Appendix C

Baseline Studies

Appendix C1

Agricultural Baseline Report and Assessment

AGRICULTURAL ASSESSMENT AND PROFILE REPORT

WOLFE ISLAND WIND PROJECT

TECHNICAL APPENDIX C1

File No. 160960180

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TECHNICAL APPENDIX C1
AGRICULTURAL ASSESSMENT AND PROFILE REPORT

Table of Contents

TECHNICAL APPENDIX C1
AGRICULTURAL ASSESSMENT AND PROFILE REPORT

Table of Contents

List of Appendices

TECHNICAL APPENDIX C1
AGRICULTURAL ASSESSMENT AND PROFILE REPORT

Table of Contents

List of Figures

Appendix A

List of Tables

Appendix B

TECHNICAL APPENDIX C1
AGRICULTURAL ASSESSMENT AND PROFILE REPORT

Table of Contents

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1.0 Introduction

Canadian Hydro Developers, Inc., through its wholly owned subsidiary Canadian Renewable Energy Corporation ("CREC"), is proposing to develop a 197.8 megawatt ("MW") wind plant on Wolfe Island, Township of Frontenac Islands, Frontenac County, Province of Ontario (the "Project"). The Project will consist of eighty-six, 2.3 MW wind turbine generators, strategically placed over the western portion of Wolfe Island.

Electricity from the Project will be gathered via a 34.5 kilo volt ("kV") collection system, converted to 230 kV at a transformer station on Wolfe Island, and then transmitted via a new electrical transmission line that will run underwater through a portion of the St. Lawrence River, known locally as the "Lower Gap". Upon reaching the mainland, the transmission line will be underground, connecting with the provincial grid at Hydro One Network Inc.'s Gardiners Transformer Station in the City of Kingston. The study area for the Project is shown in **Figure 1.1 (Appendix A)**.

As part of the Ontario Ministry of the Environment's ("MOE") Environmental Screening Process ("ESP") for electricity projects (i.e., Ontario Regulation 116/01), Stantec Consulting Ltd. ("Stantec") undertook an agricultural assessment of the study area. Specifically, this report addresses items 5.2 and 5.3 of the MOE's environmental screening checklist: will the project:

- Have negative effects on the use of Canada Lands Inventory Class 1 to 3 (i.e., prime agricultural lands), specialty crops, or locally significant agricultural lands?
- Have negative effects on existing agricultural production?

In addressing these items, this assessment identifies the agricultural characteristics and resources within the study area. Also, section 5.0 of this report discusses mitigation measures, introduces and addresses topics of specific interest to the Ontario Ministry of Agriculture, Food and Rural Affairs ("OMAFRA") as outlined in their letter of August 8, 2006.

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2.0 Methods

The study methodology for this agricultural assessment included the review of: i) published information regarding agricultural policies and resources, and ii) agricultural trends as shown in agricultural census data.

2.1 BACKGROUND DATA COLLECTION AND REVIEW

The following policies and resource information was reviewed:

Local Agricultural Policies

- Township of Frontenac Islands Official Plan (July, 2003);
- Official Plan for the former Township of Kingston (January, 2005); and
- Provincial Policy Statement (2005).

Agricultural Resource Information

- Statistics Canada website, 2006. 2001 Census of Agriculture;
- Correspondence with OMAFRA Regional Information Coordinator, 2006;
- OMAFRA, 2005. Soils of Ontario Data Set;
- Chapman, L.J. & D. F. Putnam, 1984. The Physiography of Southern Ontario, Third Edition;
- Ontario Ministry of Agriculture and Food. 1983. Agricultural Land Use Mapping 1:50,000 (Frontenac County, Wolfe Island Township);
- Ontario Ministry of Agriculture and Food. 1983 (Rev. 1998). Artificial Drainage Systems 1:25,000 (Frontenac County, Wolfe Island Township Sheet);
- Brown et al., 1974. The Climate of Southern Ontario, Second Edition;
- Brown et al., 1969. Daily Temperature and Precipitation Frequencies in Ontario;
- Gillespie et al., 1966. Soil Survey of Frontenac County Ontario. Report No. 39 of the Ontario Soil Survey; and
- ARDA, 1964. Canada Land Inventory Agricultural Capability Mapping, 1:50,000 sheet 31 C/ 1 E.

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3.0 Results

3.1 GENERAL CONTEXT

The Township of Frontenac Islands lies within the St. Lawrence River and is the most southerly of the five Townships comprising Frontenac County. Agriculture is a dominant land-use in the rural countryside of the Township and the predominantly rural County of Frontenac.

The Township of Frontenac Islands includes Wolfe, Simcoe, and Howe Islands. Wolfe Island is approximately 43 km long by 14 km wide and is the largest of the Thousand Islands. The study area is located predominantly on Wolfe Island with the exception of the corridor for the mainland transmission line component of the Project (roughly 1.3 to 2 km wide) within the City of Kingston.

The agricultural land within the mainland portion of the study area is owned by Correctional Services Canada ("CSC") and is zoned institutional. These lands were originally called the "Collins Bay Farm Annex" and were officially opened in February 1962 by Minister of Justice E. Davie Fulton. For approximately 30 years prior to that date, inmates from the neighbouring Collins Bay Penitentiary operated the farm. In 1975-76, the facility was renamed "Frontenac Institution".

Today, the CSC agricultural land is still operated by inmates from the minimum security Frontenac Institution. The farm reportedly produces eggs, milk and juice for many of Canada's Federal penal institutions (CSC pers. comm., 2007). Most of the property is under crop rotation forage, grains, and corn with very small blocks of forest and scrub/thicket habitat and some wetland areas scattered throughout. It is comprised of 455 hectares of land located within an urban setting surrounded by residential dwellings, and various commercial land uses within the City of Kingston.

3.2 LEGISLATIVE DOCUMENTS

3.2.1 Township Official Plans

The study area lies within two municipal jurisdictions in Frontenac County. They are the Township of Frontenac Islands and the former Township of Kingston (following amalgamation in 1998, this Township is now within the City of Kingston).

The Township of Frontenac Islands Official Plan ("OP"), as amended by Official Plan Amendment ("OPA") No. 1, was reviewed to identify applicable agricultural and wind energy policies. Section 5.1 of the OP states that the principal purpose of the agricultural designation is to protect land suitable for agricultural production from scattered development and land-uses which are unrelated to agriculture. The predominant use of lands designated Agricultural shall

be for agriculture and farm-related uses. Such uses include general farming, livestock, fish hatcheries, and nurseries (Township of Frontenac Islands. 2003). In the OP, Section 5.1.2 goes on to state that other uses permitted in the agriculture designation shall include Wind Farms. This is consistent with and implements the intent of the Provincial Policy Statement (MMAH, 2005).

Section 4.14 of the OP was also amended by OPA No.1. The OPA has been approved by the Minister of Municipal Affairs and Housing and is now in force. Section 4.14 outlines the wind energy policies for the Township. It states that, Wind Farms within the Rural or Agricultural designation will require a site-specific amendment to the zoning by-law. Wind Farm operations shall generally be located in accordance with specified criteria, including:

- Being located on large parcels of agricultural or rural land having limited development on-site or nearby;
- Being separated from sensitive land uses, wildlife habitat, commercial and institutional uses in order to minimize potential conflicts and safety hazards;
- Having sufficient setbacks to provide for safety from structural collapse or falling ice;
- Outline of mitigation measures that may be required.

The OPA also enables council to request studies considered appropriate, if it so wishes. Such studies are to be submitted by the applicant to council prior to a decision. Such studies may deal with matters such as noise, visual impact, and impact on natural heritage features. The OPA states that Wind Farms are subject to site plan control. The OPA also allows council to make use of the Holding (h) provisions under section 36 of the Planning Act to ensure development does not take place until conditions for the removal of the Holding (h) are met to Council's satisfaction.

Section 4.4 of the Township's OP deals with Community Facilities, Public Uses and Utilities. Public utilities are permitted in all designations of the OP except for generating stations, transformer stations, maintenance yards or public works depots that are permitted in all designations except Wetlands, Areas of Natural and Scientific Interest ("ANSIs"), and Environmentally Sensitive Areas.

The proposed Wind Farm and required utility systems are consistent with the intent of the OP for the Township of Frontenac Islands amended by OPA No.1.

The OP for the former Township of Kingston designates the majority of the mainland portion of the study area as Major Recreational Open Space, Institutional, Environmental Protection, Commercial, and Light Industrial. The policies for each of the respective designations allow uses consistent with the designation. The Institutional designation shall be for public and institutional uses that are, as a result of their size or nature, generally incompatible with residential uses. Within the Recreational Open Space designation, the predominant use of lands

is for outdoor recreational activities. Within the Environmental Protection designation, lands are to be used primarily for the preservation and conservation of the environment. Permitted land uses within the Commercial designation generally may include retail shops, automobile sales and service establishments, place of entertainment, eating establishments, offices, studios, open spaces, institutional uses, and residential uses. Permitted land uses within the Light Industrial designation include warehousing, manufacturing, assembling, railway uses, transportation depots, and commercial uses compatible with industrial uses.

Section 4-2.7 of the OP contains a policy that applies to All Areas and specifies that public utilities, and public uses are permitted in all designations except for areas designated as Environmental Protection unless permitted by Section 3-5 of the Environmental Protection Areas policies. Section 3-5(3) states that permitted uses in the Environmental Protection Areas designation shall include new private and/or public utilities such as pipelines, and hydro facilities approved by the Cataraqui Region Conservation Authority ("CRCA") and/or Ministry of Natural Resources ("MNR"), where suitable locations outside the Environmental Protection Areas are not feasible.

The Project will include installation of a 230 kV underground transmission line that crosses the land-use designations identified above and ultimately connects with the provincial grid at the Gardiners Transformer Station. The lands designated Institutional and Environmental Protection Area currently support electrical transmission infrastructure associated with nearby institutional and industrial uses. The new transmission line will be located parallel to the existing easement where the transmission lines are presently located. In conclusion, the location of the proposed transmission line within the former Township of Kingston is consistent with the intent of the OP subject to technical approval of the CRCA and/or the MNR for crossing lands designated as Environmental Protection Area.

3.2.2 Provincial Policy Statement

The Provincial Policy Statement ("PPS") provides direction on matters of provincial interest related to land-use planning and development (MMAH, 2005). As such, the PPS addresses many aspects of land-use planning that affect Ontarians including: long-term economic prosperity, energy and air quality, and agriculture. These aspects are discussed as they refer to renewable energy systems, which include wind farms.

