Addendum Stage 1 Archaeological Assessment (Background Research and Property Inspection)

NextEra Conestogo Wind Farm Project, Wellington County, Ontario

Prepared for:

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> May 2010 (Revised June 2010)



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EXECUTIVE SUMMARY

Archaeological Services Inc. (ASI) was contracted by GENIVAR, Markham, on behalf of NEXTera Energy Resources, to conduct an addendum Stage 1 archaeological assessment (background research and property inspection) as part of the NextEra Conestogo Wind Farm Project, in the County of Wellington, Ontario. NEXTera is applying for a Renewable Energy Approval under Ontario Regulation 359/09 of the *Green Energy Economy Act.*

ASI previously conducted a Stage 1 archaeological assessment for the majority of the project area. The addendum Stage 1 assessment will address the proposed project lay-out.

The Stage 1 archaeological assessment determined that no archaeological sites had been registered within the study area. However, a review of the geography and local nineteenth century land use of the study area suggested that it has potential for the identification of Aboriginal and Euro-Canadian archaeological sites.

The property inspection revealed that the study area consists of a rural landscape, which is being extensively used for agricultural purposes. It confirmed that the area is drained by numerous tributaries, and that the landscape exhibited minimal to no previous disturbances. As such, the property inspection supports the findings of the background research that the study area contains archaeological site potential.

In light of these results, the following recommendations are made:

- 1. Further to 0. Reg 359/09, s. 22, additional archaeological assessment is required:
 - A Stage 2 property assessment is recommended in advance of any proposed construction impact on any lands (e.g. turbine sites, associated access roads, and crane paths) within the study area where there is potential for archaeological sites (based on the results of the Stage 1 property inspection), in accordance with *Draft Standards and Guidelines for Consultant Archaeologists* (MCL 2009). While impact may be expected on access roads, turbine work sites, off-road crane paths, and buried electrical lines, the Stage 2 assessment must examine and clear all designated work sites prior to construction.

ARCHAEOLOGICAL SERVICES INC. ENVIRONMENTAL ASSESSMENT DIVISION

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1.0 INTRODUCTION

Archaeological Services Inc. (ASI) was contracted by GENIVAR, Markham, on behalf of NEXTera Energy Resources, to conduct an addendum Stage 1 archaeological assessment (background research and property inspection) as part of the NextEra Conestogo Wind Farm Project, in the County of Wellington, Ontario (Figure 1). NEXTera is applying for a Renewable Energy Approval under Ontario Regulation 359/09 of the *Green Energy Economy Act*.

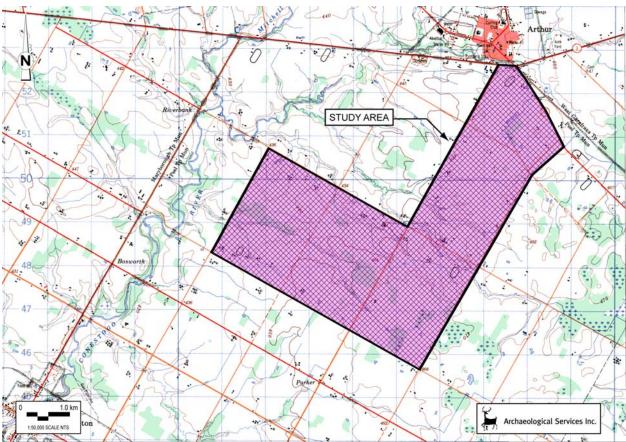


Figure 1: Location of the study area.

Base Map: NTS Sheets 40 P/15 (Palmerston)

ASI previously conducted a Stage 1 archaeological assessment for the majority of the project area (ASI 2007). The addendum Stage 1 assessment will address the proposed project lay-out.

Authorization to carry out the activities necessary for the completion of the Addendum Stage 1 assessment was granted to ASI by GENIVAR on January 19, 2010.

The objectives of this report are:

- To fulfill the requirements of O. Reg. 359/09;
- To provide updated information about the geography, history, previous archaeological fieldwork and current land condition of the addendum study area;





- To evaluate in detail the archaeological potential of the overall study area which can be used, if necessary, to support recommendations for Stage 2 survey for all or parts of the property; and
- To recommend appropriate strategies for Stage 2 survey, if necessary.

2.0 BACKGROUND RESEARCH

Under O. Reg. 359/09, s. 20 (1), item 1 and s. 21, the project must determine if there will be an impact to an archaeological resource, and then carry out an archaeological assessment under s. 22. The archaeological assessment will be conducted in accordance with the *Ontario Heritage Act* (MCL 2005) and using the *Draft Standards and Guidelines for Consultant Archaeologists* (MCL 2009). A Stage 1 archaeological assessment involves a background study to provide detailed documentary research providing a record of the archaeological and land use history and present conditions of the study area. Specifically, the background study provides information about previous archaeological fieldwork around the study area, its geography and history, and current land conditions.

2.1 Previous Archaeological Research

In order that an inventory of archaeological resources could be compiled for the study area, three sources of information were consulted: the site record forms for registered sites housed at the Ministry of Tourism and Culture¹ (MTC); published and unpublished documentary sources; and the files of ASI.

