This latter species is very sensitive to the fragmentation of forest areas, as it requires a relatively large tract of forest to provide sufficient foraging material for its survival.

Nests of Red-winged Blackbirds were observed in the riparian areas surrounding public and Allan Pond. Eggs were observed in approximately 65% of the nests. One specimen of the Rusty Blackbird was observed in the wetland areas. Rusty blackbirds are listed as a species of "special concern" on Schedule 1 of the Species at Risk Act. However, the observation was somewhat doubtful.

Breeding birds observed or possibly breeding on the Property are listed in Table 7 below (Focus Corporation, 2009).

Table 7: *Other Breeding Birds Observed in the Property (Table 12 of Focus, 2009).*

Species	Habitat	Confirmed Breeding in the Property
Rusty Blackbird (*Euphagus carolinus*)	Willow tree in Allan Pond margin	No
Tree Swallow (*Tachycineta bicolour*)	Over Hubbles Lake and Allan Pond	No
Barn Swallow (*Hirundo rustica*)	Nesting in human structure NW of Allan Pond	Yes
Pileated Woodpecker (*Dryocopus pileatus*)	Deciduous upland	No
Yellow-bellied Sapsucker (*Sphyrapicus varius*)	Nesting in dead aspen in deciduous upland	Yes
Red-winged Blackbird (*Agelaius phoeniceus*)	Nesting at Hubbles Lake and Allan Pond	Yes
Brown-headed Cowbird (*Molothrus ater*)	Parasitized red-winged blackbird nest at Allan Pond	Yes
Vesper Sparrow (*Pooecetes gramineus*)	Deciduous upland	No
American Robin (*Turdus migratorius*)	Nesting in young spruce in deciduous upland	Yes
American Crow (*Corvus brachyrhynchos*)	Deciduous upland	No
Hairy Woodpecker (*Picoides villosus*)	Deciduous upland	No
Common Grackle (*Quiscalus quiscula*)	Hubbles Lake shoreline and willow tree in the Allan Pond margin	Yes*
Song Sparrow (*Melospiza melodia*)	Shrubs bordering Hubbles Lake	No
Black Capped Chickadee (*Poecile atricapillus*)	Deciduous uplands	No

No diurnal raptors (e.g., hawks, eagles, osprey, falcons) were observed nesting on the Property or within 1 km radius of it. However, it was observed that the areas in and around the Property contain suitable nesting habitat for some of these birds. Hawks that might occur on the Property include: Red-Tailed Hawk, Northern Harrier, Swainson's Hawk and Merlin.

Four species of mammals or signs of them were observed during the May/June 2009 field surveys. These included deer (both white tailed and mule deer), moose, muskrat and snowshoe hare. Mammals observed on the Property during those surveys are listed in Table 8 below (Focus Corporation, 2009).

Table 8: *Mammals and Signs Observed in the Property (Table 13 of Focus, 2009).*

Species	Type of Observation	Habitat
Moose (*Alces alces*)	Pellets and Tracks	Throughout Property
Mule Deer (*Odocoileus hemionus*)	Visual	Allan Pond wetland
Deer Species (*Odocoileus spp.*)	Pellets and Tracks	Throughout Property
Common Muskrat (*Ondatra zibethicus*)	Visual - Swimming	Hubbles Lake & Allan Pond wetland
Snowshoe Hare (*Lepus americanus*)	Visual - Flushed	Deciduous Upland

4.8 FISH AND AQUATIC ECOSYSTEMS

Fig. 11 is an extract from the Stony Plain fish management area, from maps published by Alberta Environment for the purposes of the Watercourse Crossing Code of Practice. It can be seen that there are no mapped waterbodies in the vicinity of the Property, apart from Hubbles Lake itself, which has several fish populations (Northern Pike, Perch)

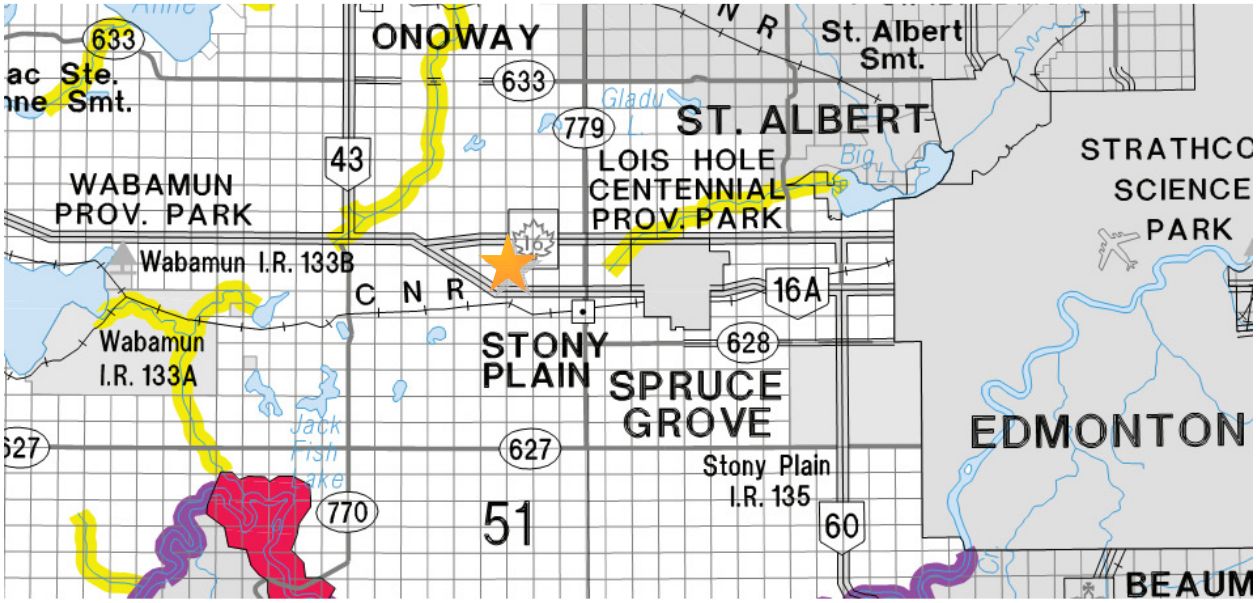

Fig. 11: *Extract from the map of classed waterbodies for the Watercourse Crossing Code of Practice (Alberta Environment, 2006, Stony Plain Management Area). Orange star indicates location of the subject site.*

The Alberta Environment maps and the classification system for watercourses in Alberta is based generally on the abundance and quality of fish habitat. Class A is the highest priority class, and class D is the lowest (except for "unmapped" watercourses which are not shown on the maps at all).

Because of the distances involved, it is unlikely that the proposed development activities will have an adverse effect on any classed or mapped fish-bearing waters or their aquatic fauna. However, if there were activities on the Property that altered drainage or introduced silt or other materials into receiving waters or adjacent lands, it could theoretically have an effect on water quality downgradient in Hubbles Lake. Where works are proposed instream or within a fish-bearing waterbody, a determination on the likelihood of a harmful alteration, disturbance or destruction (HADD) of fish habitat is required from Fisheries and Oceans Canada (DFO).

Data collected during the Qualified Aquatic Environment Specialist (QAES) Assessment, conducted by Applied Aquatics in May, 2009 (Applied Aquatics Research Ltd., 2009), help determine the nature and extent of fish habitat potential, as well as the presence/absence of fish in the wetland comprising Allan Pond.

Minnow traps and a boat-mounted float electro-fishing unit were used to sample for fish in the Allan Pond wetland. Eighteen baited minnow traps were deployed around the periphery of Allan Pond for one night in mid-May, 2009 and retrieved the following morning. Open water and deeper sections of the wetland were sampled using a boat-mounted electro-fishing unit (Applied Aquatics Research Ltd., 2009).

The following is taken from the Applied Aquatics Ltd. (2009) report, as quoted in the previous biophysical assessment report (Focus Corporation, 2009), with minor changes in wording.

A total of 18 baited minnow traps were left in Allan Pond overnight, for a total of 306 trap hours. The minnow traps yielded diving beetles, dragonfly larvae, caddisfly larvae, amphipods, and leeches. A total of 457 seconds of electro-fishing effort was carried out and revealed an abundance of the *Gammarus sp.* crustacean. No fish were captured using either sampling method.

Apparently, the wetland was stocked with fish as recently as about 1999, but it is unknown what species were stocked. Substrate within the wetland is dominated by fine grained material with the only gravel present being that used in construction of the small boat launch. Spawning habitat potential was rated for the two species documented within the adjacent Hubbles Lake. Spawning habitat was rated “moderate” for both yellow perch and northern pike, with good vegetation present. Rearing for juveniles was also rated “moderate” with the prevalence of cattails providing adequate cover. Overwintering potential was rated “moderate”, with sufficient depth available. However, the level of dissolved oxygen available across winter is not known.

Given the proximity of the wetland to Hubbles Lake, and the known fish presence in Hubbles Lake, the land between the two waterbodies was examined for connectivity between the two waterbodies. No direct connectivity between the two waterbodies was found. At their closest point, the two waterbodies are separated by a strip of land approximately 100 m wide, with an elevation of approximately 4 m. Although the elevation of this landmass decreases about 90 m to the north-east, the distance between the two waterbodies at that point is greater (close to 140 m). Flood level data are not currently available for Hubbles Lake, but based on the field survey, flow between Hubbles Lake and the wetland is likely not possible except in extreme flood years, making the transfer of fishes from Hubbles Lake into the adjacent wetland unlikely.

WETLANDS

In the previous biophysical assessment, information was collected on the wetland at the east of the Property (Allen Pond) during the Qualified Wetland Aquatic Environment Specialist (QWAES) investigation. The investigation was conducted by Applied Aquatics in May, 2009 (contained in Appendix 8 of Focus Corporation (2009)). The classification of the wetland was determined using the Stewart and Kantrud Wetland Classification System (Stewart and Kantrud, 1971). The vegetation species and distribution and amount of water present are indicators that determine the classification. Other observations of wildlife, surrounding land use, and dimensions of the wetland were recorded to help determine wetland function and importance. The perimeter of the wetland was traversed on foot, and the open-water area was investigated from a zodiac boat (Applied Aquatics Research Ltd., 2009).

The following is taken from the Aquatics Research Ltd. (2009) report, as quoted in Focus Corporation (2009), with minor changes in wording.

The wetland comprising Allan Pond is a Class V permanent pond (Stewart and Kantrud 1971). It measures approximately 2 ha in area with a width of 185 m along at its widest point. Allan Pond was surprisingly deep in the centre (>3 m), with a permanent open-water zone that dominates the wetland area. Submergent vegetation consisting of northern watermilfoil (*Myriophyllum sibiricum*) was found in the open-water zone. A 2 m-wide buffer of cattails (*Typha latifolia*) with some scattered willow (*Salix spp.*) encircles Allan Pond. Surrounding Allan Pond is a gravel path and beyond that is a deciduous forest.