The PPS, Section 1.7.1 h), details the need for and support of economic opportunities:

> *Long-term economic prosperity should be supported by: providing opportunities for increased energy generation, supply and conservation, including alternative energy systems and renewable energy systems.*

The PPS also addresses the need for land-use planning decisions to be based upon protecting and improving energy and air quality. For example:

1.8.1e) *Planning authorities shall support energy efficiency and improved air quality through land use and development patterns which: promote design and orientation which maximize the use of alternative or renewable energy, such as solar and wind energy, and the mitigating effects of vegetation.*

1.8.2 Increased energy supply should be promoted by providing opportunities for energy generation facilities to accommodate current and projected needs, and the use of renewable energy systems and alternative energy systems, where feasible.

In Ontario, there are many locations where prime agricultural lands are also areas where winds are frequently strong enough to support a wind energy facility. In these situations, the PPS states that wind farms are permitted; however, they must be designed so as to minimize agricultural impacts.

1.8.3 *Alternative energy systems and renewable energy systems shall be permitted in settlement areas, rural areas and prime agricultural areas in accordance with provincial and federal requirements. In rural areas and prime agricultural areas, these systems should be designed and constructed to minimize impacts on agricultural operations.*

The PPS clearly places a high priority on the development of renewable energy systems, such as the Project, and supports these types of developments in rural and agricultural areas.

3.3 PUBLISHED INFORMATION

3.3.1 Climate

The study area is located within the South Slopes Climatic Region of southern Ontario (Brown et al., 1974), which encompasses portions of the Counties of Oxford, Waterloo, Halton, Peel, the Greater Toronto Area, and the southern portions of the counties bordering the St. Lawrence River to Kingston.

For climatological comparative purposes, **Table 3.1 (Appendix B)** contrasts the averages of the South Slopes Climatic Region against the averages for the Lake Ontario Shore Climatic Region and the Prince Edward County Climatic Region. The Lake Ontario Shore Climatic Region encompasses the area along the shore of Lake Ontario, west of the study area, to the Toronto area. The Prince Edward County Climatic Region is also located west of the study area, and is an island County in Lake Ontario. This comparison among the three different climatic regions was undertaken because they are proximal to one another. Indeed the climate of the South

Slopes Climatic Region, which includes the study area, possesses climate normals similar to the other two regions. However, the South Slopes Climatic Region has a large inland area not adjacent to Lake Ontario and it therefore is reported to have slightly less heat units and a shorter frost-free period compared to the two regions immediately adjacent to Lake Ontario. Thus, it is likely that the study area receives heat units and a frost-free period in the upper end of the range for the South Slopes Climatic Region.

3.3.2 Physiography

The study area is located within the Napanee Plain physiographic region (Chapman and Putnam, 1984). This region is characterized by flat to undulating limestone plains from which the retreating glacier stripped most of the overburden. In the southern portions of this region, depressions are often filled with deposits of stratified clay.

These clay deposits, along with small, interspersed areas of limestone plain, dominate Wolfe and Simcoe Islands and the mainland study area. Overburden is present on almost all of the western side of Wolfe Island, with the exception of bedrock outcroppings along or near the shoreline and a few scattered exposures in the interior (Acres, 2004). The overburden consists of glaciolacustrine varved clay that is firm to very stiff. Overburden thickness generally ranges from 0.9 to 3.5 m, with a maximum overburden depth of 6.26 m. Physiographic mapping (1:253,440) indicates that the study area also contains, a large area of peat and/or muck confined to the Big Sandy Bay area on the southwest portion of Wolfe Island.

3.3.3 Soils and Agricultural Capability

The Canada Land Inventory ("CLI") classification system of land capability for agriculture, groups mineral soils into seven classes according to their agricultural potential with limitations for use. Classes 1, 2, and 3 are considered suitable for sustained production of common crops if management practices are observed. For planning purposes, these three classes are collectively referred to as prime agricultural lands. Soils designated CLI classes 4 through 6 are increasingly less suited for agriculture and require greater management practices, whereas CLI Class 7 soils are generally considered unsuitable for agriculture.

County-level (1:63,360) soil mapping indicates there are thirteen soil types mapped within the study area as shown on **Figure 3.1 (Appendix A)** (OMAFRA, 2005; Gillespie et al., 1966). **Table 3.2 (Appendix B)** shows the soil texture, drainage, parent material characteristics, and CLI capability for agriculture of the soils within the study area. CLI capability of the soils in the study area is also shown in **Figure 3.1 (Appendix A)** (ARDA, 1964). Eighty-three percent of the study area is prime (Classes 1-3) agricultural land.

As shown in **Table 3.3 (Appendix B)**, CLI Class 1 - 3 soils comprise only 10.7% or 40,532 ha (100,157 acres) of Frontenac County. Seventy percent or 267,286 ha (660,478 acres), of the County is CLI Class 7. In comparison, within the areas in Ontario covered by the CLI system, prime agricultural land covers 30.8% and organic soils cover 10% of the area.

In contrast to the County, **Table 3.3 (Appendix B)** shows that 67% of the soils of Wolfe Island are classified as prime agricultural land (9116 hectares / 22,525 acres). Calculations based on digitized soils information show that the study area has an even larger concentration (83%) of prime agricultural land. These prime soils are located throughout the study area with lower capability soils distributed around wetlands and pockets of shallow soils over bedrock.

The agricultural portion of the mainland study area has a CLI capability rating of 2d. A part of the mainland study area is classed as O, which signifies organic soils. This typically non-agricultural soil type covers 5.6% of Frontenac County.

The most common soil type on Wolfe Island is Lansdowne clay. The Lansdowne clay is generally found on gently sloping portions of the underlying limestone plains, creating an imperfectly drained soil. This soil is described as having moderate limitations for agriculture related to undesirable soil structure and/or permeability (Class 2d), in the CLI capability for agriculture mapping (ARDA, 1964).

The other soils (**Table 3.2, Appendix B)** identified throughout the study area are found in pockets, with the most prevalent soil type being Napanee clay. Napanee clay is commonly found in depressional areas of the limestone plain and is therefore poorly drained. CLI mapping indicates that this soil has moderately severe limitations for agriculture related to excess water (Class 3w) (ARDA, 1964; Gillespie et.al., 1966). Other agricultural soils including pockets of Farmington loam (Class 6r), Lindsay clay and Lindsay clay loam (Class 2w), and Newburgh fine sandy loam (Class 2t) are dispersed throughout Wolfe Island.

The soil at the transmission cable landfall location on Wolfe Island is Farmington loam that is a very shallow soil over limestone bedrock (Gillespie *et al*., 1966). This well drained soil is categorized by CLI (1966) as Class 6, capable only of producing perennial forage crops, and improvement practices are not feasible due to shallowness to solid bedrock.

Lansdowne and Napanee clay soil types also dominate the mainland portion of the study area, although Muck is prevalent along the shores of the Little Cataraqui Creek and its corresponding wetland area. Small pockets of Farmington loam are located west of the Little Cataraqui Creek, and become more prevalent in the northern portion of the study area (OMAFRA, 2005; Gillespie et al, 1966).

Review of 1:50,000 CLI soil capability for agriculture mapping indicates that the mineral soils (i.e., not Muck and Peat), within the study area, and especially on Wolfe Island, generally possess agricultural capabilities typical of prime agricultural lands (i.e., CLI classes 1-3). However, the prime agricultural lands within the study area have agricultural limitations associated with wetness (“w”), undesirable soil structure and/or low permeability (“d”), and undesirable topography (“t”) **(Table 3.2, Appendix B)**.

Review of aerial photography for the study area indicates that the agricultural land-use pattern closely follows the soils distribution identified in the County-level mapping. The prevalence of prime agricultural land is evidenced on the mineral soils by the dominance of cleared fields and active farms. The few remaining forested areas on Wolfe Island are generally located on organic soils.

Review of the published soil information indicates the presence of prime agricultural lands within the study area. Thus, there is the potential for the Project to encounter and/or utilize prime agricultural lands; however, such use is consistent with the PPS.

3.3.4 Agricultural Land-Use Statistics

Statistics Canada produces statistics that help Canadians better understand their country—its population, resources, economy, society and culture. One industry they report on is the agricultural industry. The agricultural statistics that are geographically related to this project are presented in **Appendix B**. The highlights of the statistics are discussed in this section.

3.3.4.1 Area of Farmland

The area of farmland at the township, county, regional (eastern Ontario), provincial, and federal levels is shown in **Table 3.4 (Appendix B),** as reported in the 2001 census by Statistics Canada. The farmland within Frontenac County constitutes 1.5% of Ontario's agricultural lands. The farmland within the Township of Frontenac Islands constitutes 0.2% of Ontario's agricultural lands.

3.3.4.2 Land Area Classified by Use

Table 3.5 (Appendix B) shows the area of farmland classified by use at the township, county, regional, provincial, and federal levels as reported by Statistics Canada (2001). Within Canada, 57.1% of farmland is utilized for crop production. Within the Township of Frontenac Islands, land under crops is also the predominant use, encompassing 16,024 acres, (66.2%) of farmland in the Township. Within Frontenac County, it is still predominant; however, only 37.9% of farmland is under crops.

At the County level, the second largest land-use is natural land for pasture. Other uses, including Christmas tree farms, occupy the third-largest area of farmland at the county level, followed by tame or seeded pasture. Very small areas of farmland are left in summer fallow (i.e., 0.1% in Frontenac County and none are reported in the Township of Frontenac Islands).

As indicated above, land under crops is the largest component of agricultural land-use in each of the geographic categories listed in **Table 3.5 (Appendix B)**. In the Township of Frontenac Islands areas of natural land for pasture make up the second largest farmland use, while the third largest land-use in the Township is tame or seeded pasture.

Agricultural land-uses within the mainland portion of the study area are predominantly crops (83%) with the other 17% comprised of idle agricultural land.

3.3.5 Farm Data

3.3.5.1 Number of Farms

Statistics Canada defines a census farm as an agricultural operation that produces at least one of the following products intended for sale: crops (e.g., field crops, tree fruit or nuts, berries or grapes, vegetables or seed); livestock (e.g., cattle, pigs, sheep, horses, exotic animals, etc.); poultry (e.g., hens, chickens, turkeys, exotic birds, etc.); animal products (e.g., milk or cream, eggs, wool, fur or meat); or other agricultural products (e.g., greenhouse or nursery products, Christmas trees, mushrooms, sod, honey, or maple syrup products).

The definition of a census farm was expanded for the 1996 Census of Agriculture to include commercial poultry hatcheries and operations that produced only Christmas trees. This expanded definition resulted in the inclusion of 138 commercial poultry hatcheries and 1,593 operations across Canada that produced only Christmas trees.

