

APPENDIX B:
Environmental Features in the Study Area -
Baseline Data

APPENDIX B-1:
Stage 1 Archaeological Assessment Report

Hydro One

Stage 1 Archaeological Assessment
Barrie Area Transmission Upgrade
City of Barrie and Township of Springwater, Simcoe County,
Ontario

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EXECUTIVE SUMMARY

AECOM was retained by Hydro One to conduct a Stage 1 Archaeological Assessment in advance of upcoming upgrades to the Barrie Area Transmission Upgrade, in the City of Barrie and Springwater Township. This work includes upgrading the existing 115 kilovolt (KV) lines to a 230 KV line as well as upgrades to the Barrie and Essa Transformer Stations. The study area is comprised of approximately nine kilometers of right of way as well as an additional 20 m buffer, and cover 137.42 ha of land to accommodate station expansion. The existing transmission corridor crosses a mix of farmland, forested areas and industrial lands in the City of Barrie and Springwater Township, Simcoe County, Ontario.

This report details the rationale, methods and results of the Stage 1 Archaeological Assessment. Stage 1 background research into the archaeological and land use history of the property indicated that it had moderate to high potential for containing archaeological remains. AECOM conducted the Stage 1 property inspection on July 8, 2016. The results of the Stage 1 assessment indicate that, although several portions of the study area have been visibly disturbed by past construction activity and quarrying related activities, the majority of the property appears to be undisturbed and therefore contains medium to high archaeological potential. Given the results of this assessment, AECOM makes the following recommendations:

- 1) Prior to any ground disturbance on the subject property, areas deemed to have archaeological potential (areas marked in green and yellow on **Figures 4-8**) must be subject to a Stage 2 archaeological assessment using the test pit survey method at 5 m intervals, or the pedestrian survey method at 5 m intervals where ploughing is possible. The assessment must be conducted by a licensed consultant archaeologist in accordance with the *Standards and Guidelines for Consultant Archaeologists* put forth by the Ministry of Tourism, Culture and Sport (2011).
- 2) Areas that are marked in red on **Figures 4-8** can be considered clear of further archaeological concern as it was determined that there are no archaeological resources present on these lands.
- 3) Those properties for which permission to access has not been obtained (areas marked in black cross hatching in **Figures 4-8**) will require Stage 2 archaeological assessments prior to any construction within the study area.

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1.0 PROJECT BACKGROUND

1.1 Development Context

This report details the rationale, methods and results of the Stage 1 Archaeological Assessment for the Barrie Area Transmission Upgrades, with upgrades to the Essa TS to Barrie TS Transmission lines, located in the City of Barrie and Springwater Township, Simcoe County, Ontario. The assessment was done by AECOM on behalf of Hydro One. The study area consists of approximately 9 km of right of way as well as an additional 20 m buffer. The objective of this assessment is to determine whether archaeological potential exists within the study area. This assessment is being completed as a part of the Class Environmental Assessment (EA) for Minor Transmission Facilities.

This Stage 1 Archaeological Assessment was completed using background research to describe the geography, land use history, previous archaeological fieldwork and current conditions of the land, as well as an optional field review in order to confirm the presence or absence of disturbance. In addition to the Stage 1 field review, satellite imagery and thematic and historic maps were analyzed in order to evaluate the archaeological potential found within the proposed study area.

The Stage 1 Archaeological Assessment was completed under the project direction and archaeological licence Glenn Kearsley [licence #P123] (AECOM). Work was completed in accordance with the provisions of the *Ontario Heritage Act* (2005) and with the Ontario's Ministry of Tourism, Culture and Sport's (MTCS) *Standards and Guidelines for Consultant Archaeologists* (2011). The Stage 1 Archaeological Assessment field review was completed under the direction of Alexandra Mullan [R1006] (AECOM). Permission to access some of the properties were granted by Hydro One, with the exception of the Gun Club located within the study area where permission to access was not provided. This report details the results of the Stage 1 Archaeological Assessment and provides a recommendation.

1.2 Objectives

The Stage 1 Archaeological Assessment has been conducted to meet the requirements of the MTCS's *Standards and Guidelines for Consultant Archaeologists* (Ontario Government 2011). The objective of the Stage 1 Archaeological Assessment background study is to document the archaeological and land use history and present conditions within the study area. This information will be used to support recommendations regarding cultural heritage value or interest as well as assessment strategies. The Stage 1 Archaeological Assessment research information will be drawn from:

- MTCS's Ontario Archaeological Sites Database (OASD) for a listing of registered archaeological sites within a 1 km radius of the study area;
- Reports of previous Archaeological Assessments within 50 m of the study area;
- Visual inspection of the subject area lands
- Recent and historical maps of the study areas; and
- Archaeological management plans or other archaeological potential mapping, where available

1.2 Historical Context

1.2.1 Pre-contact Period Overview of Southern Ontario

Although southern Ontario was exposed after glacial retreat as early as 15,000 B.P., it was not until 10,900 B.P. to 9,500 B.P. that land access routes opened up allowing the first inhabitants, referred to by archaeologists as Paleo-Indians, into the area. Paleo-Indians were widely scattered, nomadic groups that occupied the sub-tundra-like environment that

prevailed in southern Ontario during that time. Past research indicates that these groups likely followed big game (such as Caribou) across the landscape, preferring to camp on high ground, immediately adjacent to water sources, such as glacial lakes or spillways, where smaller game and plant foods would have also been harvested. Due to the relative antiquity of Paleo-Indian sites, all that remains at their occupations are stone tool fragments and their characteristic spear points known as “fluted points”.

The subsequent Archaic period (9,500 B.P. to 2,800 B.P.) is characterized by a warming climate and a temperate forest environment which was crisscrossed by streams and rivers and surrounded by large fresh water lakes that would have supported many species of fish, shorebirds and mammals. Small hunting and gathering bands (20-50 people) utilized the lake shores during the spring and summer months, then broke into smaller family groups and moved inland for the fall and winter to hunt and trap. Archaic period tool assemblages consisted of both chipped and ground/polished stone implements indicating that a wider variety of activities, such as fishing, woodworking and food preparation/grinding, were now taking place.

The Archaic period was followed by the Woodland period (2,800 B.P. to A.D. 1650) which is subdivided into three phases. The Early Woodland period (circa 2,800 B.P. to A.D. 0) is characterized by the introduction of pottery as a means of food production / storage and an increase in regional trade networks. This trading of exotic goods, such as obsidian, silver, copper and sea shells persists into the Middle Woodland period (circa A.D. 0 to A.D. 900) when horticulture was introduced to southern Ontario resulting in a more sedentary lifestyle in seasonal villages, and more elaborate burial ceremonies – including the construction of large, earthen mounds. The Late Woodland period (circa A.D. 900 - 1650) is marked by the establishment of palisaded villages (often containing dozens of longhouse structures), intensified agriculture and an increase in regional warfare.

Commencing in the 12th century and continuing into the 17th century, the Huron-Wendat peoples inhabited the area between Lake Simcoe and Georgian Bay known historically as Huronia, (present day Simcoe County (Ramsden 1990: 361)). The Huron-Wendat people favoured this area for a variety of reasons including availability of fish and game, suitability of soils for maize based horticulture and, later, its safety from raids by the Five Nation Iroquois in New York State, easy access to Algonquian traders, and proximity to the hunting territories on the Canadian Shield (Warwick 2013: 72). As with other Late Woodland groups around the Great Lakes, the Huron-Wendat lived in large, multi-hectare villages comprised of dozens of long house structures and surrounded by multiple rows of palisades. They also utilized temporary settlements such as hunting and fishing camps or small inland hamlets thought to be “satellites” of major villages (Ramsden 1990: 373). Artifact assemblages from Huron-Wendat sites can be large and varying, and include ceramics, smoking pipes, tools made from stone, antler and bone and beads / decorative / ritual items (Ramsden 1990: 363). Post contact, European manufactured items such as copper arrow points, knives, and kettles can also be found on Huron-Wendat sites (Ramsden 1990: 363).

Early exploration into Simcoe County began in 1615 when Samuel de Champlain traveled from Lake Nipissing down the French River and along the eastern shores of Georgian Bay. He visited many Huron-Wendat villages in an effort to ally himself with the Huron-Wendat against the Iroquois. The population in this area at the time was approximately twenty to thirty thousand, and they mainly relied on the cultivation of maize. In addition to French fur traders; Jesuit missionaries had entered the area in an effort to convert the native peoples to Christianity. Unfortunately, religious and world views the French traders and Jesuits Missionaries brought with them deeply divided Huron-Wendat villages, and diseases that devastated the populations of the Aboriginal people in this part of the Great Lakes so that, when the Five Nations began large scale raids on the Huron-Wendat in the 1640's, it marked the end of their occupation in Huronia. The Jesuits abandoned the area in 1650, and it was close to 150 years before British settlers entered the area for the first time (Belden 1881: 4).

1.2.2 Post-Contact / Historical Overview

The Essa TS to Barrie TS study area is now located in the City of Barrie, and Springwater Township. Historically, the study area was located within the Township of Vespra, in the County of Simcoe. Simcoe County is situated east of Grey and Wellington Counties, north of York County, and within the boundaries formed by the Holland and Severn Rivers, Lakes Simcoe and Couchiching, and Georgian Bay from the mouth of the Severn to the northeast corner of Grey County (Belden 1881: 3).

The County of Simcoe was named after Lieutenant Governor John Graves Simcoe, the first Lieutenant Governor of Upper Canada from 1791-1796. The first settlers in Simcoe County came in 1815 and settled in West Gwillimbury. There is no record of the location of settlers within the borders of Vespra Township, until 1819 when several settlements sprang up along the Penetanguishene Road (Beldon 1881: 7). It was several more years before settlement extended away from the highway into the interior of the township.

The Town of Barrie played a large role for the British in the War of 1812; a storage depot was established on its shores through which military supplies were shipped by portage to the Nottawasaga River and on to posts on upper Lake Huron and Georgian Bay (Beldon 1881: 7). This route is known as the Nine-Mile Portage, originally an aboriginal portage it was utilized heavily during the war for the movement of supplies. Its route was first mentioned in 1793 by Lieutenant-Governor Simcoe on a sketch map.

Barrie was surveyed by Wm. Hawkins, P.L.S., who also surveyed in Sunnidale Road through Vespra. In the 1830's more settlers began to move into the area, and the first store and tavern was built in 1831, a post office and church was established in 1834, and the first school in 1836. By 1879 there were a number of railways in the area known collectively as The Northern Railway Group (Anderson and Anderson 1987: 56). In 1888 The Northern Railway Group was taken over by the Grand Trunk, which became the Canadian National Railway (CPR) in 1920 (Anderson and Anderson 1987: 57). The railway was built through Vespra between 1906 and 1908, and in 1906 tracks were laid across the Penetanguishene Road. The building of Sunnidale Road and the Northern Railway marked the end of the Nine-Mile Portage. The North Simcoe Railway, which was built in 1878 and abandoned in 1991, was located just north of the Ontario Simcoe and Huron Union Railway, and is found in the western section of the study area.

Barrie was incorporated as a "town" in 1850, but lacked any municipal organization. In 1854 it sent a representative from Vespra to the County Council and appointed Jonathan Lane as its first reeve; however its municipal organization at the time was still that of a village (Hunter 1998: 210). Barrie was finally recognized as a town in 1871 with Robert Simpson as its first mayor (Hunter 1998:210). In 1897 the village of Allandale was incorporated into Barrie.

1.3 Archaeological Context

Physiography and Current Conditions of the Site Area

The study area is located in the Simcoe uplands physiographic region of Southern Ontario. The Simcoe uplands region is comprised of broad, rolling till plains which are separated by steep-sided, flat-floored valleys (Chapman and Putnam, 1984: 182). These areas are encircled by a number of shorelines indicating they were once islands in Lake Algonquian. Within this physiographic region are broad uplands south of Barrie and high ground north of Alliston, which stand approximately 200 feet above the adjoining lake plains.

The origin of the ridges and valleys in Simcoe County is not certain (Chapman and Putnam, 1984: 182). The most likely explanation is that the surface form follows the bedrock topography. It is also possible that the ridges originated as moraines due to an ice lobe in the Georgian Bay depression. Regardless, their surfaces were planed by a glacier moving towards the southwest. The till in the Simcoe uplands is different than that found east of Lake Simcoe, as it

consists mostly of Precambrian rock rather than limestone. In more southern areas it is a gritty loam, becoming sandier and boulder towards the north. There are heavier and more calcareous till near Lake Simcoe and Midland.

The original forests in the Simcoe uplands consisted of hardwoods, sugar maple and beech, as well as white pine. Yellow birch, basswood, and hemlock were also common (Chapman and Putnam, 1984: 183). The white pine was mostly logged during the lumbering period, but beech is still abundant. The agriculture of the region is comprised of mixed farming including hay, corn, mixed grains, barley, oats, and wheat in addition to livestock.

The study area corridor is approximately 9km long and passes through grasslands and active agricultural fields. A small section of the corridor passes through a residential neighborhood and industrial buildings. There are two active Hydro One transformer stations (TS) within the study area as well as an active quarry. These areas have been disturbed by deep ground alterations.

Previous Archaeological Research

In Ontario, information concerning archaeological sites is stored in the Ontario Archaeological Sites Database (OASD) maintained by the MTCS. This database contains archaeological registered sites within the Borden system. Under the Borden system, Canada has been divided into grid blocks based on longitude and latitude. A Borden block is approximately 13 km east to west, and approximately 18.5 km north to south. Each Borden block is referred to by a four letter designation and sites located within the block are numbered sequentially as they are found. The subjected property is situated within the *BcGw* Borden block.

According to the OASD, four registered archaeological sites have been identified within 1 km of the Essa TS to Barrie TS study area (MTCS 2016). Of these sites, three are pre-contact (*BcGw*-17, *BcGw*-71, and *Vespra* 41) and one is a post-contact tavern site (*BcGw*-48).

Table 1: Registered Archaeological Sites within 1 km of the Study Area

Borden #	Site Name	Cultural Affiliation	Site Type/Feature	Researcher	Comments
BcGw-17	Bennett	Archaic	Campsite	Jamie Hunter (1977)	Archaic campsite, original report dated 1977. No other information available.
BcGw-48	Tavern	Euro-Canadian	Tavern/restaurant	Richard Sutton (1991)	Ceramics, pipe stems, glass & nails collected during survey activity. Further work required.
BcGw-71	MLJ	Late Woodland	Hamlet	Marilyn Cornies (2001)	A total of 458 artifacts collected during Stage 1-3 Archaeological Assessments. One longhouse and several smaller structures found. Further work required.
BcGw-18	Barrie	Huron-Wendat	Village	Andrew Hunter (1907)	Iroquoian village dating to 1280-1330 A.D, first reported by Andrew Hunter as <i>Vespra</i> #41.

There are a number of Huron-Wendat village sites in *Vespra* that were identified by Andrew Hunter in the late 19th and early 20th centuries. The *Barrie* site (*BcGw*-18), located north of the study area, was first reported by Hunter as *Vespra* #41 (Sutton 1999). This site is actually a number of small sites which represents one of the earliest known Uren substage Middle Iroquoian villages in the south-central Ontario. The *Barrie* site was excavated by Frank Ridley in 1958,

limited test excavations were completed in 1976 by J. Hunter and Richard Sutton completed test unit and salvage excavations between 1991 and 1993 (Ridley 1958; Hunter 1977; Sutton 1999). Sutton's excavations indicated that the size was approximately 0.8-0.9 hectares, with two longhouses and four midden areas, as well as over 500 post moulds and 47 features (Sutton 1999). A total of 18,499 artifacts were recovered, including ceramics, lithics, copper, worked bone and faunal remains (Sutton 1999: 48).

There have been no other archaeological assessments completed within 50 m of the study area.

Existing Conditions

The Essa TS to Barrie TS study area begins at the northwest corner of Tiffin Street and Highway 400 in Barrie and ends at the northwest corner of Highway 90 and Pinegrove Road in Springwater Township. The corridor passes through forested areas, grass meadows, active agricultural fields, residential and industrial areas, as well as the Barrie Gun Club and an active quarry as well as both the Essa TS and the Barrie TS. The North Simcoe Rail Trail, a part of the Trans Canada Trail, is located in the western portion of the study area, found between the Essa TS and the quarry. This trail follows the former North Simcoe Railway, which was built in 1878 and abandoned in 1991.

Determination of Archaeological Potential

Archaeological potential is established by determining the likelihood that archaeological resources may be present on a subject property. Criteria commonly used by the MTCS (2011) to determine areas of archaeological potential include:

- Proximity to previously identified archaeological sites;
- Distance to various types of water sources;
- Soil texture and drainage;
- Glacial geomorphology, elevated topography and the general topographic variability of the area;
- Resource areas including food or medicinal plants, scarce raw materials and early Euro-Canadian industry;
- Areas of early Euro- Canadian settlement and early transportation routes;
- Properties listed on municipal register of properties designated under the *Ontario Heritage Act*;
- Properties that local histories or informants have identified with possible archaeological sites, historical events, activities or occupants; and
- Historic landmarks or sites.

Distance to modern or ancient water sources is generally accepted as the most important element for past human settlement patterns and when considered alone may result in a determination of archaeological potential. In addition any combination of two or more of the criteria listed above, such as well drained soils or topographic variability, may indicate archaeological potential.

Certain features indicate that archaeological potential has been removed, such as land that has been subject to extensive and intensive deep land alterations that have severely damaged the integrity of any archaeological resources. This includes landscaping that involves grading below the topsoil level, building footprints, quarrying and sewage and infrastructure development (MTCS 2011).

The evaluation of archaeological potential has determined that there is the potential for pre-contact and contact period Aboriginal archaeological resources, based on topography and soil conditions, registered archaeological sites and proximity to potable water. The potential for Euro-Canadian archaeological resources is also judged to be high, based on the early settlement of the area.

2.0 STAGE 1 FIELD REVIEW

The Stage 1 Archaeological Assessment was completed using historical mapping, aerial photographs, and background research. In order to gain first-hand knowledge of the study area, to evaluate if modern disturbance may have occurred within the study area and to confirm whether or not features of archaeological potential, perhaps not visible on mapping, were present AECOM conducted the Stage 1 field review of Essa TS to Barrie TS on July 8, 2016 under the field direction of Alexandra Mullan [R1006]. The field review was carried out as outlined in **Section 1.2** of the *Standards and Guidelines for Consultant Archaeologists (MTCS 2011)*. The sections of the study area for which permission to access had been obtained was photo-documented, which is illustrated in **Appendix B**, as well as **Figure 3** in **Appendix A**. Weather conditions during this time was overcast with an average temperature of 22.4 degrees Celsius (**Table 2**).

Table 2: Weather Conditions during Field Review

Date	Weather Conditions	Temperature
July 8, 2016	Hot and overcast	22.4°C

Sections of the subject property lie within an area that has previously been used to construct a transformer station, residential properties, industrial properties, and a quarry. These areas are considered disturbed and any archaeological potential has been removed. The remainder of the study area is a linear hydro corridor that passes through grass meadows, forested areas and active agricultural lands. A section of the corridor passes through the Barrie Gun Club; however permission to access was not obtained at the time of the field review.

These conditions and disturbances were photo-documented and are illustrated in **Appendix B**, as well as on **Figure 3** in **Appendix A**. **Table 3** depict the results of the Stage 1 Field Review.

Table 3: Results of the Stage 1 Archaeological Assessment

Survey Method	Hectares	%
Disturbed	64.99	46.52
No Permission to Access	22.83	16.34
Pedestrian Survey Required	3.16	2.26
Test Pit Survey Required	48.716	34.87
Totals	139.70	100

Documentation generated during the field review includes 1 page of notes and observation, maps and photographs. **Table 4** below is an inventory of the documentary record.

Table 4: Inventory of the Documentary Record

Photographs	Maps	Field Notes
78	4	1 page general field notes, 1 page of photo logs

3.0 ANALYSIS AND CONCLUSIONS

The Stage 1 Archaeological Assessment for the Barrie Area Transmission Upgrade, City of Barrie and Springwater Township, Simcoe County, Ontario was completed on behalf of Hydro One in advance of upcoming upgrades to the Transmission lines from Barrie TS to Essa TS. This work includes upgrading the existing 115 KV lines to a 230 KV line as well as upgrades to the Barrie and Essa Transformer Stations. The field review was completed on July 8, 2016 in order to document the current conditions of the study area. The optional property inspection combined with the examination of detailed mapping, satellite imagery, historical mapping and historical documentation were used in order to evaluate the property's archaeological potential.