Several species of waterfowl were observed in Allan Pond: two Canada geese (*Branta canadensis*), four American coot (*Fulica americana*), numerous red-winged blackbirds (*Agelaius phoeniceus*), one common merganser (*Mergus merganser*), one mallard (*Anas platyrhynchos*), one lesser yellowlegs sandpiper (*Tringa flavipes*), and two red-necked grebes (*Podiceps grisegena*). The grebes appeared to be nest-building. A woodpecker was heard, but not seen and a single muskrat was seen swimming. No reptiles were observed; no amphibians were heard calling and no adults, larvae, or egg masses of amphibians were observed. Amphibian surveys in the 1960s and 1970 reported toads in Section 09-053-01 W5M, but a March 16, 2009 search on the FWMIS Wildlife Database yielded no results (Hugh Wollis, Wildlife Biologist, Woodlands Area, Fish and Wildlife, Spruce Grove, as quoted in Applied Aquatics Research Limited, 2009). Several mule deer were observed near Allan Pond.

Allan Pond provides suitable spawning habitat for northern pike and yellow perch and a moderate habitat potential for rearing and overwintering. There is also an abundance of food for fishes (*Gammarus sp.*). No fish were captured or observed and the absence of fishes from this wetland (from either the historical connection or recent fish stocking efforts) may be the result of winter kill, common in wetlands of this size. Diel variations in dissolved oxygen (DO) concentrations (i.e., between day and night) may also occur within this wetland. In general, more productive waterbodies have a greater fluctuation in DO concentration, which can range from supersaturation during the day to zero at night (Goldman and Horne 1983).

Allan Pond appears to be functioning well as a wetland, and is used by several waterfowl species and other wildlife. No amphibians were observed during the daytime survey; nevertheless, it is recommended that any future plans for fish stocking be considered with caution, as this could discourage amphibian use of the wetland. Late fall or winter construction will reduce any potential negative impacts from construction on migration and critical life-history stages of amphibians and birds. Standard run-off controls such as silt fences should be used at this location to minimize sediment mobilization into the wetland.

Provided that construction does not include the removal or destruction of vegetation within the confines of the bed and shores of the wetland, filling in any part of the wetland, or draining or realignment of the wetland, Approval under the Water Act is not required. Given the wetland is currently non-fish-bearing and that construction within the wetland is not being proposed, notification to/or approval from DFO is not required.

Wetland quality could be affected by the proposed development. Construction in close proximity to a wetland has the potential to damage or destroy vegetation, enable the spread of weedy and invasive species and cause soil compaction. Unless care is taken, riparian vegetation surrounding Allan Pond and the shore of Hubbles Lake could be impacted by construction within the roadway, which would have adverse impacts on water quality.

4.9 BIODIVERSITY

Habitat Diversity and Biodiversity

As a rule, a high degree of structural diversity in an ecosystem leads to a correspondingly high number of ecological "niches" for plants and animals, and accordingly a greater number of species of wildlife and plants inhabiting the ecosystem, hence greater overall biodiversity. The study area comprises several different types of habitat, differing both in vegetation communities represented and in topography. These include: mature deciduous forest; wetland/pond; and shoreline.

The deciduous forest stands in the ravine systems running across the Property have a well-developed upper canopy of trembling aspen and balsam poplar, with a rich and diverse understory of young trees, shrubs and ground vegetation. These stands would serve to provide nesting, feeding and dispersal habitat to a number of species of birds, as well as small mammals, ungulates, amphibians and a wide variety of food-chain organisms. The combination of a well developed upper canopy, an understory and diverse ground vegetation would create a wide variety of ecological niches for these forms of wildlife, which would in turn support a wide and diverse variety of organisms.

The mixture of mature deciduous forest, wetland/pond and shoreline areas would collectively contribute a fairly high degree of structural habitat diversity. This structural habitat diversity would in turn lead to a respectably high variety of ecological niches, and accordingly a reasonably high diversity of plant and animal species. Acting counter to this influence, the Property is also disturbed in terms of habitat loss, fragmentation, and has been so for a considerable period. Non-native, invasive plants are also abundant, and this will tend to limit the number of native species with which they compete successfully for nutrients, soil and water. All factors considered, therefore, a moderately high degree of biodiversity would be anticipated in such an environment.

Rare and Endangered Species, Species at Risk and Element Occurrences

Results of Field Reconnaissance

Based on the field observations, it is evident that the ecosystems on the Property represent vegetation communities that are common and well known in the Dry Mixedwood Sub-Region. The property is also disturbed in terms of habitat loss, fragmentation, and has been so for several decades. Therefore, it is unlikely (though not impossible) that rare plants or ecosystems would be found there.

None of the plant species listed in the ANHIC List of Plant Species of Special Concern was observed during the field surveys. This applies to both the Tracking List and the Watch List.

Table 9: *Endangered and Threatened plant species for Alberta.*

Endangered species listed for Alberta:	
Small-flowered Sand-verbena Tripterocalyx micranthus	
Threatened Species listed for Alberta:	
western Blue Flag	*Iris missouriensis*
Slender Mouse-ear-cress	*Halimolobos virgata*
Soapweed	*Yucca glauca*
western spiderwort	*Tradescantia occidentalis*

The list of species of concern listed under the federal *Species at Risk Act* was also examined. SARA-listed species that are listed giving Alberta as location are shown in Table 10 below (Environment Canada website for SARA-listed species). For each of these species, the specific ranges and habitat types were considered.

Table 10: *The list of species of concern listed under the federal Species at Risk Act.*

Endangered species listed for Alberta:	
Swift Fox	*Vulpes velox*
Burrowing Owl	*Athene cunicularia*
Piping Plover circumcinctus subspecies	*Charadrius melodus circumcinctus*
Mountain Plover	*Charadrius montanus*
Greater Sage-Grouse urophasianus subspecies	*Centrocercus urophasianus urophasianus*
Sage Thrasher	*Oreoscoptes montanus*
northern Leopard Frog	*Rana pipiens*
Threatened Species listed for Alberta:	
Woodland Caribou	*Rangifer tarandus caribou*
Peregrine Falcon anatum subspecies	*Falco peregrinus anatum*
Sprague's Pipit	*Anthus spragueii*

Loggerhead Shrike excubitorides subspecies	*Lanius ludovicianus excubitorides*
Special Concern Species:	
Long-billed Curlew	*Numenius americanus*
Harlequin Duck	*Histrionicus histrionicus*
Yellow Rail	*Coturnicops noveboracensis*
Northern Leopard Frog	*Rana pipiens*
Great Plains Toad	*Bufo cognatus*
Western Toad	*Bufo boreas*
Monarch butterfly	*Danaus plexippus*
Weidemeyer's Admiral	*Limenitis weidemeyerii*

From the above list, it was determined that with few exceptions, the reported range of the species is far from the subject property (e.g., dry prairie region of southern Alberta) and/or the habitat requirements of the species were not available at the Property.

Amphibians, small mammals, and carnivores would utilize the areas around the wetland for foraging. Several common species of amphibians are likely to be present in the Allan Pond wetland or the shoreline of Hubbles Lake, possibly including boreal chorus frog, wood frog, Western toad, Canada toad, and tiger salamander (although these were not see during the previous biophysical assessment).

The Canadian Toad (*Bufo hemiophrys*), sometimes considered a subspecies of the American Toad (*Bufo americanus*), is one of three species of the genus *Bufo* found in Alberta, along with the Western Toad (*Bufo boreas*) and the Great Plains Toad (*Bufo cognatus*). Over the past several decades, Canadian Toads have declined sharply in numbers or disappeared in some areas of central Alberta and populations in other areas of the range such as Manitoba and Wyoming may be declining as well. In Alberta, the Canadian Toad is included on the red list of species that current information suggests are at risk of declining to nonviable population levels in the province.

Of the exceptions, there are no Peregrine Falcon nests known at the Property, and none of these birds were seen in the field surveillance. The Western Toad lives in a range of habitats and requires some cover, e.g., bushes, as well as the presence of standing water. While they might exist there, the Property would not represent critical or unique habitat for these amphibians. Monarch butterflies exist primarily wherever milkweed (*Asclepius*) and wildflowers (such as Goldenrod, asters, and Purple Loosestrife) exist. This includes abandoned farmland, along roadsides, and other open spaces where these plants grow. Given the predominantly forested area on the Property, it is unlikely that the Property represents particularly good habitat for these insects.

Results of Data Base Enquiries

The Alberta Tourism, Parks and Recreation's Alberta Natural Heritage Information Centre (ANHIC) collects, continually updates, analyzes and disseminates information about the location, condition, status, and trends of selected tracked elements, including species and plant communities in a central database.

In the previous biophysical assessment (Focus Corporation, 2009), a search of rare plant and rare plant occurrences was conducted for NE¼-09-053-01 W5M, and for adjacent lands at Sections 3, 4, 9, 10, 15, and 16 in Township 053 Range 01 W5M. There were no occurrences for elements on the tracking lists in the vicinity of the search area. However, this does not indicate that occurrences do not exist. The absence of records could indicate that very few inventories/surveys have been done in this part of the province (Duke Hunter, Senior GIS Technologist email communication June 3, 2009, as quoted in Focus Corporation, 2009).

There are 117 tracked vascular plants, 137 tracked non-vascular plants (bryophytes and lichens), and 18 tracked plant communities that could potentially occur in the Central Parkland and Dry Mixedwood Natural Subregions (and the Property) (ANHIC 2008).

A search of ACIMS database maps on January 17, 2012, showed no Element Occurrences (sensitive or non-sensitive) on or near the Property.

4.10 SUSTAINABILITY

In determining whether an ecosystem is likely to be sustainable over the long term, some of the important factors to consider include the size of the system (e.g., the length and width of a stand of trees), the health and sensitivity of the soil, slope angles and aspect, soil drainage and supply of moisture, the depth of the water table and supply of groundwater, and the exposure and susceptibility of the system to the extremes of weather.

In terms of plant and animal habitat and biodiversity, importance should be placed upon conserving the mature aspen/poplar deciduous stands existing on the south slopes of the Property, i.e., DF1 - DF4. Even though they have been fragmented to a considerable extent in previous developments and activities, it is important to maintain what is left of core habitat by minimizing the amount of new clearing.

The stands of aspen, poplar, birch and other understory trees and bushes on the slopes appeared to be generally healthy, although the observations were made in the winter, when leafage cannot be evaluated. In some areas there is some degree of breakage, possibly due to dry conditions over the last years, as well as wind damage, but these do not appear to be excessive, i.e., the degree of this is no more than would be typical for a stand of similar size nowadays in this region. The understory appeared to be vigorous, and there were relatively few signs of unusually high senescence or disease. In many areas, there were old, dying and fallen trees but there were also densities of young deciduous trees coming up, this fostering succession of the stands over future years, and hence sustainability. The stand DF4 at the west end of the Property is one of relatively young deciduous trees. There were very few coniferous trees in the understory of the forested slopes. This suggests that the makeup of the forest will remain similar to its present species mix (i.e., trembling aspen, balsam poplar and birch dominant in the overstory) for a considerable time, or at least until some form of major disturbance such as fire, or significant insect or disease infestation. Normally, the climax forest for this region is dominance by mature aspen and white spruce. If this form of forest system were desired, it would require some under-planting with spruce, since there does not appear to be a sufficiently great seed source of spruce in that location.