In Ontario, information concerning archaeological sites is stored in the Ontario Archaeological Sites Database (OASD) maintained by the MTC. This database contains archaeological sites registered within the Borden system. Under the Borden system, Canada has been divided into grid blocks based on latitude and longitude. A Borden block is approximately 13 km east to west, and approximately 18.5 km north to south. Each Borden block is referenced by a four-letter designator, and sites within a block are numbered sequentially as they are found. The study area under review is located in the Borden Block *AkHd*.

According to the OASD (email communication, Robert von Bitter, MTC Data Coordinator, April 27, 2010), there are no previously registered sites within or immediately adjacent to the study area. In general, the study corridor vicinity has not been subjected to systematic archaeological research, and therefore, the paucity of known sites should not be considered a predictor of archaeological site potential.

In 2007, ASI completed a Stage 1 archaeological assessment for the Conestogo Wind Farm Project, in the Counties of Wellington and Dufferin (ASI 2007). Turbine sites and access roads were not known at the time of project initiation. The assessment determined that no archaeological sites had been registered within or immediately adjacent to the study area. The field review found that the study area consisted of a rural landscape which was being extensively and successfully used for agricultural purposes. It also confirmed that the area was well-drained by numerous watercourses and that the landscape exhibited minimal to no previous disturbances. As such, a Stage 2 assessment was recommended for any and all lands to be impacted by the construction of individual wind turbines, the transmission lines connecting them to the electrical grid, access roads to the building sites, or other facilities, whether temporarily or permanently associated with the project.

¹ In January 2010, the Government of the Province of Ontario re-organized several of its ministries, and the new Ministry of Tourism and Culture was formed from the former Ministry of Culture and the Ministry of Tourism.

2.2 Geography

The study area is located within the Dundalk Till Plain physiographic region of Southern Ontario. The gently undulating till plain comprises an area of approximately 2,370 square kilometres and low drumlinoidal swells appear with their long axes oriented southeastward (Chapman and Putnam 1984). With an elevation of 425 to 530 m, this region forms the watershed which issues the headwaters of the Saugeen, Maitland, and Grand River, as well as those of the Nottawasaga. A few pockets of poorly drained soil are present within the study area. However, much of the project falls within areas of imperfectly to well drained soils and there is potential for archaeological sites on these lands (Figure 2).

Potable water is the single most important resource necessary for any extended human occupation or settlement. Since water sources have remained relatively stable in southwestern Ontario after the Pleistocene era, proximity to water can be regarded as a useful index for the evaluation of archaeological site potential. Indeed, distance from water has been one of the most commonly used variables for predictive modeling of site location.

The *Draft Standards and Guidelines for Consultant Archaeologists* (MCL 2009:5) stipulates that primary water sources (lakes, rivers, streams, creeks, etc.), secondary water sources (intermittent streams and creeks, springs, marshes, swamps, etc.), ancient water sources (glacial lake shorelines indicated by the presence of raised sand or gravel beach ridges, relic river or stream channels indicated by clear dip or swale in the topography, shorelines of drained lakes or marshes, cobble beaches, etc.), as well as accessible or inaccessible shorelines (high bluffs, swamp or marsh fields by the edge of a lake, sandbars stretching into marsh, etc.) are characteristics that indicate archaeological potential. The Conestogo River flanks the northwestern edge of the study area and many of its tributaries bisect it as well (Figure 2).

Other geographic characteristics that can indicate archaeological potential include: elevated topography (eskers, drumlins, large knolls, plateaux), pockets of well-drained sandy soil, especially near areas of heavy soil or rocky ground, distinctive land formations that might have been special or spiritual places, such as waterfalls, rock outcrops, caverns, mounds, and promontories and their bases. There may be physical indicators of their use, such as burials, structures, offerings, rock paintings or carvings. Resource areas, including; food or medicinal plants (migratory routes, spawning areas, prairie) and scarce raw materials (quartz, copper, ochre, or outcrops of chert) are also considered characteristics that indicate archaeological potential (MCL 2009:5-6). None of these characteristics are present within the study area.

Therefore, due to the proximity of numerous water sources, it may be concluded that there is potential for the recovery of Aboriginal cultural material within the study area.