Based on the field review and background research into the archaeological and land use history it has been determined that the study area has moderate to high potential for containing archaeological resources. While some of the lands within the study area have been disturbed by past residential and industrial construction, as well as quarrying activities, there remains archaeological potential for both Euro-Canadian and Aboriginal resources, based on proximity to water, previously registered archaeological sites, physiographic characteristics, and early Euro-Canadian settlement. Along with those portions of the study area for which permission to enter was not available (Barrie Gun Club), Stage 2 survey will be required in these areas. All other lands have been deeply disturbed by past construction and should be considered clear of any further archaeological potential.

4.0 RECOMMENDATIONS

Based on the results of this assessment AECOM makes the following recommendation:

- 1) Prior to any ground disturbance on the subject property, areas deemed to have archaeological potential (areas marked in green and yellow on **Figures 4-8**) must be subject to a Stage 2 archaeological assessment using the test pit survey method at 5 m intervals, or the pedestrian survey method at 5 m intervals where ploughing is possible. The assessment must be conducted by a licensed consultant archaeologist in accordance with the Standards and Guidelines for Consultant Archaeologists put forth by the Ministry of Tourism, Culture and Sport (2011).
- 2) Areas that are marked in red on **Figures 4-8** can be considered clear of further archaeological concern as it was determined that there are no archaeological resources present on these lands.
- 3) Those properties for which permission to access has not been obtained (areas marked in black cross hatching in **Figures 4-8**) will require Stage 2 archaeological assessments prior to any construction within the study area.

The above recommendation is subject to Ministry of Tourism, Culture and Sport approval, and it is an offence to alter any archaeological site without MTCS concurrence. No grading or other activities that may result in the destruction or disturbance of an archaeological site are permitted until notice of Ministry of Tourism, Culture and Sport approval has been received.

5.0 ADVICE ON COMPLIANCE WITH LEGISLATION

a) This report is submitted to the Minister of Tourism, Culture and Sport as a condition of licencing in accordance with Part IV of the *Ontario Heritage Act*, R.S.O. 1990, c 0.18. The report is reviewed to ensure that it complies with the standards and guidelines that are issued by the Minister, and that the archaeological fieldwork and report recommendations ensure the conservation, protection and preservation of the cultural heritage of Ontario. When all matters relating to archaeological sites within the project area of a development proposal have been addressed to the satisfaction of the Ministry of Tourism, Culture and Sport a letter will be issued by the Ministry stating that there are no further concerns with regard to alterations to archaeological sites by the proposed development.

b) It is an offence under Sections 48 and 69 of the *Ontario Heritage Act* for any party other than a licensed archaeologist to make any alteration to a known archaeological site or to remove any artifact or other physical evidence of past human use or activity from the site, until such a time as a licensed archaeologist has completed archaeological fieldwork on the site, submitted a report to the Minister stating that the site has no further cultural heritage value or interest, and the report has been filed in the Ontario Public Register of Archaeological Reports referred to in Section 65.1 of the *Ontario Heritage Act*.

c) 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 Section 48 (1) of the *Ontario Heritage Act*.

d) The *Cemeteries Act*, R.S.O. 1990, c.C.4 and the *Funeral, Burial and Cremation Services Act*, 2002, S.O. 2002, c.33 (when proclaimed in force) require that any person discovering human remains must notify the police or coroner and the Registrar of Cemeteries at the Ministry of Consumer Services.

e) Archaeological sites recommended for further archaeological fieldwork or protection remain subject to Section 48 (1) of the Ontario Heritage Act and may not be altered, or have artifacts removed from them, except by a person holding an archaeological licence.

Documentation related to the archaeological assessment of this project will be curated by AECOM 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 of the project owner, the Ontario Ministry of Tourism, Culture and Sport, or any other legitimate interest groups.

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Appendix A: Figures

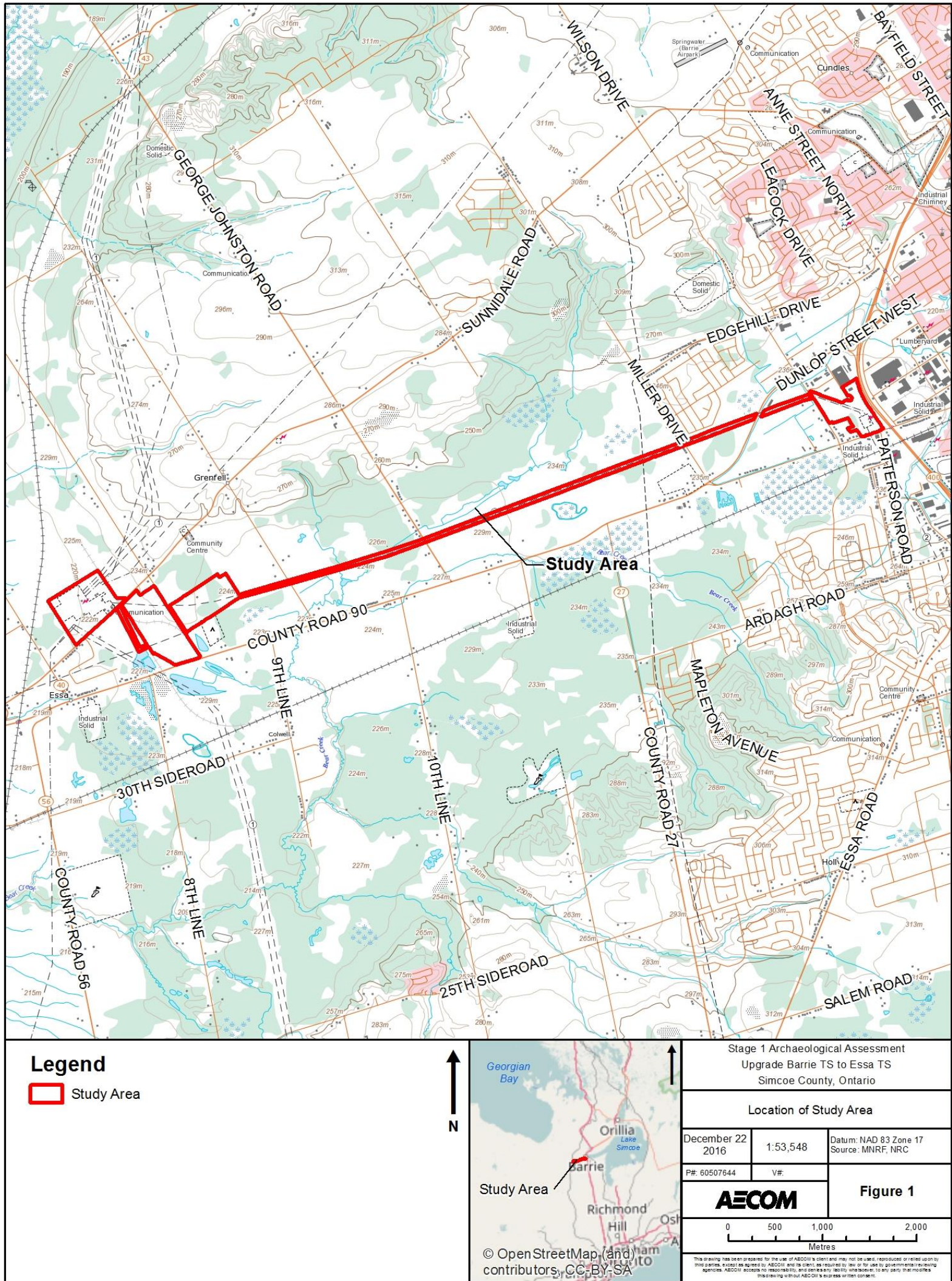


Figure 1: Location of the Essa TS to Barrie TS Study Area in Relation to the Topography

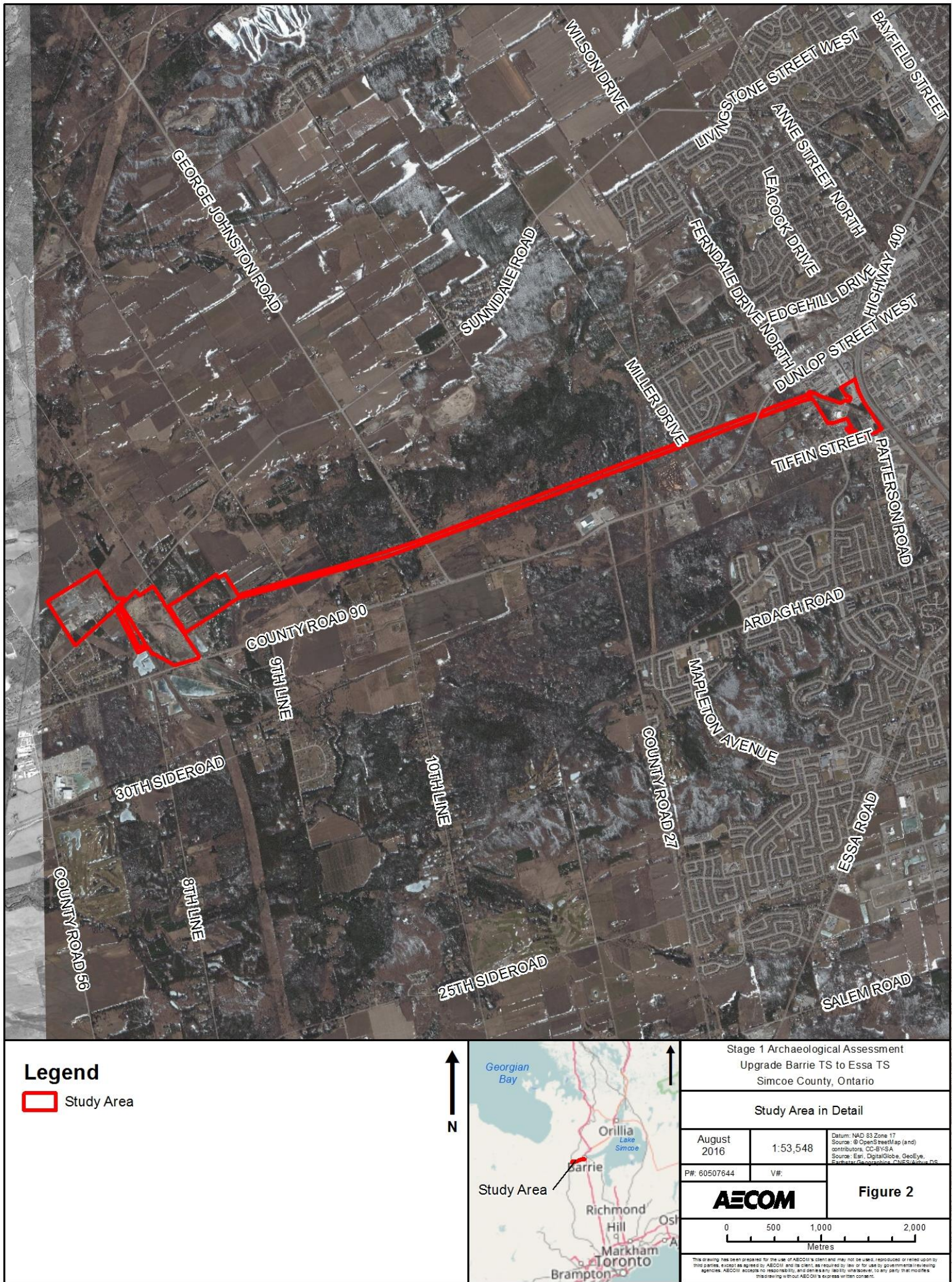


Figure 2: Essa TS to Barrie TS Study Area

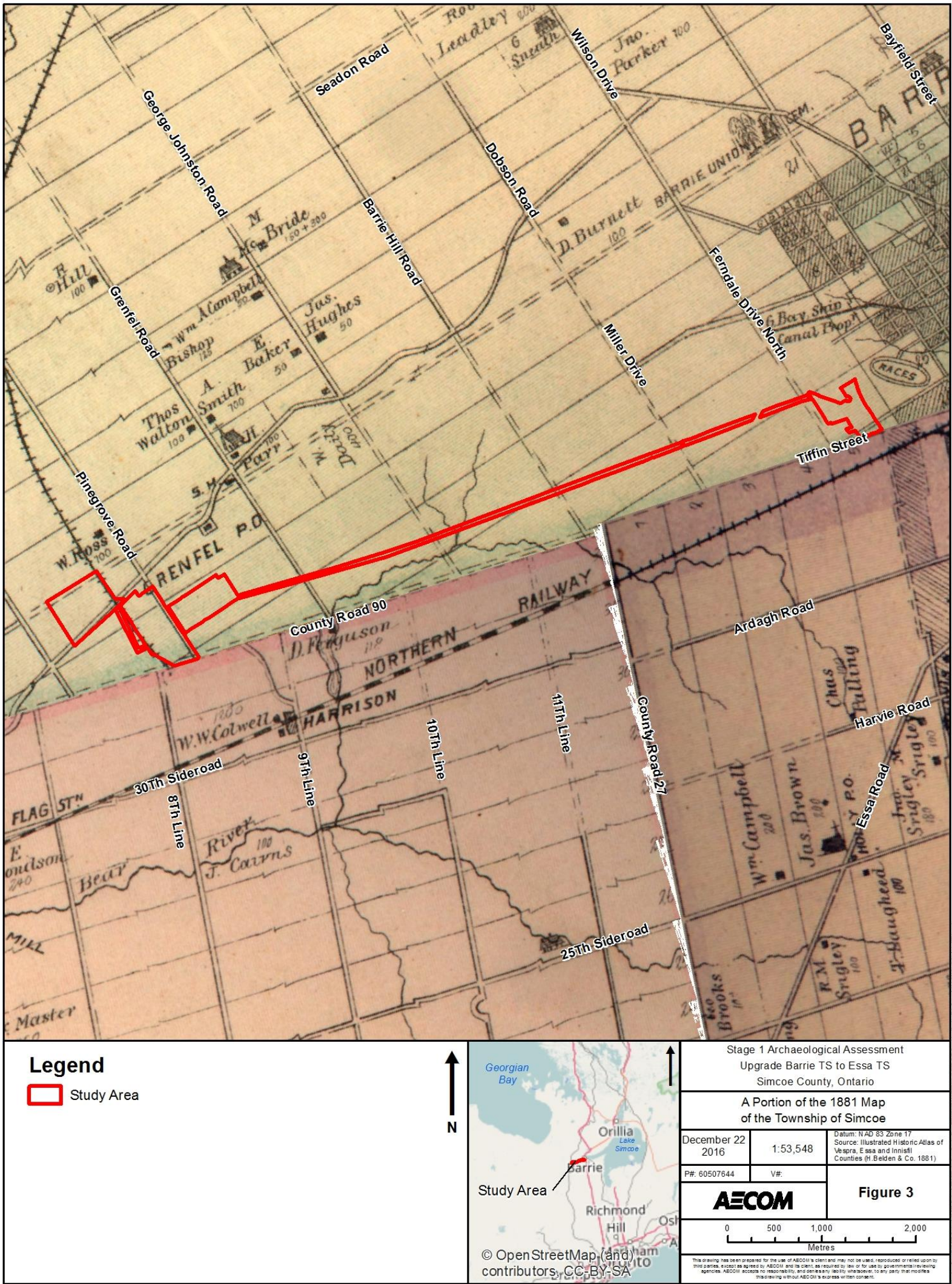


Figure 3: Essa TS to Barrie TS Study Area in Relation to the 1881 Historic Atlas Map

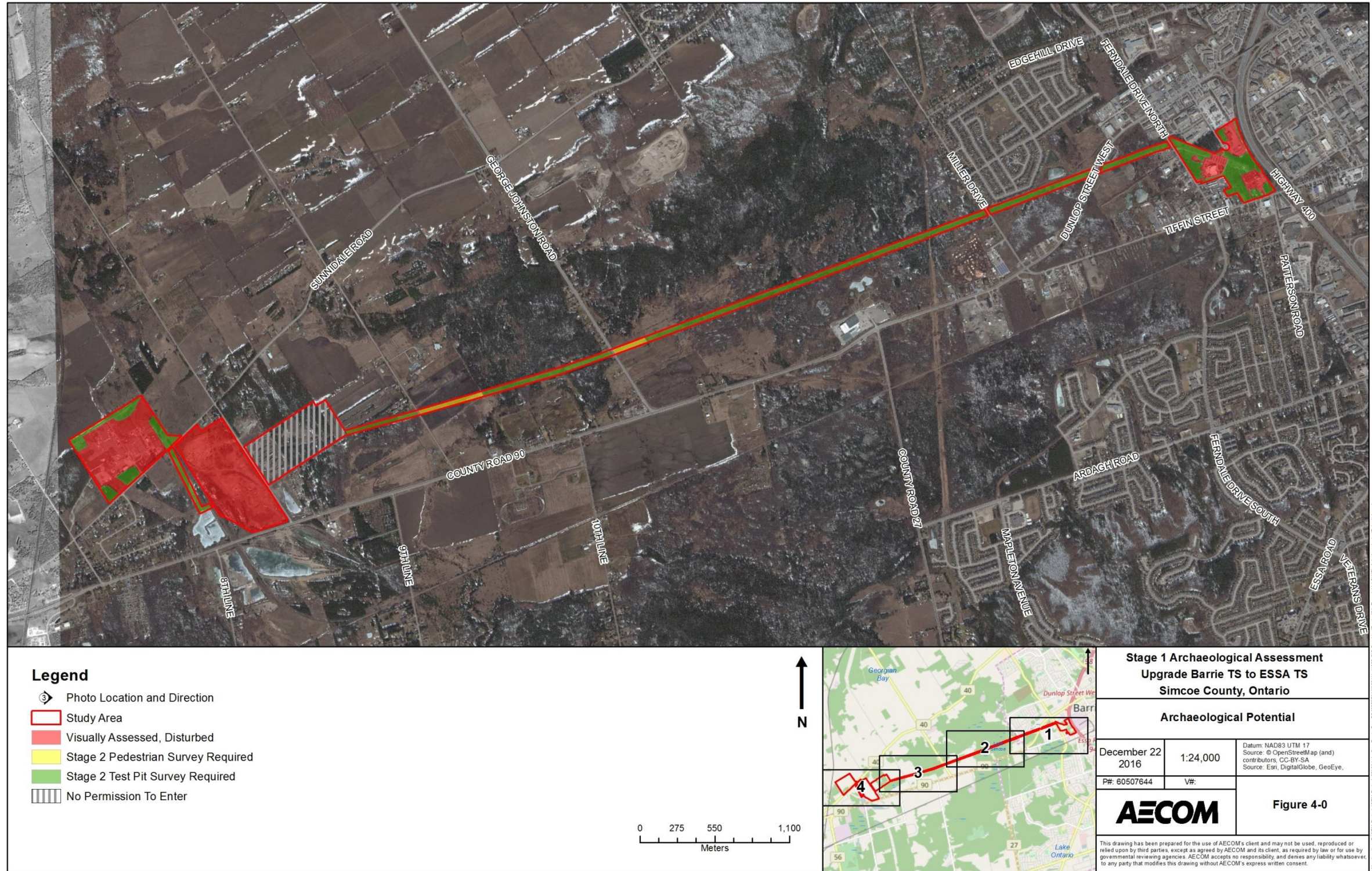


Figure 4: Results of the Stage 1 Archaeological Assessment for the Essa TS to Barrie TS Study Area



Figure 5: Results of the Stage 1 Archaeological Assessment for the Essa TS to Barrie TS Study Area with Recommendations and Photo Plates



Figure 6: Results of the Stage 1 Archaeological Assessment for the Essa TS to Barrie TS Study Area with Recommendations and Photo Plates