As reported by Statistics Canada (2001), the number of farms in Canada has been falling for the last five decades, reflecting, in part, rapid changes in technology and increased productivity. The greatest national decline was between the 1956 and 1961 Censuses, when numbers fell by 94,116 farms or 16.4%. Another 15% of farms were lost between 1966 and 1971. The rate of decline slowed between 1991 and 1996, but between 1991 and 2001, the number of farms in Canada decreased 12%.

Table 3.6 (Appendix B) shows the number of farms at the township, county, regional, provincial, and federal levels for the years 1991, 1996, and 2001. Contrary to the national trend, between 1991 and 1996 the total number of farms in Frontenac County increased 11% and in the Township of Frontenac Islands the total number of farms increased 14%. However, between 1996 and 2001 the total number of farms in Frontenac County decreased 15%; generating a net loss of 4% in the total number of farms over the two census periods. Contrastingly, between 1996 and 2001 the total number of farms in the Township of Frontenac Islands also decreased but only by 9%, generating a net gain of 4% in the total number of farms over the two census periods. The agricultural lands on the mainland portion of the study area are operated by one farm business, the Frontenac Institution.

3.3.5.2 Farm Sizes

The average size of Canada's farms increased between 1991 and 2001 by 32 ha (242 ha to 274 ha). Smaller farms are often sold and consolidated, resulting in fewer, but larger farms. This trend has also been the case throughout most of Ontario for a number of decades and it is a trend that continues today. **Table 3.7 (Appendix B)** shows the average farm sizes at the township, county, regional, provincial, and federal levels.

Farms in Frontenac County have been and continue to be, on average, larger than the average Ontario farm (119 ha vs. 91 ha Ontario average in 2001). Also, in 2001, the average farm size in the Township of Frontenac Islands was 136 ha. The mainland portion of the study area is on the CSC Frontenac Institution land; this farm is 455 ha. This is larger than the county, regional, and provincial averages and represents a unique land-use in a now predominately urban area. The national average was much larger (274 ha) reflecting the large farm parcels common to agriculture in the Prairie Provinces.

3.3.5.3 Farm Types

Each census farm is classified according to the predominant commodity produced. Statistics Canada does this by estimating the potential receipts from the inventories of crops and livestock reported on the census questionnaire. The commodity or group of commodities that accounts for 51% or more of the total potential receipts determines the farm type. For example, a census farm with total potential receipts of 60% from dairy, 20% from hogs, and 20% from field crops would be classified as a dairy farm.

Where there is no single major commodity associated with the farm operation (e.g., 45% dairy, 45% hogs, and 10% field crops), the farm is classified as either a 'livestock combination' or 'other combination' operation. Field crop farms include wheat, grain, oilseed and other field crops. Miscellaneous specialty includes greenhouse flower and plant production, bulbs, shrubs, trees, sod, ornamentals, mushroom houses, honey production, maple syrup production, etc.

In 2001, the most common type of farm in Canada was field crop operation, followed by beef operations, and subsequently miscellaneous specialty crop operation **(Table 3.8, Appendix B)**. Statistics Canada also notes that livestock numbers increased at a national level between 1996 and 2001.

Within Ontario, three farm types, beef (25%), field crops (32%), and dairy (12%) made up 69% of all farms in 2001, with very little change from 1996. In 1996, beef operations comprised 24%, field crops 30%, and dairy operations 14%.

Beef farms were the most common farm type in Frontenac County (50%) and Township of Frontenac Islands (54%) in 2001. In both the County and Township dairy (16% and 19% respectively) and field crops (14% and 12% respectively) followed beef farms in abundance.

The agricultural land-use on the mainland portion of the study area is dominated by crops (83%), with the balance as idle agricultural land.

3.3.5.4 Farm Operation Arrangements

Table 3.9 (Appendix B) describes farm operation arrangements at the township, county, provincial, and federal levels. Farm arrangements are categorized according to four categories:

- Sole Proprietor - includes one-person owned farming operations
- Partnership - includes farms operating with and without written agreements between the partners
- Corporation - includes family and non-family farms
- Other - includes institution farms, community pastures, and other types of farming operations that are not otherwise categorized.

Most of the farms in Frontenac County (64%) and the Township of Frontenac Islands (59%) are operated as sole proprietor operations. Sole proprietor is also the most common farm operation arrangement across Ontario and Canada. In the Township of Frontenac Islands, there are no farm operation arrangements identified as 'Other'. The agricultural land on the mainland portion of the study area is operated by CSC.

3.3.5.5 Soil Conservation Practices

A variety of soil conservation practices are implemented in the Township of Frontenac Islands and Frontenac County **(Table 3.10, Appendix B).** Among these, crop rotation (35%) is the most commonly applied practice in the Township of Frontenac Islands. At the individual farm level, crop rotation is often combined with the other practices listed in the table, depending on soil conditions, crop types, the presence of watercourses and topography. In Frontenac County, permanent grass cover is the dominant soil conservation practice. It is second (33%) in the Township. Similarly, this method is often combined with the other practices listed in **Table 3.10, Appendix B**.

Soil conservation practices on the CSC lands, although not specifically published are assumed to be similar to those in the surrounding area. In that, the mixed grain lands mapped on **Appendix A, Figure 3.2** may be in a rotation (most common practice in the Township) and the hay lands mapped may be considered to be in permanent grass (most common practice in the County).

3.3.5.6 Agricultural Land-Use Patterns

OMAFRA Agricultural Land-Use Systems Mapping (1:50,000, 1983) was reviewed to identify the agricultural land-use patterns within the study area **(Figure 3.3, Appendix A)**. The mapping indicates that the predominant use of the lands within the study area is agricultural production, with hay production being the main agricultural land-use system. Less predominant agricultural systems identified include pasture, mixed systems, corn and grain systems (OMAF, 1983).

Recent discussion with the Regional OMAFRA Information Coordinator, located in Brighton, Ontario, indicated that there has not been much change in the agriculture land-use on Wolfe Island in the last 25 years. As such, OMAFRA noted that the 1983 Agricultural Land-Use System Mapping is still representative of present agricultural conditions (OMAFRA, pers. comm.)

Within the mainland portion of the study area, some agricultural production occurs on lands zoned institutional. As noted above, these lands are owned by CSC and are farmed by inmates from the Frontenac Institution. Hay and mixed grain systems are the most common agricultural land-uses in the mainland portion of the study area **(Figure 3.3, Appendix A)**.

3.3.5.7 Artificial Drainage Systems

One municipal drain is identified within the study area, Reeds Bay Municipal Drain (unclassified). It is located north of Reeds Bay Road, east of Concession Road 5 and west of Concession Road 7, on Wolfe Island.

OMAF Artificial Drainage System Mapping (1:25,000, 1998) was reviewed to identify existing agricultural drainage infrastructure within the study area (**Figure 3.1, Appendix A)**. The mapping indicates that there is minimal investment in random or systematic tile drainage in the study area. The mapping shows that, on Wolfe Island, there are three areas with tile drainage infrastructure. One is located in the south. It has approximately five systematically tile drained fields and two randomly tile drained fields. They appear to outlet into local creeks. In the middle of the Island there is an operation that has two systematically tile drained fields. They are located proximal to Reed's Bay Municipal Drain and it is likely that they outlet into the surface drain. The third operation with tile drainage is in the north. It has approximately four systematically tile drained fields and one randomly tile drained field. Those drains appear to outlet into local creeks. Discussions with individual landowners continue to yield the most current information on which fields are randomly or systematically tile drained, the tile locations, tile spacing, and the direction of flow. Published also mapping shows that, on the mainland, there is one field that is systematically tile drained that likely outlets into the local creek.

3.3.6 Agricultural Economics

3.3.6.1 Gross Farm Receipts

Table 3.11 (Appendix B) presents total gross farm receipts, gross farm receipts per farm, and gross farm receipts per acre of farmland at the township, county, regional, provincial, and federal levels from the most recent agricultural census (2001).

Gross farm receipts in Frontenac County (2001) totalled in excess of $36 million, accounting for 0.4% of the total provincial gross farm receipts. In the County and Township, the gross farm receipts per farm ($51,779 and $66,168 respectively) and gross farm receipts per acre figures ($176 and $197 respectively) indicate reduced agricultural productivity as compared to national ($155,104 and $230), provincial ($152,616 and $675) and regional ($99,951 and $377) values.

No statistics were found specific to gross farm receipts on the CSC land.

3.3.6.2 Operating Expenditures

Total operating expenditures at the township, county, regional, provincial, and federal levels are shown in **Table 3.12 (Appendix B).** Operating expenditures in Frontenac County (2001) totalled in excess of $33 million, while expenditures at the Township level were $4,461,068. Expenditures per acre were very similar in the County and Township ($164 and $166, respectively), but were below regional ($322), provincial ($580) and national ($199) averages.

No statistics were found specific to operating expenditures on the CSC land.

3.3.6.3 Net Revenue

Table 3.13 (Appendix B) provides data on total annual net revenue (less capital costs) per farm (less capital costs) and per acre at the township, county, regional, provincial, and federal levels. Annual net revenue (less capital costs) was calculated by subtracting total expenditures from gross farm receipts. In 2001, net revenue (less capital costs) in Ontario totalled approximately $1.3 billion, or about $95 per acre. The data showed that annual net revenue (less capital costs) per farm ($4021) and per acre ($14) in Frontenac County were substantially lower than the regional, provincial, and national averages. Values for the Township were greater than the County ($10,405 per farm and $31 per acre).

No statistics were found specific to net revenue on the CSC land.

3.3.6.4 Farm Capital

Farm capital is a critical component to the economic viability of Canada's farms. As farms become larger and on-farm labour forces decrease, the agriculture industry has become more capital intensive. **Table 3.14 (Appendix B)** shows farm capital at the township, county, provincial, and federal levels. The 2001 values for farm capital per farm and farm capital per acre of farmland are very similar in Frontenac County and the Township of Frontenac Islands ($1,571 and $1,517, respectively). These amounts are much lower than the provincial average of $3,743. However, they are higher than the federal average of $1,179.

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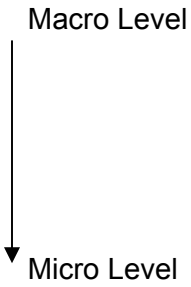
4.0 OMAFRA Considerations

Siting wind turbines is a challenging task, requiring a balance among environment, agriculture, landowner, and environmental noise issues. Consequently, siting typically follows a decision hierarchy to define a preferred location for each turbine, including:

- regional wind regime
- local wind regime
- lands subject to a Land Lease Agreement
- environmental noise assessment
- local environmental features
- policies and regulations
- site conditions and practices
- landowner preferences.