Because such features represent a hydrological reserve as well as valued habitat for various small mammals and birds as well as aquatic organisms, the riparian area of Allan Pond is worthy of preservation as an Environmental Reserve. The sustainability of the riparian vegetation community will depend largely on the supply of surface water and groundwater: it is evident that the Pond has a sufficient supply of water that it forms a permanent pond (i.e., it contains water year-round).

Similarly, the riparian shoreline vegetation of Hubbles Lake, where it coincides with the Property, should be left as an Environmental Reserve. The row of deciduous vegetation DF5, which runs parallel to the shoreline of the Lake, appears to be healthy and vigorous, and would serve as a good buffer for wildlife utilizing the shoreline habitat.

The soil and soil cover appeared to be healthy, with sufficient coarse woody debris, ground vegetation and moisture. The exceptions were around the base of the slopes near Allan Pond, where there were steep slopes and sandy soils (discussed above). Coarse woody debris (i.e., dead, fallen trees or dead standing trees (snags)) is an important element in nutrient cycling in the forest ecosystem, as well as being a factor in biodiversity because of the opportunities for habitats for many species of small plants and animals. The sustainability of these stands can be expected to be dependent on their remaining size, the condition of the soils and slopes, the degree of moisture, and the species, condition, age and health of the trees.

Invasion by non-native plant species, i.e., weeds, however, is a present reality in the area, both in the forested and unforested zones of the Property. Weeds compete with native vegetation, for soil, nutrients and water, and often supplant the natural plant populations.

Portions of any treed stands that are retained should be sufficiently large that they do not become susceptible to windfall or excessively exposed to other climatic variables, e.g., a drying out effect due to heat and air movement. Construction should be avoided too close to the edge of the forested area that is to be preserved.

In any case where there is doubt about the condition or configuration of trees in a stand, an arborist should be consulted to determine if the stand is truly sustainable, and what measures might be necessary to enhance the sustainability if it is to be conserved.

Finally, it is interesting that the portion of the Hubbles Lake shoreline contained by the Property consists mainly of bulrushes (*Scirpus spp.*), whereas the shoreline immediately to the west is dominated by cattails (*Typha latifolia*). Apart from weeds, the vegetation should not be deliberately cut back or altered, as emergent vegetation, including cattails, serves as a sink for nutrients (containing nitrogen and phosphorus) that would otherwise lead to eutrophication of the lake water and in advanced cases, depletion of dissolved oxygen.

4.11 ECOLOGICAL LINKAGES

In both the Dry Mixedwood and Central Parkland ecological regions, ecological connectivity has much to do with forested areas, which provide visual and thermal cover for many forms of wildlife, as well as nutritional support. Moose and deer, for example, move readily along corridors of forest, because it provides them with visual cover from predators, as well as providing them with a source of food in the form of leafy vegetation. Although they venture out into the open to travel or to access other sources of food, deer prefer to stay within about 200 m of forest cover. Extensive forest areas, therefore, serve as movement corridors for these animals. Similarly, birds use forest corridors for habitat, visual and thermal cover and the acquisition of food, and because they can fly, easily disperse among patches of forest on the landscape. Mammalian wildlife such as moose, deer, coyotes, furbearers and even amphibians, also use patches of treed areas to disperse with greater safety. These adjacent patches are referred to as "stepping stones", while long bands of forest are called "corridors". Patches of forest that are sufficiently large to support the life-cycle activities of animals are referred to as "core" habitats.

In 1950, major wooded areas existed on the Property, as well as in most directions adjacent to it. Even by that time, however, some of the area around the Property had been cleared of trees to accommodate agriculture. By 2006, most of the wooded area previously existing around the location of the Property, had been removed to accommodate agriculture and other human activities.

In short range context, treed connectivity within the boundaries of the Property is high, albeit with the forest cover fragmented due to clearings that have been created for camping and buildings.

The 6-foot high chain-link fence that borders the southern and eastern boundaries of the Property, however, would form a significant barrier to most mammals, though passerine birds would not be deterred by it.

In the medium range, treed connectivity exists to the north, the northeast, and around the properties to the west, along the north shore of Hubbles Lake. Connectivity also exists to the south, and thence to the southwest and to a larger extent the southeast (see green arrows in Fig. 12.

In the long range (Fig. 13), areas of largely treed deciduous or mixedwood forest become scarce and very fragmented at distances of more than 2 km in any direction. The two major highways 16X and 16A (to the north and to the south, as well as the west) would form a significant barrier to mammals, as well as the risk of mortality.

Aquatic connectivity is limited between the Property and adjacent areas, as there are no substantial tributaries into or out of Hubbles Lake nor Allan Pond. This being said, both the Pond and the Lake would be linked hydrologically and ecologically to wet areas of the adjoining lands.

Given the remaining connectedness of the forest zone on the Property and the wooded areas beyond, it is important that there be some overall strategy in place to conserve as much of this linkage as possible over the long term, before it is too late. While it is not possible for the proponent to control development outside of the proposed development site, it is recommended that the County make plans to conserve these ecological linkages. This would include strategically conserving all or some of the forested areas on the lands to the north and south and southwest, which would have some core habitat value, as well as serving as ecological linkages in those directions.

Finally, the blocks of forest on the Property will still function to some extent as dispersion corridors for birds, small mammals and food chain organisms (as well as providing nesting and denning opportunities). Conserving these tree blocks would provide short-range ecological connectivity in the project area.

Fig. 12: *Ecological linkages, medium range, based on wooded areas in the vicinity of the project site (imagery from Google Earth Pro, 2006). Green arrows indicate potentially "permeable" wooded corridors or stepping stone patches amongst core habitats (implies travel in both directions). Yellow marker indicates location of the study site.*

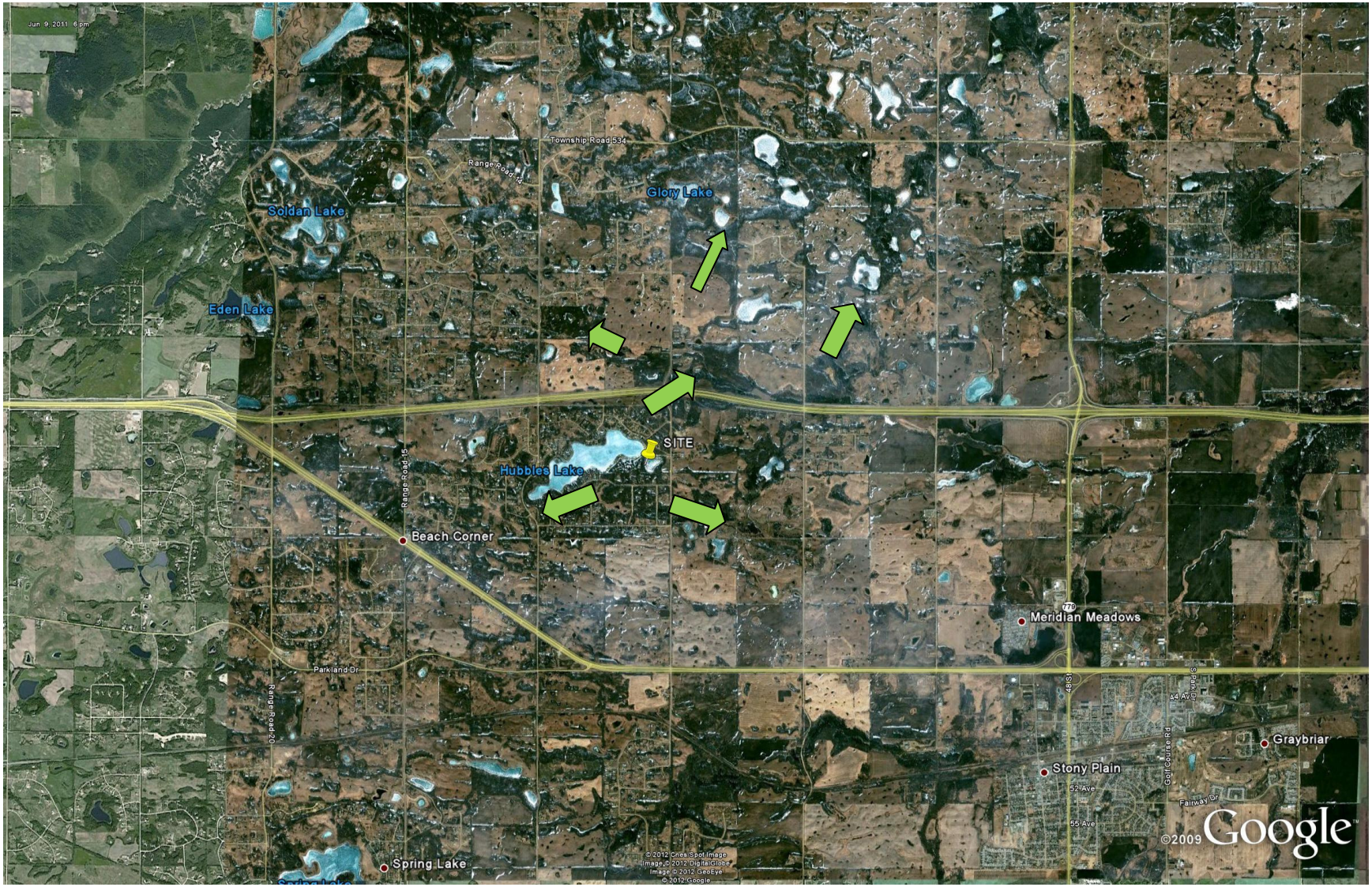

Fig. 13: *Ecological linkages, longer range, based on wooded areas in the vicinity of the project site (imagery from Google Earth Pro, 2006). Green arrows indicate potentially "permeable" wooded corridors or stepping stone patches amongst core habitats (implies travel in both directions). Yellow marker indicates location of the study site.*

4.12 AESTHETICS AND VISUAL IMPACT

The forested slopes of the topography, combined with the shoreline of Hubbles Lake, contribute significantly to the aesthetic appeal and visual interest of the Property. This gives the area substantial visual interest, which would appeal to residents / users, provided that the important elements of these attributes are respected within the context of the proposed development. In general, the existing topography of the Property should be retained, as it lends considerable aesthetic interest, as well as moderating surface water flows.

For this purpose, it is recommended that as much as possible of the deciduous forest be retained, as well as the small column of younger deciduous trees that runs along the shore of Hubbles Lake (DF5).

The small row of mature white spruce (CF1) near the administration building at the east side of the Property also contributes to the visual interest of the Property, and for that plus vegetation/habitat values, these trees should be left in place.

Collectively, the above forested areas could provide a visual and noise barrier, if retained as treed areas. Treed blocks can also moderate or improve micro-climate (humidity, temperature) through shading and their biochemical processes. Features such as these provide not only a positive visual feature and recreational experience, but also serve to reduce the transmission of noise to, from and within the Property. Dust levels, too, can be reduced to some extent by forest patches and shelterbelts. Overall, they can improve the sense of well-being through the visual, auditory and olfactory senses of people living there or visiting.

The treed areas, including the slopes, also provide the possibility for creating walking trails through the area, which add to the interest of the land, and provide an opportunity not only for recreational walking but also for the appreciation of the natural forest ecosystem and wildlife habitat.

Allan Pond and its shoreline vegetation provide an additional, significant element of visual and aesthetic interest to the Property, and should be protected.