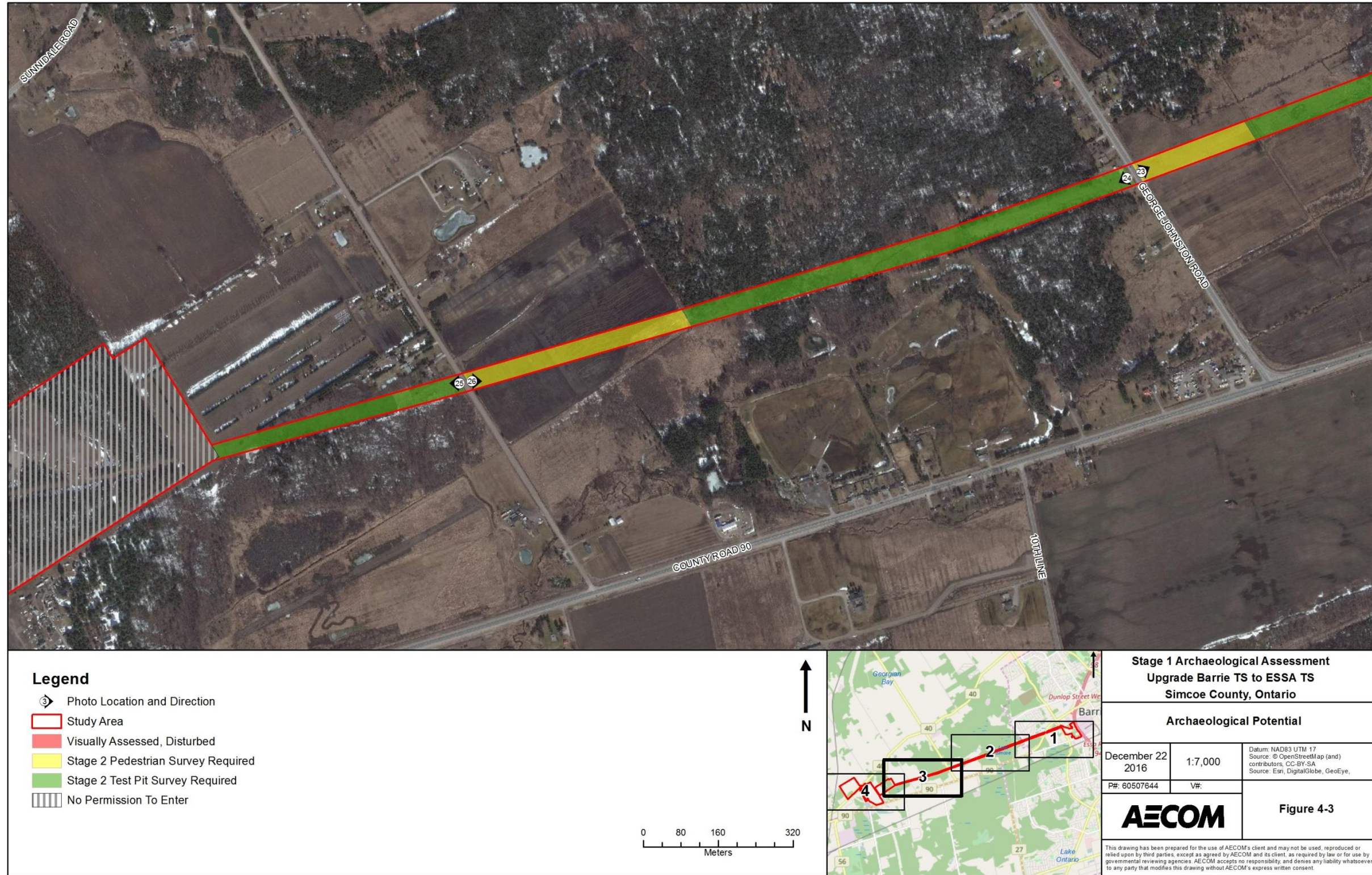


Figure 7: Results of the Stage 1 Archaeological Assessment for the Essa TS to Barrie TS Study Area with Recommendations and Photo Plates

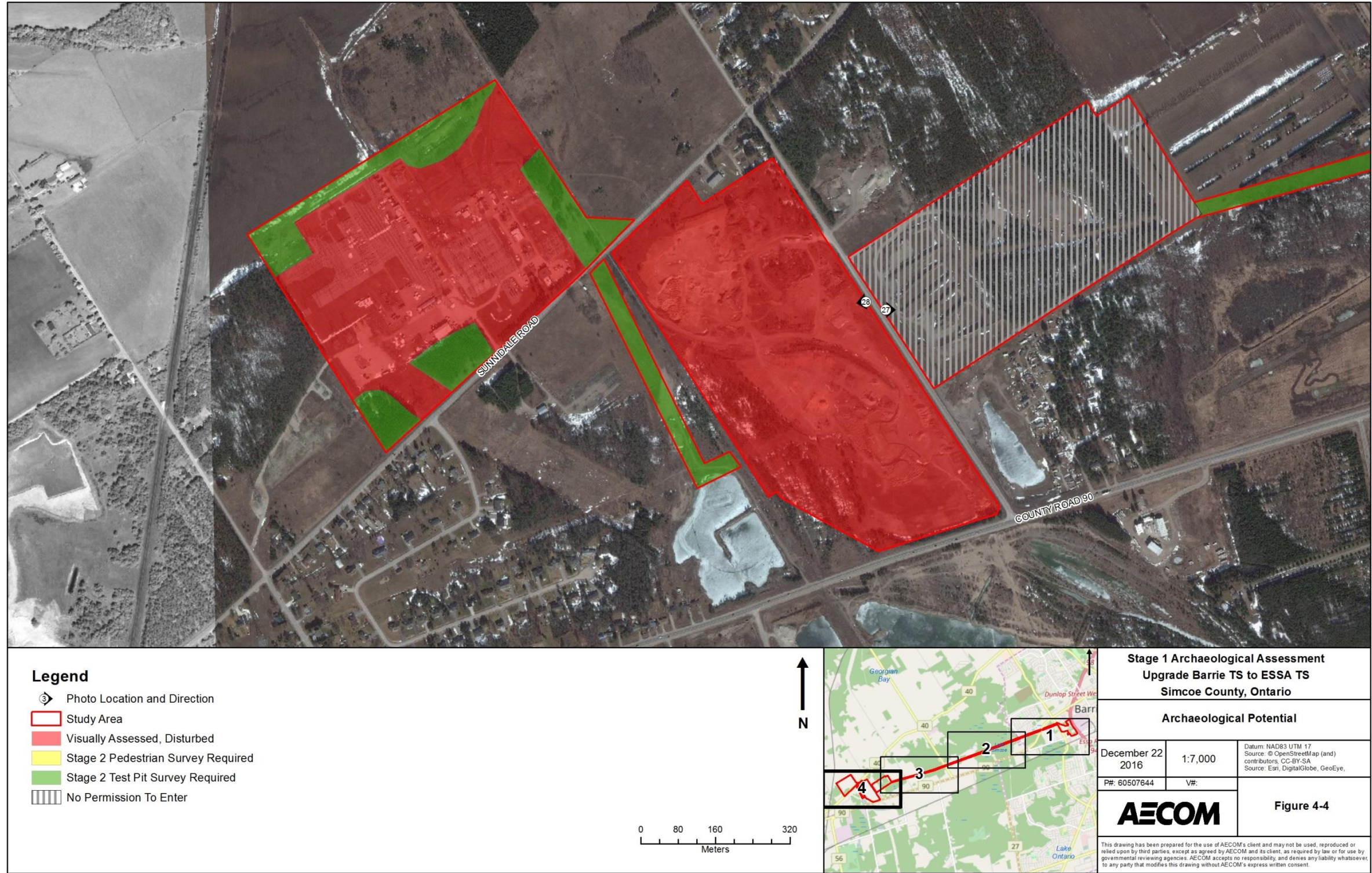


Figure 8: Results of the Stage 1 Archaeological Assessment for the Essa TS to Barrie TS Study Area with Recommendations and Photo Plates

Appendix B: Photo Plates



Photo 1: Flat, forested area to the southeast of existing transmission station; view east



Photo 2: Cleared area southwest of existing transmission station; view west



Photo 3: Barrie Transmission Station; view north



Photo 4: Barrie Transmission Station, disturbance from hydro tower; view northeast



Photo 5: Barrie Transmission Station; view northwest



Photo 6: Hydro corridor; view southeast



Photo 7: Disturbance from gravel road; view southeast



Photo 8: Forested area within study area; view west



Photo 9: Area filled with mobile trailers, view east



Photo 10: Gravel path along fence of Transmission Station;
view south



Photo 11: Barrie Transmission Station, disturbed from
construction; view northeast



Photo 12: Flat forested area, view west



Photo 13: Flat forested area, view west



Photo 14: Flat forested area, view east



Photo 15: Flat forested area, view west



Photo 16: Hydro corridor, disturbance from gravel road, view southeast



Photo 17: Hydro corridor; view northwest



Photo 18: Hydro corridor, ditch flooding associated with ongoing roadwork; view east



Photo 19: Hydro corridor through grass meadowland; view west



Photo 20: Hydro corridor through grass meadowland; view east



Photo 21: Hydro corridor through grass meadowland; view east



Photo 22: Hydro corridor through grass meadowland; view west



Photo 23: Hydro corridor through active agricultural field; view east



Photo 24: Hydro corridor through grass meadowland; view west



Photo 25: Hydro corridor through grass meadowland; view west



Photo 26: Hydro corridor through active agricultural field; view east



Photo 27: Hydro corridor through Barrie Gun Club property. No permission to access, condition of property unknown; view east



Photo 28: Hydro corridor through active quarry. No permission to access, condition of property unknown; view northwest



Photo 29: Hydro corridor through residential and industrial locations; view southeast



Photo 30: Hydro corridor through residential property; view northwest

APPENDIX B-2:
Stage 2 Archaeological Assessment Report

Hydro One

Stage 2 Archaeological Assessment

Barrie Area Transmission Upgrades

City of Barrie and Township of Springwater, Simcoe County,
Ontario

G.W.P. 06-20016

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PIF Number: **P123-0351-2017**

Related PIFs : P123-0316-2016

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Revision #	Date	Revised By:	Revision Description

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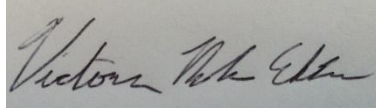
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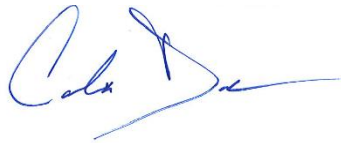
Quality Information

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Executive Summary

AECOM was retained by Hydro One to conduct a Stage 2 Archaeological Assessment (AA) in advance of upcoming upgrades to the Barrie Area Transmission Upgrade, in the City of Barrie and Township of Springwater. This work includes upgrading the existing 115 kilovolt (KV) lines to a 230 KV line as well as upgrades to the Barrie and Essa Transformer Stations. The study area is comprised of approximately nine kilometers of Right-of-Way (ROW) as well as an additional 20m buffer, and cover 55.782ha of land to accommodate station expansion. The existing transmission corridor crosses a mix of farmland, forested areas and industrial lands in the City of Barrie and Township of Springwater, Simcoe County, Ontario.

Stage 1 background research into the archaeological and land use history of the property indicated that it had potential for containing archaeological remains. The results of the Stage 1 AA indicated that, although several portions of the study area had been visibly disturbed by past construction activity and quarrying related activities, the majority of the property appeared to be undisturbed and therefore contained archaeological potential. The Stage 1 recommended that the areas deemed to have archaeological potential should be subject to Stage 2 assessment, using *Section 2.1.1 Pedestrian Survey* or *Section 2.1.2 Test Pit Survey* in the *Standards and Guidelines for Consultant Archaeologists* (20011). The assessment must be conducted by a licensed archaeologist.

This report details the results of the Stage 2 AA conducted by AECOM from June 01, 2017 to October 12, 2017. The Stage 2 AA was completed using *Section 2.1.1 Pedestrian Survey* and *Section 2.1.2 Test Pit Survey* in the *Standards and Guidelines for Consultant Archaeologists* (2011). The Stage 2 assessment found no archaeological resources within the study area.

Given the results of this assessment, AECOM makes the following recommendations:

- 1) Due to the presence of disturbance, low-lying permanently wet areas, and the fact that no archaeological resources were found during the Stage 2 assessment, the study area is deemed to no longer contain archaeological potential and should be considered clear of further archaeological concern.

Project Personnel

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Project Administrator:	Glenn Kearsley M.A [P123]
Field Director:	Rebecca Gray, Hons B. A. [R452]
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Acknowledgements

Proponent Contact:	Hydro One
Approval Authority:	Hydro One

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Under Separate Cover
Statement of Aboriginal Engagement

1. PROJECT BACKGROUND

1.1 Development Context

This report details the rationale, methods and results of the Stage 2 Archaeological Assessment (AA) for the Barrie Area Transmission Upgrades, located in the City of Barrie and Township of Springwater, Simcoe County, Ontario. The assessment was done by AECOM on behalf of Hydro One. This work includes upgrading the existing 115 kilovolt (KV) lines to a 230 KV line as well as upgrades to the Barrie and Essa Transformer Stations. The study area is comprised of approximately nine kilometers of Right-of-Way (ROW) as well as an additional 20m buffer, and cover 55.782ha of land to accommodate station expansion. The objective of this assessment is to determine whether archaeological resources are present within the study area. This assessment is being completed as a part of the Class Environmental Assessment (EA) for Minor Transmission Facilities.

The Stage 1 AA was completed using background research to describe the geography, land use history, previous archaeological fieldwork and current conditions of the land, as well as an optional field review in order to confirm the presence or absence of disturbance. In addition to the Stage 1 field review, satellite imagery and thematic and historic maps were analyzed in order to evaluate the archaeological potential found within the proposed study area. The results of the Stage 1 assessment indicated that, although several portions of the study area had been visibly disturbed by past construction activity and quarrying related activities, the majority of the property appeared to be undisturbed and therefore contained archaeological potential. The Stage 1 recommended that the areas deemed to have archaeological potential should be subject to Stage 2 assessment, using *Section 2.1.1 Pedestrian Survey* or *Section 2.1.2 Test Pit Survey* in the *Standards and Guidelines for Consultant Archaeologists* (2011). The assessment must be conducted by a licensed archaeologist.

The Stage 2 AA was completed under the project direction and archaeological licence Glenn Kearsley [licence #P123] (AECOM). Work was completed in accordance with the provisions of the *Ontario Heritage Act* (2005) and with the Ontario's Ministry of Tourism, Culture and Sport's (MTCS) *Standards and Guidelines for Consultant Archaeologists* (2011). The Stage 2 Archaeological Assessment field review was completed under the direction of Rebecca Gray [R452] (AECOM). The AECOM field crew was accompanied by either Jaaka Romain or Xavier D'aigle, monitors for the Huron-Wendat First Nation. Jaaka or Xavier were present in order to observe and participate during the Stage 2 assessment in order to inform the Huron-Wendat of the survey results. Permission to access the subject properties were granted by Hydro One and the individual property owners. This report details the results of the Stage 2 AA and provides a recommendation.

1.2 Historical Context

1.2.1 Pre-Contact Period Overview of Southern Ontario

Although southern Ontario was exposed after glacial retreat as early as 15,000 B.P., it was not until 10,900 B.P. to 9,500 B.P. that land access routes opened up allowing the first inhabitants, referred to by archaeologists as Paleo-Indians, into the area. Paleo-Indians were widely scattered, nomadic groups that occupied the sub-tundra-like environment that prevailed in southern Ontario during that time. Past research indicates that these groups likely followed big game (such as Caribou) across the landscape, preferring to camp on high ground, immediately

adjacent to water sources, such as glacial lakes or spillways, where smaller game and plant foods would have also been harvested. Due to the relative antiquity of Paleo-Indian sites, all that remains at their occupations are stone tool fragments and their characteristic spear points known as “fluted points”. During this time period Georgian Bay / Lake Huron (referred to as Glacial Lake Algonquin) was much higher than it is today. As a result, low lying areas around the Barrie / Cookstown / Alliston were inundated by this water body and its associated embayment’s. The ancient shoreline of Glacial Lake Algonquin is still visible throughout much of Simcoe County (much further inland than the present Georgian Bay shoreline) and archaeological research over the last 30 years has identified numerous Paleo-Indian sites along its extent.

The subsequent Archaic period (9,500 B.P. to 2,800 B.P.) is characterized by a warming climate and a temperate forest environment which was crisscrossed by streams and rivers and surrounded by large fresh water lakes that would have supported many species of fish, shorebirds and mammals. Small hunting and gathering bands (20-50 people) utilized the lake shores during the spring and summer months, then broke into smaller family groups and moved inland for the fall and winter to hunt and trap. Archaic period tool assemblages consisted of both chipped and ground/polished stone implements indicating that a wider variety of activities, such as fishing, woodworking and food preparation/grinding, were now taking place.

The Archaic period was followed by the Woodland period (2,800 B.P. to A.D. 1650) which is subdivided into three phases. The Early Woodland period (circa 2,800 B.P. to A.D. 0) is characterized by the introduction of pottery as a means of food production / storage and an increase in regional trade networks. This trading of exotic goods, such as obsidian, silver, copper and sea shells persists into the Middle Woodland period (circa A.D. 0 to A.D. 900) when horticulture was introduced to southern Ontario resulting in a more sedentary lifestyle in seasonal villages, and more elaborate burial ceremonies – including the construction of large, earthen mounds. The Late Woodland period (circa A.D. 900 - 1650) is marked by the establishment of palisaded villages (often containing dozens of longhouse structures), intensified agriculture and an increase in regional warfare.

Commencing in the 12th Century and continuing into the 17th Century, the Huron-Wendat peoples inhabited the area between Lake Simcoe and Georgian Bay known historically as Huronia, (present day Simcoe County (Ramsden 1990: 361)). The Huron-Wendat people favoured this area for a variety of reasons including availability of fish and game, suitability of soils for maize based horticulture and, later, its safety from raids by the Five Nation Iroquois in New York State, easy access to Algonquian traders, and proximity to the hunting territories on the Canadian Shield (Warwick 2013: 72). As with other Late Woodland groups around the Great Lakes, the Huron-Wendat lived in large, multi-hectare villages comprised of dozens of long house structures and surrounded by multiple rows of palisades. They also utilized temporary settlements such as hunting and fishing camps or small inland hamlets thought to be “satellites” of major villages (Ramsden 1990: 373). Artifact assemblages from Huron-Wendat sites can be large and varying, and include ceramics, smoking pipes, tools made from stone, antler and bone and beads / decorative / ritual items (Ramsden 1990: 363). Post contact, European manufactured items such as copper arrow points, knives, and kettles can also be found on Huron-Wendat sites (Ramsden 1990: 363).

1.2.2 Post-Contact / Historical Overview

The Essa TS to Barrie TS study area is located in the City of Barrie and Township of Springwater, County of Simcoe. Historically, the study area was located within the Township of Vespra, in the County of Simcoe. The County of Simcoe was named after Lieutenant Governor John Graves Simcoe, the first Lieutenant Governor of Upper Canada from 1791-1796. The first settlers in Simcoe County came in 1815 and settled in West Gwillimbury. There is no record of the location of settlers within the borders of Vespra Township until 1819 when several settlements sprang up along the Penetanguishene Road (Beldon 1881: 7). It was several more years before settlement extended away from the road into the interior of the township.

The first survey of the Township of Vespra was in 1819 by Samuel S. Wilmot. He was tasked with surveying a road of communication between Kempenfelt Bay and Penetanguishene Harbour and to lay lots along the road. He surveyed the outline of a settlement on Kempenfelt Bay and allowed 0.805 km (0.5 miles) for its depth and then surveyed 48.28km (30 miles) of road and the original outline of the settlement of Penetanguishene. The second person to survey the township was James G. Chewett in 1820, followed by John Goessman in 1835 and then Robert Ross. The surveys were said to have been done badly, with some half lots having an extra 20 – 30 acres and others having less than the allotted 100 acres (Vespra Township Council 1987: 41).

The City of Barrie has its beginning as the head of the Nine Mile Portage. The Nine Mile Portage was considered to be militarily and economically significant to John Graves Simcoe. The Nine Mile Portage formed part of the route connecting Lake Ontario with the upper Great Lakes and the West. The route worked its way west by the Toronto Portage, which included alternative routes from the mouths of the Rouge or Humber Rivers, to modern day Holland Landing area. A traveler would go via Cook's Bay in Lake Simcoe to Kempenfelt Bay to present day downtown Barrie. This was the beginning of the Nine Mile Portage, where a canoe would be carried to Willow Creek, which could be followed to the Nottawasaga River and into Georgian Bay/Lake Huron (Coutts 1961).

The first structure built in what would become Barrie was a log dwelling constructed by Sir George Head in 1815 as he awaited orders from Simcoe. Shortly thereafter a military store house and supply depot were constructed near present day Fred Grant Square. A 45 acre military reserve was established around the supply depot between present day Bayfield and Berczy Streets. The first permanent settler to Barrie was a Scottish teamster named Alexander Walker who arrived in 1824. It was reported in this year that Barrie had two good houses of log, both with good chimneys of brick (Cotton 2004: 3). One of these houses was occupied by Walker and his team who worked six days a week taking goods up and down the portage. In 1828, Walker acquired a lease to open a public house (Cotton 2004: 4). The townsite for Barrie was completed in 1833. Prior to this survey Barrie already had three taverns, a warehouse, emigrant sheds and a wharf (Cotton 2004: 17). The construction of the Ontario, Simcoe and Huron Railway to nearby Allandale created an economic boom in Barrie and by 1851 the population was 1,007. Barrie became a town in 1852 (Craig 1977: 231). In 1865 the Railway was extended into Barrie into present day Heritage Park (Cotton 2004: 31). Barrie was incorporated as a city in 1871 with Robert Simpson, brewer, as its first mayor. The census of that year shows a population of 3,398 (Cotton 2004: 73). In the 1880s Barrie had its first electric street light installed and by 1885 local telephone service was available (Craig 1977: 231). Industries that came to Barrie included the Clarke and Clarke leather firm in 1927, Capaco (Co-operative Packers of Ontario Ltd) established in 1931 and a General Electric plant in 1945. In the 1950s Highway 400 was constructed as far as Barrie and this began the trend of people commuting between Barrie and Toronto.

