

# Road Reconstruction Environmental Study Report

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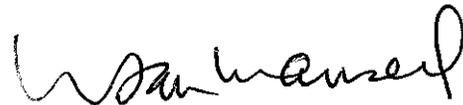
Reconstruction of Bay Road  
Gananoque, Ontario  
(RfP # RDS-2016-01)

MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT PROCESS

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## Terrestrial Ecosystem Existing Conditions and Impact Assessment

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## **Acknowledgements**

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Dan Fencott, Manager G. D. Jewell Engineering Inc. provided overall guidance to the study assisted by Nathan Klemencic as project manager. Both provided guidance in the preparation of this report. Erin Thompson Seabert, Fish & Wildlife Technical Specialist – Ministry of Natural Resources and Forestry provided information on the natural heritage features of the area. Brad McNevin, McNevin Environmental Solutions, worked in parallel with a study of the Aquatic Ecosystem in the study area and shared some of his observations.

When viewing various documents about the study area the naming conventions for the roadway used two terms: Bay Street and Bay Road. Bay Street was used in the Archaeological Assessment Report of the study area as well as in the Town of Gananoque’s RFP # RDS-2016-01 and visitors guide, yet on the provincial topographic maps and in the Official Plan for the Town it is identified as Bay Road. For the purposes of this report the roadway is identified as Bay Road.

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## **1. Introduction**

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The Environmental Assessment Act (EAA) is administered by the Ontario Ministry of the Environment (OMOE) and requires an environmental assessment of any major public sector undertaking such as public roads, transit, wastewater and stormwater installations that have the potential for significant environmental effects. An EA determines the ecological, cultural, economic and social impacts of a project and is a key part of the planning and decision-making process before a project can proceed. The EAA also establishes a ‘Class Environmental Assessment’ process to streamline the planning of provincial and municipal projects. It sets out a self-assessment process of routine works that have predictable and manageable environmental effects and is completed by the proponent who follows an approved terms of reference before submitting it to the MOE for review and decision.

In 1987, the first Municipal Class Environmental Assessment was prepared by the Municipal Engineers Association on behalf of Ontario municipalities. The Municipal Class EA has been regularly reviewed, updated and approved since then and now applies to all municipal infrastructure projects in four schedules: Schedule ‘A’ projects include normal or emergency operational and maintenance activities; Schedule ‘B’ projects include improvements and minor expansions to existing facilities; and Schedule ‘C’ projects are the construction of new and major expansions to existing facilities.

The purpose of this report is to contribute to the preparation of a Schedule ‘B’ Municipal Class Environmental Assessment on the reconstruction of Bay Road in the Town of Gananoque by preparing an Environmental Study Report on the existing terrestrial ecosystem of the area and provide an assessment of the potential impacts of road reconstruction.

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## **2. The Development Proposal**

### **2.1 The Location**

The study area is located in the Town of Gananoque. Bay Road is approximately 550 m long that provide a one-way vehicular and pedestrian connection between Clarence Street and King Street West. The roadway is within a road allowance of about 20 m wide (Figure1). The study area extends on both sides of the road allowance by a further 120 m. As such the study area is about 7.7 ha.

The study area lies in the former Leeds County, Town of Gananoque and within the administrative jurisdiction of Cataraqui Conservation (Cataraqui Region Conservation Authority). The study area drains directly into the St. Lawrence River and falls within the jurisdiction of the Kemptville District, Ontario Ministry of Natural Resources and Forestry.

**Figure 1. Location of the Study Area in Leeds County, Town of Gananoque, Ontario.**

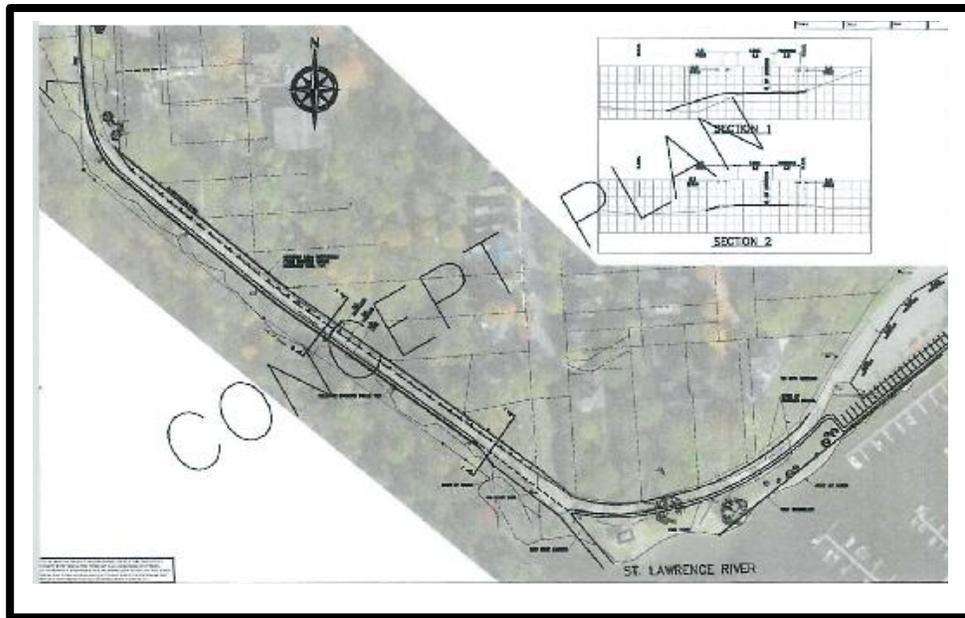


## **2.2 The Proposed Development Concept**

Design details for the project have not yet been developed but the intent of the Town is to improve the roadway for vehicular and pedestrian traffic, replace storm sewers, upgrade lighting and incorporate a public boat-launching area and associated parking adjacent to Gananoque Municipal Marina (Figure 2).

The concept is sufficiently generalized that opportunities to mitigate impacts are still possible.

**Figure 2. The Proposed Development Concept for the Study Area.**



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## **3. Methods**

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### **3.1 Orientation to the Study Area**

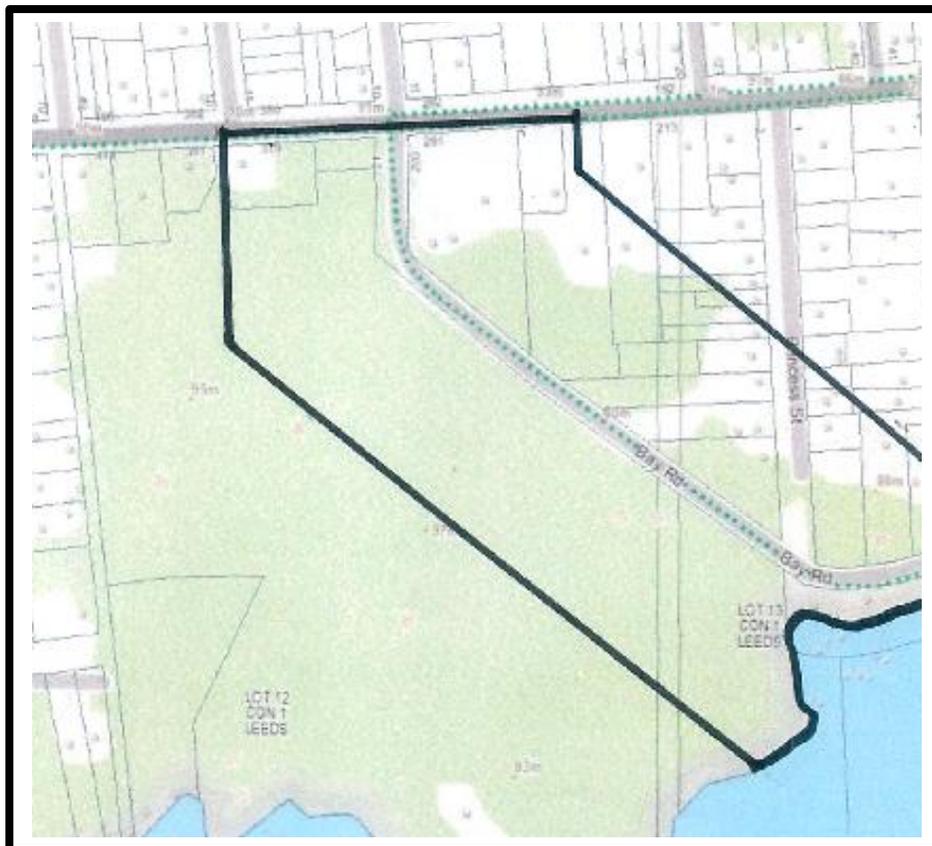
While the investigator is generally familiar with the town, a road tour around the project area was completed to understand the local geography and current development. A number of maps, such as 1:50,000 scale topographic maps and aerial photographs were referenced to provide a more detailed description and features of the site. A draft concept sketch of the proposed development was used to understand the nature and extent of development and its location in relation to lot lines, mandated setbacks and other features.

### **3.2 Literature Search**

An effort was made to review all published information about the study area including general references with sections that covered the site. The unpublished reports and data files of various agencies and organizations were accessed to obtain a broader information base that could be used to enhance a description of the site and assist an understanding of changes to it from the time of settlement to the present. In addition, a request was made to OMNRF for any information they had about natural heritage features, including Species at Risk.

Library and internet searches were completed to find direct or indirect data on the geographical area and key subjects such as water source areas, hydrology, settlement history, physical features, natural history, etc. Most of the study area is rich in the recorded history of settlement. Early county atlas coverage is excellent and is available on the internet.

**Figure 3. Boundaries of the study area along Bay Road in Gananoque.**





### 3.3 Field Studies

On site work occurred on June 1 and included a reconnaissance drive around the general area, a walk around the perimeter of the property, taking pictures of key site features, observing plant and wildlife species, confirming the boundary location of unique landscapes with mandated setbacks such as Provincially Significant Wetlands, evaluating the buffer distance between these unique features and proposed back-lot lines, locating points of interest, judging the direction of surface runoff, and talking to local residents about their plant and animal observations.

The methodology for developing species lists differed for plants and animals. Since plants are stationary, they can be identified on site. Animals are mobile and may not be present at the time of surveys so both direct and indirect methods were used to develop lists such as past surveys, present information provided by OMNF that are based on scientifically-proven and widely-applicable protocols for monitoring birds, mammals and herpetofauna as well as atlas maps, species lists and publications.

Vegetation is an integrator of soil, landform, climate and disturbance. Vascular plants were identified on the basis of random transect searches along the Bay Street road allowance and an adjacent 120 m stretch on either side. Both woody and herbaceous under-story plant species were noted.

Birds were monitored using random methods of observations during the site inspection. No protocol surveys were conducted. Mammals were identified on the basis of tracks, scat, burrows, nests, scrapes, rubs, claw marks, hair/fur and sightings. Small mammals were not trapped but carcasses on the perimeter roads were used to enhance the list of observed mammals. Herpetofauna (turtles, frogs, toads, snakes, lizards and salamanders) were identified primarily on the basis of visual encounter in the open, or by disturbing ground debris that might uncover specimens. The nocturnal amphibian marsh monitoring protocol of BSC was not completed and no pitfall traps or cover boards were used.

The first day of June timing of the inspection is consistent with flowering, and the peak calling, breeding or nesting periods of animals (Table 1). However, a one-day site investigation should not be considered an adequate effort to comprehensively evaluate its natural features.

**Table 1. Recommended Times for Species Inventory.**

|              | April | May | June | July | August | September |
|--------------|-------|-----|------|------|--------|-----------|
| Plants       |       | X   |      | X    |        | X         |
| Birds*       |       | X   | X    | X    |        |           |
| Mammals      | X     | X   | X    | X    | X      | X         |
| Herpetofauna | X     | X   | X    |      |        |           |

\* Site visits occurred on June 1, 2016 between 8 AM and 11 PM.

### 3.4. Precautionary Principle

The inspection was designed to provide reasonable point-in-time data on the terrestrial importance of local habitats and were interpreted using a “*precautionary principle*”. That principle “*states that if an action or policy has the suspected risk of causing harm to the public or the environment, in the absence of scientific consensus that the action or policy is harmful, the burden of proof that it is not harmful falls on those taking the action.*”

In the case of this report it simply confirms that if a species is known to have occurred in Leeds County, its presence would be presumed to be present in the study area proper, even without



visual confirmation during field studies, unless there were scientifically-valid reasons for assuming otherwise (e.g. extinct and extirpated species; preferred habitat absent).

### **3.5. Other Conventions**

Since data for the species diversity list have been drawn from various sources, the convention in use is that ‘region’ refers to southeastern Ontario, ‘area’ refers to Leeds County and ‘site’ refers to the study proposed development site. The term ‘study area’ includes both the area of the proposed development and 120 m area surrounding its boundaries.

It is also the convention in this report to identify all species that are included in the Species at Risk Act or Endangered Species Act as ‘listed species’ without regard to their risk category.

### **3.6 Definitions**

**Fish habitat** is defined as *“any component of an aquatic system that provides any one of the following: cover for escape from predators, competitors and high flows such as substrate, woody debris, undercut banks and even deep water; food to survive and reproduce; adequate substrate and water quality for successful reproduction; water quality, particularly the preferred water temperatures of the resident species; and unobstructed migration routes”*.