This section is structured around comments received in a memo from OMAFRA related to the Wolfe Island Wind Project (Aug. 8, 2006, **Appendix C**).

As stated in the OMAFRA memo, “the class environmental assessment process includes all phases and components of the project, including construction, operation and retirement of the project. The intent of the process is to identify and mitigate negative environmental effects to the greatest extent possible. Negative environmental effects include the negative effects that a project has, or could potentially have, directly or indirectly on the environment. Negative environmental effects include the displacement, impairment, conflict or interference with existing land uses”. Below, these three Project phases (construction, operation and retirement/decommissioning) are discussed by listing the OMAFRA consideration and identifying the associated potential effects and proposed mitigation measures.

4.1 CONSTRUCTION OF THE PROJECT

OMAFRA - Disruption of agricultural operations and agricultural infrastructure, as a result of this project, should be minimized to the greatest extent possible. Possible negative environmental effects such as *noise and vibrations* should be mitigated. Disruption of agricultural infrastructure such as field tiles, drainage ditches, culverts, field entrances and fences should also be avoided and mitigated if impacted. The amount of agricultural and rural land to be used should be minimized to the greatest extent possible. Structures for these projects should be cited as to minimize the disruption to agricultural operations. This Ministry suggests structures be located adjacent to lot lines and in proximity to existing entranceways.

OMAFRA also recommends that any work on prime agricultural or rural lands that are in addition to the land needed for the project should be conducted according to appropriate construction standards so that the land is returned to productive agricultural uses.

4.1.1 Noise and Vibration

4.1.1.1 Potential Effect

During construction, which will be spread over approximately two years, noise and vibration will be generated by the operation of heavy equipment and construction related vehicles at each of the work areas.

4.1.1.2 Mitigation

The vibration and audible noise at receptors beyond the construction areas is expected to be a minor, short-term disruption consistent with those generated by any industrial construction project during daylight hours. To minimize inconvenience brought on by excessive noise during the construction phase of the project all construction equipment engines will be equipped with mufflers and/or silencers in accordance with MTO or MOE guidelines and regulations. Noise levels arising from equipment will also be compliant with sound levels established by the MOE.

To the greatest extent possible construction activities that could create excessive noise will be restricted to daylight hours and adhere to any local noise by-laws. If construction activities that cause excessive noise must be conducted outside of daylight hours, adjacent residents and the appropriate municipality (i.e., Township of Frontenac Islands or the City of Kingston) will be notified in advance. Sources of continuous noise, such as portable generator sets, will be shielded as appropriate or located so as to minimize disturbance to off-site receptors.

4.1.2 Agricultural Operations

4.1.2.1 Potential Effect

Croplands can potentially be used as pasturelands at some point in an agricultural crop rotation. As such, fences border many fields that are in crop production. To facilitate entry for construction traffic, fences may need to be opened. As well, access to fields for fertilizing, controlling weeds, harvesting etc. could potentially be disrupted due to the construction process.

Wind power is becoming an increasingly attractive option for farmers and ranchers across North America as a means of producing supplemental farm income. A potential concern regarding the placement of wind turbines on agricultural land is their effect on livestock.

4.1.2.2 Mitigation

Accordingly, lands that are currently fenced may require the installation of a gate at turbine access road entrances in order to ensure that agricultural operational flexibility (use of the lands for pasture or crops) is not reduced. This requirement should be determined in conjunction with the individual landowner.

The landowner will also be consulted with respect to field access requirements during construction to ensure that no areas are inaccessible at critical times. Aside from a land-use change at the turbine and access road locations, no effects are anticipated to crops.

One concern regarding the placement of wind turbines on agricultural land is their effect on livestock. To address this, a literature review was conducted to investigate the potential effects on livestock from the construction and operation of wind turbines.

The U.S Department of Energy states that wind turbines have a minimal effect on farming and ranching operations (U.S Department of Energy, 2004). Furthermore, the Canadian Wind Energy Association and British Wind Energy Association have indicated that the presence of wind turbines on agricultural land does not disturb livestock; sheep, cows, and horses can graze up to and around the base of wind turbines (Canadian Wind Energy Association, 2006; British Wind Energy Association, 2006). In addition, cows often have been seen resting against the base of wind turbines (Raloff, 2001), and the Australian Wind Energy Association has noted that the base of wind turbines act as scratching posts for livestock and provide them with a source of shade (Australian Wind Energy Association, 2004).

The Melancthon I Wind Plant, located in Shelburne, ON, also owned by Canadian Hydro Developers, Inc., includes wind turbines located within lands used to graze livestock. Observations by local agricultural operators and Canadian Hydro staff indicate no disturbance to livestock as a result of the presence or operations of the turbines. Similar to the observations by the Canadian Wind Energy Association and the British Wind Energy Association, livestock at the Melancthon Wind Plant have been observed grazing and congregating at the base of operating turbines **(Photo 1)**.

Photo 1. Grazing Cattle at Melancthon I Wind Plant

During the construction phase of the Project, effects on livestock are also expected to be negligible. However, livestock will need to be kept away from excavation sites and may need to be barricaded from the construction site for short periods of time during the construction phase. It is recommended that, as a good practice, an inventory of cropping patterns be conducted during finalization of construction details in order to account for any potential crop-specific effects of construction or operation of the turbine or ancillary facilities. This survey requirement should be determined in conjunction with the land leaseholder.

The distribution of cropping patterns, shown on **Figure 3.3 (Appendix A)**, indicates that there are livestock related operations (e.g., dairy, beef cattle etc.) within the study area. There has been concern about the potential effects on livestock from the construction of wind turbines, however, as discussed no effects on livestock are expected as a result of the construction of the Project.

Statistics Canada data (2001) shows that wind farms can be associated with improving agricultural operations instead of disrupting them. The trend on Canadian farms since the early 1970's is that realized net income, which accounts for depreciation, has declined. As a result, farms with revenues between $10,000 and $249,999 on average were highly dependent on off-farm income (FTPWG, 2006).

As shown in Table 3.13, the average net income (less capital costs) for farms in the Township of Frontenac Islands is $10,405. This low amount indicates that many of the farms in the study area are likely highly dependent on off-farm income. The income generated from wind project lease payments can represent additional income with no investment in time or money required from the farm operators.

4.1.3 Agricultural Infrastructure

4.1.3.1 Potential Effect

Vertical subsurface water flow that is intercepted through tile drainage infrastructure could potentially be impaired as a result of soil compaction caused by heavy equipment operation or tile severance during topsoil stripping, grading etc. Reeds Bay Municipal Drain could be negatively impacted by blocking flow.

4.1.3.2 Mitigation

Published artificial drainage system mapping (OMAF, 1998) identifies tile drainage infrastructure within the study area (**Figure 3.1, Appendix A**). On Wolfe Island, tile drainage is limited and there is a single municipal drain, Reeds Bay Municipal Drain (unclassified). Discussions with individual landowners continue to yield the most current information on which fields are randomly or systematically tile drained, tiles locations, tile spacing, and the direction of flow.

The Construction Manager will retain a tile drainage contractor to ensure that all tile drainage affected by the Project is properly maintained during construction and restored immediately following completion of the construction works.

Final turbine and ancillary facility layouts on lands with artificial drainage infrastructure should include appropriate re-alignments or alteration of existing tile drainage infrastructure to ensure that this infrastructure is not adversely affected by the Project. Any disruption related to construction activities should be appropriately repaired. The function and integrity of Reeds Bay Municipal Drain will be maintained throughout construction through appropriate setbacks and standard watercourse protection measures.

4.1.4 Agricultural and Rural Land

4.1.4.1 Potential Effect

Due to the predominance of agricultural land-use within the study area, wind turbines and/or ancillary facilities will unavoidably be located on agricultural land. Based upon Canadian Hydro Developers Inc.'s experience with the Melancthon I Wind Plant, approximately 0.4 – 0.8 ha (1 – 2 acres) will be required for each wind turbine, including its access road and power line.

Assuming a similar footprint on Wolfe Island, and not accounting for servicing multiple turbines with the same access road, this means approximately 35 – 70 ha (86 – 172 acres) will be taken out of the agricultural land base over the life of the Project, assuming that all turbines are located on active agricultural lands.

4.1.4.2 Mitigation

As demonstrated above, prime agricultural areas cannot be totally avoided during implementation of the Project. CREC has and will continue to work with the landowners to ensure construction effects on agricultural lands are minimized to the greatest extent possible and mitigated where necessary. For example, unless requested by the landowner, diagonal field crossings by access roads have been avoided.

4.1.5 Siting of Structures

4.1.5.1 Potential Effect

Constructing a wind plant within agricultural landscape could potentially disrupt agricultural operations. Inappropriate turbine siting for example could result in blocking travel ways or restricting access to critical locations such as water or feed sites.

4.1.5.2 Mitigation

The footprint of the turbines, access roads, and ancillary facilities (i.e., lands taken out of agricultural production) has been minimized to the greatest extent possible given the current land-uses, access roads, and foundation requirements of the Project. This has been achieved to a large degree by following industry best practices for siting infrastructure and working with individual landowners directly affected by the Project.

Where possible, farm operator preferences with regard to turbine location and access road alignment have been accounted for, including actions taken to:

- Avoid or minimize field fragmentation and diagonal access road crossings.
- Minimize cultivation pattern disruptions.
- Place access roads and ancillary facilities adjacent to lot lines and use existing roads where possible.

- Place turbines near lot lines, in headlands, and/or in areas that are not critical to agricultural operations.

4.1.6 Appropriate Construction Standards

4.1.6.1 Potential Effect

On all construction projects, there is potential to have incremental expansion to the staging and construction areas. If not controlled, work areas can expand into adjacent crop or pasture lands.

4.1.6.2 Mitigation

As necessary, all staging and construction areas will be clearly delineated prior to the initiation of on-site works and minimized to the extent possible. The Construction Manager will ensure that work is confined within these areas. To prevent topsoil compaction, topsoil will be stripped and stockpiled in construction areas and staging areas. Vehicle movement will be restricted to the defined areas. CREC will employ the industry's best practices to minimize disruptions to agricultural land.

A key component of appropriate construction standards is landowner dialogue and consultation during construction. As such, the Construction Manager will be available to address any landowner questions or issues as they arise during construction. Landowners will also be supplied with the names and telephone number of the key Project individuals.

4.2 OPERATION OF THE PROJECT

OMAFRA – Noise should be appropriately mitigated with respect to agricultural operations. Mitigation measures may include, but are not limited to increasing the separation distance between the wind towers and agricultural operations, constructing noise barriers and low speed rotating machines.