As stated above, the Nine Mile Portage was believed to have great military and economic importance. It was widened to accommodate wagons and was then extended to the Village of Grenfel which is to the north of the study area. The Nine Mile Portage route was later extended to Brentwood Village in Sunnidale Township in 1825. This road is known as Sunnidale Road, which runs north of the project area. Grenfel, on Sunnidale Road, was established in 1833 by Dudley Rool, with the opening of a tavern. By 1882 Grenfel had a post office, church, school, blacksmith shop and tavern. In the 1920s the first saw mill was opened by Wilfred Degeer, prior to this inhabitants of Grenfel would have to travel to Minesing (Vespra Township Council 1987: 512).

Research found three historic maps for the project area. The first is a patent plan, with additions made in 1844. The others are Historic Atlas Maps. The details from these maps can be found in **Table 1** below. Names and structures were added to the historical atlas maps by subscription. As such, a lot may appear vacant due to the property owner not wishing to pay to have their name included in the atlas.

Table 1: Lot and Concession Information for the project area

Concession	Lot	1844 Map	1871 Historical Atlas Map	1881 Historical Atlas Map	Comments
6	25	<i>Illegible</i>		Part of Barrie – race track shown on lot	
7	24	George Mason West ½	GOvens West ½		
		J (<i>Illegible</i>) H (<i>Illegible</i>) East ½	T. Drury East ½		
8	23	<i>Illegible</i>			
	24	Canada Company			
9	23	Canada Company	Canada Company		1881 – Watercourse on property
10	22	William Daily	P. Daly		
	23	Duncan McInstosh West ½	P. Daly		1881 – Watercourse on property
John Simpson East ½					
11	22	Hon. Rev. John Strachan, Bishop of Toronto	J. Ferguson		
12	21	<i>Illegible</i>	Dogherty		1871 – Railway through property 1881 – Road through property
	22	John Smith West ½	J. Smith West ½		1871 – Railway through property
Hobart Trunk Company East ½		H. Smith East ½			

1.3 Archaeological Context

1.3.1 Physiography and Current Conditions of the Site Area

The study area is located in the Simcoe uplands physiographic region of Southern Ontario. The Simcoe uplands region is comprised of broad, rolling till plains which are separated by steep-sided, flat-floored valleys (Chapman and Putnam, 1984: 182). These areas are encircled by a number of shorelines indicating they were once islands in Glacial Lake Algonquian. Within this physiographic region are broad uplands south of Barrie and high ground north of Alliston, which stand approximately 60m above the adjoining lake plains.

The origin of the ridges and valleys in Simcoe County are not certain (Chapman and Putnam, 1984: 182). The most likely explanation is that the surface form follows the bedrock topography. It is also possible that the ridges originated as moraines due to an ice lobe in the Georgian Bay depression. Regardless, their surfaces were planed by a glacier moving towards the southwest. The till in the Simcoe uplands is different than that found east of Lake Simcoe, as it consists mostly of Precambrian rock rather than limestone. In more southern areas it is a gritty loam, becoming sandier and boulder towards the north. There are heavier and more calcareous till near Lake Simcoe and Midland.

The original forests in the Simcoe uplands consisted of hardwoods, sugar maple and beech, as well as white pine. Yellow birch, basswood, and hemlock were also common (Chapman and Putnam, 1984: 183). The white pine was mostly logged during the lumbering period, but beech is still abundant. The agriculture of the region is comprised of mixed farming including hay, corn, mixed grains, barley, oats, and wheat in addition to livestock.

The Essa TS to Barrie TS study area begins at the northwest corner of Tiffin Street and Highway 400 in Barrie and ends at Sunnidale Road in Springwater Township. The corridor passes through forested areas, grass meadows, active agricultural fields, residential and industrial areas, as well as the Barrie Gun Club and an active quarry as well as both the Essa TS and the Barrie TS. The North Simcoe Rail Trail, a part of the Trans Canada Trail, is located in the western portion of the study area, found between the Essa TS and the quarry. This trail follows the former North Simcoe Railway, which was built in 1878 and abandoned in 1991.

1.3.2 Previous Archaeological Research

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

According to the OASD, five registered archaeological sites have been identified within 1 km of the Essa TS to Barrie TS study area (MTCS 2017). Of these sites, four are pre-contact (*BcGw*-17, *BcGw*-18, *BcGw*-71 and *BcGw*-72) and one is a post-contact tavern site (*BcGw*-48).

Table 2: Registered Archaeological Sites within 1 km of the Study Area

Borden	Site Name	Cultural Affiliation	Site Type/ Feature	Researcher	Comments
BcGw-17	Bennett	Archaic	Campsite	Jamie Hunter (1977)	Archaic campsite, original report dated 1977, no other information available
BcGw-18	Barrie	Huron-Wendat	Village	Hunter (1907)	Iroquoian Village dating to 1280-1330 AD, first reported by Andrew Hunter as <i>Vespra</i> #41
BcGw-48	Tavern	Euro-Canadian	Tavern/ Restaurant	Sutton (1991)	Ceramics, pipe stems, glass and nails collected during survey activity, further work required
BcGw-71	MLJ	Late Woodland	Hamlet	Conies (2001)	A total of 458 artifacts collected during Stage 1-3 archaeological assessment. One longhouse and several smaller structures found. Further work required.
BcGw-72	Bear Creek	Unknown	Unknown	Wilson (2003)	No further CHVI. 13,143 artifacts including debitage, projectile points, stone tools, rough stones, faunal

Borden	Site Name	Cultural Affiliation	Site Type/ Feature	Researcher	Comments
					remains, charcoal and recent items

One assessment has been completed within 50m of the project area. The Stage 1 AA of the Barrie Area Transmission Upgrades (P123-0316-2016) was completed by AECOM in 2017. The Stage 1 AA used background research to describe the geography, land use history, previous archaeological fieldwork and current conditions of the land, as well as an optional field review in order to confirm the presence or absence of disturbance. In addition to the Stage 1 field review, satellite imagery and thematic and historic maps were analyzed in order to evaluate the archaeological potential found within the proposed study area. The results of the Stage 1 assessment indicated that, although several portions of the study area had been visibly disturbed by past construction activity and quarrying related activities, the majority of the property appeared to be undisturbed and therefore contained archaeological potential. The Stage 1 recommended that the areas deemed to have archaeological potential should be subject to Stage 2 assessment, using *Section 2.1.1 Pedestrian Survey* or *Section 2.1.2 Test Pit Survey* in the *Standards and Guidelines for Consultant Archaeologists* (20011). The assessment must be conducted by a licensed archaeologist.

1.3.3 Determination of Archaeological Potential

Archaeological potential is established by determining the likelihood that archaeological resources may be present on a subject property. Criteria commonly used by the MTCS (2011) to determine areas of archaeological potential include:

- Proximity to previously identified archaeological sites;
- Distance to various types of water sources;
- Soil texture and drainage;
- Glacial geomorphology, elevated topography and the general topographic variability of the area;
- Resource areas including food or medicinal plants, scarce raw materials and early Euro-Canadian industry;
- Areas of early Euro- Canadian settlement and early transportation routes;
- Properties listed on municipal register of properties designated under the *Ontario Heritage Act*;
- Properties that local histories or informants have identified with possible archaeological sites, historical events, activities or occupants; and
- Historic landmarks or sites.

Distance to modern or ancient water sources is generally accepted as the most important element for past human settlement patterns and when considered alone may result in a determination of archaeological potential. In addition any combination of two or more of the criteria listed above, such as well drained soils or topographic variability, may indicate archaeological potential.

Certain features indicate that archaeological potential has been removed, such as land that has been subject to extensive and intensive deep land alterations that have severely damaged the integrity of any archaeological resources. This includes landscaping that involves grading below the topsoil level, building footprints, quarrying and sewage and infrastructure development (MTCS 2011).

2. STAGE 2 ASSESSMENT

AECOM conducted the Stage 2 AA of the Barrie Area Transmission Upgrades study area between June 01, 2017 and October 12, 2017 under the field direction of Rebecca Gray [R452]. The study area was comprised of approximately nine kilometers of ROW as well as an additional 20m buffer, and covers 55.782ha of land to accommodate station expansion. The Stage 1 site inspection found at the areas to the extreme west and east of the project area contained areas which had been disturbed, and were cleared of further archaeological concerns. The remaining part of the project area was recommended for Stage 2 assessment, with two areas recommended for pedestrian survey and the remainder recommended for test pit survey.

Stage 2 assessment took place in weather and lighting conditions which permitted good visibility of archaeological resources, as per *Section 2.1, Standard 3* of the *Standards and Guidelines for Consultant Archaeologists* (2011). The weather conditions can be found in **Table 3** below.

Table 3: Weather Conditions Encountered during the Stage 2 Archaeological Assessment

Date	Weather Conditions	Temperature (°C)
June 01, 2017	Sunny with cloudy periods	16
June 05, 2017	Rainy and overcast	13
June 06, 2017	Rainy and overcast	13
June 07, 2017	Sunny	23
June 08, 2017	Sunny	23
June 12, 2017	Hot and sunny	34
July 17, 2017	Sunny	34
July 18, 2017	Sunny	34
July 19, 2017	Sunny	28
October 12, 2017	Overcast	8

The Stage 2 AA was comprised of test pit survey and pedestrian survey. Following *Section 2.1.2 Test Pit Survey* in the *Standards and Guidelines for Consultant Archaeologists* (2011) test pitting was completed on a 5m grid with each test pit being at least 30cm in diameter and excavated 5cm into subsoil. All soil was screened through 6mm mesh to aid in the recovery of artifacts and all test pits were backfilled to grade after investigation. Test pitting was completed to within 1m of built structures.

Following *Section 2.1.1 Pedestrian Survey* in the *Standards and Guidelines for Consultant Archaeologists* (2011) pedestrian survey was completed in areas which were actively or recently cultivated. The areas surveyed were recently ploughed and allowed to weather for one heavy rainfall or several small rainfalls to improve visibility of archaeological resources. At least 80% of the ploughed surface was visible during assessment. Pedestrian survey was completed at 5m intervals. No archaeological resources were found during the Stage 2 assessment, and as such survey transects were not decreased.

Areas that have severe slopes (>20°), extensive and deep landform alteration or were low lying and wet were not subjected to further Stage 2 investigation, consistent with *Standards 2a, and 2b* of *Section 2.1* of the *Standards and*

Guidelines for Consultant Archaeologists (2011). The field conditions, disturbances, areas of low lying and wet and the Stage 2 assessment are photo-documented in **Section 8: Images**.

A summary of the conditions and Stage 2 field methods employed at each of the study areas assessed is presented below

Table 4: Results of the Stage 2 Archaeological Assessment

Survey Method	Hectares	%
Disturbed	3.969	7.12
Pedestrian Survey at 5m intervals	1.238	2.22
Previously Assessed	8.237	14.77
Test Pitted at 5m intervals	26.655	47.79
Wet	15.682	28.11
Grand Total	55.782	100.00

The study area consists of a hydro corridor and transformer stations which run between Highway 400 to the east and Sunnidale Road to the west. In order to facilitate communications between the Field Directors and the Project Coordinator, each of the properties were given their own PIN number which would be referred to during the fieldwork and report writing. The proposed corridor limits were illustrated on field maps and were labelled with GPS reference points to help the field crew identify the study area boundaries. All PIN locations were assessed during the Stage 2 AA. Much of the study area consisted of gently rolling terrain covered by scrub and meadow, densely forested areas, and agricultural fields. Additionally, some of the study area was found to be disturbed or low lying and wet.

The inventory of documentary records accumulated during this Stage 2 can be found in **Table 5**.

Table 5: Inventory of the Documentary Record

Photographs	Maps	Field Notes	Number of Banker Boxes of Artifacts
151	10	12 pages of Field notes, 14 pages of photo log, 10 maps	0

Table 6: Results of the Stage 2 Archaeological Assessment by PIN Number

PIN Number	Vegetation	Topography	Topsoil	Subsoil	Subsoil Depth (cm)	Comments
587660378	Long grass	Plain	Medium brown loam with pebbles	Yellowish grey sand	27	95% test pitted at 5m intervals.
587640120 587640121	Grassland	Flood Plain	Dark yellow brown loam	Medium yellow to dark grey mottled sand	35	60% test pitted at 5m intervals, the remaining is wet with some disturbances around hydro poles
587650048	Grass and gravel	Flood Plain	Medium to dark brown loam	Yellow to grey mottled sand	26	50% test pitted at 6m intervals, the remaining contained some wet areas and disturbance from the housing development to the north.
583550113	Grassland	Plain	Medium to dark brown sandy loam	Yellow to greyish yellow sand	21	70% test pitted at 5m intervals, the remaining is wet.
583550111	Long grass	Flood Plain	Dark brown to black loamy sand	Light yellow sand	22	10% test pitted at 5m intervals, the remaining was found to be wet
583550213	Marshland	Flood Plain	N/A	N/A	N/A	100% wet, not tested
583550215	Marshland	Flood Plain	N/A	N/A	N/A	100% wet, not tested
583550209	Marshland/Ploughed field	Flood Plain	Medium brown sandy loam	N/A	N/A	50% subject to pedestrian survey, 50% wet
583540084	Meadow	Plain	Medium brown sandy loam	Yellow to grey sandy soil	27	100% test pitted at 5m intervals
583540118	Marshland	Flood Plain	Medium to dark brown sand	Yellow to grey sand	20	5% test pitted at 5m intervals, 95% wet
583540050	Marshland	Flood Plain	N/A	N/A	N/A	100% wet, not tested
583540024	Marshland	Flood Plain	N/A	N/A	N/a	100% wet, not tested
583540024	Ploughed field	Plain	Medium brown sandy loam	N/A	N/A	100% pedestrian survey on 5m transects
583540043 583540041	Meadow	Plain	Medium brown sandy loam	Yellow to grey sandy soil	27	95% test pitted at 5m intervals, 5% wet
583540040	Meadow	Plain	Medium brown sandy loam	Yellow to grey sandy soil	28	100% test pitted at 5m intervals.

PIN Number	Vegetation	Topography	Topsoil	Subsoil	Subsoil Depth (cm)	Comments
583540038	Meadow	Plain	Medium brown sandy loam	Yellow to grey sand	25	100% test pitted at 5m intervals
583530147 583530154	Meadow with disturbance	Plain	Medium brown loam with pebble inclusions	Orange and yellow sand	32	75% test pitted at 5m intervals, 25% disturbed

3. ANALYSIS AND CONCLUSIONS

In 2017, AECOM was retained by Hydro One to conduct a Stage 2 AA for the Barrie Area Transmission Upgrade, City of Barrie and Township of Springwater, Simcoe County, Ontario on behalf of Hydro One in advance of upcoming upgrades to the Transmission lines from Barrie TS to Essa TS. The objective of this AA is to identify if there are any archaeological resources in the study area.

The results of the Stage 2 AA are that the hydro corridor had areas of intact soils, low lying and wet areas and areas of disturbance. No archaeological resources were recovered during the Stage 2 AA of the Barrie Area Transmission Upgrade study area. The study area should be cleared of further archaeological concerns.

4. RECOMMENDATIONS

Given the results of this assessment, AECOM makes the following recommendations:

- 1) Due to the presence of disturbance, low-lying permanently wet areas, and the fact that no archaeological resources were found during the Stage 2 assessment, the study area is deemed to no longer contain archaeological potential and should be considered clear of further archaeological concern.

The above recommendation is subject to Ministry of Tourism, Culture and Sport approval, and it is an offence to alter any archaeological site without MTCS concurrence. No grading or other activities that may result in the destruction or disturbance of an archaeological site are permitted until notice of Ministry of Tourism, Culture and Sport approval has been received.

5. ADVICE ON COMPLIANCE WITH LEGISLATION

a) This report is submitted to the Minister of Tourism, Culture and Sport as a condition of licencing in accordance with Part IV of the *Ontario Heritage Act*, R.S.O. 1990, c 0.18. The report is reviewed to ensure that it complies with the standards and guidelines that are issued by the Minister, and that the archaeological fieldwork and report recommendations ensure the conservation, protection and preservation of the cultural heritage of Ontario. When all matters relating to archaeological sites within the project area of a development proposal have been addressed to the satisfaction of the Ministry of Tourism, Culture and Sport a letter will be issued by the Ministry stating that there are no further concerns with regard to alterations to archaeological sites by the proposed development.

b) It is an offence under Sections 48 and 69 of the *Ontario Heritage Act* for any party other than a licensed archaeologist to make any alteration to a known archaeological site or to remove any artifact or other physical evidence of past human use or activity from the site, until such a time as a licensed archaeologist has completed archaeological fieldwork on the site, submitted a report to the Minister stating that the site has no further cultural heritage value or interest, and the report has been filed in the Ontario Public Register of Archaeological Reports referred to in Section 65.1 of the *Ontario Heritage Act*.

c) 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 Section 48 (1) of the *Ontario Heritage Act*.

d) The *Cemeteries Act*, R.S.O. 1990, c.C.4 and the *Funeral, Burial and Cremation Services Act*, 2002, S.O. 2002, c.33 (when proclaimed in force) require that any person discovering human remains must notify the police or coroner and the Registrar of Cemeteries at the Ministry of Consumer Services.

Documentation related to the archaeological assessment of this project will be curated by AECOM 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 of the project owner, the Ontario Ministry of Tourism, Culture and Sport, or any other legitimate interest groups.