Use of the following terms is consistent with the definitions in the Provincial Policy Statement:

- **natural heritage features and areas means:** *“features and areas, including significant wetlands, significant coastal wetlands, fish habitat, significant woodlands south and east of the Canadian Shield, significant valleylands south and east of the Canadian Shield, significant habitat of endangered species and threatened species, significant wildlife habitat and significant areas of natural and scientific interest, which are important for their environmental and social values as a legacy of the natural landscapes of an area”*;
- **ecological function means:** *“the natural processes, products or services that living and non-living environments provide or perform within or between species, ecosystems and landscapes. These may include biophysical, physical and socio-economic interactions.”*
- **significant means** (from page 38 of the Natural Heritage Reference Manual for Natural Heritage Policies of the provincial policy Statement, 2005, Second Edition March `18, 2010):
  - *“in regard to wetlands, coastal wetlands and areas of natural and scientific interest, an area identified as provincially significant by the by the Ontario Ministry of Natural Resources” [OMNR];*
  - *“ in regard to the habitat of endangered species and threatened species, ... the habitat as approved by the [OMNR] that is necessary for the maintenance, survival and/or the recovery of naturally occurring or reintroduced populations” of these species, “and where those areas of occurrence are occupied or habitually occupied by the species during all or any part(s) of its life cycle”;*
  - *“in regard to woodlands, an area which is ecologically important in terms of features such as species composition, age of trees and stand history; functionally important due to its contribution to the broader landscape because of its location, size or ... the amount of forest cover” ...”; or economically important due to site quality, species composition or past management history”;* and
  - *“in regard to other features and areas ....., ecologically important in terms of features, functions, representation or amount, and contributing to the quality and diversity of an identifiable area or natural heritage system.”*

## **4. Existing Conditions**

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The ecological history of a landscape combines such disparate information as its physical history (bedrock geology, soils, topography, climate and hydrology), social history (aboriginal presence, pioneer activities, settlement patterns and current land use), and its natural history and present condition of ecological health. Interpreting why a landscape appears the way it does is a function of its physical attributes, how the physical features influenced human settlement, and how the physical features were altered by human use. This knowledge is the key to all environmental impact evaluations because it

- distinguishes cause from effect influences,
- establishes parameters within which protection activities for key natural features must operate,
- defines the ecological limitations of suitable mitigation techniques, and
- predicts reasonable expectations for successfully achieving sustainable but altered ecosystems.

### **4.1 Earth Science Features**

This section describes the physical features of the site including bedrock geology, glaciation, surface deposits, soils, relief, climate and hydrology. It is these features that determined the original ecology and influenced the type and pace of pioneer settlement which gave rise to the current land use patterns. These factors define the basic character of the ecosystem that is being considered for development.

#### **4.1.1 Physiography**

Bedrock geology influences topography and processes such as erosion and soil development. The first step in the development of soil is the formation of parent material from the disintegration and weathering of rocks. This material may be shallow or deep and coarse or finely textured.

The underlying rock in the Canadian Shield is Precambrian. This the same rock found in the Adirondack Mountains in New York State and the Algonquin Dome in Ontario. These two landforms are linked by the narrow Frontenac Axis in Leeds County. The rocks include gneisses, schists, granite and marble. Glacial action around the site has resulted in a thin layer of soil material that consists of stone-free calcareous clay deposits with outcroppings of Precambrian rock. The site is part of the Leeds Knobs and Flats physiographic region.

The area became ice-free from the Wisconsin Glacier during the Main Algonquin beach stage and the creation of the Champlain Sea east of the study area about 12,000 years ago. An ice plug on the St. Lawrence melted and flowage into the Atlantic Ocean started about 4,000 years ago. It is one of the last areas in southern Ontario to be exposed.

#### **4.1.2 Soils**

Soils are developed from their parent materials through such forces as time, weather, hydrology and plant growth. Soils have either mineral or organic (peat and muck) origins. The Brunisolic and Podzolic soil groups have a mineral origin, good natural drainage characteristics and develop under forest cover. The Gleisolic and Humisolic soil groups also have mineral origins but are normally water-saturated for one or more seasons and develop under water-tolerant vegetation and typically lie under wetlands.



The soils that underlie the site include Napanee clay and Rockland. Napanee clay is a Humic Gleysol that develops on lacustrine deposits, is calcareous and poorly drained. Rockland is a very rocky feature with very thin soils.

#### **4.1.3 Relief**

The relief of an area includes such topographic features as elevation, aspect, slope and orientation. Each of these produces a unique microclimate which directly influences the composition of native plant communities and indirectly determines the resident animal community.

The study area is gently rolling with a southern aspect. The elevation along King Street is 91 m and declines southward to the St. Lawrence River at 78 m. The roadway lies in a surface water discharge flowage with edge elevations of 88 m in the east and 95 m in the west. While the eastern slope is steep and gradual to residential development on the plateau, the west slope is rocky, abrupt and irregular. The roadway has a north-south slope of 3 %.

#### **4.1.4 Climate**

There is an important distinction to be drawn between climate and weather. Climate is used to describe events over centuries and decades while weather describes events that occur daily, weekly, monthly and annually. Weather systems bring periods of heat, cold, rain or snow, sunshine or clouds. These variations are normal features of weather that are determined by the movement of air masses from their source areas as either high or low pressure systems. The most influential air source-regions are the arctic, the northern oceans and the tropics. Land (ridges and valleys) and water (lakes and rivers) features affect these air movements to produce environmental conditions that determine local plant and animal communities. The most significant of these parameters on the local ecology is the frost-free period or the length of interval when temperatures lie above 0 C (32 F). Each plant species can be defined by its own growing period: the time required for germination, active growth and seed production. Consequently, the weather of an area will produce plant communities that have adapted to this regional parameter.

The site is in the Eastern Counties Climatic region. The mean daily temperatures range from 5C (42F) in April to 8C (42F) in July. The growing season for the site is 200 days and the area receives 86 cm (34 in) of precipitation annually.

#### **4.1.5 Hydrology**

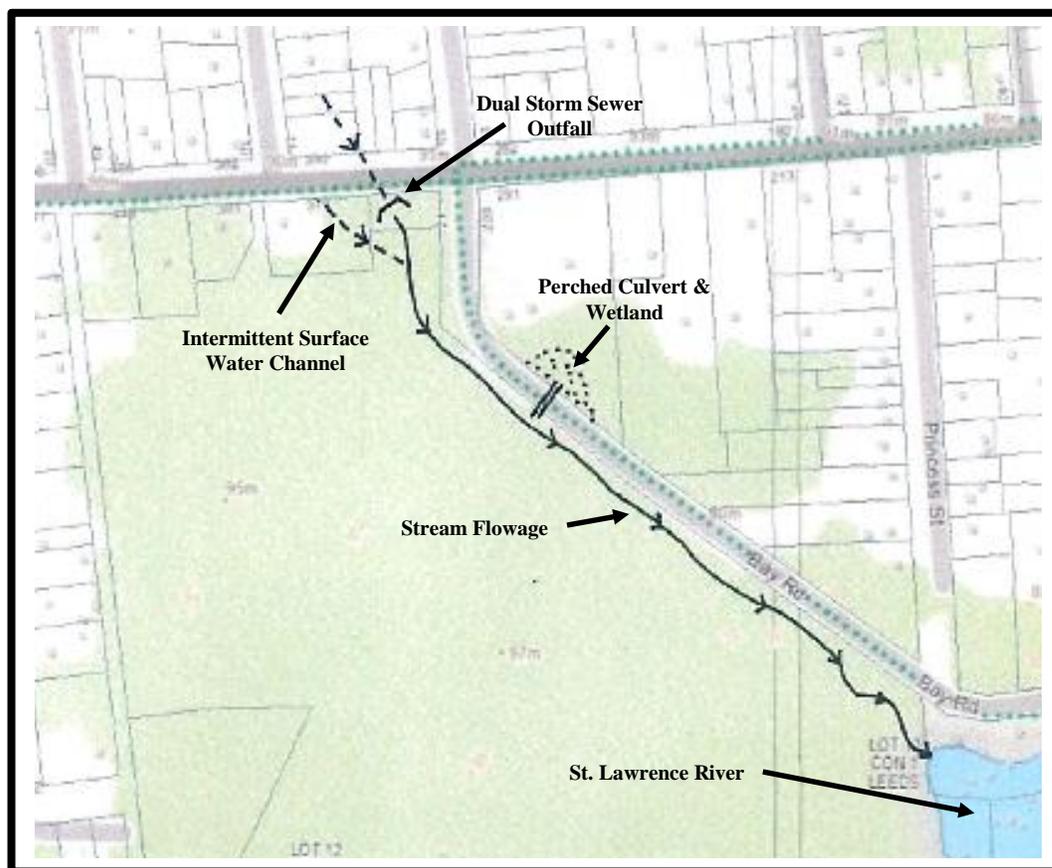
Hydrology is the single most critical factor in an understanding of watershed dynamics and its relative health. The source, amount, periodicity and quality of surface and groundwater characterize the entire natural and built landscape. The critical elements for understanding the hydrologic system include the basin shape and area, precipitation rates as both rainfall and snow, evapotranspiration rates, monthly and seasonal flows, permeability of soils in each catchment-basin, the type and proportion of natural cover and the extent of hard surfaces that human development has created.

The site lies within the St. Lawrence River Watershed. The study area includes a watercourse that parallels the roadway and arises upslope of King Street, has been directed into an underground storm sewer that terminates south of King Street in the flowage and drains directly into the St. Lawrence River. Based on the existing topography, there appears to have been an historic flowage west of the existing channel that connect just south of King Street to the existing waterway but contained no flows when inspected. It likely passes surface water only during the snowmelt period and after significant storm events.

There is an impoundment at the base of the east slope and roadway that appears to be the consequence of a ‘perched’ culvert that is artificially holding back water in the ditch rather than directing it all under the roadway and into the existing channel.

The Lake Ontario and St. Lawrence River elevations are controlled by the R. H. Saunders Dam at Cornwall, downstream of Gananoque. Consequently, the natural river elevations at the study site are moderated by the power generator.

**Figure 4. The On-site Hydrology of the Proposed Development Site.**



#### **4.2 Historical Ecology and Social Setting**

This section of the ecological history describes the historical ecology as reflected by first nation cultures, the pattern of early European settlement and the current land use plans of the local community around the proposed development site. It is the combined effect of the occupation, settlement and community development activities that influences and defines the current landscape. These sequential events contribute to an understanding of the original ecology and how it has evolved, over time, to the present condition. It also describes the historical hydrology and how settlement and community development may have altered it. This knowledge is useful in evaluating potential impacts by humans, selecting mitigation techniques that are sustainable, low cost, energy-efficient and successful, and in selecting the most appropriate mitigation strategies.

#### **4.2.1 First Peoples Occupation**

Despite the limitation that original cultural histories were oral and not written, archaeologists are able to interpret from artifacts (midden contents such as bones, seeds and clothing; ceramics or pottery; pipes; lithics or tools; worked bone; and burial practices) the original ecology of different ‘cultural periods’ that span thousands of years. Their studies provide clues to the state of the local ecology during each cultural period and how it gradually evolved between periods. This knowledge of ecological change, its trajectory and rate, is critical to an understanding of human impact and its scale, relative significance and possible avoidance in considering possible development.

Several sequential cultural periods followed the retreat of glaciers. The Palaeo culture remains the first well-documented period, spread along the south edge of glacial ice as it receded about 12,000 years ago, and developed distinctive spears utilizing the atlatl to hunt caribou, arctic fox, hare, mammoth and mastodon. Next was the Archaic period when warmer temperatures about 10,000 years ago created changes in the flora and fauna. This influenced the development of a culture that hunted deer, elk, bear and beaver with the bow and arrow. They also supplemented their diet with smaller game, fish, shell fish, berries and other wild plants.

While the ecological evidence from these earliest cultures is absent, there is good archaeological evidence for the four subdivisions of the lengthy Woodland Period which ended about 1,000 years ago when European exploration commenced. The social organization in these hunter-gatherer cultures began a gradual evolution from a nomadic hunter-gatherer society to a more sedentary and agrarian society living in permanent villages for 20 to 50 years and cultivating the ‘Three Sisters’ - corn, beans and squash.

When interpreting and synthesizing the information from archaeological investigations it is only possible to confirm the presence of a species during that era. It is not possible to conclude that the lack of bones, for example, equates to the species being absent. And simply because its bones may be present it is not possible to relate the frequency or volume of fragments to its population size. The frequency may well reflect the ease of its harvest, or even the selective preference during that cultural period. Their preferred wood for fires was pine, maple, oak, beech, cedar, yellow birch, elm and ash. These cultures also consumed the seeds, fruit and vegetation of indigenous plants (hay, rye and oats) along with those plants imported through a widespread trading network (corn, beans, squash, tobacco and sunflowers).

For the nomadic cultures, the areas adjacent to campsites would be impacted but a combination of small group size and seasonal patterns of use allowed the site ecology to recover quickly. In addition, the low intensity of hunting, trapping and gathering were sustainable because they were within the replacement capacity of indigenous plant and animal populations. Adjacent to permanent villages, the impacts would persist longer and the scale of impact would be greater, particularly for those engaged in agriculture. But even these villages were moved periodically (20-30 years apart) when fuelwood, water or other critical supplies became limited.

Since the study area did not become ice-free until about 12,000 years ago, some of the earliest cultures could not have been present but archaeological studies have established occupation dating back 4,000 years. There are no known archaeological sites in the study area.

#### **4.2.2 European Settlement**

While Champlain’s first campaign in 1615 was intended to secure the fur trade for France, it also initiated the first of seven explorations of Ontario, largely by the Jesuit missionaries. Their findings consolidated European knowledge of the province, including the best navigation routes,



and resulted in the establishment of military and trading forts. After this initial flurry, there were fewer explorations of Ontario until 1730, when Kelsey entered Hudson Bay. By then, the major fur route had become the Ottawa River and the Humber River-Lake Simcoe-Georgian Bay route to inland areas. The ecological effect from exploration was minimal but it did identify landscapes of interest for trapping furbearers and sites for potential settlements.

A subsequent, 50-year pioneering era began a transformation of the Upper Canada (Canada West - Ontario) landscape that was largely unaffected by nomadic Indian presence and primitive agriculture to one that was subjected to intensive European land use practices. Soil conditions influenced the pace and type of agricultural development and the concomitant loss of natural cover. Sandy soils, formed from deltas and outwash deposits, supported oak and were avoided. Limestone soils that grew walnut were favoured. Game was still plentiful and diverse. As land clearing progressed, large herbivores such as elk and predators such as wolverine and cougar, disappeared.