4.2.1 Noise

4.2.1.1 Potential Effect

During operation there is potential for limited environmental noise effects from mechanical and aerodynamic noise emitted from the wind turbines.

4.2.1.2 Mitigation

To mitigate the effect of environmental noise, the Project will use modern, low-speed rotating turbines, and will meet noise criteria set out by the MOE under the *Environmental Protection Act*. Based on existing research **(Section 4.2)** and Canadian Hydro's experience in the operation of wind farms in agricultural areas, the environmental noise emissions from the wind turbines during operation of the Project are not anticipated to interfere with agricultural operations.

4.3 RETIREMENT OF PROJECT

OMAFRA – In the event the project ceases to exist, a retirement plan should include restoration of prime agricultural land and rural land to the same grade and average soil quality as the surrounding area. This includes the removal of all structures including towers, above ground footings, concrete pads, anchors, guy wire, fences, fixtures, materials, improvements and personal property.

(During project design…) existing roads are to be utilized to the greatest extent possible and any additional internal access road/drives that are constructed should be removed and the roadbeds rehabilitated to an agricultural use. Any soil compaction that has occurred should be mitigated and depending on the type and amount of traffic, this may involve replacement of the topsoil and excavation of the roadbeds. Ground cover crops such as alfalfa and clover should be planted on the roadbeds to assist in the rehabilitation of the soils.

4.3.1 Retirement Plan

4.3.1.1 Potential Effect

The design life of the Project is estimated to be 30 years however it is not uncommon for well-maintained projects to have a longer useful life than the design life. In the event that Project decommissioning was to occur, infrastructure and localized physical alterations to agricultural lands would still exist.

4.3.1.2 Mitigation

Although no definitive decommissioning plan has been finalized at this stage in the planning process, it is foreseeable that at the end of the Project's useful life the structures will be dismantled. The steel towers, maintenance shop / control building, and the Wolfe Island Transformer Station could be kept to support another wind power generation project, converted to an alternate use, sold to a third party, or dismantled.

Decommissioning regulations are likely to evolve between Project planning and decommissioning, and decommissioning practices will have advanced during the same period. Decommissioning activities for the Project could involve the following works, depending on regulatory requirements, field practices, and landowner preferences:

- Removal of mechanical and electrical equipment
- Removal of ancillary facilities
- Removal of concrete foundation to a depth that does not interfere with agricultural operations (foundations should be covered with approximately one metre of soil of the same average quality as the surrounding area)
- Demolish remaining site structures

- Fill and grade the turbine site with suitable engineered fill
- Relieve soil compaction
- Replace topsoil and cultivate and/or seed as required.

The degree to which the affected lands are restored may ultimately depend upon their intended after-use. For example, where the intent is to return the land to agricultural use, the structures will be taken down and the footings removed to a depth that permits ploughing. Prime agricultural lands will be restored to the same grade and general soil quality as the surrounding area.

All access roads and roadbeds that are constructed for the Project on agricultural lands, unless requested by the landowner to remain in place, will be removed and rehabilitated to an agricultural use upon retirement of the Project. This includes the mitigation of any soil compaction that may have occurred as a result of Project activities on each site. In that, topsoil would be stripped and stockpiled in construction and staging areas as required and replaced to original grades following any necessary de-compaction activities. Vehicle movement would be restricted to the defined areas. Depending on the type and amount of traffic, rehabilitation may involve subsoiling of the roadbeds and replacement of the topsoil. During construction, operation and decommissioning, wet soil work shutdown will be implemented whenever significant soil rutting and/or mixing is likely to occur.

Groundcover crops such as trefoil, alfalfa and clover would be planted on any reclaimed roadbeds to assist in the rehabilitation of the soils

Regardless of the ultimate outcome of the wind plant, all decommissioning activities would be performed in compliance with the applicable regulations in force at that time and may include the MOE's *Guidelines for the Decommissioning and Cleanup of Sites in Ontario* or equivalent.

4.4 PLANNING POLICIES

OMAFRA - In addition to the goals and objectives of OMAFRA, as detailed above, the letter (**Appendix C**) also states that the criteria contained in the PPS, specifically Sections 1.8 and 2.3 - Agricultural Policies should be considered.

Review of the Township of Frontenac Islands OP indicates that, subject to completion of a zoning by-law amendment, large-scale wind operations such as the Wolfe Island Wind Project are permitted within the agricultural and rural designations. The Township OP states that wind farms are permitted within the agricultural designation and that the principal purpose of the agricultural designation is to protect land suitable for agricultural production from scattered development and land-uses which are unrelated to agriculture. This municipal policy is consistent with PPS Section 1.8.3, which states that renewable energy systems shall be permitted in prime agricultural areas and that these systems should be designed and constructed to minimize potential effects on agricultural operations.

Within the study area, there are limited lower capability agricultural lands that may be suitable for a wind turbine and ancillary facilities; these areas are not extensive and generally possess existing forest cover and/or wet conditions. Construction within these few lower capability lands often presents other potential environmental effects associated with vegetation removal, loss of wildlife habitat, drainage alteration, and fill requirements. Nevertheless, consistent with the PPS and Official Plan, wind farms are a compatible land-use with agricultural lands and operations and are thus permitted in rural and agricultural areas.

The PPS states that prime agricultural areas shall be protected for long-term use as agriculture (Section 2.3.1). The PPS is equally clear that renewable energy systems such as wind shall be permitted within rural and agricultural lands (Section 1.8.3). In Ontario, ideal wind energy generation locations are typically located on flat lands with minimal disruption of wind flow regimes by surface features (e.g., forested lands, significant landforms, and buildings). Consequently, forested low-lying or hummocky terrain is not generally well suited to establishment of a viable wind generation facility.

In Ontario, cleared uplands with minimal topographic relief are often areas of higher agricultural capability. Therefore, on a regional basis, wind energy generation facilities and agriculture possess similar land base requirements. This makes it difficult for wind energy developments to exist outside of these resource areas. As such, the specific land base requirement inherent of wind energy facilities reduces the opportunity for avoiding prime agricultural areas.

Within the study area, there are some limited lower capability agricultural lands (i.e., CLI Classes 4 to 7) that, at the macro level, may appear suitable for a turbine and ancillary facilities. However, at the meso and micro levels it becomes apparent that these areas are of very limited size and are mostly located within or very near to protected environmental features such as shoreline, woodlots or along watercourses. Consequently, construction within these lower capability lands presents potentially adverse environmental effects associated with vegetation removal, loss and/or disturbance to wildlife habitats, and fill requirements. The unsuitability of these lands for wind turbine placement further reduces opportunities to avoid prime agricultural areas.

Due to the similar land base requirements of wind energy facilities and agricultural production, there is from both macro and micro scale perspectives, limited opportunity to avoid prime agricultural areas on Wolfe Island (the majority of the land base is agricultural/rural). In terms of the lands directly affected by the Project (i.e., land to which CREC holds Land Lease Agreements), the environmental and constructability constraints associated with development of the Project in the limited, lower capability agricultural areas preclude total avoidance of prime agricultural lands.

4.5 CONCLUSIONS ON OMAFRA COMMENTS

Section 4.0 has been included to address comments from OMAFRA regarding the Wolfe Island Wind Project. As a result of a detailed review of OMAFRA issues, coupled with the mitigation measures proposed herein, any potential effect has been avoided and/or minimized. Therefore no significant negative agricultural effect is anticipated as a result of the Project. Further, the lease payments received by farm operators as a result of the Project will provide supplemental farm income, diversify the farm revenue stream, and represents significant potential farm income without financial investment by the farm operator.

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5.0 Summary

The study area for the Wolfe Island Wind Project includes parcels on the Kingston mainland and on Wolfe Island. Project infrastructure on the mainland portion of the study area consists only of an underground power line to transmit the energy generated from the wind turbines on Wolfe Island to the interconnection point of the provincial power grid at the Gardiners Transformer Station. Both the mainland and Island portions have agriculture as a significant component of land-use.

The mainland portion of the study area is within the City of Kingston. Predominant land-uses in this area include residential, commercial, institutional, and agricultural. The agricultural lands are on a large property owned and operated by CSC called the Frontenac Institution. These lands encompass approximately 25% of the mainland portion of the study area.

The Wolfe Island portion of the study area is predominantly rural. With the exceptions of Marysville, a small community on the north shore, Port Alexandria, a small community on the south shore and some aggregate extraction, the dominant land-use on Wolfe Island is agriculture.

There are thirteen soil types mapped within the study area. Prime agricultural land (CLI Classes 1-3) occupies approximately 83% of the study area. In contrast, prime agricultural land comprises only 10.7% of Frontenac County and 30.8% of the land base covered by the CLI classification system in Ontario.

As reported by Statistics Canada (2001) the number of farms has been declining for the last five decades, in part, reflecting rapid changes in technology and increased productivity. Between 1991 and 2001, farms in the Township decreased in number by almost 10% and farms in the County decreased by 5%. Similarly, there was a 5% decrease in the number of farms in Ontario from 1991 to 2001. For comparison, between 1991 and 2001, the number of farms in Canada decreased 12%. Much of this decrease is a result of farm consolidation (e.g., one farm owner buys another farm and the two farms become one farm operation as recorded by the census).

Average farm size in Frontenac County (119 ha / 294 acres) continues to be, on average, larger than the average Ontario farm (91 ha / 226 acres). The average farm size in the Township of Frontenac Islands (136 ha/335 acres) is also larger than the provincial average. However, both the County and Township farm sizes are lower than the national average (274 ha / 676 acres); likely due in part to the inclusion of larger landholdings in the Prairie Provinces.

Today, most of the farms in the study area are beef farms, followed by dairy and field crop operations. Beef, field crops, and dairy farms are also the top three farm types provincially and nationally.

In 2001, net revenue (less capital costs) in Ontario totalled approximately $95 per acre. The annual net revenue (less capital costs) per acre of farmland, in Frontenac County, was $14; substantially lower than the provincial average. This is reflected in the low farm capital and investment in infrastructure.

On average, Ontario farms have in excess of three times more farm capital, per acre, than that the average farm across Canada. The Township of Frontenac Islands has, on average, more farm capital per acre ($1,517) than the national average ($1,180) but less than the provincial average ($3,743).

The County of Frontenac as a whole is not known for having highly productive farm operations. However, there are lands within the study area that do have high agricultural capability, and the net revenue there is much higher than the County average. High capability lands are therefore significant resources within the study area.