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7. FIGURES

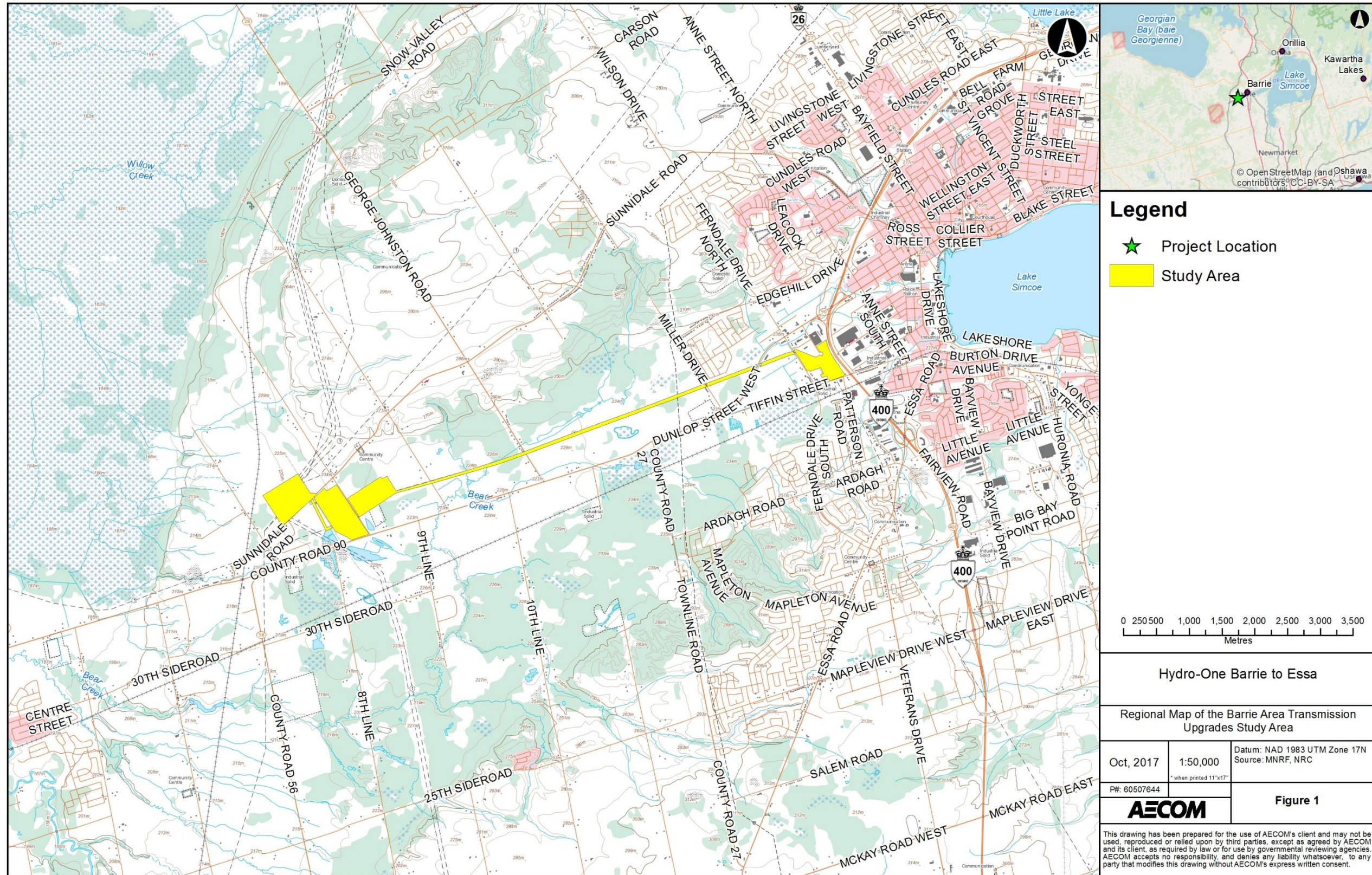


Figure 1: Regional Map of the Barrie Area Transmission Upgrade Study Area

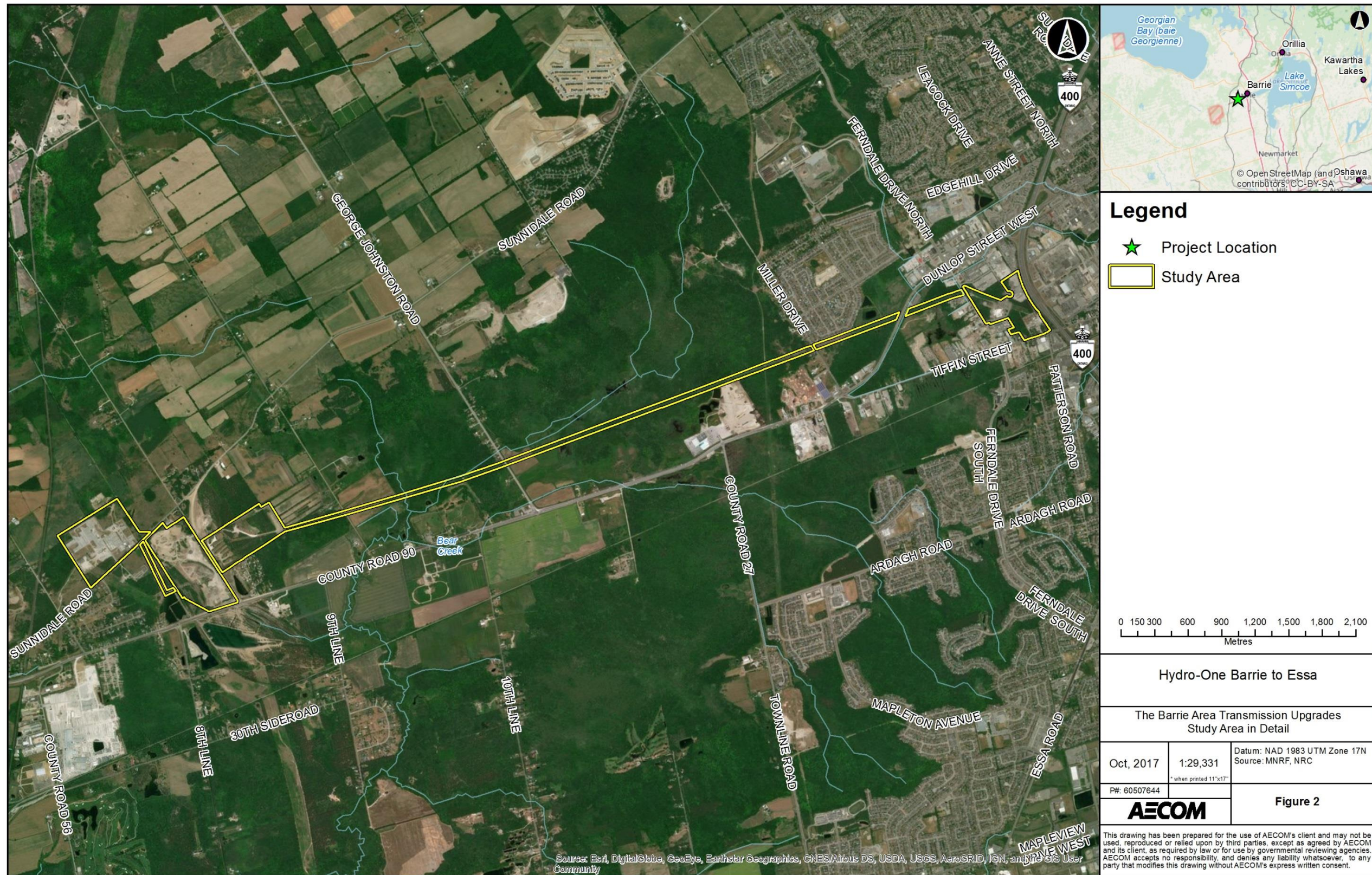


Figure 2: Location of the Barrie Area Transmission Upgrade Study Area

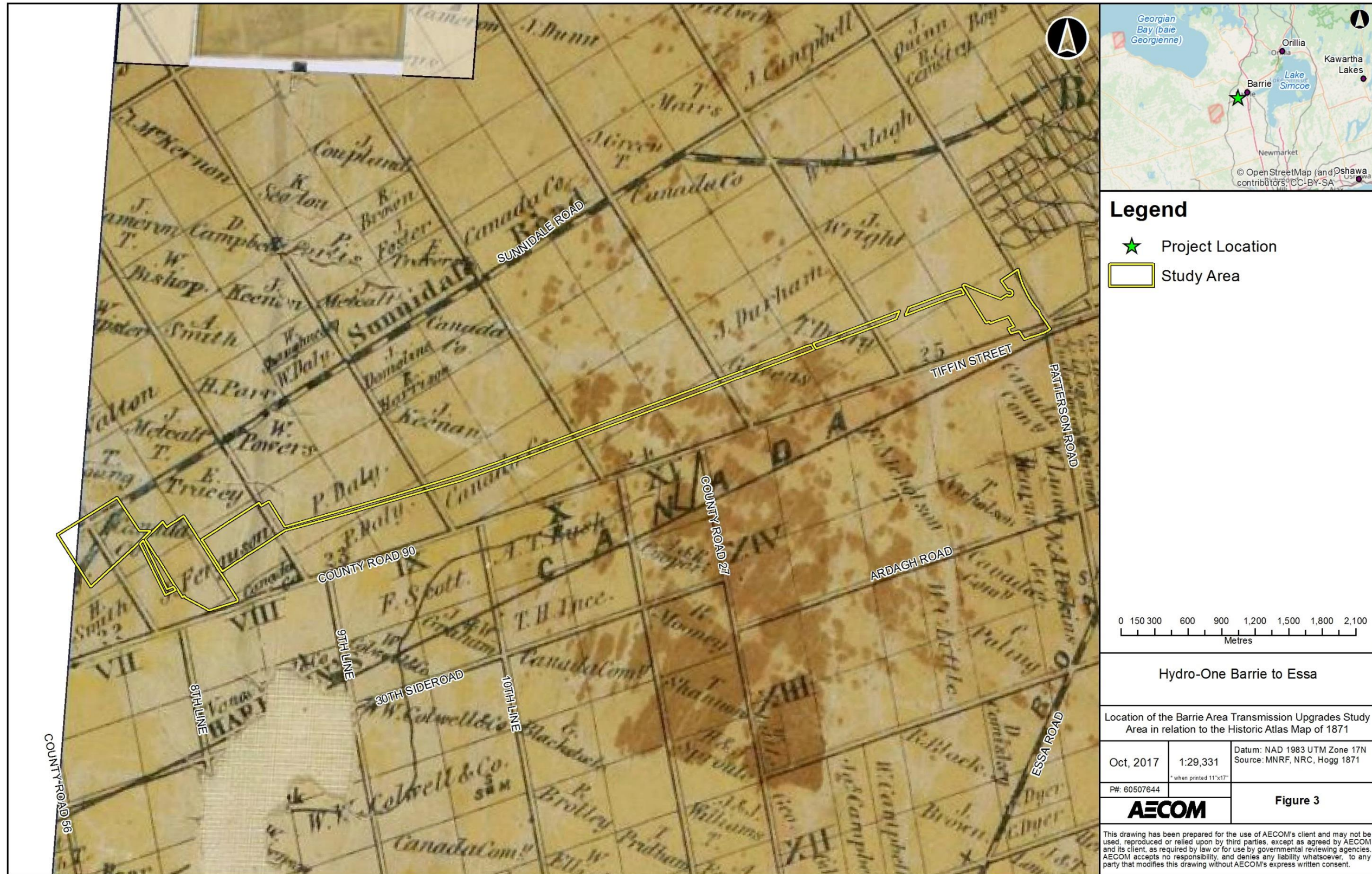


Figure 3: Barrie Area Transmission Upgrade Study Area in Relation to the 1871 Historic Atlas Map

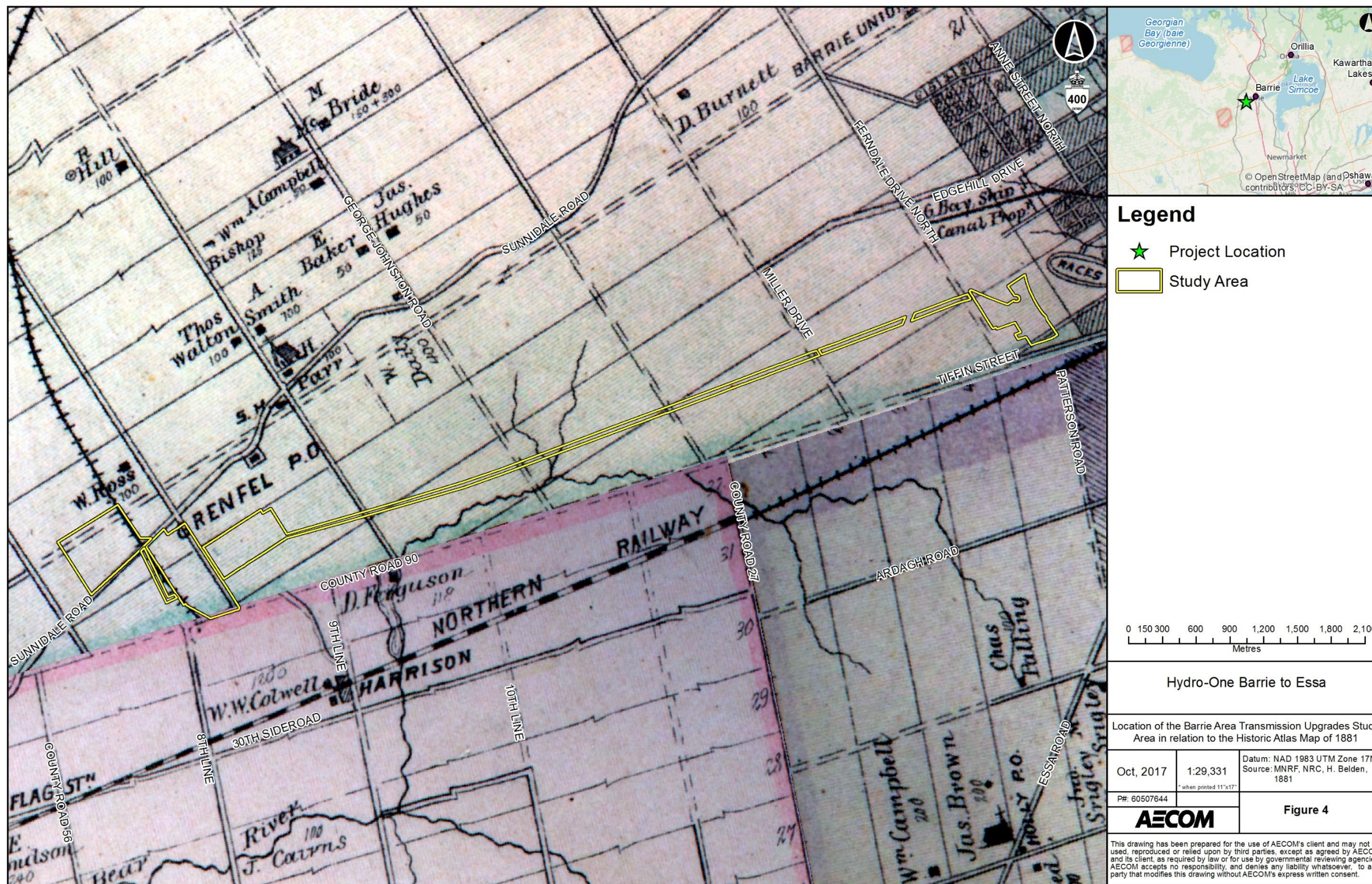


Figure 4: Barrie Area Transmission Upgrade Study Area in Relation to the 1881 Historic Atlas Map

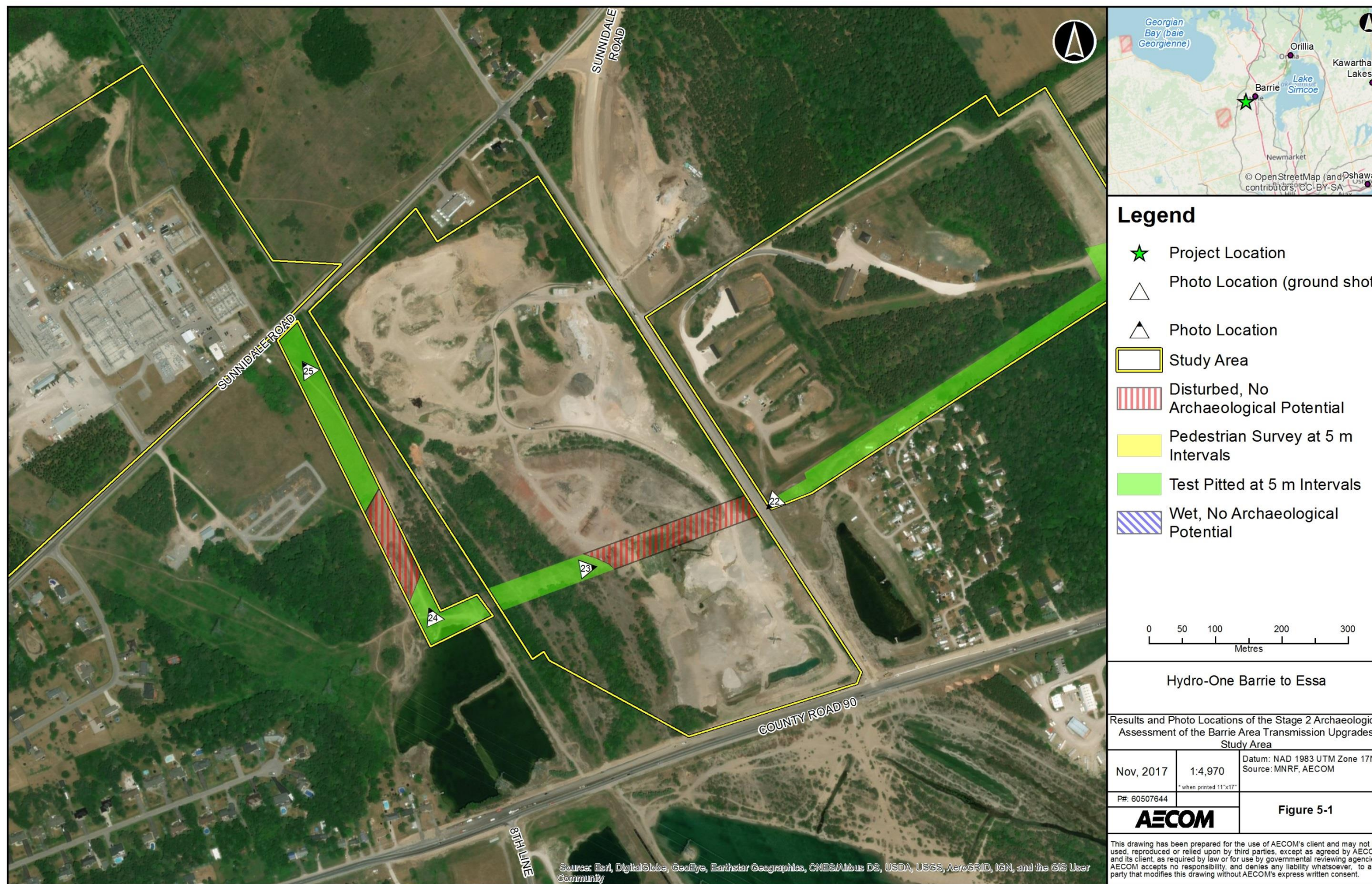


Figure 5: Results of the Stage 2 Archaeological Assessment for the Barrie Area Transmission Upgrades Study Area with Photo Plates



Figure 6: Results of the Stage 2 Archaeological Assessment for the Barrie Area Transmission Upgrades Study Area with Photo Plates

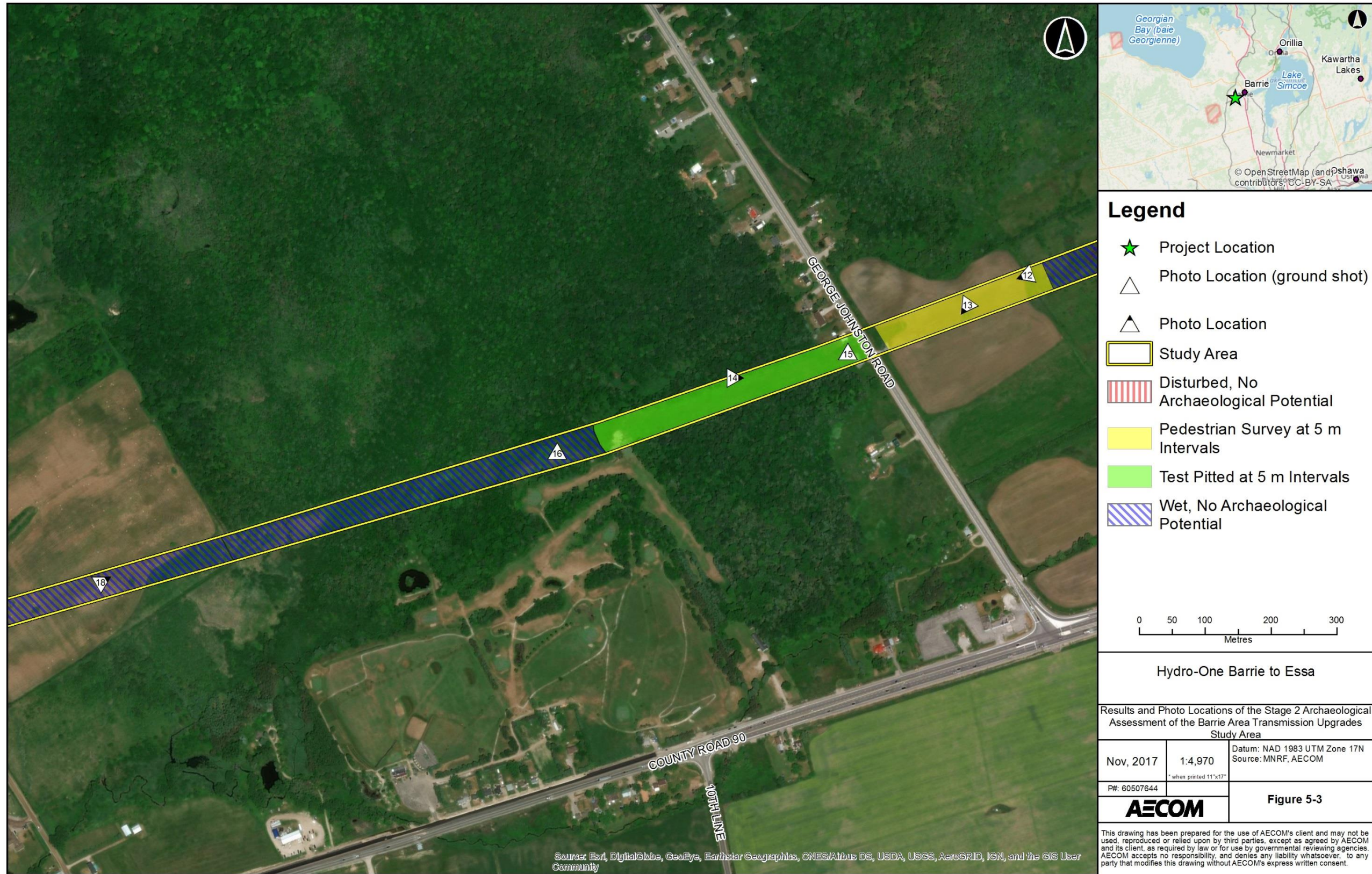


Figure 7: Results of the Stage 2 Archaeological Assessment for the Barrie Area Transmission Upgrades Study Area with Photo Plates



Figure 8: Results of the Stage 2 Archaeological Assessment for the Barrie Area Transmission Upgrades Study Area with Photo Plates