Prior to the start of European settlement in 1800, the original landscape of southern Ontario was more than 90% woodland. Wetlands covered 10-25% of the area including swamps or forested wetlands. Most (95%) of inland wetlands were swamp-type. Most of the falls and rapids along rivers flowed freely, with few floods after the spring snowmelt period. But the relative rate of change early in this period remained comparatively slow, the pattern of use was scattered and the type of conversion was limited to the loss of some localized natural woodlands, wetlands and open areas into small-scale cultivated landscapes consistent with the impacts from only 75,000 residents.

Early land use activities focused on forestry and agriculture which resulted in extensive deforestation. The economy switched from furs to domestic products of wheat, timber and potash about 1820. While the pace of settlement varied across the south, by the 1850s almost half of the landscape had been cleared and more than that had been drained. Many of the larger rivers had been dammed to provide water-power for grist and lumber mills. Large land grants were common and by 1868 free land grants were provided to an increasing population which accelerated the loss of natural cover and resulted in widespread flooding, wildfires and erosion. By 1874, the riparian area of the St. Lawrence River from Lake St. Francis to Lake Ontario, and the shores of Lake Ontario as far as the Bay of Quinte, around Fort Niagara and along the Detroit River, had been colonized. Then the impacts of landscape conversion were accelerated by the conversions of manpower to horsepower, and then to mechanization.

Commercial transportation evolved from portage trails to roads, from rivers with portages to canals, from canoes to barges or ships and from wagons to vehicles or trains. The impact of these linear corridors was an accelerated destruction, fragmentation and degradation of forests, wetlands, river valleys and wildlife habitat. By 1967, over 60% of the wetlands had disappeared. Most naturalized landscapes are now comprised of 15% - 40% woodlands and 5% - 10% wetlands. Artificial drainage in some counties reached 70%. Over this period, the landscape in southern Ontario lost, to varying but accelerating degrees, the natural capital and the ecological services provided by woodlands, grasslands, wetlands and riparian areas along streams and rivers.

Leeds County was first settled by the United Empire Loyalists in 1793. One of the first Loyalists was Captain Joel Stone who obtained a grant of 500 acres on the Gananoque River, along with half of the waterpower rights. The county also boasts of the first iron foundry in 1825 which produced plows, pots and kettles. Numerous small but deadly encounters between the British and



Americans occurred in the area during the War of 1812-14 but by 1881 rural settlement in the county was well established.

The study area lies within the Town boundaries and includes residential and recreational developments. It does not contain any agricultural uses. While the east and north side of the study area is residential, the west side is a natural woodland and the south side is defined by the municipal marina and the St. Lawrence River.

#### **4.2.4 Current Setting**

The collective impact these historic changes on sensitive ecologies are the aegis of current government legislation, policy, and the programs of many agencies, organizations, communities and landowners.

#### **Federal Legislation and Policy**

There are many federal statutes and policies that might affect a development proposal depending on its location and features. Some reflect national agreements (biodiversity strategy) or international commitments (Kyoto). The most commonly applicable of these deal with sites that may be subject to land claims, locations with or adjacent to fish habitat, controlling the spread of invasive species such as the emerald ash borer in ash tree materials, properties that contain or are adjacent to navigable waterways, wildlife habitats that contain species at risk, species which migrate into and out of Canada, and international waters.

#### **Land Claims**

The Canadian government is responsible for relations with First Nation communities, dating back to the signing of treaties when lands were ceded to the Crown. Currently, there are about 230 claims filed by First Nations in Ontario but only 50 of these are considered major claims. Negotiations to settle these claims are ongoing but there are no known land claims on or adjacent to the site.

#### **Fisheries Act**

The Fisheries Act prohibits any activity that results in the harmful alteration, disruption or destruction of fish habitat. There is fish habitat in the study area.

#### **Species at Risk**

The Species at Risk Act (SARA) was designed to meet Canada's commitment under the International Convention on Biological Diversity. It was passed on June 5, 2003 and provides the framework for the protection of species that migrate in and out of the country as well as habitat protection on federal lands and waters. Environment Canada is the lead agency that is responsible for migratory birds and terrestrial species with the exception that Parks Canada is responsible for all SAR species (aquatic and terrestrial) on their lands. Fisheries and Oceans Canada is responsible for all aquatic species such as fish and mussels, including the mussel's host fish species.

Recovery Strategies are developed for endangered and threatened species which identify population and distribution objectives, develop protection goals, define critical habitat and promote stewardship. Action Plans guide the implementation. Management Plans must be prepared within 3 years of a species being listed as Special Concern. Critical Habitat is identified at two scales: landscape and site. Within critical habitat landscapes a site assessment determines the protected critical habitat sites where destruction is prohibited, harm must be mitigated and formally approved by agreement or permit.



The province has the responsibility to ensure that non-migratory species and their habitats receive protection comparable to the federal legislation. The prohibitions of this federal act do not apply to species of Special Concern whose protection is achieved through the Migratory Birds Convention Act and within National Parks and Wildlife Areas. While there is the intention to harmonize SARA and ESA, separate permits are required to work in habitats of interest. Applicable details will be outlined in the section on provincial responsibilities.

### **Emerald Ash Borer (EAB)**

The Emerald Ash Borer is an invasive exotic beetle from Virginia that was first discovered at Windsor in 2002. Successive and unsuccessful attempts to restrict the spread of the beetle began with a Ministerial order in March 2011 by the Canadian Food Inspection Agency to control the movement of all ash tree materials and all firewood from specific areas of Ontario. The order prohibits the movement of ash nursery stock, ash trees, ash logs and ash branches, rough ash lumber, wood packaging materials with an ash component, ash bark, ash wood chips or bark chips and firewood from all tree species within the range of ash species (white, black, green, pumpkin and blue). The study area lies within the regulated area.

### **Watershed Health**

In response to the ecological impacts of urbanization, Environment Canada published “How much is Enough” which summarized the synthesis of science-based, landscape-level, natural cover features required to sustain healthy watersheds and sources of water. It provides guidelines for the management of wetland, riparian and forests on a watershed basis and is suitable for assessing natural landscapes in southern Ontario for sustained water benefits. The study area includes the topographic features of a natural watercourse and it was passing flowing water from its catchment area when inspected.

### **Remedial Action Plans**

The International Joint Commission was established by the United States and Canada to administer their interests on the Great Lakes. This group identified 23 locations around the lakes that were the focus of integrated restoration activities involving all levels of government. Each site has a steering committee that oversees the process of delisting after improvements achieve stated goals of water quality. There are no RAPs in the study area but the St. Lawrence RAP lies downstream to the east and is a shared site with the United States. The Canadian portion has successfully completed its restoration of water quality and ecosystem health.

### **Biodiversity Strategy**

The Canadian Councils of Resource Ministers, under the guidance of a steering committee comprised of provincial and territorial specialists, set out a Biodiversity Strategy in 2006 that would achieve the United Nations objective “*to achieve a significant reduction of the current rate of biodiversity loss at the global, regional and national level as a contribution to poverty alleviation and to benefit life on earth.*” Applicable details will be outlined in the section on provincial responsibilities.

### **St. Lawrence Seaway**

The St. Lawrence Seaway is a system of locks, canals and channels in Canada and the United States that permit ocean-going vessels to travel from the Atlantic Ocean into the western end of Lake Superior. Its development dates back to the 1890s but it was not fully supported by both countries until 1954. There are no Seaway facilities in Gananoque or in the study area.



### **Thousand Islands National Park**

This National Park consists of facilities on the mainland and several islands for recreationalists. While there are no facilities within the study area there are 5 islands offshore (Aubrey, Mermaid, Beau Rivage, McDonald and Thwartway) that form part of the park.

### **Provincial Legislation and Policy**

Ontario has almost 30 pieces of legislation that may apply to developments. The characteristics of each proposal determine which ones are applicable but those that are commonly applicable include the Mining Act, the Aggregate Resources Act, the Heritage Act, the Planning Act and a series of acts and policies that deal with natural heritage values such as the Conservation Authorities Act and the Generic Regulation, the Drainage Act, the Endangered Species Act, the Environmental Assessment Act, the Environmental Protection Act, the Fish and Wildlife Conservation Act, the Lakes and Rivers Improvement Act, the Nutrient Management Act and the Water Resources Act. The bulk of this legislation is administered by three agencies: Ministry of Natural Resources and Forestry (OMNRF), Ministry of the Environment (OMOE) and Ministry of Agriculture, Food and Rural Affairs (OMAFRA).

### **Crown Lands**

The Ministry of Natural Resources and Forestry is the agency that manages lands owned by the Ontario Crown. These would include provincial parks and the lands under lakes and rivers unless specifically deeded to the private owner. They also include lands under water that is considered to be navigable. There are no provincial parks in the study area but it does contain a watercourse which is not navigable and likely privately owned as well as a Great Lakes Area shoreline that may be subject to Crown review of the proposal, approval and permitting.

### **Minerals**

The province produces more than 25 different metals (gold, silver, nickel, copper, platinum and iron), non-precious metals (bismuth, chromium, cobalt, lead, zinc, mercury, molybdenum, and radium), non-metallic products (corundum, apatite, arsenic, asbestos, barite, diatomite, fluorospar, graphite, gypsum, lignite, marl, mica, quartz, quartzite, salt, slate, sulphur, tale and soapstone), fuels (natural gas, peat and petroleum), and structural materials (sandstone, limestone, lime, granite, feldspar, clay and cement).

Ontario's mining industry dates back to 1800 with the construction of the first iron ore blast furnace in Leeds County. Other iron ore furnaces followed in 1813 (Norfolk County), 1819 (Hastings County), and 1831 (Essex County). In 1860, mica was mined in Lanark County, molybdenite in 1863 from Leeds County, and in 1866 lead from Frontenac County, gold from Hastings County and salt from Huron County. Graphite and apatite (phosphate) was produced from Lanark County in 1870 as was arsenic from Deloro. To round out the range of mineral products, natural gas was first discovered at Port Colborne and Essex County.

The Mining Act defines mining rights as “the right to minerals on, in, or under any land.” Surface rights are “every right in land other than the mining rights.” The Act provides for access to a property for both mining and surface rights. Over the past 300 years there have been a number of changes in the practices of dealing with mineral rights ownership. This means that the ownership of surface and mining rights will differ from property to property. Prior to May 6, 1913, the crown land grants included mineral rights. After this date, the land patents may or may not have included mineral rights. When a landowner does not hold the mining rights, the Mining Act permits anyone holding a prospectors license to stake a claim, allowing them the right to prospect, and the legal right to later convert their claim to a mining lease on the property. Staking a claim involves entering the property, establishing corner posts and boundaries which may result



in cutting or blazing trees. As far as can be determined, there are no mining claims on the property.

### **Aggregates**

The Aggregate Resources Act (ARA), administered by the OMNRF, provides for the management of aggregate resources and regulation of aggregate operations on all Crown and designated private lands. Wayside pits for road construction require permits for some parts of Ontario. The excavation of sand and gravel requires a license, the process of which involves a public process of input. There are no licensed operations on site or adjacent to the site.

### **Cultural Heritage**

The Provincial Policy Statement provides direction to an approval authority in making decisions on land use planning matters, including the protection of cultural heritage and archaeological resources that include artifacts, archaeological sites and marine archaeological sites. The significance of areas of archaeological potential must precede removal, documentation or preservation. The Heritage Act enables municipalities to preserve the Province's heritage properties and archaeological sites by providing standards and guidelines. The designation of archaeological sites may include management plans that define buffers to protect locations where significant historical and cultural values have been found. A Stage 1 and Stage 2 archaeological report has been completed for the study area.

### **Agricultural Land Use Policies**

The protection of agricultural land uses is included in the Provincial Policy Statement, issued under the Planning Act. Agricultural activities are also regulated and permitted under several other statutes such as the Farming and Food Production Act, Nutrient Management Act, the Drainage Act and Environmental Protection Act.

Under the Planning Act, municipalities must include the provincial policy statement directives when they adopt official plans policies and zoning bylaw provisions to regulate agricultural land uses. Among those requirements is the '*Minimum Distance Separation*' which is designed to provide an adequate distance between livestock facilities and other land uses. Application of the MDS I and MDS II formulas are employed to calculate these distances which vary with the size, type and degree of expansion of the livestock operation and the type of manure storage. The premise of the MDS formula application is that there is adequate distance between the proposed development and any adjacent farming operation. There are no farming operations in the study area.

### **Biodiversity Strategy**

In 2005, Ontario finished its Biodiversity Strategy, after a year of engagement with provincial, municipal, environmental, industry and Aboriginal leaders. The document adopts the definition of biodiversity used in the Canadian Biodiversity Strategy and the United Nations Convention on Biological Diversity. In its 107 million hectares of land and water, Ontario provides habitat to more than 3,380 species of plants, 470 bird species, 80 mammal species, 60 species of herpetiles and 160 species of fish. About 40 % of the species at risk occur in this province, with the majority found in the south. Biodiversity maintains the ecological services that are basic to life on Earth, including the growth forecast of 4 million additional people in the province by 2030.

The Strategy recognizes the differences between four major ecological regions: Hudson Bay Lowlands (25%), Ontario Shield (60%), Mixedwood Plains (10%) and Great Lakes (9%). There are two goals: to protect the genetic, species and ecosystem diversity of the province; and to use and develop the biological assets of the province sustainably and capture the benefits from their



use for Ontarians. The Strategy acts as an integrator of a range of provincial legislation, policy and programs.

### **Natural Heritage Values**

The OMNRF is responsible for natural heritage legislation and policies including: the custodian of provincial Crown lands, waters and forests; fish and wildlife; provincial parks; private land stewardship; endangered species; wetland evaluation, etc. These are covered in detail in the life science section.