The agricultural resources of the study area should be protected against incompatible land-uses that would reduce the agricultural productivity of the area and those that would erode the economic profitability of the agricultural operations. The Wolfe Island Wind Project proposes to protect those resources through avoidance, where possible, and using best practices during planning and construction to minimize effects where avoidance is not possible. Appropriate siting of the wind farm facilities and associated infrastructures has minimized potential effects on the agricultural community, while maximizing the harness of renewable energy.

During the agency contact component of the Project, input was solicited from OMAFRA. Comments and information were received in the form of a letter. The bulk of the comments refer to the construction phase of the project. Noise and vibration, siting of turbines, effects to agricultural operations and infrastructure, and construction standards were identified as construction factors to be addressed and/or mitigated. During operation, noise was identified as an operational factor to be addressed. A post operational factor, namely the retirement plan for the Project was also presented.

As a result of a detailed review of the OMAFRA issues, coupled with avoidance and the mitigation measures proposed herein, any potential effect has been avoided and/or minimized. Thus, no significant negative agricultural effect is anticipated as a result of the Project.

Further, the lease payments received by farm operators as a result of the Project will provide supplemental farm income, diversify the farm revenue stream, and represents significant potential farm income without financial investment by the farm operator. As such, the Project will make positive contributions to multiple agricultural operations within the study area.

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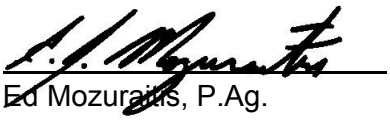

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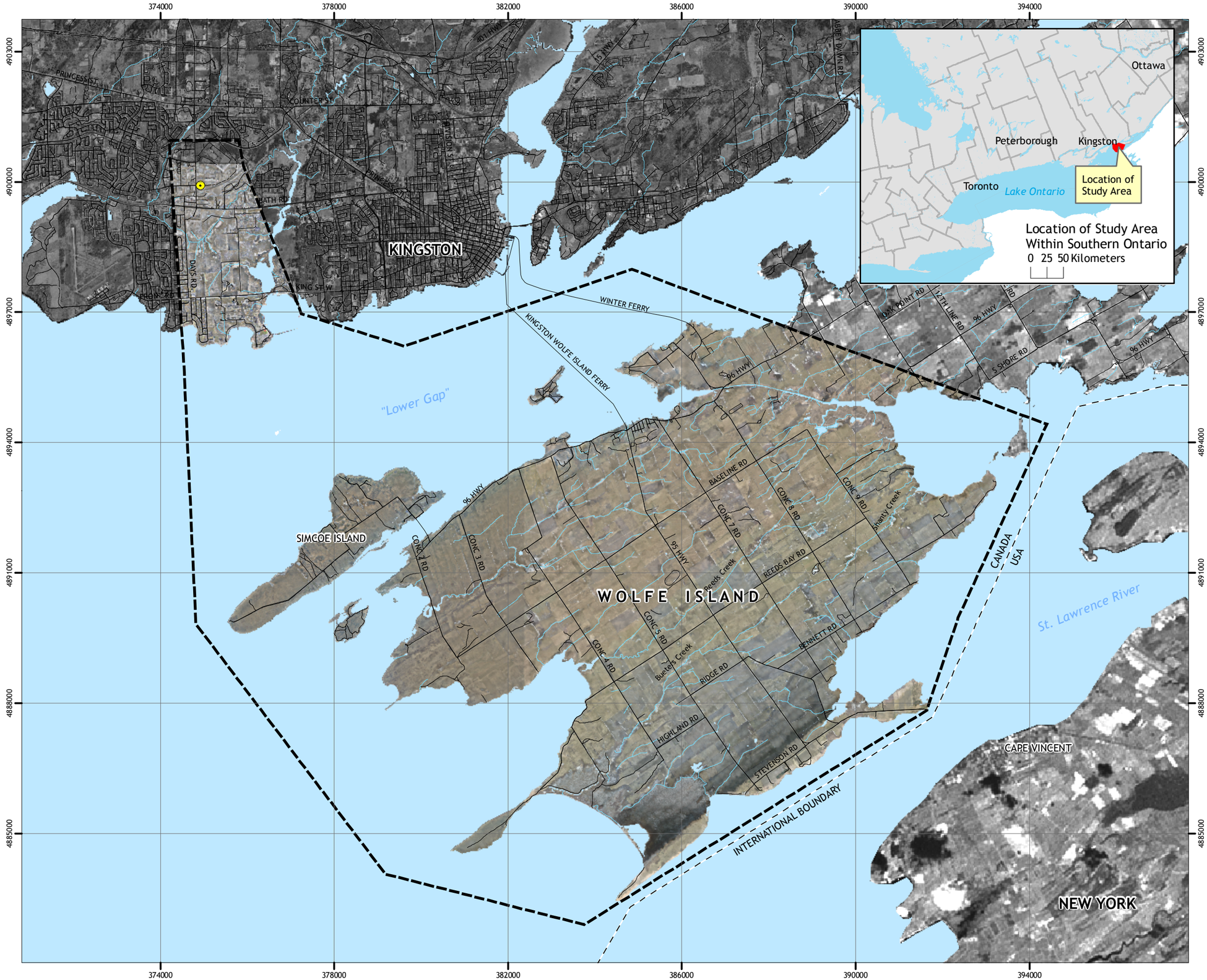
Appendix A

Figures



CANADIAN HYDRO DEVELOPERS, INC.
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Canadian Renewable Energy Corporation

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Notes:
Base map layers: MNR Land Information Distribution Service (LIDS).

Air Photos: LIDAR (study area coverage), January 2006.
LANDSAT7 (U.S. coverage), 1999.
City of Kingston (city coverage), 2005.

Legend

- Study Area
- Gardiners Transformer Station

WOLFE ISLAND WIND PROJECT
AGRICULTURAL ASSESSMENT AND PROFILE REPORT

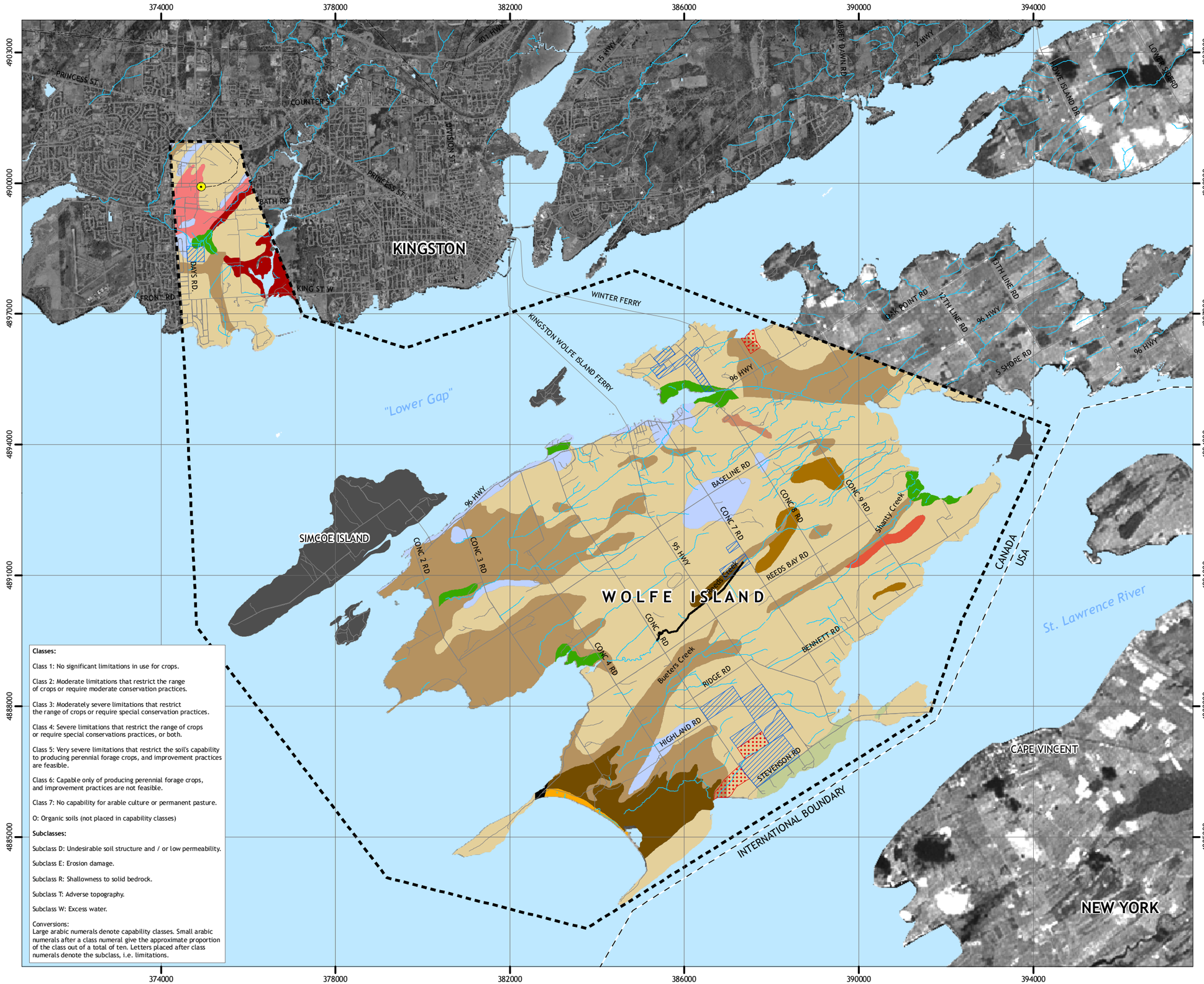
FIGURE NO.

1.1

Project Location and Study Area

FILE:			PROJECT NUMBER
60960056_C1_01_project_location.mxd			60960056
REV. NO.	SHEET NO.	SCALE:	DRAWN BY:
0	1 OF 1	1:85,000	JLW

October, 2007



Classes:

Class 1: No significant limitations in use for crops.

Class 2: Moderate limitations that restrict the range of crops or require moderate conservation practices.

Class 3: Moderately severe limitations that restrict the range of crops or require special conservation practices.

Class 4: Severe limitations that restrict the range of crops or require special conservations practices, or both.

Class 5: Very severe limitations that restrict the soil's capability to producing perennial forage crops, and improvement practices are feasible.

Class 6: Capable only of producing perennial forage crops, and improvement practices are not feasible.

Class 7: No capability for arable culture or permanent pasture.

O: Organic soils (not placed in capability classes)

Subclasses:

Subclass D: Undesirable soil structure and / or low permeability.

Subclass E: Erosion damage.

Subclass R: Shallowness to solid bedrock.