The above forested and wetland areas on the Property, if left in place and not significantly more fragmented than they currently are, would present a visual and noise screen as well as an additional aesthetic feature.

Any infrastructural developments, parking pads or buildings should be keyed into the treed zones in such a way as to preserve as much treed habitat as possible, while creating a visual and noise shield to enhance privacy. The establishment of new trees that will eventually grow in around the homes should be given consideration.

Additionally, measures should be in place to discourage motorized vehicles from traveling along the conserved forested, wetland or shoreline areas, as there will be sensitive soils and vegetation in these locations.

Any solid waste, spilled materials, excavations, dirt piles, machinery or woody debris should be cleaned up immediately following construction.

4.13 DESIGNATED ENVIRONMENTAL AREAS

In the Township 53-01 W5M, there are no Natural Areas, Provincial Parks, Ecological Reserves or other designated areas (Alberta Parks, Land Reference Manual, on website). In adjoining townships there are the Kilini Creek Natural Area (PNT) and the Manly Corner Natural Area (PNT) to the NW, the Spring Lake Natural Area to the SW, and the Wagner Natural Area to the east; but these are at least 5 km distant from the Property.

In a map of Environmentally Significant Areas in Parkland County produced by Westworth Associates Environmental Ltd. (2004), the shoreline of Hubbles Lake, including the stretch of shoreline contained by the Property, is indicated as an Environmentally Significant Area of local significance (Fig. 14).

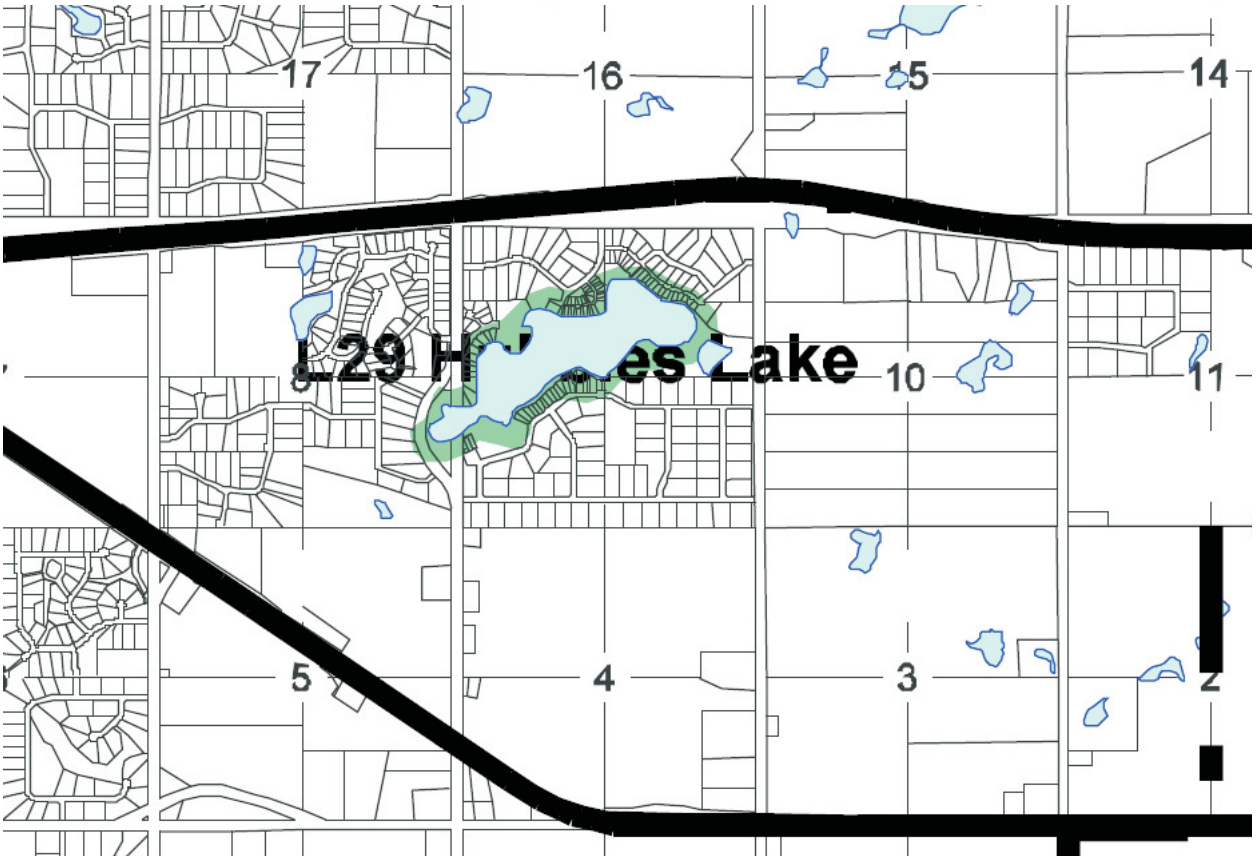

Fig. 14: *Map of Environmentally Significant Areas in Parkland County (partial). Blue shading indicates areas of local environmental significance. From Focus Corporation, 2009. Original information from Westworth Associates Environmental Ltd. (2004).*

4.14 EXISTING DISTURBANCES

The property has been operated as a resort for the past sixty years, and this has involved the clearing of patches of forest on the Property, as well as certain buildings and other infrastructure.

A Phase 1 Environmental Site Assessment (ESA) was conducted on the Property in July 2007, by Envirotech Engineering (Calgary)(Envirotech, 2007).

The ESA identified several areas of concern. These included possible historical spills and handling of chemicals and materials on the Property, the leaching of septic waste into the groundwater or into the pond/lagoon, solid waste associated with the garbage burn pit, PCBs associated with the three transformers located on the Property and possible liabilities related to the house that was built in the 1940's (i.e., asbestos insulation, lead based paint, mould, the historic heating of the building).

Another possible issue was the caveats imposed on the Property by Imperial Oil and the West Parkland Gas Co-op which may have performed activities that could have potentially resulted in environmental degradation on the Property.

Two above ground storage tanks (diesel/gasoline) were utilized for maintenance equipment on the Property. The vegetation around the storage tanks was observed to be healthy with a minor area showing signs of stress around the base of the diesel tank. The current owner of nine years at that time reported that there have been no spills related to the use of the storage tanks. Several jerry cans, paint, batteries, oil and other commonly used landscaping maintenance products were seen stored in the maintenance storage area at the time of the ESA site visit.

There were two septic fields that were used for the treatment of septic waste on the Property. The vegetation on the septic field appeared to be healthy at the time of the ESA site visit. There were five buried storage septic tanks associated with the two septic fields; and an additional eight isolated septic storage tanks on the Property which are have the accumulated waste removed once every week or two. Potential liabilities associated with the Property's septic storage and treatment is the leaching of septic waste into the groundwater or into the pond/lagoon.

There was one garbage burn pit, approximately 5 square meters in size, which was burning at the time of the ESA inspection in 2007. Envirotech saw no visual evidence of burning products unsuitable for the burn pit; however, there was no evidence of a containment system for the ash. The potential liability related to the burn pit was considered to be the current and historical waste that has been burned in the pit and the residue left behind.

There was no evidence of recorded leaks or spills in the 2007 site visit, and no unidentified drums or containers were seen on the Property. There were two storage buildings used for recycling. No unidentified or unlabeled waste was seen during the site inspection. It was observed that liquid chemicals were stored in a designated storage area.
It was determined whether there was any waste generation or disposal records, or if there are any approvals or permits (municipal, provincial or federal) associated with the site.

Three transformers on poles containing Polychlorinated Biphenyls (PCBs) were observed on the Property; however, there was no evidence of leakage and there was no reason to suspect PCB contamination. It was not determined whether any PCBs previously on the site had been removed.

Based on the above findings, the Assessor concluded that the concerns likely did not pose significant financial or environmental liabilities for the site. Maintenance and infrastructure upgrades (for the secondary containment associated with the AST's) and general housekeeping was suggested for those areas of the Property identified as areas of concern.

5.0 POTENTIAL IMPACTS

5.1 Soils

The soils in some areas on the southern slopes are previously disturbed. Forested areas occurring on the Property were on hummocky slopes ranging to about 20 degrees, with some of the sloped areas being naturally "benched". In some places they are soft and organic, while in others, bare, sandy soil was exposed. There is the potential for soil erosion particularly near the base of the slopes surrounding Allan Pond. Examples include: WP15, WP18, WP21, WP26, WP33 (viewing platform) and WP50.

In some locations, supporting walls have been erected to contain any ground instability, and in some areas there is soil instability and erosion.

Construction activities associated with the proposed redevelopment may increase the potential for erosion to occur. Sediments released in that area would be carried directly into Allan Pond, causing secondary impacts on water quality and fish habitat. In the absence of proper soil handling methods and reclamation considerations, there would be adverse impacts to the Property. There is also the potential for the topsoil and subsoils to become mixed during the soil stripping, stockpiling and replacement process, thereby affecting the original soil characteristics and soil fertility. Mixing of topsoils and subsoils can cause adverse effects on soil drainage and compactability.

Compaction can occur on subsoils and fine topsoils where heavy equipment is used. Compacted soils will limit root penetration, reducing the ability of vegetation to become established in reclaimed areas. Local drainage patterns can also be modified during grading if pre-existing terrain contours are changed. There would be adverse impacts associated with compaction.

5.2 Vegetation

The proposed development may require some clearing of previously undisturbed vegetation. Currently, there is a significant degree of habitat fragmentation that has resulted from past clearing of the forested areas to accommodate the camping and parking facilities of the development, particularly in areas DF3 and DF4 (Fig. 10). While most of the land on the Property has been disturbed in the past there are several areas of relatively undisturbed vegetation in the riparian areas and in the deciduous forest areas. Clearing of either forested or riparian areas would result in a loss of habitat for a number of species of wildlife. Potentially, this would lead to even more habitat fragmentation than has been done in the past. Unless these impacts are mitigated, the net effect will be negative and long-term.

Construction activities related to the proposed development could potentially result in opportunities for invasive, non-native species of plants to proliferate on the Property. The seeds of weedy species could enter the Property via construction machinery; and seeds could inhabit stockpiled top soils and become reestablished when the topsoil is spread during reclamation. Without mitigation, the introduction of invasive, non-native species of plants would represent an adverse impact, because they can outcompete many species of native plants, and can absorb disproportionately great amounts of water and nutrients from the soil. The question of weed infestations should be viewed as an ongoing problem that has the potential to get worse.

Unless appropriate measures are taken, there is the possibility for petroleum products, lubricants, etc., to be released during construction activities. This can have toxic effects on

vegetation and wildlife. This is especially serious when working near water bodies such as Hubbles Lake and Allan pond.

No rare plants or rare ecological communities were observed on the Property during the 2009 or January 2012 field surveys. The types of forest and riparian plant communities observed on the Property represent fairly common ecosystems in this ecological subregion. Because of this, and considering the disturbed nature of the land on the site, it is very unlikely that rare plants or rare ecological communities occur. Based on this information, impacts to rare plants or rare ecological communities are unlikely.