### ***Wetlands***

Wetlands are among the most productive and biologically diverse habitats on the planet. Ontario has evaluated over 2,300 wetlands as part of a program to protect those with provincially significant values: nutrient removal, flood and erosion reduction, groundwater recharge and discharge, wildlife habitat, carbon sequestering, recreation and tourism values, as well as resource products such as trees, wild rice, berries, furs, fish and baitfish. Through the Natural Heritage Policies of the PPS, their mapped area and a 120 m buffer are protected from development that may cause a negative impact. There is a small wetland in the study area as well as a riparian wetland along the St. Lawrence River shoreline.

### ***Areas of Natural and Scientific Interest***

Ontario embarked on a systematic planning process to survey natural areas and geological sites in 1977 with the intent of identifying those life and earth science sites that are representative of the province's diversity. The PPS defines Areas of Natural and Scientific Interest (ANSI) as areas of land and water containing natural landscapes or features that have been identified as having representative life or earth science values that need to be protected from development, are important to scientific study, or provide unique opportunities for education. The determination of Provincial or Regional importance is based on an analysis of the candidate location in relation to its representation, diversity, condition, ecological considerations and special features of the landscape and do not have adequate protection. Through the Natural heritage Reference Manual (NHRM) which provides guidance on natural heritage policies of the PPS, ANSI mapped areas and a buffer (120 m for life science types and 50 m for earth science types) are protected from development that would result in a negative impact. There are no ANSIs in the study area.

### ***Conservation Lands***

Eligible lands with natural heritage features include provincially significant wetlands, areas of natural and scientific interest, habitat of regulated endangered species or designated escarpment natural areas. Property tax reductions are available to cooperating landowners through the Managed Forest and the Conservation Lands Tax Incentive Programs. Wetlands are among the most productive and biologically diverse habitats on the planet. Ontario has evaluated over 2,300 wetlands as part of a program to protect those with provincially significant values: nutrient removal, flood and erosion reduction, groundwater recharge and discharge, wildlife habitat, carbon sequestering, recreation and tourism, as well as resource products such as trees, wild rice, berries, furs, fish and baitfish. Through the Natural Heritage Policies of the Planning Act, the mapped area of these natural heritage values and a buffer are protected from development: 120 m for PSWs; and between 120 m and 50 m for ANSIs. It is unknown if the private lands along the west edge of the study area have been enrolled in the MFTIP or CLTIP.

### ***Endangered Species Act***

In June 2008, Ontario's Endangered Species Act (ESA) was passed. Species that are listed as endangered or threatened in the SARA are protected under the ESA. The new legislation provides broader protection for species at risk and their habitats, provides greater support for



volunteer stewardship by landowners, resource users and conservation organizations, provides a stronger commitment to the recovery of species, provides greater flexibility in its application, describes increased fines, requires more effective enforcement and greater accountability, including government reporting requirements.

The inclusion of a species is determined by the Committee on the Status of Species at Risk in Ontario (COSSARO) based on scientific studies as well as local and aboriginal or traditional knowledge. Once a species is classified as ‘at risk’, it is classified as extirpated, endangered, threatened or special concern. All species and their habitats that are classified as extirpated, endangered or threatened are automatically protected under the ESA.

In Ontario, species-specific habitat protection falls into one of three categories: regulated, general or critical. **‘Regulated habitat’** is defined by regulation and also includes recovery plans and specific stewardship requirements of the landowner. **‘General habitat’** is defined “*as an area on which the species depends, directly or indirectly, to carry on its life processes such as reproduction, rearing, hibernation, migration or feeding at such sites as dens, nests, hibernacula or other residences.*” **‘Critical habitat’** is the habitat necessary for the survival or recovery of a listed endangered, threatened or extirpated species in Schedule 1 of the Act.

The legislation requires the creation of recovery strategies for endangered and threatened species and management plans for species of concern. Regulations are currently being drafted for 10 species but none have been approved at present. All of the 42 species, listed in Schedule 1 of the Act, were given general habitat protection by the legislative revisions. The Ministry of Natural Resources and Forestry have indicated they believe the study area contains the habitats of several listed species.

### **Special Policy Areas**

Development on private land is controlled by the Planning Act which is administered by the Ministry of Municipal Affairs and Housing (MMAH) and municipalities through the planning process. In addition, there are several Acts that deal with Special Policy areas: the Greenbelt Act, the Niagara Escarpment Planning and Development Act, the Oak Ridges Moraine Protection Act, the Oak Ridges Moraine Conservation Act and the Lake Simcoe Watershed Act. The site is not located in any of these special policy areas.

### **Municipal Policies and Plans**

The MMAH coordinates access to planning services for municipalities that had previously been independently available from several ministries such as Environment and Energy, Natural Resources, Agriculture, Food and Rural Affairs, and Northern Development and Mines. This single point of contact and the Provincial Policy Statements provide clear direction to councils on land use planning matters and their responsibility of ‘having regard to’ issues of provincial interest in municipal planning decisions.

### **Municipal Official Plan**

The Town of Gananoque has official plan policies that define the long-range planning directions for the community. The east side of the study area is designated as ‘Lowertown’ while the west side is designated as ‘Open Space’. North of the study area the designation is ‘Residential’. There is no designation for the shoreline and adjacent aquatic environment. The roadway is designated as a ‘Recreational Pathway’. There are no designations for ‘Trade and Industry’, or ‘Natural and Cultural Heritage Feature’ in the study area.



The Township of Leeds and The Thousand Islands also has an Official Plan which recognizes that the navigable waters of the St. Lawrence River is considered a Crown possession and management responsibility. It may also have a blended management style among municipal, provincial federal and international interests.

#### **Municipal Zoning Bylaw**

The study area contains three Development Permit Area: ‘Open Space’ west of Bay Street; ‘Lowertown Residential’ to the east; and ‘Lowertown Mixed Use’ along the waterfront at the end of the street.

#### **Municipal Forest Conservation or Tree Cutting Bylaws**

Municipalities have been empowered to enact forest conservation bylaws throughout southern Ontario for the past 50 years. These bylaws allow landowners to harvest their timber resources on the basis of a diameter limit or by marking crop trees based on silvicultural prescriptions. This municipality has no bylaw.

#### **Municipal Drainage**

Artificial drainage schemes have significant potential impact on landscapes. The activity is subject to Common Law, provincial legislation and municipal bylaws. Since 1976, landowners, road superintendents and OMAFRA may petition the municipality to construct artificial drains to alleviate flooding of agricultural lands and roadways. Since drains affect groundwater and surface water resources, they must be factored into a EISs where they may influence the development proposal. There is storm drainage facilities along the roadway.

#### **Municipal Services**

The roadway is not used to collect garbage, provide water supply and electrical services, or access to properties along its length.

#### **Conservation Authority Policies and Programs**

The site is located in the administrative boundaries of Cataraqui Conservation.

##### *Environmental Impact Study Standards*

This agency has recently set out its Environmental Impact Study (EIS) terms of reference and submission standards. Their authority rests in The Planning Act, Provincial Policy Statements (Natural Heritage and Natural Hazards Policies), municipal Official Plans, and the Conservation Authorities Act (and Generic Regulation).

##### *Generic Development, Interference and Alteration Regulations (2006)*

This regulation requires that development proposals consider the potential impacts on the natural heritage values of the site. No development is allowed within the regional flood line. Any changes to the area within 15 m of the regional flood line, top-of-bank line or shoreline or 120 m from Provincially Significant Wetlands, or 30 m from other wetlands over 0.5 ha, may require their review and approval.

##### *Watershed Report Cards*

Watershed Report Cards are designed to provide basic information on the health status of a watershed, with emphasis on the land and water resources that sustain local communities. It shows the results of watershed monitoring data collected over a number of years, indicating the current health indicators of the watershed, and is focused on the key parameters of surface water quality, extent of forest cover, wetland area and groundwater conditions. The 2013 Watershed



Report Card for the unnamed watershed in the study area has a surface water grade of ‘C’, a forest conditions grade of ‘A’, and a wetland conditions grade of ‘A’.

#### *Hazard Lands*

The Conservation Authority also identifies hazard lands (steep slopes, flood-susceptible areas, etc.) and develops policies to identify and protect them from inappropriate development. To protect shoreline development from flooding, they have established a regulatory floodline along the St. Lawrence River based on a 1:100 year water level of 76.0 elevation.

#### *Significant Woodlands*

It is unknown if Cataraqui Conservation has undertaken mapping for Significant Woodlands.

#### *Source Water Protection Act (2006)*

The public inquiry into the Walkerton water tragedy resulted in several recommendations that confirm the important role that natural landscapes such as woodlands, wetlands and valleylands play in protecting the quality of groundwater resources of a watershed. It also recommended that because local Conservation Authorities play a leadership role in watershed planning, they would incorporate source water protection objectives in these documents. It is unknown if Cataraqui Conservation has identified any of the study area is considered a source water area.

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### **4.3 Life Science Features**

This part of the ecological history compiles the existing life science attributes of the site and its adjacent area. The current condition of an ecosystem is the terminus of a trajectory of change from its pristine condition that was defined by its earth science characterization and then influenced by the extent, pace and nature of settlement activities and early development. It is a description of the natural environment that society, through its development and conservation activities, has shaped, altered or retained.

#### **4.3.1 Future Climatic and Hydrological Conditions**

Climate change over the next century will affect the local conditions and predictions are that carbon dioxide levels will double. This may increase average summer temperatures between 3 C and 6 C in southern Ontario while annual precipitation will decrease by 4 % (31-37 cm; 1-1.5 in) with major shifts in the seasonal distribution (30% increase in the spring and fall; 30% decrease in the summer and winter). An increase in summer temperatures along with decreased precipitation will increase the frequency and severity of drought, the incidence of extreme weather events and variations in weather.

Current local weather trends are indicative of these changes. Precipitation events are of shorter duration, of higher intensity, and more isolated (scattered thunderstorms) with limited volumes (less than 25 mm). Groundwater storage has been reduced (winter precipitation will fall as rain and not snow). Changes will occur in stream flows (higher in spring and winter; lower in summer and fall), and spring snowmelt will occur earlier in the spring.



### **Anticipated Environmental Changes**

The likely consequences of climate change will be: an increase in the potential for soil erosion as a result of more intense rainfall; an increase in the amount of stream sedimentation; a difficulty in matching plant moisture needs with moisture availability; greater production difficulties on soils with low moisture capacity; commercial crop yield decreases of between 12% and 27%; the length of the growing season will increase; the timing of sap runs for maple syrup production may be earlier and shorter and the sugar content of sap could be lower; the reduction in winter snow depths may result in root damage; increased summer temperatures may result in die-out; the forest fire season length, fire frequency and fire intensity will increase as a consequence of drought and longer growing seasons; and plant diseases and insect infestations could increase as a result of drought stress.

### **Implications for Vegetation**

All these factors could change the age and composition of forest ecosystems and along with increased frequencies of ice storms, floods and temperatures (high and variable) would further stress the ecosystem. Plants with greater genetic variability may eventually dominate the vegetation communities. Herbaceous plants would be favoured over woody plants because of increased carbon dioxide. Northward movement of the climate is predicted to be about 3 km/year but a plant species' ability to migrate is typically under 1 km/year. Over centuries, plant species could migrate northward (e.g. oak-hickory forests of the mid-continent could enter the Great Lakes – St. Lawrence woodlands). In fact, the growing season in parts of the province, have increased by almost 1 month in the last 20 years.

### **Implications for Birds**

Birds in every terrestrial and aquatic habitat will be affected, although individual species will respond differently. Birds in coastal, arctic and grassland habitats show intermediate levels of vulnerability while birds of wetlands and forests show lower levels. Rising sea levels and increased frequency and severity of storms will inundate or fragment low-lying habitats and alter marine food webs along the Hudson and James Bay coasts. Increased temperatures will alter arctic surface waters and vegetation. Wetland birds, many of them not yet '*listed*', will be affected by reduced rainfall and temperature changes, grassland birds will be affected by warmer and dryer climates and forest birds by gradual changes in precipitation and the effects of increased fires, insects and diseases. Long-distance migrants, especially aerial insect eaters, may also face challenges in the timing of their movements and the synchrony between the birth of their young and the emergence of food sources.

Most bird groups (forest, water and waterfowl) in the Lower Great Lakes – St. Lawrence Region have increased in recent decades by about 20 %. Nevertheless, there have also been dramatic declines in aerial insectivorous (95 %) and grassland groups (70 %).

### **Implications for Herpetofauna**

Recent investigations of the effects of climate change on reproductive phenology of amphibians suggests that early-spring breeders such as wood frog, spring peeper and northern leopard frog are calling earlier in the year in response to temperature changes but the later breeding species showed no change in peak calling date. Predictions suggest an advance in peak breeding of nearly 11 days by 2100 and a 30% increase in the breadth of the breeding season.

### **Implications for Mammals**

Michigan has applied a "Climate Change Vulnerability Index (CCVI)" for mammals developed by NatureServe and have identified the following mammals as vulnerable: moose, marten, snowshoe hare, ruffed grouse.

### **General Conclusions**

These changes will be accompanied by losses of ecological, hydrological and cultural functions provided by natural landscapes which may increase the numbers of 'listed' species in the future. Any mitigation or restoration techniques being considered in this project must incorporate these potential long-term effects in their application.

#### **4.3.2 Ecological Land Classification**

The ecological land classification is an integrated approach to surveying and classifying recurring and complex ecological patterns of the landscape into a reasonable number of comparable and meaningful units. An ecological site region (ecoregion) is an area of land within which the response of plant communities and fauna to the physical features of the landform (surface deposits, soils, relief, climate and hydrology) follows a predictable and consistent pattern. Site Districts (ecodistricts) are sub-sets of an ecoregion that are characterized by a distinctive pattern of relief, geology, geomorphology, vegetation, soils, water and fauna. An ecosite is defined as a part of the ecosystem that has relatively uniform parent material, soil, hydrology and characteristic vegetation.

The study area lies within ecodistrict 13 of the Hurontario ecoregion and Site Region 6E and Site District 10. The study area is part of the Leeds Sub-district which lies along the St. Lawrence River valley and is comprised mainly of shallow till and rock ridges.