Subclass T: Adverse topography.

Subclass W: Excess water.

Conversions:
Large arabic numerals denote capability classes. Small arabic numerals after a class numeral give the approximate proportion of the class out of a total of ten. Letters placed after class numerals denote the subclass, i.e. limitations.

CANADIAN HYDRO DEVELOPERS, INC.
through its wholly owned subsidiary
Canadian Renewable Energy Corporation

Stantec

0 1 2 Kilometers

Notes:
Base map layers: MNR Land Information Distribution Service (LIDS).

Air Photos: LIDAR (study area coverage), January 2006.
LANDSAT7 (U.S. coverage), 1999.
City of Kingston (city coverage), 2005.

Soil data: OMAFRA Soils of Ontario data set, 2005.

Artificial Drainage features: OMAFRA Artificial drainage systems. Frontenac County, Wolfe Island Township. Revised 1998.

- Study Area
- Gardiners Transformer Station

Soil Series / CLI Soil Capability for Agriculture Classifications

- Farmington loam (Fl) / 6r
- Eastport sand (Es) / 7e
- Lansdowne clay (Lac) / 2d
- Lansdowne - shallow phase clay (Lac-sh) / 4r
- Lindsay clay (Lc) / 2w
- Lindsay clay loam (Lcl) / 2w
- Napanee clay (Nc) / 3w
- Napanee - shallow phase clay (Nc-sh) / 4r,w
- Newburgh fine sandy loam (Nufsl) / 2t
- Marsh (Ma) / 7w
- Peat (P) / O
- Rock Outcrop (R.O.) / 7r
- Muck (M) / O
- Not Mapped
- Random Drainage
- Systematic Drainage
- Reeds Bay Municipal Drain

WOLFE ISLAND WIND PROJECT
AGRICULTURAL ASSESSMENT AND PROFILE REPORT

FIGURE NO.

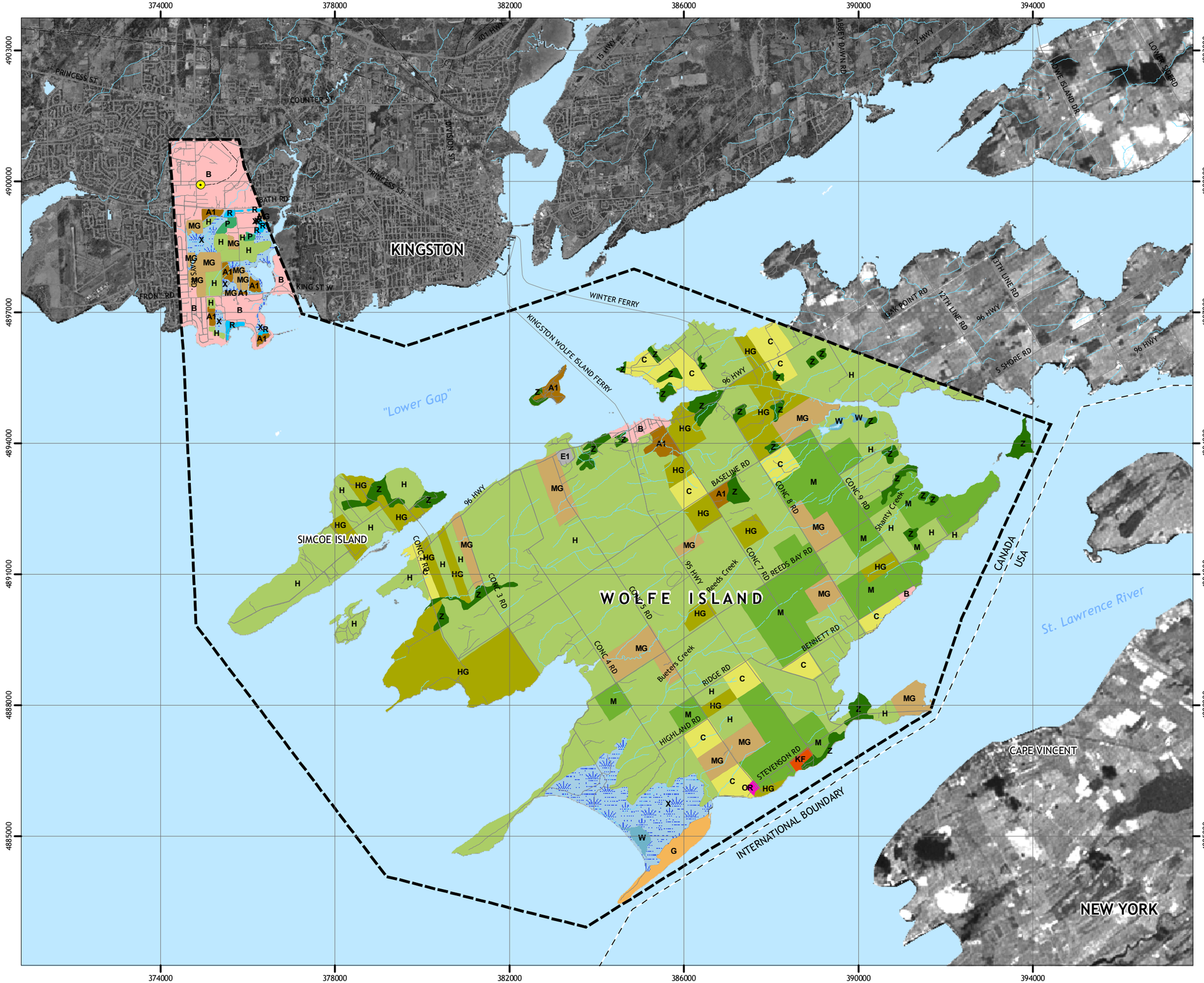
3.1

Soil Series / CLI Classifications and Artificial Drainage Features

FILE:	PROJECT NUMBER
60960056_C1_02_soils_cli.mxd	60960056

REV. NO.	SHEET NO.	SCALE:	DRAWN BY:
0	1 OF 1	1:85,000	JLW

October, 2007



CANADIAN HYDRO DEVELOPERS, INC.
through its wholly owned subsidiary
Canadian Renewable Energy Corporation

Stantec

0 1 2 Kilometers

N W E S

Notes:
Base map layers: MNR Land Information Distribution Service (LIDS).

Air Photos: LIDAR (study area coverage), January 2006.
LANDSAT7 (U.S. coverage), 1999.
City of Kingston (city coverage), 2005.

Wolfe Island Agricultural Land Use Information:
OMAF Agricultural Land-Use Mapping Systems, 1983.

Legend

- Study Area
- Gardiners Transformer Station

Field Crop Systems: Wolfe Island

- C Corn System
- KF Extensive Field Vegetables
- MG Grain System
- G Grazing System
- H Hay System
- M Mixed System
- OR Orchard
- HG Pasture System

Non-System Land Uses: Wolfe Island

- B Built Up
- E1 Extraction (pits and quarries)
- A1 Idle Agricultural Land 5-10 years
- R Recreation
- X Swamp, Marsh or Bog
- W Water
- Z Woodland

Land Uses - Mainland

- Built Up
- P Continuous Row Crops
- MG Grain System
- G Grazing System
- H Hay System
- A1 Idle Agricultural Land 5-10 years
- R Recreation
- X Swamp, Marsh or Bog

WOLFE ISLAND WIND PROJECT
AGRICULTURAL ASSESSMENT AND PROFILE REPORT

FIGURE NO.

3.2

Agricultural Land Use

FILE: 60960056_C1_03_land_use.mxd
PROJECT NUMBER: 60960056
REV. NO.: 0
SHEET NO.: 1 OF 1
SCALE: 1:85,000
DRAWN BY: JLW

October, 2007

Appendix B

Tables

Table 3.1 Climate Normals for South Slopes Region compared to Lake Ontario Shore and Prince Edward County Climatic Regions.

Parameter	South Slopes Climatic Region	Lake Ontario Shore Climatic Region	Prince Edward County Climatic Region
Mean Temperature (degrees F)	44-46	44-46	44-46
Growing Season (days)	200-210	200-210	200-210
Mean Annual Corn Heat Units	2,700-2,900	2,900-3,100	2,900-3,100
Mean Annual Growing Degree Days	3,400-3,600	3,400-3,600	3,400-3,600
Mean Annual Frost Free Period (days)	140-150	140-160	140-160

Source: Brown, D.M., G.A. McKay and L.J. Chapman. 1978.

Table 3.2 Soils and Soil Capabilities Within the Study Area

Soil Name	Texture	Drainage	Parent Material	Soil Capability (CLI Class)
Lansdowne	Clay, shallow phase clay	Imperfect	Calcareous lacustrine clay	2D
Napanee	Clay, shallow phase clay	Poor	Calcareous lacustrine clay	3W
Farmington	Loam	Good	Calcareous stony loam till	6R
Lindsay	Clay, Clay loam	Poor	Lacustrine clay over calcareous stony loam till	2W
Newburgh	Fine sandy loam	Good	Calcareous fine sand and silt	2T
Eastport	Sand	Good to rapid	Beach sand	7E
Marsh	Organic	Very Poor	Organic	Organic (not classified)
Peat	Organic	Very Poor	Organic – brown undecomposed moss and sedge	Organic (not classified)
Muck	Organic	Very Poor	Organic – black decomposed woody plant material	Organic (not classified)

Source: ARDA 1964.

Table 3.3 Distribution of Soils by CLI Capability for Agriculture

Soil Class	Frontenac County		Wolfe Island		Comments
	Area Ac. (ha)	% of total	Area Ac. (ha)	% of total	
Class 1	13,123 (5,311)	1.4	0 (0)	0	Suitable for sustained production of common field crops if specified management practices are followed.
Class 2	55,301 (22,380)	5.9	14,230 (5,759)	42.5	
Class 3	31,733 (12,842)	3.4	8,295 (3,357)	24.8	
Class 4	30,488 (12,338)	3.2	175 (71)	0.5	Physically marginal for sustained arable use.
Class 5	48,257 (19,529)	5.1	6,480 (2,622)	19.4	Capable of use only for permanent pasture and hay.
Class 6	50,702 (20,518)	5.4	2,010 (813)	6	Capable of use only for grazing.
Class 7	660,478 (267,286)	70	1,090 (441)	3.3	Unsuitable for agriculture.
Class O	46,239 (18,712)	5.6	1,175 (476)	3.5	Organic soils.
Total	944,000 (382,024)	100	33,455 (13,539)	100	

Source: Hoffman and Noble, 1975.