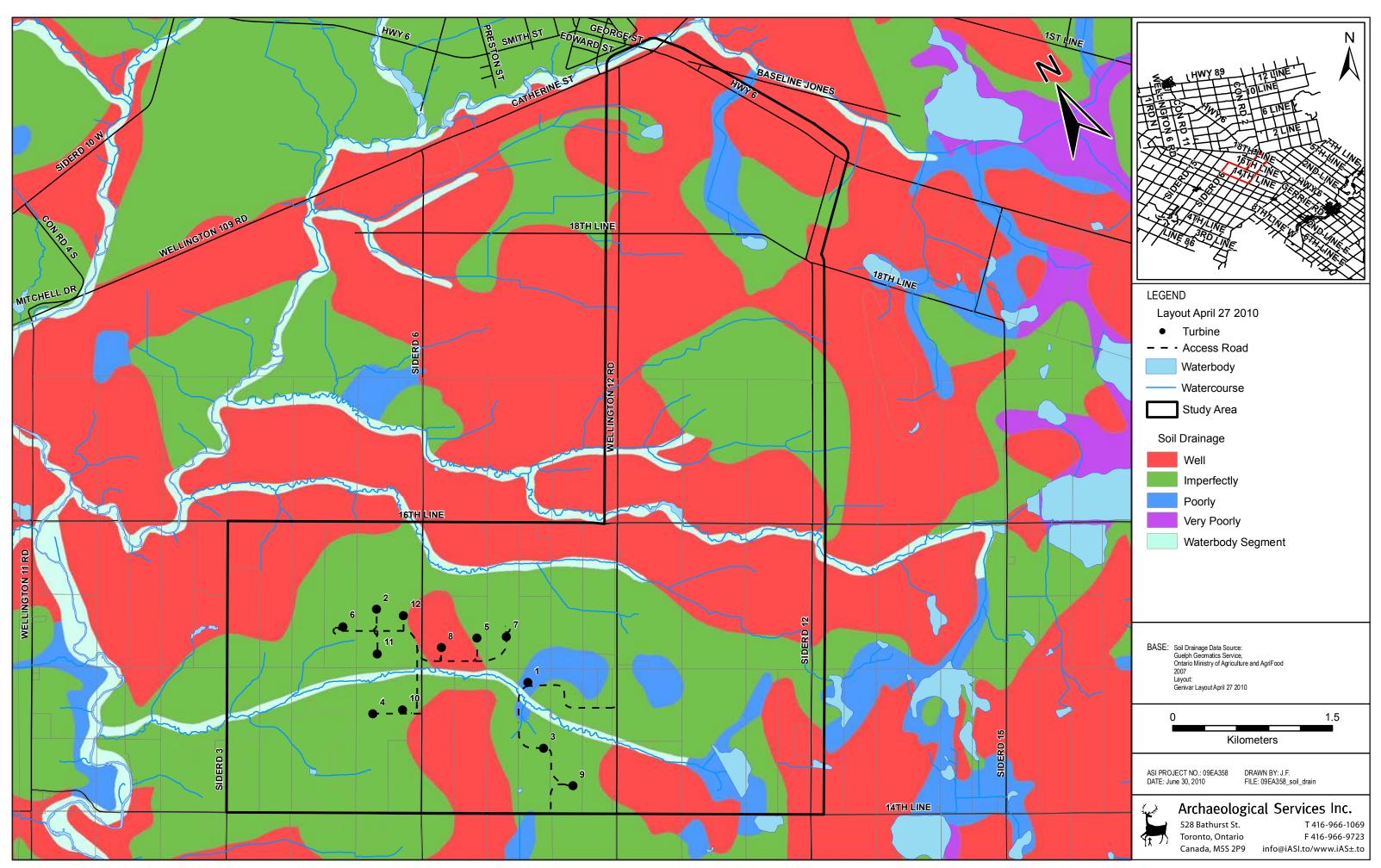


Figure 2: NextEra Conestogo Wind Farm - Project Layout, Soil Drainage and Water Sources

2.3 Land-Use History: Historic Map Review

The 1906 *Illustrated Atlas of the County of Wellington* was reviewed to determine the potential for the presence of historical archaeological remains within the study area during the nineteenth century (Figure 3).

The original project area included portions of the historic townships of Peel, Arthur, Luther and Garafraxa. The addendum study area is located within portions of Lots 5 to 9, Concessions XV to XIX, in the former Township of Peel. No other historic features are illustrated near any of the proposed turbine sites or access roads. It should be noted, however, that not all features of interest were mapped systematically in the Ontario series of historical atlases, given that they were financed by subscription, and subscribers were given preference with regard to the level of detail provided on the maps. Moreover, not every feature of interest would have been within the scope of the 1906 atlas.

For the Euro-Canadian period, the majority of early nineteenth century farmsteads (i.e., those which are arguably the most potentially significant resources and whose locations are rarely recorded on nineteenth century maps) are likely to be captured by the basic proximity to the water model outlined in Section 2.2, since these occupations were subject to similar environmental constraints. An added factor, however, is the development of the network of concession roads and railroads through the course of the nineteenth century. These transportation routes frequently influenced the siting of farmsteads and businesses. Accordingly, undisturbed lands within 100 m of an early settlement road, such as Wellington Road 12 and 14th Line, are also considered to have potential for the presence of Euro-Canadian archaeological sites.

The *Draft Standards and Guidelines for Consultant Archaeologists* (MCL 2009: 6) stipulates that areas of early Euro-Canadian settlement (pioneer homesteads, isolated cabins, farmstead complexes), early wharf or dock complexes, pioneer churches and early cemeteries, are considered to have archaeological potential. There may be commemorative markers of their history, such as local, provincial, or federal monuments or heritage parks. Early historical transportation routes (trails, passes, roads, railways, portage routes), properties listed on a municipal register or designated under the *Ontario Heritage Act* or a federal, provincial, or municipal historic landmark or site, and properties that local histories or informants have identified with possible archaeological sites, historical events, activities, or occupations are also considered to have archaeological potential.