The ecological land classification is an integrated, ecological approach to land-unit description and classification intended to identify recurring ecological patterns and reduce the complex natural variation to a reasonable number of ecosystem units. The ELC for the study area was not completed in this preliminary site investigation and so the vegetation types and form, which are the finest resolution of the system, are also unknown at this time.

#### **4.3.3 Significant Portions of the Habitat of Endangered and Threatened Species**

The Ministry of Natural Resources and Forestry has indicated that their records suggest the possible presence of 7 species in the study area: barn swallow, Blanding's turtle, butternut, eastern small-footed myotis, gray ratsnake, little brown bat, and northern long-eared bat. A site investigation did not result in any observations of these species.

#### **Recovery Strategies**

The Species at Risk Act requires that a recovery strategy be prepared for each endangered, extirpated and threatened species. Such plans have been drafted for Blanding's turtle and butternut and one covering three bat species is being completed.

#### **Habitat Protection**

No inventory of the habitat within the study area was completed so it may exist but none of these species were observed during the site inspection. Local residents have observed gray ratsnakes along the roadway. It is possible that there are summer maternal bat colonies in the super-canopy trees along the west side of the study area and preferred foraging areas of open water, along waterways and forest edges are also present.

#### **4.3.4 Significant Wildlife Habitat**

Significant wildlife habitats are ecologically important to the requirements of plants, animals and other organisms to live and find adequate amounts of food, water, shelter and space needed to sustain naturally producing populations. They include the habitats of species of concern, locations where a species concentrates at vulnerable periods of their annual or life cycle (deer wintering area, migration staging areas and corridors, reptile hibernacula and bat caves), and rare



habitats (alvars, tall grass prairie, savannahs, talus slopes, rock and sand barrens, Great lakes dunes, woodland amphibian breeding ponds, mast production areas, mineral licks, cliffs, seeps and springs). Rocky ecosites and a mature woodland exists along the west edge of the study area.

#### **Species of Special Concern**

The Ministry of Natural Resources and Forestry has indicated that their records suggest the possible presence of 4 species in the study area: eastern musk turtle, milksnake, northern map turtle and common snapping turtle. A young snapping turtle was observed in the study area.

#### **The Habitats of Species of Special Concern**

The study area obviously contains snapping turtle habitat but it is not known if it contains the habitats of the other species.

#### **Seasonal Concentration Areas and Important Bird Areas**

It is not known if there are areas of wildlife concentration in or adjacent to the study area.

#### **Rare Vegetation Communities**

The study area does contain cliff and talus slope plant communities and may also contain some old growth forest communities.

#### **Specialized Habitat for Wildlife**

It is not known if there are any areas of specialized habitat for wildlife in or adjacent to the study area.

#### **Animal Movement Corridors**

It is not known if there are any animal movement corridors in the study area but it does contain a surface water drainage channel and a shoreline, both of which can serve that function.

### **4.3.5 Areas of Natural and Scientific Interest**

The PPS defines Areas of Natural and Scientific Interest (ANSI) as areas of land and water containing natural landscapes or features that have been identified as having representative life or earth science values that need to be protected from development, are important to scientific study or provide unique opportunities for education. ANSIs fall into two types: earth science ANSIs are geological in nature and include significant representations of Ontario's bedrock, fossils and landforms. Life science ANSIs are significant representations of Ontario's biodiversity and natural landscapes. The determination of Provincial or Regional importance is based on an analysis of the candidate location in relation to its representation, diversity, condition, ecological considerations and special features of the landscape and do not have adequate protection. The OMNRF has indicated that there are no ANSIs on site or on adjacent lands.

### **4.3.6 Provincially Significant Wetlands**

The determination of Provincial Significance of a wetland ecosystem is the result of a field investigation, evaluation and classification. These surveys define wetland characteristics in four categories: biological, social, hydrological and special features. They also determine its type (marsh, fen, bog and swamp), site type (lacustrine, riverine, palustrine and isolated), complexity (biodiversity, social values such as economic, educational and aesthetic, the hydrological benefits it provides and rarity of its component features) and significance (Provincial, regional or local). Provincially Significant wetlands are given special considerations under the Planning Act, regional and local significant wetlands are given considerations through policies, official plans and zoning bylaws of Conservation Authorities and municipalities. The OMNRF has indicated that there are no PSWs on site or on adjacent lands.

### **Other Wetlands**

There is a small wetland in the east side of the study area and the river shoreline would be considered a wetland habitat but neither are Provincially Significant.

### **4.3.7 Significant Natural Areas**

Several investigations have been completed to evaluate natural areas managed by agencies and government: national areas such as parks, marine conservation areas, historic sites, heritage rivers, migratory bird sanctuaries, wildlife areas, marine protected areas, marine wildlife areas and National Capital Commission Lands; provincial areas such as parks, conservation reserves, wilderness areas, forest reserves, enhanced management areas, significant wetlands, ANSIs, wildlife management areas, Niagara Parks System, Parks of the St. Lawrence, conservation authority properties, forest management reserves and Crown protected forests, restricted access area, the Niagara Escarpment, Oak Ridges Moraine, Greenbelt and Lake Simcoe Watershed; municipal areas such as parks, natural heritage areas, Rouge Park; and a wide range of private land areas such as the Eastern Habitat joint Venture, Nature Conservancy of Canada, Ontario Nature, Bruce Trail Conservancy, Carolinian Canada, Ontario Heritage Trust and other land trusts. The roadway is identified as being part of the Waterfront Trail network.

### **4.3.8 Significant Woodlands**

Significant Woodlands are defined in the Natural Heritage Reference Manual for Policy 2.3 of the Provincial Policy Statement: woodlands mean treed areas that provide environmental and economic benefits to both the private landowner and the general public such as erosion prevention, hydrological and nutrient cycling, provision of clean air and long-term storage of carbon, provision of wildlife habitat, outdoor recreational opportunities and the sustainable harvest of a wide range of woodland products. There are four major criteria that determine significance: woodland size, ecological functions, uncommon characteristics and economic and social values. The ecological function criteria itself is comprised of five sub-criteria.

Trees and forests also provide significant water benefits. The average annual rainfalls of 890 mm are slowed, filtered and deposited in stream and aquifers by trees and forests. Assuming an open-grown deciduous tree has 200,000 leaves, it transpires as much as 3,400 l of water and reduces overland flows and associated contaminants into the forest, with the remainder entering a complex system of filtration into ground water aquifers. Trees anchor the soil that reduces erosion, produce soil macropores that assist in filtering out contaminants, contribute organic materials to the soils, provide shade that regulates decomposition and stream temperatures, and produce seeds that regenerate the forest and provide food sources for wildlife. The quantity of water trees and forest contribute to the water table varies with the type of trees with conifers being stingy compared to hardwoods. The quality of water contributed is influenced by the age of trees and forest with younger stems removing more contaminants than older stems. And if forests are diverse they provide a highly resilient protection for drinking water supplies in spite of the vagaries of climate change, wind, snow, ice, rainfall intensity, disease and pests. These forested landscapes can yield about 4,450 cu m of water per ha.

The site lies within the Mixedwood Plains forested ecozone and there is woodland habitat in the study area. A single study plot in the forest indicated that the basal area was 38 sq m. Stems from three species of trees were measured to determine the general condition of the stand: average diameter of white pine was 42 cm, red oak was 106 cm and hard maple was 24 cm. It is unknown if Cataraqui Conservation have determined if the site is a Significant Woodland but the Town has designated as 'Open Space' in the Official Plan.



#### **4.3.8 Significant Valley Lands**

Significant Valley Lands are defined in the Natural Heritage Reference Manual for Policy 2.3 of the Provincial Policy Statement. There are four factors that determine significance: prominence; degree of naturalness; ecological functions; restoration potential; and historical and cultural value. There does not appear to be any designated Significant Valley Lands on or adjacent to the study area.

#### **4.3.9 Fish Habitat**

Administration of the provisions of the Fisheries Act is a combined responsibility of the Department of Fisheries and Oceans and Environment Canada. The key aspect of the legislation is protection of fish habitat and pollution prevention. These are jointly enforced, through delegated authority agreements with Conservation Authorities. The aquatic habitat in the study area is being investigated by McNevin Environmental Solutions.

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## **5. The Natural Environment and Impact Assessment**

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Ecological functions can be impacted by many influences. These influences may act singly or in combination, the impact may be immediate or delayed, the response may be apparent, or hidden, or a combination of all of these variables.

Since the objective of an ESR is to evaluate these potential impacts and reduce them as far as possible, it is necessary to understand how the impact of change affects the environment. Naturally functioning ecosystems have a set of characteristic responses to impacts or stressors. The current ‘health’ of the environment on the site being subjected to change needs to be understood so the cause of a change is distinguished from the effects of that change. A proper diagnosis provides the assurance of effective and achievable mitigation and/or restoration.

It is also important to realize that the science basis for judging impact is not an absolute decision. It is based on the probabilities: determining cause and effect; proposing effective alternatives; selecting the least risky solution; and implementing the best option(s) successfully. This reality means that a stressor *may* cause an impact given certain conditions are met. The change could be immediate, or it could occur gradually over a long period of time, or it may occur but not be visible, or the ecological system itself undergoes internal changes that are unexpected.

Making any judgment involves an element of subjectivity. For the purpose of this report an impact will be classified as ‘major’ if it has the potential for the loss of natural area or ecological function(s) and ‘minor’ if the impact has the potential to only impair the local ecological functions, not destroy the local ecological functions.

### **5.1 Environmental Concerns of the Proposal**

The environmental concerns of most developments are that it will negatively affect natural features in a significant way. A development has two footprints: a physical footprint in which the impacts are direct and contained within the dimensions of the development; and a virtual footprint in which the impacts are indirect, affect a much larger area but less well-defined.

The direct effects are loss of natural heritage areas along the existing roadway. The indirect effects are a degradation in the habitat quality for plants and wildlife as well as a perceived reduction in the quality of a quiet walkway. The cumulative effects are a reduction in the ability of natural systems to adapt to climatic changes with a shrinking habitat base.

The development concept for the study area is to improve the roadway for vehicular and pedestrian traffic, replace storm sewers, upgrade lighting and incorporate a public boat-launching area and associated parking adjacent to Gananoque Municipal Marina. Detailed planning has not yet been undertaken and so only a generalized assessment of the proposal is possible.

#### **5.1.1 Significance of Natural Heritage Features**

The Ontario Ministry of Natural Resources has responsibility to establish significant habitat of endangered and threatened species, significant wetlands and significant coastal wetlands, and areas of natural and scientific interest. The MNR information E/T, PSW and ANSI has been included in previous sections.

Planning authorities (e.g. Municipalities and Conservation Authorities) have the responsibility to identify such habitats or approve the work of others using the criteria in the manual to achieve provincial objectives for significant woodlands, significant valleylands, and significant wildlife



habitat. The boundaries and the required buffers have not been defined by this investigation and it is not known if the Cataraqui Conservation Authority or municipality have identified these areas officially. The policies on significant woodlands and valleylands apply only to those areas south and east of the Canadian Shield.

The recommended width for defining adjacent lands is 120 m for all natural features listed above except earth science ANSIs where it is 50 m and except lake trout lakes at capacity on the Canadian Shield where it is 300 m.

#### ***Habitat of Endangered or Threatened Species***

The MNRF have identified several species whose habitat preferences may be present on site but this has not yet been confirmed. The habitat needs of some species could not be satisfied on site such as marine species, wetland species, and those of unique habitats. Some species have not been found in this part of the county. Despite their presence in the area, other species may only migrate through the area and do not breed locally. The species whose habitat preferences **may** be found on site include butternut, Blanding’s turtle, gray ratsnake, eastern small-footed myotis, little brown myotis and northern long-eared bat.

#### ***Significant Wetlands and Significant Coastal Wetlands***

There are no significant wetlands or significant coastal wetlands on site. The local wetland on site is too small to have been evaluated by OMNRF.

#### ***Significant Woodlands***

It is not known if the local woodlands on site have been mapped or evaluated by the municipality or conservation authority.

#### ***Significant Valleylands***

Acting as the conduit of the natural plumbing system for surface waters, valleys also perform important ecological, social and cultural functions: bridges and mills represent European colonization, archaeological sites represent first peoples occupation, economic resources such as aggregates, agriculture and forestry, recreational activities, centres of human habitats, a source of drinking water and an area of wastewater treatment.

Conservation Authorities regulate development, through permits, in or adjacent to river or stream valleys, watercourses and hazardous lands. The physical boundaries of a valley are determined for well-defined valleys as the stable or predicted top-of-bank, top-of-slope or top-of-valley. For less well-defined valleys and stream corridors, the boundaries are determined by riparian vegetation, flood hazard limit, meander belt or the highest level of seasonal inundation.

It is not known if Cataraqui Conservation has policies that relate to the study area.

#### ***Wildlife Habitat***

The ‘Significant Wildlife Habitat Guide’ identifies four categories:

- habitats of seasonal concentrations of animals. It is not known if any have been mapped by OMNRF, QC or the municipality;
- rare vegetation communities or specialized habitat for wildlife. The plant communities in the study area may have some unique attributes because of the undeveloped rocky and eruptive terrain but no studies were conducted to determine if any are provincially rare communities;
- habitat of species of conservation concern. No habitat studies were undertaken to evaluate its importance but some of the species identified by OMNRF could be found on



- site including musk turtle, milksnake, and northern map turtle. Common snapping turtle was observed during field studies;
- animal movement corridors. The drainage channel and St. Lawrence River shorelines could be considered as an animal movement corridor but no definitive study was made. The woodland appeared to be an isolated habitat, surrounded by residential development, and with few obvious linkages to other woodlands but two white-tailed deer were observed during field work; and
  - bat caves. No caves were discovered during the field visit but rock outcrops, cliffs and ledges as well as the super-canopy trees may support summer maternal bat colonies.