Figure 9: Results of the Stage 2 Archaeological Assessment for the Barrie Area Transmission Upgrades Study Area with Photo Plates

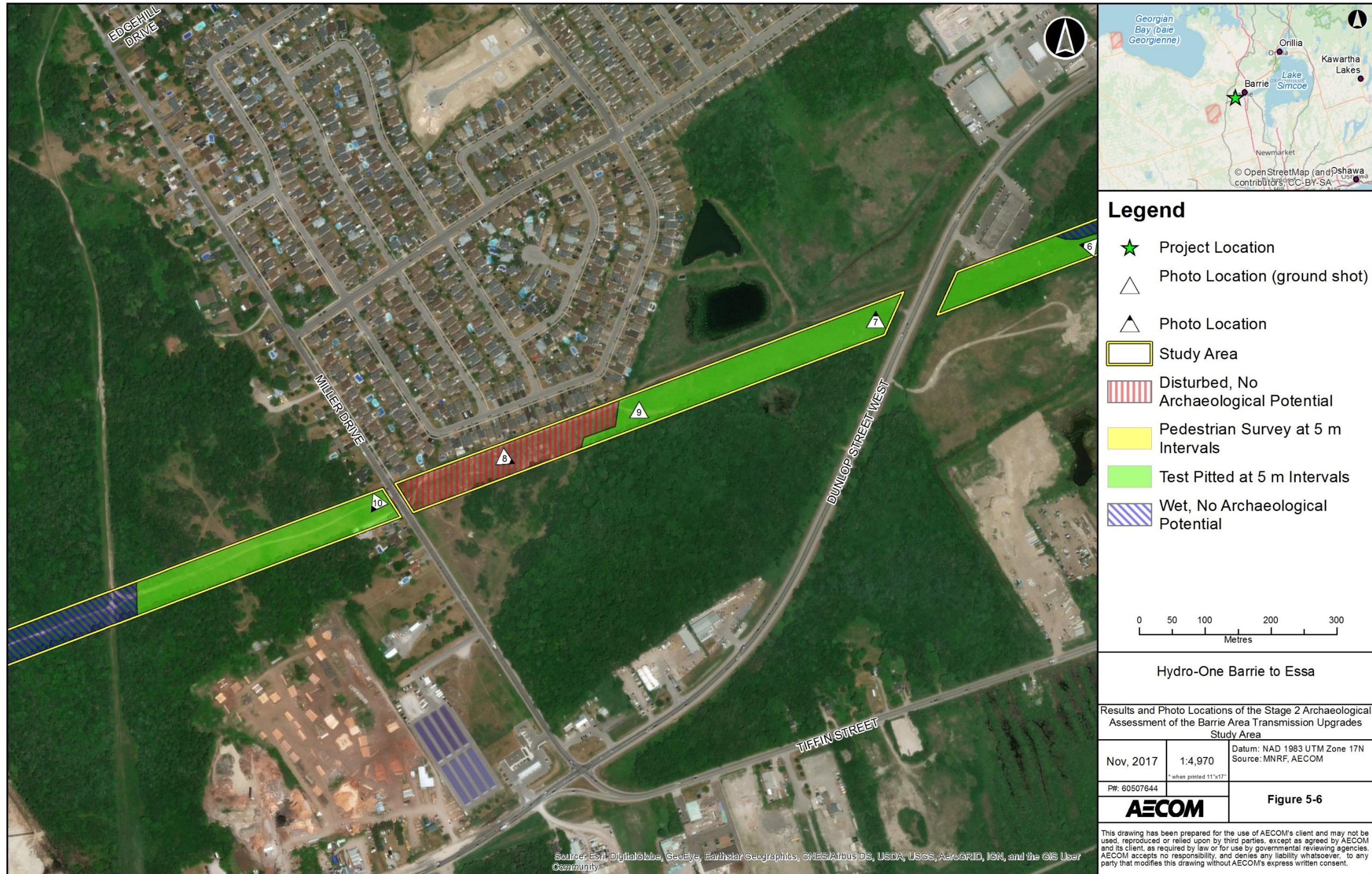


Figure 10: Results of the Stage 2 Archaeological Assessment for the Barrie Area Transmission Upgrades Study Area with Photo Plates



Figure 11: Results of the Stage 2 Archaeological Assessment for the Barrie Area Transmission Upgrades Study Area with Photo Plates

8. IMAGES



Photo 1: Crew at work at PIN 587660378, facing southeast.



Photo 2: Woodlot at PIN 587660378, facing east.



Photo 3: Typical test pit at PIN 587660378, facing down..



Photo 4: Disturbance at PIN 587660378, facing northeast.



Photo 5: Overview of study area at PIN 587640120, facing east.



Photo 6: Low lying and wet area at PIN 587640120, facing northwest.



Photo 7: Study area with crew at work at PIN 587650048, facing north.



Photo 8: Ground disturbance at PIN 587650048, facing south.



Photo 9: Undisturbed test pit at PIN 587650048, facing down.



Photo 10: Overview of study area at PIN 583550113, facing southwest.



Photo 11: Low lying and wet area at PIN 583550113, facing west.



Photo 12: Ground conditions for pedestrian survey at PIN 583550209, facing west

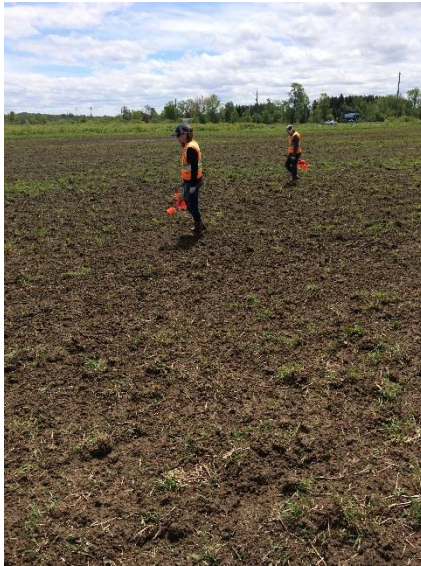


Photo 13: Pedestrian survey in progress at PIN 583550209, facing southwest.



Photo 14: Study area at PIN 583540084, facing west.



Photo 15: Typical test pit at PIN 583540084, facing down.



Photo 16: Low lying and wet area at PIN 583540118, facing down.



Photo 17: Area subject to pedestrian survey at PIN 583540024, facing northwest.



Photo 18: Crew at work at PIN 583540024, facing east.



Photo 19: Study area at PIN 583540043, facing northeast.



Photo 20: Low lying and wet area at PIN 583540043, facing southwest



Photo 21: Typical test pit at PIN 583540043, facing down.



Photo 22: Overview of study area at PIN 583540038, facing southwest.



Photo 23: Construction yard at PIN 583530147, facing east.



Photo 24: Crew at work at PIN 583530154, facing north.



Photo 25: Study area at PIN 583530154, facing north.

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Hydro One

Statement of Aboriginal Engagement
Stage 2 Archaeological Assessment

Barrie Area Transmission Upgrades

City of Barrie and Township of Springwater, Simcoe County,
Ontario

G.W.P. 06-20016

Licensee: Glenn Kearsley
License: P123
PIF Number: **P123-0351-2017**

Related PIFs : P123-0316-2016

Prepared by:

AECOM
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November 03, 2017

Project Number: 60507644

STATEMENT OF ABORIGINAL ENGAGEMENT

The Stage 2 Archaeological Assessment in advance of upcoming upgrades to the Barrie Area Transmission Upgrade, in the City of Barrie and Springwater Township involved consultation with and participation by First Nations monitors whose ancestral territories are affected by the study area. The study area falls within the ancestral territory of the Huron-Wendat First Nation.

In accordance with the draft technical bulletin entitled *Engaging Aboriginal Communities in Archaeology* (MTCS 2011b) the Huron-Wendat First Nation was contracted to monitor the Stage 2 fieldwork for this project. The monitoring was conducted by either Jaaka Romain or Xavier D'aigle who were present in order to observe and participate during the Stage 2 assessment in order to inform the Huron-Wendat of the survey results.

The process for reporting the results of engagement to the community was undertaken by Jaaka and Xavier following the fieldwork.

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Ministry of Tourism Culture and Sport

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APPENDIX B-3:

Built Heritage Resources Background Review

MEMORANDUM



Memo to: Heather Wright, Environmental Planner, Hydro One
From: Emily Game, Heritage Researcher
Re: Essa TS to Barrie TS, Built Heritage Background Review Memo

Date: August 17, 2016

This Built Heritage Background Review Memo addresses the area surrounding Hydro One's Barrie and Essa Transmission Stations (TS) (**Figure 1**). AECOM was retained by Hydro One to conduct a Stage 1 Archaeological Assessment in advance of upcoming upgrades to the Essa TS to Barrie TS Transmission Lines. This work includes upgrading the existing 115KV lines to a 230KV line as well as other tasks related to the change. The study area is comprised of approximately nine kilometers of RoW as well as an additional 20 metre buffer. The overall study area is approximately 108 hectares. The existing transmission corridor crosses a mix of farmland, forested areas and industrial lands in the City of Barrie and Sunnidale Township, Simcoe County, Ontario. The study follows the approved planning process for a Group 'C' project under the MTO's *Class Environmental Assessment for Provincial Transportation Facilities (2000)*, and the MTO *Environmental Guide for Built Heritage and Cultural Heritage Landscapes (2007)*.

The conclusion of the research and analysis, consultation with the City of Barrie, the Barrie Historical Society and the Township of Springwater along with the fieldwork, is that no Built Heritage Resources or Cultural Heritage Landscapes reflecting the historic character of the area have survived within the Study Area around the hydro corridor that would be negatively affected by the proposed upgrades transmission stations.

Methodology

Following the process for Identification of Cultural Heritage Resources outlined in the *Standards and Guidelines for Conservation of Provincial Heritage Properties (2010)*, the following steps were taken:

- The City of Barrie, and the Heritage Municipal Register, the Barrie Historical Society, the Township of Springwater and the Canadian Register of Historic Places, were consulted for information about recognized heritage resources in, or adjacent to, the study area;
- Research was carried out using archival mapping and aerial photography, census, local histories and directories, to prepare a historical overview of the area and establish its historical character and settlement patterns.
- A field survey was conducted on July 8, 2016, to determine whether any Built Heritage Resources or Cultural Heritage Landscapes are present within the Study Area around the corridor.

Summary of Findings

- The age and character of the structures within the Study Area around the hydro corridor could not be confirmed from the mapping and aerial (satellite) imagery (**Figure 2**).

- The field survey of the hydro corridor identified no built heritage resources within the study area (**Figures 1-6, 8-15**).
- It should be noted, however, that one historic structure was identified at 97 Ferndale Drive North. The one storey brick school house is located approximately 100 metres north of the hydro corridor (**Figure 7**).
- The City of Barrie and the Township of Springwater did not identify any Listed or Designated structures or landscapes within or adjacent to the Study Area.
- The Barrie Historical Society knew of no significant cultural resources in the Study Area around the hydro corridor.

Historical Context

The Essa TS to Barrie TS study area is now located in the City of Barrie, and the Township of Sunnidale. Historically, the study area was located within the Townships of Vespra and Innisfil, in the County of Simcoe. Simcoe County is situated east of Grey and Wellington Counties, north of York County, and within the boundaries formed by the Holland and Severn Rivers, Lakes Simcoe and Couchiching, and Georgian Bay from the mouth of the Severn to the northeast corner of Grey County.¹

The County of Simcoe was named after Lieutenant Governor John Graves Simcoe, the first Lieutenant Governor of Upper Canada from 1791-1796.² The first settlers in Simcoe County came in 1815 and settled in West Gwillimbury. There is no record of the location of settlers within the borders of Vespra Township, until 1819 when several settlements sprang up along the Penetanguishene Road.³ It was several more years before settlement extended away from the highway into the interior of the township.

One of these townships, Innisfil Township, first surveyed in 1822, is a shortened version of the word *Innisfail*, a poetical name for Ireland⁴. Many Innisfil settlers hailed from Scotland and Ireland, as well as a large group from Markham⁵. With the opening of the Penetanguishene Road (modern day Yonge Street), the settlement of the Township began in earnest and by 1850 there were 1,807 inhabitants, post offices, churches and stores. There were several settlements in the Township by the second half of the 19th century, including Allandale, Belle Ewart, Henry's Corner's (now Thornton), and Perry's Corners (now Cookstown). The growth of Allandale can be tied to the presence of the Ontario, Simcoe, and Huron Railway (later the Northern Railway) in 1853. It was incorporated as a Village in 1891 and later annexed by Barrie.

The Town of Barrie played a large role for the British in the War of 1812; a storage depot was established on its shores through which military supplies were shipped by portage to the Nottawasaga River and on to posts on upper Lake Huron and Georgian Bay.⁶ This route is known as the Nine-Mile Portage, originally an aboriginal portage it was utilized heavily during the war for the movement of supplies. Its route was first mentioned in 1793 by Lieutenant-Governor Simcoe on a sketch map.

¹ H. Belden. *Illustrated Atlas of the County of Simcoe*. Port Elgin, Ontario. 1881. p. 3

² Armstrong 1930, 265

³ H. Belden. *Illustrated Atlas of the County of Simcoe*. Port Elgin, Ontario. 1881. p. 7

⁴ Armstrong 1930: 141

⁵ Hunter 1909:55

⁶ H. Belden. *Illustrated Atlas of the County of Simcoe*. Port Elgin, Ontario. 1881. p. 7

Barrie was surveyed by Wm. Hawkins, P.L.S., who also surveyed Sunnidale Road through Vespra. In the 1830's more settlers began to move into the area, and the first store and tavern was built in 1831, a post office and church was established in 1834, and the first school in 1836. By 1879 there were a number of railways in the area known collectively as The Northern Railway Group.⁷ In 1888 The Northern Railway Group was taken over by the Grand Trunk, which became the Canadian National Railway (CN) in the 1920s.⁸ The railway was built through Vespra between 1906 and 1908, and in 1906 tracks were laid across the Penetanguishene Road. The building of Sunnidale Road and the Northern Railway marked the end of the Nine-Mile Portage.

Barrie was incorporated as a "town" in 1850, but lacked any municipal organization. In 1854 it sent a representative from Vespra to the County Council and appointed Jonathan Lane as its first reeve; however its municipal organization at the time was still that of a village. Barrie was finally recognized as a town in 1871 with Robert Simpson as its first mayor.⁹ In 1897 the village of Allandale was incorporated into Barrie.

Conclusions

Based on historical research, site investigation, contact with the City of Barrie and the Township of Springwater as well as the Barrie Historical Society, it is the conclusion of AECOM that there are no Cultural Heritage Resources in the study area around the Barrie TS to Essa TS that would be adversely affected by the proposed upgrades.

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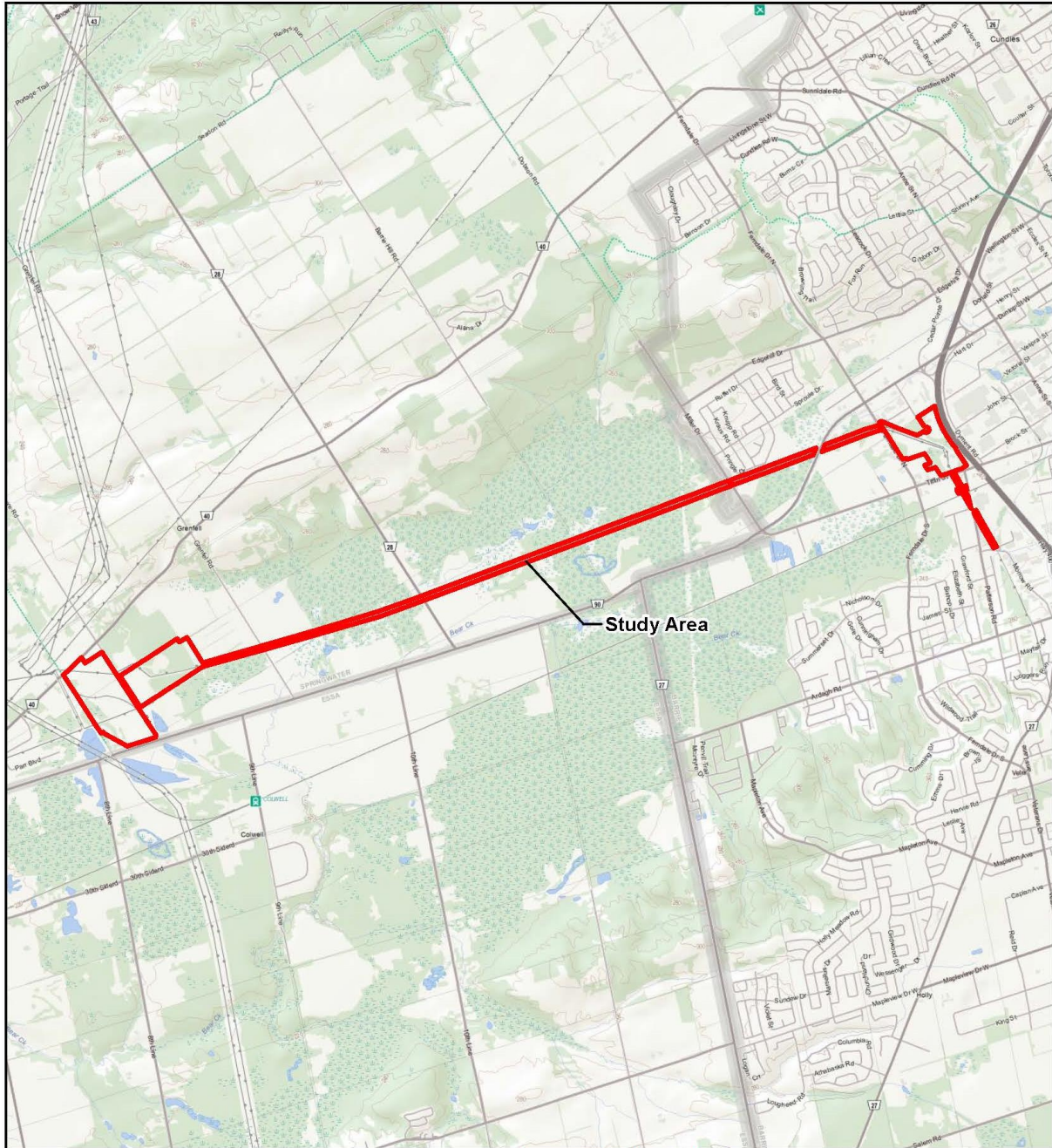
Ontario, Ministry of Tourism, Culture & Sport. *Ontario Heritage Toolkit*.