Therefore, based on the proximity to early settlement roads, it may be concluded that there is potential for the recovery of historic cultural material within the study area.

2.4 Burial or Cemetery Sites

Of special significance and sensitivity are sites of human burial. These sites must be treated in accordance with the *Ontario Cemeteries Act*. It should be noted that burials may occur in settlement sites (either within or between houses, or on the margins of the settlement compound), or even in "isolated" locations that are apparently unrelated to any other site. The occurrence of such interments can rarely be predicted in advance of their actual discovery through excavation, unless previous investigations of the site have resulted in the recovery of human bone and/or a suite of diagnostic/unusual artifacts. While cemeteries and burials are often associated with areas of archaeological potential, predictive modelling cannot



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Figure 3: NextEra Conestogo Wind Farm - Project Layout overlaid on 1906 mapping

reliably account for all possible burial locations due to the complex cultural and ideological considerations that may be involved in the selection of burial sites. As well, the formerly mapped limits or existing limits of cemeteries dating to the 19th century or earlier may not reflect the actual limits of the interment area.

While no known Aboriginal burials or historic cemeteries are present within the vicinity of the project facilities, it is possible that unidentified burials/cemeteries may exist.

3.0 ANALYSIS: SUMMAY OF ARCHAEOLOGICAL POTENTIAL

A model of archaeological site potential was created using the criteria discussed in the preceding sections. Potential for archaeological sites is assumed within a 300 m wide buffer around known archaeological sites, historic features, and water sources. Site potential also exists within the polygons where elevated terrain and well-drained soils co-occur.

Conversely, where negative criteria occur, there is no or low potential for sites, and these polygon areas are also included in the site potential modeling. Where positive and negative criteria coincide, field verification is used to inform the evaluation of site potential.

GIS mapping for the study area was produced in order to illustrate this model of archaeological potential. Figure 4 represents a composite map of the potential for archaeological sites in the vicinity of proposed facilities.

Table 1 provides a summary of archaeological potential as it relates to specific turbine sites.

Turbine #	Rational		
1	Low potential: poorly drained soils		
2	Low potential: distance from features of archaeological potential		
3	Archaeological potential: within 300 m of a water source		
4	Archaeological potential: within 300 m of a water source		
5	Low potential: distance from features of archaeological potential		
6	Archaeological potential: within 300 m of a water source		
7	Low potential: distance from features of archaeological potential		
8	Archaeological potential: within 300 m of a water source		
9	Archaeological potential: within 300 m of a water source		
10	Archaeological potential: within 300 m of a water source		
11	Archaeological potential: within 300 m of a water source		
12	Archaeological potential: within 300 m of a water source		