### ***Significant Areas of Natural and Scientific Interest***

There are no significant life science or earth science ANSIs on site.

## **5.2 Impact Assessment**

The impacts (stressors) being anticipated from the development on a naturally-functioning site ecosystem can be grouped into four categories: physical, chemical, biological and social. In each category the impact may affect an area of the ecosystem (size, topography, soils, etc.) and/or one or more of its functions (hardening of the surface, flood control, water quality, open space, municipal services, etc.).

### **Potential Physical Impacts**

#### **Natural Area**

There may be some loss of natural habitat as the roadway is redeveloped.

#### **Ecological Function**

Some of the functions that are provided by the woodland, the valley and stream course might be affected.

#### **Assessment**

As the Town has not completed a redevelopment concept with site-specific improvements, no assessment is possible. It is, however, quite possible to mitigate potential changes so that the impacts are minor.

### **Potential Chemical Impacts**

#### **Natural Area**

Any loss of woodland or riparian vegetation will result in a decrease of the site's ability to sequester carbon dioxide, a key climate change factor.

#### **Ecological Function**

There may be some transfer of household chemical contaminants being transported into the riparian channel and river is surface flows from hard surfaces during weather events (snow melt, wind or rain storms). The thin surface soils have good natural drainage characteristics which may allow percolation of household chemicals into the ground water on site.

#### **Assessment**

The nutrient removal capability of natural cover, particularly wetlands can be between 92 % and 98 % for suspended solids, nitrogen (all forms) and phosphorus. The decrease in carbon sequestering and the possibility of serious chemical contamination from household sources are both considered to be minor.



### **Potential Social Impacts**

#### **Natural Area**

The site is currently being used by residents for open space recreation. Conversion of this area to more intensive uses may be viewed negatively.

#### **Planning and Servicing**

Residents of Gananoque may view this change as beneficial since the development is occurring within the Town boundaries and may produce economic benefits to the marina and local businesses. Dependent on the redevelopment concept chosen, the natural trail segment of the Waterfront Trail system may not be lost.

#### **Assessment**

The impact of redeveloping this site and the effect on residents and municipal services, considering the extent of existing adjacent residential and recreational uses, is considered to be minor.

### **Potential Biological Impacts**

#### **Natural Area**

There is the potential for loss of some naturalized areas. The stream channel can be maintained and protected with some innovative planning and construction. The private woodlands could be excluded from losses by the roadway design.

#### **Ecological Function**

The redevelopment envisioned could affect some of the stream channel, stream flows and woodland functions in the study area. These include groundwater recharge, groundwater discharge, flood stage alteration, sediment stabilization, nutrient removal, rare habitats and habitats of significance to listed species. It will not affect production export, aquatic diversity or wildlife diversity. Changes in the flow regime of the stream channel could disrupt the traditional hydrology in the study area.

#### **Assessment**

The proportion of the natural habitat in the micro-watershed that is being redeveloped and the extent of degradation in the functioning of these natural habitats is considered to be minor.

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## **9. Appendix**

### **Appendix 9.1. Photographs of the Study Area Taken by the Author on June 1, 2016.**



**Embayment at the mouth of the stream course and the St. Lawrence River.**



**Lower portion of the stream course as it abuts a rocky face along its west edge.**



**Twin storm sewer outfall culverts at the top of the stream course below King Street**



**The interior of the woodland with super-canopy trees and woody debris on the ground.**



**Bay Street forms part of the Waterfront Trail system.**



**Exposed rock face along the west edge of the water course.**



**Painted turtles at the mouth of the stream course in the St. Lawrence River.**



**Northern water snake at the mouth of the watercourse in the St. Lawrence River.**



**White-tailed deer on an existing woodland trail.**



**Appendix 9.2. A listing of Ontario species covered by the federal Species at Risk Act.**

| Category / Group          | Species  | Species  | Species   | Species  |
|---------------------------|--|--|---|--|
| <b>EXTINCT</b>            |  |  |   |  |
| Birds                     | Passenger pigeon   |  |   |  |
| Fishes                    | Deepwater cisco  | L. Ontario kiyi  | Blue walleye  |  |
| Arthropods                | E. persius .duskywing  |  |   |  |
| Mosses                    | Macoun’s shining moss  |  |   |  |
| <b>EXTIRPATED</b>         |  |  |   |  |
| Birds                     | Gr. Prairie chicken  |  |   |  |
| Reptiles                  | Timber rattlesnake   | Box turtle   |   |  |
| Amphibians                | Tiger salamander   | Spring salamander  |   |  |
| Arthropods                | Karner blue  | Frosted elfin  | A. burying beetle   |  |
| Fishes                    | Gravel chub  | Paddlefish   |   |  |
| Vascular plants           | Spring blue-eyed Mary  | Illinois tick-trefoil  |   |  |
| Mosses                    | Incurved grizzly .moss   |  |   |  |
| <b>ENDANGERED</b>         |  |  |   |  |
| Mammals                   | American badger  | Cougar   | Little brown myotis   | Northern myotis<br>Tri-coloured bat  |
| Birds                     | Northern bobwhite<br>Piping plover<br>Kirtland’s warbler<br>Yellow-breasted chat                       | Eskimo curlew<br>King rail<br>Prothonotary warbler   | Acadian flycatcher<br>Loggerhead shrike<br>Golden eagle<br>Cerulean warbler                                   | Barn owl<br>Henslow’s sparrow<br>Red knot  |
| Reptiles                  | Blue racer<br>E. ratsnake (Carolinian)<br>Queensnake   | Spotted turtle<br>E. foxsnake<br>Carolinian<br>Massassauga   | L. Erie watersnake<br>Five-lined skink<br>.....(Carolinian)   | Wood turtle<br>Butler’s gartersnake  |
| Amphibians                | N. cricket frog<br>Jefferson salamander  | Small-mouthed salamander   | N. dusky salamander<br>Fowler’s Toad  | Allegheny Mt. dusky salamander   |
| Fishes                    | Shortnose cisco<br>Aurora trout  | Northern madtom  | Pugnose shiner  | Lake Chubsucker  |
| Arthropods                | Aweme borer moth<br>Laura’s clubtail<br>Hungerford’s .crawling .... water beetle                       | Pale-bellied frost<br>.....lichen<br>Rusty-patched bumble<br>...bee  | Rapids clubtail<br>.....dragonfly<br>N. barrens tiger beetle  | Bogbean buckmoth<br>Hine’s Emerald<br>Gypsy Cuckoo<br>Bumble<br>.....Bee   |
| Molluscs                  | Rayed bean<br>Mudpuppy muscle<br>Northern riffleshell  | Round hickorynut<br>Snuffbox<br>Broad-banded<br>Forestsnaill   | Kindneyshell<br>Round pigtoe<br>Proud goblet  | Wavy-rayed<br>.....lampmuscle<br>Lilliput  |
| Vascular plants           | Gattinger’s agalinis<br>Bluehearts<br>E. prickly pear cactus<br>American ginseng<br>Virginia mallow    | Skinner’s agalinis<br>Bashful bulrush<br>American chestnut<br>American columbo<br>Virginia goat’s-rue<br>Pink milkwort | Scarlet ammannia<br>Slender bush-clover<br>E. prairie finged-orchid<br>Forked three-awned<br>...grass         | Cherry birch<br>Butternut<br>White prairie gentian   |
| Vascular plants continued | Large whorled pogonia<br>False Hop sedge<br>Blunt-lobed woodsia<br>Ogden’s pondweed<br>Bent spike-rush | Hoary mountain-mint<br>Nodding pogonia<br>Juniper sedge<br>Cucumber tree<br>Bird’s-foot violet<br>Four-leaved milkweed | Red mulberry<br>Small whorled pogonia<br>Horsetail spike-.rush<br>Spotted wintergreen<br>E. flowering dogwood | Heart-leaved plantain<br>Engelmann’s quillwort<br>Drooping trillium<br>Wood-poppy<br>Virginia mallow<br>W. silvery aster |
| Mosses/Lichens            | Spoon-leaved moss  |  |   |  |
| <b>THREATENED</b>         |  |  |   |  |
| Mammals                   | Woodland caribou<br>Eastern wolf   | Grey fox   | Wolverine   | Polar bear   |
| Birds                     | Least bittern<br>Barn swallow<br>Wood thrush   | Peregrine falcon<br>Bobolink<br>Louisiana waterthrush  | Chimney swift<br>Whip-poor-will   | Am. white pelican<br>E. meadowlark<br>Bank swallow   |
| Reptiles                  | E. hog-nosed snake   | Stinkpot<br>E. foxsnake (Georgian Bay)   | Blanding’s turtle   | E. ratsnake (Frontenac)<br>Spiny softshell   |
| Amphibians                | W. chorus frog (Great Lakes & Shield)  |  |   |  |



|                         |  |   |  |  |
|-------------------------|--|---|--|--|
| Fishes                  | E. sand darter   | Spotted gar   | Channel darter   | Pugnose shiner   |
| Molluscs                | Mapleleaf mussel   | Rainbow muscle  | Threehorn wartyback  |  |
| <b>Category / Group</b> | <b>Species</b>   | <b>Species</b>  | <b>Species</b>   | <b>Species</b>   |
| Vascular Plants         | Crooked-stem aster<br>Colicroot<br>Goldenseal<br>Wild hyacinth<br>Hill's thistle<br>Houghton's goldenrod<br>Toothcup | Branched bartonia<br>Lakeside daisy<br>Round-leaved<br>...greenbriar<br>Am. water-willow<br>Pitcher's thistle<br>Purple twayblade | White wood aster<br>Dense blazing star<br>Deerberry<br>Dwarf hackberry<br>Small-flowered<br>.....lipocarpha<br>Showy goldenrod | Willowleaf aster<br>Kentucky coffee-tree<br>Common hoptree<br>False rue-anemone<br>Climbing prairie rose<br>Blue ash<br>Small white Lady's-slipper |
| OLichens                | Flooded jellyskin  | Black-foam lichen   |  |  |
| <b>SPECIAL CONCERN</b>  |  |   |  |  |
| Mammals                 | Beluga whale<br>Wolverine  | Eastern mole  | Woodland vole  | Atlantic walrus  |
| Birds                   | Rusty blackbird<br>Black tern<br>Golden-winged warbler<br>Wood Pewee   | Bald eagle (southern)<br>Canada warbler<br>Buff-breasted sandpiper<br>Grasshopper Sparrow (eastern)                               | Short-eared owl<br>Nighthawk<br>Horned grebe<br>Red-necked phalarope   | Yellow rail<br>Red-headed<br>....woodpecker<br>Olive-sided flycatcher  |
| Reptiles                | Milksnake<br>Snapping turtle   | E. ribbonsnake<br>Spring salamander   | Five-lined skink<br>...(Shield)  | N. map turtle  |
| Fishes                  | Grass pickerel<br>Silver chub<br>Warmouth  | Upper Great Lakes Kiyi<br>River redhorse  | N. brook lamprey<br>Deepwater sculpin<br>Spotted sucker  | Bridle shiner<br>Blackstripe<br>.topminnow   |
| Arthropods              | Monarch  | West Virginia white   | Pygmy snaketail  | Yellow-banded Bumble Bee   |
| Vascular Plants         | Riddell's goldenrod<br>Hill's pondweed   | American hart's-tongue ...fern<br>Green dragon  | Broad beech fern<br>Tuberous Indian-<br>...plantain<br>Swamp rose-mallow   | Shumard oak<br>Dwarf lake iris   |
| Mosses                  | Pygmy pocket moss  |   |  |  |

**ACTION PLANS:**

**Birds** – Piping Plover, Kirtland's Warbler

**Vascular Plants** – Horsetail Spike-rush, Small Whorled Pogonia, Forked Three-awned Grass, Cucumber Tree

**MANAGEMENT PLANS:**

**Mammals** – eastern mole, woodland vole

**Birds** - Cerulean Warbler, Yellow Rail, Louisiana Waterthrush, Yellow-breasted Chat, Rusty Blackbird, Peregrine Falcon, Short-eared Owl

**Lizards** – Five-lined Skink, Spring Salamander

**Arthropods** – Pygmy Snaketail

**Butterflies** - Monarch

**Vascular Plants** - Am. Heart's-tongue Fern, Swamp Rose-mallow, Climbing Prairie Rose, Riddell's Goldenrod, Tuberous Indian-plantain, Houghton's Goldenrod, Blue Ash, Pygmy Pocket Moss

**RECOVERY STRATEGIES:**

**Mammals** - Woodland Caribou, American Badger

**Birds** - Henslow's Sparrow, King Rail, Loggerhead Shrike, Prothonotary Warbler, Piping Plover, Least Bittern, Yellow-breasted Chat, Acadian Flycatcher, Golden-winged Warbler, Olive-sided Flycatcher, Common Nighthawk, Canada Warbler, Eastern Whip-poor-will, Barn Owl, Red Knot,

**Reptiles** - Timber Rattlesnake, Eastern Ribbonsnake, Milksnake, Wood Turtle, Blanding's Turtle, Spiny Softshell, Spotted Turtle, Eastern Musk Turtle,

**Amphibians** – Blanchard's Cricket frog, Fowler's Toad, Western Chorus Frog, Jefferson Salamander, Allegheny Mountain Dusky Salamander,

**Fishes** - Shortnose Cisco, Eastern Sand Darter, Spotted Gar, Pugnose Shiner

**Vascular Plants** - Butternut, Spring Blue-eyed Mary, Blunt-lobed Woodsia, Bluehearts, Heart-leaved Plantain, Showy Goldenrod, Skinner's Agalinis, White Prairie Gentian, Swamp Rose Mallow, Pink Milkwort., Eastern Prairie Fringed-orchid, Heart-leaved Plantain, False Hop Sedge, Eastern Flowering Dogwood, Dense Blazing Star, Kentucky Coffee-tree, Colicroot, Toothcup, Scarlet