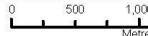
⁷ Anderson and Anderson. *A History of Vespra Township*. Belleville, Ontario: Mika Publishing Company, 1987. p.56

⁸ Anderson and Anderson. *A History of Vespra Township*. Belleville, Ontario: Mika Publishing Company, 1987. p.57

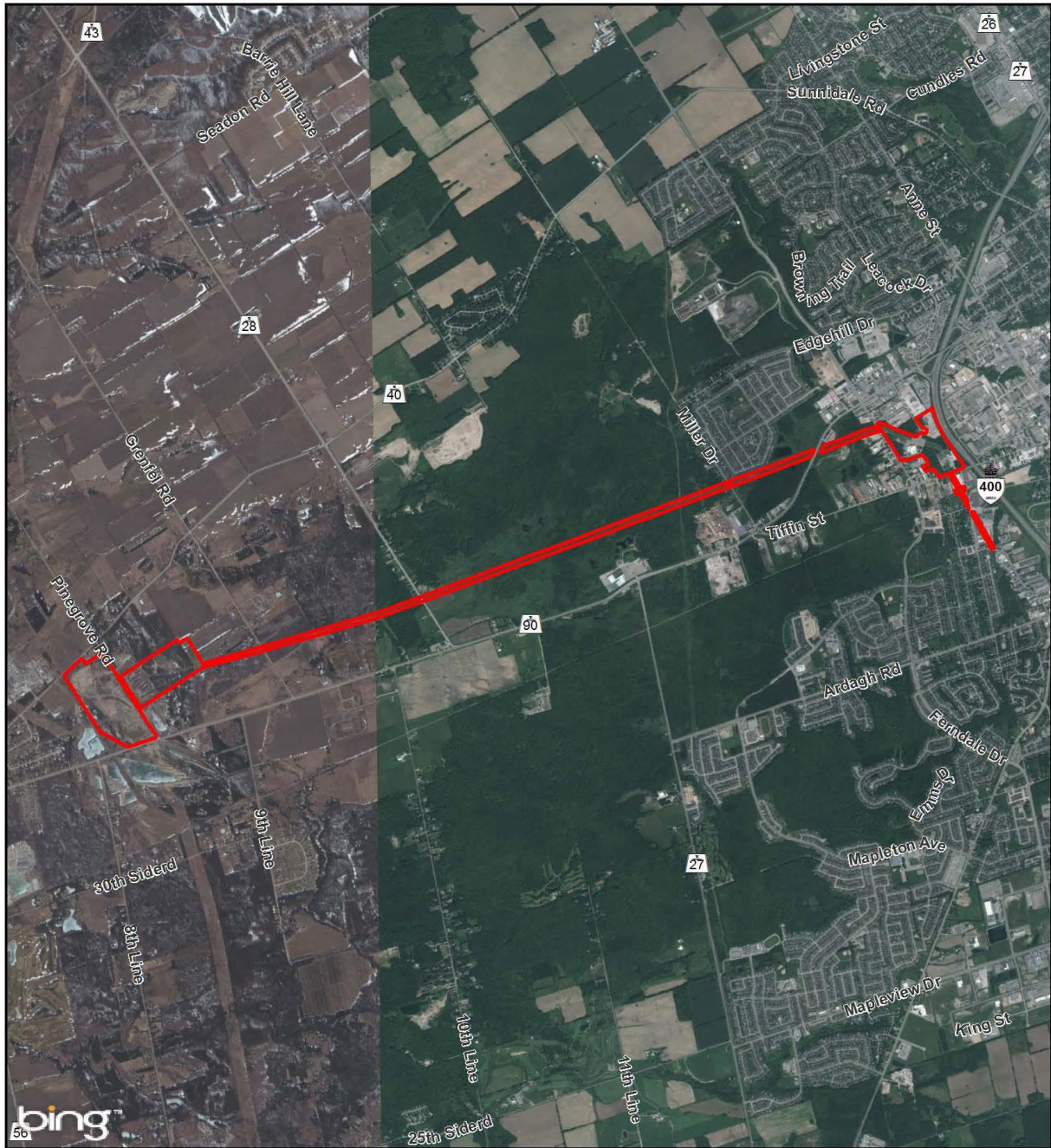
⁹ Andrew F. Hunter. *A History of Simcoe County*. Oshawa, Ontario Mackinaw Productions. 1998. p. 210

Maps & Images



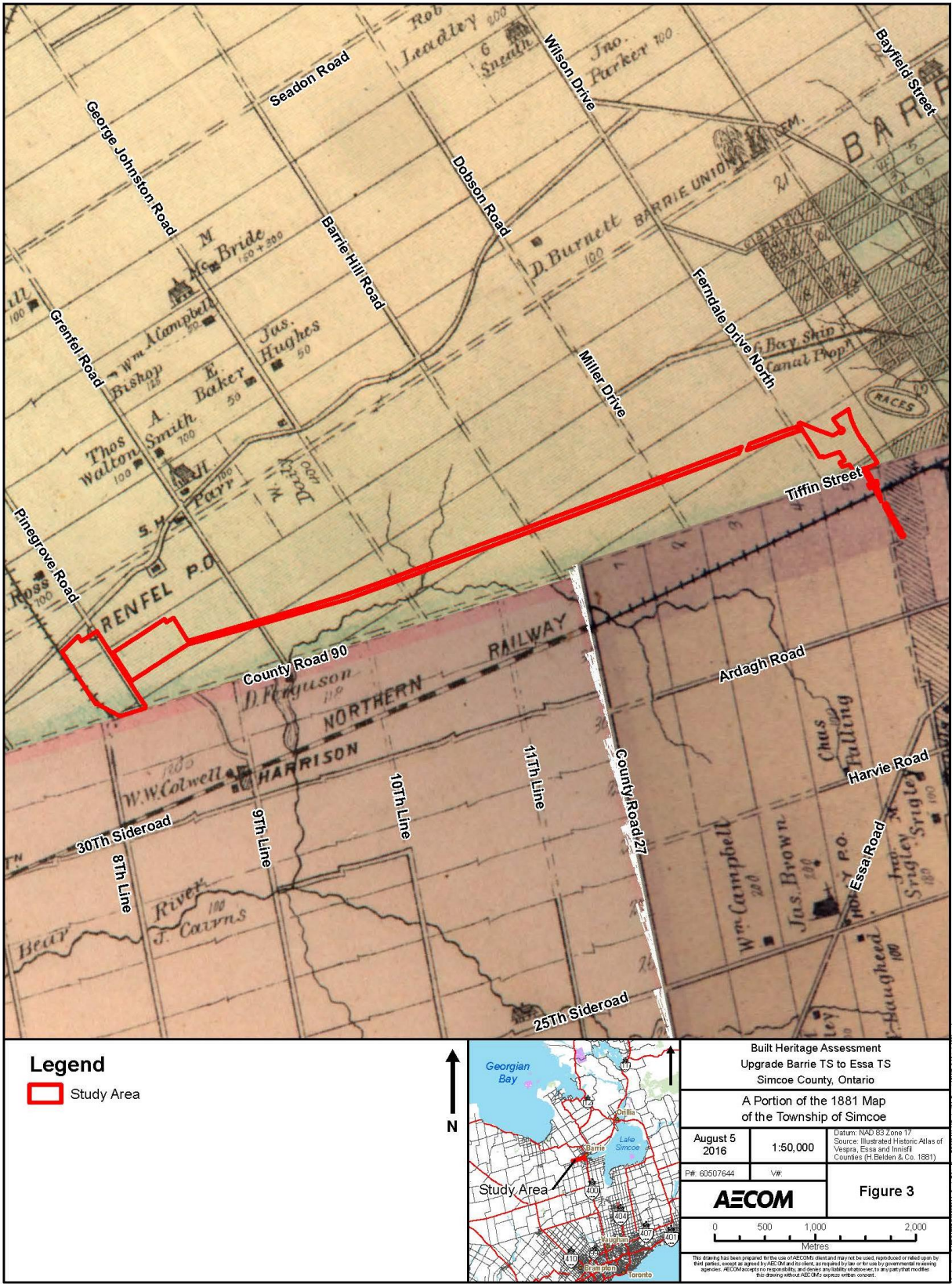
Legend  Study Area		Built Heritage Assessment Upgrade Barrie TS to Essa TS Simcoe County, Ontario		
		Location of Study Area		
		August 5 2016	1:50,000	Datum: NAD 83 Zone 17 Source: Web Mapping Service www.giscoecache.lrc.gov.on.ca
		PW: 60507644	VW:	Figure 1
				
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Map 1: Location of the Barrie and Essa Transmission Stations



Legend Study Area		Built Heritage Assessment Upgrade Barrie TS to Essa TS Simcoe County, Ontario	
		Study Area in Detail	
August 2016	1:50,000	<small> Datum: NAD 83 Zone 17 Source: © Harris Corp, Earthstar Geographic Information Systems © 2016 Microsoft Corporation </small>	
PW: XXXXXXXXXX	1/6	Figure 2	
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Map 2: Aerial view of the Barrie and Essa Transmission Stations



Map 3: Location of the Barrie and Essa Transmission Stations, Historic Atlas Map (B & Co., 1881)



Figure 1: View to south east of existing hydro corridor along Patterson Avenue



Figure 2: View to west of rail corridor within the study area



Figure 3: View to north of Hydro One Transmission Station



Figure 4: View to south east of Hydro One Transmission Station



Figure 5: View to south east of the hydro corridor from Ferndale Drive North



Figure 6: Ferndale Drive North, facing south



Figure 7: School house at 97 Ferndale Drive North, located north of the transmission corridor



Figure 8: Commercial plaza north of hydro corridor on Dunlop Street West



Figure 9: View to west of hydro corridor from Dunlop Street West



Figure 10: Modern housing development on Miller Drive adjacent to hydro corridor



Figure 11: Typical modern house on Miller Drive



Figure 12: View to north west of hydro corridor along George Johnston Road



Figure 13: View to east of hydro corridor from George Johnston Road



Figure 14: View of hydro corridor from Grenfel Road



Figure 15: View of hydro corridor from Pinegrove Road

APPENDIX B-4:

Baseline Natural Heritage Survey Results

Appendix B-4: Field Surveys and Data Collection Dates (2016 and 2017)

Site Visit (Date and Time)	Personnel on Site¹	Survey Completed	Weather Conditions
June 17, 2016 6.45 am	Barbara Hard	Breeding Birds Survey, vegetation survey, incidental wildlife, including mammals, amphibians, reptiles and SAR.	10 °C, sunny, no wind.
June 21, 2016 5.35 am	Barbara Hard	Breeding Birds Survey, vegetation survey, incidental wildlife, including mammals, amphibians, reptiles and SAR.	13 °C, sunny, no wind.
June 23, 2016 6 am	Barbara Hard	Breeding Birds Survey, vegetation survey, incidental wildlife, including mammals, amphibians, reptiles and SAR.	8 °C, sunny, light wind.
July 11, 2016 6.45 am	Barbara Hard	Breeding bird survey, vegetation survey, incidental wildlife, including mammals, amphibians, reptiles and SAR.	15 °C, clear, sunny, no wind.
July 14, 2016 6.30 am	Barbara Hard	Breeding bird survey, vegetation survey, incidental wildlife, including mammals, amphibians, reptiles and SAR.	21 °C, overcast, no wind.
May 1, 2017 9:17 pm	Midori Depante, Samuel Lingwood	Amphibian survey	14 °C, overcast, light wind.
May 10, 2017 9.26 pm	Midori Depante, Samuel Lingwood	Amphibian survey	15 °C, clear, sunny, no wind.
May 11, 2017 9 am	Barbara Hard	Spring vegetation survey, incidental wildlife including mammals, amphibians, reptiles and SAR.	12 °C, overcast, no wind
May 23, 2017 9.30 am	Barbara Hard	Spring vegetation survey, incidental wildlife including mammals, amphibians, reptiles and SAR.	17 °C, overcast, light wind
June 1, 2017, 9.30 am	Barbara Hard	Spring vegetation survey, incidental wildlife including mammals, amphibians, reptiles and SAR.	14 °C, sunny with scattered clouds, light wind
June 7, 2017 9.26 pm	Midori Depante, Samuel Lingwood	Amphibian survey	20 °C, clear, no wind.
June 8, 2017 9.13 pm	Midori Depante, Samuel Lingwood	Amphibian survey	19 °C, clear, no wind
July 5, 2017 9.11 pm	Midori Depante, Samuel Lingwood	Amphibian monitoring survey.	23 °C, mostly clear, no wind
July 10, 2017 9:23 pm	Midori Depante, Anna Raynham	Amphibian monitoring survey.	25 °C, mostly clear, no wind

Notes: Arcadis Personnel onsite: Barbara Hard, Senior Ecologist; Midori Depante, Junior Biologist; and Samuel Lingwood, Intermediate Biologist.

Appendix B-4: Plant Species Inventory within the Study Area

Common Name	Scientific Name	NHIC Status	Native/ Introduced
Alfalfa	<i>Medicago sativa</i>	SNA	I
American Elm	<i>Ulmus americana</i>	S5	N
American Vetch	<i>Vicia americana</i>	S5	N
American Witch-hazel	<i>Hamamelis virginiana</i>	S5	N
Awl-fruited Sedge	<i>Carex stipata</i>	S5	N
Balsam Fir	<i>Abies balsamea</i>	S5	N
Baslam Willow	<i>Salix pyrifolia</i>	S5	N
Bebb's Willow	<i>Salix bebbiana</i>	S5	N
Bird's Foot Trefoil	<i>Lotus corniculatus</i>	SNA	I
Black Medick	<i>Medicago lupulina</i>	SNA	I
Black Raspberry	<i>Rubus occidentalis</i>	S5	N
Black Spruce	<i>Picea mariana</i>	S5	N
Bladder Champion	<i>Silene vulgaris</i>	S5E	N
Blue Vervain	<i>Verbena hastata</i>	S5	N
Boneset	<i>Eupatorium perfoliatum</i>	S5	N
Broad-leaved Cattail	<i>Typha latifolia</i>	S5	N
Buckthorn	<i>Rhamnus cathartica</i>	SNA	I
Bull Thistle	<i>Cirsium vulgare</i>	SNA	I
Butter & Eggs	<i>Linaria vulgaris</i>	SNA	I
Canada Goldenrod	<i>Solidago canadensis</i>	S5	N
Canada thistle	<i>Cirsium canadensis</i>	SNA	I
Chicory	<i>Cichorium intybus</i>	SNA	I
Chokecherry	<i>Prunus virginiana</i>	S5	N
Common Milkweed	<i>Asclepias syriaca</i>	S5	N
Common Mullein	<i>Verbascum thapsus</i>	SNA	I
Common Blackberry	<i>Rubus allegheniensis</i>	S5	N
Common Elderberry	<i>Sambucus canadensis</i>	S5	N
Common Horsetail	<i>Equisetum arvense</i>	S5	N
Common Tansy	<i>Tanacetum vulgare</i>	SNA	I
Common Yarrow	<i>Achillea millefolium</i>	S5	N
Curled Dock	<i>Rumex crispus</i>	SNA	I
Dandelion	<i>Taraxacum officinalis</i>	SNA	I
Eastern Cottonwood	<i>Populus deltoides</i>	S5	N
Eastern Red Cedar	<i>Pantherophis spilloides</i>	S5	N
Eastern White Cedar	<i>Thuja occidentalis</i>	S5	N
Eastern White Pine	<i>Pinus strobus</i>	S5	N
English Plantain	<i>Plantago lanceolata</i>	SNA	I
Fireweed	<i>Chamerion angustifolium ssp. angustifolium</i>	S5?	N
Forget -me not	<i>Myosotis sylvatica</i>	SNA	I
Garden Asparagus	<i>Asparagus officinalis</i>	SNA	I
Garlic Mustard	<i>Alliaria petiolata</i>	SNA	I
Grass spp.	<i>Poa spp.</i>	N/A	N/A

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Common Name	Scientific Name	NHIC Status	Native/ Introduced
Grey Dogwood	<i>Cornus racemosa</i>	S5	N
Hawkweed	<i>Hieracium caespitosum</i>	SNA	I
Heal-all	<i>Prunella vulgaris</i>	S5	N
Joe Pye Weed	<i>Eutrochium maculatum</i>	S5	N
Lakebank Sedge	<i>Carex lacustris</i>	S5	N
Lamb's Quarters	<i>Chenopodium album</i>	SNA	I
Manitoba Maple	<i>Acer negundo</i>	S5	N
Marsh Horsetail	<i>Equisetum palustre</i>	S5	N
Marsh Marigold	<i>Caltha palustris</i>	S5	N
Mugwort	<i>Artemisia vulgaris</i>	SNA	I
Narrow-leaved Cattail	<i>Typha angustifolia</i>	SE5	N
Nodding Beggarticks	<i>Bidens cernua</i>	S5	N
Orchard Grass	<i>Dactylis glomerata</i>	SNA	I
Oxeye Daisy	<i>Leucanthemum vulgare</i>	SNA	I
Philadelphia fleabane	<i>Erigeron philadelphicus</i>	S5	N
Poison Ivy	<i>Toxicodendron radicans</i>	S5	N
Pussy Willow	<i>Salix discolor</i>	S5	N
Queen Ann's Lace	<i>Daucus carota</i>	SNA	I
Red Ash/Green Ash	<i>Fraxinus pennsylvanica</i>	S5	N
Red Clover	<i>Trifolium pratense</i>	SNA	I
Red Maple	<i>Acer rubrum</i>	S5	N
Red Oak	<i>Quercus rubra</i>	S5	N
Red-osier Dogwood	<i>Cornus stolonifera</i>	S5	N
Red Pine	<i>Pinus resinosa</i>	S5	N
Reed Canary Grass	<i>Phalaris arundinacea</i>	S5	N
Riverbank Grape	<i>Vitis riparia</i>	S5	N
Rose	<i>Rosa multiflora</i>	SNA	I
Royal Fern	<i>Osmunda regalis</i>	S5	N
Rush	<i>Juncus spp.</i>	N/A	N
Rush	<i>Scirpus spp.</i>	N/A	N
Sedge	<i>Carex spp.</i>	N/A	N
Sensitive Fern	<i>Onoclea sensibilis</i>	S5	N
Slender Willow	<i>Salix petiolaris</i>	S5	N
Soft Rush	<i>Juncus effusus</i>	S5	N
Speckled Alder	<i>Alnus incana ssp. rugosa</i>	S5	N
Spreading Dogbane	<i>Apocynum androsaemifolium</i>	S5	N
Staghorn Sumac	<i>Rhus typhina</i>	S5	N
St. John's Wort	<i>Hypericum perforatum</i>	SNA	I
Sugar Maple	<i>Acer saccharum</i>	S5	N
Tall Buttercup	<i>Ranunculus acris</i>	SNA	I
Tartarian Honeysuckle	<i>Lonicera tatarica</i>	SNA	I
Timothy	<i>Phleum pratense</i>	SNA	I
Trembling Aspen	<i>Populus tremuloides</i>	S5	N

Common Name	Scientific Name	NHIC Status	Native/ Introduced
Virginia Creeper	<i>Parthenocissus quinquefolia</i>	S4?	N
White Ash	<i>Fraxinus americana</i>	S4	N
White Clover	<i>Trifolium repens</i>	SNA	I
White Mulberry	<i>Morus alba</i>	SNA	I
White Oak	<i>Quercus alba</i>	S5	N
White Spruce	<i>Picea glauca</i>	S5	N
White Sweet Clover	<i>Melilotus alba</i>	SNA	I
Wild Bergamot	<i>Monarda fistulosa var. fistulosa</i>	S5	N
Wild Parsnip	<i>Pastinaca sativa</i>	SNA	I
Wild Strawberry	<i>Fragaria virginiana</i>	S5	N
Willow	<i>Salix spp.</i>	S4/S5	N
Wool Grass	<i>Scirpus cyperinus</i>	S5	N

Appendix B-4: Breeding Birds Heard and/or Observed within the Study Area

Common Name	Scientific Name	Habitat	Location	Provincial (S Rank)	Species at Risk Act Status	Endangered Species Act, 2007 Status	Breeding Status
Canada Goose	<i>Branta canadensis</i>	L/O	AG	S5B			POSS
Turkey Vulture	<i>Cathartes aura</i>	O	AG	S5B			POSS
Red-tailed Hawk	<i>Buteo jamaicensis</i>	O	AG	S5			POSS
Killdeer	<i>Charadrius vociferus</i>	O	AG	S5B, S5N			CONF
Mourning Dove	<i>Zenaida macroura</i>	ES	CUM1-1	S5			POSS
Pileated Woodpecker	<i>Dryocopus pileatus</i>	MW	CUM1-1	S5			POSS
Blue Jay	<i>Cyanocitta cristata</i>	WE	AG, CUM1-1	S5			POSS
American Crow	<i>Corvus brachyrhynchos</i>	W	AG, CUM1-1	S5B			POSS
Tree Swallow	<i>Tachycineta bicolor</i>	O/WL	AG, AGG, MAS2-1/MAS2-3	S4B			POSS
Black-capped Chickadee	<i>Poecile atricapillus</i>	MW	FOD5-1, CUM1-1	S5			POSS
Rose-breasted Grosbeak	<i>Pheucticus ludovicianus</i>	W	FOD	S4B			POSS
White-breasted Nuthatch	<i>Sitta carolinensis</i>	W	FOD5-1	S5			POSS
Wood Thrush	<i>Hylocichla mustelina</i>	DW/MW	FOD5-1, WE	S4B			POSS
American Robin	<i>Turdus migratorius</i>	U	CUM1-1	S5B			POSS
Brown Thrasher	<i>Toxostoma rufum</i>	WE	FOD5-1, WE	S4B			POSS
Cedar Waxwing	<i>Bombycilla cedrorum</i>	O/W	AG	S5B			POSS
European Starling	<i>Sturnus vulgaris</i>	U	AG	SNA			POSS
Chipping Sparrow	<i>Spizella passerina</i>	CW	WE	S5B			POSS
Song Sparrow	<i>Melospiza melodia</i>	ES	CUM1-1	S5B			POSS
White-throated Sparrow	<i>Zonotrichia albicollis</i>	W/WE	FOD5-2, WE	S5B			POSS
Northern Cardinal	<i>Cardinalis cardinalis</i>	U	CUM1-1	S5			POSS
Bobolink	<i>Dolichonyx oryzivorus</i>	A	Towers #15N and #33S	S4B	No Status	THR	POSS
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	WL	In all wetlands	S4			CONF
Common Grackle	<i>Quiscalus quiscula</i>	W	CUM1-1	S5B			POSS
Brown-headed Cowbird	<i>Molothrus ater</i>	W	CUM1-1, FOD5-1	S4B			POSS
House Finch	<i>Haemorhous mexicanus</i>	U	CUM1-1	SE			POSS
American Goldfinch	<i>Spinus tristis</i>	ES	CUM1-1, WL	S5B			POSS
House Sparrow	<i>Passer domesticus</i>	U	CUM1-1	SE			POSS