Table 1: Summary of Archaeological Potential

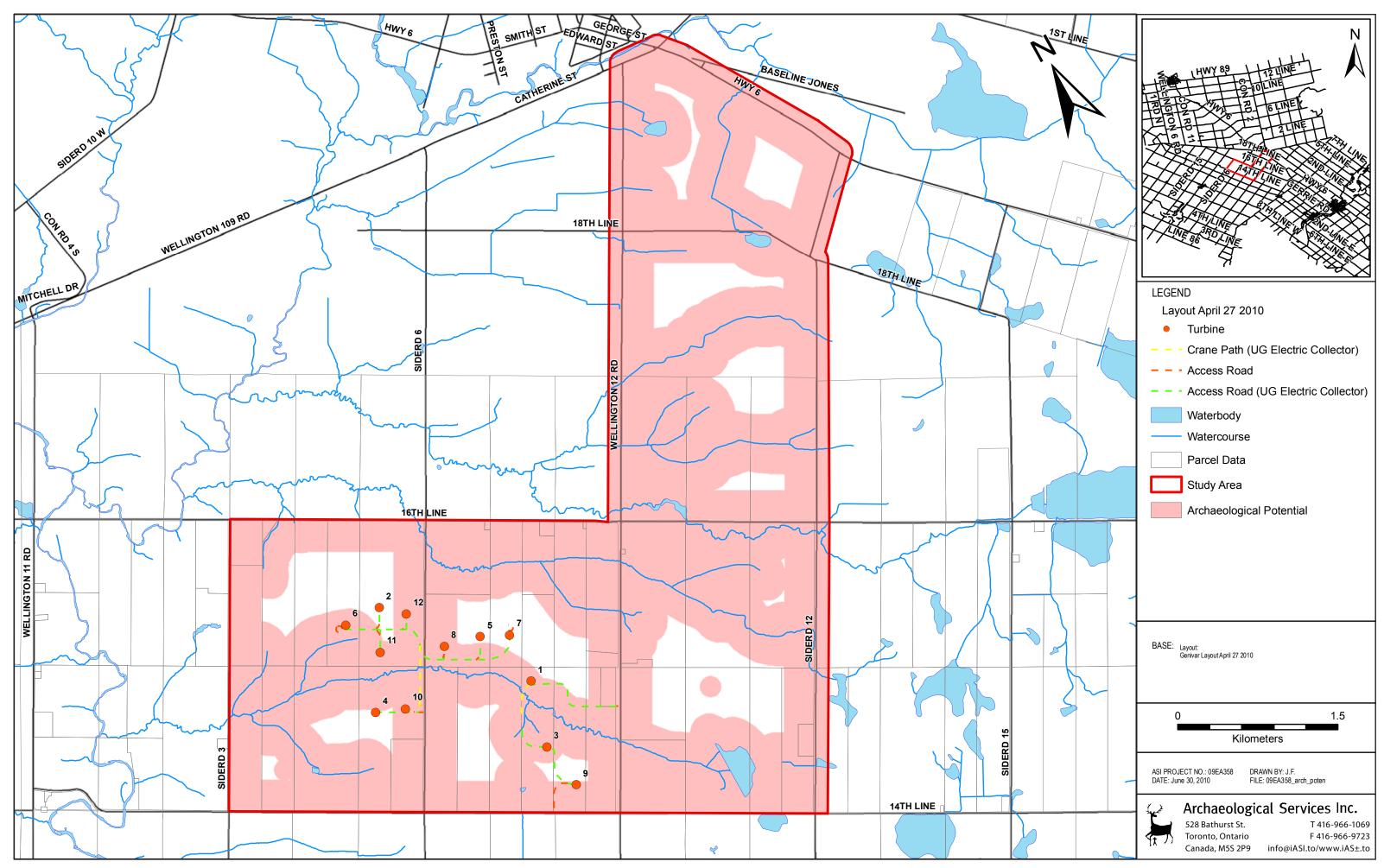


Figure 4: NextEra Conestogo Wind Farm - Project Layout and Composite Archaeological Potential

4.0 PROPERTY INSPECTION

A property inspection of the study area was conducted by Peter Carruthers (P163), ASI, on April 29, 2010, in order to gain first-hand knowledge of its geography, topography, and current conditions, and to evaluate and map its archaeological potential. It is a visual inspection only and does not include excavation or collection of archaeological resources. Because all observations were made from accessible public lands, usually roadways, observations were for the most part generalized. Weather conditions during the property inspection were sunny, clear, and 19°C. Field observations have been compiled onto a map of the study area (Figure 5). Associated photography can be found in Section 7.0.

The proposed project consists of building 12 wind turbines located on existing farmland with some overhead wires to be installed within municipal right-of-ways. On-site access roads to each turbine will be constructed to provide an access point to the properties for equipment during the construction phase. These access roads will be used for maintenance access following completion of the construction phase.

The property inspection focused on entire lots where turbine sites and access roads proposed (layout dated April 27, 2010).

Tributaries of the Conestogo River meander through the project area. The valley land adjacent to these water sources and some woodlots within the study area can be characterized as being low/wet (Plates 1, 6, 8, 12). No further archaeological assessment is required on these lands (Figure 5: areas marked in blue).

For the most part, the proposed turbine sites and access roads are situated in active agricultural fields² that can be characterized as level to gently undulating. These areas have remained relatively undisturbed and contain archaeological potential, primarily based on proximity to water. A Stage 2 property assessment (pedestrian survey) should be conducted on undisturbed land with archaeological potential (Figure 5: areas marked in green). Note that while areas of low potential are identified in Table 1, these areas must also be field verified during the Stage 2 property assessment. Where access roads pass through wooded areas, a Stage 2 property assessment (test pit survey) should be conducted as these areas have also remained relatively undisturbed (Figure 5: areas marked in red).

Table 2 provides a summary of the field conditions at the time of the property inspection and can be used to guide the Stage 2 property assessment.

	,		
Turbine #	Lot	Conc.	Field Conditions
1	8	XV	Winter wheat/ alfalfa
2	6	XVI	Fallow field or alfalfa
3	8	XV	Recently ploughed
4	6	XV	Recently ploughed
5	7	XVI	Recently ploughed
6	5	XVI	Recently ploughed
7	8	XVI	Fallow field or alfalfa
8	7	XVI	Recently ploughed
9	9	XV	Recently ploughed
10	6	XV	Recently ploughed
11	6	XVI	Recently ploughed
12	6	XVI	Recently ploughed

Table 2: Summary of the field conditions at the time of the property inspection.

² Note that activities such as agricultural cultivation do not affect archaeological potential.