If the row of deciduous trees DF5 lying parallel to the shore of Hubbles Lake is disturbed or cut down, this could result in the loss of a favorable visual and noise barrier between the lakeshore/riparian environment and the developed area to the south. It was evident in the field reconnaissance that ungulates, hare and other wildlife utilize the shoreline zone, and this row of trees would to some extent provide a buffer from human activities in the development, both during construction and operational phases. Loss of this buffer would represent an adverse effect on wildlife as well as aesthetics.

5.3 Wildlife

If further clearing of vegetation and forest areas is required as part of the proposed development, this would result in the reduction of available wildlife habitat on the Property. Loss of vegetation would also result in further fragmentation of the remaining core habitat. This could affect ungulates (moose and deer), birds and small mammals. Some wildlife species are more sensitive to habitat fragmentation, e.g., the Pileated Woodpecker.

Disturbances such as noise, light and traffic may result in sensory disturbance to wildlife, which in turn could disrupt nesting, denning, foraging or breeding patterns, or to cause wildlife to avoid areas entirely. This could happen during either construction or operational phases of the project. Some species of wildlife are more sensitive to this type disturbance than others.

Additionally, the nests of migratory birds may be disturbed if tree clearing activities are carried out in the nesting season (approximately mid April to late July). Similarly, nests of waterbirds are at risk from activities in the shoreline zone of Hubbles Lake. The disturbance or destruction of migratory birds nests is an offense under the federal *Migratory Birds Convention Act (MBCA)*.

The movement of vehicles on or around the Property during construction or operational phases of the project could result in vehicle-wildlife collisions and mortality of wildlife.

New developments may result in the erection of physical barriers, which could disrupt or change seasonal and daily movements of wildlife. However, it is to be noted that the existing chain-link fence around the east and south boundaries of the Property already forms a barrier to a large extent.

5.4 Impacts on Rare and Endangered Species

The biophysical assessment report produced previously (Focus Corporation, 2009) listed the following species as being species of management concern, which might be adversely affected by the proposed project:

- Barn Swallow;
- Pileated Woodpecker;
- Rusty Blackbird;

- Sandhill Crane; and
- Red-Sided Garter Snake.

Due to the lack of suitable habitat on the Property, mitigations for the Rusty blackbird and Sandhill Crane are considered to be unnecessary. The Barn Swallow is adaptive when it comes to habitat utilized, e.g., it adapts well to habitats that have been altered by human activities and developments.

If a significant amount of large trees (live or dead) are to be removed as a result of the project, the Pileated Woodpecker may be adversely affected, as it prefers closed-canopy habitats in relatively mature forests, and since it requires a relatively large core habitat. It must be recognized, however, that the area is already fragmented to a large degree. The impact would be more or less proportionate to the amount of mature trees that are going to be removed.

While Red-sided Garter Snakes are believed to occur in the area of the project, the previous biophysical assessment report reported that no garter snake hibernacula or dens were observed on the Property, nor were there any reports of them. If a hibernaculum were to be destroyed in the winter, an entire population of snakes can be killed at once. If a hibernaculum or den were to be discovered during the construction phase of the project, workers or land managers should be aware of this when it happens, and the steps that should be taken to protect them.

5.5 Fisheries and Wetlands

The following was taken from the Applied Aquatics Research Ltd., (2009) report, as quoted in Focus Corporation (2009), with minor changes in wording.

Allan Pond provides suitable spawning habitat for Northern Pike and Yellow Perch and a moderate habitat potential for rearing and overwintering. There is also an abundance of food for fishes (*Gammarus sp.*). No fish were captured or observed and the absence of fishes from this wetland (from either the historical connection or recent fish stocking efforts) may be the result of winter kill, common in wetlands of this size. Diel variations in dissolved oxygen (DO) concentrations (i.e., between day and night) may also occur within this wetland. In general, more productive waterbodies have a greater fluctuation in DO concentration, which can range from supersaturation during the day to zero at night (Goldman and Horne 1983).

Allan Pond appears to be functioning well as a wetland, and is used by several waterfowl species and other wildlife. No amphibians were observed during the daytime survey; nevertheless, it is recommended that any future plans for fish stocking be considered with caution, as this could discourage amphibian use of the wetland. Late fall or winter construction will reduce any potential negative impacts from construction on migration and critical life-history stages of amphibians and birds. Standard run-off controls such as silt fences should be used at this location to minimize sediment mobilization into the wetland.

Provided that construction does not include the removal or destruction of vegetation within the confines of the bed and shores of the wetland, filling in any part of the wetland, or draining or realignment of the wetland, Approval under the Water Act is not required. Given the wetland is currently non-fish-bearing and that construction within the wetland is not being proposed, notification to/or approval from DFO is not required.

Wetland quality could be affected by the proposed development. Construction in close proximity to a wetland has the potential to damage or destroy vegetation, enable the spread of weedy and invasive species and cause soil compaction. Unless care is taken, riparian

vegetation surrounding Allan Pond and the shore of Hubbles Lake could be impacted by construction within the roadway, which would have adverse impacts on water quality.

5.6 Cumulative Effects

Cumulative effects are changes to the environment that are caused by an action in combination with other past, present and future human actions. The proposed redevelopment project is consistent with the stipulated land use of the area, and is similar in form to existing development around the shores of Hubbles Lake. Furthermore, the Property has already been developed and used for a considerable period for recreational facilities including RV parking and camping and some related buildings and infrastructure. The area surrounding the Property, around Hubbles Lake and elsewhere has been developed. Accordingly, the proposed residential / recreational development is not anticipated to "tip the balance" of impacts resulting in a significant cumulative effect.

6.0 SUMMARY OF FINDINGS AND CONCLUSION

This Biophysical Assessment has been developed for TRG Developments Corp., Calgary, and IBI Group, Edmonton (design consultant) as part of an application to develop the north half of the NE quarter-section of Section 09, Township 53, Range 01 West of the 5th Meridian. The total land within the Property ("the Property") site of the proposed project is 15.2 ha (37.8 acres). The biophysical assessment is required to inform a decision by Parkland County on the approval of a development plan for the site, as requirements under the *Alberta Water Act,* the *Environmental Protection and Enhancement Act.* and the *Public Lands Act*.

The property is included in the Glory Hills Area Structure Plan (ASP) of Parkland County. The ASP identifies country residential development and public recreation as the preferred land-use for the area (Parkland County, 1987). Much of the Property is occupied by north-facing, deciduously treed slopes, but it also includes a wetland (Allan Pond) and a portion of the southeastern shore of Hubbles Lake. The shoreline of Hubbles Lake has previously been identified as an Environmentally Significant Area of local importance in Parkland County.

The property has served as a recreational resort for approximately 60 years; however, it has been closed since the fall of 2008. The landowner now wishes to modify and improve the existing property by developing a year-round resort.

A biophysical impact assessment was carried out for the Property in 2009 (Focus Corporation, 2009). Because the present biophysical assessment was conducted in the winter of 2012, this report draws on the 2009 study for much of the vegetation, wildlife and related components, as well as a field reconnaissance conducted in January 2012.

Much of the soils, vegetation and other ecological components have been disturbed and fragmented by past/current developments, as the Property has been used as a recreational resort for a considerable period.

6.1 Soils

The soils in some areas on the southern slopes are previously disturbed. Forested areas occurring on the Property were on hummocky slopes ranging to about 20 degrees, with some of the sloped areas being naturally benched. In some places they are soft and organic, while in others, bare, sandy soil is exposed. There is the potential for soil erosion particularly near the base of the slopes surrounding Allan Pond. In some locations, supporting walls have been erected to contain any ground instability, and in some areas there is already soil instability and erosion.

6.2 Vegetation

A large portion of the site consists of deciduous forest, while the remainder is relatively disturbed land consisting either of grassed areas, driveways, or gravelly terrain related to the former RV parking pads and campsite areas, as well as the administration area. The deciduous forest area occurs on the north-facing slopes of both the west and east sides of the Property. Driveways and pads surround Allan Pond wetland at the east end of the site, and throughout the deciduous forest areas, taking up a relatively large portion of the site. The beach area at the east end of Hubbles Lake represents the other area clear of trees.

The deciduous forest occupying the slopes within the Property represents a vegetation community that is relatively common in this ecological subregion, and which appears to be relatively healthy. However, the forested areas (particularly DF3 and DF4 on the west side of the Property) are highly fragmented due to the above-mentioned disturbances.

There were two riparian areas of significance on the Property. One is the shoreline emergent zone of Hubbles Lake, which is dominated by bulrushes and in certain locations by cattails, as well as sedges. The other is the emergent zone around the periphery of Allan Pond. Both areas were infested to some extent with invasive, non-native plants. However, both serve as habitat for waterbirds, amphibians, invertebrate food-chain organisms and other forms of wildlife.

6.3 Wildlife

The property borders the south and east shores of Hubbles Lake, which provides locally significant habitat for waterfowl and shorebirds as well as terrestrial birds and mammals.

On the basis of the vegetation observed there, the deciduous forest areas on the slopes of the Property would represent good habitat for ungulates (deer, moose), passerine birds, ground birds, and to some extent raptors, as well as small mammals such as hare. This habitat would offer visual and thermal shelter, as well as browse for ungulates and prey for predators.

Allan Pond appears to provide habitat for a number of a number of waterfowl and water bird species. In the previous biophysical study, a total of 28 species, including two amphibian/reptile, 22 bird, and four mammal species, were observed on the Property during the wildlife surveys, which were carried out in May and June of 2009. Of these, five of the wildlife species recorded on the Property were considered species of management concern. Of these five species, only the Rusty Blackbird is federally listed under the *Species at Risk Act*. In total, nine species of waterfowl and waterbirds were observed during surveys conducted in May and June, 2009. Of these, five species were confirmed as nesting in the Property.

Red-sided garter snakes were observed within the Property in June, 2009. These snakes are designated as "sensitive" in Alberta.

Four species of mammals or signs of them were observed during the May/June 2009 field surveys. These included deer (both white tailed and mule deer), moose, muskrat and snowshoe hare.

6.4 Biodiversity

The mixture of mature deciduous forest, wetland/pond and shoreline areas would collectively contribute a fairly high degree of structural habitat diversity. This structural habitat diversity would in turn lead to a respectably high variety of ecological niches, and accordingly a reasonably high diversity of plant and animal species. Acting counter to this influence, the Property is also disturbed in terms of habitat loss, fragmentation, and has been so for a considerable period. Non-native, invasive plants are also abundant, and this will tend to limit the number of native species with which they compete successfully for nutrients, soil and water. All factors considered, therefore, a moderately high degree of biodiversity would be anticipated in such an environment.

No rare plants, rare animals or rare ecological communities were observed on the Property during the 2009 or January 2012 field surveys. The types of forest and riparian plant communities observed on the Property represent fairly common ecosystems in this

ecological subregion. Because of this, and considering the disturbed nature of the land on the site, it is very unlikely that rare plants or rare ecological communities occur. A search of ACIMS database maps in January, 2012, showed no Element Occurrences (sensitive or non-sensitive) on or near the Property. No rare, endangered or provincially listed species were observed during the field reconnaissance of May/June 2009 or in January 2012.

6.5 Aquatic Ecosystems

Allen Pond, with its riparian shoreline, constitutes a class V wetland, i.e. a permanent pond (under the Stewart and Kantrud, 1971 classification system for wetlands); a number of waterfowl and water bird species were observed utilizing it in the 2009 study. In a minnow trapping and electro-fishing program carried out in May 2009, however, no fish were found in Allan Pond.