Legend: AG: Agricultural; O: Open Areas; THR: Threatened; ES: Early Successional; WE: Woodlands Edge; CW: Coniferous Woodlands; U: Urban; POSS: Possible Breeding; L: Lakes/Open Water; WL: Wetlands; DW: Deciduous Woodlands; W: Woodlands; CONF: Confirmed; MW: Mixed Woodlands

Appendix B-4: Results of Amphibian Surveys

Date and Time	Approximate Temperature (°C)	Approximate Wind Speed (km/h)	UTM Coordinates	Species Present (within 100 m monitoring boundary)	Species Present (outside 100 m monitoring boundary)
May 1, 2017 21:17	14	6-11	17T 600254 E and 4913520 N	None	Two (2) American Toads, several Chorus Frogs, two (2) Spring Peepers
June 7, 2017 22:09	20	0-2		Four (4) with several additional Spring Peepers	Several Grey Treefrogs
July 5, 2017 21:57	23	0-2		None	One (1) Green Frog, several Chorus Frogs
May 1, 2017 21:57	14	12-19	17T 601329 E and 4913934 N	One (1) American Toad, one (1) Spring Peeper	One (1) American Toad, several Chorus Frogs, four (4) Spring Peepers,
June 7, 2017 23:40	16	0-2		One (1) Green Frog, two (2) Grey Treefrogs	None
July 10, 2017 23:11	0-2	0-2		None	None
May 1, 2017 22:17	14	12-19	17T 601575 E and 4913985 N	One (1) American Toad, one (1) Northern Leopard Frog,	Several American Toads, Spring Peepers, and Chorus Frogs
June 7, 2017 23:56	16	0-2		None	One (1) with several additional Grey Treefrogs
July 10, 2017 23:02	20	0-2		None	Three (3) Green Frogs
May 1, 2017 22:42	14	3-11	17T 602162 E and 4914176 N	None	One (1) Spring Peeper
June 8, 2017 23:14	19	0-2		None	Several Chorus Frogs, one (1) with several additional Grey Treefrogs, several Spring Peepers
July 10, 2017 23:23	20	0-2		Two (2) Green Frogs	None
May 1, 2017 23:24	12	12-19	17T 594981 E and 4911514 N	Three (3) American Toads, three (3) Spring Peepers	None
June 7, 2017 22:57	17	0-2		One (1) with several additional Chorus Frogs, two (2) Grey Treefrogs, several Spring Peepers	Several Chorus Frogs, several Grey Treefrogs
July 5, 2017 22:43	20	0-2		Two (2) Chorus Frogs	Several Chorus Frogs
May 1, 2017 23:50	12	12-19	17T 595501 E and 4911659 N	None	None
June 7, 2017 23:19	16	0-2		One (1) Spring Peeper	Several Chorus Frogs
July 5, 2017 22:20	23	0-2		Two (2) Chorus Frogs	Two (2) Green Frogs, several Chorus

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Date and Time	Approximate Temperature (°C)	Approximate Wind Speed (km/h)	UTM Coordinates	Species Present (within 100 m monitoring boundary)	Species Present (outside 100 m monitoring boundary)
					Frogs
May 10, 2017 21:26	12	3-5	17T 599271 E and 4913149 n	Three (3) American Toads, one (1) Pickerel Frog, four (4) with several additional Spring Peepers	Several Spring Peepers, and one (1) American Toad
June 7, 2017 21:17	20	0-2		Nine (9) Treefrogs	Four (4) with several additional Grey Treefrogs
July 5, 2017 21:11	23	0-2		Twelve (12) Green Frogs	Five (5) Green Frogs
May 10, 2017 21:59	12	3-5	17T 600055 E and 4913455 N	One (1) American Toad, One (1) Spring Peeper	Two (2) American Toads, one (1) with several additional Spring Peepers
June 7, 2017 21:51	20	0-2		Seven (7) Treefrogs, one (1) Green Frog	One (1) with several Grey Treefrogs, one (1) Green Frog
July 5, 2017 21:48	23	0-2		None	Three (3) with several Green Frogs
May 10, 2017 22:49	12	0-2	17T 598490 E and 4912853 N	Four (4) Spring Peepers	Several Spring Peepers
June 8, 2017 22:45	19	0-2		Two (2) Grey Treefrogs, seven (7) Green Frogs	Six (6) with several additional Green Frogs, two (2) Grey Treefrogs
July 10, 2017 22:06	22	0-2		Minimum six (6) Green Frogs	Several Green Frogs
May 10, 2017 23:33	11	0-2	17T 597101 E and 4912372 N	Two (2) American Toad, six (6) Spring Peepers	Nine (9) Spring Peepers
June 8, 2017 21:13	19	0-2		Two (2) Spring Peepers, three (3) Grey Treefrogs	Seven (7) Grey Treefrogs
July 2, 2017 23:21	21	0-2		None	None
May 10, 2017 23:57	11	0-2	17T 597512 E and 4912490 N	Four (4) Spring Peepers	Ten (10) with several additional Spring Peepers
June 8, 2017 22:01	18	0-2		Two (2) Grey Treefrogs	One (1) with several additional Grey Treefrogs
July 10, 2017 21:23	25	0-2		None	One (1) Green Frog, one (1) Chorus Frog
May 10, 2017 24:17	10	0-2	17T 597795 E and 597795 N	None	Three (3) American Toads, four (4) Spring Peepers
June 8, 2017 22:23	18	0-2		Two (2) Grey Treefrogs	Three (3) with several additional Grey

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Date and Time	Approximate Temperature (°C)	Approximate Wind Speed (km/h)	UTM Coordinates	Species Present (within 100 m monitoring boundary)	Species Present (outside 100 m monitoring boundary)
					Treefrogs, one (1) Spring Peeper
July 10, 2017 21:38	23	0-2		None	One (1) Green Frog
June 7, 2017 0:25	17	0-2	17T 602640 E and 4913956 N	None	None
July 5, 2017 23:56	20	0-2		None	One (1) Chorus Frog
June 7, 2017 0:30	16	0-2	17T 602689 E and 4913860 N	None	None
July 5, 2017 24:00	20	0-2		Two (2) Chorus Frogs	None

Legend: Grey Treefrog (*Hyla versicolor*); Green frog (*Rana clamitans melanota*); Spring Peeper (*Pseudacris crucifer*); American Toad (*Bufo americanus*); Chorus Frog (*P. triseriata* & *P. maculata*); Northern Leopard Frog (*Rana pipiens*); Pickerel Frog (*Rana palustris*)

APPENDIX B-5: Species at Risk Screening

Appendix B-5: Species at Risk Screening

Common Name	Scientific Name	SARA ¹	ESA 2007 ²	Srank ³	Habitat Requirement	Habitat Present in the Right of Way
Forked Three-awned Grass	<i>Aristida basiramea</i>	END	END	S2	Open, bare ground or in sparsely-covered grassy areas.	Some potential. However, species was not observed during surveys and right-of-way is not a known occurrence location.
Hart's-tongue Fern	<i>Asplenium scolopendrium</i>	SC	SC	S3	On calcareous rocks in deep shade maple beech forests, rocky slopes.	No, habitat not present in the right-of-way. Species was not observed during vegetation surveys.
Spotted Wintergreen	<i>Chimaphila maculata</i>	END	END	S2	Dry oak-pine woodland habitats with sandy soils.	No, habitat not present in the right-of-way. Species was not observed during vegetation surveys.
Hill's Thistle	<i>Cirsium hillii</i>	THR	THR	S3	Sand dunes, sandy woods, alvar pavement.	No, habitat not present in the right-of-way. Species was not observed during vegetation surveys.
Butternut	<i>Juglans cinerea</i>	END	END	S3?	Deciduous and mixed forests.	Some potential. However, species was not observed during surveys and right-of-way is not a known occurrence location.
Eastern Prairie Fringed Orchid	<i>Platanthera leucophaea</i>	END	END	S2	Fens, swamps and tallgrass prairie.	No, habitat not present in the right-of-way. Species was not observed during vegetation surveys.
Insects						
Rusty-patched Bumble Bee	<i>Bombus affinis</i>	END	END	S1	Open habitats, urban settings, open woods.	Some potential. However, species was not observed during surveys and right-of-way is not a known occurrence location.
Monarch	<i>Danaus plexippus</i>	SC	SC	S2N, S4B	Open habitats, urban settings	Yes, presence in right-of-way confirmed. Observed throughout the right-of-way.
Hine's Emerald	<i>Somatochlora hineana</i>	END	END	S1	Groundwater-fed wetlands with grassy vegetation.	Potential, general area of the right-of-way is a known occurrence location. However, species was not observed during surveys.
Fish						
Lake Sturgeon	<i>Acipenser fulvescens</i>	No Status	THR	S3	Large lakes and rivers	No, habitat not present in the right-of-way.
Northern Brook Lamprey	<i>Ichthyomyzon fossor</i>	SC	SC	S3	Cool water streams	No, habitat not present in the right-of-way.
Reptiles						

Appendix B-5: Species at Risk Screening

Common Name	Scientific Name	SARA ¹	ESA 2007 ²	Srank ³	Habitat Requirement	Habitat Present in the Right of Way
Snapping Turtle	<i>Chelydra serpentina</i>	SC	SC	S3	Wetlands, ponds and lakes.	Potential, wetlands present in the right-of-way. However, species not observed during surveys.
Blanding's Turtle	<i>Emydoidea blandingii</i>	THR	THR	S3	Large wetlands and shallow lakes.	Some potential, wetlands present in the right-of-way although relatively small with only small open water areas. Species was not observed during surveys and right-of-way is not a known occurrence location.
Northern Map Turtle	<i>Graptemys geographica</i>	SC	SC	S3	Rivers and lakeshores.	No, habitat not present in the right-of-way. Species was not observed during surveys.
Eastern Musk Turtle	<i>Sternotherus odoratus</i>	THR	SC	S3	Ponds, lakes, marshes and rivers.	Potential, wetlands present in the right-of-way. However, species not observed during surveys.
Massasauga Rattlesnake	<i>Sistrurus catenatus</i>	THR	THR	S3	Tall grass prairie, bogs, marshes, shorelines, forests and alvars.	Some potential. However, species was not observed during surveys and right-of-way is not a known occurrence location.
Eastern Ribbonsnake	<i>Thamnophis sauritus</i>	SC	SC	S4	Close to water, especially in marshes.	Some potential, wetlands present in right-of-way. However, species was not observed during surveys and right-of-way is not a known occurrence location.
Birds						
Henslow's Sparrow	<i>Ammodramus henslowii</i>	END	END	SHB	Farm fields, tall grass pastures, and wet meadows.	Potential, but not noted in breeding bird surveys.
Eastern Whip-poor-will	<i>Antrostomas vociferus</i>	THR	THR	S4B	Open woodlands or openings in mature, deciduous, coniferous and mixed forests.	No, habitat not present in the right-of-way. Species was not noted during breeding bird surveys.
Cerulean Warbler	<i>Dendroica cerulea</i>	SC	THR	S3B	Mature, deciduous forests.	Potential in the vicinity of the right-of-way, but not noted in breeding bird surveys.
Bobolink	<i>Dolichonyx oryzivorus</i>	No Status	THR	S4B	Open hay fields.	Yes, presence in right-of-way confirmed. Observed on the right-of-way during two Site visits.

Appendix B-5: Species at Risk Screening

Common Name	Scientific Name	SARA ¹	ESA 2007 ²	Srank ³	Habitat Requirement	Habitat Present in the Right of Way
Barn Swallow	<i>Hirundo rustica</i>	No Status	THR	S4B	Man-made structures, such as barns, buildings, bridges near open grasslands and wetlands.	Potential, but not noted in breeding bird surveys.
Least Bittern	<i>Ixobrychus exilis</i>	THR	THR	S4B	Cattail wetlands.	Potential, but not noted in breeding bird surveys.
LoggerheadShrike	<i>Lanius ludovicianus</i>	No Status	END	S2B	Grasslands, open habitats and hedgerows.	Some potential. The species was not noted during breeding bird surveys and the right-of-way is not a known occurrence location.
Louisiana Waterthrush	<i>Seiurus motacilla</i>	SC	THR	S3B	Steeply sloped ravines with fast flowing streams in mature forests.	No, habitat not present in the right-of-way. Species was not noted during breeding bird surveys.
Eastern Meadowlark	<i>Sturnella magna</i>	No Status	THR	S4B	Pastures, hayfields, agricultural fields.	Potential, but not noted in breeding bird surveys.

Legend: ¹Species at Risk Act (SARA), 2002; ²Endangered Species Act, 2007 (ESA 2007); ³Provincial Srank (S1 - Critically imperilled, S2 – Imperilled, NAR - Not at Risk, S3 – Vulnerable, SC - Special Concern, S4 - Apparently secure, S5 – Secure, B – Breeding, N - Non-breeding)

APPENDIX B-6:
Ministry of the Environment and Climate
Change Water Well Records

WELL No.	WELL TYPE	DATE COMPLETED	DRILLING METHOD	EASTING	NORTHING	ELEVATION	STRATIGRAPHIC LOG (mbgs)	STATIC LEVEL (m)	PUMPING RATE (Lpm)
5709125	Overburden	25-Sep-72	Rotary (Reverse)	602394	4914335	233.1	BRWN GRVL SAND 0021 BRWN CLAY GRVL 0025 GREY CLAY STNS 0063 GREY CLAY GRVL 0081 BRWN FSND GRVL 0105 BRWN SAND GRVL 0127 BRWN SAND GRVL BLDR 0134 BRWN CLAY BLDR 0153 BRWN SAND SILT CLAY 0177 GREY CLAY SILT 0179 BRWN SAND GRVL CLAY 0183 BRWN SAND GRVL 0188 GREY CLAY SILT GRVL 0189 GREY CLAY GRVL SAND 0191 BRWN SAND CLAY BLDR 0199 BRWN SAND SILT CLAY 0218 BRWN SAND GRVL CLAY 0240 BRWN GRVL 0265 BRWN SAND GRVL BLDR 0298 WHIT SAND GRVL CLAY 0302 BRWN SAND GRVL 0321 BRWN SAND GRVL CLAY 0322 BRWN GRVL BLDR SAND 0329 BRWN GRVL CLAY 0330	10.98	5455.31
5710837	Overburden	29-Jan-74	Cable Tool	602214	4913923	235.6	BRWN CLAY SAND 0009 GREY CLAY 0038 GREY CLAY SILT SAND 0132 GREY FSND SILT 0142	8.84	90.92
5711998	Overburden	5-Jul-74	Boring	600814	4913573	237.6	LOAM 0002 BRWN CLAY SNDY 0006 BRWN CSND 0023	3.96	
5713314	Overburden	7-Jul-76	Cable Tool	596414	4912423	228.3	GREY CLAY 0008 GREY CLAY SAND 0045 GREY CLAY SAND GRVL 0058 BRWN SAND GRVL 0061	1.22	31.82
5715190	Overburden	4-May-78	Cable Tool	601114	4914123	237.7	SAND 0005 CLAY 0012 CLAY SAND 0043 MSND 0068 CLAY SAND 0073 FSND 0081	14.02	40.91
5718390	Overburden	9-Nov-82	Cable Tool	593614	4911923	217.4	LOAM FILL SAND 0003 SAND CLAY 0015 GREY FSND CLAY 0040 FSND 0056		18.18
5718582	Overburden	14-Jun-83	Rotary (Convent.)	597814	4913023	230.1	BLCK LOAM 0001 BRWN SAND 0020 GREY CLAY 0065 GREY SAND CLAY LYRD 0090 GREY MSND WBRG 0097	1.52	45.46
5718708	Overburden	22-Sep-83	Cable Tool	595014	4912423	234.6	BLCK LOAM SAND 0001 BRWN SAND STNS 0016 BRWN SAND 0064 GREY SAND CLAY LYRD 0067 BRWN SAND 0070 GREY CLAY 0070	1.83	90.92
5719248	Overburden	14-Feb-84	Cable Tool	595971	4912033	226.0	PEAT 0006 GREY CLAY SILT 0020 GREY CLAY 0058 GREY SAND 0064		18.18
5719578	Overburden	11-Feb-85	Cable Tool	602764	4913723	235.4	PRDR 0069 BRWN FSND 0074 GREY CLAY SAND 0075	7.62	22.73
5719816	Overburden	12-Sep-84	Cable Tool	595440	4912014	235.4	PRDR 0069 BRWN FSND 0074 GREY CLAY SAND 0075	6.10	45.46
5722426	Overburden	23-Sep-87	Rotary (Convent.)	598665	4912973	230.9	BLCK LOAM 0001 BRWN SAND CLAY 0015 GREY SILT CLAY 0040 GREY CLAY 0070 GREY SAND HARD 0115 GREY SAND LOOS WBRG 0123	3.96	27.28
5727738	Overburden	2-Oct-90	Rotary (Convent.)	600206	4913279	233.5	FILL SAND 0006 SAND SILT 0050 MSND 0085 GREY CLAY STNS SAND 0095	1.83	90.92
5729891	Overburden	28-Jan-93	Rotary (Convent.)	599803	4912868	232.4	BRWN SAND 0040 GREY CLAY 0225 BRWN SAND GRVL 0240	9.75	1136.52
5730034	Overburden	4-May-93	Rotary (Convent.)	601409	4914000	235.6	BRWN SAND 0062	6.40	113.65
5734811	Overburden	27-Jul-99	Cable Tool	597117	4912721	227.8	LCK LOAM 0001 BRWN SAND 0014 GREY CLAY 0042 GREY CLAY SAND 0051 GREY SAND 0051	3.05	109.11

WELL No.	WELL TYPE	DATE COMPLETED	DRILLING METHOD	EASTING	NORTHING	ELEVATION	STRATIGRAPHIC LOG (mbgs)	STATIC LEVEL (m)	PUMPING RATE (Lpm)
5734906	Overburden	3-Dec-99	Rotary (Convent.)	597445	4912319	225.6	BRWN SAND 0065 GREY CLAY SILT 0135 GREY CLAY GRVL 0155 GREY CLAY SILT 0168 BRWN FSND WBRG 0182	3.96	68.19
5738001	Overburden	11-Jun-03	Cable Tool	594506	4911878	223.1	RWN FSND 0029 BRWN MSND 0049	5.79	45.46
5739211	Overburden	19-Aug-04	Rotary (Convent.)	602034	4914111	235.5	BLCK SAND LOAM CLAY 0025 GREY CLAY 0087 GREY SAND 0091	8.23	227.30
7101966		24-Aug-07	Cable Tool	600508	4913995	236.2	LOAM 0003 BRWN CLAY 0025 GREY CLAY SOFT 0053 GREY CLAY SILT CMTD 0104 GREY FSND WBRG 0114	9.75	45.46
5732646	Overburden	20-Nov-96	Cable Tool	597190	4911920	225.6	SAND FILL 0002 BRWN CLAY 0012 GREY CLAY 0140 GREY CLAY SILT 0179 BRWN SAND 0184	1.52	90.92
7183231		14-Jun-12	Rotary (Convent.)	593952	4911516	218.1	BLCK LOAM SOFT 0001 BRWN SAND LOOS 0012 BRWN SAND CGRD 0035	3.66	136.38
7043009	Overburden	11-Apr-07	Jetting	602497	4913511	237.5	BRWN FSND GRVL 0008 GREY SAND SLTY GRVL 0023		
7108502		2-Jul-08	Cable Tool	595003	4912174	232.8	YLLW SAND GRVL 0015 YLLW SAND MGRD FGRD 0066	9.46	27.30
7227128		1-Aug-14	Rotary (Convent.)	601874	4913716	236.3	BLCK SAND 0002 BLCK SAND 0010 GREY SAND 0015		
5700282	Overburden	6-Aug-66	Cable Tool	601959	4914477	235.8	FILL 0003 MSND MUCK 0024 GREY CLAY 0063 YLLW MSND MUCK CLAY 0083 GREY CLAY 0087 MSND CSND 0097	6.10	68.19
5705552	Overburden	4-Oct-68	Cable Tool	602824	4913593	237.2	FILL 0003 MSND CLAY 0015 CLAY 0023 MSND 0035 CLAY 0060 CLAY MSND 0072 MSND 0078	10.67	22.73
5734067	Overburden	24-Mar-99	Rotary (Air)	594331	4911532	221.3	BRWN SAND FSND 0010 BRWN SAND CGVL 0057	3.66	113.65
5729653	Overburden	24-Sep-92	Cable Tool	595189	4911317	230.0	CLAY SAND 0008 BRWN SAND CLAY 0020 CLAY GRVL 0025 GREY CLAY 0069 BRWN SAND 0080	9.14	45.46