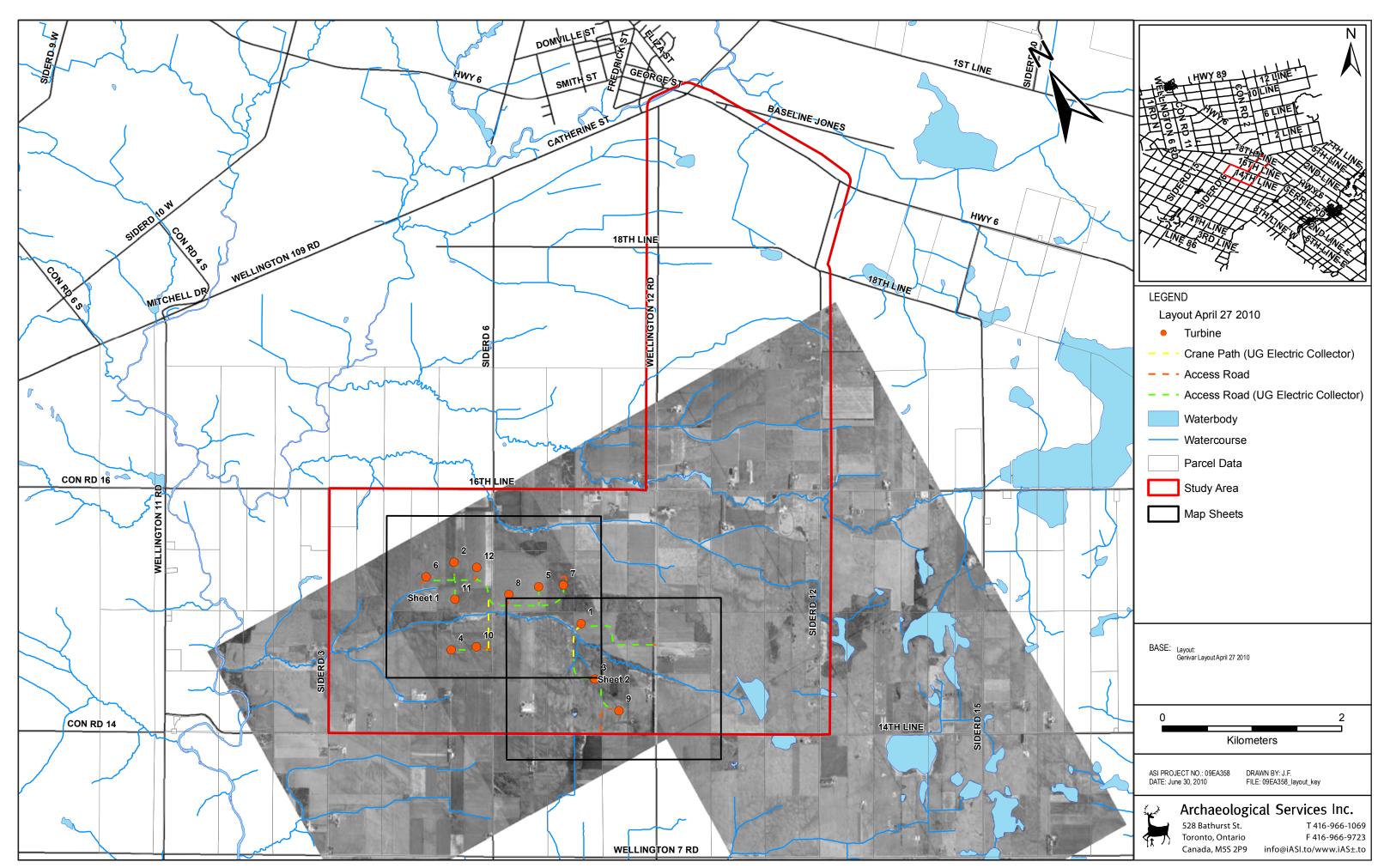


Figure 5: NextEra Conestogo Wind Farm - Key Plan

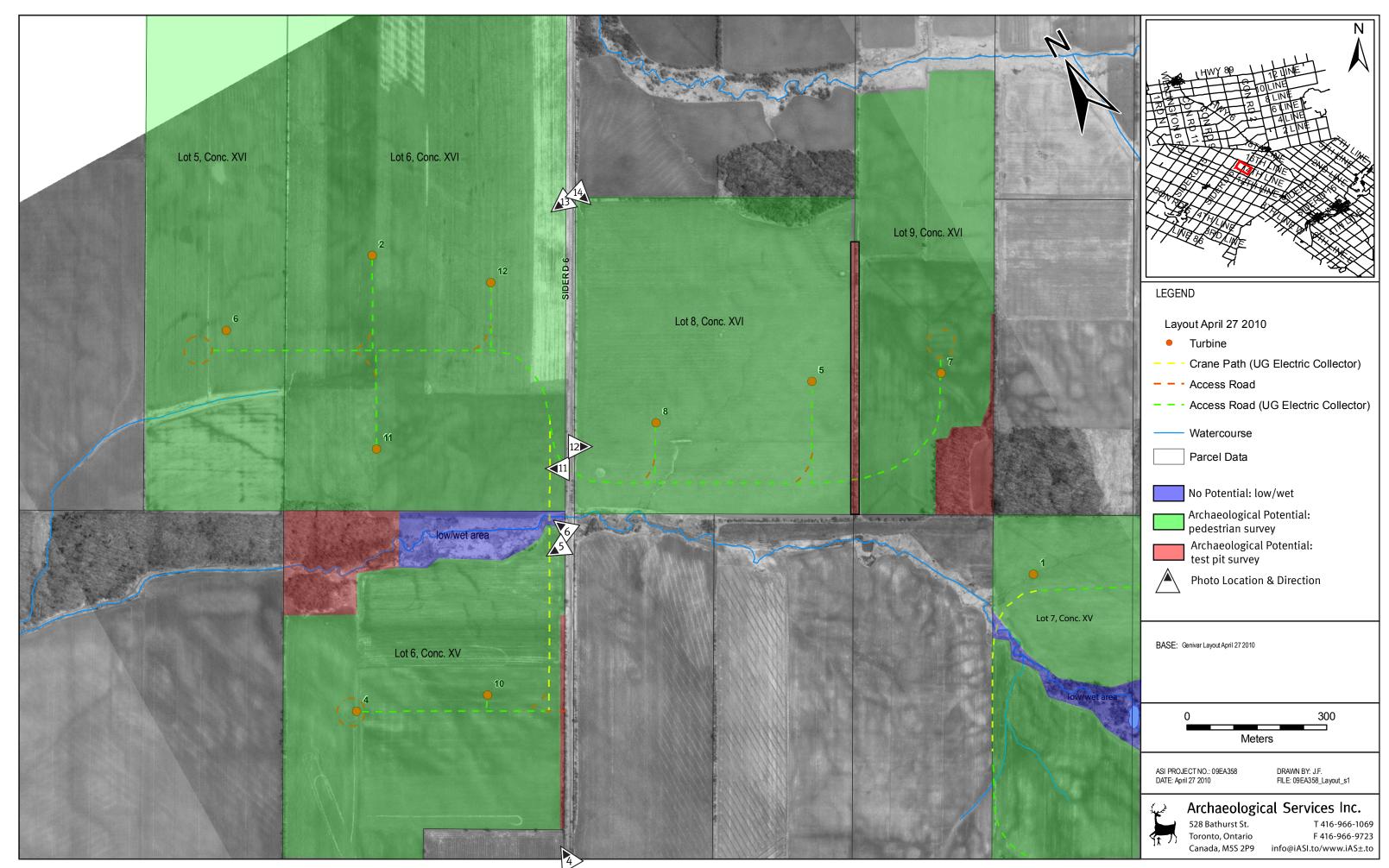


Figure 6: NextEra Conestogo Wind Farm - Results of the Stage 1 Archaeological Assessment