Table 3.4 Area of Farmland, 2001- in acres (hectares)

Canada	166,802,197 (67,502,560)
Ontario	13,507,357 (5,466,242)
Eastern Ontario Region	2,476,109 (1,002,047)
Frontenac County	205,542 (83,180)
Township of Frontenac Islands	26,828 (10,857)

Source: Census of Canada, Agricultural Profile of Ontario, 2001.

Table 3.5 Land Area Classified by Use - in acres (hectares)

	Under Crops	Summer Fallow	Tame or Seeded Pasture	Natural Land for Pasture	Other*	Total
Canada	89,934,387 (36,395,210)	11,565,518 (4,680,406)	11,872,170 (4,804,504)	38,032,172 (15,391,100)	6,231,328 (2,521,733)	157,635,575 (63,792,950)
Ontario	9,035,915 (3,656,711)	35,175 (14,235)	773,650 (313,086)	1,314,335 (531,893)	2,348,282 (950,318)	13,507,357 5,466,242)
Eastern Ontario Region	1,340,492 (542,479)	5,692 (2,303)	159,812 (64,674)	385,970 (156,097)	584,143 (236,395)	2,476,109 (1,002,047)
Frontenac County	77,995 (31,564)	237 (96)	14,241 (5,763)	57,641 (23,327)	55,428 (22,431)	205,542 (83,180)
Township of Frontenac Islands	16,024 (6,485)	NA	3,329 (1,347)	5,116 (2,070)	NA	24,469 (9,902)

Source: Census of Canada, Agricultural Profile of Ontario, 2001.

*Lands classified as Other include all lands used for Christmas tree farms and those agricultural lands not elsewhere classified. The symbol N/A (Not Available) has been inserted in townships where there are too few farms reporting data to ensure confidentiality. As such, N/A does not equal zero, rather it indicates that a positive figure exists for the township and has been used in calculating the total area of the land use.

Table 3.6 Number of Farms, 1991 – 2001

Township	1991	1996	2001
Canada	280,043	276,548	246,923
Ontario	68,633	67,520	59,728
Eastern Ontario Region	10,655	10,473	9, 333
Frontenac County	733	823	699
Township of Frontenac Islands	77	88	80

Source: Census of Canada, Agricultural Profile of Ontario, 1991, 1996 & 2001.

Prior to the 2001 Census, the Township of Frontenac Islands was reported as Wolfe Island. It included farm statistics from Howe Island as well. These are comparable statistics to the new Township of Frontenac Islands because the two islands hold the vast majority of farms in the Township of Frontenac Islands.

Table 3.7 Average Farm Size, 1991 – 2001 - in acres (hectares)

Township	1991	1996	2001
Canada	598 (242)	608 (246)	676 (274)
Ontario	196 (79)	206 (83)	226 (91)
Eastern Ontario Region	233 (94)	239 (97)	265 (107)
Frontenac County	278 (113)	263 (106)	294 (119)
Township of Frontenac Islands	347 (140)	296 (120)	335 (136)

Source: Census of Canada, Agricultural Profile of Ontario, 1991, 1996 & 2001.

Prior to the 2001 Census, the Township of Frontenac Islands was reported as Wolfe Island. It included farm statistics from Howe Island as well. These are comparable statistics to the new Township of Frontenac Islands because the two islands hold the vast majority of farms in the Township of Frontenac Islands.

Table 3.8 Number of Farms by Major Products (>$2,499 in sales)

	Dairy	Beef	Hogs	Poultry & egg	Field crops*	Fruit	Veg.	Misc. spec.	Livestock combo	Other combo
Canada	18,574	67,814	7,148	4,394	75,183	6,650	2,890	28,315	4,991	4,671
Ontario	6,414	13,669	2,454	1,609	17,789	1,733	1,233	7,301	1,617	1,273
Eastern Ontario Region	1,815	2,911	51	84	1,765	98	68	1,051	201	185
Frontenac County	98	303	1	1	83	6	4	74	18	15
Township of Frontenac Islands	14	40	0	0	9	2	0	4	1	4

Source: Census of Canada, Agricultural Profile of Ontario, 2001.

* Field crops includes wheat, grain, oilseeds and other field crops.

Table 3.9 Farm Operation Arrangements (#of farms)

Township	Sole Proprietor	Partnership	Corporation	Other
Canada	142,915	70,172	33,005	831
Ontario	33,675	18,724	7,275	54
Frontenac County	446	200	51	2
Township of Frontenac Islands	47	26	7	0

Source: Census of Canada, Agricultural Profile of Ontario, 2001.

Table 3.10 Soil Conservation Practices (# of farms)

Practice	Frontenac County	Township of Frontenac Islands
Crop rotation	256	39
Permanent grass cover	344	37
Winter crop cover	17	3
Contour cultivation	17	1
Strip cropping	12	1
Grassed waterways	71	10
Windbreaks or shelterbelts	53	7
Green manure crops for plough-down	58	7
Mechanical or hand-weeding of crops	48	8

Source: Census of Canada, Agricultural Profile of Ontario, 2001.

Table 3.11 Gross Farm Receipts

Township	Total farm gate sales	Sales per farm	Sales per acre (per hectare)
Canada	$38,298,728,817	$155,104	$230 ($567)
Ontario	$9,115,454,790	$152,616	$675 ($1668)
Eastern Ontario Region	$932,804,334	$99,951	$377 ($931)
Frontenac County	$36,193,428	$51,779	$176 ($435)
Township of Frontenac Islands	$5,293,439	$66,168	$197 ($488)

Source: Census of Canada, Agricultural Profile of Ontario, 2001.

Table 3.12 Operating Expenditures

Township	Total expenditures	Expenditures per farm	Expenditures per acre (per hectare)
Canada	$33,213,077,917	$134,508	$199 ($492)
Ontario	$7,829,246,574	$131,082	$580 ($1,432)
Eastern Ontario Region	$796,126,279	$85,302	$322 ($794)
Frontenac County	$33,382,488	$47,757	$164 ($401)
Township of Frontenac Islands	$4,461,068	$55,763	$166 ($410)

Source: Census of Canada, Agricultural Profile of Ontario, 2001.

Table 3.13 Net Revenue (less capital costs)

Township	Total net revenue	Net revenue per farm	Net revenue per acre (per hectare)
Canada	$5,085,650,900	$20,596	$30 ($75)
Ontario	$1,286,208,216	$21,534	$95 ($235)
Eastern Ontario Region	$136,678,035	$31,372	$55 ($136)
Frontenac County	$2,810,940	$4,021	$14 ($33)
Township of Frontenac Islands	$832,371	$10,405	$31 ($77)

Source: Census of Canada, Agricultural Profile of Ontario, 2001.

Table 3.14 Farm Capital

Township	Total farm capital	Farm capital per farm	Farm capital per acre (per hectare)
Canada	$196,868,929,481	$797,289	$1,180 ($2,916)
Ontario	$50,529,783,505	$845,998	$3,743 ($9,244)
Frontenac County	$322,789,959	$461,788	$1,571 ($3,881)
Township of Frontenac Islands	$40,667,617	$508,345	$1,517 ($3,746)

Source: Census of Canada, Agricultural Profile of Ontario, 2001.

Appendix C

Letter from OMAFRA

From: Valaitis, Ray (OMAFRA) [mailto:ray.valaitis@omafra.gov.on.ca]
Sent: Tuesday, August 08, 2006 2:50 PM
To: Nadolny, Rob
Subject: RE: Wolfe Island Wind Project - Request for OMAFRA guidance

Rob:

As per our conversation potential issues that should be considered when undertaking the preparation of an Environmental Screening Report are provided in terms of the goals and objectives of this Ministry and the criteria contained in the 2005 Provincial Policy Statement (PPS), specifically Sections 1.8 and 2.3 - Agricultural Policies.

The Class Environment Assessment process includes all phases and components of the project, including construction, operation and retirement of the project. The intent of the process is to identify and mitigate negative environmental effects to the greatest extent possible. Negative environmental effects include the negative effects that a project has, or could potential have, directly or indirectly on the environment. Negative environmental effects include the displacement, impairment, conflict or interference with existing land uses.

Construction of the Project:

Disruption to agricultural operations and agricultural infrastructure, as a result of this project, should be minimized to the greatest extent possible. Possible negative environmental effects such as noise and vibrations should be mitigated. Disruption of agricultural infrastructure such as field tiles, drainage ditches, culverts, field entrances and fences should also be avoided and mitigated if impacted. The amount of agricultural and rural land to be used should be minimized to the greatest extent possible. Structures for these projects should be cited as to minimize the disruption to agricultural operations. This Ministry suggests structures be located adjacent to lot lines and in proximity to existing entranceways;

Any work on prime agricultural or rural lands that are in addition to the land needed for this project should be conducted according to appropriate construction standards so that the land is returned to productive agricultural uses.

Operation of the Project:

Noise should be appropriately mitigated with respect to agricultural operations. Mitigation measures may include, but are not limited increasing the separation distance between the wind towers and agricultural operations; constructing noise barriers and; low speed rotating machines.

Retirement of Project:

In the event the project ceases to exist, a retirement plan should include restoration of prime agricultural land and rural land to the same grade and average soil quality as the surrounding area. This includes the removal of all structures including towers, above ground footings, concrete pads, anchors, guy wires, fences, fixtures, materials, improvements and personal property.

Existing roads are to be utilized to the greatest extent possible and any additional internal access roads/drives that are constructed should be removed and the roadbeds rehabilitated to an agricultural use. Any soil compaction that has occurred should be mitigated and depending on the type and amount of traffic, this may involve replacement of the topsoil and excavation of the roadbeds. Groundcover crops as alfalfa and clover should be planted on the roadbeds to assist in the rehabilitation of the soils.

Please be advised that the above-noted comments do not represent an overall provincial position on this matter and that there may be comments or concerns of other ministries or agencies that should be considered.

Should you have any questions please contact this office.

Yours truly,

Ray Valaitis

Rural Planner

Ontario Mnistry of Agriculture, Food and Rural Affairs

Environmental Policy and Programs Branch

Agricultural land Use Unit

Brighton, Ontario

K0K 1H0

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ray.valaitis@omafra.gov.on.ca

From: Nadolny, Rob [mailto:rnadolny@stantec.com]

Sent: April 25, 2006 3:28 PM
To: Valaitis, Ray (OMAFRA)
Subject: Wolfe Island Wind Project - Request for OMAFRA guidance

<<OMAFRAletter_Apr 25 2006.pdf>>
Hi Ray:

It was good to talk to you today. Sounds like you are very busy covering the hole left by David M's departure. I hope they find a good replacement for that position soon!

Attached is the letter we spoke about during our telephone call. Please give me a shout if you need anything else.

Regards,
Rob

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