**EXISTING CONDITIONS REPORT -**  
*Bay Road Reconstruction – Gananoque, Ontario*



Ammannia, Small White Lady’s-slipper, Ogden’s Pondweed, Virginia Mallow, Spotted Wintergreen, Drooping Trillium, Bent Spike-rush, Bird’s-foot Violet, Large Whorled Pogonia, American Columbo, American Chestnut, Western Silvery Aster, Purple Twayblade  
**Arthropods** – Bogbean Buckmoth, Rapids Clubtail, Northern Barrens Tiger Beetle, Aweme Borer, Rusty-patched Bumble Bee,  
**Lichens** – Flooded Jellyskin, Pale-bellied Frost Lichen

**CRITICAL HABITAT:**

**Fish** – Lake Chubsucker, Pugnose Minnow, Northern Madtom, Spotted Gar, Eastern Sand Darter, Channel Darter  
**Mussels** – Round Hickorynut, Kidneyshell, Northern Riffleshell, Snuffbox, Round Pigtoe, Mudpuppy Mussel, Rayed Bean  
**Vascular Plants** – Eastern Flowering Dogwood, False Hop Sedge

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## 10. Resume

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### W. Dan Mansell

#### Post-secondary Education

Forestry Program – University of British Columbia – 1961  
Bachelor of Science in Agriculture (Fish & Wildlife Specialty) - University of Toronto - 1964  
Master of Science - University of Guelph - 1966

#### Professional Experience – Department of Lands & Forests

Lake of the Woods Fisheries Biologist - 1964/65  
Lake Huron District Biologist - 1965/71  
Lake Huron District Fish & Wildlife Supervisor - 1971/73

#### Professional Experience – Ministry of Natural Resources

Wingham District Manager - 1973/78  
Huron District Manager - 1978/90  
Richmond Hill Deputy Regional Director - 1990/91  
Ontario Eastern Habitat Joint Venture – Provincial Coordinator - 1991/98  
Hunting Heritage/ Hunting Futures – Provincial Coordinator - 1997/98

#### Professional Experience – asiOtus natural heritage consultants

Principal Ecologist – 1998 to present  
Company Vision: *to assist landowners in applying ecologically-sensitive management practices that ensure sustainable and diverse landscapes for wild life benefits while achieving their personal and society's goals*

#### Professional Affiliations

Certified Wildlife Biologist (CWB) Water Management & Wetland Restoration Course Trainer  
Approved Natural Sciences Consultant – M. T. O Registration, Appraisal and Qualification System  
Wetland Evaluator Butternut Health Assessor (# 332)  
Minimum Distance Separation I Report Preparer

#### Memberships

Canadian Kennel Club North American Versatile Hunting Dog Association  
Ontario Federation of Anglers and Hunters Ontario Hunt Camps Association  
Ganaraska Forest Ontario Forestry Association  
Ontario Woodlot Association Peterborough Stewardship Council (former member)  
Kawartha Wild Turkeys (former Secretary) Hunting Heritage/ Hunting Futures Initiative  
Ruffed Grouse Society (former Canadian Director) Vespra Township Planning Committee (past chair and member)  
Sunset Farm Hunt Camp Calvary Church

#### Publications

##### Technical Articles

1963. with U. Buerkle. *First nesting of the Cattle Egret in Canada*. The Auk. 80(3):378-379.  
1964. *Falconiformes*. Ontario Agricultural College Rpt. 7 pp.  
1964. *A nesting study of raptors in Toronto Township, Peel County*. Ontario Agricultural College Rpt. 17 pp.  
1965. *Eagle nesting survey in the Lake of the Woods area*. Can. Audubon 27(1):18-21.  
1965. *Present status of the White Pelican (Pelecanus erythrorhynchos) in Ontario*. Ont. Field Biol. 19:11-14.  
1965. *Systematic hare survey*. Lands & Forests Res. Mgmt. Rpt. 84:30-42.  
1967. *Antlered female deer*. Lands & Forests Res. Mgmt. Rpt. 93:13.  
1967. *Fecundity, Fertility and Natality of White-tailed deer in the Bruce Peninsula, Ontario*. Master of Science Thesis. University of Guelph. 77 pp.  
1967. *A further instance of fetal atrophy in white-tailed deer*. Can. J. Zoology. 46:33-34.  
1968. *The breeding and subsequent fawning season in the Bruce Peninsula herd*. Ont. Fish & Wildl. Rev.7:15-22.  
1968. *Nutritional value of Bruce Peninsula Deer Browse*. Ont. Dept. Lands & Forest Rpt. 14 pp.  
1968. *Winter weight and condition of deer from the Bruce Peninsula*. Ont. Dept. Lands & Forest Rpt. 60 pp.  
1968. *Antlered Female Deer*. Res. Mgmt. Rpt. No. 93:13.  
1968. *Browse supply in the St. Edmunds deer yard*. 1969. *A life table for Ontario deer*. Ont. Dept. Lands & Forest Rpt. 26 pp.  
1971. *Accessory corpora lutea in ovaries of white-tailed deer*. J. Wildl. Mgmt. 35(2):369-374.  
1971. with D. N. Meeking. *A comparison of three methods used to determine the age of white-tailed deer*. Res. Mgmt. Rpt. No. 106:9-14.



1973. *Nutritional value of Bruce Peninsula deer browse*. Ont. Dept. Lands & Forest Rpt. 7 pp.
1974. *Productivity of white-tailed deer on the Bruce Peninsula, Ontario*. J. Wildl. Mgmt. 38(4):808-814.
1975. *Lands for learning*. Trans. Ont. Chap. Can. Soc. Environ. Biol.
1978. *Areas of importance for migratory bird protection in Ontario*. Ont. Min. Nat. Res. Rpt. 31 pp.
1979. *Migratory Bird Management Strategy for Ontario*. Ont. Min. Nat. Res. Rpt. 21 pp.
1980. *Why do you hunt?* N.A.V.H.D.A. March Newsletter, Ont. Chap.
1981. with A. Houser. *Towards a wetland policy for Ontario*. Land Use Committee of the Cabinet Committee for Resources Development. 78 pp.
1990. with D. M. Fraser and R. Mills. *Matchedash Bay: project implementation under the North American Waterfowl Management Plan*. Wetlands of the Great Lakes International Symposium.
1992. *Gobblers and Geese*. Ontario Out of Doors. March. pp 32 & 63.
1995. *Ontario Implementation Plan: Eastern Habitat Joint Venture*. 85 pp.
- 1996 with K.K. Loftus. *A brief overview of U.S. experience with wetlands compensation and mitigation banking*. Nat. Workshop on Wet. Mitigation and Compensation. N.A.W.C.C. (Canada) Rpt. 12 pp.
1997. with K.K. Loftus. *Ontario's experience with a "No Loss" wetlands policy: Is there a role for compensation?* Nat. Workshop on Wet. Mitigation and Compensation. N.A.W.C.C. (Canada) Rpt. 11 pp.
1998. with L. Christl, R. Maher, A. Norman, N. Patterson and T. Whillans *Temperate Wetland Restoration Guidelines*. Consortium Rpt. 150 pp.
2000. (Editor). *Proceedings of the Premier's Symposium on North America's Hunting Heritage*. Wildlife Forever Publ. 266 pp.
2001. with T. Harrison. *A Life Science Inventory of Petawawa Terrace Provincial Nature Reserve*. Town of Petawawa Rpt. asiOtus natural heritage consultants Publ. 28 pp.
2001. *Shorebird Habitat Project*. Peterborough Field Naturalists Project Rpt. asiOtus natural heritage consultants Publ. 24 pp.
2002. *Life Science Values of the Bella-Rebecca Lakes Watershed*. Bella-Rebecca Community Association Rpt. asiOtus natural heritage consultants Publ. 64 pp.
2003. *Leitrim Wetland: Opinion on the Tolerance of the Natural Environment to Possible Changes in Water Levels*. Canadian Wildlife Service Rpt. asiOtus natural heritage consultants Publ. 27 pp.
2004. with K. Erwin, M. Garraway, D. Howell, R. Jones and T. Harrison. *Guide to the Restoration of Wetlands and Watershed Health*. Saugeen Valley Conservation Authority Rpt. asiOtus natural heritage consultants Publ. 54 pp.
2004. with K. Erwin, M. Garraway, D. Howell, R. Jones and T. Harrison. *A Tale of Two Rivers*. Saugeen Valley Conservation Authority Rpt. asiOtus natural heritage consultants Publ. 132 pp.
2008. with K. L. Erwin, A. J. Norman and G. MacPherson. *The Oak Ridges Moraine Wetland Restoration Project: Phase 1 Report*. Ontario Headwaters Restoration Initiative Publ. 126 pp.

## **Fisheries Studies**

1964. *Some limnological aspects of a eutrophic lake*. Ontario Agricultural College Thesis. 32 pp.
1964. *Study of the limnology and biology of the Speed River*. Ontario Agricultural College Rpt. 23 pp.
1964. *Lake of the Woods Survey – Central sector*. Ont. Dept. Lands & Forests Rpt. 93 pp.
1966. *Brown trout in southwestern Ontario*. Ont. Fish & Wildl. Rev. 5(2):3-8.
1992. with R. Craig. *The Animals of Severn Sound: a contribution to the Remedial Action Plan*. Water Pollution Res. J. Canada.
2011. *Sandelowsky Pond Inspection Report*. asiOtus natural heritage consultants Publ. 4 pp.

## **Popular Articles**

1970. *His Office – The Great Outdoors*. Go Government Go. Ontario Public Service Recruiting Schedule. p. 10.
1974. *A Question of Radio*. Aski. April. pp 1 & 6.
1984. *Bells of Sunset Farm*. Ont. Out of Doors. Dec. p. 25.
1987. *Common sense leads to office automation*. Ont. Min. Nat. Res. Computer Wise. Spring. pp 4.
1988. *The Deer Camp*. Ont. Out of Doors. Apr. p. 88.
1991. *Dogs and Deer*. Gun Dog. Vol. 11(2): p. 50.
1992. *Gobblers & Geese*. Ont. Out of Doors. Mar. p.32.
1992. *Jade Mountain Jake*. Ont. Out of Doors. April p. 29-32.
1994. *Picking a Turkey Tree*. Ont. Out of Doors. Mar. p. 24.
2005. *The Sunset Farm Hunt Club: a century of deer hunting lore and 50 years of Sunset Farm Hunt Club camp life*. Sunset Farm Hunt Club Publ. 106 pp.
2007. *Artisan: the life and works of G. R. (Dick) Mansell*. The Mansell Heritage Series. asiOtus natural heritage consultants Publ. 69 pp.
2008. *One of the Big Seven: the story of Purdy, Mansell, Limited and its principals*. The Mansell Heritage Series. asiOtus natural heritage consultants Publ. 86 pp.
2008. *Five Sons in a Canoe*. The Mansell Heritage Series. asiOtus natural heritage consultants Publ. 29 pp.
2009. *asiOtus*. In 'A Gentleman's Fireside Diary'. Doubles and Dogs Publ. p. 130-146.
2009. *Elike von Graf – A Bright Future*. Spotlight Dog. Versatile Hunting Dog Publication. Vol. XXXX. No. 5. p 6.
2009. *The Alien Turkey Hunters*. The Mansell Heritage Series. asiOtus natural heritage consultants Publ. 74 pp.
2009. *Western Birds and Eastern Dogs*. The Mansell Heritage Series. asiOtus natural heritage consultants Publ. 74 pp.
2011. *Northern Canoeing Journals*. The Mansell Heritage Series. asiOtus natural heritage consultants Publ. 67 pp.
2011. *Western Haunts*. The Mansell Heritage Series. asiOtus natural heritage consultants Publ. 60 pp.
2012. *Sunset Farm: the origin and history of a Muskoka free land grant farmstead*. asiOtus natural heritage consultants Publ. 35 pp.



2014. *with Carolyn Paterson and Marlene Walker. The Sinclair Raconteur's Anthology: Barbara Paterson's published stories.* asiOtus natural heritage consultants Publ. 126 pp.
2015. *Pioneer Glimpses from Sinclair Township, Muskoka.* asiOtus natural heritage consultants Publ. 105 pp.
2015. *Gunners, Gun Dogs and Game: revisiting 50 years of hunting diaries.* The Mansell Heritage Series. asiOtus natural heritage consultants Publ. in press.
2015. *Eco-Genealogy of the Mansell – Hancock Family.* The Mansell Heritage Series. asiOtus natural heritage consultants Publ. in press.
2015. *Tranquillity.* The Mansell Heritage Series. asiOtus natural heritage consultants Publ. in press.

### **Forest Stewardship Plans**

2007. *Managed Forest Plan for the Whiteoaks Ranch.* asiOtus natural heritage consultants Publ. 31 pp.
2008. *Managed Forest Plan for the Stewart Property.* asiOtus natural heritage consultants Publ. 58 pp.
2008. *Forest Stewardship Plan for the Miller-Chisholm Property.* asiOtus natural heritage consultants Publ. 20 pp.
2008. *Forest Stewardship Plan for the Van Nieuwenhuizen Property.* asiOtus natural heritage consultants Publ. 18 pp.
2008. *Forest Stewardship Plan for the Teng Property.* asiOtus natural heritage consultants Publ. 24 pp.
2008. *Forest Stewardship Plan for the de Lange Property.* asiOtus natural heritage consultants Publ. 19 pp.
2009. *Forest Stewardship Plan for the Metrow Properties.* asiOtus natural heritage consultants Publ. 24 pp.
2009. *Forest Stewardship Plan for the Lagonelbosco Limited Properties.* asiOtus natural heritage consultants Publ. 22 pp.
2009. *Forest Stewardship Plan for the Garbutt Property.* asiOtus natural heritage consultants Publ. 24 pp.
2010. *Forest Stewardship Plan for the Kelley Property.* asiOtus natural heritage consultants Publ. 24 pp.
2010. *Forest Stewardship Plan for BRIGUS.* asiOtus natural heritage consultants Publ. 32 pp.
2010. *Forest Stewardship Plan for the Herold Property.* asiOtus natural heritage consultants Publ. 32 pp.
2011. *Forest Stewardship Plan for asiOtus.* asiOtus natural heritage consultants Publ. 21 pp.
2011. *Stogran Forest Stewardship Plan.* asiOtus natural heritage consultants Publ. 18 pp.
2012. *Forest Stewardship Plan for the Gallant Property.* asiOtus natural heritage consultants Publ. 17 pp.
2012. *Forest Stewardship Plan for the Smith Property.* asiOtus natural heritage consultants Publ. 24 pp.
2013. *Forest Stewardship Plan for the Lagonelbosco Limited Properties.* asiOtus natural heritage consultants Publ. 24 pp.
2014. *Forest Stewardship Plan for the Payne Hunt Camp Properties.* asiOtus natural heritage consultants Publ. (in press).