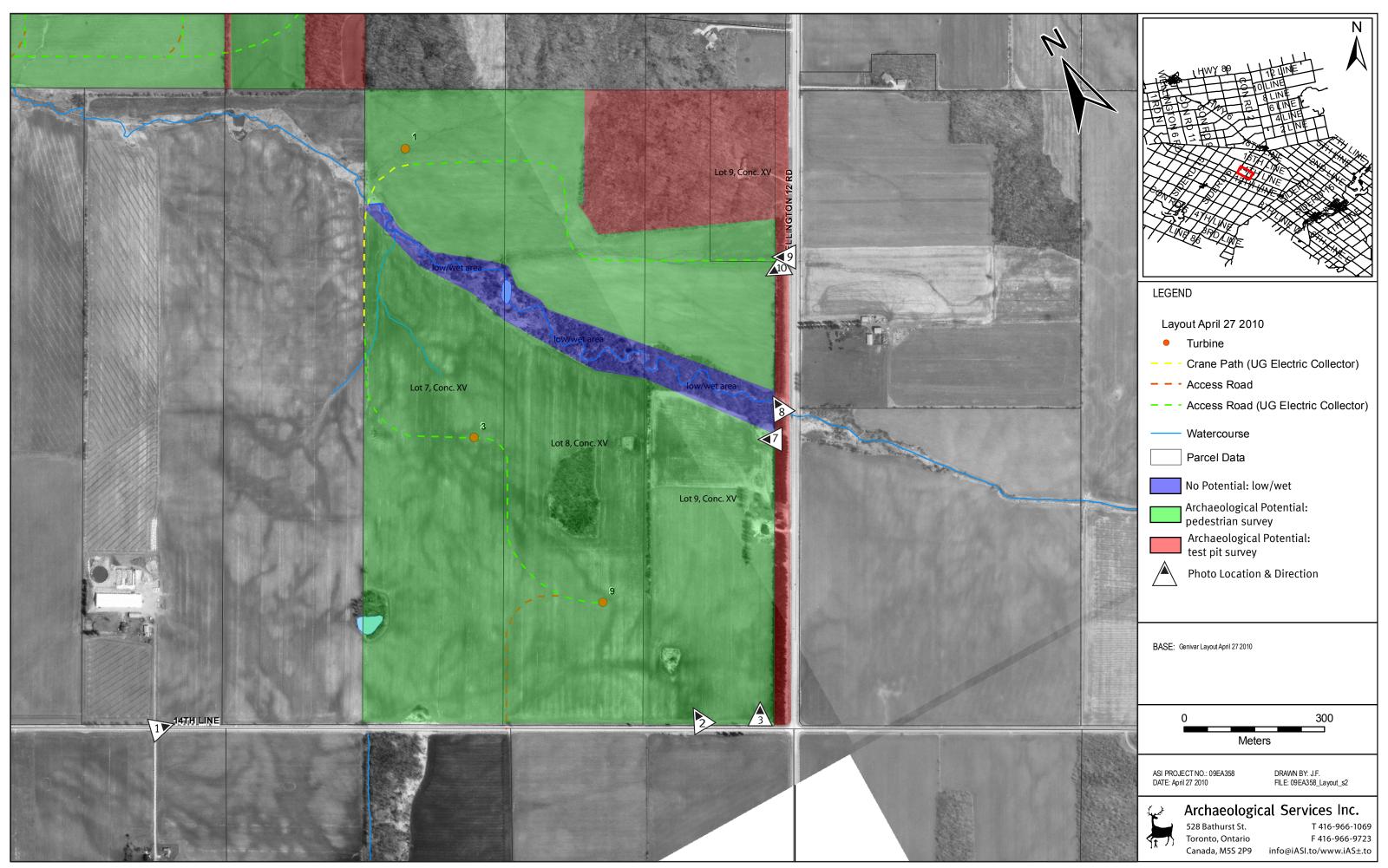


Figure 7: NextEra Conestogo Wind Farm - Results of the Stage 1 Archaeological Assessment

5.0 RECOMMENDATIONS AND COMPLIANCE ADVICE

The Stage 1 archaeological assessment was completed to assist with the Conestogo Wind Energy Centre, in the County of Wellington, Ontario and was completed under O.Reg.359/09. The assessment determined that no archaeological sites had been registered with the study area. However, a review of the geography and local nineteenth century land use of the study area suggested that it has potential for the identification of Aboriginal and Euro-Canadian archaeological sites.

The property inspection revealed that the study area consists of a rural landscape, which is being extensively used for agricultural purposes. It confirmed that the area is drained by numerous tributaries, and that the landscape exhibited minimal to no previous disturbances. As such, the property inspection supports the findings of the background research that the study area contains archaeological site potential.

In light of these results, the following recommendations are made:

- 1. Further to O. Reg 359/09, s. 22, additional archaeological assessment is required:
 - A Stage 2 property assessment is recommended in advance of any proposed construction impact on any lands (e.g. turbine sites, associated access roads, and crane paths) within the study area where there is potential for archaeological sites (based on the results of the Stage 1 property inspection), in accordance with *Draft Standards and Guidelines for Consultant Archaeologists* (MCL 2009). While impact may be expected on access roads, turbine work sites, off-road crane paths, and buried electrical lines, the Stage 2 assessment must examine and clear all designated work sites prior to construction.

ASI also advises compliance with the following legislation:

- This report is submitted to the Minister of Tourism and Culture as a condition of licensing in accordance with Part VI of the *Ontario Heritage Act*, RSO 1990, c 0.18. The report is reviewed to ensure that the licensed consultant archaeologist has met the terms and conditions of their archaeological licence, and that the archaeological fieldwork and report recommendations ensure the conservation, preservation and protection of the cultural heritage of Ontario;
- Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48 (1) of the *Ontario Heritage Act*. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out archaeological fieldwork, in compliance with sec. 48 (1) of the *Ontario Heritage Act*; and