There are no Class C or higher watercourses[1] in the vicinity of the site, apart from Hubbles Lake itself, which contains fish populations of Northern Pike and Yellow Perch.

6.6 Ecological Linkages and Connectivity

In the short range context, treed connectivity within the boundaries of the Property is high, albeit with the forest cover fragmented due to clearings that have been created for camping and buildings. The 6-foot high chain-link fence that borders the southern and eastern boundaries of the Property, however, would form a significant barrier to most mammals, though passerine birds would not be deterred by it.

In the medium range, treed connectivity exists to the north, the northeast, and around the properties to the west, along the north shore of Hubbles Lake. Connectivity also exists to the south, and thence to the southwest and to a larger extent the southeast. In the long range, areas of largely treed deciduous or mixedwood forest become scarce and very fragmented at distances of more than 2 km in any direction. The two major highways 16X and 16A (to the north and to the south, as well as the west) would form a significant barrier to mammals, as well as the risk of mortality.

Aquatic connectivity is limited between the Property and adjacent areas, as there are no substantial tributaries into or out of Hubbles Lake nor Allan Pond. This being said, both the Pond and the Lake would be linked hydrologically and ecologically to wet areas of the adjoining lands.

6.7 Sustainability

The stands of aspen, poplar, birch and other understory trees and bushes on the slopes of the Property, although they have been fragmented from previous development, appeared to be generally healthy with a vigorous understory, although the observations were made in the winter, when leafage cannot be evaluated. Such forest habitat will be sustainable only if the remaining blocks of trees are not so small as to create risk from environmental factors such as wind, desiccation and invasion by weedy plant species.

Because they represent a hydrological reserve as well as valued habitat for various small mammals and birds as well as aquatic organisms, the riparian area of Allan Pond will only be sustainable if it is protected from human activities or development. Similarly, the

[1] As per the Alberta Environment catalog for the purposes of the *Water Act* Code of Practice for Watercourse Crossings, 2006.

shoreline vegetation of Hubbles Lake, where it coincides with the Property, will only be sustainable if it is afforded protection from human activities and developments. The row of deciduous vegetation DF5, which runs parallel to the shoreline of the Lake, appears to be healthy and vigorous, and would serve as a buffer for wildlife utilizing the shoreline habitat.

6.8 Land Use

The property is included in the Glory Hills Area Structure Plan (ASP) of Parkland County. The ASP identifies country residential development and public recreation as the preferred land-use for the area (Parkland County, 1987). On the south, west, north and northwest, the Property is adjacent to residential acreage developments or farmland. The proposed development would appear to be consistent with this prescribed land use.

6.9 Cumulative Effects

The proposed redevelopment project is consistent with the stipulated land use of the area, and is similar in form to existing development around the shores of Hubbles Lake. Furthermore, the Property has already been developed and used for a considerable period for recreational facilities including RV parking and camping and some related buildings and infrastructure. The area surrounding the Property, around Hubbles Lake and elsewhere has been developed. Accordingly, the proposed residential / recreational development is not anticipated to "tip the balance" of impacts resulting in a significant cumulative effect.

6.10 Conclusion

Depending on the project design, there will be at least some residual impacts to vegetation, wildlife habitat and biodiversity if significant clearing of trees and earthworks are being contemplated. The project will also lead to more human activity in the forested areas, around Allan Pond and along the shoreline of Hubbles Lake. The degree of impact will depend on how much forest is cleared, how much revegetation or re-planting of bare areas is done, and what buffers can be retained or enhanced around areas that are sensitive to human activity. It should also be taken into account that the Property has been extensively disturbed for a considerable number of years. If these influences are minimal, if opportunities for habitat enhancement are taken, and if the recommendations in this report are implemented effectively, the residual and cumulative impacts of the proposed development should be within the bounds that is appropriate for the intended land use (country residential development and public recreation).

7.0 RECOMMENDATIONS

The following recommendations are put forward for consideration in the design, construction and post-construction phases of the proposed recreational/residential development on Hubbles Lake, Parkland County, Alberta. To the extent that the recommendations are correctly implemented, environmental effects should be minimized to an extent that is compatible with the intended land use (i.e., country residential development and public recreation).

7.1 Development Concept

- Much of the Property is comprised of mature deciduous forest on north-facing slopes, with complex terracing and benching due to the somewhat hummocky topography. The property also contains wetland and shoreline areas. These features will be influential in surface drainage and storm water runoff patterns on the Property. To the extent feasible, the natural contours of the land should be retained as features of the area design in order to conserve the natural drainage patterns and flows, and to moderate stormwater drainage patterns, thus damping out extremes of overland flow, avoiding erosion and promoting the settling of solid particulate matter.
- Otherwise, where opportunities exist, bioswales and slopes re-vegetated with native vegetation should be built into the contouring and landscaping of the development. Bioswales allow the surface runoff water to follow its natural course. By slowing down the runoff, this provides more opportunity for particulate matter to settle and nutrients to be removed. The vegetation also serves as a filter for particulate matter in the runoff water, and reduces the amount of silt and other substances carried in the runoff. To some extent, the existing topography will form natural bioswales if the first recommendation is adopted in the subdivision design.

7.2 Habitat Conservation and Protection

- With its wooded slopes, wetland area and lake shoreline, a reasonably high diversity of bird, mammal and other forms of wildlife in the project area can be expected. There would be sufficient wooded area to present core habitat for many species of birds and small mammals, while providing cover and browsing material for larger mammals such as deer and moose. The presence of the wetland Allan Pond and Hubbles Lake shoreline would provide good habitat for waterfowl, shorebirds and amphibians. Accordingly, as much as possible of the existing native vegetation on the forested slopes should be retained within the context of the proposed development, for the purposes of conservation of habitat, hydrology, protection of erodible land, and water quality. In particular, the forested slopes surrounding the wetland Allan Pond (i.e., DF1 and DF2 on Fig. 10) should be retained as an undeveloped area in its present form, as here there are steep slopes with sensitive soils and since it has not been disturbed to the extent that some of the other areas on the Property have in the past.
- To the extent practical and without compromising safety, existing clearings should be utilized for rights-of-way or other features that will not be treed in the new development. Consideration should be given to establishing trees (aspen, poplar, birch, spruce) in clearings that existed prior to the project and remain after construction.

- Lots and/or pads, yards should key into the existing forest stands around them, so that as much forest connectivity as possible is retained.
- The shoreline of Hubbles Lake, within the Property boundaries, should be regarded as an Environmental Reserve. It is very important for nesting waterfowl and water bird species, which are sensitive to human activities and shoreline development. The riparian area itself, as well as the row of deciduous trees (DF5) that runs parallel to the shore, should be included in the reserve. No vegetation (other than weeds) should be removed or altered on the Environmental Reserve. Significant infrastructural improvements or developments should not be implemented in this area.
- Allan Pond, a Class V wetland, and its riparian area should also be set aside as an Environmental Reserve. No vegetation (other than weeds) should be removed or altered on the Environmental Reserve. Significant infrastructural improvements or developments should not be implemented in or around the Pond for a distance of at least 6 m from the shoreline.
- In any case where there is doubt about the condition or configuration of trees in a stand, an arborist should be consulted to determine if the stand is truly sustainable, and what measures might be necessary to enhance the sustainability if it is to be conserved.
- The felling of trees should be avoided during the nesting season if it appears that this would affect nests of migratory birds. Similarly, the destruction of migratory birds' nests in wetland or shoreline vegetation should be avoided during the nesting season. The nesting period is usually from about mid-April to about mid-July.

7.3 Soils

- In any area of earthworks, effective measures to avoid erosion should be undertaken (e.g., silt fencing, berms, drainage canals, etc.). Following construction, subsoils should be contoured, and topsoil replaced evenly. Re-vegetation efforts should begin as soon as possible after construction is complete. Mitigation should include at a minimum, using an appropriate seed mix, and the use of erosion-preventive netting or matting. Silt fencing should remain in place until such time as the vegetation becomes well-established, and it will require periodic maintenance to ensure that it is functioning as intended.
- Examples of areas that have particularly sensitive soils and already shown signs of erosion and instability include: WP15, WP18, WP21, WP26, WP33 (viewing platform) and WP50. These situations need to be stabilized and if possible, re-vegetated.
- Mineral soils should be stripped and stockpiled prior to construction and using the soils for reclamation efforts within the Property after construction. In areas of new construction, the top 10 cm of soil should be stripped to salvage the seedbank and prevent compaction of valuable topsoil prior to construction. Every effort should be made to prevent mixing of topsoil and subsoil. This is especially important in areas with a poor colour change between the topsoil and subsoil. In forested areas, the litter layer and top 15 cm of mineral material should be stripped.
- Construction traffic within areas to be reclaimed should be minimized, especially when soils are wet. Care should be taken to prevent ruts that may alter drainage. Prior to topsoil replacement, subsoils should be ripped to alleviate compaction. Areas

with finer texture topsoil should be disked following replacement. Paratilling after topsoil replacement will relieve any remaining subsoil compaction. Following construction, the subsoils should be contoured to match the natural landscape, and topsoil or salvaged surface soil should be replaced evenly.

- Human activities in the slopes areas that would promote erosion or other soil/vegetation disturbance should be discouraged. For example, if walking trails are planned, they should be of low-impact design, and located away from areas where there are steep slopes and/or sensitive erosion-prone soils.
- Measures should be developed to discourage damaging activities on any conserved forest slopes, thicket or wetland areas, or the shoreline of the Lake, as there will be sensitive soils and vegetation in these locations. The use of ATVs, dirt bikes or other similar machinery on slopes, in wetland zones and along the Lake shoreline should be prohibited and appropriate signage erected.
- Monitoring of erosion control measures, protection of topsoil and progress of vegetation establishment should be done by a qualified soil specialist during and for a reasonable period after construction, to assess the effectiveness of mitigation and to serve as an indicator as to whether additional or strengthened measures are required.

7.4 Vegetation

- Clearing of existing native vegetation should be avoided or minimized to the extent possible, and leave as small an additional footprint as possible, given the intended land use. To the extent possible, existing "blocks" of deciduous forest on the southern slopes (i.e., areas DF1, DF2, DF3 and DF4) should not be further fragmented or diminished in size. This principle also applies to the construction, i.e., flagging the clearing limits to ensure vehicles and machinery keep to the immediate work area.
- Reclamation and re-planting should begin immediately after construction. The spread of invasive plant species should be controlled.
- Before entering an area containing native vegetation prior to construction, equipment that has been used in weedy areas should be cleaned using adequate methods to remove or inactivate any seeds of invasive, non-native plants. Weed control should also be used on soil stockpiles where necessary.
- Measures to minimize the possibility of contamination of vegetation or soil by fuels, lubricants or other environmentally hazardous products should be implemented throughout the construction. Such substances should be stored in a secure, central location with appropriate signage and containment. Re-fuelling and any other maintenance should not be carried out within 100 m of Allan Pond or Hubbles Lake, or within any area of sensitive vegetation or riparian habitat. Personnel should be familiar with spill avoidance, containment and clean-up procedures; and appropriate spill equipment should be present at the work site.
- No riparian vegetation from the shores of Allan Pond or Hubbles Lake should be removed, e.g., cattails, bulrushes, young birch and willow. Riparian vegetation fulfills an important role in terms of wildlife habitat and the absorption of nutrients that can otherwise adversely affect water quality.