### **Environmental Impact Statements**

2006. *Environmental Impact Statement for the Spry Subdivision in Stirling, Ontario.* asiOtus natural heritage consultants Publ. 70 pp.
2007. *Environmental Impact Statement for the Quick Subdivision - Brighton, Ontario* asiOtus natural heritage consultants Publ. 77 pp.
2007. *Environmental Impact Statement for the Brindakis Subdivision - Brighton, Ontario* asiOtus natural heritage consultants Publ. 78 pp.
2008. *Environmental Impact Statement for the Jewell Severance, Alnwick/Haldimand Township, Northumberland County, Ontario.* asiOtus natural heritage consultants Publ. 28 pp.
2008. *Environmental Impact Statement for the Haley Severances, Alnwick/Haldimand Township, Northumberland County, Ontario.* asiOtus natural heritage consultants Publ. 29 pp.
2008. *Environmental Impact Statement for the Prentice Severances, Alnwick/Haldimand Township, Northumberland County, Ontario.* asiOtus natural heritage consultants Publ. 25 pp.
2008. *Environmental Impact Statement for the Boldoldrick-Beaudrie Severance, Tyendinaga Township, Hastings County, Ontario.* asiOtus natural heritage consultants Publ. 24 pp.
2008. *Scoped Environmental Impact Statement for the Snelgrove Severances, South Frontenac Township.* asiOtus natural heritage consultants Publ. 56 pp.
2009. *A Scoped Environmental Impact Statement for the Cheer Severances, Brighton, Ontario.* asiOtus natural heritage consultants Publ. 75 pp.
2009. *Environmental Impact Statement for the Watson Severances, Alnwick-Haldimand Township, Northumberland County, Ontario.* asiOtus natural heritage consultants Publ. 32 pp.
2010. *A Scoped Environmental Impact Statement for the Bryans Severance, Trent River, Ontario.* asiOtus natural heritage consultants Publ. 58 pp.
2010. *A Scoped Environmental Impact Statement for the Tweedie Severance, Quinte West, Ontario.* asiOtus natural heritage consultants Publ. 35 pp.
2010. *A Scoped Environmental Impact Statement for the Tobey Severances, Brighton, Ontario.* asiOtus natural heritage consultants Publ. 44 pp.
2010. *Scoped Environmental Impact Statement – The Ray Cottage, Township of Havelock-Belmont-Methuen, Ontario.* asiOtus natural heritage consultants Publication. 46 pp.
2011. *Environmental Impact Opinion on Residential Development – Richmond Hill.* asiOtus natural heritage consultants Publication. 11 pp.
2011. *Environmental Impact Statement – The Davey Severances, Township of Alnwick-Haldimand, Ontario.* asiOtus natural heritage consultants Publication. 56 pp.
2011. *Environmental Impact Statement – The Wright Severance, City of Kawartha Lakes, Ontario.* asiOtus natural heritage consultants Publication. 58 pp.
2011. *Preliminary Site Assessment for the Glens of Antrim Subdivision, Grafton, Ontario.* asiOtus natural heritage consultants Publication. 22 pp.
2011. *Environmental Impact Statement for the Glens of Antrim Subdivision, Grafton, Ontario.* asiOtus natural heritage consultants Publ. 39 pp.



2012. *Environmental Impact Opinion on Residential Development – Township of Alnwick/Haldimand*. asiOtus natural heritage consultants Publication. 7 pp.
2012. *Environmental Impact Statement – The Klintworth Severances, Township of Trent Hills, Ontario*. asiOtus natural heritage consultants Publication. 65 pp.
2012. *Environmental Impact Statement for the Glens of Antrim Subdivision, Grafton, Ontario*. asiOtus natural heritage consultants Publ. xx pp.
2012. *Environmental Impact Statement – The Florinski Severance, Township of Alnwick-Haldimand, Ontario*. asiOtus natural heritage consultants Publication. 55 pp.
2013. *Addendum – The Davey and Florinski Environmental Impacts Statements*. asiOtus natural heritage consultants Publication. 7 pp.
2014. *Environmental Impact Statement for the Bear Ridge Campground and Cottages, Coe Hill, Ontario*. asiOtus natural heritage consultants Publication. 78 pp.
2014. *Scoped Environmental Impact Statement for the Stohn-Schuyler Mill Pond Restoration, Alnwick-Haldimand Township, Ontario*. asiOtus natural heritage consultants Publication. 104 pp.

### **Ecological Histories**

2007. *Ecological History of the McArthur Property – Bridgenorth, Ontario*. asiOtus natural heritage consultants Publ. 68 pp.
2008. *Existing Life Science Conditions Report for the Drimmie Dam Study Area - Elora, Ontario*. asiOtus natural heritage consultants Publ. 24 pp.
2008. *Ecological History of the Champlain Sea Area of Southeastern Ontario*. asiOtus natural heritage consultants Publ. 74 pp.
2009. *Ecological History and Biodiversity Plan for Beavermeadow Farm*. asiOtus natural heritage consultants Publ. 53 pp.

### **Dam, Lock, Road, Highway and Bridge Studies**

2006. *Forest Inventory of the Otonabee River between Lock 22 and 23*. asiOtus natural heritage consultants Publ. 25 pp.
2007. *Ecological History Report for Denny's Dam – Southampton, Ontario*. asiOtus natural heritage consultants Publ. 42 pp.
2009. *Natural Environmental Impact Assessment Report – Obstruction Removal (Belmont 11<sup>th</sup> Line)*. Highway 7 Detail Design Study: W. P. 67-99-00, Norwood to Havelock. asiOtus natural heritage consultants Rpt.15 pp.
2009. *Migratory Bird Nesting Survey Report*. Highway 7 Contract 2009-4011. asiOtus natural heritage consultants Publ. 23 pp.
2009. *Terrestrial Ecosystem Existing Conditions Report*. Highway Improvements – Highway 7 from the east Limit of Norwood to the West Limit of Havelock: Detailed Design Environmental Assessment. asiOtus natural heritage consultants Publ. 40 pp.
2010. *Terrestrial Ecosystem Existing Conditions, Impact Assessment and Mitigation Report*. Highway Improvements – Highway 7 from the East Limit of Norwood to the West Limit of Havelock: Detailed Design Environmental Assessment. asiOtus natural heritage consultants Publ. 71 pp.
2010. *The Bridgenorth Bypass Proposal Environmental Study Reports: an ecological critique*. asiOtus natural heritage consultants Publ. 28 pp.
2010. with R. Warne and D. Howell. *Environmental Guide for the Identification of Turtle Hibernacula: for turtle species that are listed in the federal Species at Risk Act and the provincial Endangered Species Act*. asiOtus natural heritage consultants Publ. 15 pp.
2010. *Highway 62 Improvements from Highway 401 to Palliser Creek: Detailed Design Pre- inspection – Terrestrial Environment Existing Conditions - Endangered Species Re-assessment*. asiOtus natural heritage consultants. 20 pp.
2011. *Belleville Bay CPR Bridge Rehabilitation Environmental Study Report*. Municipal Class Environmental Assessment (Schedule C). asiOtus natural heritage consultants Publ. 39 pp.
2011. with H. D. Howell. *Road Extension Environmental Study Report – Aquatic Ecosystem Existing Conditions and Impact Assessment: Alma Street to County Road 42, Township of Asphodel-Norwood, Peterborough County*. asiOtus natural heritage consultants Publ. 62 pp.
- 2012 - 2014. *Highway 62 Environmental Inspection Reports-Terrestrial Ecosystems in MTO Contract 2011-4020*.
2012. *Highway 7 Environmental Inspection Reports-Aquatic and Terrestrial Ecosystems in MTO Contract 2011-4057*.
2012. *Highway 401 Environmental Inspection Reports-Terrestrial Ecosystems in MTO Contract 2012-4021*.
2014. *Environmental Impact Study for the Reconstruction of the Peterborough County Road 16 (Tara Road) and Edenderry Line Intersection*. asiOtus natural heritage consultants Publ. 41 pp.
2014. *Highway 115 Environmental Inspection Reports-Terrestrial Ecosystems in MTO Contract 2013-4004*.
2014. *Highway 62 – Palliser Bridge Environmental Inspection Reports-Terrestrial Ecosystems in MTO Contract 2014-4014*.
2014. *Jeff- Clydesdale Road Environmental Inspection Reports-Terrestrial Ecosystems in North Kawartha Contract R06-13*.
2014. *Jellyby Road & Bridge Environmental Inspection Reports-Terrestrial Ecosystems in Elizabethtown-Kitley Township Contract 2014-02*.
2015. *Environmental Inspection Reports (12 at present) for the Stohn-Schuyler Mill Pond Restoration Implementation, Alnwick-Haldimand Township, Ontario*. asiOtus natural heritage consultants Publication. 10 pages + photographs each.
2016. *Environmental Study Report: Terrestrial Ecosystem Existing Conditions and Impact Assessment: Reconstruction of Bay Street – Gananoque, Ontario*. asiOtus natural heritage consultants Publication. 44 pp.

### **Pit & Quarry Natural Environment Reports**

2010. *Access Road Route Selection for the Shelter Valley Aggregates Pit*. asiOtus natural heritage consultants Publ. 35 pp.
2013. with R. Genge. *Natural Environment Level 1 and Level 2 Reports and Environmental Impact Statement for the Smith Pit Extension*. Ontario. Ontario Lake Assessments and asiOtus natural heritage consultants. 116 pp.



## **Other Media Experience**

**Editor/Writer, Huron Tract 1974-1978** (*A quarterly information bulletin of the Ontario Ministry of Natural Resources – Wingham District*)  
**Producer/Writer, All Outdoors 1972-1977** (*A half-hour radio show of the Ontario Ministry of Natural Resources on CKNX Wingham*)  
**Featured on Angler & Hunter Television** (*A half-hour television show – 1991 on Hunting with Dogs; 2004 on Grouse Hunting*)

## **Other Areas of Expertise**

**35 years of senior professional and managerial experience** (*performance and operational audits*)  
**Communication** (*Authored over 50 popular, technical and scientific documents; television & radio shows; editor*)  
**Municipal Planning** (*6 years - 2 as Chair of the Vespra Township Planning Board; Environmental Impact Statements; Environmental Assessments; Existing Life Science Condition Reports, Ecological Histories*)  
**Conservation Law Enforcement** (*law enforcement audits, courtroom presentations, former Conservation Officer*)  
**Resource Planning** (*Provincial Park and Provincial Wildlife Area Management Plans, Crown Land Plan, WIA and Agreement Forest Plans, Eastern Habitat Joint Venture Implementation Plan, EHJV Evaluation Plan*)  
**People Management** (*problem employee, performance appraisal, selection, communications, office automation, decision support, quality circles, facilitation, problem solving*)  
**Policy Development** (*Wetlands, Law Enforcement, Supply Management, Networking, Mitigation/Compensation, Wildlife*)  
**Resource Management** (*deer, small game, fisheries, hatcheries, wetlands, migratory birds*)  
**Conference Planning** (*Senior Managers, Wetland Restoration, Hunting Heritage/Hunting Futures, EHJV Board, North American Wetlands Conservation Council (U.S.), National Wetlands Mitigation/Compensation Workshop, 2000 Premier's Symposium on North America's Hunting Heritage*)  
**Tribunals** (*Game & Fish Hearing Board, Ontario Municipal Board, Environmental Assessment Hearing Board, Provincial Court, Grievance Settlement Board*)  
**Property Plans** (*wildlife, forestry, wetlands, natural heritage, sustainable agriculture, watershed restoration*)  
**Training** (*Temperate Wetlands Restoration Training Courses: Level I and Level II; Ontario Hunter Education Course, Canadian Firearm Safety Course, Wild Turkey Hunter Education Course; Water Management & Wetland Restoration Course: 1995-2015*)  
**Consulting** (*Principal Ecologist for asiOtus natural heritage consultants – 1998 to present*)

## **Contract Experience**

Wildlife Habitat Canada, Canadian Wildlife Service, Ducks Unlimited Canada, Trent University, Goodwood Club Whiteoaks Ranch, Town of Petawawa, Arbex Forest Resource Consultants Inc., Peterborough Field Naturalists Ontario Ministry of Natural Resources, Ontario Federation of Anglers & Hunters, Stringer's Environmental Services, Toronto and Region Conservation Authority, Bella-Rebecca Lake Community Association, G. D. Jewell Engineering Inc., Saugeen Valley Conservation Authority, Raisin River Region Conservation Authority, Sunset Farm Hunt Club, Peterborough Utilities Group, Mansell Properties Limited, Sanchez Engineering Inc., Cheer Homes, Grenville Land Stewardship Council, Cruikshank Construction Limited, Warne Engineering and Biological Services, Shelter Valley Aggregates, MHBC Planning - Kingston, Scaletta Sand & Gravel Limited, Gordon Tobey Developments Limited, B. G. Schikedanz Homes Inc., Northland Inc., Coco Paving Inc., Miller Paving Ltd., Norenco Contracting Ltd., Skystone Media Inc., Frontenac Stewardship Foundation, and many private landowners.

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