- The *Cemeteries Act* requires that any person discovering human remains must immediately notify the police or coroner and the Registrar of Cemeteries, Ministry of Consumer Services.

The documentation related to this archaeological assessment will be curated by Archaeological Services Inc. until such a time that arrangements for their ultimate transfer to Her Majesty the Queen in right of Ontario, or other public institution, can be made to the satisfaction.

6.0 REFERENCES CITED

Archaeological Services Inc. (ASI)

2007 Stage 1 Archaeological Assessment Conestogo Wind Farm Project, Wellington County and Dufferin County, Ontario. Report on file with the Ministry of Tourism and Culture.

Chapman, L.J. and F. Putnam

1984 *The Physiography of Southern Ontario*. Ontario Geological Survey, Special Volume 2. Ontario Ministry of Natural Resources, Toronto.

Historical Atlas Publishing Co.

1906 Historical Atlas of the County of Wellington, Ontario. Toronto: Historical Atlas Publishing Co.

Ministry of Culture

2005 Ontario Heritage Act.

2009 *Standards and Guidelines for Consultant Archaeologists* (final draft, June 2009). Cultural Programs Branch, Ontario Ministry of Culture, Toronto.

Ministry of Environment

2009 Green Energy and Green Economy Act.

7.0 PHOTOGRAPHY



Plate 1: View east from 14th line toward agricultural field with low/wet wooded area.



Plate 3: View north-northeast up gentle slope of ploughed field with modern farm in far distance.



Plate 5: View west at gently rolling terrain toward proposed Turbine 4.



Plate 2: View north across active agricultural field in direction of proposed Turbine 3 and 9.



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Plate 6: View north-northwest across corner of agricultural field with creek valley in distance.





Plate 7: View west-northwest across fallow ground above creek valley.



Plate 9: View west-northwest along access road and margin of fallow field.



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Plate 8: View north along stream/ low and wet ground.



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Plate 12: View east-southeast across active agricultural field toward proposed Turbine 8. Note dip in distance marks a seasonally wet stream.





Plate 13: View west across active agricultural field toward proposed Turbine 12.



Plate 14: View south-southeast across active agricultural field toward proposed Turbine 5.