- The row of young deciduous trees lying parallel to the shore of Hubbles Lake (DF5) should not be removed or disturbed, since its removal could result in the loss of a favorable visual and noise barrier between the lakeshore/riparian environment and the developed area to the south. Loss of this buffer would represent an adverse effect on wildlife as well as aesthetics.
- The row of mature spruce trees at the east of the Property (CF1) appears to be sustainable, and should be retained as a positive feature of the development.
- Special care should be taken to reclaim and re-vegetate those areas identified as being erosion-prone and with sensitive soils. Examples of such locations are given above.
- Damage to tree roots in any conserved treed areas should be avoided during construction, by keeping any excavation a sufficient distance away (at least 3 m).

7.5 Surface Water and Groundwater

- The stormwater management plan for the developed subdivision should aim at maintaining overland runoff at approximately pre-development conditions, so that any conserved forested or wetland areas are not desiccated or unduly flooded as a result of altered runoff patterns. Significant disruptions or alterations of surface water drainage patterns could result in mortality of trees, thicket, wet meadow or wetland vegetation, or changes in vegetation type. This would apply particularly to the sloped areas. The storm water management plan should ensure that drainage down the slopes is not increased to the point where erosion, bank instability and washouts are triggered.
- Sanitary waste should be managed in such a way as to avoid the entry of nutrients or other pollutants into groundwater or surface water, particularly Allan Pond or Hubbles Lake. Nutrients (i.e., phosphorus, nitrogen) can cause groundwater and surface water quality problems in adjacent systems, if excessive. The sanitary waste management design should be done in accordance with site specific soil and geotechnical studies, and conform with provincial regulations and guidelines.
- The use of chemical fertilizers by the new occupants of the development, or land uses that require fertilizer use, should be minimized, particularly on lots nearest to the lower areas of the Property or adjacent to the ravine areas.
- In the construction and design of the development, measures to prevent erosion, siltation and sedimentation should be put in place. Sedimentation of particulate matter should be encouraged, in order to prevent silty water going off-site during periods of intense precipitation or snowmelt, or from adversely affecting ravine slopes or wetland habitats. Dry ponds and wet ponds should be sized accordingly, to provide sufficient residence time for particles to settle, according to provincial standards (i.e., >80% of 75 micron or smaller particles).
- Where any clearing or earthworks are necessary, strict erosion control and reclamation measures should be taken. Contouring should avoid significantly increasing the angle of slopes, such as would lead to erosion and instability. During construction, silt fences, diversion ditches and other methods should be employed to reduce and delimit erosion. Removal of naturally occurring vegetation from the forested slopes should be minimized.

- Where ditches intercept stormwater runoff sheet flows, the runoff should be directed to a constructed sediment control facility. The facility should be designed to achieve effective settlement of suspended solids in accordance with the current Alberta Environment guidelines. Otherwise, discharge points from the ditches should be into a vegetated or other area where energy dissipation will occur, or the equivalent, in order to prevent local erosion. Where necessary, roads and their ditches should have flow-limiting structures (e.g., ditch blocks) along sloped stretches so that water draining off or along them does not cause erosion.
- A water conservation strategy should be developed and adopted for the new community. It should be assured that groundwater supplies are sustainable, and withdrawal will not significantly and adversely affect other nearby users. It may be worthwhile to consider cistern systems in combination with water conservation until an optimal water supply system is established for the greater area.
- Surface paving should be minimized, other than what is necessary for transportation and other infrastructure in order to maintain soil permeability, infiltration and thus groundwater re-charge.
- Stockpiled soil should be protected from wind and water erosion, and then replaced after construction.
- Measures should be taken to prevent erosion on or near the forested slopes, particularly during construction, and to control siltation and sedimentation of nearby waterbodies. All steps possible should be taken to avoid the introduction of silty water into Hubbles Lake or Allan Pond.

7.6 Fisheries and Wetlands

- Adequate mitigation measures must be taken during construction to protect Allan Pond and its surrounding vegetation. It is recommended that the vegetation buffer (e.g., cattails and willows) be left intact during and after construction. Fencing and silt fencing around Allan Pond will ensure that no sediment will enter the water, and that the riparian vegetation is protected from mechanical damage.
- Some consideration could be given to enhancing natural shoreline vegetation in the strip of land between the deciduous tree row DF5 and the emergent vegetation zone of Hubbles Lake. The vegetation here is sparse and weeds are common. It is possible that the shoreline environment could be improved in this manner.
- Some form of limited human access along the shoreline area could be considered, e.g., boardwalk, viewing deck. The goal would be to limit human disturbance of sensitive vegetation and wildlife, while offering an opportunity for wildlife viewing. A low footprint design is essential.
- Design and construction of the project should be such as to avoid directly impacting wetlands and the surrounding vegetation in and around the wetland that comprises Allan Pond. Wetland margins should be flagged off. Once construction has been completed, reclamation of any disturbed sites should be done promptly.
- Late fall or winter construction will reduce any potential negative impacts from construction on migration and critical life-history stages of amphibians and birds. Standard run-off controls such as silt fences should be used at this location to minimize sediment mobilization into the wetland.

7.7 Wildlife

- As mentioned above under vegetation, habitat loss or habitat fragmentation should be minimized. This would apply to the forested slopes of the South of the Property (DF1, DF2, DF3, DF4); as well as to any of the riparian areas on the periphery of Allan Pond and Hubbles Lake. No riparian vegetation from the shores of Allan Pond or Hubbles Lake should be removed, e.g., cattails, bulrushes, young birch and willow. Riparian vegetation fulfills an important role in terms of wildlife habitat and the absorption of nutrients that can otherwise adversely affect water quality.
- The row of young deciduous trees lying parallel to the shore of Hubbles Lake (DF5) should not be removed or disturbed, since its removal could result in the loss of a disturbance barrier for wildlife between the lakeshore/riparian environment and the developed area to the south.
- Construction activities in or near forest and/or riparian areas should be timed to avoid disturbance in habitats that are critical during nesting and migration periods. For forest or riparian migratory birds, construction activity should he avoided during the breeding bird season (from approximately mid April to approximately the end of July). If construction activities cannot be avoided during the breeding bird season, a qualified biologist should check the Property for any migratory birds nests, and advise as to either how to avoid any impact from construction, or what timing window would be acceptable.
- If the bird nesting season cannot be avoided, an Active Migratory Bird Nest Survey Program (AMBNS) is recommended (Canadian Wildlife Service 2008). The draft AMBNS guidelines recommend a 20-30 m buffer zone around active nest sites with adjustments for species-specific requirements (Focus Corporation, 2009).
- If it is safe to do so, snags and deadfalls (i.e., dead, standing or fallen trees) should be left in place, as these provide habitat for woodpeckers and other insectivores or detritivores, e.g., the Pileated Woodpecker.

7.8 Sustainability

- Portions of the deciduous forest stand that are retained should be of sufficient size that they do not become susceptible to windfall or excessively exposed to other climatic variables, e.g., a drying out effect due to heat and air movement. Construction should be avoided too close to the edge of the forested area.
- Establishment of conifers such as white spruce in or among patches of deciduous trees such as aspen and poplar might also be advantageous, as this will serve to buffer the effect of wind and protect the deciduous trees to some extent (i.e., underplanting), thus enhancing long term sustainability.

7.9 Aesthetics and Visual Quality

- For aesthetic as well as habitat purposes, as much as possible of the deciduous forest habitat on the Property should be conserved in its existing state within the context of the proposed development project, with the additional benefits of conservation of habitat, hydrology, protection of erodible land, and water quality.
- Lots and homes should be keyed into the treed and thicket zones in such a way as to preserve as much treed or thicket habitat as possible, while creating a visual and

noise shield to enhance privacy. The establishment of new trees that will eventually grow in around the homes should be given consideration.

7.10 Hazards, Wastes and Disturbances

- A fire prevention, control and response strategy should be developed to reduce the risk of fire spreading throughout forested areas. This could be in the form of the provincial FireSmart program. Precautions should be taken in the form of, for example, maintaining sufficient spacing between adjacent lots/buildings, designing homes with fire resistant roofing, clearing ladder fuels within a safe distance to buildings and so forth. Residents should be discouraged from having open fires in yards adjacent to treed areas (e.g., through a restrictive covenant).
- The issues raised in the Environmental Site Assessment that was produced for the Property should be addressed, e.g., PCBs in electrical transformers, previous spills sites, bacterial populations in the soil.
- Invasive weedy plants should be managed, e.g., scentless chamomile, purple ox-eye daisy, toadflax, leafy spurge, tall buttercup, tall thistle, spreading dogbane, loosestrife, thistles, nettles, sow thistle, tansyweed, common plantain and dandelions. This could be incorporated into an information package for residents of the area.
- The condition of trees and other vegetation should be monitored periodically, and action taken to conserve stand health if necessary. Hazard trees should be removed in areas where falling trees could damage people or property, e.g., near homes, along paths.
- Unnatural pools of standing water should be monitored and eliminated in order to minimize mosquito breeding.

7.11 Environmental Sustainability and Community Participation

- This heterogeneous landscape would provide an interesting setting in which to create ecologically interesting natural areas and nature trails (provided they are of low-impact design), featuring ecological elements of the slopes, deciduous forest areas and wetland areas.
- If street lighting is planned for the development, it should utilize strategically placed fixtures that reduce light pollution, especially avoiding projecting light into natural areas. Fixture design and placement should ensure that most of the light produced should be projected downwards, rather than laterally into the surrounding environment. The use of long wavelength bulbs should be encouraged, as they have less impact on wildlife.

7.12 Ecological Linkages

- Given the remaining connectedness of the forest zone on the Property and the wooded areas beyond, it is important that there be some overall strategy in place to conserve as much of this linkage as possible over the long term, before it is too late. While it is not possible for the proponent to control development outside of the proposed development site, it is recommended that the County make plans to conserve these ecological linkages. This would include strategically conserving all or some of the forested areas on the quarter-sections to the north, the northeast,

around the properties to the west along the north shore of Hubbles Lake, as well as to the south, and thence to the southwest and to a larger extent the southeast (see green arrows in Figs. 12 and 13).

7.13 Follow-up and Monitoring

- The County should arrange for an environmental professional to monitor the success of mitigation measures that have been implemented, during and after construction, with a view to assessing the need for additional or strengthened protection measures, including but not necessarily limited to: condition of the water and emergent vegetation zones of Hubbles Lake and Allan Pond; species of waterfowl, amphibians and other wildlife using these habitats; revegetation with native species; weed infestation; unstable slopes and erosion; siltation and sedimentation of waterbodies; and condition of slopes in critical areas.

8.0 REFERENCES[2]

1. Agronomic Interpretations Working Group (1995). Land Suitability Rating System for Agricultural Crops: 1. Spring-seeded small grains. W.W. Pettapiece (Ed.). (Technical Bulletin 1995-6E). Centre for Land and Biological Resources Research, Agriculture and Agri-Food Canada, Ottawa. Retrieved on July 20, 2009 from sis.agr.gc.ca/cansis/publications/ manuals/lsrs.html
2. Alberta Agriculture and Rural Development. (2009). Alberta Soil Information Viewer. Retrieved on July 22, 2009 from www2.agric.gov.ab.ca/app77/imf.jsp?site=agrasid
3. Alberta Culture, 1984. A Checklist of the Rare Vascular Plants in Alberta.
4. Alberta Environment (AENV). (n.d.) Groundwater Information Network Hubbles Lake Well. Retrieved on July 8, 2009 from www.environment.alberta.ca/apps/GOWN/Well.aspx?GOWN=326
5. Alberta Environmental Protection, 1993. Alberta Plants and Fungi – Master Species List and Species Group Checklists.
6. Alberta Environmental Protection. 1996. The Status of Alberta Wildlife. Natural Resources Service, Wildlife Management Division.
7. Alberta Vegetation Inventory Standards Manual. February 2003. SRD Public Lands Division. Resource Data Branch.
8. Andriashek, L.D., Fenton, M.M., and Root, J.D. (1979). Surficial Geology of Wabamun Lake, Alberta (NTS 83G), Alberta Geological Survey, Alberta Research Council, Edmonton, AB.
9. Applied Aquatics Research Ltd., 2009. Redevelopment of Allan Beach Resort, Alberta: Summary of QWAES/QAES Investigation (letter report from K. Oseen to M. Bogner of Focus Corporation, dated May 25, 2009).
10. Canadian Wildlife Service (CWS). (2008). Draft Migratory Bird Active Nest Surveys – Canadian Wildlife Services (PYR) Advice to Industry. Canadian Wildlife Service, Pacific and Yukon Region, Draft.
11. Committee on the Status of Endangered Wildlife in Canada, COSEWIC). 1997. Current list of vulnerable, threatened and endangered species in Canada.
12. Environment Canada. (1981). Canada Land Inventory. Land Capability for Wildlife – Waterfowl. Summary Report. The Canada Land Inventory. Report No. 16.
13. Environment Canada. (1991). Birds protected in Canada under the Migratory Birds Convention Act – Occasional Paper Number 1 Canadian Wildlife Service. Authority of the Minister of the Environment, Canada.
14. Environment Canada. (2009). Canadian Climate Data. Retrieved on June 2009 from www.climate.weatheroffice. ec.gc.ca/climateData/monthlydata_e.html.
15. Envirotech Engineering, Calgary, 2007. Redevelopment of Allan Beach Resort, Alberta: Environmental Site Assessment.

[2] Includes references contained in the previous Biophysical Assessment (Focus Corporation, 2009).

16. Federation of Alberta Naturalists/ City of Edmonton, 2006. Living near Urban Lakes.
17. Focus Corporation, Calgary, 2009. Biophysical Impact Assessment for Allan Beach Resort. Submitted to Allan Beach Developments GP Ltd. Dated August 2007; updated October 2007.
18. Goldman, Charles R., and Horne, Alexander J. (1983). Limnology. McGraw-Hill, Inc.
19. Hamilton, W.H., W.H. Price, and Langenberg, C.W. (1999). Geological Map of Alberta. Map No. 235. Alberta Geological Survey, Edmonton, AB: Energy Resources Conservation Board.
20. J.R. Paine and Associates Ltd. (2008). Geotechnical Investigation Proposed Allan Beach Resort Upgrades Range Road 13 South of Highway 16 NE 9-53-1-W5M (portion) Parkland County, AB Report No: 3961-3.
21. Kershaw, L., Gould, J., Johnson, D. and Lancaster, J., Rare Vascular Plants of Alberta. University of Alberta Press, 2001.
22. Parkland County. (2009). Noxious Weeds. Retrieved on July 16, 2009 from www.parklandcounty.com/ Departments_and_Services/Agricultural_Services/Noxious_Weeds.htm
23. Pedocan Land Evaluation Ltd. (1993). Soil Series Information for Reclamation Planning in Alberta. Alberta Conservation and Reclamation Council Report No. RRTAC-93-7.
24. Primeau, S., Bell, M., Riopel, M., Ewaschuk, E., and Doell, D. 2009. Green Communities Guide: Tools to Help Restore Ecological Processes in Alberta's Built Environments. Land Stewardship Centre of Canada. Edmonton, Alberta.
25. Provincial Wetland Restoration/ Compensation Guide (Alberta Environment/NAWMP, February 2007)
26. Semenchuk, G.P. (ed) 1992. The Atlas of Breeding Birds of Alberta. Federation of Alberta Naturalists, Edmonton, Alberta 391pp.
27. Stewart, R.E. and H.A. Kantrud, 1971. Classification of Natural Ponds and Lakes in the Glaciated Prairie Region. US Department of the Interior, Fish and Wildlife Service. Resource Publication No. 92.
28. The 2005 General Status of Alberta Wild Species: Website http://www.srd.gov.ab.ca/fishwildlife/wildspecies/search.htm
29. The Atlas of Breeding Birds of Alberta: A Second Look. Federation of Alberta Naturalists. 626pp. with bibliography and index.
30. University of Alberta. (1990a). Atlas of Alberta Lakes. Hubbles Lake Water Quality. Retrieved on July 8, 2009 from sunsite.ualberta.ca/Projects/Alberta-Lakes/view/?region=North%20 Saskatchewan%20Region&basin=North%20Saskatchewan%2 0River%20Basin&lake= Hubbles%20Lake&number=78&page=Water
31. University of Alberta. (1990b). Atlas of Alberta Lakes Hubbles Lake Biological Characteristics. Retrieved on July 8, 2009 from sunsite.ualberta.ca/Projects/Alberta-Lakes/view/?region=North%20Saskatchewan%20Region&basin=North%20Saskatch ewan%2 0River%20Basin&lake=Hubbles%20Lake&number=78&page=Biological

32. Westworth Associates Environmental Ltd. (2004). Environmental Conservation Plan. Volume 1: Environmentally Significant Areas Inventory of Parkland County. Parkland County. Edmonton, Alberta: Westworth Associates Environmental Ltd.

9.0 LIMITATIONS

This report has been prepared for the exclusive use of TRG Developments Corp., Calgary, Alberta and IBI Group, Edmonton and their consultants or clients relative to the proposed project described in the report. It may not be used or relied upon in any manner whatsoever, or for any purpose whatsoever, by any other party. The Consultant makes no representation of fact or opinion of any nature whatsoever to any person or entity other than the company, organization or individual to whom this report is addressed.

Bruce Thompson & Associates Inc. denies any liability whatsoever to other parties who may obtain access to this report for any injury, loss or damage suffered by such parties arising from their use of, or reliance upon, this report or any of its contents without the express written consent of the author and the client.

Subject to the following conditions and limitations, the investigation described in this report has been conducted in a manner consistent with a reasonable level of care and skill normally exercised by members of the environmental consulting profession currently practicing under similar conditions in the area.

The investigation described in this report has been limited to the scope of work described in discussions between Bruce Thompson & Associates Inc. and the client group November 2011 to January 2012.

The investigation described in this report has been limited to the extent that the steps of doing a field reconnaissance were done at only one time of the year, that being in winter (January). Features such as plants and wildlife, and water flows, are not clearly visible at this time of the year, although some features such as wildlife tracks and major vegetation species will be identifiable. To determine the entire assemblage of plants and wildlife that would frequent the study site, it would be necessary to conduct field surveys during the middle and late summer months. The plant and animal species identified in this study included those that can be inferred to use the site, based on its location and vegetation communities, and based on past experience in other investigations. The drainage map in this report was developed from visual observations and a contour map. The outlines depicted in the report, of water flows, vegetation areas and other features are intended to be approximations only.

It is to be noted that a biophysical impact assessment was prepared for the Property in the spring/summer of 2009 (Focus Corporation, 2009). Because the Focus Corporation's assessment and field studies took place during the spring and summer months, and because the present assessment was of necessity undertaken during the winter (of 2012), this report draws substantially upon the information that was collected during the Focus Corporation's assessment and published in their October 2009 report.

10.0 APPENDICES

APPENDIX A: LIST AND LOCATION OF WAYPOINTS

APPENDIX B: SITE PHOTOGRAPHS

APPENDIX A: WAYPOINT COORDINATES

Table A1: Waypoints established during the Field Reconnaissance (Datum WGS84).

Waypoint	Latitude / Longitude	Elevation
1	N53 33.884 W114 04.540	
2	N53 33.907 W114 04.747	
3	N53 33.946 W114 04.827	
4	N53 33.881 W114 04.893	
5	N53 33.892 W114 05.081	
6	N53 33.780 W114 05.250	
7	N53 33.776 W114 05.015	
8	N53 33.780 W114 04.769	
9	N53 33.781 W114 04.541	
10	N53 33.836 W114 04.821	
11	N53 33.855 W114 04.651	
12	N53 33.885 W114 04.762	
13	N53 33.884 W114 04.652	2440 ft
14	N53 33.884 W114 04.760	2408 ft
15	N53 33.879 W114 04.693	2412 ft
16	N53 33.861 W114 04.648	2416 ft
17	N53 33.865 W114 04.621	2438 ft
18	N53 33.843 W114 04.630	2430 ft
19	N53 33.827 W114 04.682	2395 ft
20	N53 33.783 W114 04.743	2422 ft
21	N53 33.809 W114 04.808	2421 ft
22	N53 33.834 W114 04.814	2408 ft
23	N53 33.871 W114 04.793	2403 ft
24	N53 33.876 W114 04.815	2411 ft
25	N53 33.883 W114 04.834	2405 ft
26	N53 33.795 W114 04.787	
27	N53 33.821 W114 04.890	2467 ft
28	N53 33.813 W114 04.909	2469 ft
29	N53 33.802 W114 04.929	2444 ft
30	N53 33.785 W114 05.005	2424 ft
31	N53 33.795 W114 05.035	2443 ft
32	N53 33.810 W114 05.082	2433 ft
33	N53 33.833 W114 05.126	2441 ft
34	N53 33.798 W114 05.182	2438 ft
35	N53 33.777 W114 05.191	2434 ft
36	N53 33.756 W114 05.308	
37	N53 33.795 W114 05.246	2388 ft
38	N53 33.813 W114 05.193	2393 ft

39	N53 33.819 W114 05.198	2383 ft
40	N53 33.847 W114 05.132	2401 ft
41	N53 33.872 W114 05.084	2394 ft
42	N53 33.873 W114 05.032	2398 ft
43	N53 33.859 W114 04.980	2393 ft
44	N53 33.857 W114 04.919	2396 ft
45	N53 33.870 W114 04.880	2403 ft
46	N53 33.887 W114 04.842	2405 ft
47	N53 33.899 W114 04.851	2401 ft
48	N53 33.918 W114 04.830	2393 ft
49	N53 33.942 W114 04.825	2393 ft
50	N53 33.914 W114 04.764	2403 ft
51	N53 33.877 W114 04.570	2449 ft
52	N53 33.840 W114 04.577	2442 ft
53	N53 33.831 W114 04.585	2445 ft
54	N53 33.881 W114 04.549	2459 ft

APPENDIX B: SITE PHOTOGRAPHS